Analysis of the effectiveness of primary care services and of hospital efficiency in the Mexican health care system

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A México, esperando que mi trabajo, presente y futuro, contribuya a mejorar la salud y el bienestar de su gente, mi gente.

I, David Gibran Lugo Palacios, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

David G. Lugo Palacios

Date

Signature

ABSTRACT

In 2003, Mexico conducted a major health reform that transformed its health system to gradually extend health care insurance coverage to more than 50 million uninsured. The expansion of insurance coverage increased the demand for health care and the amount of resources allocated to health. However, little is known about the efficiency with which these resources have been used and about the quality of the services provided. This thesis contributes to this literature by analysing the extent to which primary and hospital care providers are making an efficient use of the resources in the system. The first part of the thesis uses ambulatory care sensitive hospitalisations (ACSHs) to analyse the effectiveness of primary care services within and between the 32 states of Mexico during 2001-2011. Additionally, the burden of ACSHs is defined and a methodology to estimate it proposed. The second part of the thesis details the incentive structure faced by Mexican public hospitals and predicts that hospitals will adjust their performance level to meet their external demand. The model is tested by extending previous work that estimates hospital effects on the length of stay of its patients purged of patient and treatment characteristics. Each hospital effect is interpreted as a measure of performance and then used to construct a panel to examine whether variation across hospitals and over time is related to hospital and state characteristics in estimated dependent variable models for 2005-2013. The findings suggest a high heterogeneity in both primary and hospital care performance with well identified groups of best and worst performers. The empirical model on hospital performance supports the theoretical prediction and additionally found that hospital performance is persistent over time and consistent across type of care.

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ABBREVIATIONS

2SLS	*Two-stage least squares*
ACSH	*Ambulatory Care Sensitive Hospitalisations*
CAUSES	*Catálogo Universal de Servicios de Salud* (*Universal Catalogue of Essential Services)*
COLS	*Corrected Ordinary Least Squares*
CONACyT	*Consejo Nacional de Ciencia y Tecnología (National Council for Science and Technology)*
CONEVAL	*Consejo Nacional de Evaluación de la Política de Desarrollo Social (National Council for the Evaluation of Social Development Policy)*
DALYs	*Disability-adjusted Life Years*
DEA	*Data Envelopment Analysis*
DMU	*Decision-Making Unit*
DRG	*Diagnosis-Related Groups*
FE	*Fixed Effects*
GDP	*Gross Domestic Product*
GP	*General Practice/Practitioner*
GPR	*General Poisson Regression*
HBS	*Hospital Budget Softness*
HFR	*Hospitales Federales de Referencia (Federal Reference Hospitals)*
ICD-10	*International Classification of Diseases, Tenth Revision*
ICD-9CM	*International Classification of Diseases, Ninth Revision, Clinical Modification*
IMSS	*Instituto Mexicano del Seguro Social (Mexican Institute of Social Security*)
INSALUD	*Institutos Nacionales de Salud (National Health Institutes)*
ISSSTE	*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (Institute of Social Security and Services for State Workers)*

IV	*Instrumental Variables*
JURIS	*Health Jurisdictions*
LoS	Length of Stay
MXN	*Mexican Pesos*
NB	*Negative Binomial*
OECD	*Organisation for Economic Co-operation and Development*
PAN	*Partido Acción Nacional (National Action Party)*
PEMEX	*Petróleos Mexicanos (Mexican Petroleum)*
PRD	*Partido de la Revolución Democrática (Democratic Revolution Party)*
PRI	*Partido Revolucionario Institucional (Institutional Revolution Party)*
SESA	*Servicios Estatales de Salud (States Health Services)*
SFA	*Stochastic Frontier Analysis*
SGI	*Social Gap Index*
SHMs	*State Health Ministries*
SPSS	*Sistema de Protección Social en Salud (System of Social Protection in Health)*
ToC	*Types of Care*
WHO	*World Health Organisation*
YLD	*Years Lived with Disability*
YLL	*Years of Life Lost*

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CHAPTER 1. INTRODUCTION

In 2003, Mexico conducted a major health reform that transformed its health care system to extend health care insurance coverage to more than 50 million uninsured. This reform gave birth to *Seguro Popular*- the subsidised insurance-based component of the reform- which offers free access at the point of delivery to an explicit set of health care interventions to the population not covered by any other public insurance scheme.

Undoubtedly, *Seguro Popular* represents a huge step in providing health care to an important sector of the population that before its implementation did not have access to health care services or even if they had access, for whom becoming ill not only meant a health problem, but the possibility of incurring catastrophic expenditures. The expansion of insurance coverage increased health care utilisation. Being affiliated to *Seguro Popular* increased the probability of individuals using health care services by 6.3 percentage points **(Knox, 2016)**. Additionally, increasing health care coverage required a huge investment in human, physical and financial resources: since 2000, funding for health increased by one percentage point of gross domestic product (GDP); the budget of the Ministry of Health grew 142% in real terms between 2000 and 2010; between 2001 and 2011, 15 public high-specialty centres, more than 200 hospitals and almost 2000 ambulatory clinics were built; between 2004 and 2010, the physician to population ratio increased by 54%; and, between 2004 and 2009, the availability of nurses, increased by 29**% (Knaul et al., 2012)**. However, little is known about the efficiency with which these resources have been used and about the quality of the services provided.

Despite significant improvements in health care coverage and in the amount of resources allocated to health care, the Mexican health care system remains underfunded (judged by percentage of GDP devoted to health care relative to other OECD countries). The system is fragmented, with highly unequal access to and quality of health services. A major challenge for the health care system is to ensure that the expanded coverage translates into better system performance and, ultimately, into better health. In this context efficient use of resources is essential to ensure the provision of the health care services needed by the Mexican population at acceptable quality levels without jeopardising the financial sustainability of the health system.

Therefore, in an effort to contribute to the understanding of the extent to which Mexicans are getting value for the money spent on health, this thesis analyses the effectiveness of primary care services and hospital performance in the Mexican health care system.

Timely, effective and high-quality primary care services can prevent the development or exacerbation of certain health conditions which may lead to hospitalisations. These preventable hospitalisations - ambulatory care sensitive hospitalisations (ACSHs) - have been widely used to study the access to, quality and effectiveness of primary care services **(Ansari, 2007, Caminal et al., 2004, Finegan et al., 2010, Agency for Healthcare Research and Quality, 2013).** High rates of ACSHs may reflect insufficiency of primary health care, mal-distribution of primary care resources, barriers to accessing primary care services and inefficient use of resources when hospital care substitutes primary care **(Ansari, 2007).** Furthermore, an ACSH causes society to incur economic costs and health losses which are in principle preventable. The economic cost of ACSHs is formed by the value of the resources needed to provide this type of care instead of using them in other interventions and by the effects of an

ACSH on the participation and performance in the labour market of those suffering them. The health burden of an ACSH could be represented by the effects on the disability suffered by patients with ACSHs that would not have been incurred if they had received appropriate primary care.

In order to investigate the effectiveness, the quality, and the access to primary care services in Mexico, the first part of this thesis analyses the ACSH rate focusing on the differences in the magnitude and trend of ACSHs between and within the 32 states before and during the health insurance expansion; and, explores the association of this indicator with patient and community factors. In addition, the financial and health burden of ACSHs is estimated to provide information about the resources that could potentially have been available for other health purposes if these hospitalisations had been prevented, thus setting an upper limit to the potential benefit from improving primary care.

The second part of this thesis analyses the performance of general hospitals managed by the 32 state health ministries. Typically, research on health care performance has focused on efficiency analyses that use either parametric or non-parametric methods to estimate production/cost frontiers to identify (in)efficient decision making units (DMUs) according to their competence in translating inputs into outputs **(Hollingsworth, 2008, Jacobs et al., 2006)**. In this sense, inefficiency is defined as the extent to which a DMU's costs exceed those predicted by the cost function or the extent to which its output falls short of that predicted by the production function **(Jacobs et al., 2006)**.

However, these methodologies may not be very insightful for hospital managers and policy makers, mainly for two reasons. First, the estimated frontiers are often sensitive to the methodological choice between parametric and non-parametric techniques and to the way in which models are formulated; hence, this sensitivity raises concern about the reliability of the analyses **(Hollingsworth and Street, 2006, Newhouse, 1994)**. Second, efficiency analyses considering the hospital as a whole may not provide information about specific actions to improve efficiency **(Hollingsworth and Street, 2006)**. In addition, frontier estimation analyses assume a common production function across all hospitals that may be inappropriate as hospitals offering a different range of services (i.e. specialty mix) may face different production functions **(Laudicella et al., 2010).** In this context, comparing the same department or procedure across hospitals appears more appropriate as it is likely that they have similar production processes **(Laudicella et al., 2010)**. Moreover, the results of such a comparison will be department/procedure specific and, in principle, easier to interpret than a global efficiency score.

In this line of research, previous studies have examined hospital performance by analysing variations in the length of stay (LoS) required for a particular type of care**,** under the rationale that reductions in the LoS can reduce the costs of undertaking a fixed workload and increase the amount of work that hospitals can undertake within their fixed budget **(Gaughan et al., 2012, Martin and Smith, 1996, Street et al., 2012).** This thesis extends this methodology to the longitudinal case by analysing hospital performance in five types of care (appendectomy, cholecystectomy, inguinal hernia repair, childbirth, and stroke) for 2005-2013.

Specifically, this thesis intends to answer the following research questions:

- **I.** What is the magnitude and trend of the ACSH rate in health jurisdictions before and during the health insurance expansion in Mexico?
- **II.** How does the ACSH trend differ between and within states?
- **III.** What is the econometric association of the ACSH rate with patient and community factors?
- **IV.** What can ACSHs tell us about primary care when health care insurance is expanding?
- **V.** What is the economic and health burden associated with ACSHs and how can it be measured?
- **VI.** How does the incentive structure faced by Mexican public hospitals affect hospital resource-use?
- **VII.** What is the trend followed by hospital resource-use during the health insurance expansion period?
- **VIII.** Which are the public general hospitals that make more efficient (and inefficient) use of their resources in providing care for five specific conditions?
- **IX.** What hospital and state-level characteristics can be associated with hospital performance?
- **X.** How persistent is hospital performance across time and is it consistent across conditions?

The thesis has the following structure. Chapter 2 describes the main characteristics of the Mexican health care system. Chapter 3 introduces the concept of ambulatory care sensitive hospitalisations, discusses the methodologies and findings from relevant previous studies and answers research questions **I –IV** using panel data methods, including fixed-effects and instrumental variables models**.** After identifying in Chapter

3 that diabetic conditions account for more than 40% of total ACSHs in Mexico and acknowledging the serious diabetes problem that the country is facing, Chapter 4 focuses on diabetic complications to propose a methodology to measure (with currently available data) the financial and health burden imposed by these conditions and compares the size of the burden observed in the two largest Mexican health care sub-systems covering more than 110 million people, thus addressing research question **V**. To answer research question **VI,** Chapter 5 details the incentive structure of Mexican public hospitals and presents a simple discrete choice model to illustrate how this incentive structure influences hospital resource-use. A two-step econometric estimation strategy (including multilevel, count data and dynamic panel models) is used to analyse variations in LoS and answer research questions **VII-X.** Finally, Chapter 6, synthesises the key findings, highlights the contributions to the literature and the policy implications of the study, states the thesis limitations, identifies areas of future research and concludes. Literature review, discussions of findings and limitations specific to the individual research papers are included in those papers (Research Papers 1-4, Chapters 3-5). The abstract and sections of each research paper are structured according to the guidelines provided by the relevant journal.

CHAPTER 2. MEXICAN HEALTH CARE SYSTEM

The General Health Law (LGS) establishes in its 5th article that the National Health System is formed by the federal and local entities of the Public Administration and by the physical and moral persons in the social and private sector that provide health services with the goal of complying with the right of health protection included in the 4th article of the Mexican Constitution **(Ley General de Salud, 2012).**

In this sense, the institutions in charge of the provision of health services can be classified as belonging to the public sector or the private sector. The public sector includes the social security institutions that provide services to salaried workers and institutions serving the population without social security (non-salaried workers, self-employed and informal sector workers). Therefore, the affiliation to a social security scheme is automatically determined by employment status.

The social security institutions (covering more than 74 million people) are *Instituto Mexicano del Seguro Social* (IMSS), *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* (ISSSTE) and the ones providing services to the workers of the National Mexican Oil Company (PEMEX), the Mexican Army, and the Mexican Navy, as well as similar schemes that cover employees from local governments and some students from public universities **(Instituto de Seguridad Social y Servicios Sociales de los Trabajadores del Estado, Instituto Mexicano del Seguro Social, IMSS, 2015)**. These institutions provide complete medical care (no explicit package of services), including prescribed drugs, without any copayment. In addition to health services, the package of social security benefits includes a system of pensions, protection against occupational risk, child care centres as well as housing and recreational services. The social security sub-systems are funded through payroll contributions by the employer and the employee with an additional allocation financed by general taxation. Social security institutions are responsible for their own funds and resource allocation decisions.

The institutions that provide health care services to the population without social security (more than 50 million people) are the State Health Services (SESA – state health ministries)[1]; the National Health Institutes (INSALUD); the Federal Reference Hospitals (HFR) managed by the Ministry of Health; and the medical units of the IMSS-*Oportunidades* (now IMSS-*Prospera)* programme.[2] In general, the services that are offered to individuals without social security include basic ambulatory care in rural clinical units and a more complete set of interventions in the biggest cities. These institutions are mostly financed through general taxation. Before 2004, patients receiving care in most non-social security institutions needed to pay a "recovery fee"; the size of this copayment depended on a socio-economic evaluation that was made when the services and the drugs were provided. **(Comisión Mexicana sobre Macroeconomía y Salud, 2006, Frenk, 2006, Frenk et al., 2006, González-Pier et al., 2006, Knaul et al., 2006, Knaul et al., 2012, Lugo-Palacios, 2009, Lugo-Palacios, 2012, Observatorio de la Salud para Latinoamérica y el Caribe, 2008, OECD, 2005).**

[1] Even though SESA and state health ministries are used interchangeably throughout this document, strictly speaking, they are different public entities. State health ministries focus on regulating health matters within states and on providing community health services, while SESA provides health care services in hospitals and clinics. SESA were formed after a two-stage decentralisation process that took place in the 80's and 90's (OECD, 2005). Both public entities are directly accountable to the state government.

[2] *IMSS-Prospera/Oportunidades* is a programme operating mainly in rural areas that offers health care services in first-level medical clinics and in second-level rural hospitals.

In 2003, the General Health Law was reformed to establish the System of Social Protection in Health (SPSS) which introduced new financial rules to fund population-based interventions and personal health care interventions, the latter financed through *Seguro Popular*, the subsidised insurance-based component of the SPSS that offers free access, at the point of delivery, to an explicit set of health care interventions listed in the Universal Catalogue of Essential Services (CAUSES), as well as some treatments defined as catastrophic in financial terms[3] **(González-Pier et al., 2006).** *Seguro Popular* is operated by the 32 state health ministries and its beneficiaries are served by SESA, INSALUD and HFR. The intention is that all the uninsured population, including the beneficiaries of IMSS-*Prospera*, become beneficiaries of *Seguro Popular*.[4]

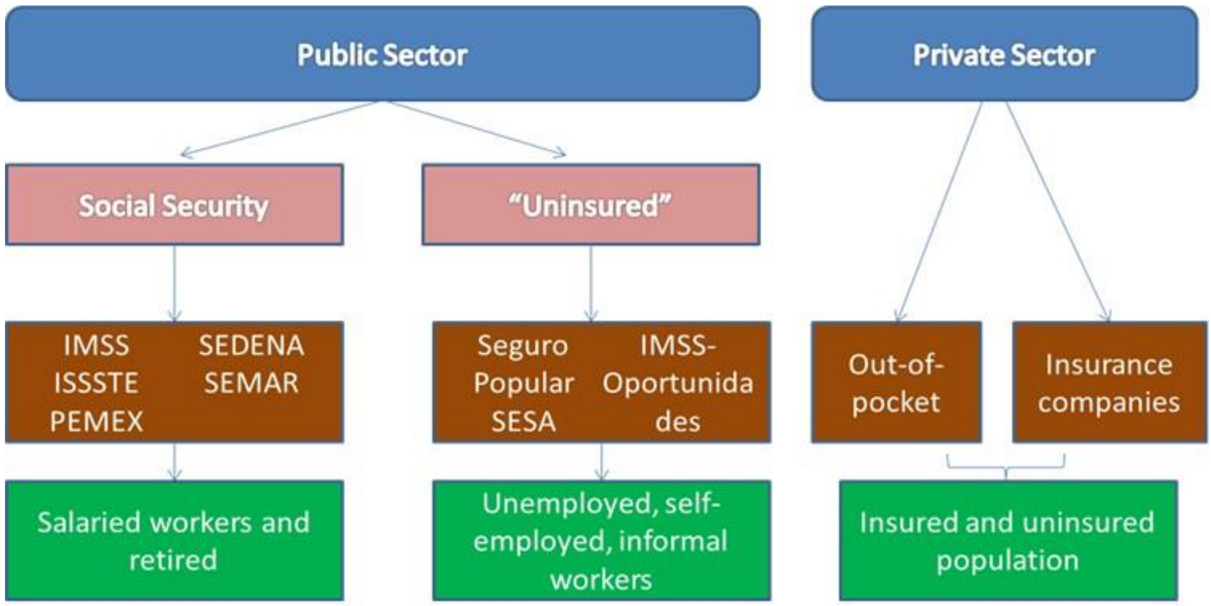
Users of the private health services belong both to the beneficiaries and non-beneficiaries of the social security schemes and receive medical care in heterogeneous private hospitals and medical clinics. Typically, the use of these services implies a high expenditure that can be financed in two ways: directly from users (out-of-pocket expenditure) or through private insurance companies, with the latter only covering up to 6.9% of the Mexican population **(OECD, 2016).** Figure 2.1 is a graphical representation of the structure of the Mexican Health Care System.

In April 2012 the federal government declared that universal health insurance coverage was achieved with *Seguro Popular* covering 51.8 million people and the social security institutions more than 69 million people (more than 120 million people

[3] Catastrophic health expenditures are the ones that represent more than 30% of household's income net of food spending.
[4] For more details of the structure of *Seguro Popular* see Appendix 2.1.

when total population of Mexico was at that time 112.3 million people).[5] This achievement was also recognised by the World Health Organization (WHO). However, in many cases this coverage is just nominal and not real in the sense that not all Mexicans have effective access to health care and not even all are formally registered with a health care institution.

Figure 2.1: Structure of the Mexican Health Care System.



The most distinctive feature of the Mexican health system is its subdivision into various sub-systems where each sub-system replicates the fundamental health system activities for its affiliated populations: stewardship, revenue raising, as well as the purchasing and provision of health services **(OECD, 2016)**. Therefore, in practice, each sub-system operates as a distinct health system with little coordination of functions across them and with each institution owning and managing its own medical facilities, and employing their own health workforce **(OECD, 2016)**. Currently, the

[5] This is clear evidence of multiple coverage. According to FUNSALUD (2012) more than 14% of *Seguro Popular* beneficiaries are also covered by social security institutions.

Mexican population not covered by the social security is entitled to receive preventive and curative services only at the facilities managed by non-social security institutions. In case of emergencies, patients can be treated in other institutions, but once medically stabilised they are referred to their corresponding institution facilities. Social security affiliates are, however, entitled to receive health care both at the institution where they are affiliated and at the facilities managed by non-social security institutions.[6]

With exception of the INSALUD and the HFR, the provision of health care services to the population not covered by the social security is decentralised to the state level. These services are funded mainly with federal and state resources obtained from general taxation. Three budget lines within the Federal Government budget are used to allocate resources to health care for the population without social security. Budget line 12 comprises the Federal Ministry of Health budget, some resources of the *Seguro Popular* Programme, the health component of the Oportunidades/Progresa programme, public health programmes and the budgets of the INSALUD and the HFR. Budget line 19 includes the resources allocated to the IMSS Oportunidades/Prospera programme. Budget line 33 comprises earmarked transfers to the 32 states through the Fund for Allocations for Health Services (FASSA). In 2013, federal allocations accounted for 87% of the total public resources allocated to health care for people without social security **(OECD, 2016).**

[6] However, by law, they are not entitled to become *Seguro Popular* beneficiaries; hence, if they receive care from non-social security institutions, they would need to pay a recovery fee.

States can collect their own resources through local taxes and public services fees and allocate them to health care. State resources are usually used to fund local health programmes and to cover the state contribution to *Seguro Popular*.

Federal resources can be directly allocated to health care (e.g. INSALUD and HFR budgets) or can be first transferred to each of the 32 states who will be in charge of the management of these resources (e.g. *Seguro Popular*). The manner in which federal funds reach states is complex: funds first go from the Ministry of Finance through the State Treasury, which subsequently transfer funds to the State Health Ministry **(OECD, 2016).**

When funds arrive at a State Treasury it is uncertain whether those funds will be used effectively to support health services because of a lack of accountability at the state level **(OECD, 2016).** Under current Mexican law, the states are responsible for deciding how to spend their resources although they have to follow broad rules: no more than 40% of *Seguro Popular* funds can go to human resources, no more than 30% can be spent on pharmaceuticals and a minimum of 20% can be spent on preventive activities. Apart from these restrictions, there is no clear resource allocation strategy at the state level meaning that the distribution of the resources within states (i.e. health jurisdictions, hospitals and other health care facilities) is left to the local government discretion. In practice, as will be further explained in Chapter 5, public hospitals and other public health care facilities are funded through non-binding historical budgets determined by the State Health Ministry.

Both social security and non-social security institutions provide primary, secondary and tertiary care. However, social security institutions have a higher availability of health workers and hospital beds, both in absolute and per capita terms **(OECD, 2005)**.

Mexico has relatively low health care expenditure measured as a percentage of GDP; only 6.2% in 2013, which is not only below the average of OECD countries (8.9%) but also below the average in the Latin American region (7%). The share of public health expenditure is amongst the lowest in the OECD (51%). Out-of-pocket (OOP) spending in Mexico constitutes 44.7% of health system revenue and 4% of household expenditure **(OECD, 2016, OECD, 2012).** High OOP spending results from dissatisfaction with the quality of care provided by the institutions to which individuals are affiliated and because particular services may not be available through their institution and thus they seek health care in the private sector **(OECD, 2016)**.

Allocating a relatively low level of resources to health is related to low rates of care delivery; for example, the number of doctor consultations per capita in Mexico was the second lowest in the OECD in 2013 (2.8 compared to the average of 6.6) and the rates of cardiovascular, hip and knee procedures are also amongst the lowest in the OECD **(OECD, 2016)**. In addition to the allocation of relatively few resources to health overall, the distribution of these resources among the health sub-systems is unequal with per capita and OOP expenditure levels, health care utilisation rates, quality and number of facilities, as well as the array of services offered, among other variables, varying markedly across health care institutions and across geographical regions **(IMSS, 2015, OECD, 2016, Secretaria de Salud, 2013a, Secretaria de Salud, 2013b, Secretaria de Salud, 2014).**

Therefore, it seems that Mexico has both an underfinanced and fragmented health system that hinders the efficiency and the effectiveness of the health care services provided to its population. Every institution providing health care has its own incentives and financial structures making it difficult to create synergies that can improve the quality and the equity of the health care services provided. Furthermore, the way in which the Mexican health care system is structured contributes to resource wasting in several forms, such as duplication of funding, multiple coverage and high administrative costs.

CHAPTER 3. ANALYSING THE EFFECTIVENESS OF PRIMARY CARE SERVICES

3.1 Preamble of Research Paper 1

The previous chapter presented a general description of how the Mexican health care system is structured. Reports describing in detail the specificities of the physical and the human resources, the relationship among all the participants of the sector, the financing of the system as a whole and of each sub-system, the improvements achieved in the last years and the major challenges faced by the Mexican health system have been published recently **(Gómez-Dantés et al., 2011, OECD, 2005, OECD, 2016, Fundación Mexicana para la Salud, 2012).** The purpose of Chapter 2 was to provide an overview of the current state of the Mexican health care system in order to familiarise the reader with the context of the present study, rather than to describe the system in detail. However, before analysing the performance of public primary care, it is important to elaborate more about the way in which these services are provided. The following description synthesises the information presented in **OECD (2005)**.

Primary care in Mexico is comprised by rural and urban health centres offering regular check-ups to healthy patients, non-specialised treatments for non-serious conditions, management of existing health conditions (in particular chronic conditions) and referral to more specialised care. In this sense, primary care clinics represents the gate to the health system **(Secretaría de Salud, 2011).**

In the public sector, medical clinics provide primary care services including dental care and family planning, and dispense pharmaceuticals. Patients' choice is limited as individuals cannot select their doctor at the point of delivery. All primary care services for the social security affiliates are free and, since the implementation of *Seguro Popular*, most of the primary care services are now covered for the population with no social security.

In Mexico, the provision of health care by public non-social security institutions is decentralised to the state level. Within states the administrative units in charge of the management and operation of primary care are health jurisdictions accountable to the state health ministries (SHMs). Health jurisdictions have several primary care clinics, each of them offering services to 300-500 families without social security.

All institutions in the public sector operate a referral system for individuals needing access to higher levels of care. However, in practice patients often bypass the referral system at the primary level, especially the population without social security. In IMSS, each (family) doctor in primary care clinics is assigned a specific number of patients and becomes responsible for following them up as long as the beneficiary is entitled to receive care from IMSS. SHMs facilities are run as small units with a head doctor and several doctors and nurses working for him/her.

Previous studies analysing ACSHs in Mexico have used the state as the unit of analysis without acknowledging the structure of the health system, specifically the way in which primary care is organised and delivered in the country **(Rodríguez Abrego et al., 2012, Secretaría de Salud, 2012)**. To the best of my knowledge, the analysis presented in the following section of this chapter is the first using health jurisdictions, the ultimate administrative unit responsible for managing primary care in Mexico, as the unit of analysis. This approach allows identification of differences in the performance of primary care between and within states.

During the study period, Mexico extended its health care insurance coverage to more than 50 million people through *Seguro Popular*, the health insurance based-component of the 2003 Health Reform. It is important to mention that the purpose of Research Paper 1 is to use ACSHs to analyse the effectiveness of primary care services in Mexico during 2001-2011 and not to evaluate the effect of *Seguro Popular* on ACSHs. The reason being that the available data are not suitable to conduct a quasi-experimental analysis that would allow the estimation of a causal effect of *Seguro Popular* on ACSHs. In particular, the administrative records analysed were not obtained from a random-selected sample and, additionally, the data is potentially subject to two factors that could blur the real effect of this policy on ACSHs; namely, the overlap of the Seg*uro Popular* and the Oportunidades/Prospera target populations, and the potential effects of *Seguro Popular* in encouraging informality in Mexico.

Oportunidades/Prospera is an anti-poverty and human resource investment conditional cash transfer programme that began operating in small rural communities in 1997 and since then it has gradually expanded to urban areas. Oportunidades/Prospera transfers are generally made to the mothers in the household, conditional on behaviours such as children and adolescents attending school, mothers attending sessions on nutritional and health practices, and all family members having regular checkups in health clinics **(Behrman and Parker, 2011)**. The health care services are provided by public health care institutions including the SHMs and the IMSS (the latter through the IMSS-Oportunidades/Prospera programme). The impact evaluation of this programme showed that Oportunidades/Prospera rural families tend to use 35% more preventive and curative services than non-beneficiary rural families, while urban beneficiaries of this programme use these services 17% more than comparable non-beneficiary urban families **(Gutiérrez et al., 2005)**. This evaluation also found that Oportunidades/Prospera reduces by 2.5% the probability of members of beneficiary urban families being hospitalised. Since most of the Oportunidades/Prospera target population lack social security coverage, they belong to the *Seguro Popular* target population, by definition. However, the available administrative records do not allow an effective differentiation between beneficiaries and non-beneficiaries of the Oportunidades/Prospera and the *Seguro Popular* programmes. *Ceteris paribus*, it would be expected that the effect of *Seguro Popular* on ACSHs among the Oportunidades/Prospera beneficiaries in the initial stages of *Seguro Popular* would be lower than the non-beneficiaries as the former were already receiving free primary care that could potentially prevent ACSHs during the study period.

Recent studies have argued that *Seguro Popular* (being a subsidised-health insurance scheme to workers outside the formal sector of the economy) changes the incentives in the labour market and may induce a reallocation of labour from formal jobs, where workers and firms are taxed to obtain health coverage, to informal jobs, where access to health services is non-contributory or heavily subsidised **(Aterido et al., 2011, Bosch and Campos-Vazquez, 2014)**.Using social security data, Bosch and Campos-Vazquez (2014) show that *Seguro Popular* had a negative effect on formal employment registration four years after the implementation of the programme of around 4% for both employers and employees in small and medium firms. This behaviour might have similar implications on ACSHs to those described in the previous paragraph, since workers that switch from formality to informality as a result of the *Seguro Popular* implementation may have had better access to appropriate primary care than the population without social security. In this sense, the population previously covered by the social security might have a lower probability of experiencing an ACSH than the population that was not covered by the social security.

Ignoring both the dual Oportunidades/Prospera – *Seguro Popular* coverage and the fact that some formal workers switched to informality would represent important limitations in an evaluation that intends to estimate the effect of *Seguro Popular* on ACSHs. Therefore, this study does not aim to estimate the effect of *Seguro Popular* on the effectiveness of primary care, but rather to analyse primary care before and during the implementation of this programme. This study acknowledges the importance of *Seguro Popular* within the Mexican health system and conditions for its gradual and heterogeneous expansion in the econometric analysis presented in Research Paper 1.

Moral hazard behaviour describing the incentive of insured individuals to behave opportunistically after signing the insurance contract has been studied extensively in the insurance literature **(Knox, 2016, Pauly, 2000, Spenkuch, 2012, Zweifel and Manning, 2000)**. In the case of health risks, moral hazard occurs in two different forms **(Zweifel et al., 2009)**:

a) Ex-ante moral hazard: Once insured, individuals may choose to forgo preventive care or even neglect their health since the price of treating illness has fallen **(Knox, 2016).** In other words, insurance coverage might crowd-out self-protection **(Spenkuch, 2012)**.
b) Ex-post moral hazard: In the event of illness health insurance reduces the net money price of medical care. Such a reduction may lead to increased use of health care **(Zweifel and Manning, 2000).**

It could be argued that an increase in ACSHs after the implementation of *Seguro Popular* could reflect ex-ante moral hazard, since the development or exacerbation of the condition that leads to an ACSH is potentially preventable through timely and effective primary care; thus, one potential explanation for an increase in the ACSH rate could be that the recently insured are using less preventive health care services. Without further evidence, it would be difficult to tell if this increase would be indeed linked with ex-ante moral hazard or if, rather, it could be explained by a previously unmet need for appropriate primary care or to an ineffective provision of primary care services. However, in a recent study, Knox (2016) shows that *Seguro Popular* increases the likelihood of receiving some forms of preventive care, suggesting that ex-ante moral hazard behaviour might not be present among *Seguro Popular* beneficiaries.

One of the criteria to consider a hospitalisation as ACSH is that the hospitalisation is necessary when the health problem (indicated by the ICD-10 code of main diagnosis) occurs **(Caminal et al., 2004)**. In this sense, an increase in ACSHs would not be necessarily explained by ex-post moral hazard, as being admitted for an ACSH (once the preventable condition is present) is not a choice, but a need.

Therefore, the fact that Research Paper 1 does not take into account moral hazard as one potential explanation for the observed ACSHs behaviour is not considered as an important limitation of the study.

Research paper 1 uses hospital discharges in general hospitals managed by state health ministries during 2001-2011 of patients 20 years or older.[7,8] This dataset was complemented with information from seven additional sources to analyse the magnitude and trend of the ACSH rate, to identify its difference between and within states, and to explore for associations of the ACSH rate with patient and community factors (thesis research questions I-III). The additional sources used allowed the inclusion of variables such as social gap index (SGI) in the econometric analysis.[9] Research Paper I addresses research question IV by proposing a different approach to assess primary care performance in the presence of expanding health care insurance.

[7] Following previous studies **(Macinko et al., 2011; Secretaría de Salud, 2012),** this analysis was limited to hospitalisations among adults (defined here as 20 years or older) as hospitalisations tend to be more prevalent among this demographic group.

[8] The period analysed is 2001-2011 and not updates since at the time the analysis was conducted this was the only data available.

[9] Social gap index is a weighted measurement that summarises four social deprivation indicators (education, health, household services and housing spaces) into a single index whose purpose is to arrange units according to their social deprivation **(Consejo Nacional de Evaluación de la Política de Desarrollo Social, 2012).** The SGI is reported at the community, municipality, and state level. Since each health jurisdiction groups several municipalities, the SGI used in Research Paper I is the weighted average of the SGI of all the municipalities in the jurisdiction in question.

3.2 Research Paper 1

Title: Using ambulatory care sensitive hospitalisations to analyse the effectiveness of primary care services in Mexico

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Student	David Gibran Lugo Palacios
Principal Supervisor	John Cairns
Thesis Title	Analysis of the effectiveness of primary care services and of hospital efficiency in the Mexican health care system

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	Social Science & Medicine		
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Student Signature: ______________ **Date:** 3 June 2016

Supervisor Signature: John Cairns **Date:** 3 June 2016

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Research Paper 1

Title: Using ambulatory care sensitive hospitalisations to analyse the effectiveness of primary care services in Mexico

Authors: David G. Lugo-Palacios, John Cairns

Candidate contribution: Under the guidance of my supervisor (and co-author), I designed the study, managed the data, conducted the analysis, drafted the manuscript and addressed reviewers' comments.

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Abstract

Ambulatory care sensitive hospitalisations (ACSH) have been widely used to study the quality and effectiveness of primary care. Using data from 248 general hospitals in Mexico during 2001-2011 we identify 926,769 ACSHs in 188 health jurisdictions before and during the health insurance expansion that took place in this period, and estimate a fixed effects model to explain the association of the jurisdiction ACSH rate with patient and community factors. National ACSH rate increased by 50%, but trends and magnitude varied at the jurisdiction and state level. We find strong associations of the ACSH rate with socioeconomic conditions, health care supply and health insurance coverage even after controlling for potential endogeneity in the rolling out of the insurance programme. We argue that the traditional focus on the increase/decrease of the ACSH rate might not be a valid indicator to assess the effectiveness of primary care in a health insurance expansion setting, but that the ACSH rate is useful when compared between and within states once the variation in insurance coverage is taken into account as it allows the identification of differences in the provision of primary care. The high heterogeneity found in the ACSH rates suggests important state and jurisdiction differences in the quality and effectiveness of primary care in Mexico.

Keywords: Mexico; ambulatory care sensitive hospitalisations; primary care; quality; instrumental variables.

3.2.1 Introduction

Timely, effective and high-quality primary care services can prevent the development or exacerbation of certain health conditions which may lead to hospitalisations. These avoidable hospitalisations - ambulatory care sensitive hospitalisations (ACSHs) - have been widely used to study the access to, quality and effectiveness of primary care services, typically in high-income countries **(Ansari, 2007, Caminal et al., 2004, Finegan et al., 2010, Agency for Healthcare Research and Quality, 2013).** This paper analyses ACSHs before and during the health insurance expansion in Mexico, thus adding to studies of the behaviour of ACSHs in countries where efforts to expand the primary care coverage have been made **(Macinko et al., 2011, Saha et al., 2007)**.

The Mexican healthcare system comprises a public and a private sector. The public sector is divided into two segments: workers in the formal labour market and their dependents (insured population) covered by social security institutions financed mostly by payroll taxes; and, non-salaried workers, unemployed, self-employed and informal sector workers (uninsured population) receiving health care offered by non-social security institutions financed mainly by the federal government from general revenues. Social security institutions provide complete medical care, including prescribed drugs, without any copayment. On the other hand, until 2003, the uninsured population needed to pay utilisation fees out-of-pocket (with the possibility of incurring catastrophic expenditures) in order to receive basic ambulatory care at rural clinics and a more complete set of interventions in the biggest cities. Users of the private health services belong both to the insured and to the uninsured population; they receive medical care in heterogeneous private hospitals and medical clinics financed mainly with out-of-pocket expenditure, but also through private insurance companies.

In 2003, Mexico conducted a major health reform that gradually offered, through the *Seguro Popular* (*SP*) programme operated by the 32 state health ministries, free access to an explicit package of health care interventions to more than 50 million population not covered by any other public insurance scheme (described as uninsured). By 2012, the package included 284 interventions covering almost 100% of the primary level demand and 85% of the hospitalisation and surgery demands **(Comision Nacional de Protección Social en Salud, 2012)**. Since the reform, Mexico has made substantial advances in terms of health insurance coverage and financial protection **(Knaul et al., 2012).** With almost half of the Mexican population affiliated to *SP* and the rest being covered by the public social security institutions, Mexico declared universal health coverage in 2012.

While a fall in the ACSH rate might be expected following the reform, given the increase in the funding for the provision of primary care, opposing forces may prevent this fall. First, even when new resources were transferred from the federation to the states, the rules for budget allocation within the states (i.e. health jurisdictions, hospitals, primary care centres) seem to have remained unchanged hindering major changes in the way primary care is delivered. Second, as a result of the increase in coverage, the workload of primary care providers boomed. Since primary care providers are salaried and are not responsible for health outcomes or for further health care expenses, they do not necessarily have adequate incentives to provide appropriate care (under the assumption that providing high-quality health care services is both time consuming and costly, at least in terms of effort). Therefore, primary care workers might provide poor quality services, refer patients to specialists or hospitalise them in order to manage the increasing demand for primary care services. Third, accessing hospital care via the emergency services is still relatively easy. Fourth, it could be difficult to avoid hospitalisations for patients with limited access to appropriate care before the implementation of the reform, thereby when the reform lowered barriers to health care their condition might have worsened to the point that the hospitalisation might not be avoidable anymore. The increase/decrease of the ACSH rate would still be a valid effectiveness and quality indicator if the first three forces are present, but not necessarily if the latter is also preventing a fall in this indicator, since ensuring the provision of appropriate care to the previously uninsured was outside the control of the primary care team.

Therefore, the two main objectives of this paper are 1) to identify the ACSH rate in health jurisdictions focusing on the differences in the magnitude and trend of ACSHs between and within states before and during the health insurance expansion in Mexico; and, 2) to explore the association of this indicator with aggregated patient and community factors. In doing this it is acknowledged that the traditional focus on changes in the ACSH rate as an indicator of the effectiveness of primary care services may not be valid when health insurance coverage is expanding.

3.2.2 Literature Review

ACSHs have been studied using different approaches leading to different results and, thus, literature findings are still not conclusive. Previous efforts have focused mainly on describing the trends of ACSHs throughout different periods of time **(Ashton et al., 1999, Kozak et al., 2001, Stranges and Stocks, 2010)** and on using econometric methods to identify associations of several variables with these hospitalisations. Research on ACSHs has used three different units of analysis: individuals, hospitals, and small geographic areas; the chosen approach being mainly driven by data availability. In most ACSH studies, the authors associate the increase or high levels of the ACSH rate with poor primary care.

Econometric analysis of ACSHs has been addressed using ordinary least squares **(Finegan et al., 2010, Laditka et al., 2005)**, logistic regressions **(Culler et al., 1998, Saha et al., 2007, Weissman et al., 1992)**, and panel data models **(Dusheiko et al., 2011a)**. When defining the model specification, Culler et al. and Finegan et al. followed Andersen's behavioural model and proposed that variation in this kind of hospital utilisation is a function of an individual's predisposing, enabling, and need characteristics **(Andersen and Davidson, 2007).**

Literature has reached consensus on the importance of the association between socioeconomic conditions and ACSHs. Most of the studies controlling by socioeconomic status show that a higher income level is associated with a lower ACSH rate **(Bindman et al., 1995, Blustein et al., 1998, Epstein, 2001, Finegan et al., 2010)**. Contrary to this finding, with the introduction of two variables controlling for the effect of income, Laditka et al. (2005) did not find a significant effect for the proportion of low-income households and the county ACSH rate, but showed that the proportion of high-income households has a positive and significant effect; Culler et al. (1998) did not find a significant association between ACSHs and income level, but possibly the effect of income was captured by the variable measuring social vulnerability that had a positive effect on the probability of having at least one ACSH.

Dusheiko et al. (2011) found that moving 10% of registered diabetic patients from poor to good glycaemic control was associated with a 14% decrease in the rate of emergency admissions for short term complications. Shi et al. (1999) showed that individuals without a primary care physician in South Carolina were more likely to be admitted for an ACSH.

Saha et al. (2007) is one of the few studies that have examined the change of ACSHs after increasing access to care. They found that the ACSH rate rose after expanding Medicaid coverage in Oregon, USA. They discussed several explanations for this increase such as easier access to inpatient care, potential decrease in the patients' threshold for seeking care and in the physicians' threshold for admitting them, sufficient health decline for those lacking timely receipt of care while uninsured, and data-related biases. Macinko et al. (2011) analysed ACSHs after the rolling out of a community-based primary care programme in Brazil and found that the ACSH rate declined by about a third in 1999-2007.

The current study contributes to this literature by analysing the behaviour of the ACSH rate for a large population located in areas experiencing different and increasing health insurance coverage rates and examines changes in the ACSH rate as this coverage expands. Furthermore, it challenges the traditional analysis of the increase/decrease of the ACSH rate to measure the effectiveness of primary care services in a health insurance expansion context and explores an alternative interpretation of this indicator that could help to identify areas with primary care systems performing less well than others.

3.2.3 Methods

This paper follows Finegan et al. (2010) approach to estimate the association between avoidable hospitalisations and health jurisdiction characteristics that predispose care-seeking; enable patients to obtain care; and provide a proxy for the need of health services.

The model estimated is

$$Y_{it} = X_{it}\beta + W_{it}\gamma + Z_{it}\varphi + H_{it}\delta + \varepsilon_{it}, \qquad i = 1, \dots, N; t = 1, \dots, T \qquad (3.1)$$

where Y_{it} is the vector showing the ACSH rate per 10,000 uninsured in health jurisdiction i in year t; X, W and Z are vectors of aggregated characteristics that predispose, enable and influence the need of patients to obtain care. H is the vector of hospital supply controls (number of hospital beds and outpatient consultancy rooms per 10,000 uninsured in each jurisdiction). X includes age group, proportion of females, and proportion of indigenous population. W includes social gap index (SGI), proportion of the population living in rural localities, and *Seguro Popular* (*SP*) jurisdiction coverage rate. Three dummy variables were created to capture the effect of SGI: very low, low and medium SGI with high and very high SGI forming the reference group. *SP* coverage rate is the percentage of the population of the jurisdiction with no social security affiliated to *SP* (only those not covered by social security institutions are entitled to register as *SP* beneficiaries). A quadratic relationship between the ACSH rate and the *SP* coverage rate will be tested to explore if a decrease or a levelling-off in the ACSH rate is observed as jurisdictions reach higher *SP* coverage levels. Z includes the state diabetes and hypertension prevalence rates, state general practice (GP) consultation rate, and the proportion of patients hospitalised in a different jurisdiction from where they are registered. State-level data were used when jurisdiction-level data were unavailable. All variables other than *SP* coverage rate and SGI are mean-centred and expressed per 10,000 population. $\beta, \gamma, \varphi,$ and δ capture the effect of $X, W, Z,$ and H, respectively. Finally, $\varepsilon_{it} = \alpha_i + u_{it}$ is the disturbance of jurisdiction i composed of an unobservable individual specific component α_i and of an error component u_{it}, independent across time and across jurisdictions.

In Mexico, the provision of health care by public non-social security institutions is decentralised to the state level. Within states the administrative units in charge of the management and operation of primary care are health jurisdictions accountable to state health ministries. Taking into account that health jurisdictions are at the heart of primary care provision in Mexico, two units of analysis were chosen for this study: health jurisdictions with at least one general hospital in their territory (hospital jurisdictions) and health jurisdictions where hospitalised patients reside (origin jurisdictions). While jurisdictions manage and operate primary care in their territories, they do not necessarily administer hospital budgets as these may be defined directly by state health ministries.

Both perspectives are relevant and have important advantages and disadvantages. On the one hand, it is interesting to analyse the ACSH rate by hospital jurisdiction since they are the administrative units where health resources were used to provide this type of avoidable care that could otherwise had been used to provide more cost-effective services. However, this perspective omits jurisdictions with no general hospitals and overlooks that jurisdictions where ACSHs take place are not always responsible for providing primary care services to the people suffering them. The latter drawback is tackled by analysing ACSHs by origin jurisdictions; the major disadvantage of this perspective is that not all these jurisdictions have comparable controls for hospital supply since not all of them have a general hospital in their territory. Since it is not clear which perspective is superior this study analyses ACSHs from both perspectives and compares them. To deal with the issue that some origin jurisdictions did not have general hospitals in their territory, two separate analysis were run. First, origin jurisdictions with no general hospitals were excluded; in the second, all origin jurisdictions were analysed even if they had no general hospital in their territory. To control for hospital supply in the latter a dummy variable was included indicating if a general hospital was within 50 km and less than one hour drive from the most populated municipality in the jurisdiction. The use of two units of analysis provides the opportunity to examine the robustness of any findings.

The original idea was to consider the hierarchical structure of the Mexican Health System to estimate a multilevel or hierarchical model that would allow account to be taken not only of the correlation between jurisdictions in the same state to obtain correct standard errors, but also disentangling of the jurisdiction effect from the state effect to analyse both effects separately. However, multilevel models only lead to consistent estimates when the individual specific components are not correlated with the covariates. This assumption was tested and rejected by the Hausman test and by finding significant differences between the fixed effects (FE) and the random effects estimates which is asymptotically equivalent to the Hausman test **(Rabe-Hesketh and Skrondal, 2012).** For this reason, a FE model with jurisdictions as the unit of analysis and clustered at the state level was preferred.

The variable "*Seguro Popular* jurisdiction coverage" in (3.1) is potentially endogenous since jurisdictions in states with better-organised healthcare systems (and better provision of primary care services that could potentially influence their ACSH rate), might also manage to affiliate the uninsured population to the *SP* programme at a faster pace. In the linear case, a way to deal with this issue is the use of instrumental variables (IV). Therefore, the *SP* coverage is instrumented by the years that *SP* had been operating in the state where each health jurisdiction is located. *SP* specifically targeted poor families in both urban and rural areas of Mexico without access to any other form of private or public coverage and it was rolled out gradually during 2001-2005; the process of incorporation to *SP* entailed political decisions at the state and federal level, but there is no evidence that such decisions were linked to the quality of primary care in each state or jurisdiction nor to their ACSH rate **(Torres and Knaul, 2003, Sosa-Rubi et al., 2009).** Therefore, it is reasonable to think that the years that *SP* had been operating in the state only affects the jurisdiction ACSH rate through the *SP* jurisdiction coverage rate in each year. Sosa-Rubi et al (2009) also used incorporation to *SP* as an instrument with the difference that they defined three dummy variables indicating the year when each state was officially incorporated to *SP*.

With the intention of analysing the dynamics of the data, lagged values of the ACSH rate were introduced in the model in order to obtain the Arellano-Bond estimator. However, the restrictions imposed by this alternative specification proved not to be valid. Dummy variables for each year in 2001-2011 were used instead as regressors to control for the time effect. All models were estimated using both hospital and origin jurisdictions as units of analysis and were conducted using STATA 13 **(StataCorp, 2013).**

3.2.4 Data

The analysis uses hospital discharge data for the period 2001-2011 from general hospitals run by state health ministries **(Secretaria de Salud, 2013b).** Data on diagnosis, age, gender, insurance status, state and municipality of the patient are recorded for each discharge, but it is not possible to keep track of each patient since unique id patient numbers are not available.

Hospitalisations of patients 20 years or older were classified as ACSHs if the main diagnosis contained one of 300 ICD-10 codes across 21 conditions identified by previous studies (Agency for Healthcare Research and Quality, 2013; Caminal et al.; 2004; Epstein, 2001; Finegan et al., 2010; Weissman, 1992). While the primary care services covered by *SP* can prevent hospitalisations for these conditions, *SP* does not cover hospital care for all of them (see Appendices 3.1 and 3.2). Services not covered by *SP* are subject to utilisation fees.

This study identified 926,769 ACSHs from a total of 10.6 million hospital discharges during 2001-2011 in more than 248 general hospitals (new hospitals were added throughout the period: 287 hospitals were observed in 2011) within 188 health jurisdictions in the 32 states of Mexico. These data was complemented with variables from different sources, shown in **Table 3.1**, to form the final database. Data for SGI and diabetes/hypertension prevalence rates were only available at three points in time (2000, 2005, and 2010 for the former and 2000, 2006, and 2012 for the latter). The first observation was assigned as the value for 2001-2003; the second as the value for 2004-2007; and the third as the value for 2008-2011.

Figure 3.1 presents the overall composition of ACSHs for the period 2001-2011. Diabetes and hypertension represent more than half of all ACSHs. **Figure 3.2** shows the dramatic 50% increase in the national ACSH rate per 10,000 uninsured population (target population of health jurisdictions), reaching 19.7 in 2011. During the same period total hospitalisations in the health jurisdictions analysed increased by 42.5%. Measured as the proportion of total hospitalisations, ACSHs rose by 3.8% overall, after an initial increase of 10.3% during 2001-2005 followed by a decline of 5.9% in 2005-2011.

Table 3.1: Variable Description

Variable	Description	Source
ACSH rate per 10,000 uninsured	(Discharges, for patients ages 20 and older, with one of the 300 ICD-10 codes considered preventable as main diagnosis in general hospitals of the jurisdiction i / total population without social security in jurisdiction i) X 10,000	(Secretaria de Salud, 2013b)
different JURIS rate	(number of patients residing in other jurisdictions but hospitalised in hospitals of the jurisdiction i / total population without social security in jurisdiction i) X 10,000	
Seguro Popular (SP) coverage rate	(number of *SP* beneficiaries in jurisdiction i / total population without social security in jurisdiction i) * 100	(Comision Nacional de Protección Social en Salud, 2011b, Secretaria de Salud, 2013b)
social gap index	weighted measurement that summarises four social deprivation indicators (education, health, household services and housing spaces) into a single index whose purpose is to arrange units according to their social deprivation	(Consejo Nacional de Evaluación de la Política de Desarrollo Social, 2012)
state diabetes prevalence per 10,000 population	(diabetic population in state / total population in state) * 10,000	(Gutiérrez et al., 2012, Olaiz et al., 2003, Olaiz-Fernández et al., 2006)
state hypertension prevalence per 10,000	(hypertensive population in state / total population in state) * 10,000	
state GP consultation rate	(general practice consultancies for population without social security in state / total population without social security in state) * 10,000	(Secretaria de Salud, 2014)
beds rate	(number of hospital beds in jurisdiction i / total population without social security in jurisdiction i) * 10,000	(Secretaria de Salud, 2015)
consultancy room rate	(number of consultancy rooms in general hospitals of the jurisdiction i / total population without social security in jurisdiction i) * 10,000	

rural population	(population from the jurisdiction i residing in localities with less than 2,500 population / total population without social security in jurisdiction i) * 100	(Consejo Nacional de Población, 2012, Consejo Nacional de Población, 2013)
indigenous population	(indigenous population in the jurisdiction i / total population without social security in jurisdiction i) * 10,000	(Comision Nacional para el Desarrollo de los Pueblos Indigenas, 2010)

Figure 3.1: Composition of Ambulatory Care Sensitive Hospitalisations, 2001-2011

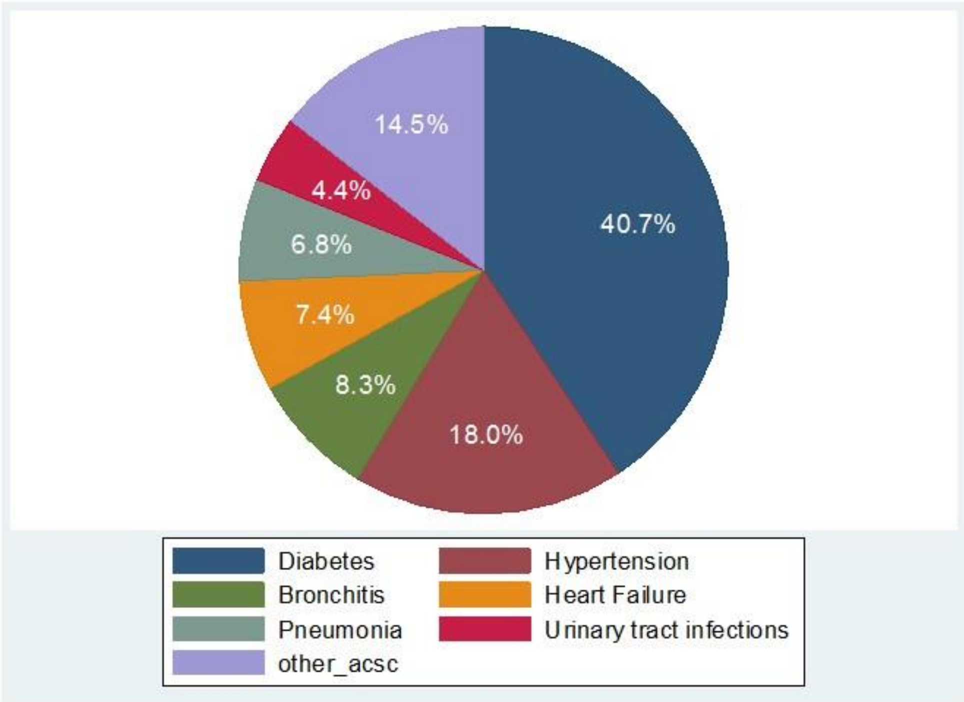


Figure 3.2: Ambulatory Care Sensitive Hospitalisation National Rate, 2001-2011

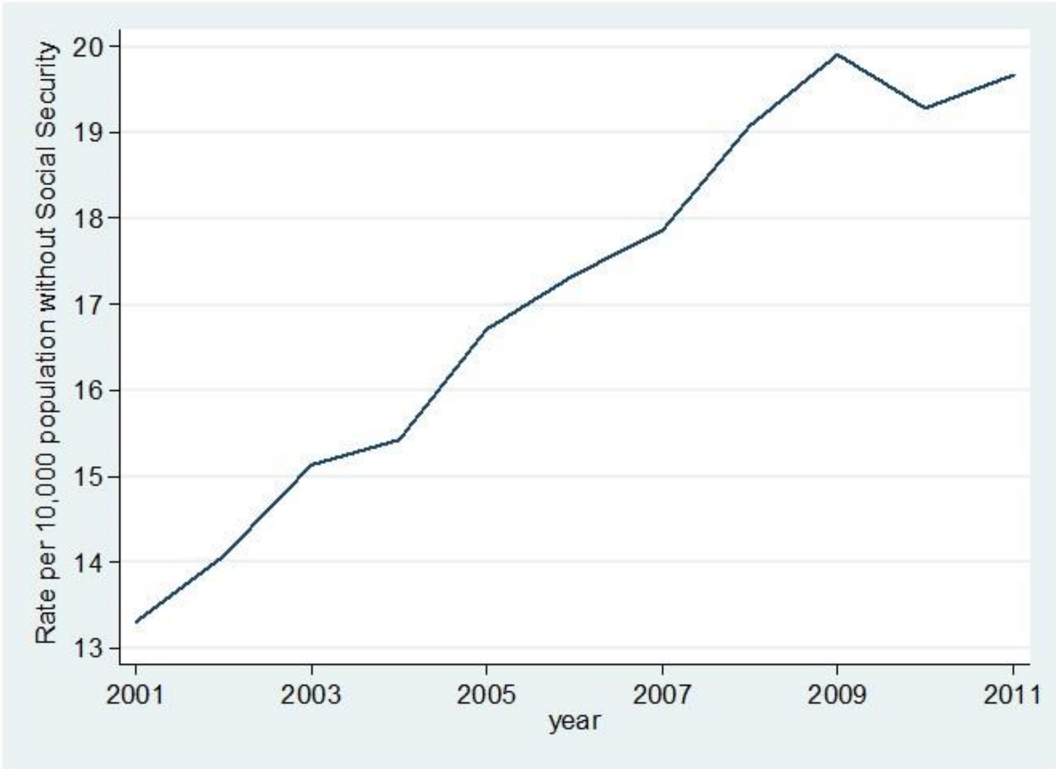


Table 3.2 shows the descriptive statistics for the 188 health jurisdictions included in the hospital jurisdiction analysis (home to approximately 53.2 million uninsured Mexicans). For some jurisdictions the *SP* coverage rate has values over 100%. However, this is not surprising since previous studies have documented multiple coverage among *SP* beneficiaries **(Fundación Mexicana para la Salud, 2012).** The high proportion of jurisdictions with very low SGI may reflect that only health jurisdictions with at least one general hospital were analysed and usually general hospitals tend to be located in jurisdictions with better socioeconomic conditions than the ones without a general hospital, but also that the jurisdictional SGI was obtained as a weighted average of the SGI of all the municipalities in the jurisdiction. Forty four jurisdictions were excluded from the hospital jurisdiction analysis. The reasons for excluding them were either because they did not have a general hospital in their territory or because general hospitals in the jurisdiction changed their classification

during the period studied and in one case because the general hospital in the jurisdiction was inside a prison. In general, the excluded jurisdictions are less populous and have higher rate of uninsured population, lower *SP* coverage rate, higher percentage of rural population, and higher SGI indices. When changing the unit of analysis from origin jurisdictions to hospital jurisdictions, there is no loss in the number of hospitalisations only in the number of jurisdictions: origin jurisdictions with no general hospitals are not included in the hospital jurisdiction analysis but patients with ACSHs coming from these jurisdictions are classified in jurisdictions where the hospitalisation occurred.

Table 3.2: Descriptive Statistics, Hospital Jurisdictions

Variable	Mean	SD	Min	Max
Pop with no Social Security	274,541	197,784	12,383	1,156,468
ACSH rate*	23.8	18.6	0.1	173.2
Female rate*	5,020	165.9	4,509	5,422
Age group 20-29*	1,788	199.8	1,228	2,346
Age group 30-39*	1,442	205.4	955	2,119
Age group 40-49*	1,031	146.4	720	1,852
Age group 50-59*	639	105.7	390	1,321
Age group 60-69*	392	103.0	167	861
Age group older than 70*	325	118.6	95	900
Seguro Popular coverage	39.5	36.2	0.0	135.9
Rural	32.9	22.7	0.0	89.0
Indigenous population*	1,066	1,800	8	9,873
Very Low SGI	0.60	0.49	0.0	1.00
Low SGI	0.20	0.40	0.0	1.00
Medium SGI	0.15	0.36	0.0	1.00
High & Very high SGI	0.05	0.23	0.0	1.00
Different JURIS rate*	36.8	68.0	0.0	577.1
GP consultation rate*	14,700	4,438	7,874	28,899
Beds rate*	4.1	2.7	0.5	21.8
Consultancy room rate*	1	1	0	7
Diabetes state prevalence	730	188.2	330	1,230
Hypertension state prevalence	1,454	285.9	810	2200

SGI: Social Gap Index; JURIS: heath jurisdiction.
*Rate per 10,000 population with no Social Security

3.2.5 Results

Table 3.3 reports the main results of the models described above. The FE and the IV model from the origin jurisdictions perspective are not reported, but they are available from the authors upon request.[10] The estimates are robust for different specifications and a likelihood ratio test indicates that model 4 is preferred to model 1 ($\chi^2_{(10)}$ statistic = 32.48). As expected, since chronic conditions are the most prevalent causes of ACSHs, the younger age groups have a negative association with ACSHs while this relation is positive for the older age groups. With the exception of the proportion of the population living in rural localities, enabling factors show a strong association with the ACSH rate: the higher the jurisdiction SGI and the higher the *SP* jurisdiction coverage rate, the higher the ACSH jurisdiction rate. A quadratic relationship between the ACSH rate and the *SP* coverage rate was discarded in model 2. It is worth noting that the strongest association is between SGI and the ACSH rate. The estimated coefficient for *SP* coverage changed only slightly after an explicit control for the effect of time is introduced (model 4); in the models where origin jurisdictions are the unit of analysis (models 5 and 6) the estimated coefficients are within the 95 per cent confidence interval for those estimated in model 4. The individual estimates for each year dummy variable in models 4-6 are not reported in **Table 3.3** but they show an increasing association, for example in model 4 it goes from 1.2 in 2003 to 3.3 in 2009 (although not always significantly different from 2001, the reference year).

[10] The thesis version reports them in Appendix 3.3

Table 3.3: Fixed Effects Models for ACSH rate

Variable	(1) Fixed Effects	(2) Squared *SP* coverage	(3) Instrumental Variables	(4) Year Dummies	(5) Origin JURIS ‡	(6) Origin JURIS ALL ††
Predisposing Factors						
*Age group*ᵎ						
20-29	-0.0113*	-0.0104	-0.0113*	-0.0113	-0.0062	-0.0078
	[0.0065]	[0.0064]	[0.0064]	[0.0069]	[0.0075]	[0.0072]
30-39	-0.0361	-0.0366*	-0.0359*	-0.0363*	-0.0455**	-0.0486***
	[0.0213]	[0.0214]	[0.0211]	[0.0211]	[0.0211]	[0.0159]
50-59	-0.0854**	-0.0809**	-0.0848**	-0.0878**	-0.0913**	-0.0812**
	[0.0396]	[0.0367]	[0.0389]	[0.0356]	[0.0357]	[0.0338]
60-69	0.1299**	0.1282**	0.1294**	0.1311**	0.1328**	0.1158**
	[0.0625]	[0.0604]	[0.0617]	[0.0632]	[0.0650]	[0.0516]
Enabling Factors						
SP coverage rate	0.1120***	0.0771***	0.1149***	0.1032**	0.0945**	0.0818**
	[0.0134]	[0.0250]	[0.0112]	[0.0384]	[0.0380]	[0.0319]
SP coverage squared	-	0.0004	-	-	-	-
	-	[0.0003]	-	-	-	-
Very Low SGI	-4.6277*	-4.4177*	-5.0143**	-5.6046**	-5.8559**	-5.6433**
	[2.4950]	[2.3677]	[2.1993]	[2.6133]	[2.5468]	[2.7448]
Low SGI	-3.9843	-3.6716	-4.2730**	-4.9460*	-4.8286*	-3.9788
	[2.4419]	[2.1985]	[2.1441]	[2.4284]	[2.4100]	[2.5275]
Medium SGI	-3.5744**	-3.4013**	-3.6939**	-3.9934**	-4.0069**	-3.7426***
	[1.6962]	[1.5833]	[1.6449]	[1.7285]	[1.6898]	[1.2430]
Need Factors						
*Different JURIS rate*ᵎ	0.0794***	0.0773***	0.0797***	0.0802***	0.0447*	0.0473***
	[0.0264]	[0.0265]	[0.0258]	[0.0263]	[0.0235]	[0.0118]
*GP consultation rate*ᵎ	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0001
	[0.0003]	[0.0003]	[0.0003]	[0.0003]	[0.0003]	[0.0003]
Hospital Characteristics						
*Beds rate*ᵎ	2.8704***	2.8752***	2.8694***	2.8506***	2.4110**	-
	[0.9168]	[0.9087]	[0.8949]	[0.9169]	[0.9050]	-
*Consultancy room rate*ᵎ	4.4102*	4.2387*	4.4243**	4.4061*	4.9915**	-
	[2.1718]	[2.1514]	[2.1164]	[2.1754]	[2.3004]	-
General hospital closer than 50 km	-	-	-	-	-	8.9905**
	-	-	-	-	-	[3.7231]
Constant	23.8121***	23.8876***	24.0061***	23.7982***	22.4107***	11.9163***
	[1.8034]	[1.8313]	[1.9401~]	[1.8162]	[1.8341]	[2.6101]
$\widehat{SD}$						
sigma_u	12.9899	13.0656	13.0812	13.2639	14.0671	16.6586
sigma_e	6.7512	6.7416	6.7518	6.7166	6.7561	7.0619
rho	0.7873	0.7897	0.7896	0.7959	0.8126	0.8477
N	1961	1961	1961	1961	2020	2552
R^2	0.3823	0.3844	0.3822	0.3925	0.355	0.2504
ll	-6418.1214	-6414.7698	-6418.301	-6401.879	-6606.063	-8472.4623

State cluster standard errors in brackets. * p<0.10, ** p<0.05, *** p<0.01. ᵎ Mean-centred rate per 10,000 population with no Social Security. In (3) SP coverage rate is instrumented by the years of SP operation in the state where each jurisdiction is located. ~The SE for the constant in (3) is not clustered. Non-significant associations unreported: proportion of female population, age groups 40-49 and older than 70, indigenous condition, rural rate, diabetes and hypertension prevalence, and in (4) year dummies. ‡ Model 5 uses origin health jurisdictions as unit of analysis. All jurisdictions without general hospitals were excluded. †† Model 6 includes all origin health jurisdictions whether they have a general hospital in their territory or not. A dummy that indicates if a general hospital is within 50 km and less than one hour driving from the biggest municipality in the jurisdiction was included to control for health care supply instead of number of hospital beds and consultancy rooms.

An important relationship between hospital supply in health jurisdictions and ACSH rate was also found; having one consultancy room more than the mean per 10,000 uninsured is associated with more than 4 additional ACSHs per 10,000 uninsured. One unit deviation from the mean of hospital beds per 10,000 uninsured is associated with an additional 2.9 ACSHs per 10,000 uninsured. The latter remains significant and with a similar magnitude in model 5. Regarding the coefficient of consultancy rooms, it remained significantly different from zero in all the models where it was included. It can be observed that in model 6 having a general hospital less than 50 km and one hour drive away has the highest association with the ACSH rate. Model 6 does not include the same hospital supply controls previously used because these were perfectly correlated for the jurisdictions with no general hospitals and the availability of a general hospital within 50 km seems to be a more relevant supply variable in this case.

Table 3.3 displays a positive association between the rate of hospitalised patients coming from different jurisdictions and the ACSH rate. This variable controls for the proportion of patients seeking care in a different jurisdiction from the one in which they live for a condition that should have been managed at the primary level that will be expected to take place, preferably, in their registered area of residence. The association for this variable is significant from the two perspectives used, but the magnitude in models 1-4 is almost twice that of models 5 and 6.

This analysis reports a lack of a significant association between the ACSH rate at the jurisdiction level and utilisation of primary care services measured through GP consultations per 10,000 uninsured at the state level.

Table 3.4 shows the first stage of the 2SLS reported in column (3) in **Table 3.3**. Years of *SP* operation in the state seem to be a strong instrument for *SP* jurisdiction coverage rate since its effect on the coverage rate is not only significant at the 1% level but it also has one of the highest estimated coefficients. The strength of the instrument is supported by a high R^2 in the regression of *SP* jurisdiction coverage rate on its instruments and also by the weak identification test where the null hypothesis that the instrument is weak is rejected at the 1% level. Also in **Table 3.4**, the endogeneity test for *SP* jurisdiction coverage rate does not reject the null hypothesis of treating this variable as exogenous, supporting the assumption in **Table 3.3** columns (4-6) that *SP* jurisdiction rate is an exogenous variable.

As an additional robustness check, the same analysis was conducted only for the diabetes ACSHs subgroup (not reported).[11] While the magnitude of the estimated coefficients is considerably lower, the sign and significance of the findings prevail (with the exception of the SGI variables whose coefficients were not different from zero in models 1-3 and only significant for the medium SGI category in models 4-6).

The increase in the ACSH rate and its positive association with the SP coverage rate should be interpreted carefully. It is important to stress that this study analyses data from a period where SP was in a gradual, continuous, and heterogeneous expansion across the country, and, consequently, access to both primary and hospital care improved for more than 50 million previously uninsured people. In general, states show an increase in their ACSH rate at an earlier stage of the SP coverage expansion, but the ACSH rate did not follow the same trend in all states as SP continued to expand.

[11] See Appendix 3.4 in thesis version.

Table 3.4: First Stage: *Seguro Popular* Coverage on Instruments

Variable	Coeff.
Female rate	0.04***
Age group	
20-29	-0.02***
30-39	-0.02
40-49	0.09***
50-59	-0.25***
60-69	0.08**
Older than 70	0.06**
Indigenous	0.00
Rural	0.24
Very Low SGI	19.32***
Low SGI	10.52***
Medium SGI	5.16**
Diabetes	-0.04***
Hypertension	0.02***
Different JURIS rate	-0.02
GP consultation rate	0.00
Beds rate[ǂ]	-0.01
Consultancy room rate[ǂ]	1.35
Years of SP operation	**10.46*** **
Constant	-14.54**
N	1961
R^2	0.89
Weak identification test (Kleibergen-Paap rk Wald F statistic):	1,637.91
Stock-Yogo weak ID test critical values:	
10% maximal IV size	16.38
15% maximal IV size	8.96
20% maximal IV size	6.66
25% maximal IV size	5.53
Endogeneity test (*SP coverage rate)*:	0.490
Chi-sq(1) P-val = 0.484	

* p<0.10, ** p<0.05, *** p<0.01.

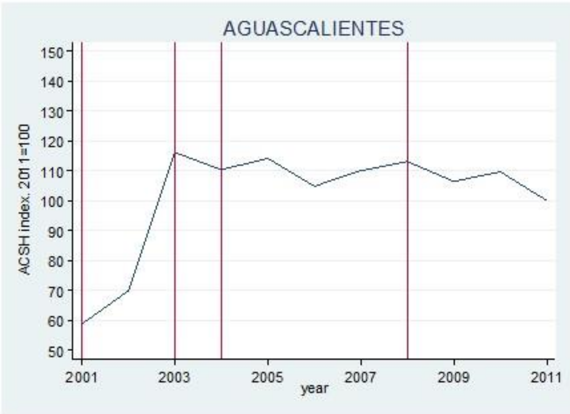
Hence, states can be classified into those with a decreasing or stable ACSH trend after reaching *SP* coverage levels above 50%; states with increasing ACSH trend irrespective of the *SP* coverage level; states with apparent stable ACSH rate throughout the period; and states without a clear ACSH trend. **Table 3.5** shows how states can be classified in these four categories and **Figure 3.3** presents one example of each group indicating the year when each of these states reached and/or passed the 0%, 20%, 50% and 80% *SP* coverage thresholds. High heterogeneity was also found for jurisdictions within states.

Table 3.5: Classification State ACSH index

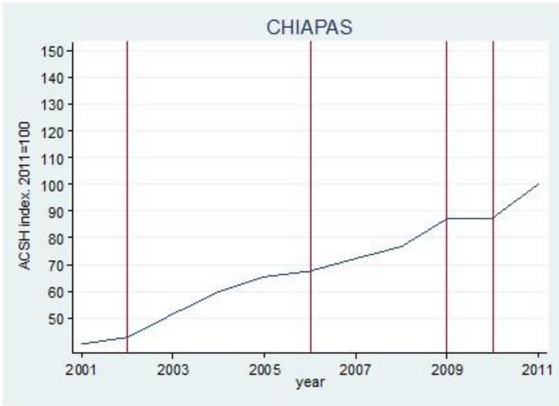
Category	States
Decreasing or relatively stable trend after reaching 50% *Seguro Popular* coverage rate	**Aguascalientes**, Colima, Distrito Federal, Durango, Guanajuato , Jalisco, Nayarit, Querétaro, Quintana Roo, Tabasco, Veracruz
Increasing trend throughout the period irrespective of the *Seguro* Popular coverage level	Coahuila, **Chiapas**, Guerrero, Hidalgo, Estado de México, Michoacán, Nuevo León, Oaxaca, Puebla, Sinaloa, Yucatán
Relatively stable throughout the period	Baja California, Baja California Sur, Morelos, **Tamaulipas**, Zacatecas
No clear trend	Campeche, Chihuahua, **San Luis Potosí**, Sonora, Tlaxcala

Figure 3.3: Ambulatory Care Sensitive Hospitalisations (ACSH) by State with *Seguro Popular* coverage thresholds, 2001-2011[12]

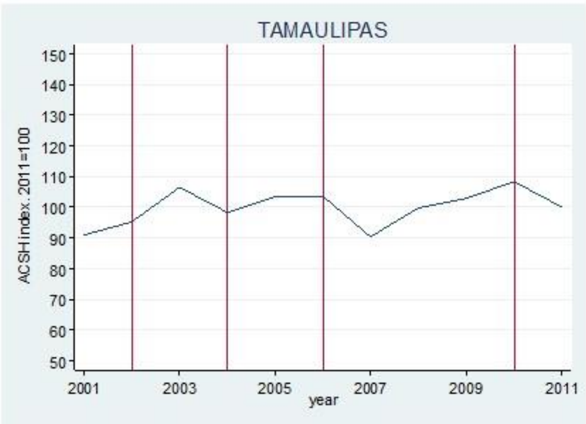
A) Decreasing/ stable ACSH trend after reaching 50% *Seguro Popular* coverage rate



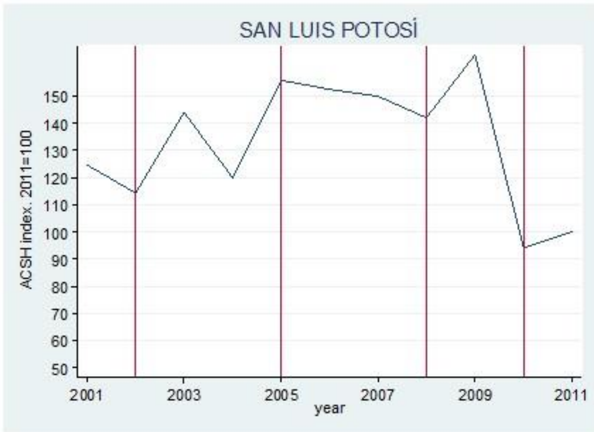
B) Increasing ACSH trend throughout the period irrespective of the *Seguro Popular* coverage level



C) Relatively stable ACSH rate throughout the period



D) Not clear ACSH trend



Notes:

(1) The ACSH rate is presented as proportion of the value of the ACSH rate in 2011 that is equal to 100.
(2) Lines in the graphs show the year when the chosen states reached and/or crossed the *Seguro Popular* coverage thresholds of 0%, 20%, 50% and 80%, respectively.

[12] In the thesis version, figures for all states are reported in Appendix 3.5.

3.2.6 Discussion

The increase in health insurance coverage experienced in Mexico after the Health Reform of 2003 did not lead to a decrease in the ACSH rate, but rather the ACSH rate boomed in the following decade. The analysis conducted suggests that this increase was driven by the expansion in health insurance coverage, at least during the initial expansion stage, as *SP* reached people with chronic conditions without sufficient access to appropriate health care services prior to the coverage expansion whose poorly controlled condition hindered the ability of primary care to avoid ACSHs. Therefore, the increase in ACSHs does not necessarily imply that the primary care services provided is ineffective or of low-quality. Focusing on the increase/decrease of the ACSH rate may not be an appropriate way to measure the effectiveness of primary care services in the Mexican post-reform context. Rather it shows the immediate consequences of years of limited access to primary care that have health and financial implications over both patients and providers that are worth exploring in further studies. This is not the first study to find an increase in the ACSH rate after an expansion in health coverage, Saha et al. (2007) observed a similar trend in preventable hospitalisations after the expansion of Medicaid coverage in Oregon.

The use of this indicator becomes relevant in the Mexican setting when ACSH rates are compared across states because after taking into account differences in the *SP* coverage rate among states and among jurisdictions, there are still unexplained differences in the ACSH rate that may be due to differences in primary care performance. This argument is supported not only by the different trends in ACSH rate during the period studied, but also by the different reactions of the ACSH rate after high *SP* coverage levels are reached. The differences observed in the ACSH rates between and within states reflect serious structural differences in management and primary care infrastructure across states that might have been worsened by the decentralisation processes of the 1980's and 1990's and that the Reform of 2003 has been unable to reduce as it did with the inter-state health-financing gap **(Autrique-Echeveste, 2012)**. Once *SP* coverage rates converge across the country, as a result of achieving universal health coverage in 2012, monitoring and comparing the ACSH rate across states, jurisdictions and facilities as well as complementing this information with primary care utilisation data will provide a clearer picture of the quality of care provided by the state health ministries.

The associations found for age and socioeconomic status are consistent with previous research: the higher the proportion of older population and the poorer socio-economic conditions, the higher is the ACSH jurisdiction rate **(Culler et al., 1998, Finegan et al., 2010, Shi et al., 1999).** It was also found that hospital supply is strongly linked to the ACSH rate; when this result is interpreted jointly with the positive coefficient of the rate of patients coming from different jurisdictions, it suggests that jurisdictions with greater availability of general hospital services attract cases that should be solved at the primary care level.

The lack of association between GP consultations at the state level and the jurisdiction ACSH rate could result from differences in access to and provision of primary care services within states. This explanation of the apparently insignificant association with the ACSH jurisdiction rate could be confirmed by better utilisation data at the jurisdiction level. Finegan et al. (2010) also found no significant association of this factor with the ACSH rate, they argue that effectiveness of primary care is not equivalent to the number of visits *per se* and that GP visits should be complemented with new effective therapies.

This study has some limitations. First, it is possible that data limitations biased the results. Using state level data as a proxy for the data at the jurisdiction level is not ideal and might have led to severe biases in the estimated coefficients of primary care utilisation and condition prevalence rates. A second limitation is that the analysis is subject to the environmental fallacy, since information is only available for individuals being hospitalised and individuals not being hospitalised for any reason (either because they did not need it or because they were not able to access to it) are not considered. This problem will remain without a survey of primary care and hospital utilisation, and future studies will continue to be unable to uncover the real problems of access, quality and effectiveness of health care. Third, this paper only analyses ACSHs in general hospitals run by state health ministries without considering those occurring in smaller public and private hospitals. This decision was made due to the high heterogeneity present in the hospital services offered by smaller hospitals. Even when heterogeneity is still present in general hospitals a comparison among them seems to be more appropriate since in order to be classified as general hospitals they need to meet minimum standards for the number of services offered. Fourth, as with any other study using administrative data, it is vulnerable to coding and measurement errors. However, these data are not used to reimburse hospitals, meaning that hospitals do not have strong incentives for upcoding; thus, the assumption that errors follow a normal distribution and do not introduce significant bias is plausible.

To conclude, it is important to note that despite significant associations between several predisposing, enabling, need and hospital supply factors and the health jurisdiction ACSH rate, an important proportion of the variation in the rate could not be explained with the proposed model. From the dispersion shown in **Table 3.3** (rho) we can infer that the main source of this unexplained variation is the high heterogeneity at the health jurisdiction level; from the figures shown above we can also conclude that the trends vary substantially from state to state. Therefore, this paper suggests that some states and jurisdictions are performing less well than others. As long as large differences in the ACSH rate are not explained, the potential role of the ineffectiveness of primary care and the provision of low-quality services in Mexico cannot be disregarded

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CHAPTER 4. ESTIMATING THE BURDEN OF PREVENTABLE HOSPITALISATIONS

4.1 Preamble to Research Papers 2 and 3

Reducing ACSHs through appropriate primary care not only improves population health, but is also likely to be more cost-effective as cost of care at the outpatient level is less than that in a hospital setting **(Shi et al., 1999)**. Therefore, designing health programmes or strategies that could prevent ACSHs can contribute to improving the allocative efficiency of the health system. In this sense, and since chronic diseases represent a significant share of ACSHs, implementing chronic disease management programmes could reduce healthcare expenditure and improve health outcomes. However, there is a lack of conclusive evidence supporting these suggestions **(de Bruin et al., 2011, Dusheiko et al., 2011b)**.

Results in Chapter 3 showed that diabetic ACSHs account for more than 40% of all preventable hospitalisations in 2001-2011, suggesting that Mexico has an important opportunity when it comes to diabetes management. In fact, as described in Research Paper 3, Mexico is facing a worrying prospect in the light of the diabetes epidemic. As a response to this challenge, the Mexican government has recently launched a number of initiatives to tackle diabetes, high-blood pressure and other chronic diseases, including a national campaign to raise awareness about the importance of primary care and self-management, constitutional reforms prohibiting unhealthy foods in schools, the introduction of “sin taxes” to carbonated drinks and other regulations **(OECD, 2016)**. Regarding specific disease management programmes, in 2008, the Mexican Institute of Social Security (IMSS) created DiabetIMSS, a diabetes management programme, but there has not been a similar national strategy followed by the state health ministries.

DiabetIMSS is a strategic programme offering integral care to IMSS affiliates aged 16 or older and diagnosed with type-2 diabetes mellitus. The goal of this programme is to achieve the metabolic control of the disease and to delay/prevent the onset of diabetic complications. The programme has three components: self-management, primary care and secondary care. The self-management component consists in monthly group meetings of patients where health education (the importance of a healthy diet and of exercise) is given by nurses and physicians of different specialties (family medicine, stomatology, ophthalmology, etc.). The primary care component comprises a visit to the family doctor who monitors the patient and identifies any risk of diabetic complications and, if needed, refer the patient to a specialist (third component). Patients that have already developed chronic kidney disease, diabetic retinopathy, diabetic foot and cognitive impairment are not considered to participate in DiabetIMSS **(Dávila-Torres et al., 2012, Zuñiga-Ramírez et al., 2013)**.

Conducting a cost-effectiveness analysis of these strategies is beyond the scope of this thesis. Rather this work identifies (using readily available data) both the preventable health losses associated with the avoidable conditions that led to hospitalisations and the costs of providing this type of care. This exercise contributes to an understanding of the potential health benefits and cost savings of preventing ACSHs.

This chapter focuses on the burden of preventable diabetic hospitalisations for a number of reasons. First, results in Chapter 3 showed that diabetes is the main condition contributing to ACSHs. Second, diabetes has been the focus of academic, policy and social attention during recent years. Third, the two largest health care institutions in Mexico have different approaches to treat diabetes (with and without diabetes management programme) and a comparison between both is of interest in itself, even if the very different circumstances faced by each institution limit the policy implications from such a comparison. Fourth, the existence of readily available data to estimate both the financial and the health burden of the main diabetic complications.

Chapter 4 addresses research question V by estimating the financial burden of diabetic ACSHs, and by conceptualising and proposing a methodology to estimate the health burden of preventable hospitalisations. The analyses presented in Research papers 2 and 3 represent an attempt to estimate the costs of inefficiency in the treatment of diabetes. In this sense, the consequences of an inefficient use of health resources are related not only with higher levels of expenditure, but with the achievement of poorer health outcomes. As suggested in Research Papers 2 and 3, the measurement of this double burden can inform health financing decision-making, since this double burden might be seen as setting an upper limit to the potential benefit from improving primary care that can be then compared to the costs of policies to improve primary care.

The next section of this chapter presents Research Paper 2 that estimates the diabetic ACSH burden of the patients treated in general hospitals run by the state health ministries. Research Paper 3, in section 4.3, presents the estimation of the financial and health burden of diabetic complications in IMSS.

4.2 Research Paper 2

Title: The financial and health burden of diabetic ambulatory care sensitive hospitalisations in Mexico

Authors: David G. Lugo-Palacios, John Cairns

Affiliation: Department of Health Services Research and Policy, London School of Hygiene and Tropical Medicine, London, UK

Status: Published in: Salud Pública de México

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Student	David Gibran Lugo Palacios
Principal Supervisor	John Cairns
Thesis Title	Analysis of the effectiveness of primary care services and of hospital efficiency in the Mexican health care system

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

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Student Signature: ____________ **Date:** 3 June 2016

Supervisor Signature: John Cairns **Date:** 3 June 2016

Research Paper 2

Title: The financial and health burden of diabetic ambulatory care sensitive hospitalisations in Mexico

Authors: David G. Lugo-Palacios, John Cairns

Candidate contribution: Under the guidance of my supervisor (and co-author), I designed the study, managed the data, conducted the analysis, drafted the manuscript and addressed reviewers' comments.

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En espera de que lo anterior le sea de utilidad, me reitero a sus órdenes.

Atentamente

Carlos Oropeza Abúndez
Editor Ejecutivo

Abstract

Objective: To estimate the financial and health burden of diabetic ambulatory care sensitive hospitalisations (ACSH) in Mexico during 2001-2011.

Materials and methods: We identify ACSH due to diabetic complications in general hospitals run by local health ministries and estimate their financial cost using diagnostic related groups. The health burden estimation assumes that patients would not have experienced complications if they had received appropriate primary care and computes the associated Disability-Adjusted Life Years (DALYs).

Results: The financial cost of diabetic ACSH increased by 125% in real terms and their health burden in 2010 accounted for 4.2% of total DALYs associated with diabetes in Mexico.

Conclusion: Avoiding preventable hospitalisations could release resources within the health system for other health purposes. In addition, patients with ACSH suffer preventable losses of health that should be considered when assessing the performance of any primary care intervention.

Keywords: ambulatory care sensitive hospitalisations; primary care; diabetes; Mexico.

4.2.1 Introduction

Timely, effective and high-quality primary care services can prevent the development or exacerbation of some health conditions which may lead to hospitalisations. These avoidable hospitalisations - ambulatory care sensitive hospitalisations (ACSHs) - have been widely used to study the access to, quality and effectiveness of primary care services **(Ansari, 2007, Lugo-Palacios and Cairns, 2015).** While the financial implications of ACSHs have been studied before for some countries, the preventable losses of health as a consequence of ACSHs have not received attention in the literature. This paper estimates the financial cost of ACSHs in public general hospitals in Mexico and proposes a way to quantify the health burden associated with them.

Although the literature on ACSHs is extensive, few studies have considered the cost they represent to the health system. Culler et al. estimated that Medicare cost savings from eliminating all potentially preventable hospitalisations could have reached 9% of the programme's spending during 1991 **(Culler et al., 1998)**. Analysing nursing home data from New York State, Grabowski et al. found that ACSHs made up 23% of total spending on nursing home hospitalisations **(Grabowski et al., 2007)**. Kim focused on uncontrolled diabetes in the U.S. during 2004 and estimated that approximately 32% of hospital admissions that were primarily a result of diabetes were due to uncontrolled diabetes with a cost amounting to 2.8 billion dollars **(Kim, 2007)**. McFarlane et al. estimated that *"the total economic burden for hospitalisations*" for diabetes and hypertension represented 1.2% of the recurrent budget for the regional health authorities of Jamaica in 2010-2011**(McFarlane et al., 2012)**. No study appears to have estimated the health burden of suffering ACSHs.

Worldwide, most ACSHs are associated with chronic diseases; in Mexico, previous studies show that diabetes is the most important cause of ACSH **(Lugo-Palacios and Cairns, 2015, Rodríguez Abrego et al., 2012, Secretaría de Salud, 2012)**. The prevalence of diabetes has risen dramatically during recent decades and its high costs and serious health consequences have made it a public health priority **(Arredondo and De Icaza, 2011, Barraza-Lloréns et al., 2015)**. This paper focuses on the costs of five diabetic complications assumed to be avoidable through timely and effective primary care.

The economic burden of diabetes in Mexico has been analysed in several studies **(Arredondo and Reyes, 2013, Barquera et al., 2013, Barraza-Lloréns et al., 2015).** In the most recent report, Barraza-Lloréns et al. (2015) estimated that in 2013 this burden, including direct and indirect costs, was MXN$362,859.8 million accounting for 2.25% of GDP. Direct costs were estimated as MXN$179,495.3 million of which medical care for the main diabetic complications represented 87%.

The health burden of diabetes in 2010 was estimated as 1,614,486 DALYs, representing the first and the fourth cause of DALYs for females and males, respectively **(Lozano et al., 2013).** Clearly diabetes imposes an important pressure on both public finance and population health in Mexico, one which is expected to increase with the continuing rise in the prevalence of diabetes **(Arredondo and De Icaza, 2011)**. While primary care does not necessarily prevent the development of diabetes, appropriate management can prevent the main complications of the disease. The aim of this paper is, therefore, to identify the avoidable component of these burdens as an effort to contribute to understanding and improving the efficiency with which healthcare resources are used in Mexico.

4.2.2 Data and Methods

The analysis uses hospital discharge data for the period 2001-2011 from general hospitals run by local health ministries **(Secretaria de Salud, 2013b).** Data on diagnosis and medical procedures, among other variables, were recorded for each discharge, but it is not possible to link patient episodes since unique ID numbers are not available.

Hospitalisations of patients 20 years or older due to five complications of diabetes (retinopathy, kidney failure, neuropathy and diabetic foot) were identified through the ICD-10 code of the main diagnosis in each case. If a patient experienced an amputation procedure and his main hospitalisation diagnosis was any of the ICD-10 codes reported in **Table 4.1**, it was classified as a diabetic amputation and also considered in this analysis.

The economic burden of ACSHs is formed by the value of the resources needed to provide this type of care instead of using them in other interventions and by the effects of an ACSH on the participation and performance in the labour market of those suffering them. This study focuses only on the first component using the financial cost of the hospital care received. The health burden of an ACSH could be represented by the effects on the disability suffered by patients with ACSHs that would not have been hospitalised if they had received appropriate primary care.

The hospital discharges database does not include cost data that could be used to estimate inpatient day costs; hence, this study uses the Diagnostic Related Group (DRG) system from the Mexican Institute of Social Security (IMSS) to estimate the financial costs of ACSH due to diabetic complications in general hospitals run by local health ministries **(Echevarría Zuno et al., 2011).** Thus, costs in IMSS hospitals are assumed similar to those operated by local health ministries. Arredondo and De Icaza estimated, however, that IMSS average diabetic hospitalisations costs are 1.8 times the costs of the Ministry of Health **(Arredondo and De Icaza, 2011).** They indicate that the difference in costs can be mainly explained by differences in case management protocols, in productivity standards, in quality standards and in cost of inputs. Consequently, this study uses the full IMSS-DRG cost to estimate the upper bound of the ACSH financial costs in local health ministries, but also presents the results using 56% of the IMSS-DRG costs (as suggested by Arredondo and De Icaza). Since IMSS-DRG data are only available for 2013, the assumption is that IMSS-DRG costs only changed due to inflation during the study period.

Table 4.1: Diabetic ICD-10 Codes and DRG classification

ICD-10 of Diabetic Complications		DRG	IMSS DRG 2013 Cost (MXN)
Kidney Failure	E10.2, E11.2, E12.2, E13.2, E14.2	698 – Other kidney and urinary tract diagnostics with major complications	71,066
Retinopathy	E10.3, E11.3, E12.3, E13.3, E14.3	125 – Other eye disorders	22,820
Neuropathy	E10.4, E11.4, E12.4, E13.4, E14.4	074 – Cranial and peripheral nerve disorders with no major complications	37,494
Diabetic Foot	E10.5, E11.5, E12.5, E13.5, E14.5	301 – Peripheral vascular disorders	46,057
Amputation	Any Diabetic code + CIE-9CM: 84.1, 84.10, 84.11, 84.14, 84.15, 84.17, 84.19	Low limb amputation secondary to diabetic foot	58,831
All Diabetic Hospitalisations ICD-10 Codes			
E10.9, E11.9, E12.9, E13.9, E14.9, E10.0, E10.1, E10.6, E10.7, E10.8, E11.0, E11.1, E11.6, E11.7, E11.8, E12.0, E12.1, E12.6, E12.7, E12.8, E13.0, E13.1, E13.6, E13.7, E13.8, E14.0, E14.1, E14.6, E14.7, E14.8, E10.5, E11.5, E12.5, E13.5, E14.5, E10.3, E11.3, E12.3, E13.3, E14.3, E10.2, E11.2, E12.2, E13.2, E14.2, E10.4, E11.4, E12.4, E13.4, E14.4			

Source: Lugo-Palacios and Cairns (2015), IMSS (2011), IMSS Medical-Economic Forms.

Some of the ICD-10 codes analysed can be classified in more than one DRG; the decision of which DRG to use in each case was based on the DRG that included all the ICD-10 codes related to the complication. The costs of the DRGs selected were taken from the IMSS Medical-Economic Forms. Since diabetic amputations are defined as those hospitalisations where the main cause was any diabetic ICD-10 code where the patient suffered an amputation, only the cost of the surgical procedure was considered since this intervention represents additional costs not previously accounted for. The latter cost was obtained from a joint effort in 2012 to produce maximum referral tariffs by the four main health care institutions in Mexico **(Secretaría de Salud et al., 2012). Table 4.1** shows the DRG classification and costs for all the ICD-10 codes considered in this analysis.

It is important to note that IMSS-DRG costs are currently used by IMSS as a reference and do not necessarily represent what IMSS hospitals are really expending on each treatment. In addition, IMSS-DRG costs do not consider rural-urban nor big-small city price differentials. Despite these drawbacks of using IMSS-DRG costs as proxy of hospital care costs in local health ministries, they are still considered the best available costing data to conduct this study.

The estimation of the health burden assumes that patients would not have experienced complications if they had received appropriate primary care and computes the associated Disability-Adjusted Life Years (DALYs). Disability weights for diabetic foot, neuropathy, kidney failure – stage IV, amputation of toe, amputation of one leg, and amputation of both legs were taken from **(Global Burden of Disease Study 2010, 2012).** The weight for retinopathy-blindness was taken from the Global Burden of Disease 2004 Update, since the 2010 version did not report a weight for this condition **(World Health Organization, 2008).** Due to lack of detail concerning the severity of the condition from hospitalised patients (e.g. degree of kidney failure or seriousness of retinopathy) and the absence of disability weights for different severity levels, only one level of disability (equal to the available weight in each case) is considered for patients whose main hospitalisation diagnosis was kidney failure, retinopathy, neuropathy and diabetic foot. This clearly overestimates the DALYs associated with these conditions and, thus, should be interpreted as the upper bound of the health burden of ACSHs resulting from diabetic complications. WHO data on the life expectancy at age with the lowest mortality observed worldwide are used to compute the Years of Life Lost (YLL) and Years Lived with Disability (YLD) **(Lozano et al., 2013, World Health Organization, 2015).**

Some hospitalised patients whose main diagnosis was kidney failure, neuropathy, retinopathy and diabetic foot also suffered amputations. Hence, to avoid double counting of deaths while computing YLL it was necessary to define the variable "net amputation" indicating those diabetic amputations in which the main hospitalisation cause was none of the other complications analysed; therefore, amputation YLL are based on net amputations. However, when computing YLD the total number of people suffering amputations was used, since amputations will contribute to their disability; in this case, patients with diabetic foot without amputations (net diabetic foot) were used to compute diabetic foot YLD.

4.2.3 Results

Table 4.2 shows the composition of ACSHs due to diabetic complications during 2001-2011. A total of 195,778 hospitalisations met the described criteria and account for 52% of total diabetic ACSHs and 21% of total ACSHs identified by **(Lugo-Palacios and Cairns, 2015)**. Total ACSHs due to diabetic complications increased by more than 130% over the period. While kidney failure and amputation discharges seemed to reach a plateau after 2008, hospitalisations for diabetic foot increased throughout the whole period (by 163% overall).

Financial Costs

Table 4.3 shows the estimated financial costs of ACSHs as a result of diabetic complications. Scenario 1 uses the full IMSS-DRG costs as proxy for local health ministries' hospital care costs; Scenario 2, uses adjusted costs as described previously.

Financial costs of ACSH due to diabetic complications increased 125% in real terms during 2001-2011. Measured as cost per person with no social security (major demanders of the services provided by the analysed hospitals), the costs in scenario 1 increased by 95.4% from 11.04 MXN in 2001 to 21.6 MXN in 2011. Diabetic foot hospitalisation costs exhibit a continuous increasing trend throughout the period growing by more than 160% and surpassed kidney failure hospitalisations from 2010 onwards as the most important contributor to the cost of ACSHs from diabetic complications; by 2011 diabetic foot hospitalisation costs were more than 80 times the retinopathy costs and more than 30 the neuropathy costs.

Health Burden

The estimated DALYs associated with diabetic complications ACSH are presented in **Table 4.4**. Overall, DALYs increased by 112% in 2001-2011. Kidney failure is the complication with the highest health burden. In 2011 DALYs associated with diabetic amputation (the complication with the second highest health burden) represented only 29% of the kidney failure DALYs.

During the study period, the difference between the health burden caused by kidney failure and the burden associated with the rest of the complications increased. However, YLL and YLD, show different trends during this period (the disaggregation of DALYs in YLL and YLD is available upon request).[13] On the one hand, the difference between kidney failure YLL and the second cause of YLL, diabetic foot, rose 161% with this gap broadening in the last three years due to a continuous increase in kidney failure YLL and a stable trend in diabetic foot YLL. On the other hand, the difference between kidney failure YLD and the second cause of YLD, amputation, grew 15% during 2001-2011, but in the last four years this difference narrowed as the trend in kidney failure YLD remained relatively stable while the amputation YLD experienced a 26% increase.

With the exception of neuropathy, the health burden of all complications increased by more than 100%; the most dramatic increment was amputation DALYs which increased by 142% from more than 5,000 DALYs in 2001 to almost 13,000 in 2011.

Figure 4.1 presents, graphically, the behaviour of the financial and health burden for each of the complications analysed. It shows that both financial and health burden for kidney failure and amputation seemed to have reached a plateau in the last four years. Diabetic foot and retinopathy show no major changes in the health burden in the last years of the period although their financial cost rose, especially in the case of diabetic foot.

[13] See Appendix 4.1.

Table 4.2: Diabetic ACSHs in Mexico 2001-2011. Hospital Discharges

Complication	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Kidney Failure	3,682	4,045	4,330	4,332	4,900	5,142	5,835	7,006	6,987	6,640	6,563	**59,462**
Retinopathy	130	140	128	96	175	221	174	175	158	138	292	**1,827**
Neuropathy	274	318	279	362	407	412	353	429	466	422	432	**4,154**
Diabetic Foot	4,520	5,140	5,717	6,056	6,815	7,468	8,243	9,461	10,139	11,352	11,883	**86,794**
Amputation[a]	2,215	2,386	2,897	3,092[b]	3,505	3,863	4,110	4,831	4,941	5,806	5,895	**43,541**
TOTAL	**10,821**	**12,029**	**13,351**	**13,938**	**15,802**	**17,106**	**18,715**	**21,902**	**22,691**	**24,358**	**25,065**	**195,778**

Source: Authors using data from Sistema Nacional de Información en Salud (2012)

Notes:

a) Some diabetic patients suffered more than one amputation. In that case, they are counted as different surgical procedures, but only contributed with one discharge to their hospitalisation type (for example, one patient with diabetic foot had two different amputations, they are counted as two amputations procedures but only one diabetic foot discharge)

b) In 2004, only 129 amputations were reported. However, this number is not consistent with the observed trend possibly due to an error in the records. The number used in this study was imputed by obtaining the average for 2003 and 2005 of the ratio of amputation procedures to total diabetic foot hospitalisations. The 2004 ratio used is less than one standard deviation from the mean of the values observed in 2001-2003 and 2005-2011.

Table 4.3: Financial ACSH Cost (2011 Million MXN[a]).

Scenario 1: Full IMSS DRG Cost											
Complication	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Kidney Failure	243.01	266.97	285.79	285.92	323.40	339.36	385.10	462.39	461.12	438.21	433.13
Retinopathy	2.76	2.97	2.71	2.03	3.71	4.68	3.69	3.71	3.35	2.92	6.19
Neuropathy	9.54	11.07	9.72	12.61	14.17	14.35	12.29	14.94	16.23	14.69	15.04
Diabetic Foot	193.34	219.85	244.54	259.04	291.50	319.42	352.57	404.67	433.66	485.53	508.25
Amputation	121.02	130.36	158.29	168.92	191.50	211.05	224.55	263.95	269.95	317.20	322.07
TOTAL	**569.66**	**631.22**	**701.04**	**728.52**	**824.28**	**888.86**	**978.20**	**1,149.66**	**1,184.30**	**1,258.56**	**1,284.68**
Scenario 2: 56% of IMSS DRG Cost[b]											
Kidney Failure	136.09	149.50	160.04	160.11	181.10	190.04	215.65	258.94	258.23	245.40	242.56
Retinopathy	1.54	1.66	1.52	1.14	2.08	2.62	2.07	2.08	1.88	1.64	3.47
Neuropathy	5.34	6.20	5.44	7.06	7.94	8.03	6.88	8.37	9.09	8.23	8.42
Diabetic Foot	108.27	123.12	136.94	145.06	163.24	178.87	197.44	226.62	242.85	271.90	284.62
Amputation	67.77	73.00	88.64	94.60	107.24	118.19	125.75	147.81	151.17	177.63	180.36
TOTAL	**319.01**	**353.49**	**392.58**	**407.97**	**461.59**	**497.76**	**547.79**	**643.81**	**663.21**	**704.80**	**719.42**

Notes:

a) 2013 IMSS DRG costs were transformed to 2011 MXN using annual inflation rates published by the National Institute of Geography and Statistics - INEGI (available at http://www.inegi.org.mx/sistemas/indiceprecios/CalculadoraInflacion.aspx). The only change assumed in the costs during this period was inflation.

b) 56% of the cost of each of the IMSS DRGs selected was used to obtain Scenario 2 results, adjusting by the cost-differential suggested by Arredondo and De Icaza (2011).

Table 4.4: Disability Adjusted Life Years (DALYs) associated with Diabetic complications ACSH. Mexico 2001-2011.[a]

Complications	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Kidney Failure	21,517	24,450	24,790	25,199	29,734	30,258	35,295	45,165	43,421	42,623	44,356
Retinopathy	2,526	2,954	2,417	1,877	3,384	3,954	3,285	3,366	3,026	2,528	5,457
Neuropathy	1,236	1,217	1,145	1,420	1,534	1,728	1,612	1,875	2,208	2,135	1,941
Diabetic Foot	3,415	5,194	4,505	4,646	3,692	5,330	5,900	6,107	7,120	7,431	7,410
Amputation	5,372	5,683	7,289	7,902[b]	8,303	9,310	9,192	11,684	11,227	13,295	12,976
TOTAL	**34,067**	**39,498**	**40,145**	**41,044**	**46,647**	**50,580**	**55,284**	**68,197**	**67,002**	**68,013**	**72,140**

Notes:

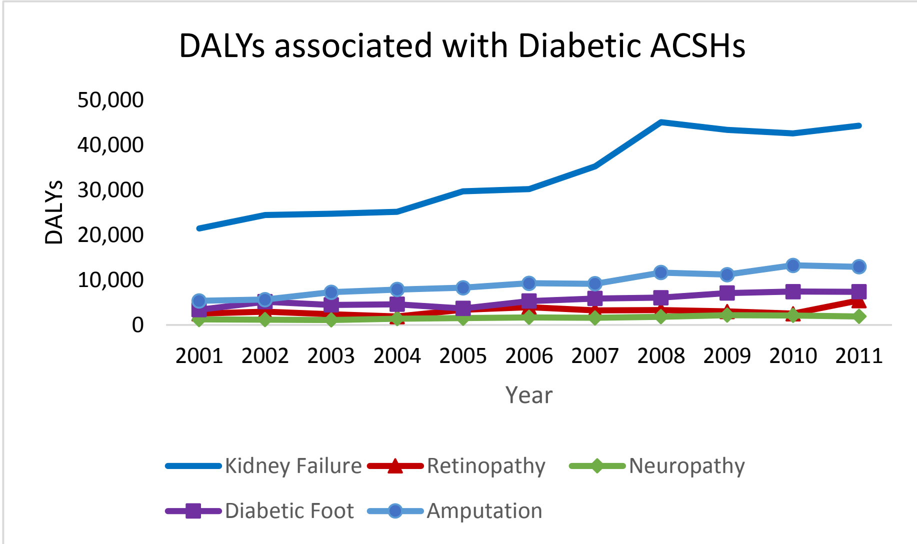
a) Disaggregation of DALYs in years of life lost (YLL) and years lived with disability (YLD) is available upon request.

b) In 2004 only 129 amputations were reported. However, this number is not consistent with the observed trend possibly due to an error in the records. The number used in this study was imputed by obtaining the average for 2003 and 2005 of the ratio of amputation procedures to total diabetic foot hospitalisations. For computing the years of life lost, the average for 2003 and 2005 of the ratio yll amputation to yll diabetic foot was used in 2004. For computing YLD (both for amputation and diabetic foot), the average of observed values in 2003 and 2005 was used because net diabetic foot is affected by amputations and if the latter is underestimated the former will be over recorded.

Figure 4.1: Financial Cost and Health Burden of Diabetic ACSH. Mexico 2001-2011.

Exhibit a)

Exhibit b)



4.2.4 Discussion

Despite promotion and prevention efforts to improve the control of diabetes across the Mexican health system, the financial and the health burden of ACSH associated with diabetic complications increased dramatically in 2001-2011. Some factors, not necessarily related to the effectiveness of primary care, can explain this rise. First, the prevalence of the disease grew importantly from 5.8% in 2000 to 9.17% in 2012, thus, increasing the demand for diabetes care **(Hernández-Ávila et al., 2013).** Second, the gradual health insurance expansion fostered by the 2003 Health Reform improved access for people with poorly controlled chronic conditions for whom preventable hospitalisations could not be avoided by the time they sought health care **(Lugo-Palacios and Cairns, 2015).** However, whether or not the ACSH rate is a valid indicator of the performance of an expanding primary care system, the financial and health burden of ACSHs requires attention since this double burden highlights an inefficient use of health resources and should be seen as a future reallocation target to improve the value for the money invested in health care in Mexico.

This paper found that financial costs of ACSH associated with diabetic complications have continuously increased but that the trend differs by complication. It is worth highlighting that the most worrying case is the one of diabetic foot, a complication that can easily be avoided through basic primary care but that it is still the leading cause of hospitalisation among the complications analysed; moreover, in 2010 and 2011 this complication became the most costly of the ACSHs due to diabetic complications.

It is important to emphasise the relevance of the magnitude of the financial costs of diabetic ACSH within the Mexican context. The estimated costs under Scenario 1 reached in 2011 almost 1,300 million MXN (approximately 105 million USD) equivalent to the *Seguro Popular* federal transfers to the state of Tabasco in that year (that had at that time more than 1.5 million *Seguro Popular* beneficiaries) and to 0.83% of the total direct costs of treating the main complications of diabetes in 2013 in Mexico estimated by Barraza-Lloréns et al. **(Barraza-Lloréns et al., 2015, Comision Nacional de Protección Social en Salud, 2011a).**

As a novel approach to ACSH, this paper also estimated the health burden of diabetic complications ACSH. In 2010, this health burden was estimated to be more than 68,000 DALYs accounting for 4.2% of total DALYs associated with diabetes in Mexico **(Lozano et al., 2013).**

Given the WHO cost-effectiveness criterion (an intervention is highly cost-effective if the cost of averting one DALY is less than or equal to GDP per capita), in 2011 it would have been cost-effective to spend up to $Int1,146.1 million on primary care interventions that could avert the DALYs associated with diabetic complications; if DALYs are discounted at the annual rate of 3%, then the threshold is $Int718.4 million ($Int stands for 2011 international dollars) **(Salomon et al., 2012).** This approach clearly highlights the importance of the health burden of diabetic ACSHs.

The present paper is subject to the following limitations. First, due to the lack of cost data from local health ministries, IMSS-DRG costs were used as proxy which could represent an overestimate of the real hospitalisation costs observed in local health ministries. With the intention of alleviating the potential bias, this paper followed Arredondo and De Icaza and assumed that costs at local health ministries are 56% of IMSS costs. Second, this study assumes a homogenous system in the provision of care when in practice there are 32 sub-systems (one per state) that can face different costs and different diabetes prevalence rates **(Hernández-Ávila et al., 2013).**

Consequently this analysis may over-estimate the hospitalisation costs in some areas and under-estimate them in others. For this reason, figures are reported at the national level such that, on average, these over-and underestimations are balanced. Third, this analysis does not estimate the indirect costs of diabetic ACSH that would include the productivity implications of premature mortality, permanent and temporary disability. Fourth, given that the hospital discharge database does not record the severity of the condition for which patients were hospitalised, and also owing to the lack of disability weights for different severity levels of certain conditions, such as kidney failure and retinopathy, all kidney failure and retinopathy admissions were assumed to have the same severity level: stage IV and blindness, respectively. This assumption clearly overestimates the associated DALYs and, therefore, should be taken as an upper bound of the health burden associated with ACSH due to diabetic complications, a sensitivity analysis of this assumption is available upon request. Fifth, since it is not possible to identify when a patient was discharged more than once in the same year or during the study period, DALYs will be double-counted when patients are admitted more than once for the same cause. Finally, DALYs may also be overestimated due to the assumption that a complication avoided in one period is avoided for the rest of the patient's life.

Avoiding preventable hospitalisations potentially releases resources within the health system making them available for other health purposes, but providing the services that could prevent these hospitalisations implies investment in primary care not taken into account in this study. This paper showed that the health burden associated with diabetic ACSHs is important and should be consider, in addition to financial costs, in primary care decision making. Sound evidence of what works to prevent ACSHs is crucial to ensure the efficient allocation of resources in primary care. Therefore, further research on the evaluation of national campaigns aiming to improve both the delivery of primary care and patients' adherence to treatments that consider both the financial and the health burden of ACSH is needed to better understand the extent to which Mexicans are getting value for their money invested in health.

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4.3 Research Paper 3

Title: Measuring the burden of preventable diabetic hospitalisations in the Mexican Institute of Social Security (IMSS)

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Student	David Gibran Lugo Palacios
Principal Supervisor	John Cairns
Thesis Title	Analysis of the effectiveness of primary care services and of hospital efficiency in the Mexican health care system

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

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Where is the work intended to be published?	BMC Health Services Research
Please list the paper's authors in the intended authorship order:	David G. Lugo-Palacios, John Cairns, Cynthia Masetto
Stage of publication	**Undergoing revision**

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	See next page.

Student Signature: [signature] **Date:** 3 June 2016

Supervisor Signature: John Cairns **Date:** 3 June 2016

Research Paper 3

Title: Measuring the burden of preventable diabetic hospitalisations in the Mexican Institute of Social Security (IMSS)

Authors: David G. Lugo-Palacios, John Cairns, Cynthia Masetto

Candidate contribution: JC and I designed the study. I conducted the data management, the data analysis, the results interpretation and drafted the manuscript. CM contributed to the data management and provided further inputs. JC contributed to the interpretation and edited the manuscript before finalisation.

Abstract

Background: The prevalence of diabetes among adults in Mexico has increased markedly from 6.7% in 1994 to 14.7% in 2015. Although the main diabetic complications can be prevented or delayed with timely and effective primary care, a high percentage of diabetic patients have developed them imposing an important preventable burden on Mexican society and on the health system. This paper estimates the financial and health burden caused by potentially preventable hospitalisations due to diabetic complications in hospitals operated by the largest social security institution in Latin America, the Mexican Institute of Social Security (IMSS), in the period 2007-2014.

Methods: Hospitalisations in IMSS hospitals whose main cause was a diabetic complication were identified. The financial burden was estimated using IMSS diagnostic-related groups. To estimate the health burden, DALYs were computed under the assumption that patients would not have experienced complications if they had received timely and effective primary care.

Results: A total of 322,977 hospitalisations due to five diabetic complications were identified during the period studied, of which hospitalisations due to kidney failure and diabetic foot represent 78%. The financial burden increased by 8.4% in real terms between 2007 and 2014. However, when measured as cost per IMSS affiliate, it decreased by 11.3%. The health burden had an overall decrease of 13.6% and the associated DALYs in 2014 reached 103,688.

Conclusions: Resources used for the hospital treatment of diabetic complications are then not available for other health care interventions. In order to prevent these hospitalisations more resources might need to be invested in primary care; the first step could be to consider the financial burden of these hospitalisations as a potential target for switching resources from hospital care to primary care services. However, more evidence of the effectiveness of different primary care interventions is needed to know how much of the burden could be prevented by better primary care.

Keywords: preventable hospitalisations; primary care; diabetes; diabetic complications; Mexico.

4.3.1 Background

People with diabetes are at higher risk of developing disabling and life-threatening health problems than people without diabetes **(International Diabetes Federation, 2015)**. However, diabetes complications can be prevented or delayed by maintaining good control of blood glucose, blood pressure and cholesterol levels **(International Diabetes Federation, 2015)**. Many complications can be detected at an early stage allowing treatment that can prevent the condition becoming more serious and more costly **(International Diabetes Federation, 2015)**. The high economic cost and the effect on the quality of life of the population with diabetic complications impose an important preventable burden on Mexican society and on its health system **(Lugo-Palacios and Cairns, 2016)**. The resources that are allocated to the treatment of these complications (specifically hospitalisations) are then not available for other health care interventions. This paper estimates the financial and health burden caused by potentially preventable hospitalisations due to diabetic complications in hospitals operated by the Mexican Institute of Social Security (IMSS) in the period 2007-2014.

The percentage of the Mexican population living with diabetes has increased markedly during recent decades. In 1994, the prevalence of diabetes was 6.7%, in 2000 it grew to 7.5% and in 2006 it reached 14.4% **(Barquera et al., 2013)**. The overall prevalence of diabetes among adults aged 20-79 in Mexico in 2015 was 14.7% and Mexico ranks sixth worldwide for number of adults with diabetes (11.5 million adults) with 3.9 million having undiagnosed diabetes **(International Diabetes Federation, 2015).**

According to Hernández-Ávila et al. (2013), 14.3% of the diabetic population in Mexico do not receive medical treatment; moreover, in 2012 only 25% of those diagnosed were under metabolic control **(Flores-Hernández et al., 2013, Hernández-Ávila et**

al., 2013). The poor control of diabetes has resulted in a high number of complications: 46.9% of diabetic patients have a diagnosis of hypertension; 47.6% have decreased vision; 13.9% present retinal damage; 6.6% have lost their sight; 1.4% receive haemodialysis because of kidney failure; 2% have suffered an amputation and 2.8% a cardiac arrest **(Hernández-Ávila et al., 2013)**.

Diabetes is considered to be an ambulatory care sensitive condition where early diagnosis and the follow-up and monitoring of the condition can prevent exacerbation of the disease which may lead to hospitalisation **(Caminal et al., 2004, Lugo-Palacios and Cairns, 2015)**. Moreover, timely detection and good control of diabetes is central to preventing diabetes progression and the development of vascular complications **(Dusheiko et al., 2011a)**. Thus, the low compliance with national diabetes control guidelines and the high prevalence of diabetic complications suggest that the Mexican primary care system as a whole may have been overwhelmed by the diabetes epidemic **(Jiménez-Corona et al., 2013).**

The economic burden of diabetes in Mexico has been analysed in several studies **(Arredondo and Reyes, 2013, Barquera et al., 2013, Barraza-Lloréns et al., 2015, Figueroa-Lara et al., 2016).** Barraza-Lloréns et al. (2015) estimated that in 2013 this burden, including direct and indirect costs, was MXN$362,860 million accounting for 2.25% of GDP. Direct costs were estimated as MXN$179,495 million of which medical care for the main diabetic complications represented 87% **(Barraza-Lloréns et al., 2015)**. Lugo-Palacios and Cairns (2016) show that during 2001-2011 hospitalisation costs due to five diabetic complications (kidney failure, retinopathy, neuropathy, diabetic foot and amputation) increased by 125%, in general hospitals run by state health ministries, reaching MXN$1,284.7 million in 2011.

The health burden of diabetes in 2013 was estimated to be 1,903,650 Disability-Adjusted Life Years (DALYs) **(Global Burden of Disease Study 2013, 2016).** The health burden of hospitalisations due to diabetic complications in general hospitals run by state health ministries, accounted for 4.2% of total DALYs associated with diabetes in Mexico in 2010 and increased over the period 2001-2011 by 112% **(Lugo-Palacios and Cairns, 2016)**.

The financial cost of the hospital care provided can be considered to be a proxy for the direct economic burden of preventable hospitalisations. The health burden of these hospitalisations can be estimated by the disability suffered by patients with diabetic complications that would not have been incurred if they had received appropriate primary care **(Lugo-Palacios and Cairns, 2016)**. Whether these hospitalisations are related to low-quality primary care, non-adherence to the recommended treatments or to easy access to secondary care through the emergency department they are, in principle, preventable at the primary level, and their presence suggests a failure of the primary care system, which includes providers, patients and health authorities, not only the primary care team.

This paper analyses the financial and health burden imposed by potentially preventable diabetic hospitalisations in IMSS hospitals. IMSS is the largest social security institution in Latin America providing health care and other social security services to more than 59 million beneficiaries from the ordinary scheme, (accounting for 49% of the Mexican population). IMSS has recently designed and implemented a strategic plan that is intended to improve quality, health outcomes, and patient satisfaction while assuring IMSS's financial sustainability in the short, medium, and long run **(González Anaya and García Cuéllar, 2015)**. Assessing the effect of these strategies on diabetic complications is, however, beyond the scope of this study. The objective of this paper is to extend the work done by Lugo-Palacios and Cairns (2016) to the IMSS case by estimating the magnitude and trend of the financial and health burden associated with potentially preventable diabetic hospitalisations while avoiding double-counting of the health burden due to multiple discharges.

4.3.2 Data and Methods

This analysis follows the methodology proposed by Lugo-Palacios and Cairns (2016) and uses hospital discharge data for the period 2007-2014 from six types of IMSS general hospitals: sub-zone general hospitals; zone general hospitals; regional general hospitals; and sub-zone, zone and regional hospitals with a primary care unit. Data on medical procedures, main and secondary diagnoses, as well as the code of the unit where the patient is registered to receive primary care, among other variables, were recorded for each discharge **(División de Información en Salud and Coordinación de Planeación en Salud, 2015b)**. Importantly, multiple discharges for the same patient can be identified. IMSS has a well-structured information system for recording every single hospital discharge across medical units which ensures the quality of the recorded data **(División de Información en Salud and Coordinación de Planeación en Salud, 2015a)**.

Hospitalisations of patients 20 years or older due to five complications of diabetes (retinopathy, kidney failure, neuropathy, diabetic foot and diabetic amputations) were identified through the ICD-10 code of the main diagnosis in each case. Amputations where the main hospitalisation diagnosis was any of the diabetic codes considered in this study, were classified as diabetic amputations and included in the analysis.

To estimate the financial cost of preventable diabetic hospitalisations in IMSS hospitals this study uses the IMSS Diagnostic-Related Group (DRG) system

(Echevarría Zuno et al., 2011). When the ICD-10 code could be assigned to more than one DRG, the decision on which DRG to use was based on the DRG that included all the ICD-10 codes related to the complication. With the exception of diabetic amputations, the DRG costs were taken from the IMSS Medical-Economic Forms where cost estimates for each DRG are reported. Since diabetic amputations are defined as those hospitalisations where the main diagnosis was any diabetic ICD-10 code where the patient suffered an amputation, only the cost of the surgical procedure was considered as this intervention represents additional costs not previously accounted for in the DRG cost. The latter cost was obtained from the inter-institutional maximum referral tariffs **(Secretaría de Salud et al., 2012). Table 4.5** shows the DRG classification and costs for all the ICD-10 codes considered in this analysis. IMSS-DRG cost data are only available for 2013, thus, it was necessary to assume that IMSS-DRG costs only changed due to inflation during the study period.

The estimation of the health burden assumes that patients would not have experienced complications if they had received appropriate primary care and computes the associated DALYs. Disability weights for diabetic foot, neuropathy, kidney failure – stage IV, amputation of toe, amputation of one leg, and amputation of both legs were taken from the Global Burden of Disease Study 2010 **(Global Burden of Disease Study 2010, 2012).** The weight for retinopathy-blindness was taken from the Global Burden of Disease 2004 Update, since the 2010 version did not report a weight for this condition **(World Health Organization, 2008).** Due to lack of detail concerning the severity of the condition of hospitalised patients (e.g. degree of kidney failure or seriousness of retinopathy) and the absence of disability weights for different severity levels, only one level of disability (equal to the available weight in each case) is considered for patients whose main hospitalisation diagnosis was kidney failure, retinopathy, neuropathy and diabetic foot. WHO data on the life expectancy at age with the lowest mortality observed worldwide are used to compute the Years of Life Lost (YLL) and Years Lived with Disability (YLD) **(Lozano et al., 2013, World Health Organization, 2015).**

Table 4.5: Diabetic ICD-10 Codes and DRG classification

ICD-10 of Diabetic Complications		DRG	IMSS DRG 2013 Cost (MXN)
Kidney Failure	E10.2, E11.2, E12.2, E13.2, E14.2	698 – Other kidney and urinary tract diagnostics with major complications	71 066
Retinopathy	E10.3, E11.3, E12.3, E13.3, E14.3	125 – Other eye disorders	22 820
Neuropathy	E10.4, E11.4, E12.4, E13.4, E14.4	074 – Cranial and peripheral nerve disorders with no major complications	37 494
Diabetic Foot	E10.5, E11.5, E12.5, E13.5, E14.5	301 – Peripheral vascular disorders	46 057
Amputation	Any Diabetic code + CIE-9CM: 84.1, 84.10, 84.11, 84.14, 84.15, 84.17, 84.19	Low limb amputation secondary to diabetic foot	58 831

All Diabetic Hospitalisations ICD-10 Codes
E10.9, E11.9, E12.9, E13.9, E14.9, E10.0, E10.1, E10.6, E10.7, E10.8, E11.0, E11.1, E11.6, E11.7, E11.8, E12.0, E12.1, E12.6, E12.7, E12.8, E13.0, E13.1, E13.6, E13.7, E13.8, E14.0, E14.1, E14.6, E14.7, E14.8, E10.5, E11.5, E12.5, E13.5, E14.5, E10.3, E11.3, E12.3, E13.3, E14.3, E10.2, E11.2, E12.2, E13.2, E14.2, E10.4, E11.4, E12.4, E13.4, E14.4

Source: Lugo-Palacios and Cairns (2016).

Some hospitalised patients whose main diagnosis was kidney failure, neuropathy, retinopathy and diabetic foot also suffered amputations. Hence, to avoid double counting of deaths while computing YLL it was necessary to define the variable "net amputation" indicating those diabetic amputations in which the main cause of hospitalisation was none of the other complications; therefore, amputation YLL are based on net amputations. However, when computing YLD the total number of people suffering amputations was used, since amputations will contribute to their disability; in this case, patients with diabetic foot without amputations (net diabetic foot) were used to compute diabetic foot YLD.

4.3.3 Results

Table 4.6 shows the composition of hospitalisations due to diabetic complications in IMSS general hospitals during 2007-2014. A total of 322,977 hospitalisations met the described criteria, of which hospitalisations due to kidney failure and diabetic foot represent 78%. Hospitalisations due to diabetic complications increased by 10.3% over this period. Total hospitalisations caused by diabetic complications per 10,000 IMSS affiliates (not shown), decreased by 9.8% from 7.91 in 2007 to 7.13 in 2014, reaching a maximum (8.15) in 2008 and a minimum (6.96) in 2013.

From **Table 4.6** it can also be observed that the percentage of multiple admissions/discharges for the same complication in the current year oscillates around 15% of the total. Only 3% of diabetic neuropathy hospitalisations per year fall into this classification. Whereas, multiple discharges in the same year are more important in the case of kidney failure and retinopathy, accounting for more than 20% of hospitalisations in some years.

Hospitalisations of patients that have been admitted at least once for the same condition in previous years increased their share throughout the period, but this increase is not the same for all conditions. The most important increment in the share of these multiple discharges is observed in amputations which grew 46% from 10.1% of amputations in 2008 to 14.7% in 2014; neuropathy was the complication whose multiple discharges share increased the least (4.5%). An increase in multiple discharges reflects the fact that the probability of having at least one hospitalisation in previous years increases over time and, of course, an unknown proportion of patients in the first year of analysis (2007) were hospitalised in previous years; nevertheless, these data give an indication of the extent to which diabetes is being controlled over time.

Financial Burden

Table 4.7 shows the estimated financial costs of hospitalisations resulting from diabetic complications. These costs increased by 8.4% in real terms between 2007 and 2014. However, when measured as cost per IMSS affiliate, the estimated costs decreased by 11.3% from MXN$41.5 in 2007 to MXN$36.8 in 2014. The hospitalisation costs of kidney failure, retinopathy and neuropathy decreased by 7%, 9% and 8%, respectively, while those for diabetic foot and amputations increased by more than 25%. Despite these changes, kidney failure remains the most important cause of preventable hospitalisation costs, accounting for 43% of costs in 2014.

Health Burden

The estimated DALYs associated with diabetic complications are presented in **Table 4.8**. Overall, as opposed to the financial costs, DALYs decreased by 13.6% from 2007 to 2014; however, in the last three years of the period, they increased slightly by 3.4%. The latter is explained mainly by the 44% increase observed in the DALYs associated with diabetic retinopathy after 2012.

During the whole study period, the DALYs associated with kidney failure have always represented more than 50% of the estimated total, reaching a peak of 62% in 2008.

Table 4.6: Diabetic preventable hospitalisations in IMSS 2007-2014. Hospital Discharges

Hospital Discharges

	2007	2008	2009	2010	2011	2012	2013	2014	Total
Kidney Failure	15 369	16 744	14 635	14 893	15 400	15 925	14 977	14 353	**122 296**
Retinopathy	2 393	1 554	1 690	1 597	1 764	1 446	1 824	2 178	**14 446**
Neuropathy	720	690	683	650	691	602	650	660	**5 346**
Diabetic Foot	14 000	14 608	14 697	16 433	16 816	16 818	17 070	17 759	**128 201**
Amputation	6 001	6 285	6 226	6 646	6 571	6 560	6 889	7 510	**52 688**
TOTAL	**38 483**	**39 881**	**37 931**	**40 219**	**41 242**	**41 351**	**41 410**	**42 460**	**322 977**

Multiple discharges for the same complication in the same year

	2007	2008	2009	2010	2011	2012	2013	2014	Total
Kidney Failure	2 854	3 369	2 521	2 678	2 865	2 959	2 772	2 685	**22 703**
Retinopathy	376	249	148	124	256	274	373	461	**2 261**
Neuropathy	22	23	15	22	13	15	16	17	**143**
Diabetic Foot	1 939	2 013	2 035	2 294	2 425	2 420	2 557	2 573	**18 256**
Amputation	422	453	433	457	455	462	472	546	**3 700**
TOTAL	**5 613**	**6 107**	**5 152**	**5 575**	**6 014**	**6 130**	**6 190**	**6 282**	**47 063**

At least one admission for the same condition in previous years (plus multiple discharges in the same year)

	2007	2008	2009	2010	2011	2012	2013	2014	Total
Kidney Failure	-	4 094	3 493	3 709	3 924	4 151	3 937	3 822	**27 130**
Retinopathy	-	323	237	255	350	363	474	575	**2 577**
Neuropathy	-	30	21	34	21	22	26	30	**184**
Diabetic Foot	-	2 752	3 060	3 686	4 029	4 166	4 394	4 622	**26 709**
Amputation	-	632	724	851	876	914	987	1 104	**6 088**
TOTAL	**-**	**7 831**	**7 535**	**8 535**	**9 200**	**9 616**	**9 818**	**10 153**	**62 688**

Number of IMSS affiliates per year

2007	2008	2009	2010	2011	2012	2013	2014
48 650 488	48 909 706	49 134 310	52 310 086	54 906 396	57 475 897	59 511 963	59 487 144

Source: Authors using data from **(Instituto Nacional de Estadística y Geografía (INEGI), 2015, División de Información en Salud and Coordinación de Planeación en Salud, 2015b).**

Table 4.7: Financial ACSH Cost (2011 Million MXN).

	2007	2008	2009	2010	2011	2012	2013	2014
Kidney Failure	1 014.32	1 105.08	965.86	982.87	1 016.34	1 051.01	988.41	947.21
Retinopathy	50.71	32.93	35.81	33.84	37.38	30.64	38.65	46.16
Neuropathy	25.07	24.03	23.78	22.63	24.06	20.96	22.63	22.98
Diabetic Foot	598.81	624.83	628.61	702.85	719.24	719.34	730.09	759.55
Amputation	327.87	343.39	340.15	363.09	359.00	358.41	376.37	410.29
TOTAL	**2 016.78**	**2 130.26**	**1 994.22**	**2 105.29**	**2 156.03**	**2 180.36**	**2 156.15**	**2 186.18**

Financial Costs per IMSS affiliated
(2011 MXN)

	2007	2008	2009	2010	2011	2012	2013	2014
Kidney Failure	20.8	22.6	19.7	18.8	18.5	18.3	16.6	15.9
Retinopathy	1.0	0.7	0.7	0.6	0.7	0.5	0.6	0.8
Neuropathy	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
Diabetic Foot	12.3	12.8	12.8	13.4	13.1	12.5	12.3	12.8
Amputation	6.7	7.0	6.9	6.9	6.5	6.2	6.3	6.9
Total	**41.5**	**43.6**	**40.6**	**40.2**	**39.3**	**37.9**	**36.2**	**36.8**

Source: Authors using data from (División de Información en Salud and Coordinación de Planeación en Salud, 2015b).

When disaggregating DALYs into YLD and YLL (not shown, but available upon request), the gap that grew in 2007-2008 between the YLD associated with kidney failure and those associated with retinopathy, following the important drop in retinopathy admissions, narrowed in recent years due to a sustained fall in kidney failure YLDs and a steep increase in retinopathy YLDs during 2012-2014. Amputation YLDs as a share of total YLDs rose in successive years from 13% in 2007 to 20% in 2014.

Figure 4.2 (exhibits a and b) presents the financial and health burden over time for each of the complications. It shows that the financial and health burdens for kidney failure have decreased throughout the period. While the gap between the kidney failure health burden and that of the other diabetic complications is still considerable, the difference in the financial burden has importantly narrowed due to the increase in both the absolute and relative importance of the diabetic foot and amputation hospitalisation costs.

4.3.4 Discussion

This study identifies potentially preventable hospitalisations due to five diabetic complications (kidney failure, retinopathy, neuropathy, diabetic foot and amputation) from 2007 to 2014 and estimates the associated financial and health burden. These hospitalisations increased by 10.3% during the study period and the estimated financial costs of hospitalisations resulting from diabetic complications increased by 8.4% in real terms, reaching MXN$2,186 million in 2014; when measured as costs per IMSS affiliate the estimated costs decreased by 11.3% from MXN$41.5 in 2007 to MXN$36.8 in 2014. The total health burden, expressed in DALYs associated with these conditions, decreased by 13.6%.

Table 4.8: Disability Adjusted Life Years (DALYs) associated with Diabetic preventable hospitalisations. IMSS 2007-2014.

Complications	2007	2008	2009	2010	2011	2012	2013	2014
Kidney Failure	67 139	67 341	60 409	57 960	60 578	61 261	58 265	54 683
Retinopathy	33 931	20 350	23 777	22 021	23 701	18 343	22 509	26 481
Neuropathy	2 300	2 317	2 278	2 167	2 230	1 950	2 211	2 117
Diabetic Foot	4 173	5 017	5 459	5 869	4 839	4 952	4 005	4 611
Amputation	12 508	12 917	13 052	13 561	13 209	13 813	14 634	15 796
TOTAL	**120 051**	**107 941**	**104 975**	**101 578**	**104 557**	**100 320**	**101 625**	**103 688**

Table 4.9 Comparison IMSS vs State Health Ministries (SHMs)

	IMSS	**SHMs**
2011 financial burden per capita [a]	39.3	21.6
2011 health burden (DALYs per 10 000 population)	19.04	12.11
2001-2011 financial burden change (%)	-	95.4
2001-2011 health burden change (%)	-	111.8
2007-2014 financial burden change (%)	-11.3	-
2007-2014 health burden change (%)	-13.6	-
2007-2011 financial burden change (%)	-5.3	28.2
2007-2011 health burden change (%)	-12.9	30.5

[a] The financial burden is expressed in per capita terms. In the case of IMSS, it is per IMSS beneficiary and in the case of SHMs is per person with no social security (major demanders of their services). The financial burden changes reported in this table were computed using per capita values while the health burden changes were computed using absolute values.

Source: Authors using data from (División de Información en Salud and Coordinación de Planeación en Salud, 2015b).

Figure 4.2. Financial and Health Burden of diabetic preventable hospitalisations. IMSS and State Health Ministries (SHMs) 2007-2014.

Exhibit a)

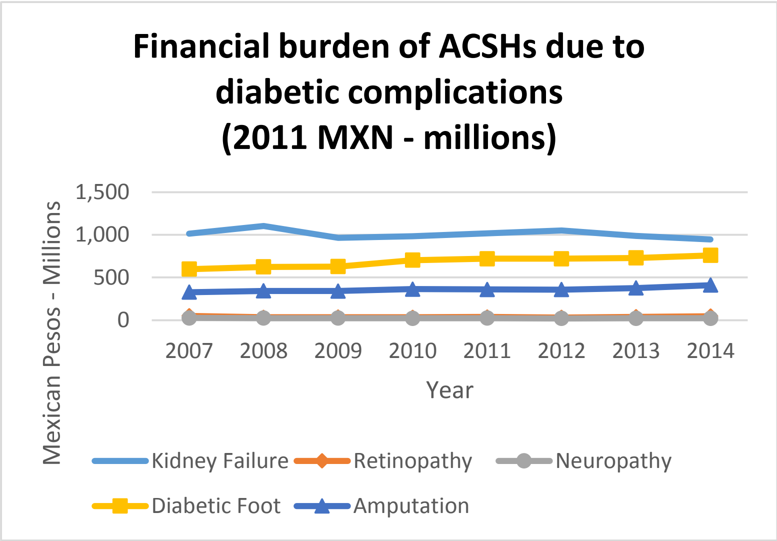

Exhibit b)

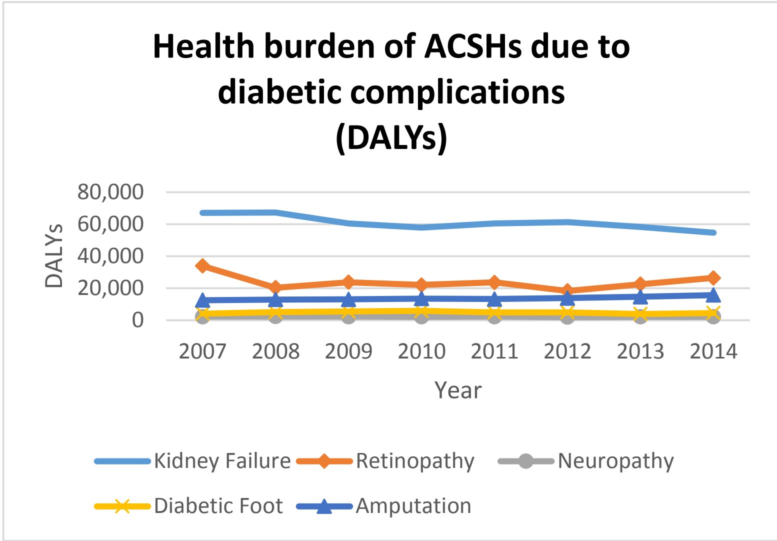

Exhibit c)

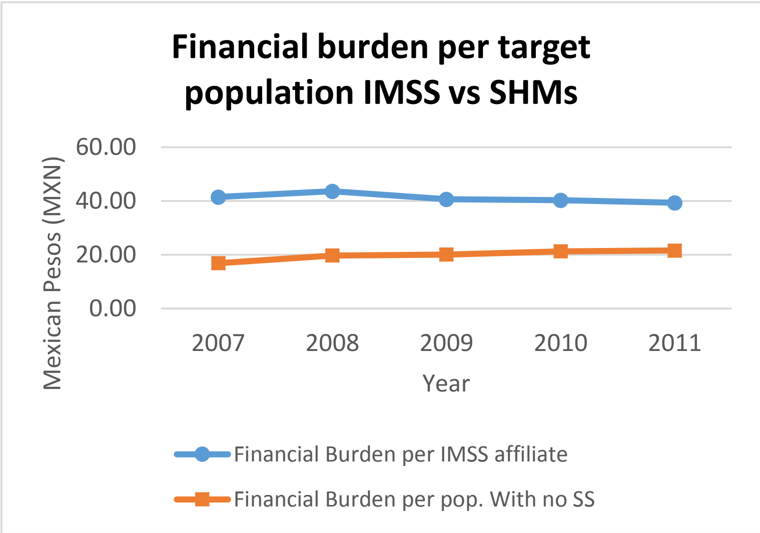

Exhibit d)

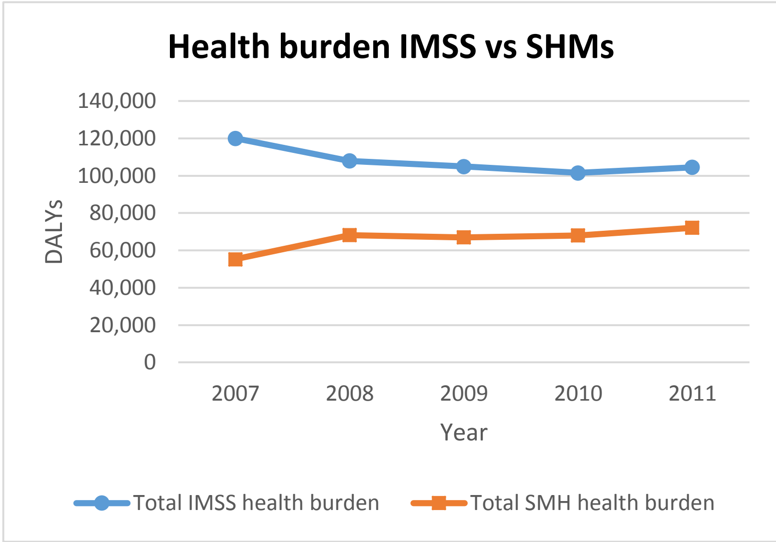

Table 4.9 compares the findings of this paper with the burden estimated for the general hospitals run by the state health ministries (SHMs) **(Lugo-Palacios and Cairns, 2016)**; the financial and the health burden of preventable diabetic hospitalisations in IMSS per capita in 2011 is higher by 82% and 45%, respectively. The difference in health burden may be greater since the present study avoids double counting DALYs when patients are admitted more than once for the same cause and/or if patients died during their hospitalisations in a given year, unlike the data from the SHMs.

Differences between IMSS and the SHMs in the trend of the burden of diabetic complications arise for two main reasons. First, increases in the estimated prevalence, diagnosis, and treatment of diabetes are largely attributable to the expansion of health insurance pushing preventable hospitalisations up among previously uninsured whose poorly controlled/unknown diabetes hindered the ability of primary care to avoid hospitalisations **(Beltrán-Sánchez et al., 2015, Lugo-Palacios and Cairns, 2015)**. While SHMs had to face the increase in the demand for health services following this health insurance expansion, IMSS coverage has remained relatively stable during the last decade **(Instituto Nacional de Estadística y Geografía (INEGI), 2015).** Second, as Arredondo and De Icaza (2011) show, and consistent with the findings presented here, IMSS costs per diabetic patient treated are 80% higher mainly due to differences in case management protocols, in productivity standards, in quality standards and in the cost of inputs **(Arredondo and De Icaza, 2011)**.

Apart from differences in the magnitude of the burdens, another important difference is the trend that each burden follows. In the case of SHMs, the rate of diabetic complications, the financial burden, the financial burden per person with no social security, and the health burden increased over the study period, while for IMSS only the financial burden from diabetic foot and amputation hospitalisations increased. The financial burden of diabetic foot and amputation increases among patient groups in IMSS and SHMs. Exhibits c and d in **Figure 4.2** show the comparison of the financial burden per target population and the total health burden of IMSS and of SHMs for 2007-2011. Both IMSS burdens show a decreasing trend while the opposite is observed for the SHMs.

All major complications of diabetes can be prevented or delayed by good control of blood glucose, blood pressure and cholesterol levels **(International Diabetes Federation, 2015)**. This requires the patient to be well-informed regarding management of their condition, as well as access to insulin, oral medications and monitoring equipment. People with diabetes should be supported by a well-educated health work force and health systems that provide regular blood tests and eye and foot examinations **(International Diabetes Federation, 2015)**. In addition, it should be noted that, paradoxically, as people with diabetes live longer they become more likely to suffer diabetic complications; therefore, it is important to develop new strategies that can prevent the onset or progression of diabetic complications **(Zimmet, 2009)**. During recent years, IMSS has implemented a number of strategies to improve the control of chronic conditions among its beneficiaries, especially those with diabetes. Evaluation of these strategies is beyond the scope of this paper; however, the evidence presented indicates that the rate of hospitalisation due to complications of diabetes per IMSS affiliate, the financial burden per IMSS affiliate, and the associated health burden has decreased during the period studied. Since the absolute financial burden increased more than 8%, there are likely to be opportunities to shift resources from expensive hospital care to more cost-effective primary care interventions; especially since the hospitalisation costs for diabetic foot and amputations are increasing, and these are avoidable with good diabetes management, specifically, with regular foot examination **(International Diabetes Federation, 2015)**.

Improving the quality of and effective access to public primary care services is crucial to ensure appropriate diabetes management as it is worrying that one in eight users state that they would avoid these services in the future mainly because of unacceptable waiting times, mistreatment or no improvement in their condition **(Gutiérrez et al., 2012)**. Furthermore, it is necessary to tackle misconceptions that primary care is basic health care, health care for the poor or rural health care, among the sector of the population that still prefers hospital over primary care **(OECD, 2016)**.

The fact that the total health burden decreases while both the number of preventable hospitalisations and the total financial burden increase is due to the way in which DALYs are computed. The contribution of a patient to the DALYs count of a specific condition only takes into account the first hospitalisation of the patient for the same cause over the period in order to avoid double-counting. Therefore, multiple admissions of the same patient for the same cause do not contribute to the health burden. However, every hospitalisation, whether or not it is the first or a subsequent one, represents a cost to the hospital. Furthermore, the importance of avoiding double-counting of the health burden associated with multiple discharges for the same condition over time is clear when 24% of total hospital discharges due to diabetic complications in 2014 do not contribute to the DALYs count.

This analysis is subject to a limitation present in early work **(Lugo-Palacios and Cairns, 2016)**. Since the severity of the condition for which patients were hospitalised is not recorded, and there is a lack of disability weights for different severity levels of kidney failure and retinopathy, all kidney failure and retinopathy admissions were assumed to have the same severity level: stage IV and blindness, respectively. This assumption causes an overestimation of the associated DALYs and should be taken as the upper bound of the health burden associated with preventable diabetic hospitalisations. As opposed to Lugo-Palacios and Cairns (2016), by tracking multiple discharges from the same patient over the study period, the present paper avoids the double-counting of DALYs when patients are admitted more than once for the same cause throughout the period and/or if patients died in any of their hospitalisations in a given year. A second limitation is that both dimensions of the burden associated with preventable diabetic hospitalisations only consider affiliates receiving care in IMSS hospitals; however, affiliates seeking care elsewhere or not seeking care at all are not taken into account (around 30% of IMSS affiliates seek primary care from the private sector **(OECD, 2016)**). In addition, IMSS-DRG costs do not necessarily represent what IMSS hospitals are actually spending on each treatment, but rather are used as a benchmark, and IMSS-DRG costs do not consider rural-urban nor big-small city price differentials **(Lugo-Palacios and Cairns, 2016)**. Nevertheless, these costs are the most robust hospital cost data available for IMSS.

4.3.5 Conclusions

Timely and effective primary care services that prevent the development or the exacerbation of the condition can reduce the burden of preventable hospitalisations. The resources used to treat avoidable hospitalisations could, in principle, be used to fund more and better primary care services. However, more evidence is required concerning which strategies are best for preventing hospitalisations and how much of the burden could be prevented by better primary care. This study might be seen as setting an upper limit to the potential benefit from improving primary care. IMSS is currently integrating primary care and hospital data at the patient level. Consequently, it should be possible to obtain a better understanding of the scope for primary care to prevent hospitalisations. The improvement of record linkage among levels of care and among all Mexican health care institutions through the patient clinical-electronic file is crucial in the design of a new integrated primary care system that could provide opportunities to reduce the financial and health burden of diabetic complications.

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CHAPTER 5. MEASURING HOSPITAL PERFORMANCE

5.1 Preamble to Research Paper 4

Chapters 3 and 4 focused on analysing preventable hospitalisations working on the premise that substituting hospital care with primary care improves the allocative efficiency of the system. This chapter now focuses on analysing how efficiently resources are used inside hospitals, once patients have been admitted.

Typically, research on health care performance has focused on efficiency analyses that use either parametric or non-parametric methods to estimate production/cost frontiers to identify (in) efficient decision making units (DMUs) according to their competence in translating inputs into outputs **(Hollingsworth, 2008, Jacobs et al., 2006)**. In this sense, (technical) inefficiency is defined as the extent to which a DMU's costs exceed those predicted by the cost function or the extent to which its output falls short of that predicted by the production function **(Jacobs et al., 2006)**.

Parametric methods use econometric techniques to estimate the parameters of the functional form of a cost or a production function **(Jacobs et al., 2006).** Among parametric methods, stochastic frontier models are the most popular. Instead of assuming that any deviation from estimated cost (or output) is explained by inefficiency - like the corrected ordinary least squares (COLS) technique- these models consider the effect of random shocks by decomposing the residual into two independent parts: a normally distributed component representing stochastic elements not under the control of the DMU that might affect costs or production, and a one-sided term representing technical inefficiency. It is clear then that, contrary to common econometric techniques, in stochastic frontier analysis (SFA) focus is placed on the residual not on the estimated effects of the included variables. The distribution of the inefficiency component of the error has been the centre of many studies, some have assumed a half-normal distribution, others a truncated normal; the exponential and the gamma distribution have also been suggested **(Greene, 2004, Greene, 1990, Hollingsworth and Wildman, 2003, Jondrow et al., 1982, Schmidt and Sickles, 1984, Wagstaff, 1989).** In longitudinal analyses, the inefficiency term has been treated either as time invariant **(Battese and Coelli, 1988, Pitt and Lee, 1981, Schmidt and Sickles, 1984)** or as time variant **(Battese and Coelli, 1992, Battese and Coelli, 1995, Kumbhakar, 1990)**. Inefficiency estimates are usually sensitive to both the distribution and the time (un)varying assumptions.

Data envelopment analysis (DEA), the predominant non-parametric method introduced by Charnes, Cooper and Rhodes (1978), is a linear programming technique that uses observed inputs and outputs to construct a production possibility frontier and to calculate efficiency scores for every DMU relative to the constructed frontier **(Charnes et al., 1978).**

However, these methodologies may not be very insightful for hospital managers and policy makers, mainly for two reasons. First, the estimated frontiers are often sensitive to the methodological choice between parametric and non-parametric techniques and to the way in which models are formulated; hence, this sensitivity raises concern about the reliability of the analyses **(Hollingsworth and Street, 2006, Newhouse, 1994)**. Second, efficiency analyses considering the hospital as a whole may not provide information about specific actions to improve efficiency **(Hollingsworth and Street, 2006)**. In addition, frontier estimation analyses assume a common production function across all hospitals that may be inappropriate as hospitals offering a different range of services (i.e. specialty mix) may face different production functions **(Laudicella et al., 2010).** In this context, comparing the same department or procedure across hospitals appears more appropriate as it is likely that they have similar production processes **(Laudicella et al., 2010)**. Moreover, the results of such a comparison will be department/procedure specific and, in principle, easier to interpret than a global efficiency score.

In this line of research, previous studies have examined hospital performance by analysing variations in the length of stay (LoS) for particular types of care**,** under the rationale that reductions in the LoS can reduce the costs of undertaking a fixed workload and increase the amount of work that hospitals can undertake within their fixed budget **(Gaughan et al., 2012, Martin and Smith, 1996, Street et al., 2012).**

This thesis extends this methodology to the longitudinal case by analysing hospital performance in five types of care (appendectomy, cholecystectomy, inguinal hernia repair, childbirth, and stroke) for 2005-2013. A better understanding of the way in which Mexican public general hospitals are using their resources is required in order to improve hospital efficiency and to increase financial sustainability for the hospital sector.

To answer research question VI, Research Paper 4 presents a theoretical description of the incentive structure of Mexican public hospitals and details how this structure influences LoS in these hospitals. Additionally, it uses a two-step econometric estimation strategy to analyse variations in LoS across hospitals and types of care and over time to answer research questions VII-X.

5.2 Research Paper 4

Title: Length of stay as a resource-use indicator to measure performance in Mexican public hospitals

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Principal Supervisor	John Cairns
Thesis Title	Analysis of the effectiveness of primary care services and of hospital efficiency in the Mexican health care system

If the Research Paper has previously been published please complete Section B, if not please move to Section C

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Stage of publication	**Not yet submitted**

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Research Paper 4

Title: Length of stay as a resource-use indicator to measure performance in Mexican public hospitals

Authors: David G. Lugo-Palacios, John Cairns, Andrew Street

Candidate contribution: JC, AS and I designed the study. I developed the theoretical model, conducted the data management, the data analysis, the results interpretation and drafted the manuscript. AS conceptualised the analysis and provided further inputs. JC contributed to the interpretation. JC and AS edited the manuscript before finalisation.

Abstract

Background: Length of stay (LoS) is often used as a measure of hospital resource use. Reductions in LoS can reduce the costs of treatment and free up capacity, allowing more patients to be treated. This paper estimates and describes the trend of hospital performance in 353 Mexican public general hospitals by analysing variations in LoS for appendectomy, childbirth, cholecystectomy, inguinal hernia repair, and stroke from 2005-2013, a period of health insurance expansion.

Methods: For each type of care, we use a two-stage approach to first estimate a multilevel count data model that explains variations in LoS and identifies the hospital influence on LoS purged of patient and treatment characteristics, treating the data as a series of repeated cross-sections. We then construct a panel of hospital effects, and examine whether variation across hospitals and over time is related to hospital and regional characteristics using estimated dependent variable models.

Results: LoS in appendectomy, cholecystectomy, inguinal hernia repair and childbirth demonstrate a decreasing trend throughout the period. Patient and treatment characteristics only explain a small proportion of LoS variation across hospitals, ranging from 17% on average for appendectomy to 36% on average for stroke. LoS is higher the more diagnoses are recorded and the more procedures are performed. There is wide variation in hospital effects on LoS but each hospitals' position in the performance distribution is persistent across time. We found evidence of economies of scale in the three surgical procedures and apparent diseconomies of scale in childbirth..

Conclusion: The results support the hypothesis that in order to increase the number of patients treated, public hospitals will need to improve their level of performance, even in the presence of a soft budget constraint. This paper identifies best and worst performing hospitals where additional financial and operational studies should be conducted to inform better practice in hospital resource-use.

Keywords: *length of stay; hospital performance; soft budget constraint; Mexico.*

5.2.1 INTRODUCTION

The length of stay (LoS) required for a particular type of care has been considered as a measure of hospital resource use. Reductions in LoS can reduce the costs of undertaking a fixed workload and increase the amount of work that hospitals can undertake within their fixed budget **(Gaughan et al., 2012, Martin and Smith, 1996, Street et al., 2010).**

It can be argued that costs, rather than LoS, are a better indicator of resource use, but reliable patient-level cost data are not always available. In contrast, accurate LoS information for every hospital admission is usually straightforward to obtain from administrative data. Furthermore, analysis based on LoS rather than cost may also prove more powerful at fostering behaviour change as clinicians have more direct influence on LoS than on costs **(Street et al., 2012)**.

Recently, several studies have analysed variation in LoS for the same type of care across hospitals **(Gaughan et al., 2012, Mason et al., 2012, Or et al., 2012, O'Reilly et al., 2012, Paat-Ahi et al., 2012, Peltola, 2012)**. After conditioning for patient and treatment characteristics, these studies identified the relative influence that each hospital has on the LoS of its patients, interpreted the estimated hospital effects as a measure of hospital performance, and explored hospital-level characteristics that could explain differences across hospitals. They used cross-sectional data to analyse hospitals in European countries where hospital payment systems are based on diagnosis related groups (DRGs). The present paper analyses five types of care (ToC: appendectomy, childbirth, cholecystectomy, inguinal hernia repair, and stroke) considered in those studies but extends the methodology by exploiting longitudinal data from 2005-2013 in Mexico, and by applying it in a context where hospital payment system is based on retrospective budgets. The aim of this work is to assess the extent to which Mexican hospitals are making efficient use of their resources and to study this behaviour over time.

5.2.2 INCENTIVE STRUCTURE

The Mexican health system comprises a public and a private sector and is characterised by a low share of public spending on health (51%) relative to other OECD countries **(OECD, 2016)**. The public sector includes social security institutions providing services to salaried workers as well as state health ministries and the federal government serving the population without social security (non-salaried workers, self-employed and informal sector workers). Each has its own hospital infrastructure. The private sector includes insurance companies and providers of health care at private hospitals and medical clinics. This study focuses on the LoS performance in public general hospitals run by the 32 state health ministries.

Public general hospitals in Mexico are mainly funded through historical budgets agreed jointly by the state health ministry and hospital managers. Partly due to the fact that hospital management has little information about the costs of the services provided within its departments, the process by which each hospital budget is determined is not transparent and the most important determinant is the budget allocated in the previous year. Additionally, hospital budgets in Mexico are not necessarily binding: if hospitals spend all of their budget before the end of the fiscal year they can ask for more funds from the local government. The government may well accede to this request in order to avoid the political cost of temporary hospital closure. This implies that Mexican public hospitals face a soft budget constraint because they might be able to negotiate a bail out by the government if they overrun their annual budgets **(Kornai, 1979, Kornai, 2009)**.

In the Mexican setting, there are three forces that might discourage good financial performance. First, because current budgets are based largely on historical spend, hospitals have incentives to at least maintain and possibly to increase their levels of spending each year. Second, given the public finance regulations in Mexico, if a public hospital spends less than its budget they cannot retain the surplus and, in principle, it must be returned to the local authority. The existence of unspent funds at the end of the year is often interpreted by authorities as an indicator of an excessive allocation, leading to a reduction in the budget for the following period **(Barnum et al., 1995)**. Therefore, the incentives are not only to keep costs high to increase future budgets, but also to use all their current budgets. Third, one of the few ways of assessing hospital performance in Mexico is by assessing bed occupancy rate, considering values between 70% and 80% as appropriate **(Secretaría de Salud, 2012).** This is a perverse measure as it provides hospitals with additional incentives to prolong LoS in order to increase bed occupancy, since it is easier for hospitals to increase the number of inpatient days, once patients are admitted, than increase the number of admissions **(Jegers et al., 2002)**.

But hospitals have faced external pressure to reduce LoS, notably the need to meet the increasing demand for hospital services. Admissions to general hospitals run by the 32 state health ministries have increased by more than 40%, following the health insurance expansion as result of the 2003 Health Reform **(Lugo-Palacios and Cairns, 2015).**

The following simple discrete choice model illustrates a hospital LoS decision in the Mexican context. Let B_t denote the budget received in time t used by the hospital to cover its operative costs in time t described by $C(l_t)$, where $l_t(e_t)$ is the hospital average LoS in time t and is a function of the level of effort exerted in time t.[14] The variable effort (e_t) could capture the physicians' effort to provide timely and effective care to the patients, adherence to clinical guidelines, the existence of efficient internal mechanisms to access operating rooms and to discharge patients, and the actual working hours of physicians and managers.[15] Hospitals in Mexico lack managerial autonomy over the level and scope of services, staffing (numbers hired, payment mechanisms and skill mix) and investments (beds and technology) **(OECD, 2016)**.[16] Therefore, LoS could be considered as one of the few elements under the hospital´s control. The model captures this by considering the number and remuneration of health workers as well as the hospital size and capital investments as exogenously determined. It is assumed, thus, that LoS is the only source of costs and that hospitals face an exogenous demand of the services provided.

The hospital expects that if it overruns its budget in time t, the deficit (d_t) will be covered by the local authority (i.e. it expects to be bailed out) as there is perfect knowledge about the local authority's unwillingness to pay the political cost of hospital closure.

The hospital is concerned about its future budget, determined by its present budget, inflation and the current period deficit (it is assumed that in t=1 the hospital receives

[14] For simplicity, the model only considers a representative hospital admission, but the model can be extended to a multi-product hospital.

[15] According to OECD (2016), insufficient regulation on dual practice may lead some physicians to skimp on working hours in the public sector.

[16] In the public sector, doctors are salaried professionals hired on national contracts negotiated collectively by the unions, with rigid conditions governing salaries, working hours and social security benefits (OECD, 2016).

an initial budget based on its exogenous characteristics, e.g. size, staff, etc.); in addition, the hospital is concerned about the number of patients treated (n_t) and the effort exerted (e_t). It is assumed that the hospital can influence n_t through LoS (and implicitly through e_t): since the bed capacity is fixed in the short term, increasing n_t may require reducing LoS to make beds available.[17] The hospital values the number of patients treated because it is assumed, firstly, that health workers are to some extent altruistic and, secondly, that the hospital is concerned about meeting its (exogenous) demand, since failing to do so would mean that hospital performance will come under social scrutiny.

After adjusting for complications and other treatment-specific characteristics, a short LoS may be a signal of an efficient use of hospital resources; hence, effort both from physicians and managers is needed to ensure that LoS does not exceed the clinically optimal level. It is further assumed that effort has a negative effect on hospital's utility. Like **(Pauly and Redisch, 1973, Socha-Dietrich, 2014)**, this paper assumes that the objective function of the hospital reflects both the interests of the physicians and the managers. Therefore, the utility function that the hospital maximises each year can be written as

$$U = U[B_{t+1}(l_t(e_t)), n_t(l_t(e_t)), e_t(l_t)] \qquad (5.1)$$

where $B_{t+1}(l_t) = (1+\pi)B_t + d_t(l_t(e_t))$. Since $d_t(l_t) = C_t(l_t(e_t)) - B_t$, eq.(5.1) can be written as

$$U = U[\pi B_t + C_t(l_t(e_t)), n_t(l_t(e_t)), e_t(l_t)] \quad (5.2)$$

[17] One may argue though that hospitals may have spare beds and that they would be able to increase the number of patients treated by making use of the already available beds without changing LoS. While this probable scenario is acknowledged, for parsimony, it is not captured by the model.

Furthermore, if U is assumed to be an additively separable utility function, eq.(5.2) can be expressed as

$$U = V[\pi B_t + C_t(l_t(e_t))] + N[n_t(l_t(e_t))] + E[e_t] \quad (5.3)$$

where $V_C(.) > 0$, $V_{CC}(.) < 0$, $C_l(.) > 0$, $C_{ll}(.) < 0$, $l_e(.) < 0$, $l_{ee}(.) < 0$, $N_n(.) > 0$, $n_l(.) < 0$, $n_{ll}(.) < 0$, $E_e(.) < 0$, $E_{ee}(.) < 0$

Due to the historical determination of the budget and to the existence of a soft budget constraint, valuing the future budget is equivalent to valuing the current deficit. Therefore, to limit the perverse incentives to run extreme deficits, the local authority sets a cap or "maximum acceptable deficit" ($\overline{D}$) beyond which the hospital manager will be fired; it can also be interpreted as the point where the local authority is indifferent between covering the hospital deficit and assuming the political cost of hospital closure. In any case, if $d_t > \overline{D}$, then $U = -\infty$. For simplicity, it is assumed that $\overline{D}$ is known by the hospital. The described constraint is captured formally in the following way

$$C_t(l_t(e_t)) - B_t \leq \overline{D} \quad (5.4)$$

The soft budget constraint assumption implies that $\overline{D} > 0$, but the model allows the scenario where hospitals are "ordered" or "pressured" to observe a negative deficit (surplus): $\overline{D} \leq 0$. The model presented here analyses the problem faced by a single hospital, but, at the aggregate level, different hospitals may observe different levels of $\overline{D}$, with higher levels of $\overline{D}$ denoting softer constraints. Moreover, the assumption of perfect knowledge can be easily relaxed by assigning probabilities to the different levels that $\overline{D}$ can take and the deterministic deficit cap can be replaced by the expected value of $\overline{D}$; in this case, additional assumptions about hospitals' attitude towards risk will need to be introduced.

The hospital chooses the effort level that maximises eq.(5.3) subject to eq.(5.4). For the purposes of discussion, we assume that the solution to this problem involves strictly positive LoS, number of patients treated, and effort exerted, denoted by $l_t^*({e_t}^*)$, $n_t{}^* l_t^*({e_t}^*)$ and $e_t{}^*$ respectively; moreover, they satisfy the first order condition

$$\frac{\partial V[\pi B_t+C_t(l_t(e_t))]}{\partial C_t} * \frac{\partial C_t(l_t(e_t))}{\partial l_t} * \frac{\partial l_t(e_t)}{\partial e_t} + \frac{\partial N[n_t(l_t(e_t))]}{\partial n_t} * \frac{\partial n_t(l_t(e_t))}{\partial l_t} * \frac{\partial l_t(e_t)}{\partial e_t} + \frac{\partial E(e_t)}{\partial e_t} - \lambda \left[\frac{\partial C_t(l_t)}{\partial l_t} * \frac{\partial l_t(e_t)}{\partial e_t}\right] = 0 \quad (5.5)$$

When the soft budget constraint binds and if it is evaluated at the optimum, it leads to

$$C_t^*(l_t^*(e_t^*) = B_t + \overline{D} \quad (5.6)$$

Eq.(5.6) can be inserted in eq.(5.3) to obtain

$$U^* = V^*[(1+\pi)B_t + \overline{D}] + N^*[{n_t}^*({l_t}^*(e_t^*))] + E^*[{e_t}^*] \qquad (5.7)$$

Now, by plugging eq.(5.6) in eq.(5.5), the hospital optimal choice e_t^* must satisfy the first order condition given by

$$\frac{\partial E^*[{e_t}^*]}{\partial e_t} = -\frac{\partial N^*[{n_t}^*({l_t}^*(e_t^*))]}{\partial e_t} \qquad (5.8)$$

This result implies that with perfect knowledge about the "maximum acceptable deficit" and when the soft budget constraint is binding, the effort choice that maximises hospital utility is where the marginal disutility of the effort exerted equals the negative of the marginal utility of patients treated. However, given the positive effect that effort has on N(.), it cannot be guaranteed that the soft budget constraint will always hold with equality; therefore, when the constraint is not binding, λ=0 and ${e_t}^*$ will be the one that satisfies

$$\frac{\partial E[e_t]}{\partial e_t} = -\left[\frac{\partial N[n_t(l_t(e_t))]}{\partial e_t} + \frac{\partial V[\pi B_t + C(l_t(e_t))]}{\partial e_t}\right] \tag{5.9}$$

Which requires $\frac{\partial N[n_t(l_t(e_t))]}{\partial e_t} > \frac{\partial V[\pi B_t + C(l_t(e_t))]}{\partial e_t}$.

Given the difficulty to obtain reliable information regarding effort, the empirical analysis presented in the following sections focuses on studying LoS, which the theoretical framework described above suggests reflects the level of effort exerted by the hospital. Therefore, this study identifies the average influence (purged of patient and treatment characteristics) that Mexican general hospitals have on the LoS of their patients in four conditions for which relatively standard care is provided and another condition usually requiring more specialised care (stroke). Based on the theory presented here, one possible explanation for significant differences among hospitals' influence on LoS could be due to variations in hospital performance, captured by e_t, how soft the hospital´s budget constraint is, and external demand pressure.

5.2.3 METHODS

This paper focuses on analysing the variation in hospital resource use, measured using variation in LoS, for patients having the same type of care, in public non-social security general hospitals which are decentralised to the state level—that is, they are run by the 32 state health ministries.

This analysis has two steps, following Street et al. (2012), extended to the longitudinal case. The first stage specifies a multilevel model which considers that patients (level 1) are clustered within hospitals (level 2) to estimate the hospital influence on LoS purged of patient and treatment characteristics. Each hospital effect is interpreted as a measure of performance. As LoS is count data subject to both under- and overdispersion, it is assumed that it follows a generalised Poisson (GP) distribution.

Modelling under and/or overdispersed count data using the standard Poisson regression model is not appropriate because even when the regression parameters are consistently estimated, the standard errors will be biased and, therefore, inference will be misleading **(Harris et al., 2012, Wang and Famoye, 1997)**. Negative binomial distributions are often used to model overdispersed data, but they do not accommodate underdispersed data whereas the GP distribution accommodates over, under, and equidispersed data. Following Harris et al. (2012), the probability mass function of y_{ik} is given by

$$f(y_{ik} \mid \theta_{ik}, u_k, \delta) = \frac{\theta_{ik}(\theta_{ik} + \delta y_{ik})^{y_{ik}-1}\, e^{-\theta_{ik}-\delta y_{ik}}}{y_{ik}!} \qquad (5.10)$$

where θ_{ik}> 0 and max(-1,- $\theta_{ik}/4$) < $\delta < 1$. The mean and variance of the GP random variable are given by

$$\mu_{ik} = E[y_{ik}|X_{ik}, u_k] => \frac{\theta_{ik}}{1-\delta} = \exp(\beta_0 + \beta' X_{ik} + u_{jk}) \qquad (5.11)$$

$$Var(y_{ik}) = \frac{\theta_{ik}}{(1-\delta)^3} = \frac{1}{(1-\delta)^2} E(y_{ik}) = \phi E(y_{ik}|X_{ik}, u_k)$$

where y_{ik} is the LoS (number of days) of patient *i* in hospital *k*; X_{ik} is a vector of patient and treatment characteristics, used as proxy for case-mix; u_{jk} are the hospital fixed effects that are estimated by introducing a dummy variable for each hospital. The term $\phi = \frac{1}{(1-\delta)^2}$ plays the role of a dispersion factor. When δ = 0, there is equidispersion, and the GP distribution reduces to the standard Poisson distribution with parameter θ_{ik}. When δ > 0 data is overdispersed, and when $\delta < 0$ it is underdispersed.

The generalised Poisson model was estimated for each ToC for each of the nine years. When the value of δ in eq.(5.2) was significantly higher than zero (evidence of overdispersion), a standard negative binomial (NB2) model was additionally estimated **(Cameron and Trivedi, 1998)**. To assess the performance of the models estimated, this paper uses the Akaike and the Bayesian information criteria (AIC and BIC), as well as the adjusted deviance R^2 **(Cameron and Windmeijer, 1996, Wang and Famoye, 1997).**

For each type of care, model (5.11) is estimated for each year in the period 2005-2013. This amounts to treating the data as a series of repeated cross-sections. During this period, health care insurance coverage in Mexico was gradually extended, through the *Seguro Popular* programme operated by the state health ministries, to more than 50 million people who became entitled to receive free access to an explicit package of health care interventions **(Knaul et al., 2012)**. Given this important and gradual shift in the demand for health care, it is interesting to analyse the time trend followed by LoS in these years; therefore, a 2005-2013 pooled analysis of model (5.11) with year dummies is conducted for each condition.

This paper then analyses the trend in hospital performance and identifies observable hospital characteristics that can explain its variation over time. This can be achieved by considering how the hospital effects estimated each year vary throughout the study period. The yearly hospital effects on LoS, estimated from the first stage, are matched with yearly hospital- and state-specific characteristics to build a hospital-level panel used to analyse the variation of these effects during 2005-2013. The second stage of the study, therefore, consists in fitting five estimated dependent variable (EDV) models (one for each ToC) exploring the associations between the hospital performance measure and hospital- and state-level characteristics. The second-stage model is specified by

$$\hat{u}_{kt} = h'_{kt}\gamma + z'_{kt}\varphi + \tau_t + \varepsilon_{kt}; \quad t = 2005, \dots, 2013 \qquad (5.12)$$

where $\hat{u}_{kt}$ is the estimated performance measure for hospital k in year t; h is a vector of variables measuring hospital-level characteristics; z is a vector of state-level covariates; τ is a vector of year dummies; and, ε_{kt} is the residual, independent across time. A Hausman test informs the decision to estimate a fixed effects (FE) or a random effects (RE) model. The dependent variable in (5.12) being estimated and not observed does not necessarily present any difficulties for regression analysis **(Lewis and Linzer, 2005)**.

Because it is likely that $\hat{u}_{kt}$ is related to or could be explained by its level in previous years, in addition to analysing the correlation among ranks of $\hat{u}_{kt}$ in different years, this paper also obtains the Arellano Bond estimator by considering the first difference of an autoregressive model of order two [AR(2)]

$$\Delta\hat{u}_{kt} = \beta_1\Delta\hat{u}_{kt-1} + \beta_2\Delta\hat{u}_{kt-2} + \Delta h'_{kt}\gamma + \Delta z'_{kt}\varphi + \Delta\tau_t + \Delta\varepsilon_{kt}; \quad t = 2008, \dots, 2013 \qquad (5.13)$$

where $\Delta\hat{u}_{kt-1} = \hat{u}_{kt-1} - \hat{u}_{kt-2}$. Assuming no serial correlation in ε_{kt}, the model is estimated using two-step generalised method of moments (GMM) with $\hat{u}_{kt-2}, \hat{u}_{kt-3}$, and $\hat{u}_{kt-4}$ as instruments for the two lagged dependent variable regressors; h_{kt}, z_{kt} and τ_t are used as instruments for themselves **(Cameron and Trivedi, 2010).** All models were conducted using STATA 14 **(StataCorp, 2014)**.

5.2.4 DATA

This paper uses hospital discharge data for the period 2005-2013 from 353 Mexican public general hospitals managed by the 32 state health ministries **(Secretaría de Salud, 2015)**.[18] Data on length of stay, diagnosis, medical procedures, age, gender,

[18] The analysis includes facilities classified as general hospitals by the Secretaría de Salud (2015) dataset.

state and municipality of the patient, among other variables, are recorded for each discharge. Cases were identified using the ICD-10 and ICD-9CM codes shown in **Table 5.1**. ICD-10 was also used to define two dummy variables conditioning for patient comorbidity, proposed by Street et al. (2012). The first indicates if the patient was diagnosed with one non-severe Charlson comorbidity and the second if the patient was diagnosed with at least one severe or two non-severe Charlson comorbidities.

This study excludes observations that fall into any of the following criteria: hospitals with less than five records of the ToC in question, hospitals inside prisons, patients aged less than one year or with unknown age, discharges with LoS longer than one year, and LoS outliers identified with a trim based on three times the standard deviation of each LoS distribution (once observations with LoS > 365 were dropped). The use of this trim in the childbirth underdispersed data implies that observations with LoS as low as 5 days are dropped; therefore, to allow sufficient variation in the dependent variable in order to ensure convergence in the childbirth models, the threshold to trim outliers was raised to 15 days.

The final dataset is an unbalanced panel with hospitals entering and exiting the analysis. The reasons explaining why a hospital does not appear every year in the panel include not satisfying the inclusion criteria in all years, construction of new hospitals, existing hospitals moving to new facilities (and, thus, receiving a new identification code), and hospitals changing classification (upgrading or downgrading from general hospitals).[19] The latter is related to political and/or

[19] A general hospital offers, in addition to emergency care, at least four medical specialties: internal medicine, paediatrics, obstetrics and surgery. In 2013, a total of 305 hospitals managed by the 32 state health ministries were classified as general hospitals.

demographic/epidemiological reasons and there is no evidence suggesting that the upgrading/downgrading decision is necessarily related with hospital performance. If a hospital satisfies the inclusion criteria for a certain year, then it is included in stage 1 of the estimation process for that year. However, only hospitals with five observations or more each year are considered for the longitudinal analysis. This decision was made in order to include only observations that have enough instruments for the lagged regressors in (5.13). Results for the FE estimation of (5.12) are robust when all hospitals included in stage 1 are considered.

In stage 2 the following hospital characteristics are used to explore the variation in hospital performance **(Secretaria de Salud, 2014, Secretaria de Salud, 2015, Secretaría de Salud, 2015)**. The volume of activity of the hospital, measured by the number of annual hospital discharges (in thousands) and the share of hospital discharges whose main diagnosis was the ToC in question, is used to condition for hospital size and, thus, to investigate economies of scale—that is, if volume increases are associated with decreasing average costs, using LoS as proxy for costs. Crowded hospitals might be pressured to discharge patients quicker to be able to admit more patients; for this reason, the variable *bed pressure* (total discharges/total hospital beds) is included in stage 2. Four variables conditioning for hospital staff mix are considered: the ratio of doctors directly involved in patient care (frontline) to the total number of staff; ratio of nurses to total number of frontline doctors; ratio of medical students to total number of frontline doctors; and the ratio of medical residents to total number of frontline doctors. The latter two also reflect the hospital teaching level. It is expected that the higher the proportion of doctors and the higher the proportion of nurses, the shorter the LoS, as more personnel would be available to provide timely care to patients, and labour may be divided appropriately across skill levels to shorten the patient stay. The direction of the proportion of residents and students is not clear because, on the one hand, they contribute to diversify the hospital skill mix (shorter LoS), but on the other, the provision of teaching may introduce delays to the treatment process if consultants spend longer reviewing each patient so that the medical students can learn from the review process (longer LoS) **(Street et al., 2010)**. To explore the pressure that potential flaws in primary care might exert on hospital performance, the hospital ambulatory care sensitive hospitalisation (ACSH) rate is also considered. It is expected that poor primary care performance has a negative association with hospital performance. The death rate and the acute myocardial infarction death rate (in separate specifications) are used as proxy for quality of care **(Gaughan et al., 2012)**. It is expected that the higher the death rate the longer the LoS.

Since the hospitals studied are managed by state health ministries, it is of interest to explore if observable state-level factors can influence hospital performance. First, to condition for the increasing demand for health services following the health care insurance expansion, the state *Seguro Popular* coverage rate is introduced. The theoretical model suggests that an increase in the patients treated will have a negative association with LoS; therefore, a negative coefficient is expected for this variable. To capture the commitment of the state authority to the health of its population, likely to be correlated with the resources allocated to health, this analysis includes two variables: the percentage of state GDP spent on health and the ratio of state funds to federal funds spent on health in the state in question. The sign of this association is not clear since a high commitment to health by the local government might be accompanied with efforts to improve the resource-use (shorter LoS), but more resources to health can also be associated with a higher grade of budget softness (longer LoS). It can also be argued, however, that due to the lack of reliable health expenditure information, deliberate under-funding with a soft budget constraint may be helpful in controlling expenditure behaviour **(Bordignon and Turati, 2003)**. Centralised information about hospital budgets is not available as each state health ministry keeps its own records, which are not publicly available. Therefore, in an effort to explore the grade of hospital budget softness (HBS) and its association with hospital performance, this paper assumes HBS is correlated with the ideology of the state Governor's political party. Taking the PRI party (centre-left) as reference, two dummy variables indicating if the governor is a member of the PAN (right) or PRD (left) party are introduced in (5.12) and (5.13).[20] Based on **(Maskin, 1996)** who shows that socialism lends to a softer budget constraint than capitalism, it is expected that hospitals in states with PRD governments observe a softer budget constraint than states governed by other parties, which, as predicted by the theoretical model, will be positively associated with longer LoS. One of the reasons for observing softer budget constraints under governments closer to socialism is that this ideology entails public ownership of capital in contrast to private ownership under capitalism **(Maskin, 1996)**.

Table 5.1: Codes used to identify patients to each type of care (ToC)

	Main diagnosis ICD-10 code	Procedure ICD-9CM code
Appendectomy	K35-K38	47.0
Cholecystectomy	K80	51.2
Inguinal hernia repair	K40	17.1, 17.2, 53.0, 53.1
Childbirth	Z37, O80-084	All
Stroke	I61, I63, I64	All

Table 5.2 shows the descriptive statistics of the data analysed. For presentation purposes, only data for 2005 and 2013 are presented here; information for the other

[20] The Green party governing the State of Chiapas since 2012 is grouped with PRI.

years is available upon request.[21] In general, the independent variables do not vary significantly over time for each ToC. The mean LoS for the study period is lower in childbirth (1.3 days) and in inguinal hernia repair (1.6) than in the other treatments (3.0 for appendectomy, 2.8 for cholecystectomy, and 5.6 for stroke). The value of the mean and standard deviation in childbirth and inguinal hernia suggest underdispersion. Furthermore, mean LoS in cholecystectomy and hernia repair decreases by 10% during the study period, but it increases for stroke by 5%. Although these changes are insignificant, the behaviour of the mean in these cases suggests a time trend. Appendectomy LoS is stable throughout the period.

Appendectomy and childbirth are more prevalent in the younger population, while stroke is more common among the elderly. Appendectomy and stroke are distributed evenly between male and female, but this does not hold for cholecystectomy and hernia repair where more women are admitted for the former and more men for the latter.

The most frequent admission channel for appendectomy, childbirth and stroke is through the emergency services as more than 90% of the cases accessed the hospital this way. Although lower, the proportion of cholecystectomies and hernia repairs admitted as emergencies increased notably throughout the period even though both are usually considered elective treatments.

Two variables specific to childbirth experienced important changes over time. The rate of C-sections halved from 14% in 2005 to 7% in 2013 (after reaching a peak of 16%

[21] See Appendix 5.1.

in 2009). The rate of episiotomies shows a sustained decrease from 30% in 2005 to 20% in 2013.

With the exception of stroke, the mean number of secondary diagnoses recorded is less than one and this is reflected in most patients reporting no Charlson comorbidities. Finally, hospitals treating stroke are generally larger than those treating other ToC with a mean of 78 hospital beds and 3.4 operation rooms.

Table 5.2: Descriptive Statistics by Type of Care (ToC). 2005 and 2013

	Appendectomy		Cholecystectomy		Inguinal hernia repair		Childbirth		Stroke	
	2005	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**
No. patients	29,428	39,223	17,159	25,422	13,131	16,713	346,013	407,584	2,726	4,140
No. hospitals	244	280	210	239	249	274	262	282	140	186
Patient/Treatment variables										
LoS	3.04 (1.95)	3.04 (2.10)	3.01 (2.27)	2.66 (2.28)	1.69 (1.25)	1.52 (1.28)	1.30 (0 .79)	1.23 (0 .70)	5.36 (4.62)	5.64 (4.99)
age	23.28 (15.47)	23.42 (15.90)	40.39 (15.82)	39.49 (15.42)	40.27 (24.41)	43.68 (23.45)	23.99 (6.11)	23.65 (6.01)	64.01 (19.06)	64.86 (18.35)
male	0.54 (0.50)	0.52 (0.50)	0.13 (0.34)	0.15 (0.35)	0.70 (0 .46)	0.72 (0.45)	0	0	0.50 (0.50)	0.50 (0.50)
transfer in	0.04 (0.20)	0.02 (0.13)	0.03 (0.17)	0.01 (0 .08)	0.02 (0.16)	0.01 (0.07)	0.03 (0.18)	0.01 (0.11)	0.05 (0.22)	0.02 (0.15)
transfer out	0.003 (0.06)	0.003 (0.06)	0.002 (0.05)	0.001 (0.03)	0.001 (0 .03)	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	0.06 (0.24)	0.03 (0.17)
emergency	0.93 (0.25)	0.92 (0.27)	0.48 (0.50)	0.61 (0.49)	0.41 (0.49)	0.54 (0.50)	0.93 (0.25)	0.93 (0.26)	0.92 (0.26)	0.92 (0.28)
death	0.001 (0.04)	0.002 (0.04)	0.002 (0 .05)	0.001 (0 .03)	0.002 (0.04)	0.002 (0.04)	0.00 (0.01)	0.00 (0.002)	0.30 (0.46)	0.26 (0.44)
laparoscopy	0.01 (0.10)	0.02 (0.15)	0.20 (0 .40)	0.36 (0.48)	0	0.003 (0 .05)	-	-	-	-
bilateral	-	-	-	-	0.04 (0.18)	0.03 (0.17)	-	-	-	-
implants	-	-	-	-	0.08 (0.28)	0.10 (0.30)	-	-	-	-
Tissue disorders	-	-	-	-	0	0	-	-	-	-
C-section	-	-	-	-	-	-	0.14 (0.35)	0.07 (0.26)	-	-
multiple deliveries	-	-	-	-	-	-	0.003 (0.06)	0.001 (0.04)	-	-
episiotomy	-	-	-	-	-	-	0.30 (0 .46)	0.20 (0.40)	-	-
stillbirth	-	-	-	-	-	-	0.00 (0.01)	0.00 (0.01)	-	-

(Continues)

Table 5.2: Continued

	Appendectomy		Cholecystectomy		Inguinal hernia repair		Childbirth		Stroke	
	2005	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**
hemiplegia	-	-	-	-	-	-	-	-	0.00 (0.03)	0.00 (0.03)
no haemorrhage	-	-	-	-	-	-	-	-	0.23 (0.42)	0.40 (0.49)
intracerebral	-	-	-	-	-	-	-	-	0.50 (0.50)	0.39 (0.49)
pneumonia	-	-	-	-	-	-	-	-	0.03 (0.17)	0.03 (0.18)
Non-severe Charlson	0.003 (0 .06)	0.003 (0 .05)	0.01 (0.10)	0.01 (0.08)	0.004 (0.06)	0.003 (0.05)	0.00 (0.01)	0.00 (0.01)	0.15 (0.36)	0.19 (0.39)
Severe Charlson	0.001 (0.03)	0.001 (0.03)	0.002 (0.04)	0.001 (0.04)	0.00 (0.03)	0.001 (0.03)	0.00 (0.01)	0.00 (0.01)	0.04 (0.19)	0.05 (0.21)
No. second diag.	0.09 (0 .35)	0.08 (0.32)	0.11 (0.38)	0.08 (0.33)	0.07 (0.30)	0.07 (0.28)	0.30 (0.54)	0.61 (0.65)	1.06 (1.09)	1.14 (1.15)
No. procedures	1.98 (1.16)	2.27 (1.54)	1.97 (1.21)	2.18 (1.48)	1.76 (1.05)	2.05 (1.41)	1.60 (1.19)	2.43 (1.70)	1.36 (1.39)	2.31 (1.97)
post-surgery infection	0.001 (0.02)	0.001 (0.03)	0.00 (0.01)	0.00 (0.01)	0	0	0.00 (0.00)	0.00 (0.02)	0	0
secondary urinary infec.	0.006 (0.07)	0.003 (0.06)	0.001 (0.04)	0.00 (0.03)	0.00 (0.02)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.02 (0.13)	0.03 (0.17)
secondary diabetes	0.003 (0.05)	0.002 (0.05)	0.01 (0 .09)	0.01 (0 .07)	0.002 (0.04)	0.002 (0.04)	0.00 (0.01)	0.00 (0.01)	0.13 (0.34)	0.17 (0.38)
secondary hypertension	0.001 (0.03)	0.001 (0.04)	0.01 (0.08)	0.01 (0 .07)	0.003 (0.06)	0.003 (0.06)	0.00 (0.01)	0.00 (0.00)	0.35 (0.48)	0.39 (0.49)
Hospital variables**										
Total discharges per hospital	5353.52 (4280.73)	6255.885 (4696.27)	5530.35 (4469.06)	6307.99 (4811.75)	5185.92 (4318.07)	6158.55 (4659.45)	5054.50 (4291.59)	6076.09 (4749.57)	6762.19 (4725.31)	7279.50 (5001.58)
ToC discharges	122.23 (107.00)	141.66 (120.48)	82.79 (109.70)	108.70 (113.65)	53.18 (43.96)	61.45 (43.63)	1321.53 (1316.50)	1445.82 (1197.22)	19.86 (19.30)	22.73 (20.04)
ToC/Tot Discharges	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.01 (0.01)	0.01 (0.01)	0.27 (0.11)	0.24 (0.09)	0.003 (0.002)	0.004 (0.003)
Hospital beds	63.36 (57.89)	66.24 (54.02)	64.29 (59.57)	68.06 (56.60)	61.66 (57.35)	65.84 (53.94)	60.14 (57.18)	63.06 (53.81)	80.76 (67.25)	77.59 (58.56)
Operation rooms	2.47 (2.02)	3.29 (2.37)	2.52 (2.07)	3.33 (2.41)	2.41 (1.98)	3.23 (2.35)	2.36 (2.00)	3.12 (2.31)	3.05 (2.37)	3.70 (2.59)
Doctors/ Total staff	0.23 (0.04)	0.22 (0.05)	0.22 (0.04)	0.22 (0.05)	0.22 (0.05)	0.22 (0.04)	0.22 (0.05)	0.22 (0.05)	0.23 (0.04)	0.22 (0.04)

(Continues)

Table 5.2: Continued

	Appendectomy		Cholecystectomy		Inguinal hernia repair		Childbirth		Stroke	
	2005	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**	**2005**	**2013**
Med Students / Tot doctors	0.16 (0.12)	0.10 (0.08)	0.16 (0.11)	0.10 (0.08)	0.16 (0.12)	0.10 (0.08)	0.15 (0.12)	0.09 (0.08)	0.18 (0.11)	0.11 (0.08)
Med Residents / Tot doctors	0.06 (0.09)	0.06 (0.09)	0.07 (0.09)	0.06 (0.09)	0.06 (0.09)	0.06 (0.09)	0.06 (0.09)	0.05 (0.08)	0.07 (0.09)	0.07 (0.10)
Nurses / Tot doctors	1.66 (0 .48)	1.76 (0 .55)	1.67 (0.47)	1.73 (0 .52)	1.67 (0.51)	1.74 (0 .51)	1.72 (0 .97)	1.76 (0.56)	1.59 (0.42)	1.72 (0.45)
Metropolitan area	0.36 (0 .48)	0.37 (0.48)	0.37 (0.48)	0.38 (0.49)	0.37 (0.48)	0.37 (0.48)	0.37 (0.48)	0.35 (0.48)	0.46 (0.50)	0.39 (0.49)
ACSH rate	68.06 (27.13)	68.62 (31.04)	69.43 (27.62)	71.43 (31.59)	67.55 (28.51)	70.25 (33.37)	66.80 (30.34)	67.26 (33.31)	68.77 (24.18)	70.56 (29.73)
Death rate	21.02 (13.10)	21.51 (14.31)	20.90 (13.01)	22.41 (14.83)	20.23 (13.27)	21.41 (14.25)	19.25 (12.67)	19.36 (11.86)	26.48 (13.62)	25.16 (14.91)
AMI death rate	276.0 (278.58)	310.29 (274.12)	265.73 (265.78)	296.81 (255.26)	272.68 (278.31)	298.05 (258.50)	276.84 (281.25)	316.35 (285.28)	250.20 (218.90)	287.66 (232.76)
State variables										
Public health exp. As GDP %	0.03 (0.01)	0.04 (0.01)	0.03 (0.01)	0 .04 (0.01)	0.03 (0.01)	0.04 (0.01)	0.03 (0.01)	0 .04 (0.01)	0.03 (0.01)	0 .04 (0.01)
State health exp. / fed health exp.	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)
Seguro Popular coverage rate	0.26 (0.19)	0 .90 (0.10)	0.26 (0.19)	0 .90 (0.10)	0.26 (0.19)	0 .90 (0.10)	0.26 (0.19)	0 .90 (0.10)	0.26 (0.19)	0 .90 (0.10)
PAN governor	0.31 (0.47)	0.22 (0.42)	0.31 (0.47)	0.22 (0.42)	0.31 (0.47)	0.22 (0.42)	0.31 (0.47)	0.22 (0.42)	0.31 (0.47)	0.22 (0.42)
PRI governor	0.50 (0.51)	0.66 (0.48)	0.50 (0.51)	0.66 (0.48)	0.50 (0.51)	0.66 (0.48)	0.50 (0.51)	0.66 (0.48)	0.50 (0.51)	0.66 (0.48)
PRD governor	0.19 (0.40)	0.12 (0.34)	0.19 (0.4)	0.12 (0.34)	0.19 (0.40)	0.12 (0.34)	0.19 (0.4)	0.12 (0.34)	0.19 (0.4)	0.12 (0.34)

- Not available. Standard deviation in brackets. **Information on hospital variables in 2013 do not consider one hospital not reporting data on human resources.

5.2.5 RESULTS

5.2.5.1 Stage 1

Results of the preferred models are reported in **Tables 5.3-5.7**. These tables show that the number of secondary diagnoses and medical procedures has a strong, positive, and significant association with LoS across the five ToCs and that results are, generally, robust over time.

5.2.5.1.1 Appendectomy

Table 5.3 presents the results for the appendectomy models. Patients suffering post-surgery infection are likely to have significantly longer hospital stays; for example, in 2007 post-surgery infection was associated with a 136% longer stay. Being a male patient increases LoS in all years. Age displays a U-shaped relationship with LoS as younger and older age groups tend to have longer stays.

The admission channel to the hospital is not always significantly associated with LoS. When significant, those who are admitted as emergencies or transferred into hospitals tend to have longer LoS; conversely, being transferred out to another hospital makes the stay shorter. Surprisingly, as in principle the recovery time is shorter, laparoscopy is associated with longer stays.

While LoS for appendectomy is generally overdispersed, in 2009 there is evidence of underdispersion; thus, a GPR model was estimated. The nine appendectomy models explain, on average, 17% of the variation in LoS.

5.2.5.1.2 Cholecystectomy

Table 5.4 shows that the U-shaped association between age and LoS observed in the appendectomy models is also valid for cholecystectomy. The positive and significant association of LoS with male patients also holds in the cholecystectomy case, but the magnitude is greater. Patients admitted as emergencies and transferred into hospitals, on average, have stays 45% and 43% longer, respectively.

Unlike the appendectomy case, laparoscopy has a negative association with cholecystectomy LoS as patients undergoing laparoscopy have a 32% shorter stay. Patients with hypertension are also associated with shorter LoS.

Overall, patient and treatment variables are able to explain 30% of the variations in cholecystectomy LoS.

5.2.5.1.3 Inguinal hernia repair

As shown in **Table 5.5**, patients being transferred into hospitals and admitted as emergencies are associated with 25% and 28% longer hernia stays, respectively. Age is also positively associated with longer LoS with patients in the older age group (older than 66 years) tending to have, on average, 27% longer stays than the reference group (16-35 years).

For most of the years, having one non-severe Charlson comorbidity is significantly associated with longer LoS. The magnitude of the association in 2012 is particularly strong as patients in this classification are likely to have 109% longer stays. In the last years of the study, being admitted for a bilateral hernia has a positive and significant association with longer LoS. Finally, male patients and procedures involving implants tend to have shorter stays.

The first stage models for inguinal hernia repair explain, on average, 29% of the LoS variation in the general hospitals studied.

5.2.5.1.4 Childbirth

Table 5.6 reports that older women have 6% longer delivery stays. It is also shown that patients undergoing C-section and those with multiple deliveries are associated with 67% and 15% longer LoS. Events of stillbirth lead to 47% longer stays. Having at least one severe Charlson comorbidity or two non-severe comorbidities as well as being diagnosed with hypertension or urinary tract infection significantly increases LoS. On the other hand, women who had an episiotomy during delivery are likely to have shorter LoS.

Models for years 2007-2012 show that patients who died in hospital have at least 40% longer stays. This result contrasts with the one obtained for 2013, where deceased are associated with 75% shorter LoS. This difference could probably be explained by the low number of patients who died in hospital.

The adjusted deviance R^2 statistics indicate that the models in **Table 5.6** explain on average 32% of the variation in childbirth LoS.

5.2.5.1.5 Stroke

Models explaining the variation in stroke LoS are reported in **Table 5.7**. Neither age nor sex have a significant association with hospital stays. On the contrary, patients transferred out, not presenting haemorrhage and those who died in the hospital are significantly associated with lower LoS. The variation in the LoS explained by the stroke models oscillates around 36%.

Stroke is the only condition with overdispersed LoS for which the preferred model was the GPR. In the other ToC all measures of goodness-of-fit suggested that the NB2 distribution better accommodated the data. However, in the stroke case the adjusted deviance R^2 was considerably higher in the GPR model while the AIC and the BIC were slightly lower in the NB2 models (not shown, but available upon request).

The results reported in **Tables 5.3-5.7** show that patient and treatment characteristics have a relatively constant association with LoS throughout the study period. However, any underlying pattern in LoS over time is overlooked by only focusing on these cross-sectional analyses. Therefore, to explore if LoS is changing over time, **Table 5.8** displays the incidence-rate ratios of the year dummies in five pooled models that conditioned for the same patient and treatment characteristics as above. With the exception of stroke, LoS follows a significant decreasing trend; the decrease is most pronounced in the case of hernia repair.

Table 5.3. Appendectomy - Stage 1 Regression Analysis: LoS on Patient and Clinical Factors

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Age 1 (<11 years)	1.135***	1.122***	1.120***	1.127***	1.141***	1.105***	1.134***	1.106***	1.129***
	-0.012	0.012	0.012	0.011	0.011	0.01	0.011	0.01	0.011
Age 3 (17-23 years)	0.877***	0.864***	0.879***	0.864***	0.885***	0.887***	0.874***	0.878***	0.880***
	0.01	0.01	0.01	0.009	0.009	0.009	0.009	0.008	0.009
Age 4 (24-35 years)	0.902***	0.880***	0.906***	0.894***	0.915***	0.913***	0.900***	0.913***	0.914***
	0.01	0.01	0.01	0.009	0.009	0.009	0.009	0.009	0.009
Age 5 (>36 years)	1.096***	1.056***	1.079***	1.067***	1.081***	1.076***	1.084***	1.086***	1.105***
	0.013	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.012
Male	1.063***	1.073***	1.069***	1.078***	1.058***	1.059***	1.068***	1.057***	1.049***
	0.007	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.007
Transfer in	0.997	1.055	1.070*	1	1.041	1.121***	1.012	1.073*	1.036
	0.028	0.032	0.034	0.031	0.032	0.036	0.031	0.032	0.032
Transfer out	0.975	1.057	0.952	1.086	1.033	0.845	0.825*	0.527***	0.680***
	0.077	0.099	0.091	0.099	0.091	0.091	0.079	0.041	0.062
Emergency	0.995	1.036	1.059*	1.004	1.044**	1.069**	1.026	1.017	1.046*
	0.022	0.024	0.024	0.022	0.021	0.024	0.019	0.018	0.02
Death	0.673**	1.155	0.963	1.181	1.148	0.916	1.215*	0.921	1.192
	0.086	0.159	0.127	0.139	0.134	0.132	0.119	0.143	0.115
Laparoscopy	1.150*	1.114*	1.013	1.119**	1.088**	1.136**	1.138***	1.111**	1.094*
	0.076	0.053	0.047	0.041	0.041	0.045	0.04	0.036	0.039
Non-severe Charlson	1.344**	1.338***	1.573***	1.158	1.116	0.95	0.974	1.167	1.14
	0.129	0.104	0.171	0.097	0.091	0.118	0.112	0.118	0.149
Severe Charlson	1.326**	1.185	1.214	1.064	1.098	1.061	1.232	1.189*	1.146
	0.118	0.124	0.149	0.089	0.136	0.119	0.138	0.103	0.141
No. secondary diagnoses	1.212***	1.281***	1.193***	1.197***	1.208***	1.251***	1.238***	1.245***	1.281***
	0.015	0.017	0.016	0.015	0.015	0.015	0.016	0.017	0.017
No. procedures	1.073***	1.076***	1.082***	1.075***	1.076***	1.060***	1.053***	1.053***	1.062***
	0.006	0.006	0.006	0.005	0.006	0.005	0.005	0.005	0.005
Post-surgery infection	1.805***	1.787***	2.361***	1.934***	2.001***	2.033***	1.860***	1.650***	1.953***
	0.161	0.18	0.286	0.143	0.212	0.17	0.149	0.223	0.141
Urinary tract infection	0.800***	0.816***	0.827***	0.822***	0.820***	0.947	0.752***	0.791***	0.743***
	0.038	0.042	0.042	0.038	0.045	0.063	0.041	0.048	0.041
Diabetes	0.881	0.760**	0.694**	0.808*	0.915	1.011	0.909	0.878	0.936
	0.089	0.075	0.089	0.086	0.088	0.134	0.117	0.105	0.137
Hypertension	0.836	1.137	1.069	0.981	1.012	0.966	1.019	0.88	0.780*
	0.101	0.113	0.122	0.103	0.092	0.108	0.106	0.077	0.075
Constant	2.443***	2.340***	2.313***	2.382***	2.248***	2.297***	2.408***	2.450***	2.332***
	0.063	0.063	0.061	0.058	0.053	0.058	0.053	0.052	0.053
N	29426	30568	30673	33579	35193	36373	38398	39233	39222
alpha/delta (dispersion)	0.012***	0.041***	0.037***	0.015***	-0.014***	0.018***	0.019***	0.021***	0.046***
Adjusted deviance R2	0.165	0.177	0.168	0.171	0.171	0.171	0.165	0.167	0.18
Model	NB	NB	NB	NB	GPR	NB	NB	NB	NB

Incidence-rate ratios. * p<0.10, ** p<0.05, *** p<0.01. Standard errors in second row. NB: negative binomial; GPR: generalised poisson regression.

Table 5.4: Cholecystectomy - Stage 1 Regression Analysis: LoS on Patient and Clinical Factors

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Age 1 (<26 years)	1.048***	1.037**	1.065***	1.043***	1.088***	1.087***	1.065***	1.063***	1.052***
	0.016	0.015	0.016	0.015	0.016	0.016	0.015	0.016	0.016
Age 3 (34-41 years)	1.016	1.004	1.006	0.998	1.003	0.995	1.004	0.961***	0.968**
	0.015	0.014	0.015	0.015	0.014	0.015	0.015	0.015	0.015
Age 4 (42-52 years)	1.056***	1.043***	1.026*	1.036**	1.023	1.046***	1.018	0.997	0.986
	0.017	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Age 5 (>53 years)	1.187***	1.146***	1.155***	1.150***	1.129***	1.161***	1.121***	1.114***	1.072***
	0.019	0.017	0.017	0.017	0.016	0.017	0.017	0.018	0.017
Male	1.107***	1.086***	1.086***	1.095***	1.090***	1.088***	1.123***	1.135***	1.095***
	0.016	0.016	0.015	0.015	0.015	0.016	0.015	0.016	0.015
Transfer in	1.241***	1.308***	1.490***	1.351***	1.370***	1.574***	1.536***	1.602***	1.424***
	0.042	0.046	0.071	0.057	0.074	0.08	0.085	0.09	0.072
Transfer out	1.362***	0.855	1.125	1.122	0.908	1.338	1.041	1.039	0.799
	0.145	0.09	0.132	0.116	0.094	0.304	0.147	0.176	0.166
Emergency	1.465***	1.460***	1.494***	1.477***	1.460***	1.436***	1.416***	1.444***	1.411***
	0.017	0.016	0.017	0.016	0.017	0.019	0.017	0.019	0.018
Death	0.916	1.085	0.996	1.155	1.171	0.816	1.124	1.218	0.951
	0.11	0.11	0.122	0.139	0.164	0.148	0.142	0.19	0.17
Laparoscopy	0.684***	0.659***	0.670***	0.691***	0.654***	0.670***	0.684***	0.722***	0.728***
	0.012	0.011	0.012	0.01	0.01	0.01	0.01	0.01	0.01
Non-severe Charlson	1.024	0.988	1.068	0.974	0.778***	1.088	0.946	0.892	0.959
	0.077	0.093	0.091	0.078	0.068	0.115	0.085	0.089	0.109
Severe Charlson	0.846	0.893	1.220*	0.810**	1.013	0.965	0.763**	0.873	0.853
	0.099	0.114	0.141	0.079	0.129	0.143	0.087	0.11	0.127
No. secondary diagnoses	1.329***	1.332***	1.261***	1.311***	1.309***	1.378***	1.364***	1.436***	1.416***
	0.021	0.021	0.022	0.023	0.022	0.024	0.022	0.028	0.023
No. procedures	1.101***	1.105***	1.119***	1.114***	1.134***	1.096***	1.114***	1.099***	1.092***
	0.007	0.007	0.007	0.006	0.008	0.007	0.007	0.007	0.007
Post-surgery infection	1.359**	-	1.367***	0.907	-	0.204***	0.606***	1.618***	2.289***
	0.172	-	0.15	0.333	-	0.015	0.087	0.137	0.088
Urinary tract infection	1.123	1.207	0.908	0.792*	0.967	1.138	1.037	1.173	1.112
	0.146	0.153	0.115	0.103	0.158	0.154	0.107	0.162	0.154
Diabetes	0.905	0.857	0.91	0.906	1.208*	0.790**	0.98	0.919	0.997
	0.077	0.09	0.085	0.078	0.118	0.091	0.096	0.105	0.123
Hypertension	0.758***	0.743***	0.780***	0.785***	0.777***	0.784***	0.713***	0.809***	0.759***
	0.044	0.052	0.05	0.05	0.056	0.049	0.047	0.061	0.051
Constant	1.853***	1.878***	1.788***	1.738***	1.659***	1.700***	1.673***	1.737***	1.735***
	0.034	0.033	0.03	0.029	0.031	0.032	0.031	0.034	0.033
	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
N	17159	18824	20213	22289	22437	23082	25307	25601	25422
alpha (dispersion)	0.04***	0.03***	0.06***	0.07***	0.06***	0.08***	0.09***	0.13***	0.11***
Adjusted deviance R2	0.335	0.321	0.316	0.333	0.302	0.29	0.281	0.273	0.257
Model	NB	NB	NB	NB	NB	NB	NB	NB	NB

Incidence-rate ratios. * p<0.10, ** p<0.05, *** p<0.01. Standard errors in second row. NB: negative binomial.

Table 5.5 Inguinal hernia surgery - Stage 1 Regression Analysis: LoS on Patient and Clinical Factors

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Age 1 (<15 years)	0.850***	0.837***	0.865***	0.876***	0.859***	0.858***	0.898***	0.840***	0.841***
	0.018	0.017	0.021	0.019	0.019	0.018	0.017	0.015	0.017
Age 3 (36-50 years)	1.033	1.037*	1.049**	1.063***	1.068***	1.089***	1.065***	1.070***	1.074***
	0.021	0.021	0.022	0.021	0.022	0.023	0.02	0.02	0.021
Age 4 (51-65 years)	1.137***	1.143***	1.123***	1.148***	1.165***	1.131***	1.148***	1.128***	1.094***
	0.023	0.023	0.023	0.024	0.025	0.024	0.022	0.021	0.022
Age 5 (>66 years)	1.273***	1.275***	1.253***	1.301***	1.321***	1.236***	1.260***	1.226***	1.264***
	0.028	0.026	0.026	0.026	0.029	0.026	0.024	0.023	0.027
Male	0.932***	0.966**	0.985	0.974*	0.960***	0.967**	0.998	0.976*	0.932***
	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.013	0.014
Transfer in	1.233***	1.279***	1.173***	1.194***	1.183**	1.250***	1.309***	1.462***	1.196**
	0.065	0.065	0.067	0.077	0.097	0.102	0.101	0.111	0.108
Transfer out	1.51	1.064	1.868***	1.118	0.925	1.497	0.570***	1.599	0.531***
	0.384	0.206	0.427	0.23	0.141	0.493	0.092	0.504	0.07
Emergency	1.311***	1.279***	1.305***	1.291***	1.265***	1.279***	1.254***	1.251***	1.249***
	0.021	0.021	0.022	0.021	0.021	0.022	0.021	0.021	0.021
Death	1.255	0.965	1.389**	1.533***	1.233	1.338**	1.192	1.112	1.881***
	0.174	0.165	0.182	0.23	0.205	0.183	0.24	0.169	0.289
Bilateral hernia	1.024	1.086	0.979	1.044	1.047	1.102**	1.176***	1.170***	1.176***
	0.049	0.055	0.052	0.044	0.05	0.051	0.052	0.05	0.054
Procedure w/implants	0.916***	0.908***	0.969	1.003	0.945**	0.911***	0.935**	1.013	0.987
	0.026	0.025	0.025	0.027	0.026	0.025	0.024	0.028	0.027
Non-severe Charlson	1.370**	1.556***	1.073	1.161	0.899	1.728***	1.425*	2.086***	1.723***
	0.197	0.177	0.134	0.174	0.162	0.272	0.273	0.501	0.268
Severe Charlson	1.487	1.191	1.399**	0.973	0.993	0.876	1.441*	1.528**	0.864
	0.376	0.186	0.219	0.195	0.135	0.118	0.292	0.272	0.233
No. secondary diagnoses	1.166***	1.149***	1.156***	1.140***	1.153***	1.122***	1.148***	1.171***	1.216***
	0.034	0.031	0.031	0.033	0.032	0.033	0.033	0.03	0.037
No. procedures	1.135***	1.148***	1.122***	1.134***	1.140***	1.157***	1.114***	1.114***	1.109***
	0.013	0.013	0.012	0.011	0.014	0.013	0.012	0.011	0.011
Urinary tract infection	0.935	0.315***	0.806	0.935	0.797	1.239	1.355	1.907	1.157
	0.33	0.135	0.167	0.199	0.133	0.18	0.35	0.873	0.333
Diabetes	0.595***	0.781*	1.023	1.093	0.928	0.627**	0.939	0.593**	0.650**
	0.11	0.107	0.147	0.238	0.178	0.125	0.227	0.153	0.14
Hypertension	0.728***	0.988	0.971	0.867	1.238**	0.852	0.923	0.722***	0.815*
	0.088	0.112	0.124	0.1	0.133	0.094	0.103	0.074	0.089
Constant	1.142***	1.077***	1.082***	1.02	0.986	0.965	0.968	0.978	1.025
	0.031	0.029	0.028	0.025	0.029	0.027	0.027	0.025	0.031
N	13130	13535	13524	14297	14160	14363	16116	17159	16713
delta (dispersion factor)	-0.13***	-0.16***	-0.15***	-0.12***	-0.14***	-0.11***	-0.07***	-0.09***	-0.05***
Adjusted deviance R2	0.303	0.3	0.292	0.302	0.284	0.285	0.288	0.289	0.244
Model	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR

Incidence-rate ratios. * p<0.10, ** p<0.05, *** p<0.01. Standard errors in second row. GPR: generalised poisson regression.

Table 5.6 Childbirth - Stage 1 Regression Analysis: LoS on Patient and Clinical Factors

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Age 1 (<18 years)	1.011*	0.991	1.008	1.045***	1.026***	0.983***	0.994	1.029***	1.025***
	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Age 3 (22-25 years)	1.007	0.969***	1.002	1.023***	0.997	1.004	1.004	1.005	1.037***
	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.006
Age 4 (26-29 years)	0.997	0.979***	1.029***	1.016***	1.013**	1.004	0.997	1.025***	1.022***
	0.006	0.006	0.005	0.005	0.005	0.005	0.004	0.005	0.005
Age 5 (>30 years)	1.059***	1.016***	1.055***	1.060***	1.083***	1.035***	1.043***	1.080***	1.093***
	0.005	0.006	0.005	0.005	0.006	0.005	0.005	0.005	0.006
Transfer in	1.001	1.026	1.051***	0.962***	1.005	1.026*	1.076***	1.046***	1.094***
	0.014	0.018	0.015	0.013	0.016	0.015	0.015	0.018	0.018
Transfer out	1.285***	0.726***	0.921	1.134*	0.974	0.911	1.091	0.991	0.908*
	0.108	0.04	0.077	0.084	0.078	0.09	0.122	0.07	0.05
Emergency	0.941***	1.002	0.962***	0.971***	0.981**	0.968***	1.056***	1.046***	1.029***
	0.01	0.01	0.008	0.009	0.01	0.009	0.009	0.011	0.01
Death	1.008	1.413	1.624**	1.429	1.918***	3.187**	3.649***	2.033**	0.252**
	0.263	0.305	0.337	0.324	0.369	1.593	1.265	0.686	0.138
C-section	1.745***	1.721***	1.765***	1.709***	1.652***	1.626***	1.602***	1.624***	1.629***
	0.008	0.007	0.007	0.007	0.006	0.008	0.008	0.008	0.009
Multiple delivery	1.161***	1.150***	1.096***	1.173***	1.143***	1.196***	1.144***	1.152***	1.123***
	0.031	0.027	0.023	0.025	0.023	0.036	0.032	0.042	0.033
Episiotomy	0.957***	0.960***	0.947***	0.934***	0.961***	0.984***	0.964***	1.008	0.969***
	0.005	0.005	0.005	0.005	0.006	0.005	0.005	0.006	0.007
Stillbirth	1.400**	1.575***	1.799***	1.498***	1.391***	1.204*	1.405***	1.156*	1.794*
	0.203	0.184	0.18	0.107	0.125	0.123	0.154	0.093	0.545
Non-severe Charlson	1.946***	1.338**	1.273	1.360*	1.436***	1.650***	1.469***	1.15	1.256**
	0.463	0.181	0.196	0.218	0.199	0.267	0.204	0.15	0.137
Severe Charlson	1.249**	1.212**	1.275**	1.574***	1.130**	1.224***	1.221*	1.192*	1.483***
	0.138	0.114	0.12	0.12	0.07	0.095	0.134	0.107	0.203
No. secondary diagnoses	1.117***	1.117***	1.055***	1.031***	1.098***	1.064***	1.056***	1.051***	1.057***
	0.005	0.005	0.004	0.004	0.004	0.004	0.003	0.004	0.004
No. procedures	1.001	1.001	1.016***	1.022***	0.999	1.018***	1.009***	1.010***	1.011***
	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.003	0.003
Urinary tract infection	1.603***	1.273***	1.395***	1.200*	1.133	1.377***	1.052	1.156	1.175**
	0.206	0.103	0.11	0.116	0.122	0.136	0.089	0.104	0.096
Diabetes	0.583**	1.085	1.149	1.211	0.765*	0.789	0.775*	1.1	1.009
	0.153	0.181	0.228	0.226	0.123	0.161	0.12	0.173	0.162
Hypertension	1.436***	1	1.305***	1.465***	1.297***	1.059	1.164***	1.268**	1.469***
	0.18	0.069	0.101	0.16	0.114	0.071	0.061	0.146	0.143
Constant	1.147***	1.110***	1.117***	1.087***	1.082***	1.080***	1.020**	0.992	1.013
	0.013	0.013	0.011	0.011	0.011	0.011	0.01	0.012	0.011
N	346013	364676	383749	424334	452436	425177	435934	419784	407584
delta (dispersion)	-0.1152***	-0.1147***	-0.109***	-0.11***	-0.119***	-0.122***	-0.128***	-0.127***	-0.127
Adjusted deviance R2	0.361	0.359	0.345	0.331	0.323	0.293	0.292	0.28	0.278
Model	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR

Incidence-rate ratios. * p<0.10, ** p<0.05, *** p<0.01. Standard errors in second row. GPR: generalised poisson regression.

Table 5.7 Stroke - Stage 1 Regression Analysis: LoS on Patient and Clinical Factors

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Age 1 (<15 years)	1.016	0.964	1.052	0.946	1.012	1.026	1.070*	1.026	1.074**
	0.042	0.039	0.045	0.037	0.037	0.038	0.039	0.035	0.038
Age 3 (36-50 years)	1.009	0.949	1.005	0.937*	0.959	0.939*	1.065*	1.012	0.989
	0.042	0.038	0.041	0.036	0.036	0.032	0.037	0.034	0.033
Age 4 (51-65 years)	0.969	0.978	0.976	0.965	0.96	1.013	1.046	0.982	0.96
	0.04	0.038	0.04	0.036	0.034	0.036	0.038	0.033	0.033
Age 5 (>66 years)	0.937	0.941	1.015	0.877***	0.953	0.996	1.053	0.958	0.971
	0.041	0.039	0.043	0.034	0.036	0.037	0.04	0.033	0.034
Male	1	0.971	1.01	1.003	1.018	1.004	1.01	1.015	0.973
	0.026	0.025	0.027	0.024	0.024	0.023	0.023	0.022	0.021
Transfer in	1.228**	0.954	1.178	1.01	0.895	1.181*	0.905	1.277**	1.089
	0.126	0.097	0.13	0.112	0.092	0.118	0.092	0.135	0.112
Transfer out	0.650***	0.578***	0.662***	0.566***	0.635***	0.732***	0.800***	0.729***	0.582***
	0.042	0.036	0.042	0.038	0.035	0.051	0.051	0.051	0.04
Emergency	1.118	0.96	1.106	1.004	0.876*	1.106	0.983	1.211***	1.014
	0.087	0.082	0.095	0.069	0.065	0.08	0.081	0.089	0.075
Death	0.750***	0.765***	0.758***	0.788***	0.814***	0.778***	0.804***	0.847***	0.831***
	0.025	0.025	0.026	0.025	0.024	0.023	0.023	0.023	0.023
Hemiplegia	0.775	1.266	1.439***	0.580*	0.568***	0.792	1.379	1.136	0.759
	0.181	0.268	0.136	0.164	0.095	0.391	0.734	0.182	0.146
No haemorrhage	0.825***	0.875***	0.872***	0.880***	0.924**	0.921**	0.827***	0.877***	0.834***
	0.037	0.041	0.037	0.032	0.033	0.034	0.028	0.029	0.028
Non-severe Charlson	1.057	1.057	1.077	0.917	0.939	0.978	0.942	0.976	1.036
	0.066	0.061	0.083	0.058	0.053	0.06	0.058	0.051	0.054
Severe Charlson	1.161*	1.087	1.099	0.909	1.017	0.879*	1.006	0.983	1.027
	0.093	0.089	0.086	0.073	0.084	0.06	0.073	0.067	0.067
No. secondary diagnoses	1.062***	1.077***	1.077***	1.072***	1.072***	1.072***	1.068***	1.114***	1.087***
	0.02	0.02	0.022	0.019	0.018	0.018	0.018	0.018	0.018
No. procedures	1.138***	1.107***	1.117***	1.125***	1.096***	1.109***	1.095***	1.096***	1.090***
	0.017	0.017	0.016	0.013	0.016	0.012	0.013	0.012	0.011
Post-surgery infection	-	-	-	-	-	2.113***	1.133	-	-
	-	-	-	-	-	0.171	0.144	-	-
Urinary tract infection	1.032	0.958	1.096	1.176**	1.149*	1.202**	1.158**	1.1	1.194***
	0.103	0.116	0.116	0.094	0.087	0.099	0.079	0.088	0.075
Diabetes	0.925	0.937	0.855**	0.999	0.985	1.048	0.944	0.899**	0.908*
	0.06	0.058	0.065	0.064	0.057	0.064	0.059	0.047	0.048
Hypertension	1.012	0.894***	0.97	0.963	0.971	0.927**	1.004	0.914***	0.961
	0.036	0.03	0.035	0.031	0.029	0.028	0.03	0.025	0.027
Constant	3.989***	5.000***	4.060***	4.538***	5.087***	4.008***	4.524***	3.821***	4.558***
	0.348	0.47	0.378	0.354	0.421	0.323	0.397	0.322	0.371
N	2726	2855	2775	3298	3647	3688	3795	4073	4140
delta (dispersion factor)	0.41***	0.41***	0.44***	0.41***	0.43***	0.43***	0.45***	0.47***	0.43***
Adjusted deviance R2	0.315	0.341	0.392	0.332	0.313	0.348	0.362	0.453	0.353
Model	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR	GPR

Incidence-rate ratios. * p<0.10, ** p<0.05, *** p<0.01. Standard errors in second row. GPR: generalised poisson regression.

Table 5.8: Time trend in pooled model conditioning for patient and treatment characteristics

	Appendectomy	Cholecystectomy	Hernia Repair	Childbirth	Stroke
yr_2006	0.993	0.985*	0.973**	1.002	1.035
yr_2007	0.994	0.979**	0.967***	1.022***	1.022
yr_2008	0.984***	0.940***	0.942***	0.998	0.995
yr_2009	0.968***	0.917***	0.898***	0.966***	0.995
yr_2010	0.969***	0.899***	0.897***	0.987***	1.024
yr_2011	0.969***	0.902***	0.864***	0.962***	1.022
yr_2012	0.961***	0.904***	0.886***	0.969***	0.998
yr_2013	0.957***	0.898***	0.848***	0.966***	0.99
N	295,600	187,375	124,176	3,409,332	27,732
Model	Pooled NB	Pooled NB	Pooled GPR	Pooled GPR	Pooled NB

IRR; Standard errors in second row. * p<0.05, ** p<0.01, *** p<0.001. NB: negative binomial. GPR: generalised Poisson regression. To be consistent with Stage 2 models, hospitals with less than five observations in the panel were dropped from the pooled analysis, the year coefficients are robust after observations are excluded.

5.2.5.2 Stage 2

5.2.5.2.1 Graphical analysis

From the models estimated in Stage 1, it was possible to capture the average hospital effect on LoS purged of patient and treatment factors that can be interpreted as a measure of hospital efficiency/performance **(Laudicella et al., 2010)**. Following Street et al. (2012), **Figure 5.1** plots for each ToC the estimated hospital effect, $\hat{u}_{kt}$, standardised by the unconditional GPR/NB2 regression with predicted fixed effects to derive the relative performance of each hospital compared with the national average. In this sense, a standardised hospital effect of 1.5 in 2013 for appendectomy means that patients in the hospital in question have 50% longer appendectomy LoS compared with the average of all hospitals in the country that provide this ToC in 2013. For presentation purposes, only hospital effects in 2013 are reported, but they reflect what is observed for other years.[22] Hospitals are ranked from left to right by their deviation

[22] See Appendix 5.2

from the national mean in ascending order. Even after conditioning for different patient and treatment factors, the variation in hospital performance remains large. Each case displays an S-shaped distribution where hospitals at the left may be considered “best performers” and those at the right “worst performers”.[23] However, this classification should be treated cautiously as there may be legitimate reasons for the observed heterogeneity in hospital resource use **(Dormont and Milcent, 2005)**. Even though Figure 1 shows that for all conditions hospital performance follows an S-shaped distribution, there are important differences among these distributions with some conditions (for instance childbirth) appearing to be a more standardised process than others (stroke). In general, while an important proportion of hospital effects do not differ significantly from the national average, for all conditions there is always a clearly defined group of best performers and another of worst performers. In addition, the confidence intervals among worst performing hospitals are wider than those for best performing hospitals, suggesting a higher variation within worst performing hospitals than within best performing hospitals.

5.2.5.2.2 Fixed effects model

Odd columns in **Table 5.9** report the results of the FE model using hospital and state factors to explain the variation in the estimated performance measurement. A FE model was preferred to an RE model as informed by the Hausman test of the consistency of the estimates from RE (not shown).

The dependent variable in the models of Stage 2 measures the hospital deviation from the average LoS; therefore, it is negative for hospitals whose effect is lower than the

[23] For the purposes of this study, hospitals are only classified in these categories if their 95% confidence interval does not include the average.

average (“best performers with lower average LoS than in other hospitals”) and positive for “worst performing” hospitals. A positive coefficient means that the variable in question is positively associated with poor performance.

Models reported in columns 1, 3, and 5 in **Table 5.9** suggest economies of scale in appendectomy, cholecystectomy, and hernia repair since the higher the volume of these surgical procedures with respect to total discharges, the better the performance. In addition, strengthening this argument for the inguinal hernia case, total hospital discharges are also negatively associated with poor performance at the 5% level. In contrast, there is evidence of diseconomies of scale in childbirth as the coefficient for volume of cases is positive and significant at the 1%.

Although the magnitude is small, in-hospital mortality is positively and significantly associated with higher average LoS in appendectomy and cholecystectomy at the 10% and 5% levels, respectively.

The ratio of state health expenditure to federal health expenditure is positively associated with poor performance in appendectomy, but for the other ToC it is non-significant.

Being in a state with a governor of the PRD party has a negative association with hospital performance in appendectomies at the 10% significance level and in cholecystectomies at the 5%. The association of this variable with hospital performance in hernia repair is also negative though insignificant. The sign of these associations is aligned with the soft budget constraint hypothesis.

Despite not always being significant, the sign and magnitude of the coefficients of the year dummies suggest that performance in inguinal hernia and cholecystectomy has improved over time. For appendectomy and childbirth, the sign of the coefficients is negative and significant only in three years, but they suggest that hospital performance in these ToC is improving over time. A different story applies for stroke, where average LoS appears to have increased over time.

Even though the second stage models indicate some statistically significant associations, the overall explanatory power of all the models is low, with adjusted R^2 ranging from 0.07 in appendectomy to 0.25 for childbirth.

5.2.5.2.3 Dynamic model

The results of estimating model (5.13) are reported in the even columns of **Table 5.9.** Given that the dependent variable in the second stage takes both negative and positive values, if the estimated coefficient for the lag regressors is positive this means that hospital effects below the mean move further down and hospital effects above the mean move upwards over time. On the other hand, if the coefficient is negative, hospital effects will tend to regress towards the mean as time passes.

The model in column 10 may suggest that best performing hospitals with respect to stroke are improving their relative performance with time, while worst performing hospitals with respect to this condition are worsening their relative performance over time, leading to an increase in the dispersion of the performance distribution. This could explain why the pooled analysis did not identify a time trend for this condition. While the first lag in the childbirth dynamic model has a positive and significant coefficient, the Sargan specification test rejects that the over-identifying assumptions imposed by the Arrellano-Bond method are valid.[24] Even though this hypothesis is not rejected for

[24] For robustness, the Hansen test was also conducted and the null hypothesis was still rejected at the 5% level.

the surgical cases, the estimates for the lag regressors do not show a significant association and, thus, the FE specifications are preferred.

Figure 5.1: Unexplained Variation in Resource Use across Hospitals

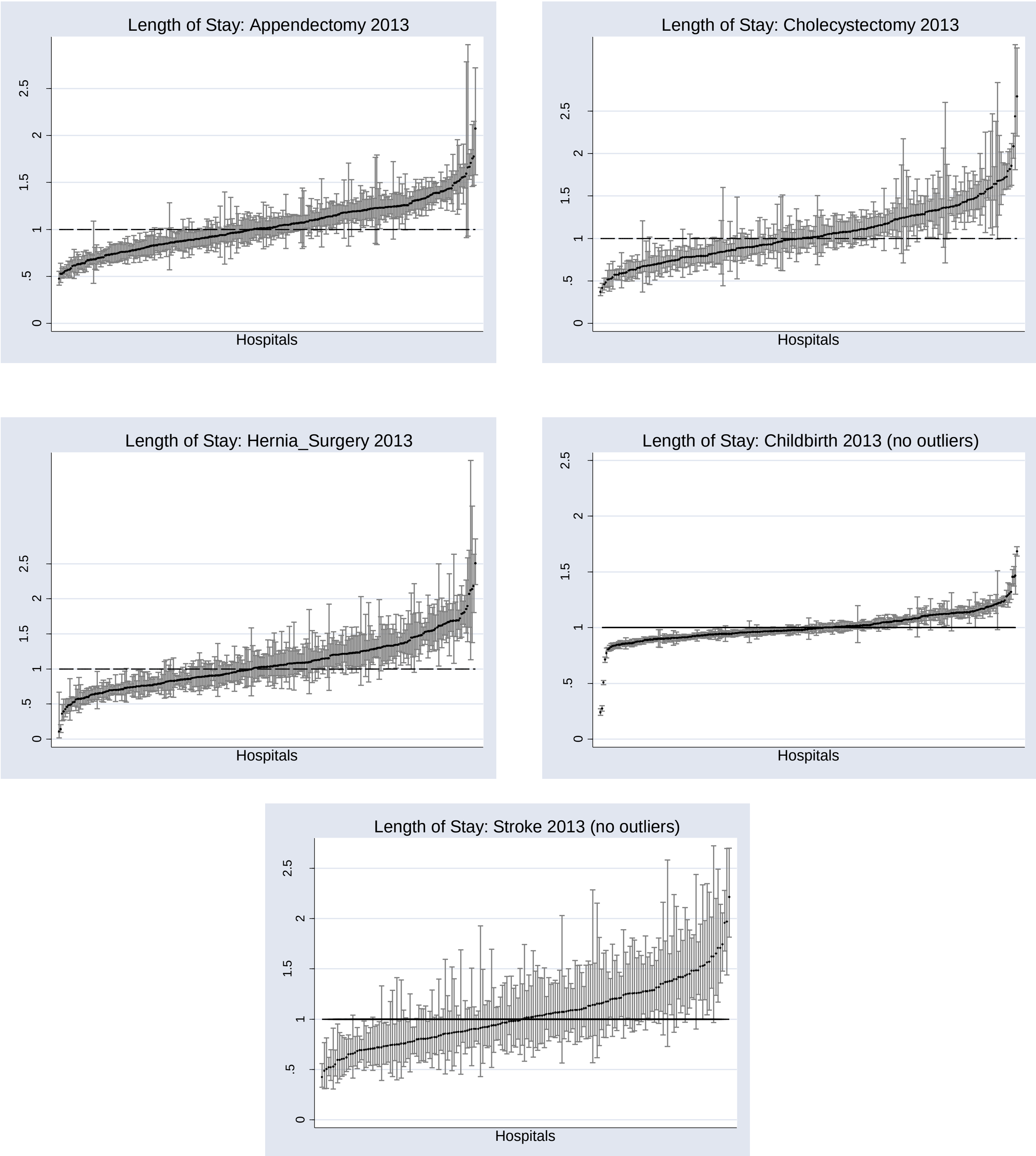

Table 5.9: Stage 2 Panel Regression Analysis: Hospital effect on hospital and state factors

	Appendectomy		Cholecystectomy		Inguinal hernia		Childbirth		Stroke	
	FE	AR2	FE	AR2	FE	AR2	FE	AR2	FE	AR2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total discharges ('000)	-0.003	0.005	-0.006	-0.015*	-0.020**	-0.016*	-0.002	-0.002	-0.014**	-0.012
Bed pressure	0	0	0	0	0	0.001**	0	0	-0.001	0
EoC/Tot Discharges	-2.743***	-0.801	-2.624**	-2.150**	-7.030***	-2.286	0.222***	0.213**	-4.33	-5.266
Doctors/ Total staff	-0.093	-0.201	-0.041	0.013	-0.358	-0.175	0.059	0.086	-0.602***	-0.396
Med Students / Tot doctors	-0.005	-0.001	-0.013	-0.009	-0.012	-0.028***	0.008	-0.001	0.01	-0.008
Med Residents / Tot doctors	0	-0.005*	0.007	-0.005	0.021**	0.01	0	0.002	0.003	-0.006
Nurses / Tot doctors	0	0.001	0	0.002*	-0.003*	0.001	-0.001	0	-0.002	0.003
ACSH rate	0	0	0	-0.001**	0	-0.001*	0	0	-0.002**	-0.002*
Death rate	0.002*	0.001	0.003**	0.003**	0.001	0.002	-0.001	-0.002***	0.003	0.007**
Public health exp. As GDP %	-0.882	-0.926	1.848	-0.219	-0.723	-1.493	0.566	-0.204	1.37	1.69
State health exp / fed health exp	0.083*	0.073	0.006	0.073	0.042	-0.170*	-0.046	-0.008	-0.04	-0.058
Seguro Popular state coverage rate	-0.042	-0.183**	0.072	-0.019	-0.011	-0.192	-0.078	-0.062	0.065	-0.153
PAN governor	-0.005	0.019	0.009	-0.029	-0.013	-0.024	0.005	0.008	-0.001	-0.115**
PRD governor	0.034*	-0.003	0.068**	0.029	0.052	0.007	-0.025	-0.026	0.037	0.006
year 2006	-0.042***		0.002		-0.065***		-0.031***		0.289***	
year 2007	-0.054**		-0.048*		-0.055		-0.012		0.035	
year 2008	-0.013	0.051***	-0.079**	-0.011	-0.096**	-0.027	-0.032*	-0.023**	0.162***	0.151***
year 2009	-0.063**	-0.003	-0.144***	-0.070***	-0.133**	-0.046*	-0.032	-0.013	0.270***	0.272***
year 2010	-0.037	0.063*	-0.117	-0.037	-0.152**	0.02	-0.015	0.004	0.029	0.029
year 2011	0.03	0.149***	-0.153*	-0.076	-0.133	0.024	-0.066	-0.054	0.134	0.151
year 2012	0.032	0.101**	-0.115	-0.037	-0.149*	-0.023	-0.084**	-0.054	-0.139*	-0.096
year 2013	-0.003	0.092**	-0.12	-0.039	-0.076	0.065	-0.079**	-0.036	0.12	0.133
L1 hospital FE		0.292		-0.06		0.104		0.257**		0.196*
L2 hospital FE		0.042		-0.095		-0.025		0.061		0.166**
_cons	0.973***	0.606**	0.582***	0.780***	0.400**	0.323***	0.066	0.067	1.666***	1.118***
N	2176	1352	1814	1091	2126	1309	2302	1445	1203	631
Adjusted R2	0.069		0.076		0.09		0.247		0.244	
F	43.442		12.137		29.187		69.552		264.415	
Ho: no autocorrelation 2nd order		0.84		0.24		0.58		0.50		0.61
Ho: no autocorrelation 3rd order		0.67		0.74		0.75		0.24		0.76
Sargan Test (Ho: valid overidentifying restrictions)		9.24		15.34		20.99		26.61		15.05

* p<0.10, ** p<0.05, *** p<0.01. p-value reported in the no autocorrelation test. In the Sargan Test the $\chi 2$ statistic with 15 df is reported.

5.2.5.3 Performance within and across Hospitals

After having conducted Stages 1 and 2 of the regression analyses, the next step is to identify the hospitals that appear as best and worst performers. **Appendix 5.3** presents a yearly hospital performance ranking for each ToC. Hospitals appearing in the rankings are classified by size: small (first two quintiles of hospital bed distribution), medium (third and fourth quintiles), and large (fifth quintile). Medium-sized hospitals are the most prevalent in both the best and worst performance rankings, where small hospitals are more common than large hospitals among the top performers, while the opposite is true for the hospitals with the longest LoS. Therefore, a sensitivity analysis was conducted where a subset of Stage 1 models were estimated separately for hospitals located below and above the median of the distribution of hospital beds (available upon request). With the exception of childbirth, the rest of the models using the split data did not show changes that would suggest that large hospitals were “penalised” by receiving complicated cases from small hospitals. In childbirth, smaller hospitals tend to have shorter LoS for patients admitted as emergencies and for those transferred out, while larger hospitals tend to have longer LoS for patients transferred into the hospital.

It is of interest to analyse how LoS performance is related across time, across ToC, and across hospitals. Therefore, following Gaughan et al. (2012) who did it in a cross-sectional study, performance rankings are rescaled to make them comparable across treatments and across time. For each treatment and year, the bottom ranking hospital received a rank of 1 and the others received a value between 0 and 1 according to their relative positions.

Table 5.10 shows the Spearman rank correlation matrices for each ToC ranking in 2005-2013. All rankings are significantly correlated at the 5% level (using the Bonferroni adjustment) and they range between 0.53 and 0.88 suggesting that hospitals observe similar levels of relative performance over time for specific ToC (for example, good performing hospitals with respect to appendectomy in a given year tend to be good appendectomy performers in other years). Furthermore, the correlation of the performance ranks within three consecutive years is generally above 0.60, showing a strong persistence in the relative performance levels within each hospital.

Table 5.11 reports the Spearman rank correlation matrices for the five performance measures for each year in 2005-2013. With the exception of stroke, performance rankings for the other ToC are usually significantly correlated at the 5% level. The highest correlations throughout the period are among the surgical procedures, indicating that if a hospital performs poorly in one procedure it will tend to perform poorly in the rest.

Table 5.10: Spearman rank correlation matrices across time

Appendectomy performance ranks 2005-2013

(184 obs)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
2005	1								
2006	0.8054*	1							
2007	0.7503*	0.8129*	1						
2008	0.8091*	0.8053*	0.8471*	1					
2009	0.7498*	0.7183*	0.7894*	0.8323*	1				
2010	0.7201*	0.6992*	0.7666*	0.7895*	0.8376*	1			
2011	0.7199*	0.7010*	0.7397*	0.7454*	0.7850*	0.8573*	1		
2012	0.6898*	0.6338*	0.6809*	0.7026*	0.7755*	0.8087*	0.8458*	1	
2013	0.5976*	0.5725*	0.6421*	0.6447*	0.7351*	0.7843*	0.7779*	0.8796*	1

Cholecystectomy performance ranks 2005-2013

(140 obs)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
2005	1								
2006	0.8584*	1							
2007	0.7344*	0.7809*	1						
2008	0.7037*	0.7244*	0.8107*	1					
2009	0.6493*	0.6696*	0.7617*	0.7975*	1				
2010	0.5657*	0.6162*	0.6639*	0.6823*	0.7894*	1			
2011	0.6164*	0.5895*	0.6801*	0.6827*	0.7520*	0.7993*	1		
2012	0.5571*	0.5574*	0.6326*	0.5910*	0.6943*	0.7928*	0.7747*	1	
2013	0.5600*	0.5660*	0.5964*	0.5905*	0.6632*	0.7796*	0.7648*	0.8787*	1

(Continues)

Table 5.10: (continued)

Inguinal hernia repair performance ranks 2005-2013

(181 obs)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
2005	1								
2006	0.7583*	1							
2007	0.7250*	0.7571*	1						
2008	0.6668*	0.6741*	0.7080*	1					
2009	0.6222*	0.6054*	0.6792*	0.7808*	1				
2010	0.5518*	0.6321*	0.5827*	0.7068*	0.7701*	1			
2011	0.5806*	0.5809*	0.6066*	0.6917*	0.7826*	0.7599*	1		
2012	0.5727*	0.5332*	0.5487*	0.6178*	0.6626*	0.6970*	0.8036*	1	
2013	0.5867*	0.5716*	0.5508*	0.6395*	0.7244*	0.7483*	0.7690*	0.8153*	1

Childbirth performance ranks 2005-2013

(198 obs)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
2005	1								
2006	0.7770*	1							
2007	0.7268*	0.7327*	1						
2008	0.7200*	0.7125*	0.7755*	1					
2009	0.6760*	0.7116*	0.6805*	0.7769*	1				
2010	0.6276*	0.6128*	0.6848*	0.7486*	0.7750*	1			
2011	0.5935*	0.5771*	0.6372*	0.6863*	0.6844*	0.8046*	1		
2012	0.5578*	0.6041*	0.6301*	0.6775*	0.6682*	0.7459*	0.7691*	1	
2013	0.6004*	0.6072*	0.6227*	0.7139*	0.7206*	0.7297*	0.7488*	0.7864*	1

Stroke performance ranks 2005-2013

(74 obs)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
2005	1								
2006	0.7097*	1							
2007	0.6646*	0.6585*	1						
2008	0.6861*	0.7153*	0.7852*	1					
2009	0.6465*	0.6914*	0.7630*	0.7593*	1				
2010	0.6764*	0.6837*	0.6939*	0.7091*	0.7343*	1			
2011	0.5834*	0.6971*	0.6780*	0.7419*	0.6513*	0.6884*	1		
2012	0.5802*	0.5957*	0.6690*	0.7439*	0.6874*	0.7907*	0.6966*	1	
2013	0.5923*	0.5768*	0.5697*	0.5690*	0.5924*	0.7033*	0.5554*	0.7423*	1

* different from zero at the 5% level. Number of observation is the number of hospitals that appear every year in the panel and taken into account in the computation of the correlations.

Table 5.11: Spearman rank correlation matrices across types of care (ToC)

2005

(115 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.3503*	1			
hernia	0.4422*	0.7065*	1		
stroke	0.2942*	0.3672*	0.2667*	1	
appendec	0.3015*	0.5559*	0.4751*	0.3445*	1

2006

(129 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.2713*	1			
hernia	0.3510*	0.7013*	1		
stroke	0.2591*	0.3314*	0.2393	1	
appendec	0.229	0.4959*	0.5500*	0.2735*	1

2007

(114 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.2918*	1			
hernia	0.3220*	0.5807*	1		
stroke	0.2519	0.2617*	0.0991	1	
appendec	0.3076*	0.4585*	0.4673*	0.2077	1

2008

(130 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.2656*	1			
hernia	0.2898*	0.5659*	1		
stroke	0.2101	0.2866*	0.1805	1	
appendec	0.3273*	0.4880*	0.4916*	0.194	1

2009

(131 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.2179	1			
hernia	0.2693*	0.5339*	1		
stroke	0.0428	0.2212	0.1415	1	
appendec	0.2833*	0.4721*	0.3262*	0.2172	1

2010

(136 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.3723*	1			
hernia	0.4218*	0.6332*	1		
stroke	0.163	0.3475*	0.2422*	1	
appendec	0.5201*	0.4718*	0.4187*	0.1494	1

2011

(139 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.3667*	1			
hernia	0.4090*	0.5758*	1		
stroke	0.2335	0.2756*	0.1609	1	
appendec	0.3788*	0.4589*	0.5174*	0.2567*	1

2012

(145 obs)	**childbirth**	**cholecys**	**hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.3460*	1			
hernia	0.4373*	0.6620*	1		
stroke	0.2770*	0.4209*	0.2861*	1	
appendec	0.3506*	0.5098*	0.3979*	0.2362*	1

(Continues)

Table 5.11: (continued)

		2013			
(151 obs)	**childbirth**	**cholecys**	**Hernia**	**stroke**	**appendec**
childbirth	1				
cholecys	0.3910*	1			
hernia	0.4252*	0.6739*	1		
stroke	0.1709	0.3802*	0.2445*	1	
appendec	0.4350*	0.5360*	0.4779*	0.3123*	1

* different from zero at the 5% level. Number of observations show the number of hospitals with discharges for every ToC in each year.

5.2.6 DISCUSSION AND CONCLUSION

By analysing LoS for appendectomy, cholecystectomy, inguinal hernia repair, childbirth and stroke in Mexican public general hospitals for the period 2005-2013, this study extends the methods proposed by Street et al. (2012) to the longitudinal case. Additionally, this analysis focuses on hospitals funded by historical budgets facing a different incentive structure to the framework in which these methods were originally applied. The discrete choice model proposed that the soft budget constraint faced by Mexican public hospitals is shaped by a *maximum acceptable deficit* set by the local authority where the level of this acceptable deficit is influenced by the political ideology of the governing political party in the state. In particular, based on Maskin (1996), it is assumed that a political ideology closer to socialism will tend to have softer budget constraint that could be translated in having higher levels of *acceptable deficit*. This paper posits that under the current incentive structure faced by Mexican public hospitals, their optimal choice of effort (and thus of LoS) may be to the detriment of hospital performance where their retrospective funding mechanism, their soft budget constraint and the pressure to meet the health care demand play an important role.

Moreover, during the period studied, Mexico extended health care insurance coverage to more than 50 million people, leading to an increase both in the demand for health care and in the pressure for public health care providers to absorb this increasing demand. The theoretical model developed here predicts that in order to increase the number of patients treated, public hospitals will need to improve their level of effort/performance—reflected in decreasing LoS—even in the presence of a soft budget constraint. The decreasing trend, even after conditioning for case-mix, of LoS in appendectomy, cholecystectomy, inguinal hernia repair and childbirth supports this hypothesis. The non-decreasing (and for short periods increasing) trend observed in stroke is not necessarily contrary to the hypothesis: the results of **(Martin et al., 2016)** imply that while declining trends in the LoS in some treatments (such as hernia repair) are not generally associated with higher readmissions, reductions in LoS in excess of general trends for stroke patients may have adverse consequences on health status.

Consistent with previous studies, the first stage models show that the number of secondary diagnoses and medical procedures has a strong, positive, and significant association with LoS across the five ToC **(Gaughan et al., 2012, Mason et al., 2012)**. Age has a positive and significant association with LoS for hernia and childbirth; for appendectomy and cholecystectomy the association has a U-shape with young and elderly patients having longer stays. Being transferred into the hospital or admitted as emergency has a positive and significant association with longer stays. Counterintuitively, as in principle the recovery time is shorter, laparoscopy is linked with longer appendectomy LoS. The latter result could be explained by the fact that no more than 2% of appendectomies are laparoscopic and/or to a potential inefficient management of this procedure.

The results of the two-stage estimation strategy show that the distribution of hospital performance is highly dispersed, suggesting that different hospitals face different conditions, including the grade of budget softness and the pressure to meet their demand.

Despite the significant associations found by the models in Stage 1, patient and treatment characteristics only explain a small proportion of LoS variation across Mexican hospitals, ranging from 17% on average for appendectomy to 36% on average for stroke. Therefore, an important share of the variation in LoS could be explained by hospital performance. In a previous cross-sectional study of ten therapeutic areas in England, the explained LoS variation ranged from 28% for stroke to 63% for hip replacement **(Gaughan et al., 2012)**.

Though with a low explanatory power, models in Stage 2 yield interesting results regarding potential economies of scale in the three surgical areas and apparent diseconomies of scale in childbirth. The positive association between long LoS in appendectomy and cholecystectomy with hospitals located in states governed by the PRD party may support the hypothesis that the softer the budget constraint the longer the LoS. The AR2 models suggest that best performing hospitals with respect to stroke are improving their relative performance with time, while worst performing hospitals with respect to this condition are worsening their relative performance over time. Thus, the dispersion in the efficiency of the resource-use in stroke is increasing throughout the study period. Rather than evidencing a true state dependence in the stroke case, it is likely that the lag regressors might be capturing heterogeneity in unobservable organisational factors that could be correlated over time.

Since the expansion of health insurance coverage was an initiative of the PAN party (who formed the federal government 2000-2012), the political party dummies included in models (5.12) and (5.13) could also be capturing a “political alignment effect”. The political alignment behaviour would be present if governors from the same party as the federal one -PAN- provide better support to the federal government than governors from other political parties by encouraging the success of the policy, possibly reflected in a more efficient use of the public resources allocated to health care in their state. Thus, it is expected that, if present, this behaviour would be related with significantly shorter LoS in hospitals located in states governed by PAN than in states governed by PRD or PRI. However, with the exception of the AR2 model for stroke, results in Table 5.8 show that LoS in hospitals in states governed by PAN do not differ significantly from LoS in hospitals in states governed by PRI, suggesting a lack of support to the existence of political alignment behaviour among state governors with regard to health care resource-use.

The correlations observed by the hospital performance rankings across time show that, even when for most of the ToC analysed the mean LoS is decreasing in the period studied, the hospitals' position in the performance distribution is persistent in all ToC. Furthermore, with the exception of stroke, the rank correlations across ToC suggest that good performing hospitals in one ToC tend to be good performers in the other ToC. The fact that stroke LoS rankings are not significantly correlated with the performance rankings in the other treatments deserves attention. One possible explanation is that stroke requires a more specialised treatment than the other ToC which are more standardised procedures. This could cause that the stroke models could be potentially more sensitive to the unobservable organisational factors.

The theoretical model presented earlier, suggests that significant differences among hospitals' influence on LoS could be due to variations in hospital performance (level of effort), in the softness of the hospital budget, and in the pressure to meet their external demand. Along with several contextual explanatory variables, the second stage of the empirical analysis used the political party governing the state where each hospital is located as proxy for the softness of the hospital budget and the *Seguro Popular* coverage rate, as well as a time trend to condition for the increasing demand pressure, to explain variations among hospitals' influence on LoS. However, the specified models could only explain a small proportion of the variation of hospitals' effect on LoS. Moreover, the rankings of hospitals' effect on LoS are persistent over time and consistent across ToC. Therefore, according to the theoretical framework of this study, it seems that the unexplained variation in LoS could be driven by unobservable factors related with the performance or level of effort exerted at the hospital level. These unobservable factors might include the physicians' effort to provide timely and effective care, adherence to practical guidelines, the existence of efficient mechanisms to admit and discharge patients and to manage operating rooms, and the actual working hours of physicians and managers.[25] This work is subject to the following limitations. First, while LoS is readily available, less subject to discretionary measurement and more powerful at fostering behaviour change, it is only a partial measure of resource use **(Street et al., 2012)**. Hospital costs are a better indicator of resource use. However, cost data at the individual patient level is not available to conduct such a performance study in Mexican public hospitals. Second, this analysis takes a lower hospital stay as a positive outcome irrespective of the quality of the services provided, the clinical appropriateness of the hospital discharge or the possible negative consequences of an early discharge (i.e. increasing readmissions, exacerbation or development of a more serious condition, etc.) and part of the hospital effect interpreted as performance here might be actually capturing these unmeasured factors. For this reason it is important to be cautious when interpreting these results since there may be a number of reasons, in addition to performance, that could explain significant deviations from the national average LoS. Nevertheless, any significant difference merits further investigation and one important contribution of this research is precisely the identification of hospitals where additional financial, organisational and operational studies need to be conducted in order to inform better practice in hospital resource-use.

[25] While some of these factors are not necessarily unobservable to the hospital managers and even to some health authorities, they are unobservable to the researcher as they are not recorded in available datasets.

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CHAPTER 6. DISCUSSION

In the pursuit of universal health coverage, countries of all income levels have markedly increased their resource allocation to health. Efficient use of these resources is essential to ensure the provision of health care services at acceptable quality levels without jeopardising the financial sustainability of the health system. By analysing ambulatory care sensitive hospitalisations (ACSHs) and variations in hospital length of stay (LoS) during the recent health insurance expansion in Mexico, this thesis contributes to the understanding of the extent to which Mexicans are getting value for the money spent on health.

This chapter brings together the main findings from previous chapters, presenting them according to the research questions raised at the beginning of the thesis. This is followed by a discussion of the limitations of this research, the contributions of this thesis to the literature and its policy implications. Finally, opportunities for extensions to this research are identified.

6.1 Key Findings

I. What is the magnitude and trend of the ACSH rate in health jurisdictions before and during the health insurance expansion in Mexico?

Using 300 ICD-10 codes related to 21 ambulatory care sensitive conditions, Chapter 3 identified almost 930,000 ACSHs from a total of 10.6 million hospital discharges during 2001-2011 in more than 248 general hospitals run by the 32 state health ministries in 188 health jurisdictions. More than half of the identified ACSHs had diabetes or hypertension diagnoses.

During 2001-2011, the ACSH rate per 10,000 population without social security increased by 50% reaching 19.7 in 2011. The analysis conducted suggests that this increase was driven by the expansion in health insurance coverage, at least during the initial expansion stage, as *Seguro Popular (SP)* reached people with chronic conditions without sufficient access to appropriate health care services prior to the coverage expansion whose poorly controlled condition hindered the ability of primary care to avoid ACSHs.

II. How does the ACSH trend differ between and within states?

In general, states show an increase in their ACSH rate at an earlier stage of the *SP* coverage expansion, but the ACSH rate did not follow the same trend in all states as *SP* continued to expand. According to the path followed by their ACSH rate throughout the study period, states can be classified into those with a decreasing or stable ACSH trend after reaching *SP* coverage levels above 50% (11 states); states with increasing ACSH trend irrespective of the *SP* coverage level (11); states with apparently stable ACSH rate throughout the period (5); and states without a clear ACSH trend (5).

High heterogeneity was also found for jurisdictions within states. In fact, from the econometric analysis conducted in Chapter 3, it can be inferred that the high dispersion at the health jurisdiction level is the main source of the unexplained variation in the ACSH rate.

III. What is the econometric association of the ACSH rate with patient and community factors?

Chapter 3 estimated different model specifications exploring the association of the health jurisdiction ACSH rate with predisposing, enabling and need factors at both the patient and community level, as well as with hospital characteristics. Table 3.3 shows, in all the six model specifications, that the variable capturing the gradual expansion of *SP* coverage at the jurisdiction level is positively and significantly associated with the ACSH rate. Consistent with previous studies, it was found that the higher the proportion of older people and the poorer socio-economic conditions, the higher is the ACSH rate in that jurisdiction **(Culler et al., 1998, Finegan et al., 2010, Shi et al., 1999)**. It was also found that hospital supply is strongly linked to the ACSH rate and that jurisdictions with greater availability of general hospital services attract cases that should be resolved at the primary care level.

Although this study was not the first to find a lack of association between ACSHs and GP consultations **(Finegan et al., 2010)**, it is likely that the result presented in Research Paper 1 reflects measurement errors in the variable capturing primary care utilisation.

IV. What can ACSHs tell us about primary care when health care insurance is expanding?

While high rates of ACSHs are usually associated with poor primary care, an increase in the ACSH rate following a health care insurance expansion does not necessarily imply that the primary care services provided are ineffective or of low quality as this behaviour may reflect the immediate consequences of addressing previously unmet needs. Therefore, focusing on the increase/decrease of the ACSH rate may not be an appropriate way to measure the effectiveness of primary care services when health insurance coverage is expanding.

However, while an increasing ACSH rate might be anticipated during the initial stages of the coverage expansion, if the provision of primary care is timely and effective, a decreasing or at least stable trend in the ACSH rate would be expected once high coverage rates are reached. This would reflect the capability of the newly extended services to gradually cover the previously unmet needs. A continuing rise in the ACSH rate should raise concern about the appropriateness of the primary care provided, especially if different regions following similar coverage paths experience different trends in the ACSH rate after reaching high coverage levels. Therefore, comparing the trends in the ACSH rate among regions with similar coverage levels can be used to assess the performance of primary care in a coverage expanding setting. The use of this approach in the Mexican case allowed the identification of states and health jurisdictions performing less well than others.

V. What is the economic and health burden associated with ACSHs and how can it be measured?

Chapter 4 identified the economic and the health burden of ACSHs. The economic burden of ACSHs depends on the value of the resources needed to provide this type of care and on the effects of an ACSH on the participation and performance in the labour market of those suffering them. The health burden of an ACSH could be represented by the effects on the disability suffered by patients with ACSHs who would not have been hospitalised if they had received appropriate primary care.

Research paper 2 proposed that the financial cost of the hospital care provided to patients with ACSHs can be considered to be a proxy for the direct economic burden of preventable hospitalisations. Additionally, this paper estimated the health burden of ACSHs using the DALYs associated with ambulatory care sensitive conditions.

Following the methodology proposed in Research Paper 2, Research Papers 2 and 3 estimated the financial and health burden of hospitalisations due to diabetic complications in general hospitals run by the state health ministries (SHMs) and in hospitals managed by the Mexican Institute of Social Security (IMSS), respectively. The financial burden of ACSHs in SHMs increased by 125% in real terms between 2001 and 2011 reaching USD$105 million in 2011. The associated DALYs in 2010 accounted for 4.2% of total diabetes-related DALYs in Mexico. Research Paper 3 found that the financial costs of hospitalisations resulting from diabetic complications in IMSS hospitals between 2007 and 2014 increased by 8.4% in real terms, reaching approximately USD$164 million in 2014; although when measured as costs per IMSS affiliate the estimated costs decreased by 11.3%. The total health burden decreased by 13.6% and accounted for 5.3% of total DALYs associated with diabetes in 2013.

As noted in Research Paper 3, these substantial differences are largely explained by three factors. First, while SHMs had to face the increase in the demand for health services following the health insurance expansion, IMSS coverage remained relatively stable during the study period. Second, IMSS costs per diabetic patient treated are 80% higher mainly due to differences in case management protocols, in productivity standards, in quality standards and in the cost of inputs, this result was consistent with previous studies **(Arredondo and De Icaza, 2011)**. Third, in contrast to Research Paper 2, in Research Paper 3 it was possible to avoid the double-counting of DALYs when patients were admitted more than once for the same cause throughout the period and/or if patients died in any of their hospitalisations in a given year.

VI. How does the incentive structure faced by Mexican public hospitals affect hospital resource-use?

This thesis posited in Chapter 5 that the incentive structure faced by Mexican public hospitals may discourage efficient use of their resources. First, because their funding is based on non-binding historical budgets –that is, they, face a soft budget constraint.

Hospitals then have incentives to at least maintain and possibly to increase their levels of spending each year. Second, the incentives are not only to keep costs high to increase future budgets, but also to use all their current budgets as hospitals cannot retain any surplus since the existence of unspent funds at the end of the year is often interpreted by authorities as an indicator of excessive allocation. Third, using bed occupancy rate to assess hospital performance provides hospitals with perverse incentives to prolong LoS in order to increase bed occupancy. However, the increasing demand for hospital services resulting from the health insurance expansion, will have exerted external pressure on hospitals to reduce LoS.

Research Paper 4 developed a discrete choice model illustrating hospitals' resource-use (determined by their choice of effort) under the incentive structure described. The model proposed that the soft budget constraint faced by Mexican public hospitals is shaped by a *maximum acceptable deficit* set by the local authority where the level of this acceptable deficit is influenced by the political ideology of the governing political party in the state. In particular, based on Maskin (1996), it is assumed that a political ideology closer to socialism will tend to involve softer budget constraints which could be consistent with having higher levels of *acceptable deficit*.

The model predicted that with perfect knowledge about the *maximum acceptable deficit* and when the soft budget constraint is binding, the effort choice (influencing the efficiency with which resources are used within the hospital) that maximises hospital utility is where the marginal disutility of the effort exerted equals the negative of the marginal utility of patients treated. This means that the hospital budget softness and the pressure to meet the demand for hospital services play a crucial role in hospital resource use and that hospitals will adjust their effort level to meet their external demand pressure.

<u>VII. What is the trend followed by hospital resource-use during the health insurance expansion period?</u>

Building on previous studies, Chapter 5 utilised variations in LoS for specific conditions to assess hospital resource use. The first stage of the econometric strategy of Research Paper 4 showed that the national average of the LoS in appendectomy, cholecystectomy, inguinal hernia repair and childbirth followed a decreasing trend during 2005-2013, supporting the prediction from the theoretical model that in order to increase the number of patients treated, hospitals needed to improve their level of performance, reflected in decreasing LoS.

<u>VIII. Which public general hospitals make more efficient (and inefficient) use of their resources when providing care for five specific conditions?</u>

From the cross-sectional models estimated in the first stage of the estimation strategy of Research Paper 4, it was possible to capture, for each year and type of care, the average hospital effect on LoS purged of patient and treatment factors. According to the direction and level of the deviation of each hospital effect from the national mean, it was possible to identify good and bad performers. For all conditions, the distribution of the deviations from the mean (i.e. relative hospital performance) is S-shaped, but there are important differences among these distributions with some conditions (childbirth) appearing to be a more standardised process than others (stroke). In addition, the confidence intervals among worst performing hospitals are wider than those for best performing hospitals. Hospital performance rankings for each year and each type of care are shown in Appendix 5.3.

IX. What hospital and state-level characteristics are associated with hospital performance?

The results of the two-stage estimation strategy show that the distribution of hospital performance is highly dispersed, suggesting that different hospitals face different circumstances, including the grade of budget softness and the pressure to meet their demand.

Even though the panel data models estimated in the second stage have low explanatory power, they yielded interesting results. For example, the analysis identified potential economies of scale in the three surgical areas since a higher volume of activity (reflecting larger hospital size) is positively associated with hospital performance. In contrast, the results suggest apparent diseconomies of scale for childbirth. The positive association between long LoS in appendectomy and cholecystectomy with hospitals located in states governed by the PRD party (left-wing political ideology) may support the hypothesis that the softer the budget constraint the longer the LoS.

X. How persistent is hospital performance across time and is it consistent across conditions?

The correlations observed in the hospital performance rankings across time show that, even when for most of the types of care analysed the mean LoS is decreasing over the period studied, any particular hospitals' position in the performance distribution is persistent for each type of care. Furthermore, with the exception of stroke, the rank correlations suggest that good performing hospitals with respect to one type of care tend to be good performers with respect to others. Furthermore, the dynamic model for stroke suggests that the dispersion in the efficiency of the resource-use in stroke is increasing throughout the study period.

In sum, by analysing the effectiveness of primary care services and hospital performance in the Mexican health system, this thesis found important regional differences in the efficiency with which resources have been used. First, the analysis of preventable hospitalisation rates before and during the health insurance expansion in Mexico allowed the identification of states and health jurisdictions that appear to be performing less well than others with regard to primary care even after taking into account the gradual and heterogeneous coverage expansion process. Second, the analyses of hospital performance allow the identification of both good and bad performing hospitals in the provision of five types of care.

Apart from pinpointing geographical areas and hospitals that are potentially making an (in)efficient use of their resources, this thesis estimated the health and financial burden of preventable hospitalisations to provide information about the potential benefit from improving primary care that can be then compared to the cost of policies to improve primary care.

Additionally, this research sketched a theoretical model describing the incentive structure faced by Mexican public hospitals and its influence on the determination of LoS. This model shows that public hospitals have strong financial incentives to use their resources inefficiently (and, thus, to have long LoS), but, on the other hand, that they faced an important pressure to meet an increasing demand for hospital care as a result of the health care insurance expansion of the 2000s. The empirical analysis suggests that the pressure to meet the demand for health care might have outweighed the incentives to behave inefficiently. However, it should be stressed that since universal health coverage was declared, the health care insurance coverage has stopped expanding at the high rates of previous years **(Comisión Nacional de Protección Social en Salud, 2015).** Therefore, it is expected that the pressure exerted on hospitals to meet increasing demand will reduce and that the relative weight of the financial incentives to behave inefficiently will increase in the coming years.

6.2 General Limitations of the Thesis

Limitations specific to each analysis are discussed in the relevant papers (Chapters 3 to 5); this section discusses limitations that apply across papers.

6.2.1 Using Administrative Data

The main sources of information for the analyses conducted in this thesis are hospital records that, as any other administrative data, are vulnerable to coding and measurement errors. Specifically, this study relies on the correct coding of the main diagnosis as well as secondary diagnoses and medical procedures of every hospitalisation included in the analyses. Notably, however, these data are not used to reimburse hospitals, meaning that hospitals do not have strong incentives for upcoding; thus, the assumption that any error or heterogeneity in the recording of the data across hospitals follows a normal distribution and does not introduce a significant bias appears reasonable.

6.2.2 Ecological Fallacy

Research Papers 1-3 are subject to the ecological fallacy, since information is only available for individuals being hospitalised and individuals not being hospitalised (either because they did not need it or because they were not able to access to it) are not considered. This problem will remain without better data on primary care and hospital utilisation and future studies will continue to be unable to uncover the real problems of access, quality and effectiveness of health care.

6.2.3 Lack of Record Linkage

With the exception of Research Paper 3, in the rest of the analyses it was not possible to link patient episodes among levels of care and among health care institutions since unique patient identification numbers (IDs) were not available. This impeded exploration of the association between primary care service utilisation and preventable hospitalisations in Chapter 3. In Research Paper 2, not having patient IDs meant that it was not possible to avoid the double-counting of DALYs. Research Paper 4 would have benefited from patient IDs so that hospital readmissions could be used as an indicator of quality of care.

6.2.4 Generalisability of Results and of Methods

Research Papers 1, 2 and 4 analyse data from general hospitals run by the SHMs, while Research Paper 3 analyses data from general and regional hospitals managed by IMSS without considering smaller public hospitals run by the SHMs, public hospitals run by other public sub-systems and private hospitals. Smaller hospitals run by the SHMs were not included due to the high heterogeneity present in these facilities. Although heterogeneity is still present in general hospitals, a comparison among them seems to be more appropriate since in order to be classified as general hospitals they need to meet minimum standards for the number of services offered. Data were not available from private hospitals and those managed by other public sub-systems. Rural hospitals run by the SHMs and those by institutions not included in this study might experience different conditions and, therefore, inference from the findings presented here should be avoided.

6.3 Overall Contribution of the Thesis

Despite the general limitations discussed above and the specific limitations included in each paper, this thesis contributes to the health economics literature by addressing the following methodological and empirical issues.

6.3.1 Methodological Contribution

1) *A different approach to assessing primary care performance in the presence of expanding health insurance*

Previous studies have also analysed preventable hospitalisation rates in health insurance expansion settings **(Macinko et al., 2011, Saha et al., 2007)**. In a novel approach, this thesis considers the gradual nature of the coverage expansion and acknowledges the heterogeneity in coverage across regions. In this sense, regions with potentially poor primary care performance could be identified if regions with similar coverage expansion paths follow substantially different trends in their ACSH rates, especially after reaching high coverage rates. This was the approach used in Research Paper 1 to identify states and health jurisdictions that could potentially be performing less well than others.

2) *Conceptualisation and methodology to estimate the health burden of preventable hospitalisations*

While the financial implications of ACSHs have been studied before, the preventable losses of health as a consequence of ACSHs have not received attention in the literature. Research Paper 2 defined the health burden of ACSHs as the effects on the disability suffered by patients with ACSHs who would not have been hospitalised if they had received appropriate primary care. Research Papers 2 and 3 took advantage of readily available disability weights to estimate this burden by computing the DALYs associated with potentially preventable diabetic complications. Moreover, Research Paper 2 showed that the health burden of ACSHs can be expressed in monetary terms.

3) *Model illustrating determination of length of stay under a retrospective payment system*

Research Paper 3 developed a discrete choice model illustrating the determination of hospital LoS through the hospital's choice of effort given an incentive structure characterised by historical budgets and a soft budget constraint. This model suggests that with perfect knowledge about the *maximum acceptable deficit* and when the soft budget constraint is binding, the effort choice that maximises hospital utility is where the marginal disutility of the effort exerted equals the negative of the marginal utility of patients treated. This model predicts that one possible explanation for significant differences among hospital's influence on LoS could be due to variations in hospital performance, how soft the hospital's budget constraint is, and external demand pressure. Furthermore, eq. (5.9) shows that if the soft budget constraint is not binding, then optimality requires the marginal effect of effort on the utility of treating patients to be higher than the marginal effect of effort on the utility obtained from the level of next-period's budget. In other words, the model predicts that the hospital will adjust the level of effort exerted (inversely related to LoS) according to the external pressure to meet its demand.

4) *Extension of the Street et al. (2012) methodology to the longitudinal case*

Street et al. (2012) proposed a methodology to analyse hospital performance using variations in LoS for the same type of care across hospitals. This method comprises a two-stage approach. The first stage specifies a cross-sectional multilevel count data model which considers that patients are clustered within hospitals to estimate the hospital influence on LoS purged of patient and treatment characteristics. Each hospital effect is interpreted as a measure of performance and then regressed on hospital–level variables to look for hospital factors that can explain variations in hospital performance. The extension of the Street et al. model to the longitudinal case, presented in Research Paper 4, consists in treating the data as a series of repeated cross-sections in the first stage and identifying yearly hospital effects that are then matched with yearly hospital- and state-specific characteristics to build a hospital-level panel to analyse the variation of these effects over time. Two specifications of the panel model were considered, a linear fixed-effects model and a dynamic model to obtain the Arellano-Bond estimator.

This extension to the Street et al. (2012) model allows the analysis of hospital performance over time and the identification not only of how consistent hospital performance is across types of care, but also how persistent it is across time.

6.3.2 Empirical Contributions

1) *Identification of states and health jurisdictions with possibly poor primary care performance*

States and health jurisdictions are classified into four groups according to the trend followed by the ACSH rate as *Seguro Popular* continued to expand.

a) States with a decreasing or stable ACSH trend after reaching *Seguro Popular* (*SP*) coverage levels above 50%
b) States with an increasing ACSH trend irrespective of the *SP* coverage level
c) States with an apparently stable ACSH rate throughout the period
d) States without a clear ACSH trend

States in groups b) and d) could potentially be providing ineffective or low-quality primary care services.

2) *Empirical support for the prediction of the LoS discrete choice model*

The decreasing trend observed by the average LoS in appendectomy, cholecystectomy, inguinal hernia repair, and childbirth supports the model prediction that, even in the presence of a soft budget constraint, hospitals will improve their level of effort/performance/efficiency in resource-use in order to increase the number of patients treated.

3) *Political ideology associated with longer LoS*

The theoretical model presented in Chapter 5 assumed that the softness of a hospital's budget is correlated with the ideology of the Governor's political party and predicted that it will also be associated with longer LoS. In this sense, it was hypothesised that hospitals in states with PRD governments (left-wing political ideology) will be positively associated with longer LoS. The results for appendectomy and cholecystectomy support this hypothesis.

4) *Hospital performance is persistent across time and consistent across treatments*

The correlations between rankings of hospital performance over time show that the hospital's position in the performance distribution is persistent for all types of care. Additionally, with the exception of stroke, this thesis found evidence suggesting that the level of hospital performance is consistent across types of care, especially among surgical procedures.

This study, therefore, was available to identify hospitals that appear to be making an efficient use of their resources in the provision of specific types of care across time.

6.4 Policy Implications

The research presented here could inform the design of policies intended to improve the efficiency with which resources are used in the Mexican health care system.

1) *Development of integrated information systems across levels of care and across institutions*

The need to develop an integrated information system across levels of care and across health care institutions was raised on various occasions throughout the thesis. An integrated information system would allow the study of the link between primary care utilisation and ACSHs and to explore if shorter LoS is related with higher probability of being readmitted to hospital. While a complete and high-quality information system is desirable from an academic perspective, it also has important benefits from a practical perspective. For example, the development of a system whereby all Mexicans receive an identification number that could be used to track their health service utilization across both the public and private sectors and across levels of care irrespective of their insurance status, and which could be accessed by any provider in the country (either public or private), would provide useful information about health care utilization and health care expenditure. This information could then be used for multiple purposes, including funding of health facilities, exchange of services among health care institutions and continuity of care. This system should also be able to track individual providers (doctors, primary care clinics, hospitals) to link them with the information of their patients even if the latter seek health care elsewhere.

Integration of the public health system, in which the population can receive health care in any facility irrespective of their insurance status, is now in the Mexican policy debate.

This represents a unique opportunity to include new mechanisms for data collection and patient identification at the heart of a redesigned health system.

2) Restructure of provider payment mechanisms

a. Incorporating ACSH into primary care doctors' remuneration

Currently primary care doctors are paid on a salary basis not providing strong incentives for an efficient resource use or for high-quality care as they are not accountable for patient health outcomes, patient satisfaction or further health expenditures. Moving away from the salary-based payment to mixed strategies, including capitation, fee-for-service and performance-based contracts has been a successful strategy to strengthen the primary care system **(OECD, 2016)**.

As part of the pay-for-performance strategy, one of the indicators that should be considered is the ACSH rate. A bonus to primary care clinics and/or primary care doctors with significantly lower ACSH rate than the national/state/regional mean could represent an interesting option to incentivise primary care providers to improve the access to care, as well as the quality and effectiveness of care offered.

b. Leaving purely historical budgets in history

Chapter 5 posited that the current incentive structure faced by Mexican public hospitals discourage good performance where their retrospective funding mechanism, their soft budget constraint and inability to retain any surplus incentivises them to keep costs high, to use all their budgets and to continuously run deficits. Mexico needs to ensure that hospitals make an efficient use of their resources and at the same time that they provide health care at acceptable quality levels. Therefore, informed by international experience, Mexico should carefully design a new hospital financing system that encourages efficiency and that meets the health needs of its population.

The first step needed is to separate effectively the functions of the purchaser and the provider of health care services. Autonomous purchasing agencies will need to be created in each state and both the federation and the states should transfer the resources allocated to health care directly to these purchasing agencies rather than to state health ministries. The purchasing agencies could then use the federal and state resources to contract health care services from both public (social and non-social security institutions) and private providers. The effective separation of the purchase and the provision of health care services represents the path to move away from soft budgets.

The second step is to substitute the retrospective payment system with a prospective system. One option could be to introduce activity-based financing in Mexican hospitals in order to improve the information on activities and costs of the services provided, but also to incentivise providers to make an efficient use of their resources. One possibility is to start using the recently developed IMSS diagnosis-related-group (DRG) catalogue in a first stage for record purposes only and then, once both purchasers and providers are familiar with its use, to use it as a financing tool.

3) *Making providers and authorities accountable to the public*

Public scrutiny could be an important tool in improving the efficiency of the health system. To this end, yearly studies on primary and hospital care performance as well as financial sustainability should be conducted by the National Council for the Evaluation of Social Development Policy (CONEVAL), which is an independent body with experience in conducting technical evaluations and making them available to the public. In addition, to improve the transparency of the system, information about hospital budgets and individual hospital bail-outs in all institutions should be publicly available.

6.5 Areas of Further Research

In the process of answering the ten research questions around which this thesis was structured, I have identified four areas that could extend the work presented here and that merit further research to improve the understanding of the extent to which taxpayers get value for the money spent on health.

1) *Understanding the links between primary care utilisation and ACSHs*

More evidence is required concerning which strategies are best for preventing hospitalisations due to ambulatory care sensitive conditions. Two types of analysis would to further this end. Firstly, studies are needed to explore the current relationship between primary care utilisation and ACSH that answer the following questions:

- Are patients admitted for ACSHs using primary care services at all?
- What are the determinants of being registered with a family doctor (or in a primary care clinic)?
- Are general practitioners (family doctors) following the practical guidelines?
- What is the effect of primary care services utilisation on the probability of being admitted for an ambulatory care sensitive condition?

Answering these questions will require data from integrated information systems across levels of care and among health care institutions. IMSS is currently integrating primary care and hospital data at the patient level; consequently, this data could be used to answer some of these questions to obtain a better understanding of the scope for primary care to prevent hospitalisations. Secondly, considering the health and financial burden of ACSHs, cost-effectiveness analyses of primary care interventions should be conducted to inform which strategies could maximise the potential of the resources invested in primary care. Conducting a cost-effectiveness analysis of the DiabetIMSS programme could represent the first step towards this goal.

2) *Analysing the inequality of the quality of primary care*

Consistent with previous studies, Research Paper 1 found that ACSHs are positively and significantly associated with socioeconomic deprivation. Analysing the concentration of ACSHs in depraved areas/population (both between and within health care institutions) would provide further evidence in this matter. Furthermore, analysing the trend of the inequality of ACSHs during and after the health care insurance expansion and comparing it across health care institutions would contribute to the understanding of the extent to which *Seguro Popular* has been able to close the quality gap between sub-systems.

3) *Further studies into best and worst performing hospitals to inform better practice in hospital care*

Understanding the reasons why hospitals' effect on the length of stay of its patients differ substantially from the national average, even after conditioning for case-mix, is the next step to improve the understanding of hospital performance. Therefore, financial and operational studies are needed to explore if the magnitude and direction of the hospital effects estimated in Chapter 5 could be explained by the (in)existence of efficient mechanisms to manage operating rooms and/or to discharge patients; if they are related with the actual working hours of doctors and nurses; if they could be explained, as predicted by the model developed in Research Paper 4, by a softer budget constraint; or even if the model is not capturing a “quicker but sicker” effect. In the Mexican case, given the nature of the data needed, it is difficult to imagine that these analyses could be done at the national level. However, there could be states or individual hospitals interested in learning more about their level of performance and, therefore, case studies might seem a more feasible approach to follow.

4) Comparing primary and hospital care performance across health care institutions

Performing analyses like the ones presented in this thesis across health care institutions could unmask systematic inefficiencies within institutions, such as differences in the hospital budget softness across institutions (since social security institutions are less sensitive to local government influence) and differences in drug and medical equipment procurement systems. Once again, integrated data will be needed to conduct such analyses.

6.6 Conclusion

In 2003, Mexico conducted a major health reform that transformed its health system to gradually extend health care insurance coverage to more than 50 million uninsured. The expansion of insurance coverage increased the demand for health care and the amount of resources allocated to health. However, little is known about the efficiency with which these resources have been used and about the quality of services provided. In order to address part of this gap in the literature, this thesis analysed the effectiveness of primary care services and hospital performance in Mexico.

The first part of this work analysed preventable hospitalisations with a different approach that validates its use in the presence of expanding health insurance. From comparing health jurisdictions that follow similar paths in the coverage expansion, but different trends in the preventable hospitalisation rate, it was possible to identify jurisdictions with possibly poor primary care performance. This thesis then conceptualised the financial and health burden of preventable hospitalisations and proposed a methodology to estimate it using diabetic complications as an application of the methods.

The second part of the thesis detailed the current incentive structure faced by Mexican hospitals and developed a discrete choice model illustrating the determination of length of stay under this structure. Additionally, it extended the Street et al. (2012) model to the longitudinal case to analyse hospital performance according to variations in the length of stay for specific conditions. The empirical analysis supported the theoretical model prediction that even in the presence of a soft budget constraint, hospitals will lower LoS in order to increase the number of patients treated.

More than a decade after the implementation of the reform that expanded health care insurance coverage, universal health coverage has been declared, but the payment mechanisms to providers remain unchanged. Furthermore, there is still low accountability in the resources that providers and authorities spent in health. It is essential to modernise the financial structure of the system towards one that fosters transparency and efficient provision of high-quality care.

REFERENCES

AGENCY FOR HEALTHCARE RESEARCH AND QUALITY. 2013. *Quality Indicators* [Online]. Available: http://www.qualityindicators.ahrq.gov/Default.aspx [Accessed 8 May 2013].

ANDERSEN, R. M. & DAVIDSON, P. L. 2007. Improving access to care in America. *Changing the US health care system: key issues in health services policy and management. 3a. edición. San Francisco: Jossey-Bass*, 3-31.

ANSARI, Z. 2007. The Concept and Usefulness of Ambulatory Care Sensitive Conditions as Indicators of Quality and Access to Primary Health Care. *Australian Journal of Primary Health,* 13**,** 91-110.

ARREDONDO, A. & DE ICAZA, E. 2011. Costos de la diabetes en América Latina: evidencias del Caso Mexicano. *Value in health,* 14**,** S85-S88.

ARREDONDO, A. & REYES, G. 2013. Health Disparities from Economic Burden of Diabetes in Middle-income Countries: Evidence from México. *PLoS ONE,* 8**,** e68443.

ASHTON, C. M., PETERSEN, N. J., SOUCHEK, J., MENKE, T. J., YU, H., PIETZ, K., EIGENBRODT, M. L., BARBOUR, G., KIZER, K. W. & WRAY, N. P. 1999. Geographic Variations in Utilization Rates in Veteran Affairs Hospitals and Clinics. *The New England Journal of Medicine,* 340**,** 32-39.

ATERIDO, R., HALLWARD-DRIEMEIER, M. & PAGES, C. 2011. "Does Expanding Health Insurance beyond Formal-Sector Workers Encourage Informality? Measuring the Impact of Mexico's Seguro Popular. *World Bank Policy Research Working Paper No. 5785.*

AUTRIQUE-ECHEVESTE, D. 2012. *Análisis de los efectos de la descentralización del Sistema de Salud en México, para la atención de la población sin seguridad social, sobre la distribución interestatal de variables selectas de oferta de servicios de salud.* Licenciatura en Economía, ITAM.

BARNUM, H., KUTZIN, J. & SAXENIAN, H. 1995. Incentives and provider payment methods. *The International Journal of Health Planning and Management,* 10**,** 23-45.

BARQUERA, S., CAMPOS-NONATO, I., AGUILAR-SALINAS, C., LOPEZ-RIDAURA, R., ARREDONDO, A. & RIVERA-DOMMARCO, J. 2013. Diabetes in Mexico: cost and management of diabetes and its complications and challenges for health policy. *Global Health,* 9**,** 3.

BARRAZA-LLORÉNS, M., GUAJARDO-BARRÓN, V., PICÓ, J., GARCÍA, R., HERNÁNDEZ, C., MORA, F., ATHIÉ, J., CRABLE, E. & URTIZ, A. 2015. Carga Económica de la diabetes mellitus en México, 2013. México, D.F.: Funsalud.

BATTESE, G. E. & COELLI, T. J. 1988. Prediction of firm-level technical efficiencies with a generalized frontier production function and panel data. *Journal of Econometrics,* 38**,** 387-399.

BATTESE, G. E. & COELLI, T. J. 1992. Frontier production functions, technical efficiency and panel data: with application to paddy farmers in India. *Journal of Productivity Analysis,* 3**,** 153-169.

BATTESE, G. E. & COELLI, T. J. 1995. A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics,* 20**,** 325-332.

BEHRMAN, J. & PARKER, S. 2011. The Impact of the PROGRESA/Oportunidades Conditional Cash Transfer Program on Health and Related Outcomes for the Aging in Mexico. *PIER Working Paper No. 11-032.*

BELTRÁN-SÁNCHEZ, H., DRUMOND-ANDRADE, F. C., RIOSMENA, F., PINTO, G., PALLONI, A., NOVAK, B., WONG, R., KUMAR, A., KARMARKAR, A. M. & TAN, A. 2015. Contribution of socioeconomic factors and health care access to the awareness and treatment of diabetes and hypertension among older Mexican adults. *Salud Pública de México,* 57.

BINDMAN, A. B., GRUMBACH, K., OSMOND, D., KOMAROMY, M., VRANIZAN, K., LURIE, N., BILLINGS, J. & STEWART, A. 1995. Preventable hospitalizations and access to health care. *JAMA: the journal of the American Medical Association,* 274**,** 305-311.

BLUSTEIN, J., HANSON, K. & SHEA, S. 1998. Preventable hospitalizations and socioeconomic status. *Health Affairs,* 17**,** 177-189.

BORDIGNON, M. & TURATI, G. 2003. Bailing Out Expectations and Health Expenditure in Italy. Munich: CESifo Group

BOSCH, M. & CAMPOS-VAZQUEZ, R. M. 2014. The Trade-Offs of Welfare Policies in Labor Markets with Informal Jobs: The Case of the "Seguro Popular" Program in Mexico. *American Economic Journal: Economic Policy,* 6**,** 71-99.

CAMERON, A. C. & TRIVEDI, P. K. 1998. *Regression Analysis of Count Data,* Cambridge, UK, Cambridge University Press.

CAMERON, A. C. & TRIVEDI, P. K. 2010. *Microeconometrics using stata,* College Station, Tex., Stata Press.

CAMERON, A. C. & WINDMEIJER, F. A. G. 1996. R-Squared Measures for Count Data Regression Models With Applications to Health-Care Utilization. *Journal of Business & Economic Statistics,* 14**,** 209-220.

CAMINAL, J., STARFIELD, B., SÁNCHEZ, E., CASANOVA, C. & MORALES, M. 2004. The role of primary care in preventing ambulatory care sensitive conditions. *The European Journal of Public Health,* 14**,** 246-251.

CHARNES, A., COOPER, W. W. & RHODES, E. 1978. Measuring the efficiency of decision making units. *European journal of operational research,* 2**,** 429-444.

COMISIÓN MEXICANA SOBRE MACROECONOMÍA Y SALUD 2006. *Macroeconomía y salud. Invertir en salud para el desarrollo económico,* México, D.F, Fondo de Cultura Económica.

COMISION NACIONAL DE PROTECCIÓN SOCIAL EN SALUD 2011a. Informe de Resultados 2011. México, D.F: Secretaría de Salud.

COMISION NACIONAL DE PROTECCIÓN SOCIAL EN SALUD 2011b. Sistema de Administración del Padrón Nacional de Beneficiarios. México, D.F: Secretaría de Salud.

COMISION NACIONAL DE PROTECCIÓN SOCIAL EN SALUD 2012. Informe de Resultados. Enero - Julio 2012. México, D.F: Secretaría de Salud.

COMISIÓN NACIONAL DE PROTECCIÓN SOCIAL EN SALUD 2015. Informe de Resultados. Enero - Junio 2015. México, D.F.: Secretaría de Salud.

COMISION NACIONAL PARA EL DESARROLLO DE LOS PUEBLOS INDIGENAS. 2010. *Sistema de información e indicadores sobre la población indígena de México* [Online]. Available: http://www.cdi.gob.mx/index.php?option=com_content&view=category&id=38&Itemid=54 [Accessed 15 January 2014].

CONSEJO NACIONAL DE EVALUACIÓN DE LA POLÍTICA DE DESARROLLO SOCIAL. 2012. *Índice de Rezago Social* [Online]. Available: http://www.coneval.gob.mx/Medicion/Paginas/Que-es-el-indice-de-rezago-social-en.aspx [Accessed 11 January 2014].

CONSEJO NACIONAL DE POBLACIÓN. 2012. *Indicadores Demográficos Basicos de las Entidades Federativas 1990-2010* [Online]. Available: http://www.conapo.gob.mx/es/CONAPO/De_las_Entidades_Federativas_1990-2010 [Accessed 19 December 2013].

CONSEJO NACIONAL DE POBLACIÓN. 2013. *Proyecciones de la Población de las Entidades Federativas 2010 - 2030* [Online]. Available: http://www.conapo.gob.mx/es/CONAPO/De_las_Entidades_Federativas_2010-2050 [Accessed 19 December 2013 2013].

CULLER, S. D., PARCHMAN, M. L. & PRZYBYLSKI, M. 1998. Factors related to potentially preventable hospitalizations among the elderly. *Medical Care,* 36**,** 804-817.

DÁVILA-TORRES, J., RODRÍGUEZ-DÍAZ PONCE, M. A. & ECHEVARRÍA-ZUNO, S. 2012. *El IMSS en el Sistema Nacional de Salud: situación actual, retos y propuestas de política,* México, D.F., FCE, Editorial Alfil.

DE BRUIN, S. R., HEIJINK, R., LEMMENS, L. C., STRUIJS, J. N. & BAAN, C. A. 2011. Impact of disease management programs on healthcare expenditures for patients with diabetes, depression, heart failure or chronic obstructive pulmonary disease: A systematic review of the literature. *Health Policy,* 101**,** 105-121.

DIVISIÓN DE INFORMACIÓN EN SALUD & COORDINACIÓN DE PLANEACIÓN EN SALUD 2015a. Bases de Datos del Sistema de Información en Salud Institucional. México, D.F.: Instituto Mexicano del Seguro Social.
DIVISIÓN DE INFORMACIÓN EN SALUD & COORDINACIÓN DE PLANEACIÓN EN SALUD 2015b. Egresos Hospitalarios IMSS 2007-2014. Mexico, D.F.: Instituto Mexicano del Seguro Social.
DORMONT, B. & MILCENT, C. 2005. How to Regulate Heterogeneous Hospitals? *Journal of Economics & Management Strategy,* 14**,** 591-621.
DUSHEIKO, M., DORAN, T., GRAVELLE, H., FULLWOOD, C. & ROLAND, M. 2011a. Does higher quality of diabetes management in family practice reduce unplanned hospital admissions? *Health Serv Res,* 46**,** 27-46.
DUSHEIKO, M., GRAVELLE, H., MARTIN, S., RICE, N. & SMITH, P. C. 2011b. Does Better Disease Management in Primary Care Reduce Hospital Costs? CHE Research Paper 65. University of York.
ECHEVARRÍA ZUNO, S., RODRÍGUEZ DÍAZ PONCE, M. A., ARROYAVE LOAIZA, M. G., MAR OBESO, A. J. & DÁVILA TORRES, J. 2011. GRD - IMSS Producto Hospitalario. México, D.F.: Instituto Mexicano del Seguro Social.
EPSTEIN, A. J. 2001. The role of public clinics in preventable hospitalizations among vulnerable populations. *Health Services Research,* 36**,** 405.
FIGUEROA-LARA, A., GONZALEZ-BLOCK, M. A. & ALARCON-IRIGOYEN, J. 2016. Medical Expenditure for Chronic Diseases in Mexico: The Case of Selected Diagnoses Treated by the Largest Care Providers. *PLoS ONE,* 11**,** e0145177.
FINEGAN, M. S., GAO, J., PASQUALE, D. & CAMPBELL, J. 2010. Trends and geographic variation of potentially avoidable hospitalizations in the veterans health-care system. *Health Services Management Research,* 23**,** 66-75.
FLORES-HERNÁNDEZ, S., REYES-MORALES, H., VILLALPANDO, S., REYNOSO NOVERÓN, N. & HERNÁNDEZ-AVILA, M. 2013. Diabetes en adultos: urgente mejorar la atención y el control. *Instituto Nacional de Salud Pública*.
FRENK, J. 2006. Bridging the divide: global lessons from evidence-based health policy in Mexico. *The Lancet,* 368**,** 954-961.
FRENK, J., GONZÁLEZ-PIER, E., GÓMEZ-DANTÉS, O., LEZANA, M. A. & KNAUL, F. M. 2006. Comprehensive reform to improve health system performance in Mexico. *The Lancet,* 368**,** 1524-1534.
FUNDACIÓN MEXICANA PARA LA SALUD 2012. Universalidad de los Servicios de Salud. Una propuesta de FUNSALUD. Mexico, D.F: FUNSALUD.
GAUGHAN, J., MASON, A., STREET, A. & WARD, P. 2012. English hospitals can improve their use of resources: an analysis of costs and length of stay for ten treatments. York: Centre for Health Economics research paper 78.
GLOBAL BURDEN OF DISEASE STUDY 2010 2012. Global Burden of Disease Study 2010 (GBD 2010) Disability Weights. Seattle, United States: Institute for Health Metrics and Evaluation (IHME).
GLOBAL BURDEN OF DISEASE STUDY 2013 2016. Global Burden of Disease Study 2013 (GBD 2013) Results by Location, Cause, and Risk Factor. Seattle, United States: Institute for Health Metrics and Evaluation (IHME).
GÓMEZ-DANTÉS, O., SESMA, S., BECERRIL, V. M., KNAUL, F. M., ARREOLA, H. & FRENK, J. 2011. Sistema de salud de México. *Salud Pública de México,* 53**,** s220-s232.
GONZÁLEZ-PIER, E., GUTIÉRREZ-DELGADO, C., STEVENS, G., BARRAZA-LLORÉNS, M., PORRAS-CONDEY, R., CARVALHO, N., LONCICH, K., DIAS, R. H., KULKARNI, S. & CASEY, A. 2006. Priority setting for health interventions in Mexico's System of Social Protection in Health. *The Lancet,* 368**,** 1608-1618.
GONZÁLEZ ANAYA, J. A. & GARCÍA CUÉLLAR, R. 2015. The Transformation of the Mexican Social Security Institute (IMSS): Progress and Challenges. *Health Systems & Reform,* 1**,** 189-199.

GRABOWSKI, D. C., O'MALLEY, A. J. & BARHYDT, N. R. 2007. The costs and potential savings associated with nursing home hospitalizations. *Health Affairs,* 26**,** 1753-61.
GREENE, W. 2004. Distinguishing between heterogeneity and inefficiency: stochastic frontier analysis of the World Health Organization's panel data on national health care systems. *Health Economics,* 13**,** 959-80.
GREENE, W. H. 1990. A gamma-distributed stochastic frontier model. *Journal of Econometrics,* 46**,** 141-163.
GUTIÉRREZ, J., BAUTISTA, S., GERTLER, P., HERNÁNDEZ, M. & BERTOZZI, S. 2005. Impacto de Oportunidades en la morbilidad y el estado de salud de la población beneficiaria y en la utilización de los servicios de salud. Resultados de corto plazo en zonas urbanas y de mediano plazo en zonas rurales. *In:* HERNÁNDEZ, B. & HERNÁNDEZ, M. (eds.) *Evaluación externa de impacto del Programa Oportunidades 2004. Tomo II.* Cuernavaca, México: Instituto Nacional de Salud Pública.
GUTIÉRREZ, J., RIVERA-DOMMARCO, J., SHAMAH-LEVY, T., VILLALPANDO-HERNÁNDEZ, S., FRANCO, A., CUEVAS-NASU, L., ROMERO-MARTÍNEZ, M. & HERNÁNDEZ-ÁVILA, M. 2012. Encuesta Nacional de Salud y Nutrición 2012. Resultados Nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública.
HARRIS, T., YANG, Z. & HARDIN, J. W. 2012. Modeling underdispersed count data with generalized Poisson regression. *Stata Journal,* 12**,** 736-747.
HERNÁNDEZ-ÁVILA, M., GUTIÉRREZ, J. P. & REYNOSO-NOVERÓN, N. 2013. Diabetes mellitus en México: El estado de la epidemia. *Salud Pública de México,* 55**,** s129-s136.
HOLLINGSWORTH, B. 2008. The measurement of efficiency and productivity of health care delivery. *Health Economics,* 17**,** 1107-28.
HOLLINGSWORTH, B. & STREET, A. 2006. The market for efficiency analysis of health care organisations. *Health Economics,* 15**,** 1055-1059.
HOLLINGSWORTH, B. & WILDMAN, J. 2003. The efficiency of health production: re-estimating the WHO panel data using parametric and non-parametric approaches to provide additional information. *Health Economics,* 12**,** 493-504.
IMSS 2015. Informe al Ejecutivo Federal y al COngreso de la Unión sobre la situación financiera y los riesgos del IMSS 2014-2015. México, D.F.: IMSS.
INSTITUTO DE SEGURIDAD SOCIAL Y SERVICIOS SOCIALES DE LOS TRABAJADORES DEL ESTADO. *Anuario Estadistico 2011* [Online]. Mexico, D.F.: ISSSTE. Available: http://www.issste.gob.mx/issste/anuarios/ [Accessed 16 May 2013].
INSTITUTO MEXICANO DEL SEGURO SOCIAL. *Memoria Estadistica 2012* [Online]. Mexico, D.F.: IMSS. Available: http://www.imss.gob.mx/estadisticas/financieras/Pages/memoriaestadistica.aspx [Accessed 16 May 2013].
INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA (INEGI). 2015. *Derechohabiencia y uso de servicios de salud* [Online]. Available: http://www3.inegi.org.mx/sistemas/sisept/default.aspx?t=msoc01&s=est&c=22594 [Accessed 20 May 2016].
INTERNATIONAL DIABETES FEDERATION 2015. IDF Diabetes Atlas, 7th edn. Brussels, Belgium: International Diabetes Federation.
JACOBS, R., SMITH, P. C. & STREET, A. 2006. *Measuring efficiency in health care: analytic techniques and health policy,* Cambridge, UK, Cambridge University Press.
JEGERS, M., KESTELOOT, K., DE GRAEVE, D. & GILLES, W. 2002. A typology for provider payment systems in health care. *Health Policy,* 60**,** 255-273.
JIMÉNEZ-CORONA, A., AGUILAR-SALINAS, C. A., ROJAS-MARTÍNEZ, R. & HERNÁNDEZ-ÁVILA, M. 2013. Diabetes mellitus tipo 2 y frecuencia de acciones para su prevención y control. *Salud Pública de México,* 55**,** S137-S143.

JONDROW, J., KNOX LOVELL, C., MATEROV, I. S. & SCHMIDT, P. 1982. On the estimation of technical inefficiency in the stochastic frontier production function model. *Journal of Econometrics,* 19**,** 233-238.
KIM, S. 2007. Burden of Hospitalizations Primarily Due to Uncontrolled Diabetes Implications of inadequate primary health care in the United States. *Diabetes Care,* 30**,** 1281-1282.
KNAUL, F. M., ARREOLA-ORNELAS, H., MÉNDEZ-CARNIADO, O., BRYSON-CAHN, C., BAROFSKY, J., MAGUIRE, R., MIRANDA, M. & SESMA, S. 2006. Evidence is good for your health system: policy reform to remedy catastrophic and impoverishing health spending in Mexico. *The Lancet,* 368**,** 1828-1841.
KNAUL, F. M., GONZÁLEZ-PIER, E., GÓMEZ-DANTÉS, O., GARCÍA-JUNCO, D., ARREOLA-ORNELAS, H., BARRAZA-LLORÉNS, M., SANDOVAL, R., CABALLERO, F., HERNÁNDEZ-AVILA, M., JUAN, M., KERSHENOBICH, D., NIGENDA, G., RUELAS, E., SEPÚLVEDA, J., TAPIA, R., SOBERÓN, G., CHERTORIVSKI, S. & FRENK, J. 2012. The quest for universal health coverage: achieving social protection for all in Mexico. *The Lancet,* 380**,** 1259-1279.
KNOX, M. 2016. Health Insurance in a Developing Country: Transfer Program or Something More? Impacts of Mexico's Seguro Popular Program Five Years after Introduction.
KORNAI, J. 1979. Resource-Constrained versus Demand-Constrained Systems. *Econometrica,* 47**,** 801-819.
KORNAI, J. 2009. The soft budget constraint syndrome in the hospital sector. *International Journal of Health Care Finance and Economics,* 9**,** 117-135.
KOZAK, L. J., HALL, M. J. & OWINGS, M. F. 2001. Trends In Avoidable Hospitalizations, 1980-1998. *Health Affairs,* 20**,** 225-232.
KUMBHAKAR, S. C. 1990. Production frontiers, panel data, and time-varying technical inefficiency. *Journal of Econometrics,* 46**,** 201-211.
LADITKA, J. N., LADITKA, S. B. & PROBST, J. C. 2005. More may be better: evidence of a negative relationship between physician supply and hospitalization for ambulatory care sensitive conditions. *Health Services Research,* 40**,** 1148-66.
LAUDICELLA, M., OLSEN, K. R. & STREET, A. 2010. Examining cost variation across hospital departments–a two-stage multi-level approach using patient-level data. *Social Science & Medicine,* 71**,** 1872-1881.
LEWIS, J. B. & LINZER, D. A. 2005. Estimating Regression Models in Which the Dependent Variable Is Based on Estimates. *Political Analysis,* 13**,** 345-364.
LEY GENERAL DE SALUD 2012. Nueva Ley publicada en el Diario Oficial de la Federacion (DOF) el 7 de febrero de 1984. *Última reforma publicada DOF*
LOZANO, R., GÓMEZ-DANTÉS, H., GARRIDO-LATORRE, F., JIMÉNEZ-CORONA, A., CAMPUZANO-RINCÓN, J. C., FRANCO-MARINA, F., MEDINA-MORA, M. E., BORGES, G., NAGHAVI, M. & WANG, H. 2013. La carga de enfermedad, lesiones, factores de riesgo y desafíos para el sistema de salud en México. *Salud Pública de México,* 55**,** 580-594.
LUGO-PALACIOS, D. G. 2009. *Analisis de los determinantes de la automedicación en México, Tesis de Licenciatura.* ITAM.
LUGO-PALACIOS, D. G. 2012. Mental Health Care and Priority Setting in the Mexican Popular Health Insurance, Master Project. Barcelona, Spain: Barcelona GSE.
LUGO-PALACIOS, D. G. & CAIRNS, J. 2015. Using ambulatory care sensitive hospitalisations to analyse the effectiveness of primary care services in Mexico. *Social Science & Medicine,* 144**,** 59-68.
LUGO-PALACIOS, D. G. & CAIRNS, J. 2016. The financial and health burden of diabetic ambulatory care sensitive hospitalisations in Mexico. *Salud Pública de México,* 58**,** 33-40.
MACINKO, J., DE OLIVEIRA, V. B., TURCI, M. A., GUANAIS, F. C., BONOLO, P. F. & LIMA-COSTA, M. F. 2011. The Influence of Primary Care and Hospital Supply on Ambulatory Care–Sensitive Hospitalizations Among Adults in Brazil, 1999–2007. *American Journal of Public Health,* 101**,** 1963-1970.

MARTIN, S. & SMITH, P. 1996. Explaining variations in inpatient length of stay in the National Health Service. *Journal of Health Economics,* 15**,** 279-304.
MARTIN, S., STREET, A., HAN, L. & HUTTON, J. 2016. Have hospital readmissions increased in the face of reductions in length of stay? Evidence from England. *Health Policy,* 120**,** 89-99.
MASKIN, E. S. 1996. Theories of the soft budget-constraint. *Japan and the World Economy,* 8**,** 125-133.
MASON, A., OR, Z., RENAUD, T., STREET, A., THUILLIEZ, J., WARD, P. & ON BEHALF OF THE EURODRG, G. 2012. How well do diagnosis-related groups for appendectomy explain variations in resource use? An analysis of patient-level data from 10 European countries. *Health Economics,* 21**,** 30-40.
MCFARLANE, C., IRWIN-CARBY, N. & CHARLES, C. A. D. Primary Health Care and the Management of the Ambulatory Case Sensitive Conditions of Hypertension and Diabetes in Jamaica. Convencion Internacional de Salud Publica. Cuba Salud 2012, 2012 La Habana.
NEWHOUSE, J. P. 1994. Frontier estimation: how useful a tool for health economics? *Journal of Health Economics,* 13**,** 317-322.
O'REILLY, J., SERDÉN, L., TALBÄCK, M., MCCARTHY, B. & GROUP, O. B. O. T. E. 2012. Performance of 10 European DRG systems in explaining variation in resource utilisation in inguinal hernia repair. *Health Economics,* 21**,** 89-101.
OBSERVATORIO DE LA SALUD PARA LATINOAMÉRICA Y EL CARIBE 2008. Mapa del sistema de salud de México. México, D.F: FUNSALUD.
OECD 2005. OECD Reviews of Health Systems: Mexico 2005. Paris, France: OECD
OECD 2012. OECD Health Data 2012. Paris OECD.
OECD 2016. *OECD Reviews of Health Systems: Mexico 2016,* Paris, OECD Publishing.
OLAIZ-FERNÁNDEZ, G., RIVERA-DOMMARCO, J., SHAMAH-LEVY, T., ROJAS, R., VILLALPANDO-HERNÁNDEZ, S., HERNÁNDEZ-AVILA, M. & SEPÚLVEDA-AMOR, J. 2006. Encuesta Nacional de Salud y Nutrición 2006. Cuernavaca, México: Instituto Nacional de Salud Pública.
OLAIZ, G., ROJAS, R., BARQUERA, S., SHAMAH, T., AGUILAR, C., CRAVIOTO, P., LÓPEZ, P., HERNÁNDEZ, M., TAPIA, R. & SEPÚLVEDA, J. 2003. Encuesta Nacional de Salud 2000. Tomo 2. La salud de los adultos. Cuernavaca, México: Instituto Nacional de Salud Pública.
OR, Z., RENAUD, T., THUILLIEZ, J., LEBRETON, C. & ON BEHALF OF THE EURO, D. R. G. G. 2012. Diagnosis related groups and variations in resource use for child delivery across 10 European countries. *Health Economics,* 21**,** 55-65.
PAAT-AHI, G., ŚWIDEREK, M., SAKOWSKI, P., SALUSE, J., AAVIKSOO, A. & ON BEHALF OF THE, E. G. 2012. DRGs in Europe: A cross country analysis for cholecystectomy. *Health Economics,* 21**,** 66-76.
PAULY, M. & REDISCH, M. 1973. The Not-For-Profit Hospital as a Physicians' Cooperative. *The American Economic Review,* 63**,** 87-99.
PAULY, M. V. 2000. Chapter 10 - Insurance Reimbursement. *In:* ANTHONY, J. C. & JOSEPH, P. N. (eds.) *Handbook of Health Economics.* Elsevier.
PELTOLA, M. 2012. Patient classification and hospital costs of care for stroke in 10 European countries. *Health Economics,* 21**,** 129-140.
PITT, M. M. & LEE, L.-F. 1981. The measurement and sources of technical inefficiency in the Indonesian weaving industry. *Journal of Development Economics,* 9**,** 43-64.
RABE-HESKETH, S. & SKRONDAL, A. 2012. *Multilevel and Longitudinal Modeling Using Stata,* College Station, TX, Stata Press.
RODRÍGUEZ ABREGO, G., ZURITA, B., RAMÍREZ SÁNCHEZ, T. & HERRERA ROJAS, J. J. 2012. Serie sobre hospitalizaciones evitables y fortalecimiento de la atención primaria en salud: El caso de México. Inter-American Development Bank.
SAHA, S., SOLOTAROFF, R., OSTER, A. & BINDMAN, A. B. 2007. Are preventable hospitalizations sensitive to changes in access to primary care?: The case of the Oregon Health Plan. *Medical Care,* 45**,** 712-719.

SALOMON, J. A., CARVALHO, N., GUTIÉRREZ-DELGADO, C., OROZCO, R., MANCUSO, A., HOGAN, D. R., LEE, D., MURAKAMI, Y., SRIDHARAN, L. & MEDINA-MORA, M. E. 2012. Intervention strategies to reduce the burden of non-communicable diseases in Mexico: cost effectiveness analysis. *BMJ,* 344**,** e355.

SCHMIDT, P. & SICKLES, R. C. 1984. Production frontiers and panel data. *Journal of Business & Economic Statistics,* 2**,** 367-374.

SECRETARIA DE SALUD. 2013a. *Sistema Dinámico de Información Estadística en Salud* [Online]. Available: http://dgis.salud.gob.mx/cubos/ [Accessed 28 May 2013].

SECRETARIA DE SALUD. 2013b. *Sistema Nacional de Información en Salud* [Online]. Available: http://www.sinais.salud.gob.mx [Accessed 28 May 2013].

SECRETARIA DE SALUD. 2014. *Boletín de Información Estadística* [Online]. Mexico, D.F. Available: http://www.sinais.salud.gob.mx/publicaciones/bie.html [Accessed 11 April 2014].

SECRETARIA DE SALUD 2015. Recursos Físicos y Humanos en Hospitales de la Secretaria de Salud. *Table produced by Dirección General de Información en Salud.* México, D.F.

SECRETARÍA DE SALUD 2011. Observatorio del Desempeño Ambulatorio 2010. México D.F.: Secretaría de Salud.

SECRETARÍA DE SALUD 2012. Observatorio del Desempeño Hospitalario 2011. Mexico, D.F: Secretaría de Salud.

SECRETARÍA DE SALUD. 2015. *Egresos Hospitalarios Secretaría de Salud* [Online]. Available: http://www.dgis.salud.gob.mx/contenidos/basesdedatos/da_egresoshosp.html [Accessed 4 September 2015].

SECRETARÍA DE SALUD, SEGURO POPULAR, INSTITUTO MEXICANO DEL SEGURO SOCIAL & INSTITUTO DE SEGURIDAD SOCIAL Y SERVICIOS SOCIALES DE LOS TRABAJADORES DEL ESTADO 2012. Tabulador de Tarifas Máximas Referenciales. México, D.F.

SHI, L., SAMUELS, M. E., PEASE, M., BAILEY, W. & CORLEY, E. 1999. Patient Characteristics Associated With Hospitalizations for Ambulatory Care Sensitive Conditions in South Carolina. *Southern Medical Journal,* 92**,** 989-998.

SOCHA-DIETRICH, K. 2014. From global hospital budgets to the mixed reimbursement system: Incentives for activity and efficiency. Odense: University of Southern Denmark.

SOSA-RUBI, S. G., GALARRAGA, O. & HARRIS, J. E. 2009. Heterogeneous impact of the "Seguro Popular" program on the utilization of obstetrical services in Mexico, 2001–2006: A multinomial probit model with a discrete endogenous variable. *Journal of health economics,* 28**,** 20-34.

SPENKUCH, J. L. 2012. Moral hazard and selection among the poor: evidence from a randomized experiment. *Journal of Health Economics,* 31**,** 72-85.

STATACORP 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.

STATACORP 2014. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP.

STRANGES, E. & STOCKS, C. 2010. Potentially Preventable Hospitalizations fro Acute and Chronic Conditions, 2008. Rockville, MD: Agency for Healthcare Research and Quality.

STREET, A., KOBEL, C., RENAUD, T., THUILLIEZ, J. & ON BEHALF OF THE EURODRG, G. 2012. How well do diagnosis-related groups explain variations in costs or length of stay among patients and across hospitals? Methods for analysing routine patient data. *Health Economics,* 21**,** 6-18.

STREET, A., SCHELLER-KREINSEN, D., GEISSLER, A. & BUSSE, R. 2010. Determinants of hospital costs and performance variation: Methods, models and variables for the EuroDRG project. Berlin: Technische Universität Berlin.

TORRES, A.-C. & KNAUL, F.-M. 2003. Determinantes del gasto de bolsillo en salud e implicaciones para el aseguramiento universal en México: 1992-2000. *In:* KNAUL, F. & NIGENDA, G. (eds.) *Caleidoscopio de la Salud.* Distrito Federal, Mexico: Fundacion Mexicana para la Salud.

WAGSTAFF, A. 1989. Estimating efficiency in the hospital sector: a comparison of three statistical cost frontier models. *Applied Economics,* 21**,** 659-672.

WANG, W. & FAMOYE, F. 1997. Modeling household fertility decisions with generalized Poisson regression. *Journal of Population Economics,* 10**,** 273-283.
WEISSMAN, J. S., GATSONIS, C. & EPSTEIN, A. M. 1992. Rates of avoidable hospitalization by insurance status in Massachusetts and Maryland. *JAMA: the journal of the American Medical Association,* 268**,** 2388-2394.
WORLD HEALTH ORGANIZATION 2008. Global Burden of Disease 2004 update: Disability weights for diseases and conditions. Geneva, Switzerland: World Health Organization.
WORLD HEALTH ORGANIZATION. 2015. *Life Tables by country* [Online]. Available: http://apps.who.int/gho/data/view.main.61060 [Accessed 29 January 2015].
ZIMMET, P. 2009. Preventing diabetic complications: A primary care perspective. *Diabetes Research and Clinical Practice,* 84**,** 107-116.
ZUÑIGA-RAMÍREZ, M. G., VILLAREAL-RÍOS, E., VARGAS-DAZA, E. R., GALICIA-RODRÍGUEZ, L., MARTÍNEZ-GONZÁLEZ, L. & CERVANTES-BECERRA, R. G. 2013. Perfil de uso de los servicios del módulo DiabetIMSS por pacientes con diabetes mellitus 2. *Revista de Enfermería del Instituto Mexicano del Seguro Social,* 21**,** 79-84.
ZWEIFEL, P., BREYER, F. & KIFMANM, M. 2009. *Health Economics,* Heidelberg, Springer-Verlag.
ZWEIFEL, P. & MANNING, W. G. 2000. Chapter 8 - Moral Hazard and Consumer Incentives in Health Care*. *In:* ANTHONY, J. C. & JOSEPH, P. N. (eds.) *Handbook of Health Economics.* Elsevier.

APPENDICES

APPENDICES TO CHAPTER 2

Appendix 2.1 Description of the *Seguro Popular* Programme[26]

In 2003, the General Health Law was reformed to establish the System of Social Protection (SPSS) in Health which introduced new financial rules to fund population-based interventions and personal health care interventions, the latter being financed through *Seguro Popular*, the subsidised insurance-based component of the SPSS that offers free access at the point of delivery to an explicit set of health care interventions.

Seguro Popular offers financial protection in health to the population not covered by any other public insurance scheme. Beneficiaries of the *Seguro Popular* have access to an essential package of primary and secondary level interventions, which are provided in ambulatory settings and general hospitals, and a package of high cost tertiary level interventions financed through the Fund for Protection against Catastrophic Expenditures (FPGC). The provision of the essential package of interventions has been decentralised at the state level, while the tertiary-care interventions are provided at regional or national units that offer high-speciality services. In 2016, the essential package (CAUSES) includes 287 health interventions covering almost 100% of the primary level demand, and 85% of the hospitalisation and surgery demands. The FPGC covers 59 interventions classified in 16 groups including, among others, HIV/AIDS, cancer in children and teenagers, cervical cancer, breast cancer, cataracts, bone marrow transplants, neonatal care and acute myocardial infarction for people younger than 60.

[26] This appendix is a summary of the information presented in Frenk et al. (2006), Gonzalez-Pier et al. (2006), Knaul et al. (2006), Knaul et al. (2012), Lugo-Palacios (2012), and CNPSS (2016).

The financial structure of *Seguro Popular* is based in a tripartite scheme with contributions for every beneficiary coming from three different sources: the federal government, the state governments and the beneficiary families.[27]

The federal government contribution has two components. The first component is the "social contribution" that is a fixed allocation per beneficiary equivalent to 3.92% of the minimum wage in the Federal District in 2009 with periodic adjustments for inflation. The second component is the "federal solidarity contribution" equivalent, on average, to 1.5 times the amount of the social contribution. The federal contribution is monthly distributed to each of the 32 states for every registered beneficiary in the system.[28]

The "state solidarity contribution" is set at half the federal social contribution and the source of funding is state-level revenue.

The family contribution is progressive according to the level of household income which is determined at the moment of affiliation to the system. Families belonging to income deciles I, II, III and IV, as well as the ones in deciles I to VII with at least one Mexican child born after December 2006, do not contribute financially, but affiliation is conditional on participating in health promotion activities.

The financial scheme includes two funds managed at the federal level. The largest is the, above mentioned, FPGC which is equal to 8% of the sum of the federal social contribution and the solidarity contributions (both federal and state). The second fund is the Prevision Budget Fund (3% of the same previous sum) dedicated to

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[27] It is important to note that from 2004 to 2009 the funding of *Seguro Popular* was done on a family basis. However, since 2010 the federal and the state government's contributions are computed on an individual basis, while the beneficiary contributions are paid by family.

[28] To avoid duplication in the allocation of resources, the federal government discounts from the federal contribution to each state an amount meant to offset the health-funding received by these same states from other federal sources, such as *Oportunidades* programme or *Fondo de Aportaciones para los Servicios de Salud* (FASSA).

infrastructure investments in poor communities and to cover unexpected fluctuations in demand and temporally overdue payments from cross-state service utilisation.

Enrolment is voluntary but states have an incentive to affiliate the entire population since their budgets are determined by the number of registered affiliates. In fact, in April 2012 the federal government declared that universal health insurance coverage was achieved with *Seguro Popular* covering 51.8 million people.

APPENDICES TO CHAPTER 3

Appendix 3.1 Ambulatory Care Sensitive Conditions Included in the Analysis[29]

ICD-10 Coding		
No.	**Condition**	**ICD-10 codes**
1	Immunisation and preventable infectious diseases	A36.0, A36.1, A36.2, A36.3, A36.8, A36.9, A37.0, A37.0, A37.1, A37.8, A37.9, A35X, A80.0, A80.1, A80.2, A80.3, A80.4, A80.9, B26.0, B26.1, B26.2, B26.3, B26.8, B26.9, B05.0, B05.1, B05.2, B05.3, B05.4, B05.8, B05.9, G00.0, I00X, I01.0, I01.1, I01.2, I01.8, I01.9
2	Congenital syphilis	A50.0, A50.1, A50.2, A50.3, A50.4, A50.5, A50.6, A50.7, A50.9
3	Tuberculosis	A15.0, A15.1, A15.2, A15.3, A15.6, A15.4, A15.5, A15.7, A15.8, A15.9, A17.0, A17.1, A17.8, A17.9, A18.0, A18.1, A18.4, A19.0, A19.1, A19.2, A19.8, A19.9
4	Diabetes mellitus	E10.9, E11.9, E12.9, E13.9, E14.9, E10.0, E10.1, E10.6, E10.7, E10.8, E11.0, E11.1, E11.6, E11.7, E11.8, E12.0, E12.1, E12.6, E12.7, E12.8, E13.0, E13.1, E13.6, E13.7, E13.8, E14.0, E14.1, E14.6, E14.7, E14.8, E10.5, E11.5, E12.5, E13.5, E14.5, E10.3, E11.3, E12.3, E13.3, E14.3, E10.2, E11.2, E12.2, E13.2, E14.2, E10.4, E11.4, E12.4, E13.4, E14.4
5	Disorders of hydro-electrolyte metabolism	E86X, E87.6
6	Anaemia	D50.0, D50.1, D50.8, D50.9
7	Convulsions and epilepsy	G40.0, G40.1, G40.2, G40.3, G40.4, G40.8, G40.9, R56.0, R56.8
8	Diseases of the upper respiratory tract	H66.0, H66.1, H66.2, H66.3, H66.4, H66.9, H67.8, J02.0, J02.8, J02.9, J31.2, J03.0, J03.8, J03.9, J06.0, J06.9, J36X

[29] The studies considered in the design of the ACSCH list used in this paper were Weissman et al. (1992), Epstein (2001), Caminal et al. (2004), Finegan et al. (2010), and Agency for Healthcare Research and Quality (2013).

No.	Condition	ICD-10 codes
9	Hypertension	I10X, I11.9, I12.0, I12.9, I13.0, I13.1, I13.2, I13.9, I15.0, I15.1, I15.2, I15.8, I15.9, I21.0, I21.1, I21.2, I21.3, I21.4, I21.9, I25.2, I24.0, I24.1, I24.8, I24.9, I25.1, I25.3, I25.4, I25.5, I25.6, I25.8, I28.9, I20.0, I20.1, I20.8, I20.9, I60.0, I60.1, I60.2, I60.3, I60.4, I60.5, I60.6, I60.7, I60.8, I60.9, I61.0, I61.1, I61.2, I61.3, I61.4, I61.5, I61.6, I61.8, I61.9, I67.4
10	Heart Failure	I50.0, I50.1, I50.9, I11.0, J18X
11	Pneumonia	J13X, J14X, J15.3, J15.4, J15.7, J15.9, J15.9, J15.9, J16.0, J16.8, J18.0, J18.9
12	Bronchitis and chronic obstructive pulmonary disease	J20.0, J20.1, J20.2, J20.3, J20.4, J20.5, J20.6, J20.7, J20.8, J20.9, J41.0, J41.1, J41.8, J43.0, J43.1, J43.2, J43.8, J43.9, J47X, J44.0, J44.1, J44.8, J44.9
13	Asthma	J45.0, J45.1, J45.8, J45.9,
14	Bleeding or perforating ulcer	K25.0, K25.2, K25.4, K25.6, K26.0, K26.2, K26.4, K26.6, K27.0, K27.1, K27.2, K27.4, K27.5, K27.6
15	Appendicitis with complication	K35.0, K35.1
16	Disease of the skin and subcutaneous tissue	L03.0, L03.1, L03.2, L03.3, L03.8, L03.9, L04.0, L04.1, L04.2, L04.3, L04.8, L04.9, L08.0, L08.1, L08.8, L08.9
17	Gastroenteritis	K52.8, K52.9
18	Urinary tract infections	N11.0, N11.1, N15.1, N36.9, N39.0
19	Pelvic inflammatory disease	N70.0, B70.1, N70.9, N73.0, N73.1, N73.2, N73.3, N73.4, N73.5, N73.6, N73.8, N73.9
20	Hypoglycaemia	E16.2
21	Gallstone ileus	K56.3

Appendix 3.2 ACSHs Covered by *Seguro Popular*

No.	Condition	Hospital care covered by *Seguro Popular*
1	Immunisation and preventable infectious diseases	
2	Congenital syphilis	
3	Tuberculosis	
4	Diabetes mellitus	X*
5	Disorders of hydro-electrolyte metabolism	
6	Anaemia	
7	Convulsions and epilepsy	X
8	Diseases of the upper respiratory tract	X
9	Hypertension	X**
10	Heart Failure	
11	Pneumonia	X
12	Bronchitis and chronic obstructive pulmonary disease	X
13	Asthma	
14	Bleeding or perforating ulcer	X
15	Appendicitis with complication	X
16	Disease of the skin and subcutaneous tissue	
17	Gastroenteritis	
18	Urinary tract infections	X
19	Pelvic inflammatory disease	
20	Hypoglycaemia	
21	Gallstone ileus	X

Source: Authors with data from Comisión Nacional de Protección Social en Salud (2012).

* Hospitalisation for diabetes with kidney failure is not covered by *Seguro Popular*.

** Treatment for acute myocardial infarction is only covered for those under 60.

Appendix 3.3 ACSH Models for Origin JURIS

Fixed Effects Models for ACSH rate - Origin JURIS

	FE	SP_iv	year_dummies	all_juris
c_p_20_29	-0.008	-0.008	-0.008	-0.008
	0.007	0.007	0.007	0.007
c_p_30_39	-0.049***	-0.048***	-0.050***	-0.049***
	0.016	0.015	0.015	0.016
c_p_50_59	-0.086**	-0.085***	-0.090***	-0.081**
	0.034	0.033	0.031	0.034
c_p_60_69	0.107**	0.107**	0.109**	0.116**
	0.051	0.050	0.051	0.052
SP_juris	0.093***	0.096***	0.071**	0.082**
	0.012	0.010	0.031	0.032
marg_muybajo	-3.936*	-4.372**	-4.627**	-5.643**
	2.128	1.860	2.193	2.745
marg_bajo	-2.982	-3.310*	-3.700*	-3.979
	2.190	1.974	2.144	2.528
marg_medio	-2.816**	-2.958**	-3.229**	-3.743***
	1.346	1.276	1.339	1.243
c_p_diffjur	0.044***	0.044***	0.043**	0.047***
	0.015	0.015	0.016	0.012
c_p_outpat	-0.000	-0.000	-0.000	
	0.000	0.000	0.000	
c_p_camas	0.293	0.296	0.284	
	0.604	0.593	0.617	
c_p_consult	5.644***	5.635***	5.684***	
	1.401	1.367	1.420	
c_p_gpvisit				-0.000
				0.000
close_hosp				8.991**
				3.723
_cons	18.858***		18.757***	11.916***
	1.539		1.545	2.610
N	2552	2552	2552	2552
r2_a	0.355	0.290	0.359	0.242
r2	0.360	0.360	0.367	0.250
F	40.078	44.733	152.031	79.594
ll	-8270.351	-8270.607	-8257.160	-8472.462
sigma_u	15.147		15.593	16.659
sigma_e	6.511	6.485	6.492	7.062
rho	0.844		0.852	0.848

Standard errors in second row
* p<0.10, ** p<0.05, *** p<0.01

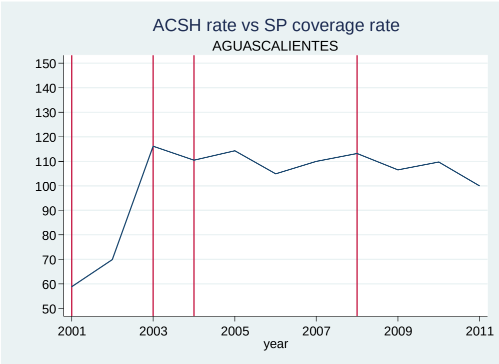
Appendix 3.4 Fixed Effects Models for Diabetes ACSHs

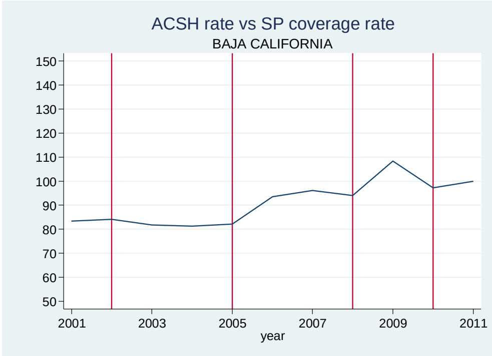
Fixed Effects Models for ACSH rate - Diabetes

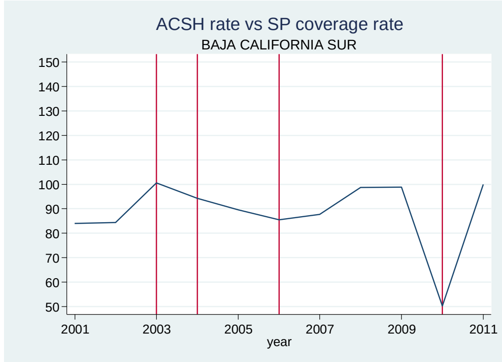
	diab_FE	diab_IV	diab_dummies
c_p_20_29	-0.005*	-0.005**	-0.005*
	0.003	0.003	0.003
c_p_30_39	-0.008	-0.007	-0.007
	0.008	0.008	0.008
c_p_50_59	-0.006	-0.006	-0.005
	0.017	0.017	0.016
c_p_60_69	0.046*	0.045*	0.044*
	0.024	0.024	0.025
SP_juris	0.044***	0.045***	0.050***
	0.006	0.005	0.015
marg_muybajo	-1.115	-1.264	-1.666
	1.182	1.107	1.240
marg_bajo	-0.461	-0.573	-0.962
	1.144	1.062	1.178
marg_medio	-1.256	-1.303*	-1.476*
	0.763	0.742	0.791
c_p_diffjur	0.025**	0.025***	0.026**
	0.010	0.009	0.010
c_p_outpat	-0.000	-0.000	-0.000
	0.000	0.000	0.000
c_p_camas	0.671***	0.671***	0.651**
	0.240	0.234	0.249
c_p_consult	2.595**	2.601***	2.557**
	1.031	1.005	1.033
_cons	8.343***		8.308***
	0.910		0.928
N	1961	1961	1961
r2_a	0.302	0.227	0.316
r2	0.309	0.309	0.326
F	23.501	23.100	37.441
ll	-4838.636	-4838.768	-4814.060
sigma_u	7.237		6.924
sigma_e	3.017	3.001	2.988
rho	0.852		0.843

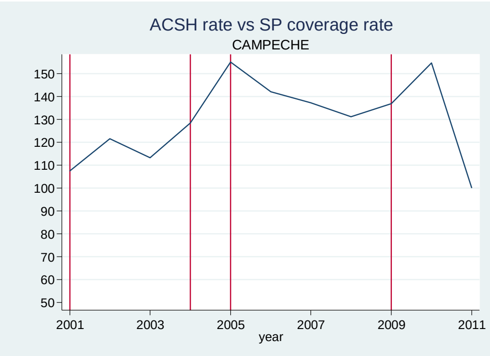
Standard errors in second row
* p<0.10, ** p<0.05, *** p<0.01

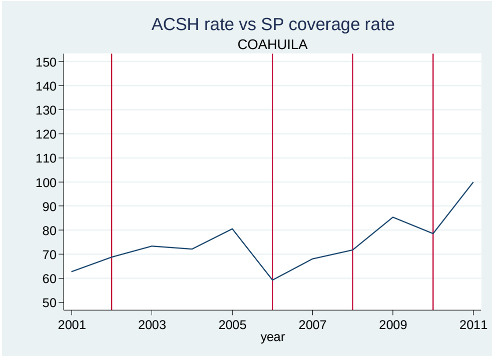
Appendix 3.5 ACSH by State with *Seguro Popular* Coverage Thresholds, 2001-2011

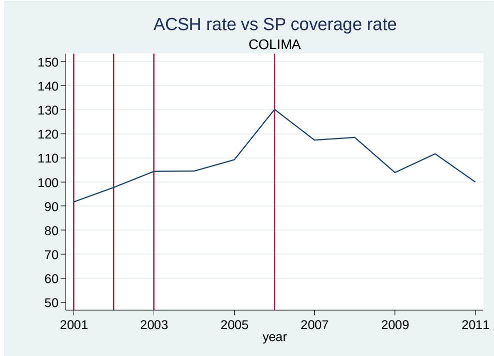


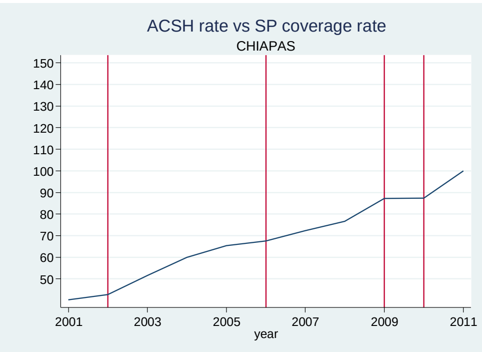


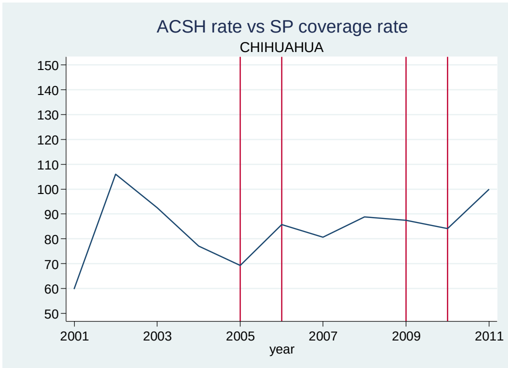


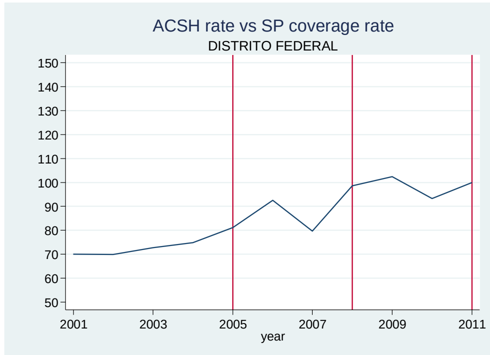


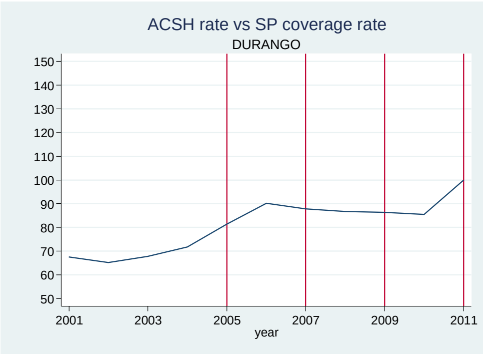


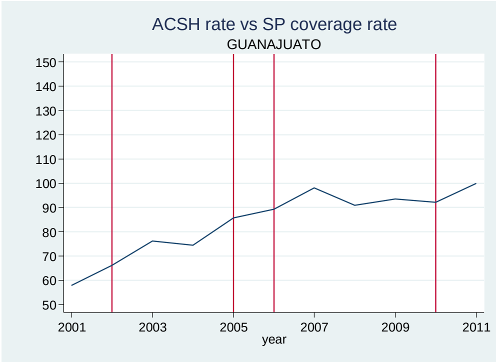


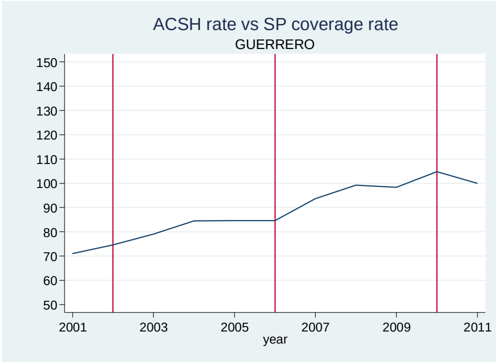


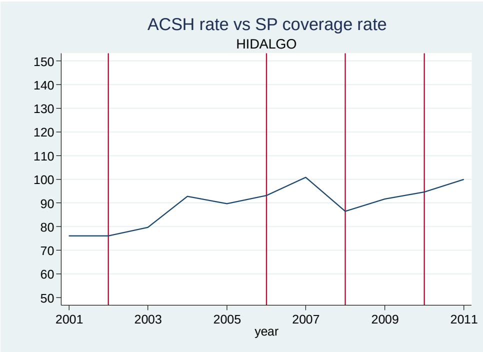


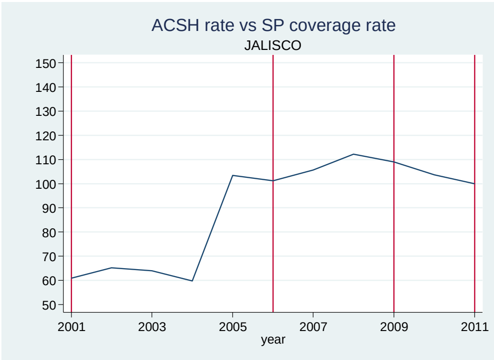


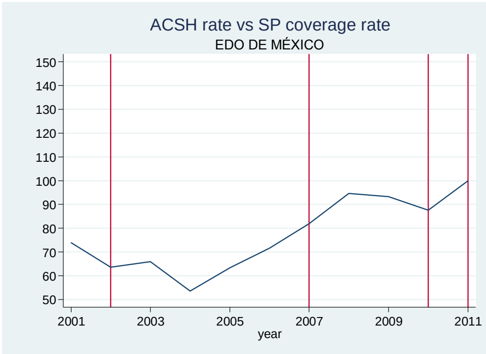

ACSH rate vs SP coverage rate
DURANGO
year

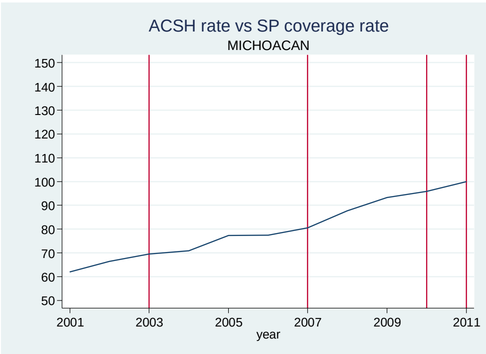

ACSH rate vs SP coverage rate
GUANAJUATO
year

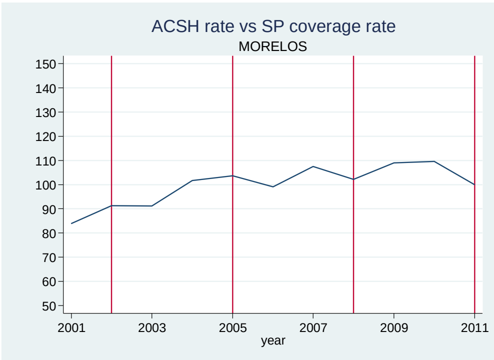

ACSH rate vs SP coverage rate
GUERRERO
year

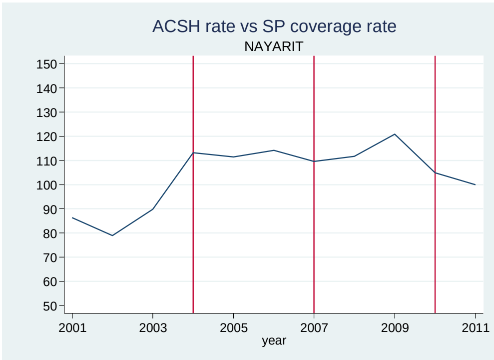

ACSH rate vs SP coverage rate
HIDALGO
year

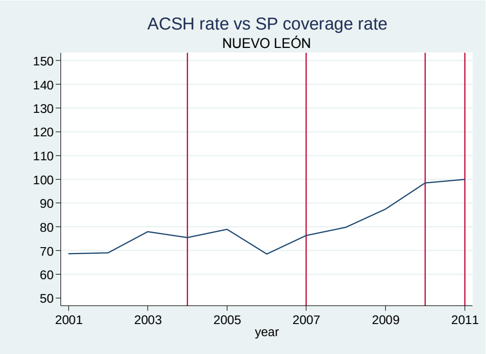

ACSH rate vs SP coverage rate
JALISCO
year

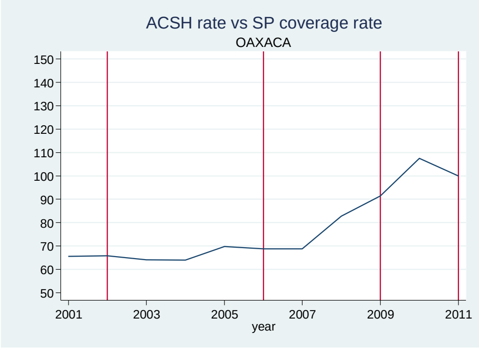

ACSH rate vs SP coverage rate
EDO DE MÉXICO
year

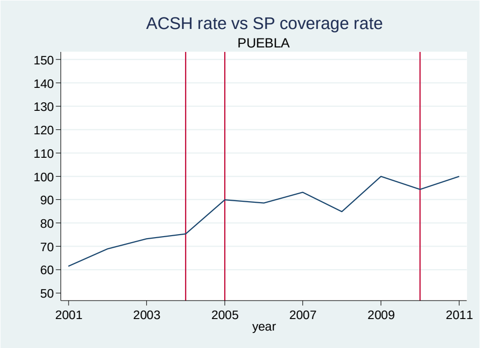

ACSH rate vs SP coverage rate
MICHOACAN
year

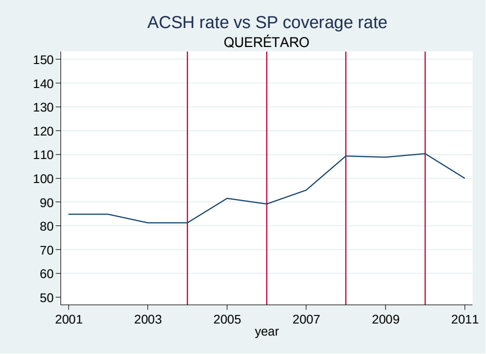

ACSH rate vs SP coverage rate
MORELOS
year

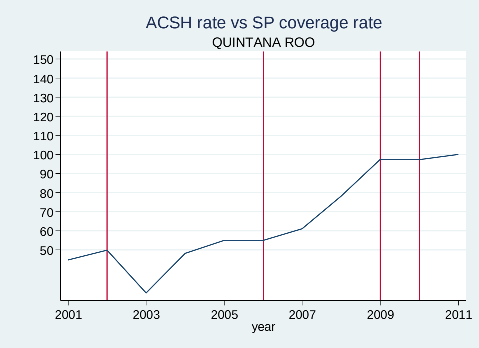

ACSH rate vs SP coverage rate
NAYARIT
year

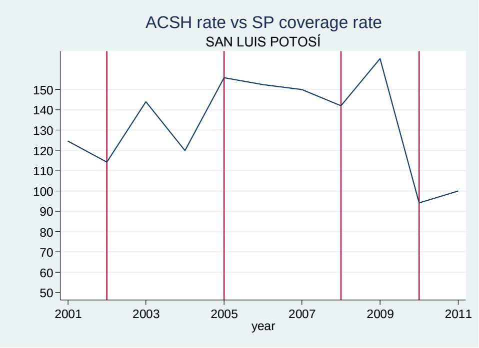

ACSH rate vs SP coverage rate
NUEVO LEÓN
year

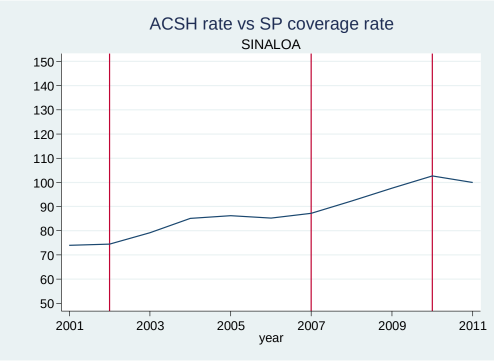

ACSH rate vs SP coverage rate
OAXACA
year

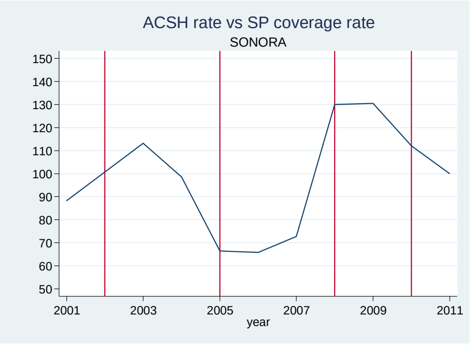

ACSH rate vs SP coverage rate
PUEBLA
year

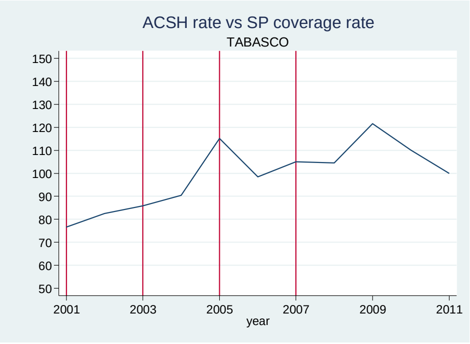

ACSH rate vs SP coverage rate
QUERÉTARO
year

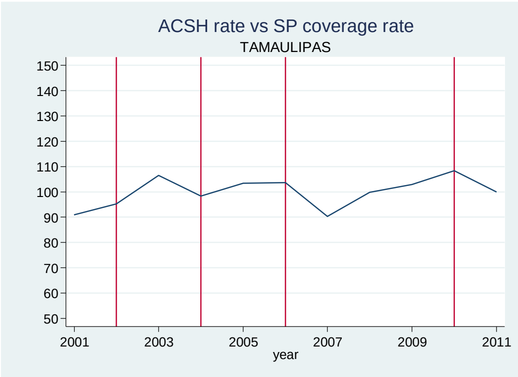

ACSH rate vs SP coverage rate
QUINTANA ROO
year

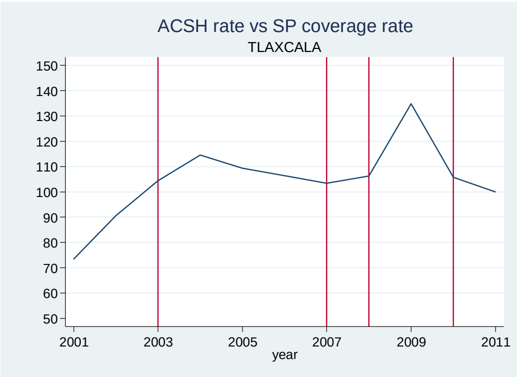

ACSH rate vs SP coverage rate
SAN LUIS POTOSÍ
year

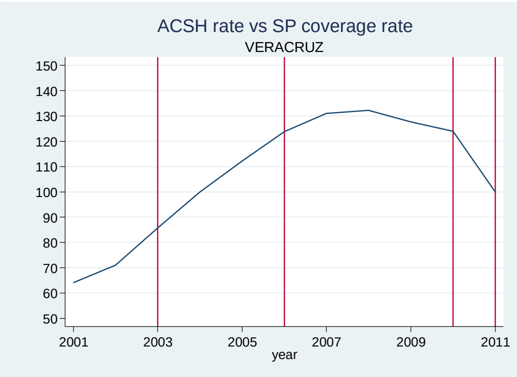

ACSH rate vs SP coverage rate
SINALOA
year

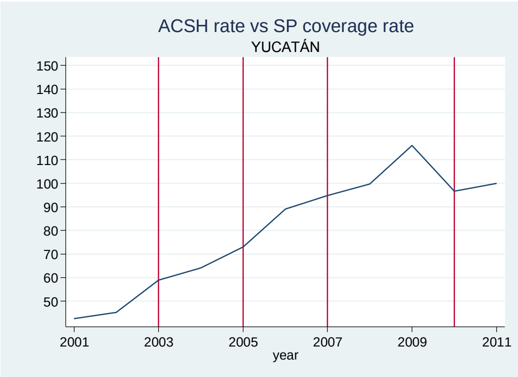

ACSH rate vs SP coverage rate
SONORA
year

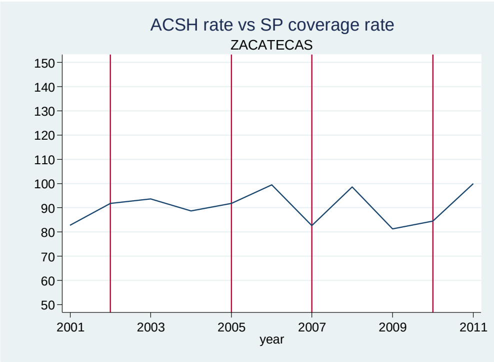

ACSH rate vs SP coverage rate
TABASCO
year











Notes:

(1) The ACSH rate is presented as proportion of the value of the ACSH rate in 2011 that is equal to 100.
(2) Lines in the graphs show the year when the chosen states reached and/or crossed the *Seguro Popular* coverage thresholds of 0%, 20%, 50% and 80%, respectively.

APPENDICES TO CHAPTER 4

Appendix 4.1 Disaggregation of the Health Burden of Diabetic Complications in YLL and YLD (State Health Ministries)

Years of Life Lost (YLL)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Kidney Failure	9,819	11,801	11,071	11,248	14,276	13,824	17,080	23,484	21,665	22,044	24,152
Retinopathy	47	82	0	61	42	28	0	140	24	24	159
Neuropathy	319	103	206	233	195	377	436	471	671	772	531
Diabetic Foot	3,383	5,157	4,465	4,602	3,643	5,278	5,842	6,043	7,051	7,357	7,332
Amputation*	570	672	498	730	750	1,244	733	1,040	774	938	714
TOTAL	**14,137**	**17,816**	**16,240**	**16,873**	**18,906**	**20,751**	**24,092**	**31,177**	**30,184**	**31,135**	**32,887**

* Net diabetic amputation: amputation where the main hospitalisation cause was different from the above

Years Lived with Disability (YLD)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Kidney Failure	11,698	12,649	13,719	13,951	15,458	16,435	18,215	21,682	21,756	20,580	20,205
Retinopathy	2,479	2,872	2,417	1,816	3,342	3,926	3,285	3,226	3,002	2,504	5,298
Neuropathy	918	1,114	939	1,187	1,339	1,351	1,176	1,404	1,538	1,363	1,410
Diabetic Foot*	32	37	40	44	48	52	57	64	69	74	78
Amputation	4,803	5,011	6,790	7,172	7,554	8,066	8,459	10,644	10,453	12,357	12,262
TOTAL	**19,930**	**21,682**	**23,906**	**24,171**	**27,741**	**29,830**	**31,192**	**37,019**	**36,818**	**36,879**	**39,252**

* Net diabetic foot: diabetic foot without amputations.

Appendix 4.2 Disaggregation of the Health Burden of Diabetic Complications in YLL and YLD (IMSS)

Years of Life Lost (YLL)

	2007	2008	2009	2010	2011	2012	2013	2014
Kidney Failure	31,655	32,605	29,745	27,016	29,003	28,287	27,601	25,114
Retinopathy	24	109	24	0	151	152	0	49
Neuropathy	216	383	247	335	241	215	308	177
Diabetic Foot	4,079	4,927	5,373	5,774	4,742	4,856	3,911	4,515
Amputation*	1,434	1,275	1,254	1,417	1,130	1,437	1,345	1,147
TOTAL	**37,408**	**39,299**	**36,642**	**34,542**	**35,268**	**34,947**	**33,165**	**31,002**

* Net diabetic amputation: amputation where the main hospitalisation cause was different from the above

Years Lived with Disability (YLD)

	2007	2008	2009	2010	2011	2012	2013	2014
Kidney Failure	35,484	34,736	30,664	30,944	31,575	32,975	30,665	29,569
Retinopathy	33,908	20,240	23,753	22,021	23,550	18,191	22,509	26,432
Neuropathy	2,083	1,934	2,032	1,832	1,989	1,735	1,904	1,940
Diabetic Foot*	94	89	86	95	97	96	94	96
Amputation	11,074	11,643	11,798	12,144	12,079	12,376	13,289	14,649
TOTAL	**82,643**	**68,643**	**68,333**	**67,036**	**69,289**	**65,373**	**68,461**	**72,686**

* Net diabetic foot: diabetic foot without amputations.

APPENDICES TO CHAPTER 5

Appendix 5.1 Descriptive Statistics

APPENDECTOMY DESCRIPTIVE STATISTICS								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**
No. patients	29,428	30,571	30,686	33,580	35,199	36,376	38,398	39,223
No. hospitals	244	258	258	267	277	274	268	280**
Patient variables								
	3.04	3.11	3.1	3.01	2.93	2.99	2.98	3.04
LoS	(1.95)	(2.12)	(2.08)	(1.96)	(1.86)	(1.96)	(1.95)	(2.10)
	23.28	23.25	23.11	23.12	23.11	23.26	23.47	23.42
age	(15.47)	(15.71)	(15.69)	(15.74)	(15.68)	(15.75)	(15.72)	(15.90)
	0.54	0.54	0.53	0.53	0.53	0.52	0.52	0.52
male	(0.50)	(0.5)	(0.5)	(0.5)	(0.50)	(0.50)	(0.50)	(0.50)
	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02
transfer in	(0.20)	(0.19)	(0.17)	(0.15)	(0.14)	(0.14)	(0.13)	(0.13)
	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.003
transfer out	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)
	0.93	0.93	0.93	0.94	0.94	0.95	0.94	0.92
emergency	(0.25)	(0.26)	(0.25)	(0.24)	(0.23)	(0.22)	(0.23)	(0.27)
	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
death	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.02
laparoscopy	(0.10)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.12)	(0.15)
	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003
single charlson	(0 .06)	(0 .06)	(0 .06)	(0 .06)	(0 .06)	(0 .05)	(0 .05)	(0 .05)
	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
double charlson	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	0.09	0.08	0.08	0.08	0.07	0.08	0.08	0.08
No. second diag	(0 .35)	(0.33)	(0.33)	(0.31)	(0.30)	(0.31)	(0.30)	(0.32)
	1.98	2.11	2.01	2.05	2.01	2.13	2.14	2.27
No. procedures	(1.16)	(1.15)	(1.19)	(1.24)	(1.10)	(1.39)	(1.44)	(1.54)
	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001
post surgery infection	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
	0.006	0.005	0.005	0.006	0.004	0.003	0.003	0.003
secondary urinary infec	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)
	0.003	0.004	0.003	0.002	0.002	0.003	0.002	0.002
secondary diabetes	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
secondary hypertension	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Hospital variables**								
	5353.52	5266.28	5596.66	5923.95	5912.40	5951.25	6291.05	6255.885
Total discharges per hospital	(4280.73)	(4180.20)	(4393.05)	(4611.27)	(4595.23)	(4492.39)	(4723.18)	(4696.27)
	122.23	119.37	120.05	127.33	128.82	134.33	145.07	141.66
Appendectomy discharges	(107.00)	(104.86)	(106.55)	(113.07)	(115.21)	(124.22)	(128.61)	(120.48)
	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Appendectomy/Tot Discharges	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	63.36	61.85	62.61	62.76	61.99	63.67	64.99	66.24
Hospital beds	(57.89)	(56.94)	(57.11)	(54.88)	(54.87)	(53.26)	(53.18)	(54.02)
	2.47	2.53	2.73	2.83	2.88	2.93	3.15	3.29
Operation rooms	(2.02)	(2.12)	(2.36)	(2.50)	(2.46)	(2.29)	(2.38)	(2.37)
	0.23	0.23	0.22	0.22	0.23	0.23	0.23	0.22
Doctors/ Total staff	(0.04)	(0 .05)	(0 .04)	(0 .04)	(0 .06)	(0 .07)	(0 .05)	(0.05)
	0.16	0.14	0.13	0.12	0.11	0.11	0.10	0.10
Med Students / Tot doctors	(0.12)	(0 .11)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.08)
	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06
Med Residents / Tot doctors	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)
	1.66	1.65	1.69	1.68	1.63	1.67	1.69	1.76
Nurses / Tot doctors	(0 .48)	(0.52)	(0.62)	(0.55)	(0.50)	(0.53)	(0.50)	(0 .55)
	0.36	0.36	0.37	0.36	0.35	0.35	0.37	0.37
Metropolitan area	(0 .48)	(0 .48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)
	68.06	67.77	66.96	66.88	67.81	68.41	66.16	68.62
ACSH rate	(27.13)	(26.62)	(26.45)	(28.90)	(30.77)	(31.05)	(30.53)	(31.04)
	21.02	20.15	19.76	19.37	19.46	19.85	20.33	21.51
Death rate	(13.10)	(13.94)	(14.0)	(13.31)	(14.05)	(14.06)	(14.07)	(14.31)
	276.0	271.6	255.42	287.98	293.29	310.97	264.74	310.29
AMI death rate	(278.58)	(273.08)	(270.26)	(283.31)	(284.68)	(281.60)	(250.69)	(274.12)
State variables								
	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Public health exp. As GDP %	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.15	0.15	0.16	0.18	0.17	0.18	0.17	0.15
State health exp / fed health exp	(0.13)	(0.13)	(0.14)	(0.18)	(0.15)	(0.16)	(0.13)	(0.13)
	0.26	0.34	0.46	0.55	0.61	0.80	0.93	0 .90
Seguro Popular coverage rate	(0.19)	(0. .19)	(0.17)	(0.16)	(0.15)	(0.14)	(0.11)	(0.10)
	0.31	0.28	0.28	0.25	0.25	0.22	0.28	0.22
PAN governor	(0.47)	(0.46)	(0.46)	(0.44)	(0.44)	(0.42)	(0.46)	(0.42)
	0.50	0.53	0.53	0.56	0.56	0.59	0.59	0.66
PRI governor	(0.51)	(0.51)	(0.51)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
	0.19	0.19	0.19	0.19	0.19	0.19	0.13	0.12
PRD governor	(0.40)	(0.4)	(0.4)	(0.40)	(0.40)	(0.40)	(0.34)	(0.34)

* Not available. Standard deviation in brackets. **Hospital YNSSA013440 excluded from 2nd stage because it didn't report data on HR

CHILDBIRTH DESCRIPTIVE STATISTICS								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**
No. patients	346,013	364,676	383,749	422,113	452,436	425,177	435,934	407,584
No. hospitals	262	274	276	281	286	283	276	282
Patient variables								
	1.30	1.31	1.32	1.31	1.29	1.24	1.23	1.23
LoS	(0 .79)	(0.78)	(0 .83)	(0.79)	(0.76)	(0.70)	(0 .68)	(0 .70)
	23.99	24	23.96	23.88	23.82	23.76	23.72	23.65
age	(6.11)	(6.10)	(6.13)	(6.11)	(6.11)	(6.06)	(6.07)	(6.01)
	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
transfer in	(0.18)	(0.17)	(0 .15)	(0 .14)	(0 .12)	(0.11)	(0.10)	(0.11)
	0.00	0.00	0.001	0.00	0.00	0.00	0.00	0.00
transfer out	(0.02)	(0.02)	(0 .02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	0.93	0.94	0.94	0.93	0.95	0.96	0.95	0.93
emergency	(0.25)	(0.24)	(0.24)	(0.25)	(0.22)	(0.21)	(0.22)	(0.26)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
death	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.002)	(0.002)
	0.14	0.15	0.15	0.15	0.16	0.10	0.09	0.07
c-section	(0.35)	(0.35)	(0.36)	(0.36)	(0.36)	(0.30)	(0.28)	(0.26)
	0.003	0.004	0.004	0.003	0.003	0.002	0.002	0.001
multiple deliveries	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.04)	(0.04)
	0.30	0.30	0.24	0.24	0.23	0.23	0.24	0.20
episiotomy	(0 .46)	(0 .46)	(0.43)	(0.43)	(0.42)	(0.42)	(0.43)	(0.40)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
stillbirth	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
single charlson	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
double charlson	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
	0.30	0.33	0.39	0.44	0.49	0.51	0.51	0.61
No. second diag	(0.54)	(0 .56)	(0.57)	(0.60)	(0.61)	(0 .62)	(0 .61)	(0.65)
	1.60	1.72	1.70	1.85	1.93	2.09	2.21	2.43
No. procedures	(1.19)	(1.20)	(1.25)	(1.27)	(1.17)	(1.47)	(1.56)	(1.70)
	0.00	0.00	0	0.00		0.00		0.00
post surgery infection	(0.00)	(0.002)		(0.001)	0	(0.001)	0	(0.02)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
secondary urinary infec	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
secondary diabetes	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
secondary hypertension	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
Hospital variables								
	5054.50	5027.75	5292.01	5576.48	5695.74	5699.06	6036.73	6076.09
Total discharges per hospital	(4291.59)	(4213.75)	(4424.74)	(4624.69)	(4602.03)	(4527.52)	(4759.20)	(4749.57)
	1321.53	1331.75	1391.16	1510.84	1582.48	1502.90	1579.94	1445.82
Childbirth discharges	(1316.50)	(1254.44)	(1274.92)	(1389.17)	(1419.78)	(1284.00)	(1360.39)	(1199.31)
	0.27	0.27	0.27	0.28	0.29	0.27	0.26	0.24
Childbirth/Tot Discharges	(0.11)	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.10)	(0.09)
	60.14	58.54	59.25	59.14	58.97	60.28	61.61	63.06
Hospital beds	(57.18)	(55.82)	(56.26)	(54.27)	(54.27)	(52.59)	(52.68)	(53.81)
	2.36	2.40	2.59	2.68	2.74	2.78	2.96	3.12
Operation rooms	(2.00)	(2.08)	(2.30)	(2.43)	(2.42)	(2.17)	(2.28)	(2.31)
	1.26	1.29	1.32	1.34	1.35	1.34	1.43	1.80
Delivery rooms	(0.56)	(0.69)	(0.70)	(0.71)	(0.74)	(0 .65)	(0.71)	(0.87)
	0.22	0.22	0.22	0.22	0.23	0.22	0.22	0.22
Doctors/ Total staff	(0.05)	(0.06)	(0 .05)	(0.04)	(0.05)	(0 .05)	(0.05)	(0.05)
	0.15	0.13	0.12	0.11	0.10	0.10	0.10	0.09
Med Students / Tot doctors	(0.12)	(0.11)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.08)
	0.06	0.06	0.05	0.05	0.06	0.05	0.05	0.05
Med Residents / Tot doctors	(0.09)	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.08)
	1.72	1.71	1.70	1.70	1.65	1.69	1.70	1.76
Nurses / Tot doctors	(0 .97)	(0 .83)	(0.64)	(0.58)	(0 .51)	(0.54)	(0.52)	(0.56)
	0.37	0.36	0.36	0.36	0.35	0.34	0.35	0.35
Metropolitan area	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)	(0.48)
	66.80	65.25	65.92	65.27	64.96	66.30	63.26	67.26
ACSH rate	(30.34)	(26.92)	(28.58)	(29.73)	(29.27)	(31.47)	(28.90)	(33.31)
	19.25	17.96	17.88	17.40	17.43	17.62	17.92	19.37
Death rate	(12.67)	(11.74)	(11.88)	(11.44)	(11.72)	(11.32)	(11.07)	(11.88)
	276.84	278.00	254.71	289.27	292.19	317.70	267.75	315.75
AMI death rate	(281.25)	(280.81)	(272.52)	(286.27)	(287.21)	(290.86)	(263.19)	(285.70)
State variables								
	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0 .04
Public health exp. As GDP %	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.15	0.15	0.16	0.18	0.17	0.18	0.17	0.15
State health exp / fed health exp	(0.13)	(0.13)	(0.14)	(0.18)	(0.15)	(0.16)	(0.13)	(0.13)
	0.26	0.34	0.46	0.55	0.61	0.80	0.93	0 .90
Seguro Popular coverage rate	(0.19)	(0. .19)	(0.17)	(0.16)	(0.15)	(0.14)	(0.11)	(0.10)
	0.31	0.28	0.28	0.25	0.25	0.22	0.28	0.22
PAN governor	(0.47)	(0.46)	(0.46)	(0.44)	(0.44)	(0.42)	(0.46)	(0.42)
	0.50	0.53	0.53	0.56	0.56	0.59	0.59	0.66
PRI governor	(0.51)	(0.51)	(0.51)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
	0.19	0.19	0.19	0.19	0.19	0.19	0.13	0.12
PRD governor	(0.4)	(0.4)	(0.4)	(0.40)	(0.40)	(0.40)	(0.34)	(0.34)

* Not available. Standard deviation in brackets.

CHOLECYSTECTOMY DESCRIPTIVE STATISTICS								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**
No. patients	17,159	18,824	20,220	22,290	22,437	23,087	25,309	25,422
No. hospitals	210	222	218	228	240	230	235	239
Patient variables								
	3.01	2.93	2.91	2.77	2.62	2.68	2.65	2.66
LoS	(2.27)	(2.19)	(2.30)	(2.27)	(2.14)	(2.24)	(2.22)	(2.28)
	40.39	40.36	40.38	39.97	39.39	39.19	39.39	39.49
age	(15.82)	(15.63)	(15.62)	(15.68)	(15.72)	(15.63)	(15.44)	(15.42)
	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15
male	(0.34)	(0.33)	(0 .35)	(0.35)	(0.35)	(0.34)	(0.35)	(0.35)
	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01
transfer in	(0.17)	(0.14)	(0 .11)	(0 .11)	(0 .10)	(0 .08)	(0 .09)	(0 .08)
	0.002	0.002	0.002	0.002	0.002	0.00	0.001	0.001
transfer out	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	(0.04)	(0.03)
	0.48	0.49	0.51	0.50	0.54	0.62	0.61	0.61
emergency	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.49)	(0.49)	(0.49)
	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.001
death	(0 .05)	(0 .05)	(0 .04)	(0 .04)	(0 .03)	(0 .03)	(0 .04)	(0 .03)
	0.20	0.21	0.23	0.28	0.29	0.32	0.34	0.36
laparoscopy	(0 .40)	(0.41)	(0.42)	(0.45)	(0.45)	(0.47)	(0.47)	(0.48)
	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
single charlson	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.09)	(0.08)
	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.001
double charlson	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
	0.11	0.10	0.08	0.08	0.08	0.08	0.08	0.08
No. second diag	(0.38)	(0.36)	(0.34)	(0.33)	(0.31)	(0.31)	(0.33)	(0.33)
	1.97	2.07	1.90	1.96	1.88	1.97	2.04	2.18
No. procedures	(1.21)	(1.18)	(1.15)	(1.24)	(1.06)	(1.30)	(1.36)	(1.48)
	0.00	0	0.00	0.00	0	0.00	0.00	0.00
post surgery infection	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
	0.001	0.001	0.001	0.001	0.001	0.00	0.00	0.00
secondary urinary infec	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
secondary diabetes	(0 .09)	(0 .08)	(0 .08)	(0 .08)	(0 .07)	(0 .07)	(0 .08)	(0 .07)
	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01
secondary hypertension	(0.08)	(0 .07)	(0.07)	(0.07)	(0.07)	(0 .07)	(0 .07)	(0 .07)
Hospital variables								
	5530.35	5557.40	5869.49	6233.57	6189.32	6241.72	6458.61	6307.99
Total discharges per hospital	(4469.06)	(4345.65)	(4595.96)	(4830.56)	(4742.01)	(4701.02)	(4926.94)	(4811.75)
	82.79	86.18	94.04	99.19	94.95	101.70	109.60	108.70
Cholecystectomy discharges	(109.70)	(112.20)	(116.36)	(118.00)	(118.58)	(124.56)	(134.69)	(113.65)
	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cholecystectomy/Tot Discharges	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	64.29	64.53	65.39	66.19	65.22	66.70	66.96	68.06
Hospital beds	(59.57)	(58.82)	(59.18)	(57.38)	(56.76)	(56.16)	(55.59)	(56.60)
	2.52	2.62	2.88	3.00	3.04	3.05	3.15	3.33
Operation rooms	(2.07)	(2.21)	(2.50)	(2.64)	(2.57)	(2.43)	(2.41)	(2.41)
	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.22
Doctors/ Total staff	(0.04)	(0.04)	(0 .04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)
	0.16	0.15	0.13	0.12	0.11	0.11	0.10	0.10
Med Students / Tot doctors	(0.11)	(0 .10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
	0.07	0.06	0.06	0.07	0.07	0.06	0.06	0.06
Med Residents / Tot doctors	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)
	1.67	1.68	1.70	1.70	1.65	1.68	1.67	1.73
Nurses / Tot doctors	(0.47)	(0.52)	(0.60)	(0.53)	(0.53)	(0.54)	(0.50)	(0 .52)
	0.37	0.36	0.38	0.38	0.36	0.36	0.38	0.38
Metropolitan area	(0.48)	(0 .48)	(0.49)	(0.49)	(0.48)	(0.48)	(0.49)	(0.49)
	69.43	68.59	68.78	68.64	70.29	69.70	67.67	71.43
ACSH rate	(27.62)	(26.93)	(27.60)	(28.91)	(31.00)	(29.96)	(30.34)	(31.59)
	20.90	20.13	19.83	19.63	20.19	19.94	20.79	22.41
Death rate	(13.01)	(12.38)	(14.05)	(12.47)	(14.54)	(13.57)	(14.59)	(14.83)
	265.73	263.58	243.72	290.16	276.54	301.62	256.31	296.81
AMI death rate	(265.78)	(262.73)	(266.56)	(282.42)	(269.74)	(274.82)	(238.53)	(255.26)
State variables								
	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0 .04
Public health exp. As GDP %	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.15	0.15	0.16	0.18	0.17	0.18	0.17	0.15
State health exp / fed health exp	(0.13)	(0.13)	(0.14)	(0.18)	(0.15)	(0.16)	(0.13)	(0.13)
	0.26	0.34	0.46	0.55	0.61	0.80	0.93	0 .90
Seguro Popular coverage rate	(0.19)	(0. .19)	(0.17)	(0.16)	(0.15)	(0.14)	(0.11)	(0.10)
	0.31	0.28	0.28	0.25	0.25	0.22	0.28	0.22
PAN governor	(0.47)	(0.46)	(0.46)	(0.44)	(0.44)	(0.42)	(0.46)	(0.42)
	0.50	0.53	0.53	0.56	0.56	0.59	0.59	0.66
PRI governor	(0.51)	(0.51)	(0.51)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
	0.19	0.19	0.19	0.19	0.19	0.19	0.13	0.12
PRD governor	(0.4)	(0.4)	(0.4)	(0.40)	(0.40)	(0.40)	(0.34)	(0.34)

* Not available. Standard deviation in brackets.

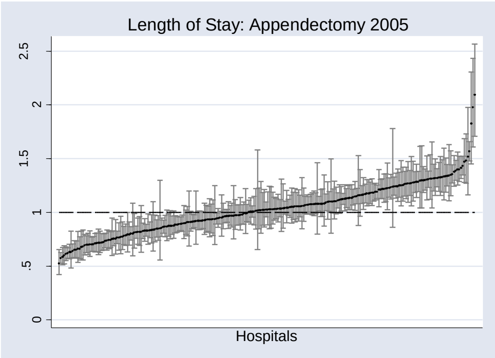
INGUINAL HERNIA SURGERY DESCRIPTIVE STATISTICS								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**
No. patients	13,131	13,535	13,528	14,297	14,163	14,365	16,116	16,713
No. hospitals	249	261	258	259	272	269	269	274
Patient variables								
	1.69	1.67	1.61	1.56	1.48	1.55	1.50	1.52
LoS	(1.25)	(1.18)	(1.15)	(1.19)	(1.09)	(1.20)	(1.18)	(1.28)
	40.27	41.03	40.58	40.82	40.69	41.78	41.92	43.68
age	(24.41)	(24.45)	(24.57)	(24.77)	(24.67)	(24.25)	(24.05)	(23.45)
	0.70	0.70	0.70	0.71	0.71	0.69	0.55	0.72
male	(0 .46)	(0.46)	(0.46)	(0.46)	(0.45)	(0.46)	(0.50)	(0.45)
	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
transfer in	(0.16)	(0.15)	(0.12)	(0.10)	(0.11)	(0.07)	(0.07)	(0.07)
	0.001	0.001	0.00	0.001	0.001	0.00	0.00	0.00
transfer out	(0 .03)	(0 .03)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
	0.41	0.43	0.42	0.42	0.48	0.56	0.55	0.54
emergency	(0.49)	(0.49)	(0.49)	(0.49)	(0.50)	(0.50)	(0.50)	(0.50)
	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.002
death	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
	0	0	0	0	0	0.001	0.001	0.003
laparoscopy						(0.03)	(0.02)	(0 .05)
	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
bilateral	(0.18)	(0.17)	(0.16)	(0.18)	(0.18)	(0.18)	(0.17)	(0.17)
	0.08	0.10	0.10	0.10	0.09	0.09	0.10	0.10
implants	(0.28)	(0.29)	(0.30)	(0.30)	(0.29)	(0.28)	(0.30)	(0.30)
	0	0	0.00	0	0	0	0.00	0
Tissue disorders			(0.01)				(0.01)	
	0.004	0.004	0.004	0.003	0.002	0.003	0.003	0.003
single charlson	(0.06)	(0.07)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	0.00	0.001	0.001	0.001	0.001	0.001	0.001	0.001
double charlson	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	0.07	0.07	0.06	0.06	0.06	0.07	0.07	0.07
No. second diag	(0.30)	(0.30)	(0.27)	(0.27)	(0.27)	(0.29)	(0.28)	(0.28)
	1.76	1.86	1.70	1.76	1.74	1.89	1.94	2.05
No. procedures	(1.05)	(1.04)	(0.99)	(1.05)	(0.98)	(1.26)	(1.32)	(1.41)
post surgery infection	0	0	0	0	0	0	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
secondary urinary infec	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
secondary diabetes	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)
	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
secondary hypertension	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)
Hospital variables								
	5185.92	5203.32	5527.53	5979.60	5918.90	5975.26	6251	6158.55
Total discharges per hospital	(4318.07)	(4229.90)	(4407.76)	(4663.97)	(4656.24)	(4561.93)	(4774.53)	(4659.45)
	53.18	52.31	52.98	55.73	52.69	53.97	60.55	61.45
Hernia surgery discharges	(43.96)	(41.57)	(45.98)	(44.80)	(43.12)	(42.17)	(48.98)	(43.63)
	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Hernia surgery/Tot Discharges	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	61.66	61.04	62.16	62.96	61.67	62.45	64.03	65.84
Hospital beds	(57.35)	(56.67)	(57.43)	(55.13)	(54.94)	(52.98)	(52.64)	(53.94)
	2.41	2.49	2.70	2.81	2.84	2.90	3.08	3.23
Operation rooms	(1.98)	(2.11)	(2.37)	(2.50)	(2.46)	(2.29)	(2.34)	(2.35)
	0.22	0.22	0.22	0.22	0.23	0.22	0.22	0.22
Doctors/ Total staff	(0.05)	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)	(0.05)	(0.04)
	0.16	0.14	0.13	0.12	0.10	0.11	0.10	0.10
Med Students / Tot doctors	(0.12)	(0.11)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.08)
	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06
Med Residents / Tot doctors	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)
	1.67	1.71	1.70	1.69	1.63	1.68	1.70	1.74
Nurses / Tot doctors	(0.51)	(0.84)	(0.65)	(0.57)	(0.51)	(0.54)	(0.50)	(0 .51)
	0.37	0.37	0.38	0.38	0.37	0.34	0.36	0.37
Metropolitan area	(0.48)	(0.48)	(0 .49)	(0 .49)	(0.48)	(0.48)	(0.48)	(0.48)
	67.55	66.96	66.55	65.07	67.22	68.33	66.42	70.25
ACSH rate	(28.51)	(27.11)	(28.07)	(28.92)	(31.33)	(30.42)	(31.17)	(33.37)
	20.23	19.36	19.20	18.80	19.20	19.35	19.92	21.41
Death rate	(13.27)	(13.41)	(14.08)	(13.35)	(14.03)	(13.84)	(14.09)	(14.25)
	272.68	274.46	257.23	294.06	294.99	311.68	263.25	298.05
AMI death rate	(278.31)	(275.07)	(272.99)	(281.91)	(281.97)	(280.32)	(257.84)	(258.50)
State variables								
	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0 .04
Public health exp. As GDP %	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.15	0.15	0.16	0.18	0.17	0.18	0.17	0.15
State health exp / fed health exp	(0.13)	(0.13)	(0.14)	(0.18)	(0.15)	(0.16)	(0.13)	(0.13)
	0.26	0.34	0.46	0.55	0.61	0.80	0.93	0 .90
Seguro Popular coverage rate	(0.19)	(0. .19)	(0.17)	(0.16)	(0.15)	(0.14)	(0.11)	(0.10)
	0.31	0.28	0.28	0.25	0.25	0.22	0.28	0.22
PAN governor	(0.47)	(0.46)	(0.46)	(0.44)	(0.44)	(0.42)	(0.46)	(0.42)
	0.50	0.53	0.53	0.56	0.56	0.59	0.59	0.66
PRI governor	(0.51)	(0.51)	(0.51)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
	0.19	0.19	0.19	0.19	0.19	0.19	0.13	0.12
PRD governor	(0.4)	(0.4)	(0.4)	(0.40)	(0.40)	(0.40)	(0.34)	(0.34)

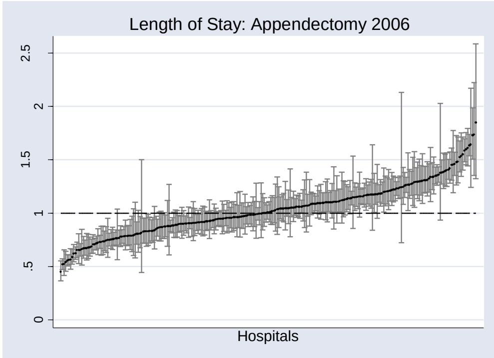
* Not available. Standard deviation in brackets.

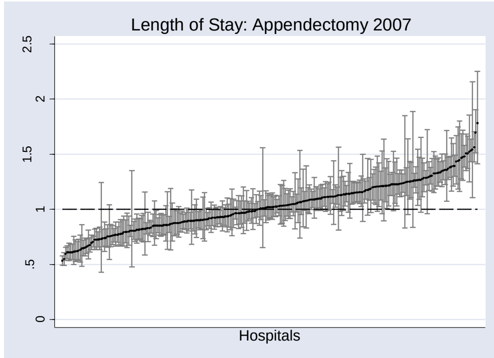
STROKE DESCRIPTIVE STATISTICS								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**
No. patients	2,726	2,855	2,777	3,298	3,648	3,688	3,795	4,140
No. hospitals	140	153	143	157	162	172	175	186
Patient variables								
	5.36	5.55	5.66	5.52	5.45	5.65	5.82	5.64
LoS	(4.62)	(4.76)	(5.18)	(4.80)	(4.80)	(4.90)	(5.22)	(4.99)
	64.01	64.40	64.56	64.91	64.63	65.54	65.07	64.86
age	(19.06)	(18.86)	(18.50)	(18.63)	(18.65)	(18.31)	(18.55)	(18.35)
	0.50	0.50	0.51	0.51	0.50	0.49	0.50	0.50
male	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
	0.05	0.05	0.04	0.03	0.03	0.02	0.03	0.02
transfer in	(0.22)	(0.22)	(0.20)	(0.17)	(0.17)	(0.15)	(0.16)	(0.15)
	0.06	0.06	0.06	0.05	0.06	0.03	0.04	0.03
transfer out	(0.24)	(0.24)	(0.23)	(0.22)	(0.23)	(0.17)	(0.19)	(0.17)
	0.92	0.92	0.93	0.92	0.93	0.94	0.93	0.92
emergency	(0.26)	(0.27)	(0.26)	(0.27)	(0.26)	(0.24)	(0.26)	(0.28)
	0.30	0.30	0.28	0.25	0.26	0.26	0.26	0.26
death	(0.46)	(0.46)	(0.45)	(0.43)	(0.44)	(0.44)	(0.44)	(0.44)
	0.00	0.001	0.001	0.001	0.001	0.001	0.001	0.001
hemiplegia	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	0.23	0.22	0.26	0.30	0.34	0.40	0.37	0.40
no haemorrhage	(0.42)	(0.42)	(0.44)	(0.46)	(0.48)	(0.49)	(0.48)	(0.49)
	0.50	0.51	0.48	0.47	0.43	0.40	0.42	0.39
intracerebral	(0.50)	(0.50)	(0.50)	(0.50)	(0 .49)	(0.49)	(0.49)	(0.49)
	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03
pneumonia	(0.17)	(0.16)	(0.15)	(0.15)	(0.15)	(0.17)	(0.17)	(0.18)
	0.15	0.16	0.15	0.15	0.17	0.18	0.16	0.19
single charlson	(0.36)	(0.37)	(0.36)	(0.36)	(0.37)	(0.38)	(0.37)	(0.39)
	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.05
double charlson	(0.19)	(0.19)	(0.19)	(0.19)	(0.18)	(0.20)	(0.18)	(0.21)
	1.06	1.06	0.93	0.93	1.03	1.04	1.03	1.14
No. second diag	(1.09)	(1.08)	(1.08)	(1.07)	(1.12)	(1.08)	(1.07)	(1.15)
	1.36	1.47	1.61	1.79	1.72	2.03	2.04	2.31
No. procedures	(1.39)	(1.39)	(1.53)	(1.68)	(1.43)	(1.86)	(1.93)	(1.97)
		0			0	0.00	0.00	
post surgery infection	0		0	0		(0.02)	(0.02)	0
	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.03
secondary urinary infec	(0.13)	(0.13)	(0.12)	(0.14)	(0.14)	(0.14)	(0.14)	(0.17)
	0.13	0.13	0.14	0.13	0.15	0.16	0.15	0.17
secondary diabetes	(0.34)	(0.34)	(0.34)	(0.34)	(0.36)	(0.37)	(0.35)	(0.38)
	0.35	0.37	0.31	0.31	0.36	0.36	0.37	0.39
secondary hypertension	(0.48)	(0.48)	(0.46)	(0.42)	(0.48)	(0.48)	(0.48)	(0.49)
Hospital variables								
	6762.19	6597.56	7280.41	7350.03	7502.20	7144.03	7484.90	7279.50
Total discharges per hospital	(4725.31)	(4527.20)	(4860.56)	(5194.42)	(5084.76)	(4951.44)	(5184.87)	(5001.58)
	19.86	18.92	19.70	21.41	22.90	21.90	22.10	22.73
Stroke discharges	(19.30)	(16.87)	(16.38)	(19.03)	(20.99)	(19.48)	(19.06)	(20.04)
	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004
Stroke/Tot Discharges	(0.002)	(0.002)	(0.001)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
	80.76	75.80	82.72	77.36	79.40	74.88	75.63	77.59
Hospital beds	(67.25)	(64.75)	(66.07)	(63.19)	(62.70)	(58.37)	(58.40)	(58.56)
	3.05	3.01	3.45	3.41	3.54	3.35	3.52	3.70
Operation rooms	(2.37)	(2.39)	(2.78)	(2.97)	(2.90)	(2.56)	(2.56)	(2.59)
	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22
Doctors/ Total staff	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.04)
	0.18	0.16	0.15	0.13	0.12	0.13	0.12	0.11
Med Students / Tot doctors	(0.11)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
	0.07	0.07	0.08	0.08	0.08	0.06	0.06	0.07
Med Residents / Tot doctors	(0.09)	(0.09)	(0.09)	(0.11)	(0.11)	(0.09)	(0.09)	(0.10)
	1.59	1.59	1.64	1.68	1.62	1.68	1.72	1.72
Nurses / Tot doctors	(0.42)	(0.44)	(0.54)	(0.58)	(0.55)	(0.44)	(0.43)	(0.45)
	0.46	0.40	0.44	0.39	0.40	0.40	0.39	0.39
Metropolitan area	(0.50)	(0.49)	(0.50)	(0.49)	(0.49)	(0.49)	(0.49)	(0.49)
	68.77	69.62	67.21	67.66	69.50	67.46	67.10	70.56
ACSH rate per 1000 discharges	(24.18)	(25.15)	(24.30)	(26.24)	(30.69)	(28.74)	(30.20)	(29.73)
	26.48	24.19	24.81	23.58	24.51	23.08	23.50	25.16
Death rate	(13.62)	(14.14)	(15.34)	(14.60)	(15.30)	(13.33)	(14.71)	(14.91)
	250.20	285.32	237.22	263.46	256.96	269.11	263.23	287.66
AMI death rate	(218.90)	(241.07)	(216.03)	(253.82)	(216.58)	(227.18)	(233.64)	(232.76)
State variables								
	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0 .04
Public health exp. As GDP %	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	0.15	0.15	0.16	0.18	0.17	0.18	0.17	0.15
State health exp / fed health exp	(0.13)	(0.13)	(0.14)	(0.18)	(0.15)	(0.16)	(0.13)	(0.13)
	0.26	0.34	0.46	0.55	0.61	0.80	0.93	0 .90
Seguro Popular coverage rate	(0.19)	(0. .19)	(0.17)	(0.16)	(0.15)	(0.14)	(0.11)	(0.10)
	0.31	0.28	0.28	0.25	0.25	0.22	0.28	0.22
PAN governor	(0.47)	(0.46)	(0.46)	(0.44)	(0.44)	(0.42)	(0.46)	(0.42)
	0.50	0.53	0.53	0.56	0.56	0.59	0.59	0.66
PRI governor	(0.51)	(0.51)	(0.51)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)
	0.19	0.19	0.19	0.19	0.19	0.19	0.13	0.12
PRD governor	(0.4)	(0.4)	(0.4)	(0.40)	(0.40)	(0.40)	(0.34)	(0.34)

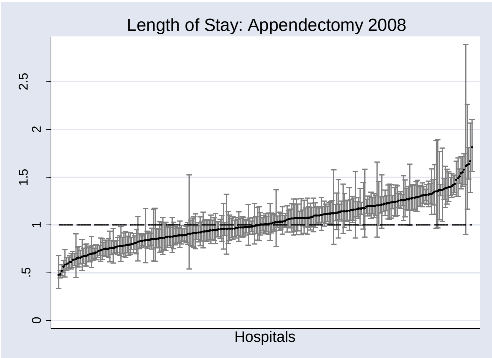
* Not available. Standard deviation in brackets.

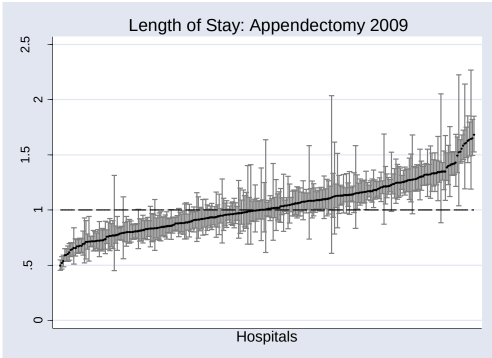
Appendix 5.2 Unexplained Variation in Resource Use across Hospitals 2005-2013

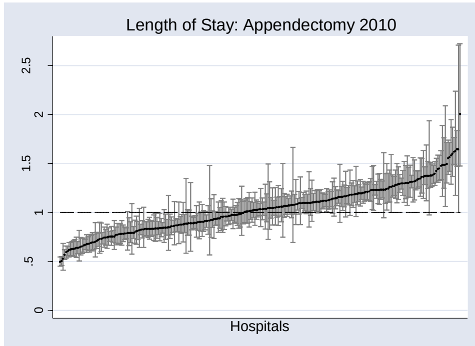


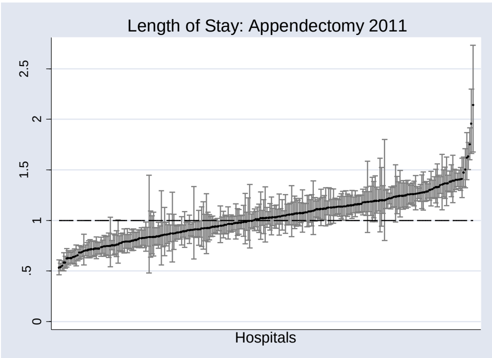


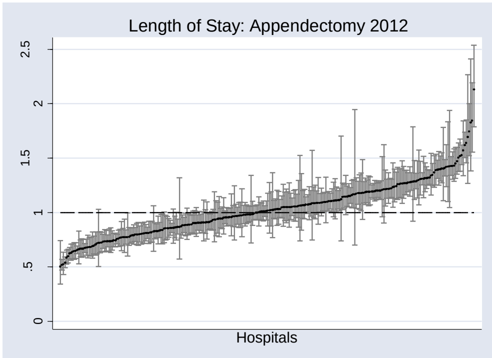


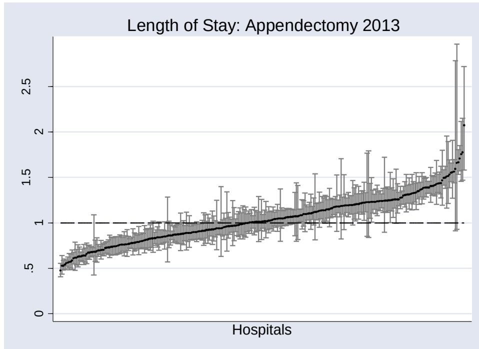




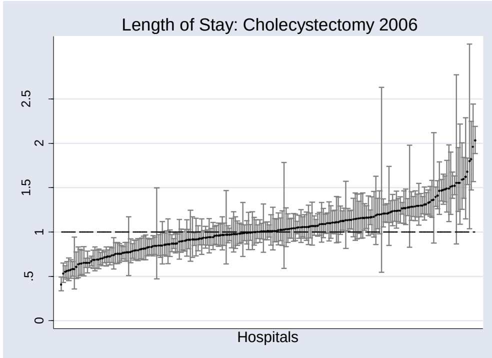


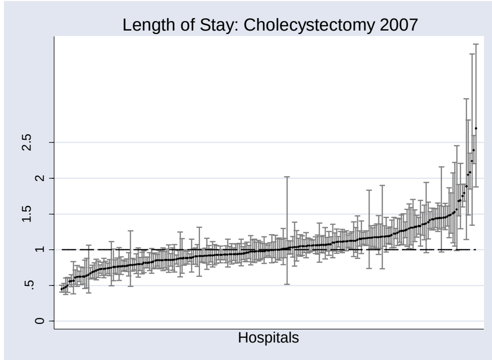




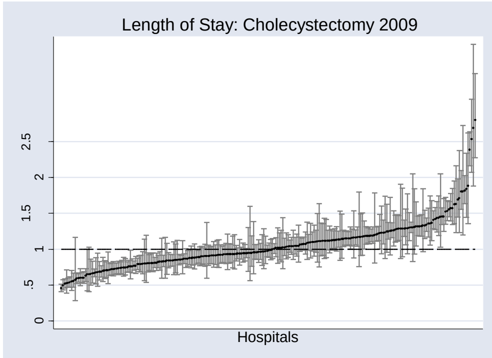


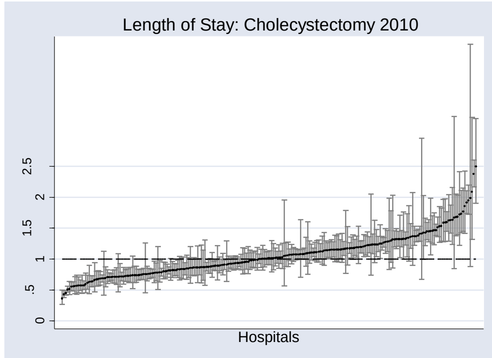

Length of Stay: Cholecystectomy 2005
0
.5
1
1.5
2
2.5
Hospitals

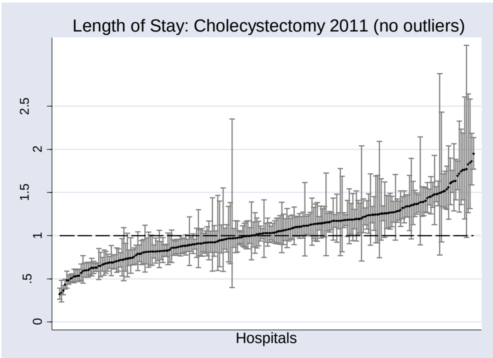

Length of Stay: Cholecystectomy 2006
0
.5
1
1.5
2
2.5
Hospitals

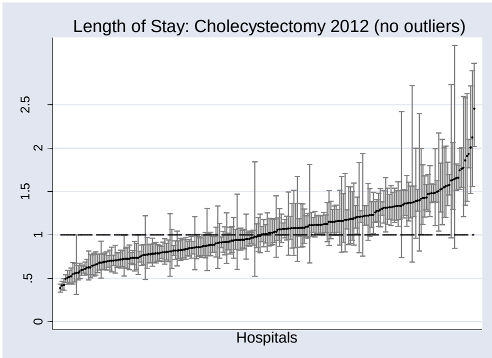

Length of Stay: Cholecystectomy 2007
0
.5
1
1.5
2
2.5
Hospitals

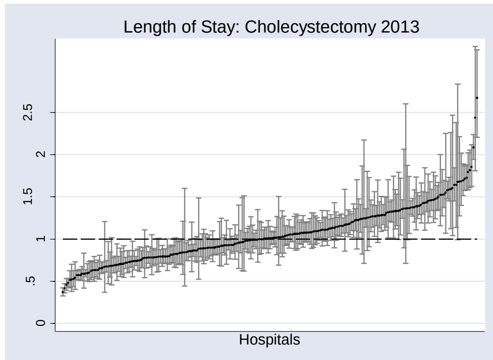

Length of Stay: Cholecystectomy 2008
0
.5
1
1.5
2
2.5
Hospitals

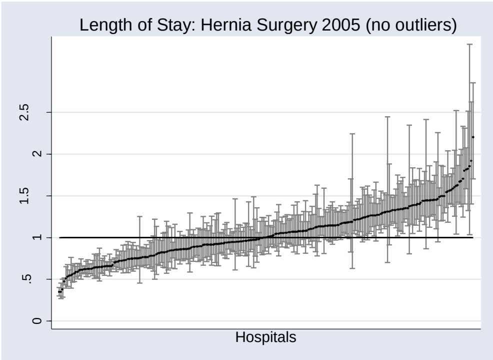

Length of Stay: Cholecystectomy 2009
0
.5
1
1.5
2
2.5
Hospitals

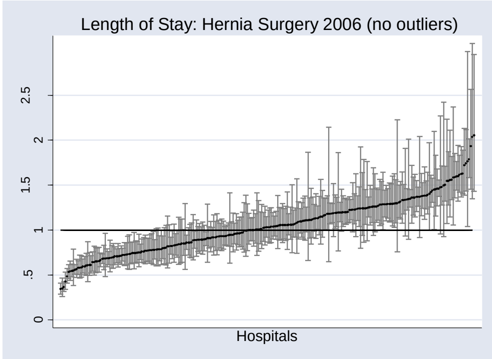

Length of Stay: Cholecystectomy 2010
0
.5
1
1.5
2
2.5
Hospitals


Length of Stay: Cholecystectomy 2011 (no outliers)
0
.5
1
1.5
2
2.5
Hospitals


Length of Stay: Cholecystectomy 2012 (no outliers)
0
.5
1
1.5
2
2.5
Hospitals


Length of Stay: Cholecystectomy 2013
0
.5
1
1.5
2
2.5
Hospitals


Length of Stay: Hernia Surgery 2005 (no outliers)
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Hernia Surgery 2006 (no outliers)
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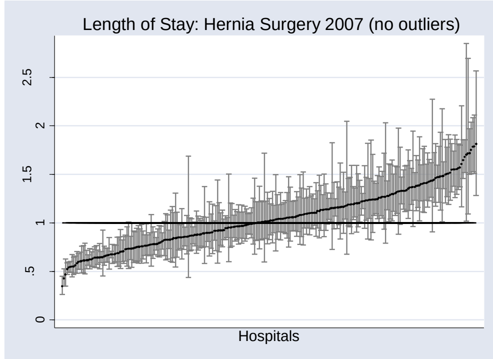
Hospitals


Length of Stay: Hernia Surgery 2007 (no outliers)
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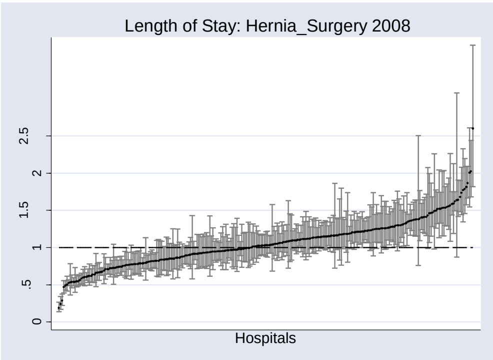
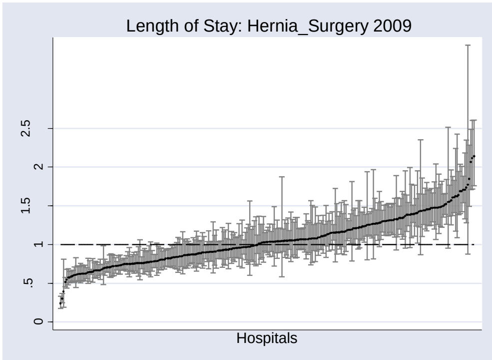
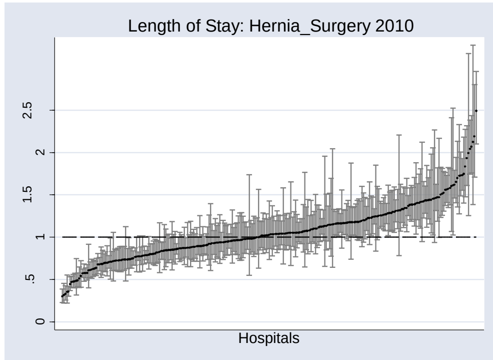
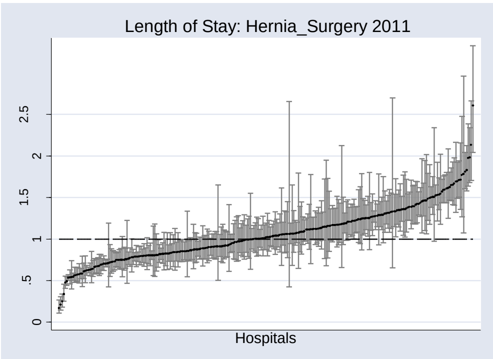
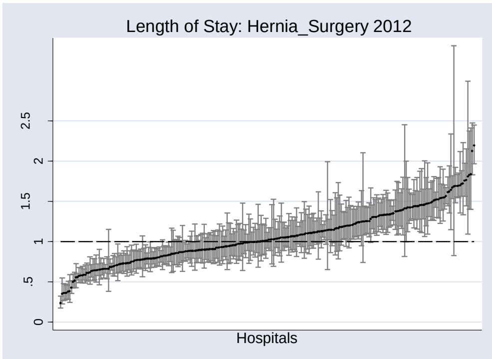
Hospitals

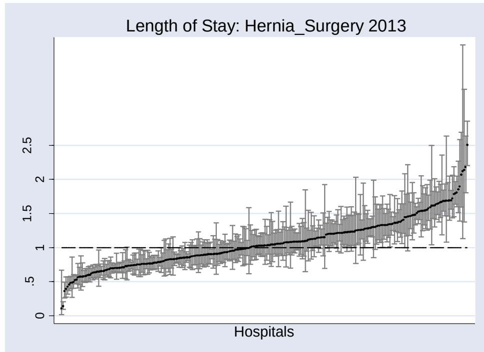

Length of Stay: Hernia_Surgery 2008
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Hernia_Surgery 2009
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Hernia_Surgery 2010
0 .5 1 1.5 2 2.5
Hospitals

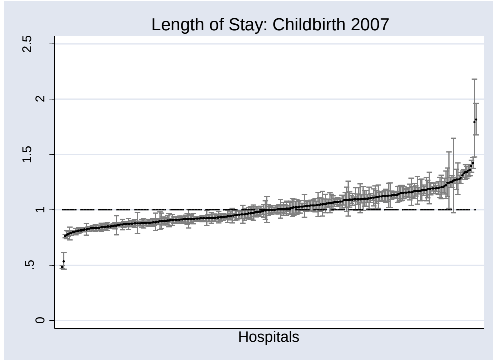

Length of Stay: Hernia_Surgery 2011
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Hernia_Surgery 2012
0 .5 1 1.5 2 2.5
Hospitals

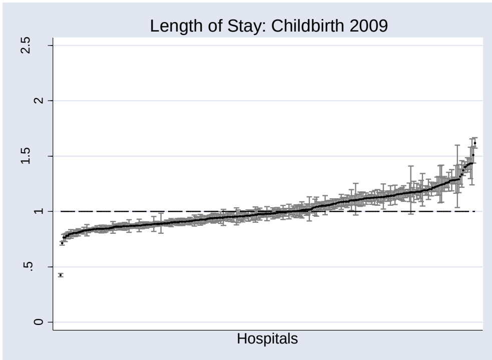

Length of Stay: Hernia_Surgery 2013
0 .5 1 1.5 2 2.5
Hospitals

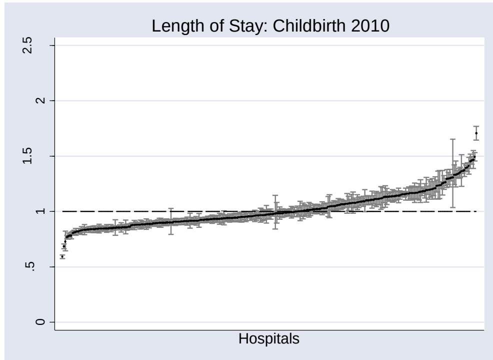

Length of Stay: Childbirth 2005 (no outliers)
0
.5
1
1.5
2
2.5
Hospitals

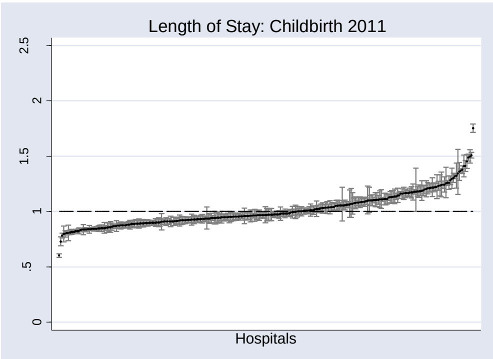

Length of Stay: Childbirth 2006 (no outliers)
0
.5
1
1.5
2
2.5
Hospitals

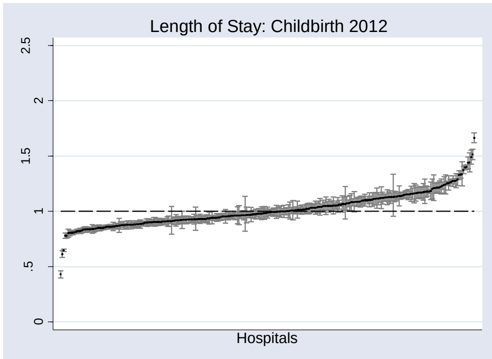

Length of Stay: Childbirth 2007
0
.5
1
1.5
2
2.5
Hospitals


Length of Stay: Childbirth 2008
0
.5
1
1.5
2
2.5
Hospitals

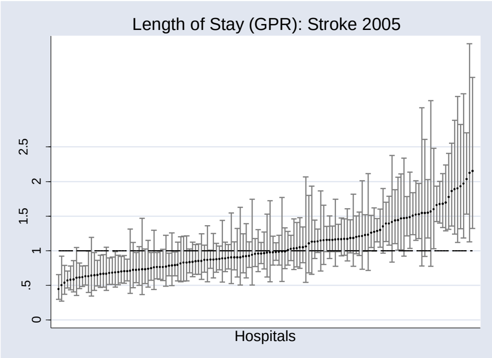

Length of Stay: Childbirth 2009
0
.5
1
1.5
2
2.5
Hospitals

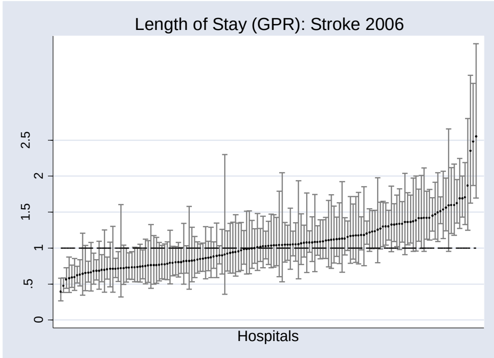

Length of Stay: Childbirth 2010
0
.5
1
1.5
2
2.5
Hospitals

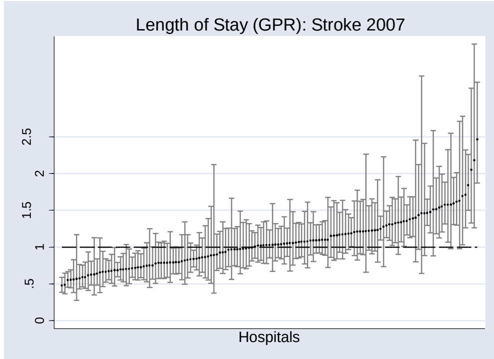

Length of Stay: Childbirth 2011
0
.5
1
1.5
2
2.5
Hospitals

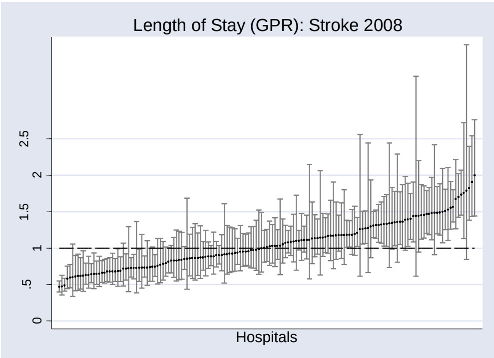

Length of Stay: Childbirth 2012
0
.5
1
1.5
2
2.5
Hospitals

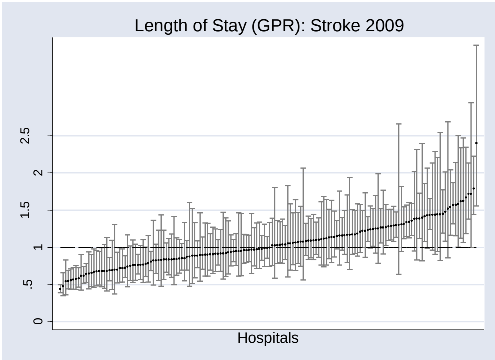

Length of Stay: Childbirth 2013 (no outliers)
0
.5
1
1.5
2
2.5
Hospitals

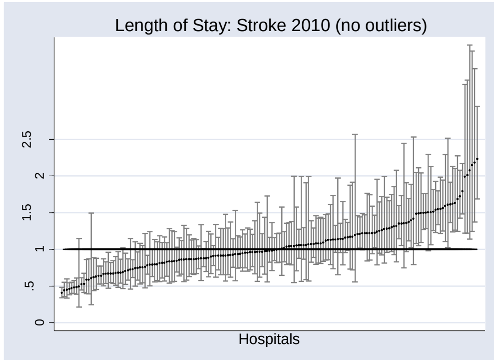

Length of Stay (GPR): Stroke 2005
0 .5 1 1.5 2 2.5
Hospitals

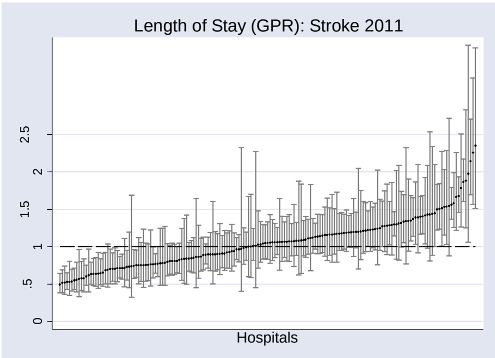

Length of Stay (GPR): Stroke 2006
0 .5 1 1.5 2 2.5
Hospitals

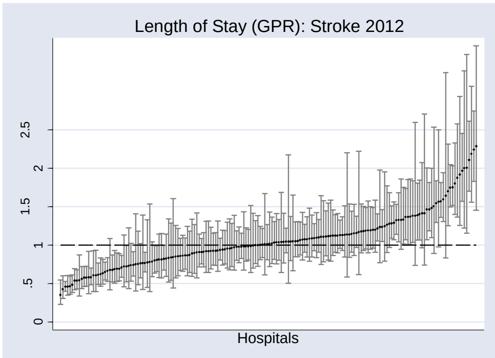

Length of Stay (GPR): Stroke 2007
0 .5 1 1.5 2 2.5
Hospitals

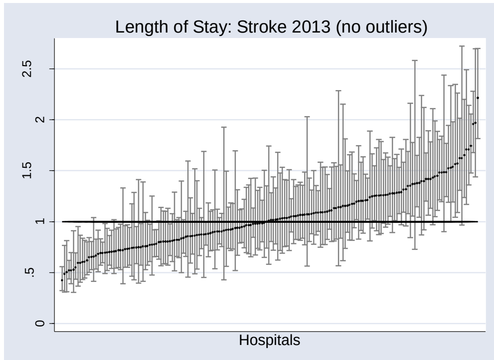

Length of Stay (GPR): Stroke 2008
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay (GPR): Stroke 2009
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Stroke 2010 (no outliers)
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay (GPR): Stroke 2011
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay (GPR): Stroke 2012
0 .5 1 1.5 2 2.5
Hospitals


Length of Stay: Stroke 2013 (no outliers)
0 .5 1 1.5 2 2.5
Hospitals

Appendix 5.3 Hospital Performance Rankings

Appendix 5.3.1 Appendectomy

Best performing hospitals 2005

RANKING	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,514	1.99%
2	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,465	4.70%
3	QTSSA001052	22 - QUERÉTARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,152	1.68%
4	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR. ALFREDO PU	110	7,369	1.98%
5	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	53	6,282	2.31%
6	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,378	2.88%
7	BSSSA000332	03 - BAJA CALIFORNIA SUR	003 - LA PAZ	HOSPITAL GENERAL "JUAN MARIA DE SALVATIERRA"	109	6,786	2.49%
8	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	897	3.46%
9	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,584	5.44%
10	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,689	2.95%
11	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,533	2.48%
12	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	36	3,458	1.47%
13	SRSSA000562	26 - SONORA	018 - CAJEME	HOSPITAL GENERAL CD.OBREGON	111	8,450	1.87%
14	SRSSA001612	26 - SONORA	038 - MOCTEZUMA	HOSPITAL COMUNITARIO MOCTEZUMA	16	744	2.02%
15	SRSSA002085	26 - SONORA	055 - SAN LUIS RIO COLORADO	HOSPITAL GENERAL SAN LUIS RIO COLORADO	26	2,834	0.53%
16	NTSSA002166	18 - NAYARIT	015 - SANTIAGO IXCUINTLA	HOSPITAL GENERAL SANTIAGO IXCUINTLA	22	3,657	2.13%
17	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,405	1.89%
18	NLSSA001263	19 - NUEVO LEON	017 - GALEANA	HOSPITAL GENERAL GALEANA	28	1,308	1.68%
19	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,590	2.12%
20	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	114	9,181	2.45%
21	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	5,266	2.94%
22	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABIFF	25	1,809	4.31%
23	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,271	3.09%
24	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,550	1.69%
25	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,266	1.53%
26	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	32	4,068	3.00%
27	TCSSA001064	27 - TABASCO	004 - CENTRO	HOSPITAL REGIONAL DE ALTA ESPECIALIDAD DR. JUAN GR	129	9,068	2.07%
28	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	90	5,045	4.44%
29	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	30	3,687	5.32%
30	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TREVIÑ(	123	10,725	1.52%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2005 - appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
244	VZSSA005560	30 - VERACRUZ DE IGNACIO DE LA LLAVE	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,493	0.52%
243	VZSSA000310	30 - VERACRUZ DE IGNACIO DE LA LLAVE	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA CAMACHO	26	2,037	0.69%
242	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,945	0.09%
241	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	8,381	4.28%
240	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,626	0.46%
239	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	33	3,744	1.04%
238	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	123	3,905	1.18%
237	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	10,559	1.87%
236	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	5,989	2.72%
235	PLSSA004952	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL ZACATLAN	35	3,644	3.49%
234	HGSSA001503	13 - HIDALGO	029 - HUICHAPAN	HOSPITAL GENERAL HUICHAPAN	30	2,769	2.17%
233	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	8,064	2.99%
232	TSSSA000850	28 - TAMAULIPAS	021 - EL MANTE	HG HOSP CIVIL DR VIRGILIO R HINOJOSA	37	6,003	1.22%
231	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	103	7,303	3.59%
230	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	30	1,667	2.64%
229	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,094	0.90%
228	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	7,091	3.19%
227	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPEC	HG TUXTEPEC	30	2,953	4.06%
226	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO SUAREZ	30	2,199	1.32%
225	VZSSA004370	30 - VERACRUZ DE IGNACIO DE LA LLAVE	124 - PAPANTLA	HOSPITAL GENERAL PAPANTLA DR. JOSE BUILL BELENGUEI	38	2,453	3.67%
224	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	28	4,819	1.93%
223	GRSSA003686	12 - GUERRERO	029 - CHILPANCINGO DE LOS BRAVO	HOSPITAL GRAL. DR. RAYMUNDO A. ALARCON	60	5,704	3.12%
222	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	14,503	2.28%
221	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FLORES	56	4,679	1.60%
220	OCSSA001183	20 - OAXACA	079 - SALINA CRUZ	SALINA CRUZ	30	3,693	2.95%
219	GRSSA006742	12 - GUERRERO	055 - TAXCO DE ALARCON	H. G. ADOLFO PRIETO	30	2,184	1.14%
218	GRSSA001813	12 - GUERRERO	012 - AYUTLA DE LOS LIBRES	HOSPITAL GENERAL DE AYUTLA	20	1,610	0.75%
217	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	107	11,943	1.87%
216	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	30	3,431	1.37%
215	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	5,575	2.82%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2006 - appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	CLSSA000050	05 - COAHUILA DE ZARAGOZA	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	17	1,393	0.86%
2	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	53	6,551	2.46%
3	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADI	15	2,377	1.22%
4	JCSSA001401	14 - JALISCO	024 - COCULA	HOSPITAL REGIONAL COCULA	30	3,938	0.20%
5	MNSSA002813	16 - MICHOACEN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	32	4,149	2.39%
6	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,624	3.09%
7	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,296	1.44%
8	SRSSA000562	26 - SONORA	018 - CAJEME	HOSPITAL GENERAL CD.OBREGON	111	8,752	2.10%
9	ASSSA000404	01 - AGUASCALIENTES	003 - CALVILLO	HOSPITAL GENERAL CALVILLO	30	2,132	3.47%
10	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,624	3.85%
11	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,347	1.54%
12	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	2,845	0.39%
13	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	5,538	3.39%
14	VZSSA007660	30 - VERACRUZ DE IGNACIO DE LA LLAVE	016 - LA ANTIGUA	HOSPITAL GENERAL DE CARDEL	30	1,662	1.02%
15	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,956	1.31%
16	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	10,214	2.14%
17	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICT	30	3,473	2.79%
18	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,925	2.47%
19	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,586	1.97%
20	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,496	5.49%
21	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	1,514	2.51%
22	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	12,225	3.29%
23	BSSSA000332	03 - BAJA CALIFORNIA SUR	003 - LA PAZ	HOSPITAL GENERAL "JUAN MARIA DE SALVATIE	96	7,129	2.36%
24	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,082	1.91%
25	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,443	2.77%
26	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,772	1.58%
27	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,310	1.60%
28	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HA	25	1,956	3.63%
29	TSSSA002192	28 - TAMAULIPAS	035 - SAN FERNANDO	HG HOSPITAL GENERAL SAN FERNANDO	45	2,513	1.55%
30	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	24	1,105	1.36%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2006 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
258	CLSSA001124	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL SALTILLO	40	5,226	0.34%
257	MCSSA002435	15 - MEXICO	035 - HUEHUETOCA	HOSPITAL MUNICIPAL HUEHUETOCA	18	1,024	0.59%
256	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	6,375	1.40%
255	VZSSA005560	30 - VERACRUZ DE IGNACIO DE LA LLAVE	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,385	0.50%
254	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	7,836	3.73%
253	TSSSA000850	28 - TAMAULIPAS	021 - EL MANTE	HG HOSP CIVIL DR VIRGILIO R HINOJOSA	37	5,210	1.71%
252	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	6,609	3.31%
251	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	11,192	1.83%
250	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	5,837	2.09%
249	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	4,986	1.40%
248	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTAÑEDA	144	10,923	1.71%
247	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	33	3,529	1.96%
246	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	1,699	2.35%
245	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	217	15,664	1.54%
244	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FLOR	50	5,114	0.90%
243	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	5,553	2.23%
242	PLSSA004952	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL ZACATLAN	35	3,827	3.08%
241	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,270	2.57%
240	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	5,446	1.95%
239	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOT	144	2,427	4.74%
238	GRSSA003686	12 - GUERRERO	029 - CHILPANCINGO DE LOS BRAVO	HOSPITAL GRAL. DR. RAYMUNDO A. ALARCON	60	5,450	2.75%
237	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	8,262	2.86%
235	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	9,889	3.01%
234	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	188	15,228	2.13%
233	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	103	8,989	3.55%
232	MCSSA001682	15 - MEXICO	025 - CHALCO	HOSPITAL GENERAL DE CHALCO	60	5,013	1.92%
231	PLSSA000081	21 - PUEBLA	003 - ACATLAN	HOSPITAL GENERAL DE ACATLAN	45	2,382	2.35%
230	PLSSA002106	21 - PUEBLA	094 - LIBRES	HOSPITAL GENERAL CIUDAD DE LIBRES	18	2,347	2.30%
229	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABIA	30	3,091	2.59%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2007 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,832	3.89%
2	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	7,004	2.20%
3	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,151	2.25%
4	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	5,976	3.15%
5	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	5,600	2.63%
6	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	10,685	2.41%
7	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	30	4,493	2.49%
8	SRSSA001612	26 - SONORA	038 - MOCTEZUMA	HOSPITAL COMUNITARIO MOCTEZUMA	17	761	3.94%
9	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,288	2.73%
10	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,149	1.66%
11	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABIFF	25	2,066	3.05%
12	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	864	3.13%
13	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL ORO	30	1,407	0.85%
14	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,512	2.22%
15	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,391	1.31%
16	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	5,598	1.93%
17	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ GALLO	HOSPITAL REGIONAL YAHUALICA	30	1,125	2.40%
18	BSSSA000332	03 - BAJA CALIFORNIA SUR	003 - LA PAZ	HOSPITAL GENERAL "JUAN MARIA DE SALVATIERRA'	96	7,018	2.39%
19	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,743	2.58%
20	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	10,226	2.47%
21	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICTOR M	30	3,700	2.97%
22	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,998	2.12%
23	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ GUEVARA	133	11,777	2.49%
24	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,983	1.36%
26	GTSSA004650	11 - GUANAJUATO	041 - URIANGATO	HOSPITAL GENERAL URIANGATO	60	5,227	2.41%
27	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR. ALFREI	110	7,320	0.93%
28	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	158	10,210	1.67%
29	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,702	2.07%
31	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,294	3.04%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2007 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
258	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	30	1,818	1.65%
257	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	7,604	1.14%
256	PLSSA004952	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL ZACATLAN	35	3,751	2.83%
255	SRSSA000726	26 - SONORA	019 - CANANEA	HOSPITAL COMUNITARIO CANANEA	24	1,699	0.65%
254	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	189	6,655	4.19%
253	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	30	4,105	1.41%
252	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	37	5,361	2.13%
251	OCSSA001183	20 - OAXACA	079 - SALINA CRUZ	SALINA CRUZ	30	3,431	2.36%
250	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,676	2.20%
249	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,121	1.39%
248	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,387	0.77%
247	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	3,158	0.63%
246	VZSSA005560	30 - VERACRUZ DE IGNACIO DE LA LLAVE	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,659	0.53%
245	MSSSA001504	17 - MORELOS	021 - TETECALA	HG DE TETECALA DR. RODOLFO BECERRIL DE LA PAZ	30	2,696	1.48%
244	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	11,261	2.16%
243	PLSSA000081	21 - PUEBLA	003 - ACATLAN	HOSPITAL GENERAL DE ACATLAN	45	2,558	1.60%
242	CSSSA000453	07 - CHIAPAS	009 - ARRIAGA	HOSPITAL GENERAL JUAREZ ARRIAGA	33	2,727	1.10%
241	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	17,789	2.01%
240	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,356	1.33%
239	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICATLAN	HG CUICATLAN DR. ALBERTO VARGAS MERINO	30	2,121	0.66%
238	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABIA	30	3,552	2.98%
237	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	11,653	1.98%
236	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	111	8,887	1.78%
235	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	8,916	3.15%
234	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTAÑEDA	144	9,447	1.86%
233	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	7,041	3.34%
232	MCSSA007982	15 - MEXICO	110 - VALLE DE BRAVO	H.G. VALLE DE BRAVO	46	4,736	1.86%
231	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	41	3,056	2.39%
230	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	5,525	1.61%
229	CSSSA007540	07 - CHIAPAS	101 - TUXTLA GUTIARREZ	HOSPITAL REGIONAL DR. RAFAEL PASCASIO GAMBOA	140	20,746	2.29%
228	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACIONAL	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,347	1.85%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2008 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SRSSA001612	26 - SONORA	038 - MOCTEZUMA	HOSPITAL COMUNITARIO MOCTEZUMA	17	874	1.37%
2	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,235	3.30%
3	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	7,259	2.31%
4	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	6,085	2.40%
5	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	27	1,440	0.56%
6	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,514	2.31%
7	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	30	4,652	2.67%
8	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	11,599	2.51%
9	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,500	1.45%
10	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	5,276	1.95%
11	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,182	2.69%
12	CSSSA007074	07 - CHIAPAS	097 - TONALA	HOSPITAL GENERAL DR. JUAN C. CORZO TONALA	29	3,517	0.17%
13	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,402	2.09%
14	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,052	1.92%
15	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICTO	30	3,734	2.97%
16	VZSSA001121	30 - VERACRUZ DE IGNACIO DE LA LLAVE	038 - COATEPEC	HOSPITAL DE LA COMUNIDAD COATEPEC	15	1,941	0.72%
17	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,060	3.40%
18	TSSSA018070	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL MATERNO INFANTIL REY	80	2,831	0.46%
19	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,308	2.09%
20	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	6,561	2.55%
21	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,723	1.51%
22	MCSSA006920	15 - MEXICO	099 - TEXCOCO	H.G. DR. JULIAN VILLARREAL	10	1,810	0.28%
23	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	14,001	1.39%
24	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTANEZ	90	11,328	2.15%
25	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO	123	11,493	1.49%
26	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,694	4.72%
27	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	13,177	3.32%
28	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ALVAREZ	HG CHILAPA DE ALVAREZ	28	3,289	1.00%
29	TSSSA002192	28 - TAMAULIPAS	035 - SAN FERNANDO	HG HOSPITAL GENERAL SAN FERNANDO	45	2,611	2.03%
30	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	5,090	2.77%

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Worst performing hospitals 2008 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
267	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	11,583	0.18%
266	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,997	0.70%
265	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,936	1.22%
264	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL ORO	30	1,309	1.15%
262	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	37	5,349	1.93%
261	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	5,935	1.89%
260	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	2,334	2.44%
259	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	13,146	2.73%
258	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASC	30	3,262	1.66%
257	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,427	1.43%
256	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,687	3.83%
255	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,407	2.31%
254	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	6,905	2.19%
253	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,815	1.33%
252	PLSSA015551	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL DE ZACATLAN	45	1,989	2.36%
251	SRSSA001851	26 - SONORA	043 - NOGALES	HOSPITAL GENERAL NOGALES	24	3,469	2.31%
250	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	30	4,353	1.70%
249	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	9,998	1.92%
248	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,730	1.39%
247	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	104	20,451	3.30%
246	MCSSA010111	15 - MEXICO	001 - ACAMBAY	HOSPITAL MUNICIPAL ACAMBAY "IGNACIO ALLE	18	2,620	0.73%
243	TCSSA000014	27 - TABASCO	001 - BALANCAN	HOSPITAL GENERAL DE BALANCAN	34	3,188	0.85%
242	HGSSA001503	13 - HIDALGO	029 - HUICHAPAN	HOSPITAL GENERAL HUICHAPAN	30	3,232	2.26%
241	CLSSA000033	05 - COAHUILA DE ZARAGOZA	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	2,923	1.16%
240	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	11,530	1.67%
239	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	51	6,961	0.57%
238	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KUM	68	10,980	2.16%
237	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MEN	476	34,314	2.16%
236	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	9,240	2.87%
235	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	63	3,735	4.07%

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Best performing hospitals 2009 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	7,111	2.31%
2	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,572	3.42%
3	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	8,099	2.80%
4	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	30	5,240	2.92%
5	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,201	2.37%
6	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,320	3.22%
7	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	6,626	2.11%
8	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ GALLO	HOSPITAL REGIONAL YAHUALICA	30	3,358	2.38%
9	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,515	3.65%
10	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	2,797	1.47%
11	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,210	2.59%
12	GTSSA004650	11 - GUANAJUATO	041 - URIANGATO	HOSPITAL GENERAL URIANGATO	63	5,907	2.54%
13	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,765	2.57%
14	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR. ALFRED	138	9,014	1.56%
15	MNSSA016533	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	5,770	2.34%
16	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	55	6,266	0.97%
17	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	1,248	2.00%
18	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	866	1.62%
19	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	152	10,085	1.60%
20	SLSSA017594	25 - SINALOA	008 - ELOTA	HOSPITAL GENERAL LA CRUZ	18	1,575	1.40%
21	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	11,184	2.22%
22	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	144	14,919	3.13%
23	SRSSA000562	26 - SONORA	018 - CAJEME	HOSPITAL GENERAL CD.OBREGON	85	3,051	6.10%
24	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,585	2.27%
25	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,474	4.62%
26	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	30	3,151	2.06%
27	ZSSSA012853	32 - ZACATECAS	024 - LORETO	HOSPITAL GENERAL LORETO	30	2,576	0.74%
28	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,403	1.66%
29	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABIFF	25	2,224	2.92%
30	BCSSA017590	02 - BAJA CALIFORNIA	005 - PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	30	2,985	2.61%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2009 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
277	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,090	1.52%
276	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	39	6,108	1.80%
275	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,764	0.28%
274	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	10,277	1.19%
273	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO SU	30	3,835	1.67%
272	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	11,821	1.49%
271	VZSSA002393	30 - VERACRUZ DE IGNACIO DE LA LLAVE	071 - HUATUSCO	HOSPITAL GENERAL HUATUSCO DR. DARIO MENDEZ I	30	3,161	0.25%
270	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	56	6,058	1.80%
269	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	7,117	2.28%
268	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	9,686	1.97%
267	VZSSA002434	30 - VERACRUZ DE IGNACIO DE LA LLAVE	072 - HUAYACOCOTLA	HOSPITAL DE LA COMUNIDAD DE HUAYACOCOTLA	11	705	0.71%
266	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	70	3,697	3.79%
265	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA LLAVE	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODORO	25	2,032	1.67%
264	PLSSA015423	21 - PUEBLA	164 - TEPEACA	HOSPITAL GENERAL DE TEPEACA	30	5,275	4.04%
263	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACIONAL	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,609	2.72%
262	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,265	1.36%
261	GRSSA001813	12 - GUERRERO	012 - AYUTLA DE LOS LIBRES	HOSPITAL GENERAL DE AYUTLA	21	2,638	0.45%
260	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	7,700	1.05%
259	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABIA	30	3,662	3.00%
258	QRSSA000011	23 - QUINTANA ROO	001 - COZUMEL	HOSPITAL GENERAL DE COZUMEL	30	2,322	1.21%
257	CLSSA000033	05 - COAHUILA DE ZARAGOZA	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	3,392	1.86%
256	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	5,624	4.62%
254	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	126	8,759	2.85%
253	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	2,638	0.83%
252	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPEC	HG TUXTEPEC	65	4,962	2.90%
251	MCSSA005095	15 - MEXICO	074 - SAN FELIPE DEL PROGRESO	HOSPITAL GENERAL SAN FELIPE DEL PROGRESO	60	6,665	1.28%
250	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	4,866	2.57%
249	CSSSA000453	07 - CHIAPAS	009 - ARRIAGA	HOSPITAL GENERAL JUAREZ ARRIAGA	34	2,555	2.15%
248	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	3,406	0.82%
247	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JU�REZ	HOSPITAL GENERAL XOCO	199	7,763	3.67%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2010 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,439	3.19%
2	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	32	5,102	3.53%
3	SLSSA017594	25 - SINALOA	008 - ELOTA	HOSPITAL GENERAL LA CRUZ	30	1,303	1.23%
4	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,981	2.78%
5	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	6,978	1.98%
6	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TREVIÑO ZAPA	123	12,050	1.54%
7	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	6,659	1.56%
8	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,185	3.87%
9	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	7,031	2.46%
10	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABIFF	25	2,434	3.53%
11	GTSSA004650	11 - GUANAJUATO	041 - URIANGATO	HOSPITAL GENERAL URIANGATO	63	6,112	2.45%
12	CLSSA002466	05 - COAHUILA DE ZARAGOZA	020 - MUZQUIZ	HOSPITAL GENERAL MUZQUIZ	25	2,804	2.21%
13	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	6,816	4.21%
14	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	22	1,892	1.37%
15	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	29	2,608	2.68%
16	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,732	2.77%
17	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,628	2.28%
18	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ GUEVARA"	133	13,332	3.36%
19	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICTOR MANUEL PITA	30	3,658	2.49%
20	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	4,828	2.17%
21	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,330	2.49%
22	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	3,045	2.63%
23	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,387	1.95%
24	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,769	3.08%
25	BCSSA000855	02 - BAJA CALIFORNIA	003 - TECATE	HOSPITAL GENERAL DE TECATE	18	1,978	0.56%
26	MNSSA016533	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	5,842	2.52%
27	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAMOS BOURS"	158	16,852	1.03%
28	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	3,026	1.49%
29	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,250	2.25%
30	VZSSA003595	30 - VERACRUZ DE IGNACIO DE LA LLAVE	108 - MINATITLAN	HOSPITAL GENERAL DE MINATITLAN	51	7,178	1.59%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2010 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
274	SPSSA017301	24 - SAN LUIS POTOSI	028 - SAN LUIS POTOSI	HOSPITAL DEL NIÑO Y LA MUJER DR. ALBERTO LOPEZ HERMOSA	90	9,979	0.10%
273	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL ORO	30	1,627	0.31%
272	OCSSA020655	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	HG PUTLA AMIGO DEL NIÑO Y DE LA MADRE	30	2,809	2.60%
271	VZSSA002393	30 - VERACRUZ DE IGNACIO DE LA LLAVE	071 - HUATUSCO	HOSPITAL GENERAL HUATUSCO DR. DARIO MENDEZ LIMA	30	3,196	0.28%
270	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	10,874	1.43%
269	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO SUAREZ	30	3,572	1.51%
268	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA LLAVE	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODORO DIEZ	27	1,982	2.02%
267	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACION	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,462	2.34%
266	OCSSA020030	20 - OAXACA	318 - SAN PEDRO MIXTEPEC -DTO. 2	HG PUERTO ESCONDIDO	30	2,899	3.35%
265	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,934	1.50%
264	MCSSA009826	15 - MEXICO	081 - TECAMAC	HOSPITAL MUNICIPAL TECAMAC "LIC. CESAR CAMACHO QUIROZ	18	1,536	0.78%
263	VZSSA015411	30 - VERACRUZ DE IGNACIO DE LA LLAVE	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,919	1.93%
262	VZSSA006313	30 - VERACRUZ DE IGNACIO DE LA LLAVE	174 - TIERRA BLANCA	HOSPITAL GENERAL DE TIERRA BLANCA JESUS GARCIA CORONA	30	3,021	1.03%
261	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	9,520	1.27%
260	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARID.	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	7,150	1.96%
259	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	98	6,401	1.77%
258	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	59	4,171	3.74%
257	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	7,232	2.27%
256	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,870	1.42%
255	VZSSA003361	30 - VERACRUZ DE IGNACIO DE LA LLAVE	102 - MARTINEZ DE LA TORRE	HOSPITAL GENERAL MARTINEZ DE LA TORRE MANUEL AVILA CAI	43	5,777	2.46%
254	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	70	3,795	3.72%
252	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	2,919	2.54%
251	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	4,577	1.14%
250	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KUMATE RODRIGUEZ	120	14,097	1.53%
249	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	4,035	0.97%
248	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,565	1.55%
247	PLSSA016543	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO	30	4,275	1.96%
246	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,053	4.69%
245	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	9,415	2.94%
244	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	8,831	2.57%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2011 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,224	1.33%
2	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,579	3.28%
3	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,968	3.29%
4	BSSSA001131	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL DE CABO SAN LUCAS	24	3,261	2.36%
5	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,856	2.86%
6	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABIFF	25	2,502	3.60%
7	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	29	4,479	2.57%
8	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,549	2.19%
9	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,896	2.33%
10	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	32	5,186	3.03%
11	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	31	4,778	3.75%
12	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,698	2.00%
13	MNSSA016533	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	6,388	2.80%
14	MNSSA016475	16 - MICHOACAN DE OCAMPO	050 - MARAVATIO	HG MARAVATIO	30	4,944	3.01%
15	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	6,878	3.69%
16	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ GUEVARA"	133	12,800	3.79%
17	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	29	2,508	1.75%
18	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	49	4,699	5.09%
19	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	50	6,857	2.58%
20	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	148	8,773	1.62%
21	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,575	1.85%
22	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	3,924	2.73%
23	SRSSA001670	26 - SONORA	042 - NAVOJOA	HOSPITAL GENERAL NAVOJOA	63	5,624	1.51%
24	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	3,497	3.17%
25	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	3,457	1.16%
26	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN ROMAN	60	6,424	3.95%
27	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	93	11,610	2.57%
28	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICTOR MANUEl	30	3,715	2.61%
29	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,928	1.97%
30	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	20	4,907	1.24%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2011 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
268	CSSSA008264	07 - CHIAPAS	109 - YAJALON	HOSPITAL GENERAL YAJALON	34	2,638	0.53%
267	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	1,681	1.37%
266	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	10,311	1.56%
265	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	7,544	1.79%
264	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA LLAVE	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODORO DIEZ	24	2,126	2.02%
263	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO SUAREZ	30	3,738	1.69%
262	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABIA	22	3,425	2.66%
261	OCSSA020655	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	HG PUTLA AMIGO DEL NIÑO Y DE LA MADRE	31	3,019	2.19%
260	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	10,130	1.48%
259	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	14,986	1.78%
258	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	21,109	2.52%
257	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	10,260	2.68%
256	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	1.42%
255	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAiSO	20	1,739	1.21%
254	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,690	1.32%
253	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	4.12%
252	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	14,698	2.88%
251	PLSSA002106	21 - PUEBLA	094 - LIBRES	HOSPITAL GENERAL CIUDAD DE LIBRES	30	2,550	1.73%
250	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ANGEL VENTURA NERI	30	3,912	2.71%
249	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,617	1.35%
248	VZSSA006313	30 - VERACRUZ DE IGNACIO DE LA LLAVE	174 - TIERRA BLANCA	HOSPITAL GENERAL DE TIERRA BLANCA JESUS GARCIA COR	30	2,930	0.99%
247	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIERREZ	63	7,536	3.45%
246	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	126	8,689	2.81%
245	CSSSA018776	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL DE LA MUJER COMITAN	60	12,245	0.29%
244	CLSSA001614	05 - COAHUILA DE ZARAGOZA	035 - TORRE0N	HOSPITAL GENERAL TORREON	51	10,904	1.08%
243	PLSSA015551	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL DE ZACATLAN	45	5,399	3.46%
242	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	7,181	3.34%
241	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,470	1.08%
240	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	3,721	4.65%
239	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	21,478	1.65%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2012 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	211	18,793	0.05%
2	JCSSA005584	14 - JALISCO	093 - TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,717	3.72%
3	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDÚ	HOSPITAL GENERAL RENE THOMAS GUIJOSA HABII	25	2,591	2.51%
4	GTSSA002760	11 - GUANAJUATO	023 - PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32	5,351	3.33%
5	QTSSA000475	22 - QUERÉTARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,483	1.96%
6	MNSSA002813	16 - MICHOACÁN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	31	4,387	4.26%
7	JCSSA001326	14 - JALISCO	023 - ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38	7,599	1.92%
8	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,521	1.89%
9	MNSSA016533	16 - MICHOACÁN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	6,175	3.08%
10	JCSSA000631	14 - JALISCO	015 - AUTLÁN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,512	3.06%
11	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLÓN DE ARTEAGA	HOSPITAL GENERAL PABELLÓN DE ARTEAGA	30	4,156	2.14%
12	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZÁLEZ GUEVAI	133	11,987	4.49%
13	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	20	1,592	2.01%
14	GTSSA017023	11 - GUANAJUATO	037 - SILAO	HOSPITAL GENERAL SILAO	43	6,453	1.83%
15	MNSSA016475	16 - MICHOACÁN DE OCAMPO	050 - MARAVATÍO	HG MARAVATIO	30	3,681	2.47%
16	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,295	2.36%
17	GTSSA002101	11 - GUANAJUATO	020 - LEÓN	HOSPITAL GENERAL REGIONAL DE LEÓN	189	21,420	3.40%
18	SPSSA000945	24 - SAN LUIS POTOSÍ	024 - RIOVERDE	HOSPITAL GENERAL DE RÍOVERDE	42	6,778	1.95%
19	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCÓN	21	2,923	1.85%
20	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	3,478	2.73%
21	MCSSA010053	15 - MÉXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,629	2.14%
22	MNSSA016492	16 - MICHOACÁN DE OCAMPO	034 - HIDALGO	HG CIUDAD HIDALGO	30	2,454	1.79%
23	GTSSA016912	11 - GUANAJUATO	032 - SAN JOSÉ ITURBIDE	HOSPITAL GENERAL SAN JOSÉ ITURBIDE	30	4,119	3.47%
24	TCSSA002003	27 - TABASCO	006 - CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,386	1.28%
25	BCSSA000855	02 - BAJA CALIFORNIA	003 - TECATE	HOSPITAL GENERAL DE TECATE	39	3,330	1.62%
27	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO T	123	10,958	1.51%
28	MNSSA002446	16 - MICHOACÁN DE OCAMPO	066 - PÁTZCUARO	HG PATZCUARO	20	4,643	1.55%
29	MNSSA000170	16 - MICHOACÁN DE OCAMPO	006 - APATZINGÁN	HG RAMÓN PONCE ÁLVAREZ	43	3,922	2.93%
30	SRSSA002085	26 - SONORA	055 - SAN LUIS RÍO COLORADO	HOSPITAL GENERAL SAN LUIS RÍO COLORADO	39	4,144	1.71%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2012 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
272	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTÓN	HOSPITAL GENERAL DE CHAMPOTÓN	12	1,792	0.28%
271	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA LLAVE	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODO	24	2,349	1.58%
270	VZSSA002393	30 - VERACRUZ DE IGNACIO DE LA LLAVE	071 - HUATUSCO	HOSPITAL GENERAL HUATUSCO DR. DARíO MENDE	30	3,384	0.47%
269	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	1,889	1.27%
268	VZSSA007660	30 - VERACRUZ DE IGNACIO DE LA LLAVE	016 - LA ANTIGUA	HOSPITAL GENERAL DE CARDEL	31	2,038	0.59%
267	MNSSA001722	16 - MICHOACÁN DE OCAMPO	052 - LÁZARO CÁRDENAS	HG LÁZARO CÁRDENAS	60	5,547	1.71%
266	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	31	8,883	1.86%
265	PLSSA002106	21 - PUEBLA	094 - LIBRES	HOSPITAL GENERAL CIUDAD DE LIBRES	30	2,375	1.81%
264	MCSSA001011	15 - MÉXICO	013 - ATIZAPÁN DE ZARAGOZA	H.G. DR.SALVADOR GONZÁLEZ HERREJON	144	11,848	2.59%
263	VZSSA006815	30 - VERACRUZ DE IGNACIO DE LA LLAVE	189 - TUXPAN	HOSPITAL GENERAL TUXPAN DR. EMILIO ALCAZAR	60	4,510	1.88%
262	MCSSA002020	15 - MÉXICO	031 - CHIMALHUACÁN	H.G. CHIMALHUACÁN	90	6,208	1.84%
261	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	8,221	2.18%
260	QRSSA000373	23 - QUINTANA ROO	004 - OTHÓN P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	3,446	4.50%
259	VZSSA004370	30 - VERACRUZ DE IGNACIO DE LA LLAVE	124 - PAPANTLA	HOSPITAL GENERAL PAPANTLA DR. JOSÉ BUILL BEL	44	3,376	2.55%
258	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	59	4,570	3.65%
257	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	17,731	1.45%
256	PLSSA000863	21 - PUEBLA	045 - CHALCHICOMULA DE SESMA	HOSPITAL GENERAL CIUDAD SERDÁN	30	972	1.34%
255	TCSSA004296	27 - TABASCO	014 - PARAÍSO	HOSPITAL GENERAL DE PARAÍSO	20	1,761	0.68%
254	CSSSA018776	07 - CHIAPAS	019 - COMITÁN DE DOMÍNGUEZ	HOSPITAL DE LA MUJER COMITÁN	60	12,249	0.70%
253	YNSSA000565	31 - YUCATÁN	050 - MÉRIDA	HOSPITAL GENERAL AGUSTÍN O´HORÁN	327	30,041	1.75%
252	TCSSA000014	27 - TABASCO	001 - BALANCÁN	HOSPITAL GENERAL DE BALANCÁN	30	2,967	0.51%
251	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABIA	30	3,902	3.08%
250	PLSSA004071	21 - PUEBLA	174 - TEZIUTLÁN	HOSPITAL GENERAL TEZIUTLAN	86	5,814	2.46%
249	DFSSA017886	09 - DISTRITO FEDERAL	010 - ÁLVARO OBREGÓN	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,976	1.57%
248	MCSSA008945	15 - MÉXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIÉRREZ	61	8,283	3.03%
247	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ÁNGEL VENTURA NERI	30	3,428	2.71%
246	MCSSA007982	15 - MÉXICO	110 - VALLE DE BRAVO	H.G. VALLE DE BRAVO	44	3,962	2.50%
245	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,774	3.85%
244	CSSSA000453	07 - CHIAPAS	009 - ARRIAGA	HOSPITAL GENERAL JUÁREZ ARRIAGA	31	3,003	2.10%
243	MCSSA002184	15 - MÉXICO	033 - ECATEPEC DE MORELOS	H.G. DR. JOSÉ MARÍA RODRÍGUEZ	144	16,011	2.64%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2013 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MNSSA002813	MICHOACÁN DE OCAMPO	SAHUAYO	HG SAHUAYO	31	4,234	3.61%
2	BSSSA000011	BAJA CALIFORNIA SUR	COMONDÚ	HOSPITAL GENERAL RENE THOMAS GUIJOS	30	2,285	2.54%
3	GTSSA002760	GUANAJUATO	PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32	5,215	2.63%
4	GTSSA000310	GUANAJUATO	SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL SAN MIGUEL ALLENDE	63	7,224	1.76%
5	JCSSA013815	JALISCO	LA BARCA	HOSPITAL REGIONAL LA BARCA	58	7,743	3.93%
6	QTSSA000475	QUERÉTARO	CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,549	2.40%
7	SLSSA018265	SINALOA	CULIACÁN	HOSPITAL GENERAL EL DORADO	26	1,548	2.65%
8	MNSSA016533	MICHOACÁN DE OCAMPO	LA PIEDAD	HG LA PIEDAD	60	5,916	2.84%
9	ASSSA000655	AGUASCALIENTES	RINCÓN DE ROMOS	HOSPITAL GENERAL RINCÓN DE ROMOS	30	3,613	1.44%
10	SPSSA000945	SAN LUIS POTOSÍ	RIOVERDE	HOSPITAL GENERAL DE RÍOVERDE	84	6,684	1.86%
11	MCSSA010345	MÉXICO	TULTITLÁN	HOSPITAL GENERAL TULTITLAN SAN PABLC	30	2,857	1.12%
12	BCSSA017590	BAJA CALIFORNIA	PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	35	3,544	0.87%
13	MNSSA016475	MICHOACÁN DE OCAMPO	MARAVATÍO	HG MARAVATIO	30	3,688	2.22%
14	BSSSA001213	BAJA CALIFORNIA SUR	LA PAZ	B. HOSPITAL GENERAL CON ESPECIALIDADI	120	8,292	2.07%
15	MSSSA000961	MORELOS	JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN	60	7,298	3.47%
16	JCSSA005584	JALISCO	TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,612	3.01%
17	JCSSA000631	JALISCO	AUTLÁN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,221	1.99%
18	HGSSA015515	HIDALGO	APAN	HOSPITAL GENERAL DE APAN	30	2,487	2.45%
19	CLSSA001404	COAHUILA DE ZARAGOZA	SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	20	1,724	1.28%
20	GTSSA004650	GUANAJUATO	URIANGATO	HOSPITAL GENERAL URIANGATO	63	5,097	3.77%
21	ASSSA000614	AGUASCALIENTES	PABELLÓN DE ARTEAGA	HOSPITAL GENERAL PABELLÓN DE ARTEAG	30	4,129	2.47%
22	MNSSA003735	MICHOACÁN DE OCAMPO	URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	10,195	2.67%
23	GTSSA002101	GUANAJUATO	LEÓN	HOSPITAL GENERAL LEÓN	221	20,648	2.95%
25	DGSSA001895	DURANGO	SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIAI	30	2,526	2.06%
26	BSSSA001131	BAJA CALIFORNIA SUR	LOS CABOS	HOSPITAL GENERAL DE CABO SAN LUCAS	24	3,122	1.76%
27	MCSSA010053	MÉXICO	JILOTEPEC	H.G. JILOTEPEC	30	4,228	2.65%
28	NTSSA001594	NAYARIT	TEPIC	HOSPITAL CIVIL DR. ANTONIO GONZÁLEZ G	133	11,472	4.29%
29	GTSSA004003	GUANAJUATO	SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	26	2,572	4.16%
30	QTSSA012935	QUERÉTARO	SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	92	9,216	2.14%
31	JCSSA000165	JALISCO	AMECA	HOSPITAL REGIONAL DE AMECA	30	3,382	3.58%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2013 – appendectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
280	VZSSA002393	VERACRUZ DE IGNACIO DE LA LLAVE	HUATUSCO	HOSPITAL GENERAL HUATUSCO DR. DARÍO	30	3,126	0.35%
279	PLSSA004404	PUEBLA	TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,008	1.29%
278	VZSSA005560	VERACRUZ DE IGNACIO DE LA LLAVE	TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	34	2,363	0.25%
277	DFSSA001540	DISTRITO FEDERAL	IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,548	2.27%
276	CSSSA002611	CHIAPAS	HUIXTLA	HOSPITAL GENERAL HUIXTLA	31	8,555	1.82%
273	PLSSA015551	PUEBLA	ZACATLÁN	HOSPITAL GENERAL DE ZACATLÁN	49	5,394	2.67%
272	TCSSA004296	TABASCO	PARAÍSO	HOSPITAL GENERAL DE PARAÍSO	20	2,001	0.80%
271	MCSSA001011	MÉXICO	ATIZAPÁN DE ZARAGOZA	H.G. DR.SALVADOR GONZÁLEZ HERREJON	144	9,296	3.58%
270	MCSSA002020	MÉXICO	CHIMALHUACÁN	H.G. CHIMALHUACÁN	90	5,885	2.01%
269	CSSSA018776	CHIAPAS	COMITÁN DE DOMÍNGUEZ	HOSPITAL DE LA MUJER COMITÁN	60	11,956	0.29%
268	TCSSA003514	TABASCO	MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	3,927	0.41%
267	GRSSA005762	GUERRERO	OMETEPEC	HOSPITAL GENERAL OMETEPEC	40	4,962	3.79%
266	QTSSA001740	QUERÉTARO	QUERÉTARO	HOSPITAL DE ESPECIALIDADES DEL NIÑO Y	141	21,398	1.08%
265	PLSSA000863	PUEBLA	CHALCHICOMULA DE SESMA	HOSPITAL GENERAL CIUDAD SERDÁN	30	2,114	1.18%
264	MCSSA001682	MÉXICO	CHALCO	HOSPITAL GENERAL DE CHALCO	60	1,747	4.87%
263	VZSSA001355	VERACRUZ DE IGNACIO DE LA LLAVE	CÓRDOBA	HOSPITAL GENERAL CORDOBA YANGA	75	8,908	2.76%
262	DFSSA003722	DISTRITO FEDERAL	VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,703	4.79%
261	VZSSA005106	VERACRUZ DE IGNACIO DE LA LLAVE	SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA	24	1,826	2.14%
260	QRSSA000373	QUINTANA ROO	OTHÓN P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	4,399	4.82%
259	CSSSA006403	CHIAPAS	TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	16,874	1.50%
258	MCSSA008945	MÉXICO	VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIÉRREZ	60	6,675	3.15%
257	OCSSA003406	OAXACA	SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VE	30	3,976	1.33%
256	YNSSA000565	YUCATÁN	MÉRIDA	HOSPITAL GENERAL AGUSTÍN O´HORÁN	262	29,731	1.91%
255	CSSSA007540	CHIAPAS	TUXTLA GUTIÉRREZ	HOSPITAL REGIONAL DR. RAFAEL PASCASI(	145	23,420	2.73%
254	DFSSA018154	DISTRITO FEDERAL	TLÁHUAC	HOSPITAL GENERAL TLÁHUAC	120	7,607	2.91%
253	CSSSA004595	CHIAPAS	PALENQUE	HOSPITAL GENERAL PALENQUE	60	8,657	2.36%
252	PLSSA004071	PUEBLA	TEZIUTLÁN	HOSPITAL GENERAL TEZIUTLAN	86	6,254	2.46%
251	MNSSA001722	MICHOACÁN DE OCAMPO	LÁZARO CÁRDENAS	HG LÁZARO CÁRDENAS	56	4,542	1.96%
250	MCSSA002184	MÉXICO	ECATEPEC DE MORELOS	H.G. DR. JOSÉ MARÍA RODRÍGUEZ	144	15,104	2.14%
249	MSSSA000080	MORELOS	AXOCHIAPAN	HG DE AXOCHIAPAN DR. ÁNGEL VENTURA	30	3,584	2.90%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Appendix 5.3.2 Cholecystectomy

Best performing hospitals 2005

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,405	1.05%
2	SRSSA002085	26 - SONORA	055 - SAN LUIS RIO COLORADO	HOSPITAL GENERAL SAN LUIS RIO COLORADO	26	2,834	0.81%
3	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,465	1.33%
4	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,584	5.64%
5	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	2,296	0.26%
6	CLSSA000050	05 - COAHUILA DE ZARAGO	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	24	725	0.83%
8	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LAREDO	47	3,496	0.74%
9	VZSSA001121	30 - VERACRUZ DE IGNACIC	038 - COATEPEC	HOSPITAL DE LA COMUNIDAD COATEPEC	16	1,551	0.45%
10	TCSSA001064	27 - TABASCO	004 - CENTRO	HOSPITAL REGIONAL DE ALTA ESPECIALIDAD DR. JUAN GR	129	9,068	3.40%
11	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,159	0.49%
12	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	36	3,458	0.93%
13	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	38	4,292	1.28%
14	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,032	2.58%
15	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	34	4,281	1.28%
16	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	100	7,149	3.97%
17	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	30	1,916	2.82%
18	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DE LA IN	HOSPITAL GENERAL CUNA DE LA INDEPENDENCIA NACION	30	5,479	0.62%
19	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,137	1.50%
20	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,059	1.80%
21	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,689	2.30%
22	VZSSA004744	30 - VERACRUZ DE IGNACIC	131 - POZA RICA DE HIDALGO	HOSPITAL REGIONAL POZA RICA DE HIDALGO	100	8,579	0.99%
23	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	3,745	3.28%
24	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,927	1.65%
25	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	20	1,779	1.01%
26	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,425	2.10%
27	TCSSA001052	27 - TABASCO	004 - CENTRO	HOSPITAL REGIONAL DE ALTA ESPECIALIDAD DR. GUSTAV(	139	16,913	1.77%
28	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	11,853	1.80%
29	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	4,063	0.94%
31	NLSSA002972	19 - NUEVO LEON	038 - MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	30	2,466	4.18%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2005 - cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
210	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	239	15,219	0.07%
209	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	10,804	0.23%
208	OCSSA001183	20 - OAXACA	079 - SALINA CRUZ	SALINA CRUZ	30	3,693	0.92%
207	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	217	15,359	1.48%
206	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,042	0.48%
205	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIERREZ	60	4,131	1.23%
204	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	7,586	0.09%
203	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	9,118	1.29%
202	CHSSA001615	08 - CHIHUAHUA	032 - HIDALGO DEL PARRAL	HOSPITAL GENERAL PARRAL	30	2,155	1.58%
201	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,645	0.65%
200	GRSSA003686	12 - GUERRERO	029 - CHILPANCINGO DE LOS BRAVO	HOSPITAL GRAL. DR. RAYMUNDO A. ALARCON	60	5,704	0.91%
199	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	4,990	0.74%
197	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	4,936	0.47%
196	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	107	11,943	1.09%
195	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,215	0.54%
194	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CANSECO	185	12,959	1.21%
193	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FLORES	56	4,679	0.30%
192	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	7,492	3.32%
191	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,367	1.76%
190	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMMNGUEZ	HOSPITAL GENERAL MAR�A IGNACIA GANDULFO COMITA	90	9,699	1.41%
188	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	70	6,334	0.49%
187	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	2,783	0.25%
186	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	30	1,667	0.90%
184	NTSSA002084	18 - NAYARIT	020 - BAHIA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	2,578	0.74%
183	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	10,559	0.69%
182	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	103	7,303	0.22%
181	QRSSA000023	23 - QUINTANA ROO	002 - FELIPE CARRILLO PUERTO	HOSPITAL GENERAL FELIPE CARRILLO PUERTO	25	2,520	0.95%
179	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MENCHACA"	536	39,606	2.99%
178	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,244	3.38%
177	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ GUEVARA"	133	11,243	1.09%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2006 - cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. /	15	2,377	3.49%
2	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,907	0.66%
3	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,496	7.04%
4	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	28	2,117	2.22%
5	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LARED(	47	3,589	0.67%
6	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,624	1.37%
7	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,956	2.73%
8	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,772	0.10%
9	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VEL	28	2,000	1.00%
10	CLSSA000050	05 - COAHUILA DE ZARAGOZ	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	17	1,393	3.16%
11	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	5,319	1.35%
12	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	4,416	0.97%
13	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	32	4,227	0.73%
14	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,285	4.39%
15	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIAR(	30	2,468	1.70%
16	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	12,225	1.89%
17	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	193	16,500	2.91%
18	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,925	1.86%
19	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	60	4,938	1.36%
20	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,443	1.58%
21	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	2,435	2.14%
22	TSSSA000401	28 - TAMAULIPAS	009 - CIUDAD MADERO	HG HOSPITAL GENERAL CIVIL CIUDAD MADEI	84	9,914	2.28%
23	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	4,001	1.52%
24	VZSSA001384	30 - VERACRUZ DE IGNACIO	045 - COSAMALOAPAN DE CARPI(	HOSPITAL GENERAL COSAMALOAPAN DR. VI	30	3,473	3.46%
25	ASSSA000404	01 - AGUASCALIENTES	003 - CALVILLO	HOSPITAL GENERAL CALVILLO	30	2,132	3.10%
26	MNSSA002813	16 - MICHOACAN DE OCAMF	076 - SAHUAYO	HG SAHUAYO	32	4,149	2.53%
27	SRSSA002295	26 - SONORA	066 - URES	HOSPITAL COMUNITARIO URES	18	382	4.19%
28	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDR(	30	3,721	3.68%
29	VZSSA015411	30 - VERACRUZ DE IGNACIO	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,786	1.74%
30	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,728	1.75%

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Worst performing hospitals 2006 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
222	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	8,262	2.80%
221	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	239	18,785	0.11%
220	MNSSA001722	16 - MICHOACAN DE OCAMF	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	4,986	0.56%
219	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	140	12,972	0.04%
218	MNSSA001891	16 - MICHOACAN DE OCAMF	053 - MORELIA	HG DR. MIGUEL SILVA	217	15,664	1.00%
217	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	60	3,664	0.16%
216	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	5,553	1.28%
215	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	1,699	0.88%
214	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	10,035	0.07%
213	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	11,657	0.07%
211	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDU	90	10,307	1.58%
210	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	6,709	1.55%
209	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	30	566	1.77%
208	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	109	2,971	0.57%
207	CLSSA001404	05 - COAHUILA DE ZARAGOZ	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,306	2.83%
206	TSSSA000850	28 - TAMAULIPAS	021 - EL MANTE	HG HOSP CIVIL DR VIRGILIO R HINOJOSA	37	5,210	1.48%
205	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLO	185	11,774	1.03%
204	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	111	12,821	1.12%
203	NTSSA002084	18 - NAYARIT	020 - BAHIA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	2,823	1.24%
202	CHSSA001615	08 - CHIHUAHUA	032 - HIDALGO DEL PARRAL	HOSPITAL GENERAL PARRAL	30	2,312	1.64%
201	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,125	0.81%
199	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	103	8,989	0.16%
198	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,733	1.85%
197	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	10,052	0.99%
196	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDEN(	DR. JORGE SOBERON ACEVEDO	60	5,131	1.77%
195	GRSSA003686	12 - GUERRERO	029 - CHILPANCINGO DE LOS BRA\	HOSPITAL GRAL. DR. RAYMUNDO A. ALARCO	60	5,450	0.90%
194	CSSSA007540	07 - CHIAPAS	101 - TUXTLA GUTIERREZ	HOSPITAL REGIONAL DR. RAFAEL PASCASIO	140	20,875	1.25%
193	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	120	10,160	1.80%
192	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FL	50	5,114	0.61%
191	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	6,609	2.04%

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Best performing hospitals 2007 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,832	2.08%
2	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADELFO S.	15	2,914	2.71%
3	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,998	1.10%
4	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	4,476	0.78%
5	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	32	4,369	3.75%
6	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	10,685	1.14%
7	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,035	0.87%
8	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,149	1.43%
9	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LAREDO	47	3,787	0.77%
10	CLSSA000050	05 - COAHUILA DE ZARAGOZA	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	17	1,676	3.52%
11	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,702	1.74%
12	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,983	2.16%
13	CSSSA008112	07 - CHIAPAS	108 - VILLAFLORES	HG VILLAFLORES	30	4,833	0.31%
14	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	864	1.85%
16	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,743	2.56%
17	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	32	4,086	1.81%
18	VZSSA007730	30 - VERACRUZ DE IGNACIO DE LA LLAVE	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	61	3,981	0.90%
19	VZSSA007660	30 - VERACRUZ DE IGNACIO DE LA LLAVE	016 - LA ANTIGUA	HOSPITAL GENERAL DE CARDEL	28	1,767	2.15%
20	VZSSA000976	30 - VERACRUZ DE IGNACIO DE LA LLAVE	032 - CATEMACO	HOSPITAL DE LA COMUNIDAD CATEMACO	13	1,278	1.88%
21	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	193	17,951	2.86%
22	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,365	2.14%
23	VZSSA015411	30 - VERACRUZ DE IGNACIO DE LA LLAVE	077 - ISLA	HOSPITAL GENERAL ISLA	44	2,024	1.73%
24	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA LLAVE	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VICTOR MAI	30	3,700	3.19%
25	TSSSA000401	28 - TAMAULIPAS	009 - CIUDAD MADERO	HG HOSPITAL GENERAL CIVIL CIUDAD MADERO	84	8,095	2.29%
26	VZSSA007754	30 - VERACRUZ DE IGNACIO DE LA LLAVE	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	1,186	6.75%
29	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	2,307	3.55%
30	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO SUAI	30	2,947	2.78%

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Worst performing hospitals 2007 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
218	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	12,868	0.04%
217	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	111	8,887	2.98%
216	MCSSA004231	15 - MEXICO	058 - NEZAHUALCoYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	10,765	0.07%
215	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,044	0.29%
214	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	239	27,425	0.05%
213	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	5,023	0.10%
212	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,356	1.30%
211	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	11,516	2.08%
210	PLSSA000081	21 - PUEBLA	003 - ACATLAN	HOSPITAL GENERAL DE ACATLAN	45	2,558	0.27%
209	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,061	0.61%
207	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	100	8,355	0.22%
206	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,471	1.77%
205	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,622	0.60%
204	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KUMATE RC	68	9,900	0.32%
203	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,239	1.95%
202	JCSSA007054	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE ZAPOPAN (CIVIL)	53	4,564	3.00%
201	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHITAN DE Z.	HG JUCHITAN DR. MACEDONIO BENITEZ FUENTES	60	4,551	1.38%
199	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDULFO COMI	90	11,131	0.64%
198	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIERREZ	60	4,737	1.54%
197	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CANSEC	185	12,194	1.34%
196	CSSSA007540	07 - CHIAPAS	101 - TUXTLA GUTIERREZ	HOSPITAL REGIONAL DR. RAFAEL PASCASIO GAMBOA	140	20,746	1.00%
195	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,515	0.99%
194	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MARIA CAN	124	9,568	1.18%
193	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	37	5,361	0.71%
191	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	4,210	1.50%
190	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	10,646	1.12%
189	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,746	0.86%
188	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	12,878	1.67%
187	GRSSA003686	12 - GUERRERO	029 - CHILPANCINGO DE LOS BRAVO	HOSPITAL GRAL. DR. RAYMUNDO A. ALARCON	60	5,631	1.28%
186	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,574	1.26%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2008 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,500	1.86%
2	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADI	16	2,963	2.33%
3	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	32	4,077	4.49%
4	HGSSA004093	13 - HIDALGO	077 - TULANCINGO DE BRAVO	HOSPITAL GENERAL TULANCINGO	60	7,082	0.85%
5	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,235	2.05%
6	MCSSA010111	15 - MEXICO	001 - ACAMBAY	HOSPITAL MUNICIPAL ACAMBAY "IGNACIO ALL	18	2,620	0.65%
7	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	11,599	1.48%
8	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LAREDO	47	3,571	0.42%
9	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	160	17,984	2.52%
10	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	27	1,440	1.18%
11	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	6,085	0.16%
12	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	976	3.28%
13	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	32	2,160	1.02%
14	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	6,561	0.61%
15	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,052	2.22%
16	VZSSA015411	30 - VERACRUZ DE IGNACI	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,923	2.34%
17	VZSSA007730	30 - VERACRUZ DE IGNACI	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	63	4,360	1.74%
18	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ALVAREZ	HG CHILAPA DE ALVAREZ	28	3,289	0.40%
19	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	6,625	1.65%
20	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,626	2.51%
21	VZSSA007882	30 - VERACRUZ DE IGNACI	116 - OLUTA	HOSPITAL GENERAL OLUTA GRAL MIGUEL ALEM	59	4,043	0.47%
22	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	5,276	1.61%
23	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	2,483	4.15%
24	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	18,999	2.73%
25	MCSSA010246	15 - MEXICO	087 - TEMOAYA	HOSPITAL MUNICIPAL TEMOAYA	16	3,205	0.31%
26	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	4,193	2.53%
27	VZSSA001384	30 - VERACRUZ DE IGNACI	045 - COSAMALOAPAN DE CARPIC	HOSPITAL GENERAL COSAMALOAPAN DR. VICT	30	3,734	3.27%
28	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	17,294	1.47%
29	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASC	30	3,262	2.88%
31	NTSSA000800	18 - NAYARIT	010 - ROSAMORADA	HOSPITAL GENERAL ROSAMORADA	40	2,870	1.95%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2008 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
228	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOT	144	13,391	2.58%
227	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	27,531	0.08%
226	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,815	1.15%
225	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,660	0.29%
224	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,687	0.18%
223	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,326	0.12%
222	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	9,998	1.83%
221	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	37	5,349	0.47%
220	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	4,204	1.86%
219	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	6,355	1.43%
218	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,304	0.11%
217	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	11,530	1.14%
216	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,804	2.05%
215	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	11,886	1.84%
214	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICAT	HG CUICATLAN DR. ALBERTO VARGAS MERINO	30	2,288	0.26%
213	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	2,334	0.81%
212	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIERREZ	55	5,059	1.32%
211	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,282	1.19%
210	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	107	9,255	0.55%
208	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,737	2.19%
207	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS C	185	11,708	1.15%
206	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	9,240	0.18%
205	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MAI	124	9,248	1.51%
203	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	32	3,281	1.62%
202	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,295	0.40%
201	CLSSA000033	05 - COAHUILA DE ZARAGOZA	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	2,923	1.47%
200	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	1,909	4.45%
199	VZSSA003740	30 - VERACRUZ DE IGNACIO DE LA	109 - MISANTLA	HOSPITAL GENERAL DE MISANTLA	35	3,442	2.00%
198	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KUN	68	10,980	0.52%
196	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO	161	16,558	2.40%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2009 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,572	2.25%
2	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	3,640	2.23%
3	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADELFO	15	3,138	2.45%
4	SLSSA017594	25 - SINALOA	008 - ELOTA	HOSPITAL GENERAL LA CRUZ	18	1,575	0.57%
5	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,765	1.44%
6	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	55	6,266	1.04%
7	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,201	0.37%
8	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,403	2.63%
10	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,585	2.01%
11	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	2,522	6.42%
12	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	30	4,325	1.02%
13	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	168	19,240	2.64%
14	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	22	2,143	1.68%
15	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	7,448	2.05%
16	MNSSA016480	16 - MICHOACAN DE OCAMPO	071 - PURUANDIRO	HG PURUANDIRO	27	979	1.23%
18	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	104	16,812	0.05%
19	CSSSA008264	07 - CHIAPAS	109 - YAJALON	HOSPITAL GENERAL YAJALON	30	2,957	0.71%
20	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	17,679	2.95%
21	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,607	2.18%
22	VZSSA007882	30 - VERACRUZ DE IGNACIO DE LA LLAVE	116 - OLUTA	HOSPITAL GENERAL OLUTA GRAL MIGUEL ALEMAN G	54	4,098	0.29%
23	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,613	1.95%
24	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,318	1.60%
25	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LAREDO	47	3,594	0.31%
26	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	30	2,363	0.89%
27	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	44	4,842	1.28%
28	MCSSA010111	15 - MEXICO	001 - ACAMBAY	HOSPITAL MUNICIPAL ACAMBAY "IGNACIO ALLENDI	18	2,094	0.48%
29	VZSSA004744	30 - VERACRUZ DE IGNACIO DE LA LLAVE	131 - POZA RICA DE HIDALGO	HOSPITAL REGIONAL POZA RICA DE HIDALGO	100	9,514	1.84%
30	DFSSA002066	09 - DISTRITO FEDERAL	009 - MILPA ALTA	HOSPITAL GENERAL MILPA ALTA	44	6,017	3.59%
31	VZSSA007754	30 - VERACRUZ DE IGNACIO DE LA LLAVE	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	1,442	4.30%

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Worst performing hospitals 2009 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
240	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	21,771	0.12%
239	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	6,702	0.12%
238	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	70	3,697	0.35%
237	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	13,416	1.83%
236	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIERREZ	55	5,530	0.24%
235	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,997	0.32%
234	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,265	0.32%
233	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,457	0.26%
232	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	6,080	1.17%
231	VZSSA000310	30 - VERACRUZ DE IGNACIO DE LA LLAVE	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA CAMA	28	2,943	0.78%
230	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA LLAVE	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODOR(	25	2,032	3.20%
229	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	5,070	0.32%
228	CHSSA001026	08 - CHIHUAHUA	021 - DELICIAS	HG DELICIAS	65	7,457	0.43%
227	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	5,203	1.17%
226	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	7,700	0.71%
225	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAM	161	16,316	2.76%
224	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	6,989	2.13%
223	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,150	1.05%
222	MSSSA001504	17 - MORELOS	021 - TETECALA	HG DE TETECALA DR. RODOLFO BECERRIL DE LA PAZ	30	2,463	2.19%
221	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,055	3.94%
220	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICATLAN	HG CUICATLAN DR. ALBERTO VARGAS MERINO	34	2,476	0.36%
219	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENTENA	88	6,614	0.35%
218	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,290	1.72%
217	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,764	2.04%
216	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. EMILIO M	60	6,965	1.91%
215	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	10,277	0.11%
214	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	39	6,108	0.51%
213	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CANS	185	9,679	0.77%
212	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MARIA C	124	8,499	1.49%
211	CLSSA000033	05 - COAHUILA DE ZARAGOZA	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	3,392	1.56%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2010 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ANGEL VENTURA NERI	30	3,321	0.21%
2	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	6,659	1.47%
3	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,439	2.68%
4	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,727	4.04%
5	PLSSA015551	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL DE ZACATLAN	45	5,785	0.10%
6	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCON	21	3,026	6.15%
7	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADEI	16	2,688	3.39%
8	TSSSA001562	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL CIVIL NUEVO LAREDO	47	3,720	0.16%
9	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,531	2.02%
10	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	7,031	0.61%
11	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	22	1,892	2.59%
12	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,628	0.38%
13	CLSSA000161	05 - COAHUILA DE ZARAGOZ.	007 - CUATRO CIENEGAS	HOSPITAL GENERAL CUATROCIENEGAS	27	663	4.37%
14	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,184	1.28%
15	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,387	1.62%
16	MCSSA015262	15 - MEXICO	052 - MALINALCO	HOSPITAL MUNICIPAL MALINALCO PEDRO ASCEI	12	1,477	0.47%
17	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	30	4,383	0.66%
18	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,732	2.37%
19	CLSSA001421	05 - COAHUILA DE ZARAGOZ.	033 - SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,253	0.49%
20	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVARO VII	107	4,934	0.28%
21	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	40	4,994	1.02%
22	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	4,828	0.93%
23	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	32	6,740	2.86%
25	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	3,817	0.45%
26	VZSSA007754	30 - VERACRUZ DE IGNACIO I	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	24	1,384	5.71%
27	TCSSA017420	27 - TABASCO	005 - COMALCALCO	HOSPITAL DR. DESIDERIO G. ROSADO CARBAJAL	42	6,387	1.96%
28	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	19,371	2.75%
29	CLSSA002710	05 - COAHUILA DE ZARAGOZ.	018 - MONCLOVA	HOSPITAL GENERAL MONCLOVA "AMPARO PAPI	38	3,567	3.73%
30	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DE L	HOSPITAL GENERAL CUNA DE LA INDEPENDENCI.	60	9,322	0.88%
31	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,330	1.02%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2010 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
230	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	24,570	0.11%
229	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	14,923	1.90%
228	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	11,316	0.07%
226	MNSSA001891	16 - MICHOACAN DE OCAMP	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,870	0.46%
225	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	9,415	1.65%
224	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	6,344	0.13%
223	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,067	0.63%
222	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,808	0.35%
221	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,497	0.10%
220	ZSSSA013143	32 - ZACATECAS	056 - ZACATECAS	HOSPITAL GENERAL ZACATECAS LUZ GONZALEZ (	120	6,257	0.96%
219	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	4,577	1.01%
217	MNSSA001722	16 - MICHOACAN DE OCAMP	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,565	0.40%
216	HGSSA015532	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	60	6,208	0.85%
215	VZSSA000310	30 - VERACRUZ DE IGNACIO I	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA CA	28	3,264	0.58%
214	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,792	1.17%
213	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,053	0.53%
212	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	9,520	0.55%
211	OCSSA020655	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	HG PUTLA AMIGO DEL NIÑO Y DE LA MADRE	30	2,809	1.42%
210	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	7,232	0.84%
209	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. EMILI(	60	6,870	1.62%
208	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO R	158	16,852	2.98%
207	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHITAN	HG JUCHITAN DR. MACEDONIO BENITEZ FUENTES	60	6,308	0.59%
206	VZSSA005106	30 - VERACRUZ DE IGNACIO I	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEOD(	27	1,982	2.17%
205	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	49	4,297	0.33%
204	NLSSA002972	19 - NUEVO LEON	038 - MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	30	2,861	3.71%
203	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CA	150	10,459	1.90%
202	CLSSA000033	05 - COAHUILA DE ZARAGOZ.	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	3,317	1.78%
199	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	105	10,687	1.21%
198	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMANGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDULFO	91	12,035	1.69%
197	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,398	4.88%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2011 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	C as % of Total Discharg
1	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,549	0.34%
2	MNSSA016475	16 - MICHOACAN DE OCAMPO	050 - MARAVATIO	HG MARAVATIO	30	4,944	0.10%
3	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGAN	58	7,224	1.43%
4	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	30	2,076	2.12%
5	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,318	3.11%
6	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,457	4.08%
7	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,579	2.80%
8	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALC	21	2,932	5.97%
9	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	90	5,182	2.39%
10	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,382	1.46%
11	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MOREN	29	4,479	2.21%
12	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	31	4,778	2.83%
13	SRSSA002085	26 - SONORA	055 - SAN LUIS RIO COLORADO	HOSPITAL GENERAL SAN LUIS RIO COLORA	28	3,685	1.90%
14	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ G	HOSPITAL REGIONAL YAHUALICA	30	3,125	0.70%
15	GTSSA017414	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL H	44	5,425	1.81%
16	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,533	2.15%
17	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DI	16	2,642	2.99%
18	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	30	6,787	2.59%
19	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA D	HOSPITAL GENERAL CUNA DE LA INDEPEN	60	9,275	0.98%
20	VZSSA004860	30 - VERACRUZ DE IGNACIO DE L	138 - RIO BLANCO	HOSPITAL REGIONAL RIO BLANCO	128	10,772	1.76%
21	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	21,279	3.00%
22	TCSSA017420	27 - TABASCO	005 - COMALCALCO	HOSPITAL DR. DESIDERIO G. ROSADO CAR	30	7,258	2.37%
23	TLSSA017925	29 - TLAXCALA	023 - NATIVITAS	HOSPITAL GENERAL DE NATIVITAS	30	740	1.89%
24	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIA	30	2,497	2.40%
25	JCSSA000165	14 - JALISCO	006 - AMECA	HOSPITAL REGIONAL DE AMECA	30	3,497	2.17%
26	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	50	6,857	0.64%
27	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAI	30	2,305	2.39%
28	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	51	4,452	1.19%
29	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	6,073	2.80%
30	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLART	61	8,885	0.26%

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Worst performing hospitals 2011 – cholecystectomy

RANKING	CLUES	STATE	MUNICIPALITY	HOSPITAL	HOSPITAL BEDS	TOTAL DISCHARGES	CHOLECYSTECTOMY %
235	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	108	5,209	0.19%
234	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALC	144	14,698	1.76%
233	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	21,478	0.34%
232	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	11,306	0.24%
231	MSSSA002373	17 - MORELOS	018 - TEMIXCO	HG DE TEMIXCO	30	1,439	0.42%
229	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ	133	12,800	0.09%
228	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	243	24,222	0.09%
227	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTAÑEDA	144	13,878	0.06%
226	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,422	0.31%
225	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	9,668	1.07%
224	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,782	1.29%
223	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	0.52%
222	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	7,181	3.09%
221	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	7,544	0.78%
220	VZSSA000310	30 - VERACRUZ DE IGNACIO DE L	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSI	28	3,103	0.48%
219	HGSSA015515	13 - HIDALGO	008 - APAN	HOSPITAL GENERAL DE APAN	30	2,607	2.76%
218	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	1.28%
217	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	4,754	0.13%
214	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR.	60	6,570	1.96%
213	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERN	158	17,641	3.16%
212	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQU	60	6,982	0.42%
211	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LEÑERO	107	4,375	5.17%
210	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN	60	5,559	1.60%
209	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,468	5.15%
208	ZSSSA013143	32 - ZACATECAS	056 - ZACATECAS	HOSPITAL GENERAL ZACATECAS LUZ GONZ	123	7,571	1.49%
207	NLSSA002972	19 - NUEVO LEON	038 - MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	30	3,314	4.19%
206	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	105	10,163	1.21%
205	CLSSA002734	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL DE SALTILLO	106	10,070	1.82%
203	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSA	124	8,646	1.75%
202	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,470	2.54%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2012 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds
1	JCSSA001326	14 - JALISCO	023 - ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38
2	TCSSA002003	27 - TABASCO	006 - CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30
3	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58
4	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCÓN	21
5	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAÚL A. CARRILLO	30
6	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119
7	GTSSA002760	11 - GUANAJUATO	023 - PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32
8	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30
9	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30
11	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADELFO S	16
12	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30
13	TCSSA000306	27 - TABASCO	002 - CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30
14	GTSSA002101	11 - GUANAJUATO	020 - LEÓN	HOSPITAL GENERAL REGIONAL DE LEÓN	189
15	MNSSA002813	16 - MICHOACÁN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	31
16	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDRO L. MEL	30
17	VZSSA007882	30 - VERACRUZ DE IGNACIO DE LA	116 - OLUTA	HOSPITAL GENERAL OLUTA GRAL MIGUEL ALEMÁN G	54
18	CMSSA001023	06 - COLIMA	009 - TECOMÁN	HOSPITAL GENERAL TECOMÁN	46
19	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DE LA IN	HOSPITAL GENERAL CUNA DE LA INDEPENDENCIA NA	60
20	SRSSA001670	26 - SONORA	042 - NAVOJOA	HOSPITAL GENERAL NAVOJOA	63
21	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	50
22	MNSSA016521	16 - MICHOACÁN DE OCAMPO	075 - LOS REYES	HG LOS REYES	30
23	GTSSA017414	11 - GUANAJUATO	002 - ACÁMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL HIDALGO	60
24	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30
25	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30
26	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	30
27	MCSSA006430	15 - MÉXICO	088 - TENANCINGO	H.G. TENANCINGO	60
28	VZSSA007730	30 - VERACRUZ DE IGNACIO DE LA	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	61
29	GRSSA000034	12 - GUERRERO	001 - ACAPULCO DE JUÁREZ	HOSP. GRAL. RENACIMIENTO	61
30	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30

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Worst performing hospitals 2012 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
236	DFSSA018154	09 - DISTRITO FEDERAL	011 - TLÁHUAC	HOSPITAL GENERAL TLÁHUAC	120	6,712	0.07%
235	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	23,300	0.12%
234	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,774	0.30%
233	CHSSA001801	08 - CHIHUAHUA	037 - JUÁREZ	HG JUÁREZ	119	5,320	0.36%
232	MCSSA010292	15 - MÉXICO	058 - NEZAHUALCÓYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	13,426	2.49%
231	CSSSA018764	07 - CHIAPAS	078 - SAN CRISTÓBAL DE LAS CASAS	HOSPITAL DE LAS CULTURAS SAN CRISTOBAL DE LAS (	65	5,439	0.24%
230	VZSSA000310	30 - VERACRUZ DE IGNACIO DE L/	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA CAMA(	28	3,091	0.58%
229	CHSSA001755	08 - CHIHUAHUA	036 - JIMÉNEZ	HG DE JIMÉNEZ	15	2,028	0.25%
228	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CANSE	150	9,708	1.44%
227	MNSSA001891	16 - MICHOACÁN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	19,554	0.39%
226	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBÉN LEÑERO	107	4,735	6.29%
225	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	11,848	1.43%
223	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,052	0.61%
221	NLSSA004046	19 - NUEVO LEÓN	046 - SAN NICOLÁS DE LOS GARZA	HOSPITAL METROPOLITANO	238	15,140	5.32%
220	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	31	8,883	0.78%
219	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	1,889	0.42%
218	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	6,436	0.70%
217	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZÁLEZ GUEVARA	133	11,987	0.15%
216	SLSSA001540	25 - SINALOA	012 - MAZATLÁN	HOSPITAL GENERAL DE MAZATLÁN	96	7,848	0.80%
215	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	8,221	0.34%
214	MCSSA007265	15 - MÉXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	9,372	2.40%
213	PLSSA016806	21 - PUEBLA	085 - IZÚCAR DE MATAMOROS	HOSPITAL GENERAL DE IZUCAR DE MATAMOROS	49	4,227	0.24%
212	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAM(	158	17,754	2.39%
211	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSÉ MARÍA C/	124	8,609	1.88%
210	ZSSSA013143	32 - ZACATECAS	056 - ZACATECAS	HOSPITAL GENERAL ZACATECAS LUZ GONZÁLEZ COSI	120	7,900	0.73%
209	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTÓN	HOSPITAL GENERAL DE CHAMPOTÓN	12	1,792	1.23%
208	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. EMILIO M/	60	6,310	2.25%
207	VZSSA002393	30 - VERACRUZ DE IGNACIO DE L/	071 - HUATUSCO	HOSPITAL GENERAL HUATUSCO DR. DARÍO MENDEZ L	30	3,384	0.71%
206	VZSSA005106	30 - VERACRUZ DE IGNACIO DE L/	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEODORO	24	2,349	1.32%
205	SPSSA000752	24 - SAN LUIS POTOSÍ	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,743	0.24%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2013 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	BSSSA000595	BAJA CALIFORNIA SUR	LOS CABOS	HOSPITAL GENERAL RAÚL A. CARRILLO	30	2,396	1.46%
2	GTSSA000310	GUANAJUATO	SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL SAN MIGUEL ALLENDE¨ FE	63	7,224	2.12%
3	TCSSA002003	TABASCO	CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,290	3.64%
4	MNSSA002813	MICHOACÁN DE OCAMPO	SAHUAYO	HG SAHUAYO	31	4,234	4.16%
5	JCSSA007054	JALISCO	ZAPOPAN	HOSPITAL GENERAL DE ZAPOPAN (CIVIL)	20	1,734	2.48%
6	JCSSA000631	JALISCO	AUTLÁN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,221	0.38%
7	CMSSA001023	COLIMA	TECOMÁN	HOSPITAL GENERAL TECOMÁN	46	5,197	1.64%
8	JCSSA001326	JALISCO	ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38	7,264	0.91%
9	JCSSA013815	JALISCO	LA BARCA	HOSPITAL REGIONAL LA BARCA	58	7,743	3.68%
10	GRSSA000034	GUERRERO	ACAPULCO DE JUÁREZ	HOSP. GRAL. RENACIMIENTO	60	7,416	2.39%
11	TSSSA018951	TAMAULIPAS	VALLE HERMOSO	HG HOSPITAL GENERAL VALLE HERMOSO DR. R	23	3,072	7.42%
12	QTSSA012935	QUERÉTARO	SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	92	9,216	2.21%
13	VZSSA007882	VERACRUZ DE IGNACIO DE LA LLA	OLUTA	HOSPITAL GENERAL OLUTA GRAL MIGUEL ALEN	54	3,222	0.25%
14	GTSSA002101	GUANAJUATO	LEÓN	HOSPITAL GENERAL LEÓN	221	20,648	2.77%
15	GTSSA003361	GUANAJUATO	SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,228	3.00%
16	SRSSA001670	SONORA	NAVOJOA	HOSPITAL GENERAL NAVOJOA	63	5,271	1.29%
17	CMSSA000125	COLIMA	COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	10,962	1.15%
18	GTSSA017414	GUANAJUATO	ACÁMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL HIDA	60	6,009	2.10%
19	DGSSA000116	DURANGO	CUENCAMÉ	HOSPITAL REGIONAL DE CUENCAME	27	1,527	1.64%
20	GTSSA001290	GUANAJUATO	DOLORES HIDALGO CUNA DE LA	HOSPITAL GENERAL DOLORES HIDALGO ¨ CUNA	60	7,390	1.80%
21	JCSSA003250	JALISCO	LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,553	1.43%
22	CLSSA000161	COAHUILA DE ZARAGOZA	CUATRO CIÉNEGAS	HOSPITAL GENERAL CUATROCIÉNEGAS	18	675	3.41%
23	HGSSA015520	HIDALGO	HUEJUTLA DE REYES	HOSPITAL GENERAL DE LA HUASTECA	30	5,602	1.96%
24	TCSSA000306	TABASCO	CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,011	1.75%
26	VZSSA004860	VERACRUZ DE IGNACIO DE LA LLA	RÍO BLANCO	HOSPITAL REGIONAL RÍO BLANCO	133	11,477	1.81%
27	HGSSA004093	HIDALGO	TULANCINGO DE BRAVO	HOSPITAL GENERAL TULANCINGO	60	10,226	0.11%
28	MCSSA006430	MÉXICO	TENANCINGO	H.G. TENANCINGO	60	5,465	0.29%
30	JCSSA005584	JALISCO	TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,612	1.66%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2013 – cholecystectomy

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
239	CHSSA001801	CHIHUAHUA	JUÁREZ	HG JUÁREZ	119	5,594	0.34%
238	JCSSA007066	JALISCO	ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	25,227	0.10%
237	SRSSA001110	SONORA	HERMOSILLO	HOSPITAL GENERAL DEL ESTADO DR. ERNESTO	158	15,224	1.92%
236	ZSSSA013143	ZACATECAS	ZACATECAS	HOSPITAL GENERAL ZACATECAS LUZ GONZÁLE	120	9,109	0.75%
235	MNSSA001891	MICHOACÁN DE OCAMPO	MORELIA	HG DR. MIGUEL SILVA	219	18,534	0.35%
234	CHSSA000676	CHIHUAHUA	CHIHUAHUA	HG CENTRAL DEL ESTADO	120	9,990	1.59%
233	MCSSA010292	MÉXICO	NEZAHUALCÓYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYC	144	12,515	2.78%
232	NLSSA004046	NUEVO LEÓN	SAN NICOLÁS DE LOS GARZA	HOSPITAL METROPOLITANO	266	16,214	4.31%
231	MCSSA007661	MÉXICO	TOLUCA	H.G. DR. NICOLÁS SAN JUAN	144	11,616	1.10%
230	CCSSA000363	CAMPECHE	CARMEN	H.G. MA. SOCORRO QUIROGA AGUILAR	47	5,707	0.54%
229	DFSSA000881	DISTRITO FEDERAL	GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	5,801	0.47%
227	PLSSA015230	PUEBLA	PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICEN	120	12,089	0.24%
226	TSSSA002431	TAMAULIPAS	TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS	150	9,520	1.90%
225	PLSSA004404	PUEBLA	TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,008	0.25%
224	DFSSA001540	DISTRITO FEDERAL	IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,548	0.26%
223	TSSSA001772	TAMAULIPAS	REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSÉ MA	120	8,713	1.79%
222	JCSSA002224	JALISCO	GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA JUAN I. MEI	476	31,500	2.33%
221	PLSSA001645	PUEBLA	HUEJOTZINGO	HOSPITAL GENERAL HUEJOTZINGO	30	3,637	0.27%
220	CSSSA002611	CHIAPAS	HUIXTLA	HOSPITAL GENERAL HUIXTLA	31	8,555	0.90%
219	CCSSA000544	CAMPECHE	CHAMPOTÓN	HOSPITAL GENERAL DE CHAMPOTÓN	13	1,605	1.18%
218	VZSSA005106	VERACRUZ DE IGNACIO DE LA LLA	SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEC	24	1,826	1.53%
217	GTSSA000766	GUANAJUATO	CELAYA	HOSPITAL GENERAL CELAYA	143	12,567	1.42%
216	CLSSA002734	COAHUILA DE ZARAGOZA	SALTILLO	HOSPITAL GENERAL DE SALTILLO	106	11,013	2.41%
215	CLSSA000033	COAHUILA DE ZARAGOZA	ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	3,173	1.67%
214	PLSSA016806	PUEBLA	IZÚCAR DE MATAMOROS	HOSPITAL GENERAL DE IZUCAR DE MATAMORO	45	4,984	0.30%
213	QRSSA000373	QUINTANA ROO	OTHÓN P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	4,399	4.59%
212	NLSSA002972	NUEVO LEÓN	MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	32	2,791	4.01%
211	VZSSA000310	VERACRUZ DE IGNACIO DE LA LLA	ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA (	28	2,810	0.82%
210	HGSSA015532	HIDALGO	TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	60	6,074	1.28%
209	DFSSA018166	DISTRITO FEDERAL	TLALPAN	HOSPITAL GENERAL AJUSCO MEDIO	69	7,149	0.53%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Appendix 5.3.3 Inguinal Hernia Repair

Best performing hospitals 2005

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,584	4.35%
2	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	90	5,045	1.47%
3	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	8,714	1.26%
4	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	36	3,458	1.01%
5	VZSSA004744	30 - VERACRUZ DE IGNACIO DE L	131 - POZA RICA DE HIDALGO	HOSPITAL REGIONAL POZA RICA DE HIDALGO	100	8,579	1.31%
6	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	100	7,149	2.35%
7	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	2,296	0.57%
8	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	20	1,779	0.84%
9	VZSSA003361	30 - VERACRUZ DE IGNACIO DE L	102 - MARTINEZ DE LA TORRE	HOSPITAL GENERAL MARTINEZ DE LA TORRE MAI	47	5,653	1.54%
10	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,405	1.02%
11	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	34	4,281	0.72%
12	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,152	1.05%
13	CHSSA001755	08 - CHIHUAHUA	036 - JIMENEZ	HG DE JIMENEZ	12	1,683	0.30%
14	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	114	9,181	1.37%
15	CLSSA001614	05 - COAHUILA DE ZARAGOZA	035 - TORREON	HOSPITAL GENERAL TORREON	42	4,835	0.62%
16	MCSSA004791	15 - MEXICO	065 - OTUMBA	HOSPITAL MUNICIPAL OTUMBA BICENTENARIO	18	707	0.85%
17	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,550	1.29%
18	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,266	0.55%
19	CLSSA000050	05 - COAHUILA DE ZARAGOZA	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	24	725	0.97%
20	GRSSA000022	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HG. COL. PROGRESO (CAAPS)	21	2,445	0.29%
21	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,465	1.84%
22	TCSSA001052	27 - TABASCO	004 - CENTRO	HOSPITAL REGIONAL DE ALTA ESPECIALIDAD DR.	139	16,913	0.56%
23	VZSSA007730	30 - VERACRUZ DE IGNACIO DE L	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	61	4,492	1.31%
24	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,927	1.20%
25	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,032	1.54%
26	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,533	1.17%
27	VZSSA005106	30 - VERACRUZ DE IGNACIO DE L	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEOD	24	1,820	2.64%
28	VZSSA003163	30 - VERACRUZ DE IGNACIO DE L	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN DEL I	16	280	6.43%
29	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,421	0.91%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2005 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
249	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	54	328	8.84%
248	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	123	3,905	0.38%
247	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,042	2.02%
246	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,244	0.72%
245	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,626	0.84%
244	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	10,804	0.73%
243	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,388	1.30%
242	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERC	PUTLA VILLA DE GUERRERO.	30	1,667	1.08%
241	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUITAL I)	30	3,013	1.16%
240	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDULFO	90	9,699	0.62%
239	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	60	3,837	1.30%
238	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	70	6,334	0.27%
237	TSSSA001550	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREDO	70	4,112	1.02%
236	NTSSA002084	18 - NAYARIT	020 - BAHIA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	2,578	2.44%
235	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MARI	124	9,333	0.94%
234	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	8,381	1.61%
233	VZSSA005560	30 - VERACRUZ DE IGNACIO DE L	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,493	0.88%
232	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCH	HG JUCHITAN DR. MACEDONIO BENITEZ FUENTE:	60	3,469	0.63%
231	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDEI	DR. JORGE SOBERON ACEVEDO	60	4,939	1.03%
230	VZSSA006972	30 - VERACRUZ DE IGNACIO DE L	193 - VERACRUZ	HOSPITAL DE ALTA ESPECIALIDAD DE VERACRUZ	281	12,455	0.27%
229	HGSSA003953	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL TULA	30	3,181	1.19%
228	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	7,492	1.68%
226	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIERREZ	60	4,131	1.04%
225	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	41	3,327	0.84%
224	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,645	0.98%
223	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CA	185	12,959	0.63%
222	TSSSA001784	28 - TAMAULIPAS	032 - REYNOSA	HG HOSP CIVIL DR MIGUEL A RIVERA T	41	2,339	0.56%
221	MCSSA002184	15 - MEXICO	033 - ECATEPEC DE MORELOS	H.G. DR. JOSE MARIA RODRIGUEZ	144	8,400	0.99%
219	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXT	HG TUXTEPEC	30	2,953	1.59%
218	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,367	1.02%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2006 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	134	5,649	2.07%
2	MNSSA003735	16 - MICHOACaN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	8,472	1.03%
3	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	42	3,496	3.29%
4	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,956	1.87%
5	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. AD	15	2,377	2.10%
6	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,082	1.33%
7	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,468	0.53%
8	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,616	0.68%
9	ASSSA000404	01 - AGUASCALIENTES	003 - CALVILLO	HOSPITAL GENERAL CALVILLO	30	2,132	1.74%
10	VZSSA003163	30 - VERACRUZ DE IGNACIO DE L	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN DE	16	309	2.59%
11	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	28	2,117	1.13%
12	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,624	1.63%
13	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,586	0.85%
14	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBRN LENERO	121	4,628	1.32%
15	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	60	4,938	0.81%
16	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	90	5,438	1.66%
17	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	10,214	1.35%
18	SRSSA002295	26 - SONORA	066 - URES	HOSPITAL COMUNITARIO URES	18	382	1.57%
19	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	21	2,252	1.55%
20	MCSSA000871	15 - MEXICO	009 - AMECAMECA	H.G. AMECAMECA	30	2,737	0.99%
21	TLSSA000483	29 - TLAXCALA	013 - HUAMANTLA	H.G. HUAMANTLA	36	5,436	0.99%
22	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,728	1.17%
23	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,907	1.66%
24	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	30	2,845	0.49%
25	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ALVAREZ	HG CHILAPA DE ALVAREZ	30	2,232	0.67%
26	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,624	1.54%
27	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,772	1.04%
28	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	3,552	1.13%
29	SRSSA001583	26 - SONORA	036 - MAGDALENA	HOSPITAL COMUNITARIO MAGDALENA	20	971	0.82%
30	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,285	1.19%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2006 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
261	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	54	229	9.61%
260	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	32	3,407	0.59%
259	SRSSA001612	26 - SONORA	038 - MOCTEZUMA	HOSPITAL COMUNITARIO MOCTEZUMA	16	691	0.72%
258	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	41	3,175	0.72%
257	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	7,836	1.67%
256	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYO	144	2,427	0.54%
255	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	123	5,584	0.73%
254	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUITAL	30	3,083	1.10%
253	TSSSA000850	28 - TAMAULIPAS	021 - EL MANTE	HG HOSP CIVIL DR VIRGILIO R HINOJOSA	37	5,210	1.04%
252	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	6,375	0.86%
251	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	60	3,664	1.09%
250	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,463	0.83%
249	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDULF	90	10,307	0.69%
248	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTE	HG TUXTEPEC	30	3,039	1.94%
247	NLSSA002972	19 - NUEVO LEON	038 - MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	30	2,550	1.25%
246	MCSSA002435	15 - MEXICO	035 - HUEHUETOCA	HOSPITAL MUNICIPAL HUEHUETOCA	18	1,024	1.37%
245	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,296	0.48%
244	MCSSA005730	15 - MEXICO	082 - TEJUPILCO	HOSPITAL GENERAL MIGUEL HIDALGO Y COSTIL	40	3,806	1.39%
243	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	7,983	0.19%
242	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	10,923	0.96%
240	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	11,657	0.95%
238	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	8,262	1.26%
237	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDEN	DR. JORGE SOBERON ACEVEDO	60	5,131	1.25%
236	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHIT	HG JUCHITAN DR. MACEDONIO BENITEZ FUENT	60	3,734	0.48%
235	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	19,348	0.12%
234	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	217	15,664	0.67%
233	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	10,035	0.97%
231	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	33	3,529	0.62%
230	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	103	8,989	0.85%
229	TSSSA001550	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREDO	70	3,617	1.11%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2007 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	10,226	1.06%
2	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,983	1.26%
3	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,316	1.37%
4	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,702	0.37%
5	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,832	2.01%
6	TLSSA000483	29 - TLAXCALA	013 - HUAMANTLA	H.G. HUAMANTLA	30	5,198	0.96%
7	OCSSA016764	20 - OAXACA	014 - CIUDAD IXTEPEC	HG CIUDAD IXTEPEC	30	1,466	0.89%
8	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. AD	15	2,914	0.93%
9	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,998	1.15%
10	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,884	1.19%
11	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	4,476	0.96%
12	GRSSA000022	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HG. COL. PROGRESO (CAAPS)	21	2,426	0.25%
13	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	103	5,979	2.29%
14	VZSSA003163	30 - VERACRUZ DE IGNACIO DE I	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN DEI	16	300	4.00%
15	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ G/	HOSPITAL REGIONAL YAHUALICA	30	1,125	0.98%
16	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,151	1.14%
17	MCSSA010246	15 - MEXICO	087 - TEMOAYA	HOSPITAL MUNICIPAL TEMOAYA	19	2,605	0.81%
18	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ALVAREZ	HG CHILAPA DE ALVAREZ	30	2,433	0.95%
19	MCSSA006920	15 - MEXICO	099 - TEXCOCO	H.G. DR. JULIAN VILLARREAL	10	1,414	0.57%
20	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,942	1.09%
21	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	7,004	0.97%
22	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	10,685	1.19%
23	CHSSA001026	08 - CHIHUAHUA	021 - DELICIAS	HG DELICIAS	52	6,998	0.13%
24	NTSSA000800	18 - NAYARIT	010 - ROSAMORADA	HOSPITAL GENERAL ROSAMORADA	40	2,808	0.85%
25	MCSSA009826	15 - MEXICO	081 - TECAMAC	HOSPITAL MUNICIPAL TECAMAC "LIC. CESAR C/	18	1,648	0.30%
26	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,035	0.77%
27	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	61	7,923	0.67%
28	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	17,133	0.89%
29	TLSSA001376	29 - TLAXCALA	038 - TZOMPANTEPEC	H.G.R. EMILIO SANCHEZ PIEDRAS	60	8,892	1.21%
30	VZSSA001121	30 - VERACRUZ DE IGNACIO DE I	038 - COATEPEC	HOSPITAL DE LA COMUNIDAD COATEPEC	16	1,694	0.89%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2007 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
258	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	46	193	12.44%
257	MCSSA002435	15 - MEXICO	035 - HUEHUETOCA	HOSPITAL MUNICIPAL HUEHUETOCA	18	1,623	1.17%
256	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	7,604	0.59%
255	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	5,023	1.06%
254	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	63	3,769	1.14%
253	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	111	8,887	1.22%
252	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	100	8,355	0.12%
251	CLSSA001124	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL SALTILLO	40	5,505	0.11%
250	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	189	6,655	2.34%
249	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MAI	124	9,568	0.66%
248	GRSSA001813	12 - GUERRERO	012 - AYUTLA DE LOS LIBRES	HOSPITAL GENERAL DE AYUTLA	20	2,302	0.48%
247	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	9,447	0.92%
246	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,061	0.86%
245	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS (	185	12,194	0.57%
244	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,044	0.44%
243	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDULF(	90	11,131	0.65%
242	CCSSA000964	04 - CAMPECHE	009 - ESCARCEGA	HOSPITAL GENERAL DE ESCARCEGA	22	2,526	1.15%
241	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDRO L	33	3,653	0.99%
240	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	30	4,800	0.40%
239	MNSSA000170	16 - MICHOACAN DE OCAMPO	006 - APATZINGAN	HG RAMON PONCE ALVAREZ	39	2,811	1.89%
238	GRSSA004350	12 - GUERRERO	034 - HUITZUCO DE LOS FIGUEROA	HOSPITAL GENERAL DE HUITZUCO	30	2,040	2.11%
237	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,356	0.71%
236	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACIC	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,347	0.60%
235	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUITAL	30	3,511	0.74%
234	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTON O'HORAN	238	16,062	0.35%
233	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	27	671	1.64%
232	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	30	4,105	1.02%
231	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,239	0.94%
229	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHIT.	HG JUCHITAN DR. MACEDONIO BENITEZ FUENT	60	4,551	0.92%
228	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYO'	144	11,516	1.32%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2008 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,694	1.51%
2	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	11,328	0.98%
3	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,052	1.06%
4	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	32	2,160	0.88%
5	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,500	0.88%
6	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,183	2.06%
7	MCSSA010111	15 - MEXICO	001 - ACAMBAY	HOSPITAL MUNICIPAL ACAMBAY "IGNACIO ALL	18	2,620	0.38%
8	BCSSA017590	02 - BAJA CALIFORNIA	005 - PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	30	2,677	0.37%
9	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	32	4,077	1.05%
10	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	6,561	1.55%
11	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	27	1,440	1.18%
12	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,235	1.82%
13	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	108	11,599	1.03%
14	TLSSA000483	29 - TLAXCALA	013 - HUAMANTLA	H.G. HUAMANTLA	30	5,284	0.62%
15	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MEI	476	34,314	1.28%
16	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	45	3,742	0.83%
17	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	160	17,984	0.96%
18	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,308	1.37%
19	NTSSA002166	18 - NAYARIT	015 - SANTIAGO IXCUINTLA	HOSPITAL GENERAL SANTIAGO IXCUINTLA	22	4,378	1.26%
20	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	104	20,451	0.68%
21	VZSSA007754	30 - VERACRUZ DE IGNACIO DE	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	1,499	4.14%
22	GRSSA000022	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HG. COL. PROGRESO (CAAPS)	21	2,352	0.26%
23	DGSSA001895	10 - DURANGO	032 - SANTIAGO PAPASQUIARO	HOSPITAL GRAL. A SANTIAGO PAPASQUIARO	30	2,626	0.61%
24	VZSSA007730	30 - VERACRUZ DE IGNACIO DE	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	63	4,360	0.62%
25	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	59	8,510	0.72%
26	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	5,276	1.35%
27	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	6,085	1.35%
28	TLSSA001376	29 - TLAXCALA	038 - TZOMPANTEPEC	H.G.R. EMILIO SANCHEZ PIEDRAS	60	9,012	1.52%
29	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,514	1.05%
30	TCSSA001665	27 - TABASCO	005 - COMALCALCO	HOSPITAL GENERAL DE COMALCALCO	30	4,938	1.42%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2008 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
259	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENT	75	2,771	0.58%
258	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	63	3,735	1.02%
257	MCSSA002435	15 - MEXICO	035 - HUEHUETOCA	HOSPITAL MUNICIPAL HUEHUETOCA	18	1,869	1.12%
256	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,687	1.66%
255	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	5,872	1.41%
254	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICA	HG CUICATLAN DR. ALBERTO VARGAS MERINO	30	2,288	1.35%
253	VZSSA002434	30 - VERACRUZ DE IGNACIO DE	072 - HUAYACOCOTLA	HOSPITAL DE LA COMUNIDAD DE HUAYACOCO	11	797	2.13%
252	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHI	HG JUCHITAN DR. MACEDONIO BENITEZ FUENT	60	5,350	0.97%
251	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MA	124	9,248	0.71%
250	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	11,583	1.04%
248	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	18,815	0.81%
247	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	4,204	0.67%
246	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	9,998	1.13%
245	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	27	646	1.24%
244	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	26	2,450	0.57%
243	TSSSA001550	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREDO	70	3,758	0.93%
242	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,936	0.56%
241	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KU	68	10,980	0.29%
240	CCSSA000964	04 - CAMPECHE	009 - ESCARCEGA	HOSPITAL GENERAL DE ESCARCEGA	22	2,511	1.04%
239	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	18,151	0.47%
238	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,997	0.80%
237	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS	185	11,708	0.79%
236	BSSSA000011	03 - BAJA CALIFORNIA SUR	001 - COMONDU	HOSPITAL GENERAL RENE THOMAS GUIJOSA H	25	2,133	1.13%
234	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	1,909	1.89%
233	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	2,334	0.81%
232	VZSSA000310	30 - VERACRUZ DE IGNACIO DE	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA C	26	3,005	0.90%
230	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,730	0.92%
229	NTSSA002084	18 - NAYARIT	020 - BAHIA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	3,198	1.44%
228	MNSSA000170	16 - MICHOACAN DE OCAMPO	006 - APATZINGAN	HG RAMON PONCE ALVAREZ	39	3,295	1.85%
227	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYO	144	13,391	1.15%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2009 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,403	1.39%
2	MNSSA003735	16 - MICHOACaN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	11,184	0.77%
3	JCSSA007054	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE ZAPOPAN (CIVIL)	18	2,123	0.28%
4	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,585	1.07%
5	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	3,640	0.77%
6	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,765	0.89%
7	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,201	1.43%
8	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. ME	476	34,622	1.34%
9	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,016	1.39%
10	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	30	2,363	1.06%
11	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	55	6,266	0.45%
12	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	45	4,234	1.28%
13	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	4,866	1.11%
14	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	59	8,674	0.67%
15	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,625	1.10%
16	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	7,448	0.98%
17	CLSSA000581	05 - COAHUILA DE ZARAGOZA	018 - MONCLOVA	HOSPITAL GENERAL MONCLOVA	21	4,842	0.74%
18	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,572	1.93%
19	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,474	1.83%
20	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA I	HOSPITAL GENERAL CUNA DE LA INDEPENDEN(	60	9,055	0.57%
21	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	17,679	0.76%
22	HGSSA015515	13 - HIDALGO	008 - APAN	HOSPITAL GENERAL DE APAN	30	2,420	0.41%
23	VZSSA006313	30 - VERACRUZ DE IGNACIO DE LA	174 - TIERRA BLANCA	HOSPITAL GENERAL DE TIERRA BLANCA JESUS (	30	3,431	1.17%
24	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,731	1.02%
25	VZSSA007730	30 - VERACRUZ DE IGNACIO DE LA	193 - VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	61	5,082	0.98%
26	DFSSA002066	09 - DISTRITO FEDERAL	009 - MILPA ALTA	HOSPITAL GENERAL MILPA ALTA	44	6,017	1.98%
27	NTSSA000800	18 - NAYARIT	010 - ROSAMORADA	HOSPITAL GENERAL ROSAMORADA	40	2,942	0.58%
28	MCSSA004791	15 - MEXICO	065 - OTUMBA	HOSPITAL MUNICIPAL OTUMBA BICENTENARIC	12	2,084	1.49%
29	MCSSA001682	15 - MEXICO	025 - CHALCO	HOSPITAL GENERAL DE CHALCO	60	6,698	0.78%
30	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	7,111	0.80%

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Worst performing hospitals 2009 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
272	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	16,575	0.28%
271	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	59	4,104	0.85%
270	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	5,203	0.50%
269	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	70	3,697	1.19%
267	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR. A	138	9,014	0.16%
266	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,462	0.97%
265	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	6,702	1.45%
264	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,055	1.65%
263	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	6,080	0.90%
262	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHI	HG JUCHITAN DR. MACEDONIO BENITEZ FUENT	60	5,641	0.96%
261	SRSSA001011	26 - SONORA	029 - GUAYMAS	HOSPITAL GENERAL GUAYMAS	37	3,226	0.62%
260	HGSSA015520	13 - HIDALGO	028 - HUEJUTLA DE REYES	HOSPITAL GENERAL DE LA HUASTECA	30	2,844	0.35%
259	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MA	124	8,499	0.58%
258	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	27	636	2.04%
257	VZSSA000310	30 - VERACRUZ DE IGNACIO DE LA	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA C	28	2,943	1.56%
256	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	10,277	0.54%
254	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	7,795	0.85%
253	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,265	0.75%
252	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. EMI	60	6,965	0.76%
251	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICA	HG CUICATLAN DR. ALBERTO VARGAS MERINO	34	2,476	1.33%
250	OCSSA000524	20 - OAXACA	039 - HEROICA CIUDAD DE HUAJ	HG HUAJUAPAN ENF. MARIA DEL PILAR SANCH	29	3,644	0.99%
249	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,764	0.74%
248	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TEO	25	2,032	1.43%
247	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	3,406	0.65%
246	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	5,624	1.03%
245	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUITAL	60	5,700	0.82%
244	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDEI	DR. JORGE SOBERON ACEVEDO	62	6,645	0.74%
243	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,910	0.41%
242	MCSSA010292	15 - MEXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYO	144	13,416	1.02%
241	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,641	0.91%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2010 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,732	1.48%
2	MNSSA003735	16 - MICHOACaN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	11,082	0.82%
3	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	104	15,272	1.05%
4	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ	139	4,422	1.40%
5	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	6,659	0.62%
6	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,497	0.89%
7	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,827	1.11%
8	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. I	476	33,677	1.15%
9	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,986	1.10%
10	QRSSA000011	23 - QUINTANA ROO	001 - COZUMEL	HOSPITAL GENERAL DE COZUMEL	30	2,217	0.23%
11	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,727	0.78%
12	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA I	HOSPITAL GENERAL CUNA DE LA INDEPENDE	60	9,322	0.57%
13	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	80	6,253	1.90%
14	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,439	1.60%
15	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,387	0.97%
16	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	4,828	1.08%
17	CLSSA001421	05 - COAHUILA DE ZARAGOZA	033 - SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,253	0.27%
18	MCSSA009826	15 - MEXICO	081 - TECAMAC	HOSPITAL MUNICIPAL TECAMAC "LIC. CESAF	18	1,536	0.46%
19	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,185	0.93%
20	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	61	8,499	0.84%
21	VZSSA006313	30 - VERACRUZ DE IGNACIO DE L/	174 - TIERRA BLANCA	HOSPITAL GENERAL DE TIERRA BLANCA JESU	30	3,021	0.70%
22	MNSSA016475	16 - MICHOACAN DE OCAMPO	050 - MARAVATIO	HG MARAVATIO	30	4,791	1.27%
23	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,459	1.59%
24	TSSSA000401	28 - TAMAULIPAS	009 - CIUDAD MADERO	HG HOSPITAL GENERAL CIVIL CIUDAD MADEI	84	7,808	1.13%
25	SPSSA017301	24 - SAN LUIS POTOSI	028 - SAN LUIS POTOSI	HOSPITAL DEL NINO Y LA MUJER DR. ALBERT	90	9,979	0.05%
26	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	86	6,205	1.10%
27	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,628	1.05%
28	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	1,787	1.45%
29	CLSSA002466	05 - COAHUILA DE ZARAGOZA	020 - MUZQUIZ	HOSPITAL GENERAL MUZQUIZ	25	2,804	0.39%
30	MCSSA000871	15 - MEXICO	009 - AMECAMECA	H.G. AMECAMECA	30	2,982	0.77%

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Worst performing hospitals 2010 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
269	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,792	0.45%
268	GRSSA005762	12 - GUERRERO	046 - OMETEPEC	HOSPITAL GENERAL OMETEPEC	59	4,171	0.79%
267	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,079	0.20%
266	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NAC	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,462	0.84%
265	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	70	3,795	1.26%
264	VZSSA003163	30 - VERACRUZ DE IGNACIO DE LA	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN I	17	276	3.62%
263	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	15,860	0.44%
262	PLSSA016543	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO	30	4,275	0.63%
261	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	4,577	0.50%
260	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,053	1.93%
259	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,656	1.01%
258	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,565	0.56%
257	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	9,520	0.45%
256	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,732	0.58%
255	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,870	0.78%
254	SRSSA001011	26 - SONORA	029 - GUAYMAS	HOSPITAL GENERAL GUAYMAS	37	3,263	0.46%
253	NLSSA001263	19 - NUEVO LEON	017 - GALEANA	HOSPITAL GENERAL GALEANA	28	1,402	1.43%
252	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGUEZ	HOSPITAL GENERAL MARIA IGNACIA GANDU	91	12,035	0.61%
251	VZSSA005106	30 - VERACRUZ DE IGNACIO DE LA	143 - SANTIAGO TUXTLA	HOSPITAL GENERAL DE SANTIAGO TUXTLA TI	27	1,982	1.51%
250	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDEI	DR. JORGE SOBERON ACEVEDO	62	6,899	0.87%
249	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	108	5,685	2.06%
248	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. EI	60	6,870	0.63%
247	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	105	10,687	0.81%
246	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	1,951	1.23%
244	VZSSA000310	30 - VERACRUZ DE IGNACIO DE LA	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA	28	3,264	0.83%
243	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE M	124	8,391	0.76%
241	OCSSA020655	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	HG PUTLA AMIGO DEL NINO Y DE LA MADRE	30	2,809	0.82%
240	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN T	60	6,074	0.43%
239	VZSSA001355	30 - VERACRUZ DE IGNACIO DE LA	044 - CORDOBA	HOSPITAL GENERAL CORDOBA YANGA	75	8,708	0.82%
238	OCSSA000524	20 - OAXACA	039 - HEROICA CIUDAD DE HUAJ	HG HUAJUAPAN ENF. MARIA DEL PILAR SAN	29	3,658	0.52%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2011 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	93	11,610	0.98%
2	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	29	4,479	1.21%
3	MCSSA006430	15 - MEXICO	088 - TENANCINGO	H.G. TENANCINGO	60	4,294	1.91%
4	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	80	6,808	2.13%
5	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,568	1.32%
6	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,224	0.82%
7	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,549	1.14%
8	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,331	1.01%
9	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ	119	6,145	2.12%
10	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,147	0.68%
11	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,382	1.10%
12	MNSSA002813	16 - MICHOACAN DE OCAMPO	076 - SAHUAYO	HG SAHUAYO	31	4,778	0.94%
13	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	4,457	1.08%
14	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,928	1.36%
15	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,579	1.43%
16	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	98	16,359	0.89%
17	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ALVAREZ	HG CHILAPA DE ALVAREZ	28	3,886	0.39%
18	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA D	HOSPITAL GENERAL CUNA DE LA INDEPENDI	60	9,275	0.60%
19	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	61	8,885	0.91%
20	SRSSA018313	26 - SONORA	033 - HUATABAMPO	HOSPITAL GENERAL DEL BAJO RIO MAYO	31	2,480	0.36%
21	MNSSA016475	16 - MICHOACAN DE OCAMPO	050 - MARAVATIO	HG MARAVATIO	30	4,944	1.70%
22	TLSSA017925	29 - TLAXCALA	023 - NATIVITAS	HOSPITAL GENERAL DE NATIVITAS	30	740	0.81%
23	TSSSA018514	28 - TAMAULIPAS	003 - ALTAMIRA	HG HOSPITAL GENERAL ALTAMIRA DR RODC	60	804	0.62%
24	TCSSA017420	27 - TABASCO	005 - COMALCALCO	HOSPITAL DR. DESIDERIO G. ROSADO CARB/	30	7,258	1.01%
25	NTSSA002166	18 - NAYARIT	015 - SANTIAGO IXCUINTLA	HOSPITAL GENERAL SANTIAGO IXCUINTLA	22	3,652	1.10%
26	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I.	476	36,791	1.25%
27	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	49	4,699	1.28%
28	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	146	15,830	1.01%
29	TLSSA001376	29 - TLAXCALA	038 - TZOMPANTEPEC	H.G.R. EMILIO SANCHEZ PIEDRAS	62	8,044	1.42%
30	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,856	1.13%

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Worst performing hospitals 2011 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
269	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,470	0.42%
268	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	3,721	0.94%
267	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	107	4,375	1.99%
266	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,617	0.72%
265	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	0.71%
264	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,782	0.51%
263	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	30	4,252	0.31%
262	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,624	0.37%
261	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	14,986	0.37%
260	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHI	HG JUCHITAN DR. MACEDONIO BENITEZ FUI	60	6,305	0.76%
259	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTE	HG TUXTEPEC	50	6,343	1.42%
258	VZSSA000310	30 - VERACRUZ DE IGNACIO DE L	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSIN	28	3,103	0.64%
257	TSSSA018070	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL MATERNO INFANTIL	80	5,601	0.20%
256	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,468	1.30%
255	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,690	1.13%
254	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	1.94%
253	PLSSA016543	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO	30	4,590	0.72%
252	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	108	5,209	1.82%
251	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	10,130	1.31%
250	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE I	124	8,646	0.89%
249	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	4,754	1.66%
248	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	60	5,223	0.69%
247	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. E	60	6,570	0.84%
246	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	1,739	1.44%
245	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	21,478	0.91%
243	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACI	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	4,257	0.89%
242	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	7,181	2.07%
241	PLSSA001645	21 - PUEBLA	074 - HUEJOTZINGO	HOSPITAL GENERAL HUEJOTZINGO	30	2,769	1.95%
240	GRSSA004350	12 - GUERRERO	034 - HUITZUCO DE LOS FIGUERO	HOSPITAL GENERAL DE HUITZUCO	30	3,014	1.49%
239	CCSSA000363	04 - CAMPECHE	003 - CARMEN	H.G. MA. SOCORRO QUIROGA AGUILAR	45	5,878	0.58%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2012 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	QTSSA012935	22 - QUERÉTARO	016 - SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	101	6,258	1.10%
2	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,583	0.74%
3	MCSSA010053	15 - MÉXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,629	1.51%
4	QTSSA001752	22 - QUERÉTARO	014 - QUERÉTARO	HOSPITAL GENERAL QUERETARO	85	6,384	2.54%
5	QTSSA000475	22 - QUERÉTARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,483	0.99%
6	MCSSA006430	15 - MÉXICO	088 - TENANCINGO	H.G. TENANCINGO	60	4,995	1.54%
7	MNSSA003735	16 - MICHOACÁN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	8,132	1.09%
8	MCSSA004231	15 - MÉXICO	058 - NEZAHUALCÓYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	14,796	0.94%
9	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,521	1.00%
10	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	119	6,161	2.61%
11	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,430	1.46%
12	GRSSA003423	12 - GUERRERO	028 - CHILAPA DE ÁLVAREZ	HG CHILAPA DE ALVAREZ	28	4,107	0.27%
13	TCSSA000306	27 - TABASCO	002 - CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,265	0.58%
14	CMSSA001023	06 - COLIMA	009 - TECOMÁN	HOSPITAL GENERAL TECOMÁN	46	5,458	1.23%
15	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,295	1.35%
16	JCSSA001326	14 - JALISCO	023 - ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38	7,599	1.08%
17	MNSSA016492	16 - MICHOACÁN DE OCAMPO	034 - HIDALGO	HG CIUDAD HIDALGO	30	2,454	1.43%
18	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DE	HOSPITAL GENERAL CUNA DE LA INDEPENDEN	60	8,594	0.62%
19	GTSSA017414	11 - GUANAJUATO	002 - ACÁMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL HIDA	60	5,510	0.93%
20	TCSSA002003	27 - TABASCO	006 - CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,386	0.82%
21	GTSSA002760	11 - GUANAJUATO	023 - PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32	5,351	2.09%
22	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	59	8,186	1.01%
23	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,902	1.10%
24	MCSSA010280	15 - MÉXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMÉRICAS	123	15,180	0.97%
25	CMSSA001356	06 - COLIMA	007 - MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	5,269	1.29%
26	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAÚL A. CARRILLO	30	2,618	0.80%
27	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	6,436	3.51%
28	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,441	0.70%
29	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDRO	30	3,215	0.75%
30	TSSSA002665	28 - TAMAULIPAS	040 - VALLE HERMOSO	HG HOSPITAL GENERAL CIVIL LUIS G. FALCÓN	21	2,923	1.06%

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269	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,470	0.42%
268	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	3,721	0.94%
267	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	107	4,375	1.99%
266	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,617	0.72%
265	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	0.71%
264	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,782	0.51%
263	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	30	4,252	0.31%
262	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,624	0.37%
261	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	14,986	0.37%
260	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHI	HG JUCHITAN DR. MACEDONIO BENITEZ FUI	60	6,305	0.76%
259	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTE	HG TUXTEPEC	50	6,343	1.42%
258	VZSSA000310	30 - VERACRUZ DE IGNACIO DE I	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSIN	28	3,103	0.64%
257	TSSSA018070	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL MATERNO INFANTIL	80	5,601	0.20%
256	GRSSA001550	12 - GUERRERO	011 - ATOYAC DE ALVAREZ	DR. JUVENTINO RODRIGUEZ GARCIA	30	2,468	1.30%
255	DFSSA017886	09 - DISTRITO FEDERAL	010 - ALVARO OBREGON	HOSPITAL GENERAL DR. ENRIQUE CABRERA	114	8,690	1.13%
254	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	1.94%
253	PLSSA016543	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO	30	4,590	0.72%
252	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	108	5,209	1.82%
251	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	10,130	1.31%
250	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE I	124	8,646	0.89%
249	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	4,754	1.66%
248	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	60	5,223	0.69%
247	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. E	60	6,570	0.84%
246	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	1,739	1.44%
245	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	21,478	0.91%
243	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACI	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	4,257	0.89%
242	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	7,181	2.07%
241	PLSSA001645	21 - PUEBLA	074 - HUEJOTZINGO	HOSPITAL GENERAL HUEJOTZINGO	30	2,769	1.95%
240	GRSSA004350	12 - GUERRERO	034 - HUITZUCO DE LOS FIGUERO	HOSPITAL GENERAL DE HUITZUCO	30	3,014	1.49%
239	CCSSA000363	04 - CAMPECHE	003 - CARMEN	H.G. MA. SOCORRO QUIROGA AGUILAR	45	5,878	0.58%

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1	MCSSA010345	MÉXICO	TULTITLÁN	HOSPITAL GENERAL TULTITLAN SAN P	30	2,857	0.21%
2	MNSSA003735	MICHOACÁN DE OCAMPO	URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	10,195	1.05%
3	MCSSA010053	MÉXICO	JILOTEPEC	H.G. JILOTEPEC	30	4,228	1.94%
4	QTSSA001752	QUERÉTARO	QUERÉTARO	HOSPITAL GENERAL QUERETARO	85	6,454	2.18%
5	CHSSA000664	CHIHUAHUA	CHIHUAHUA	HG DR. SALVADOR ZUBIRÁN ANCHON	148	9,941	1.63%
6	QTSSA000475	QUERÉTARO	CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,549	0.97%
7	GTSSA003361	GUANAJUATO	SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,228	1.24%
8	PLSSA002490	PUEBLA	PUEBLA	HOSPITAL GENERAL DR EDUARDO VA	145	3,362	1.52%
9	MCSSA004231	MÉXICO	NEZAHUALCÓYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	16,595	0.86%
10	MNSSA016475	MICHOACÁN DE OCAMPO	MARAVATÍO	HG MARAVATIO	30	3,688	1.49%
11	GTSSA000310	GUANAJUATO	SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL SAN MIGUEL ALLI	63	7,224	1.00%
12	QTSSA001052	QUERÉTARO	JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	4,237	1.18%
13	JCSSA007054	JALISCO	ZAPOPAN	HOSPITAL GENERAL DE ZAPOPAN (CI	20	1,734	2.88%
14	JCSSA003250	JALISCO	LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MO	30	4,553	1.01%
15	TCSSA002003	TABASCO	CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,290	0.56%
16	CMSSA000125	COLIMA	COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	10,962	1.21%
17	GRSSA003423	GUERRERO	CHILAPA DE ÁLVAREZ	HG CHILAPA DE ALVAREZ	26	4,529	0.29%
18	MNSSA002813	MICHOACÁN DE OCAMPO	SAHUAYO	HG SAHUAYO	31	4,234	1.70%
19	HGSSA000156	HIDALGO	ACTOPAN	HOSPITAL GENERAL ACTOPAN	30	3,280	1.25%
20	HGSSA015520	HIDALGO	HUEJUTLA DE REYES	HOSPITAL GENERAL DE LA HUASTECA	30	5,602	1.59%
21	SRSSA001670	SONORA	NAVOJOA	HOSPITAL GENERAL NAVOJOA	63	5,271	0.34%
22	MNSSA016492	MICHOACÁN DE OCAMPO	HIDALGO	HG CIUDAD HIDALGO	33	2,507	1.99%
23	JCSSA000631	JALISCO	AUTLÁN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,221	1.45%
24	GTSSA001290	GUANAJUATO	DOLORES HIDALGO CUNA D	HOSPITAL GENERAL DOLORES HIDALG	60	7,390	0.73%
25	VZSSA007730	VERACRUZ DE IGNACIO DE LA	VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (V	61	6,022	1.36%
26	QTSSA012935	QUERÉTARO	SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍ	92	9,216	0.72%
27	ZSSSA000613	ZACATECAS	JEREZ	HOSPITAL GENERAL JEREZ	30	3,927	1.17%
28	DGSSA000116	DURANGO	CUENCAMÉ	HOSPITAL REGIONAL DE CUENCAME	27	1,527	0.52%
29	BCSSA000440	BAJA CALIFORNIA	MEXICALI	HOSPITAL GENERAL DE MEXICALI	129	6,269	3.05%
30	MCSSA010280	MÉXICO	ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMÉRICAS	138	15,167	1.22%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2013 – hernia repair

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
274	DFSSA002672	DISTRITO FEDERAL	TLALPAN	HOSPITAL GENERAL TORRE MÉDICA T	110	627	12.60%
273	OCSSA016764	OAXACA	CIUDAD IXTEPEC	HG CIUDAD IXTEPEC	30	1,851	1.35%
272	OCSSA020655	OAXACA	PUTLA VILLA DE GUERRERO	HG PUTLA AMIGO DEL NIÑO Y DE LA M	31	3,560	0.25%
271	SRSSA001851	SONORA	NOGALES	HOSPITAL GENERAL NOGALES	48	3,955	0.20%
270	GRSSA005762	GUERRERO	OMETEPEC	HOSPITAL GENERAL OMETEPEC	40	4,962	0.40%
269	CCSSA001220	CAMPECHE	CANDELARIA	HOSPITAL GENERAL CANDELARIA	32	1,375	0.36%
268	CHSSA000676	CHIHUAHUA	CHIHUAHUA	HG CENTRAL DEL ESTADO	120	9,990	0.59%
267	QRSSA000373	QUINTANA ROO	OTHÓN P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	4,399	1.61%
266	MCSSA001011	MÉXICO	ATIZAPÁN DE ZARAGOZA	H.G. DR.SALVADOR GONZÁLEZ HERRE	144	9,296	1.59%
265	VZSSA000310	VERACRUZ DE IGNACIO DE LA	ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUF	28	2,810	0.75%
264	GRSSA001550	GUERRERO	ATOYAC DE ÁLVAREZ	DR. JUVENTINO RODRÍGUEZ GARCÍA	30	2,456	1.22%
263	MNSSA001891	MICHOACÁN DE OCAMPO	MORELIA	HG DR. MIGUEL SILVA	219	18,534	0.90%
262	SRSSA017671	SONORA	AGUA PRIETA	HOSPITAL GENERAL, AGUA PRIETA	29	2,422	0.54%
261	ZSSSA013143	ZACATECAS	ZACATECAS	HOSPITAL GENERAL ZACATECAS LUZ (	120	9,109	0.88%
260	MNSSA001722	MICHOACÁN DE OCAMPO	LÁZARO CÁRDENAS	HG LÁZARO CÁRDENAS	56	4,542	0.31%
259	TSSSA001772	TAMAULIPAS	REYNOSA	HG HOSPITAL GENERAL REYNOSA DR.	120	8,713	0.81%
258	CHSSA001801	CHIHUAHUA	JUÁREZ	HG JUÁREZ	119	5,594	2.63%
257	PLSSA016543	PUEBLA	HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO	33	3,219	0.68%
256	TSSSA001550	TAMAULIPAS	NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREI	67	4,468	0.92%
255	SLSSA001540	SINALOA	MAZATLÁN	HOSPITAL GENERAL DE MAZATLÁN	96	8,179	1.01%
254	DFSSA003722	DISTRITO FEDERAL	VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,703	1.66%
253	TSSSA018000	TAMAULIPAS	EL MANTE	HG HOSPITAL GENERAL DE CD. MANT	60	6,419	0.70%
252	GRSSA004350	GUERRERO	HUITZUCO DE LOS FIGUERO	HOSPITAL GENERAL DE HUITZUCO	31	2,949	0.98%
251	MCSSA007661	MÉXICO	TOLUCA	H.G. DR. NICOLÁS SAN JUAN	144	11,616	1.09%
250	TSSSA018526	TAMAULIPAS	RÍO BRAVO	HG HOSPITAL GENERAL RÍO BRAVO	30	1,042	0.77%
249	NTSSA001594	NAYARIT	TEPIC	HOSPITAL CIVIL DR. ANTONIO GONZÁ	133	11,472	0.77%
248	GRSSA004490	GUERRERO	IGUALA DE LA INDEPENDEN	DR. JORGE SOBERON ACEVEDO	65	7,427	0.89%
247	QRSSA000023	QUINTANA ROO	FELIPE CARRILLO PUERTO	HOSPITAL GENERAL FELIPE CARRILLO	29	3,762	0.72%
246	PLSSA004404	PUEBLA	TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPE	20	2,008	1.44%
245	YNSSA001224	YUCATÁN	TIZIMÍN	HOSPITAL GENERAL SAN CARLOS	36	5,739	0.38%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Appendix 5.3.4 Childbirth

Best performing hospitals 2005

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ I	100	7,149	9.40%
2	CHSSA000022	08 - CHIHUAHUA	002 - ALDAMA	HG DE ALDAMA	6	447	6.94%
3	VZSSA000416	30 - VERACRUZ DE IGNACIO DE I	013 - NARANJOS AMATLAN	HOSPITAL DE LA COMUNIDAD NARANJOS	14	886	35.78%
4	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,514	39.62%
5	CSSSA008112	07 - CHIAPAS	108 - VILLAFLORES	HG VILLAFLORES	30	4,506	31.58%
6	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	12,598	26.90%
7	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,159	19.23%
8	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,533	33.85%
9	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,689	38.98%
10	VZSSA007725	30 - VERACRUZ DE IGNACIO DE I	066 - ESPINAL	HOSPITAL DE LA COMUNIDAD DE ENTABLADI	30	31	64.52%
11	VZSSA004913	30 - VERACRUZ DE IGNACIO DE I	141 - SAN ANDRES TUXTLA	HOSPITAL GENERAL SAN ANDRES TUXTLA. DI	45	5,209	27.97%
12	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,590	29.05%
13	VZSSA001121	30 - VERACRUZ DE IGNACIO DE I	038 - COATEPEC	HOSPITAL DE LA COMUNIDAD COATEPEC	16	1,551	26.18%
14	VZSSA003163	30 - VERACRUZ DE IGNACIO DE I	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN I	16	280	41.07%
15	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,152	34.26%
16	VZSSA001384	30 - VERACRUZ DE IGNACIO DE I	045 - COSAMALOAPAN DE CARPI	HOSPITAL GENERAL COSAMALOAPAN DR. VI	30	3,544	16.99%
17	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA D	HOSPITAL GENERAL CUNA DE LA INDEPENDE	30	5,479	22.49%
18	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,266	31.78%
19	HGSSA003953	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL TULA	30	3,181	19.77%
20	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	193	16,185	16.68%
21	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	30	2,718	26.56%
22	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	53	6,282	31.01%
23	TCSSA001052	27 - TABASCO	004 - CENTRO	HOSPITAL REGIONAL DE ALTA ESPECIALIDAD	139	16,913	10.26%
24	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	4,433	20.84%
25	GRSSA004350	12 - GUERRERO	034 - HUITZUCO DE LOS FIGUERO/	HOSPITAL GENERAL DE HUITZUCO	30	1,999	19.41%
26	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,094	22.17%
27	VZSSA002970	30 - VERACRUZ DE IGNACIO DE I	087 - XALAPA	HOSPITAL REGIONAL DE XALAPA DR. LUIS F. I	130	9,260	21.11%
28	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	217	15,359	17.42%
29	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN T/	60	7,000	33.30%
30	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,215	27.58%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2005 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
262	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	54	328	3.05%
261	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,879	11.78%
260	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	8,381	15.15%
259	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLO	185	12,959	29.76%
258	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	7,026	13.55%
257	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR.	110	7,369	44.21%
256	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVARC	94	7,628	22.93%
255	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	7,492	29.59%
254	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	6,308	28.22%
253	TSSSA001784	28 - TAMAULIPAS	032 - REYNOSA	HG HOSP CIVIL DR MIGUEL A RIVERA T	41	2,339	27.45%
252	VZSSA001150	30 - VERACRUZ DE IGNACIO DE I	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DI	102	7,790	22.09%
251	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICA	HG CUICATLAN DR. ALBERTO VARGAS MERIN	30	1,892	19.08%
250	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,042	25.43%
249	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	8,810	47.51%
248	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZ/	HOSPITAL METROPOLITANO	214	19,632	47.61%
247	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	19	2,589	19.16%
246	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUIT.	30	3,013	24.89%
245	VZSSA002434	30 - VERACRUZ DE IGNACIO DE I	072 - HUAYACOCOTLA	HOSPITAL DE LA COMUNIDAD DE HUAYACOC	15	442	26.70%
244	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	140	12,116	39.61%
243	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	7,091	9.25%
242	MCSSA002435	15 - MEXICO	035 - HUEHUETOCA	HOSPITAL MUNICIPAL HUEHUETOCA	18	550	40.91%
241	CLSSA001404	05 - COAHUILA DE ZARAGOZA	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,244	9.65%
240	VZSSA007754	30 - VERACRUZ DE IGNACIO DE I	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	694	19.74%
239	VZSSA004860	30 - VERACRUZ DE IGNACIO DE I	138 - RIO BLANCO	HOSPITAL REGIONAL RIO BLANCO	118	8,186	14.87%
238	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,634	37.51%
237	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	120	9,794	18.70%
236	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTE	HG TUXTEPEC	30	2,953	35.25%
235	NLSSA001263	19 - NUEVO LEON	017 - GALEANA	HOSPITAL GENERAL GALEANA	28	1,308	30.81%
234	PLSSA004952	21 - PUEBLA	208 - ZACATLAN	HOSPITAL GENERAL ZACATLAN	35	3,644	25.80%
233	SRSSA001670	26 - SONORA	042 - NAVOJOA	HOSPITAL GENERAL NAVOJOA	44	5,304	42.46%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2006 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	CHSSA000022	08 - CHIHUAHUA	002 - ALDAMA	HG DE ALDAMA	6	74	27.03%
2	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,347	20.13%
3	SPSSA000356	24 - SAN LUIS POTOSi	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	11,668	22.21%
4	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ANGEL VENTURA NE	30	3,418	33.21%
5	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,296	40.90%
6	CSSSA008112	07 - CHIAPAS	108 - VILLAFLORES	HG VILLAFLORES	30	4,493	30.34%
7	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	45	5,772	34.63%
8	CMSSA000586	06 - COLIMA	006 - IXTLAHUACAN	HOSPITAL GENERAL IXTLAHUACAN	44	426	3.29%
9	VZSSA007725	30 - VERACRUZ DE IGNACIO DE LA	066 - ESPINAL	HOSPITAL DE LA COMUNIDAD DE ENTABLADE	30	241	26.14%
10	VZSSA015411	30 - VERACRUZ DE IGNACIO DE LA	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,786	13.89%
11	VZSSA004913	30 - VERACRUZ DE IGNACIO DE LA	141 - SAN ANDRES TUXTLA	HOSPITAL GENERAL SAN ANDRES TUXTLA. DR	45	5,557	23.92%
12	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	4,953	33.11%
13	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	30	3,932	16.17%
14	VZSSA000976	30 - VERACRUZ DE IGNACIO DE LA	032 - CATEMACO	HOSPITAL DE LA COMUNIDAD CATEMACO	13	1,229	33.52%
15	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	193	16,500	15.55%
16	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,310	29.27%
17	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. A	15	2,377	29.41%
18	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN TA	60	6,932	34.02%
19	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	30	2,515	21.19%
20	VZSSA001384	30 - VERACRUZ DE IGNACIO DE LA	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. VIC	30	3,473	16.70%
21	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,082	33.48%
22	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN RO	60	7,113	22.00%
23	VZSSA003163	30 - VERACRUZ DE IGNACIO DE LA	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN D	16	309	35.60%
24	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	4,856	22.61%
25	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	3,552	23.20%
26	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,414	28.15%
27	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	60	4,938	18.77%
28	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,728	29.03%
29	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	3,925	38.57%
30	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	53	6,551	32.96%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2006 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
274	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	54	229	3.49%
273	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,733	12.51%
272	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	7,836	17.00%
271	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR.	110	7,142	42.48%
270	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	109	2,971	37.50%
269	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	142	6,935	16.19%
268	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	19,348	51.47%
267	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS	185	11,774	32.22%
266	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	110	8,262	27.22%
265	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	6,375	55.28%
264	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVARO	94	7,821	25.12%
262	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICATLA	HG CUICATLAN DR. ALBERTO VARGAS MERIN	32	1,916	21.45%
261	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	188	15,228	23.88%
260	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,329	41.13%
259	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	10,035	33.00%
258	NLSSA001263	19 - NUEVO LEON	017 - GALEANA	HOSPITAL GENERAL GALEANA	28	1,429	23.23%
257	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	32	911	31.17%
256	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	106	2,560	57.89%
255	PLSSA000081	21 - PUEBLA	003 - ACATLAN	HOSPITAL GENERAL DE ACATLAN	45	2,382	18.68%
254	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	7,983	19.09%
253	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPE	HG TUXTEPEC	30	3,039	28.86%
252	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	11,192	21.97%
251	TSSSA001784	28 - TAMAULIPAS	032 - REYNOSA	HG HOSP CIVIL DR MIGUEL A RIVERA T	41	2,715	29.80%
250	VZSSA005560	30 - VERACRUZ DE IGNACIO DE LA	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,385	35.18%
249	ZSSSA000152	32 - ZACATECAS	010 - FRESNILLO	HOSPITAL GENERAL FRESNILLO (DR. JOSE HAI	68	10,473	29.87%
248	CLSSA001124	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL SALTILLO	40	5,226	50.33%
247	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	6,609	11.39%
246	VZSSA004860	30 - VERACRUZ DE IGNACIO DE LA	138 - RIO BLANCO	HOSPITAL REGIONAL RIO BLANCO	117	9,734	15.43%
245	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,396	24.67%
244	MCSSA007673	15 - MEXICO	106 - TOLUCA	HOSPITAL MATERNO PERINATAL MONICA PR	60	7,690	38.41%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2007 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	12,878	27.01%
2	CHSSA000022	08 - CHIHUAHUA	002 - ALDAMA	HG DE ALDAMA	6	49	26.53%
3	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	5,600	35.70%
4	VZSSA000416	30 - VERACRUZ DE IGNACIO DE L	013 - NARANJOS AMATLAN	HOSPITAL DE LA COMUNIDAD NARANJOS	14	1,625	36.55%
5	VZSSA003163	30 - VERACRUZ DE IGNACIO DE L	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN D	16	300	53.33%
6	DGSSA000116	10 - DURANGO	004 - CUENCAME	HOSPITAL REGIONAL DE CUENCAME	26	1,035	15.56%
7	CHSSA001755	08 - CHIHUAHUA	036 - JIMENEZ	HG DE JIMENEZ	15	1,813	23.00%
8	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	5,976	27.11%
9	CMSSA000586	06 - COLIMA	006 - IXTLAHUACAN	HOSPITAL GENERAL IXTLAHUACAN	44	364	1.37%
10	CSSSA008112	07 - CHIAPAS	108 - VILLAFLORES	HG VILLAFLORES	30	4,833	26.22%
11	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	3,983	20.81%
12	VZSSA007725	30 - VERACRUZ DE IGNACIO DE L	066 - ESPINAL	HOSPITAL DE LA COMUNIDAD DE ENTABLADI	30	627	30.62%
13	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,294	28.84%
14	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,266	23.07%
15	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	10,226	18.94%
16	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,387	19.19%
17	VZSSA004913	30 - VERACRUZ DE IGNACIO DE L	141 - SAN ANDRES TUXTLA	HOSPITAL GENERAL SAN ANDRES TUXTLA. DI	45	6,044	22.45%
18	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	30	4,714	16.82%
19	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,151	36.88%
20	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	193	17,951	14.38%
21	DGSSA000676	10 - DURANGO	007 - GOMEZ PALACIO	HOSPITAL GENERAL DE GOMEZ PALACIO	75	6,993	28.87%
22	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,288	34.03%
23	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	4,476	28.49%
24	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,149	14.12%
25	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,832	33.90%
26	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	5,020	21.71%
27	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,365	28.62%
28	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	30	2,898	21.19%
29	JCSSA004230	14 - JALISCO	067 - PUERTO VALLARTA	HOSPITAL REGIONAL DE PUERTO VALLARTA	61	7,923	36.73%
30	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,044	26.57%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2007 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
276	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,574	12.23%
275	DFSSA002672	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL TORRE MEDICA TEPEPAN	46	193	3.11%
274	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVARC	107	7,375	24.80%
273	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	11,598	36.89%
272	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	37	5,361	23.32%
271	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	189	6,655	13.28%
270	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,622	9.51%
269	CLSSA001124	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL SALTILLO	40	5,505	38.09%
268	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	10,646	26.22%
267	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLO	185	12,194	32.51%
266	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	30	4,800	16.52%
265	MCSSA007673	15 - MEXICO	106 - TOLUCA	HOSPITAL MATERNO PERINATAL MONICA PR	60	5,769	67.29%
264	VZSSA007754	30 - VERACRUZ DE IGNACIO DE L	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	1,186	15.18%
263	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,093	30.56%
262	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	17,716	48.55%
260	MCSSA007265	15 - MEXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	111	8,887	33.99%
259	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,368	24.54%
258	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	124	4,396	1.82%
257	MNSSA000170	16 - MICHOACAN DE OCAMPO	006 - APATZINGAN	HG RAMON PONCE ALVAREZ	39	2,811	20.28%
256	NLSSA001263	19 - NUEVO LEON	017 - GALEANA	HOSPITAL GENERAL GALEANA	28	1,546	21.22%
255	CSSSA004945	07 - CHIAPAS	068 - PICHUCALCO	HOSPITAL GENERAL PICHUCALCO	31	3,223	32.70%
254	OCSSA002052	20 - OAXACA	177 - SAN JUAN BAUTISTA CUICAT	HG CUICATLAN DR. ALBERTO VARGAS MERIN	30	2,121	23.15%
253	VZSSA000310	30 - VERACRUZ DE IGNACIO DE L	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSINA	26	2,321	35.89%
252	VZSSA005560	30 - VERACRUZ DE IGNACIO DE L	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	32	2,659	30.73%
251	VZSSA004860	30 - VERACRUZ DE IGNACIO DE L	138 - RIO BLANCO	HOSPITAL REGIONAL RIO BLANCO	118	9,174	19.38%
250	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	239	27,425	19.52%
249	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	21	3,128	17.55%
248	TSSSA001031	28 - TAMAULIPAS	022 - MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DR.	110	7,320	34.77%
247	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	11,553	56.59%
246	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	7,041	13.45%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2008 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	11,886	23.99%
2	GTSSA017023	11 - GUANAJUATO	037 - SILAO	HOSPITAL GENERAL SILAO	37	162	9.26%
3	CHSSA000022	08 - CHIHUAHUA	002 - ALDAMA	HG DE ALDAMA	6	29	41.38%
4	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,500	14.74%
5	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	42	6,085	34.10%
6	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,308	43.80%
7	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,182	29.15%
8	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	5,276	23.58%
9	MCSSA010263	15 - MEXICO	117 - ZACUALPAN	HOSPITAL MUNICIPAL ZACUALPAN	12	165	70.91%
10	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,723	18.62%
11	CSSSA007074	07 - CHIAPAS	097 - TONALA	HOSPITAL GENERAL DR. JUAN C. CORZO TOI	29	3,517	24.88%
12	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,402	27.66%
13	CHSSA001755	08 - CHIHUAHUA	036 - JIMENEZ	HG DE JIMENEZ	15	1,998	24.47%
14	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,052	21.03%
15	VZSSA015411	30 - VERACRUZ DE IGNAC	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,923	15.91%
16	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	40	4,762	17.66%
17	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	18,999	14.36%
18	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,235	35.49%
19	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	11,639	30.25%
20	SRSSA001851	26 - SONORA	043 - NOGALES	HOSPITAL GENERAL NOGALES	24	3,469	39.52%
21	MNSSA002446	16 - MICHOACAN DE OCA	066 - PATZCUARO	HG PATZCUARO	30	2,994	24.15%
22	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,514	32.58%
23	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,060	26.58%
24	MNSSA004044	16 - MICHOACAN DE OCA	112 - ZITACUARO	HG ZITACUARO	34	4,809	20.19%
25	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,287	22.77%
26	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VEL	30	3,262	28.69%
27	SRSSA001011	26 - SONORA	029 - GUAYMAS	HOSPITAL GENERAL GUAYMAS	37	3,466	38.26%
28	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DI	HOSPITAL GENERAL CUNA DE LA INDEPENDI	60	8,965	18.84%
29	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,898	26.62%
30	CSSSA008264	07 - CHIAPAS	109 - YAJALON	HOSPITAL GENERAL YAJALON	30	2,935	30.02%

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Worst performing hospitals 2008 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
281	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,884	14.29%
280	MNSSA001722	16 - MICHOACAN DE OCA	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,010	21.28%
279	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,687	13.97%
278	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,295	8.63%
277	MCSSA007673	15 - MEXICO	106 - TOLUCA	HOSPITAL MATERNO PERINATAL MONICA P	60	6,533	67.46%
276	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVAR	107	8,128	24.19%
275	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,021	39.76%
274	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,936	48.52%
273	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	160	17,984	36.88%
272	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	30	4,353	33.75%
271	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLC	185	11,708	35.38%
270	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	121	4,282	0.63%
269	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	18,151	29.51%
268	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEF	HG TUXTEPEC	60	5,694	17.39%
267	VZSSA007754	30 - VERACRUZ DE IGNAC	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	31	1,499	17.34%
266	NLSSA003911	19 - NUEVO LEON	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GAI	22	3,797	22.62%
265	CLSSA001404	05 - COAHUILA DE ZARAG	032 - SAN JUAN DE SABINAS	HOSPITAL GENERAL NUEVA ROSITA	18	1,564	12.34%
264	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS K	68	10,980	34.91%
263	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUIT	60	3,833	25.96%
262	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	11,760	47.95%
261	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,183	24.74%
259	MCSSA009826	15 - MEXICO	081 - TECAMAC	HOSPITAL MUNICIPAL TECAMAC "LIC. CESAF	18	1,798	47.50%
258	CCSSA001220	04 - CAMPECHE	011 - CANDELARIA	HOSPITAL GENERAL CANDELARIA	30	1,730	24.74%
257	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	12,532	45.93%
256	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	27	646	25.54%
255	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	19,170	41.54%
254	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	11,583	53.08%
253	VZSSA004160	30 - VERACRUZ DE IGNAC	123 - PANUCO	HOSPITAL GENERAL PANUCO DR. MANUEL I	30	2,831	26.60%
252	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	13,146	38.78%
251	SRSSA001670	26 - SONORA	042 - NAVOJOA	HOSPITAL GENERAL NAVOJOA	63	6,003	29.02%

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Best performing hospitals 2009 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	13,158	19.92%
2	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	144	14,919	25.16%
3	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	2,797	24.35%
4	MCSSA017065	15 - MEXICO	039 - IXTAPALUCA	HOSPITAL MUNICIPAL IXTAPALUCA "LEONA	18	2,699	24.05%
5	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ANGEL VENTURA N	30	3,529	39.25%
6	CHSSA001270	08 - CHIHUAHUA	029 - GUADALUPE Y CALVO	HC GUADALUPE Y CALVO	30	1,743	22.55%
7	ASSSA000655	01 - AGUASCALIENTES	007 - RINCON DE ROMOS	HOSPITAL GENERAL RINCON DE ROMOS	30	4,183	45.90%
8	SLSSA017594	25 - SINALOA	008 - ELOTA	HOSPITAL GENERAL LA CRUZ	18	1,575	37.14%
9	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	6,626	39.72%
10	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,504	19.01%
11	VZSSA003163	30 - VERACRUZ DE IGNACIO DE LA	091 - JESUS CARRANZA	HOSPITAL DE LA COMUNIDAD SUCHILAPAN	17	180	63.89%
12	BCSSA017590	02 - BAJA CALIFORNIA	005 - PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	30	2,985	43.85%
13	CHSSA001755	08 - CHIHUAHUA	036 - JIMENEZ	HG DE JIMENEZ	15	2,178	24.84%
14	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,585	23.92%
15	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	11,184	21.14%
16	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	30	3,151	24.91%
17	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLON DE ARTEAGA	HOSPITAL GENERAL PABELLON DE ARTEAGA	30	3,210	31.25%
18	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,310	25.01%
19	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	8,099	5.17%
20	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,731	32.38%
21	PLSSA003260	21 - PUEBLA	140 - SAN PEDRO CHOLULA	HOSPITAL GENERAL CHOLULA DE RIVADABI	30	3,662	31.38%
22	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	6,464	30.54%
23	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,391	31.22%
24	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,572	34.84%
25	PLSSA015423	21 - PUEBLA	164 - TEPEACA	HOSPITAL GENERAL DE TEPEACA	30	5,275	23.17%
26	MCSSA010263	15 - MEXICO	117 - ZACUALPAN	HOSPITAL MUNICIPAL ZACUALPAN	12	134	59.70%
27	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	2,566	29.89%
28	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VE	30	3,835	33.14%
29	TSSSA018000	28 - TAMAULIPAS	021 - EL MANTE	HG HOSPITAL GENERAL DE CD. MANTE DR. E	60	6,965	20.50%
30	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	44	4,842	18.38%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2009 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
286	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,290	14.08%
285	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,462	43.42%
284	VZSSA007754	30 - VERACRUZ DE IGNACIO DE LA	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAI	31	1,442	18.59%
283	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	5,624	4.93%
282	ZSSSA012853	32 - ZACATECAS	024 - LORETO	HOSPITAL GENERAL LORETO	30	2,576	43.52%
281	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	5,070	5.46%
280	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZ	HOSPITAL METROPOLITANO	224	18,271	41.39%
279	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	10,277	47.02%
278	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	9,686	41.17%
277	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,174	36.63%
276	CCSSA000112	04 - CAMPECHE	002 - CAMPECHE	HOSPITAL GRAL. DE CAMPECHE "DR. ALVAR	107	8,493	25.00%
275	MCSSA007586	15 - MEXICO	105 - TLATLAYA	HOSPITAL MUNICIPAL SAN PEDRO LIMON	15	1,066	46.44%
274	CLSSA000161	05 - COAHUILA DE ZARAGOZA	007 - CUATRO CIENEGAS	HOSPITAL GENERAL CUATROCIENEGAS	18	786	17.68%
273	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,340	24.49%
272	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	12,442	26.54%
271	VZSSA006972	30 - VERACRUZ DE IGNACIO DE LA	193 - VERACRUZ	HOSPITAL DE ALTA ESPECIALIDAD DE VERA(	265	18,784	13.78%
270	VZSSA006815	30 - VERACRUZ DE IGNACIO DE LA	189 - TUXPAN	HOSPITAL GENERAL TUXPAN DR. EMILIO AL	62	4,934	22.40%
269	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	21,771	32.93%
268	SRSSA000055	26 - SONORA	003 - ALAMOS	HOSPITAL COMUNITARIO ALAMOS	27	636	27.20%
267	NLSSA002972	19 - NUEVO LEON	038 - MONTEMORELOS	HOSPITAL GENERAL MONTEMORELOS	30	2,698	21.87%
266	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARL(	185	9,679	40.00%
265	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTE	HG TUXTEPEC	65	4,962	27.83%
264	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	112	5,203	46.30%
263	VZSSA004370	30 - VERACRUZ DE IGNACIO DE LA	124 - PAPANTLA	HOSPITAL GENERAL PAPANTLA DR. JOSE BU	37	3,118	12.64%
262	OCSSA016764	20 - OAXACA	014 - CIUDAD IXTEPEC	HG CIUDAD IXTEPEC	30	1,787	13.49%
261	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL (	28	1,581	12.71%
260	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,090	33.75%
259	TSSSA001550	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREDO	67	5,043	28.93%
258	CLSSA001614	05 - COAHUILA DE ZARAGOZA	035 - TORREON	HOSPITAL GENERAL TORREON	51	9,570	26.06%
257	NLSSA003911	19 - NUEVO LEON	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GA	22	4,133	21.53%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2010 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	144	15,906	21.84%
2	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	11,494	20.08%
3	MSSSA002373	17 - MORELOS	018 - TEMIXCO	HG DE TEMIXCO	32	609	55.34%
4	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	7,031	39.06%
5	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,497	29.57%
6	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,981	28.98%
7	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	6,659	15.05%
8	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,673	33.76%
9	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	6,665	19.46%
10	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	2,919	20.38%
11	MCSSA010263	15 - MEXICO	117 - ZACUALPAN	HOSPITAL MUNICIPAL ZACUALPAN	12	76	97.37%
12	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,986	15.60%
13	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	47	5,387	22.96%
14	MCSSA015262	15 - MEXICO	052 - MALINALCO	HOSPITAL MUNICIPAL MALINALCO PEDRO AS	12	1,477	64.59%
15	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	40	4,994	19.22%
16	VZSSA003740	30 - VERACRUZ DE IGNACIO DE LA	109 - MISANTLA	HOSPITAL GENERAL DE MISANTLA	33	3,370	24.96%
17	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,185	26.16%
18	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	27	4,204	28.47%
19	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUNA DI	HOSPITAL GENERAL CUNA DE LA INDEPENDEI	60	9,322	21.11%
20	CCSSA000544	04 - CAMPECHE	004 - CHAMPOTON	HOSPITAL GENERAL DE CHAMPOTON	12	1,792	30.86%
21	VZSSA015411	30 - VERACRUZ DE IGNACIO DE LA	077 - ISLA	HOSPITAL GENERAL ISLA	44	1,919	16.47%
22	VZSSA007660	30 - VERACRUZ DE IGNACIO DE LA	016 - LA ANTIGUA	HOSPITAL GENERAL DE CARDEL	31	1,750	14.69%
23	BSSSA001213	03 - BAJA CALIFORNIA SUR	003 - LA PAZ	B. HOSPITAL GENERAL CON ESPECIALIDADES	120	2,663	22.16%
24	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	19,371	16.54%
25	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,769	15.83%
26	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,919	16.17%
27	GTSSA017023	11 - GUANAJUATO	037 - SILAO	HOSPITAL GENERAL SILAO	43	5,643	25.25%
28	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	7,439	31.03%
29	MNSSA016533	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	5,842	27.32%
30	CLSSA001421	05 - COAHUILA DE ZARAGOZA	033 - SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,253	35.11%

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Worst performing hospitals 2010 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
283	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,461	14.71%
282	JCSSA001401	14 - JALISCO	024 - COCULA	HOSPITAL REGIONAL COCULA	30	4,399	45.37%
281	HGSSA015515	13 - HIDALGO	008 - APAN	HOSPITAL GENERAL DE APAN	30	2,529	26.61%
280	VZSSA001355	30 - VERACRUZ DE IGNACIO DE LA	044 - CORDOBA	HOSPITAL GENERAL CORDOBA YANGA	75	8,708	35.89%
279	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,067	5.49%
278	OCSSA020030	20 - OAXACA	318 - SAN PEDRO MIXTEPEC -DTO	HG PUERTO ESCONDIDO	30	2,899	16.25%
277	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FL(	50	2,950	29.73%
276	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,808	38.15%
275	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUITA	60	6,222	23.92%
274	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	24,570	28.53%
273	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,053	3.37%
272	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	9,520	48.36%
271	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	16,308	37.01%
270	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	19,340	26.92%
269	VZSSA007754	30 - VERACRUZ DE IGNACIO DE LA	181 - TLALIXCOYAN	HOSPITAL DE LA COMUNIDAD TLALIXCOYAN	24	1,384	19.44%
268	MNSSA001722	16 - MICHOACAN DE OCAMPO	052 - LAZARO CARDENAS	HG LAZARO CARDENAS	60	5,565	24.87%
267	DFSSA018166	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL AJUSCO MEDIO	78	169	24.26%
266	MCSSA007661	15 - MEXICO	106 - TOLUCA	H.G. DR. NICOLAS SAN JUAN	144	13,179	33.82%
265	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,889	42.40%
264	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	60	5,949	17.08%
263	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL OF	30	1,627	11.06%
262	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DI	112	10,080	25.08%
261	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	6,149	39.78%
260	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEI	HG TUXTEPEC	65	5,653	14.43%
259	MCSSA005095	15 - MEXICO	074 - SAN FELIPE DEL PROGRESO	HOSPITAL GENERAL SAN FELIPE DEL PROGRES	60	6,493	42.41%
258	MSSSA001504	17 - MORELOS	021 - TETECALA	HG DE TETECALA DR. RODOLFO BECERRIL DE I	30	2,679	15.34%
257	OCSSA002320	20 - OAXACA	190 - SAN JUAN COTZOCAN	HG MARIA LOMBARDO DE CASO	30	1,296	22.53%
256	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,079	12.99%
255	MCSSA010251	15 - MEXICO	040 - IXTAPAN DE LA SAL	HOSPITAL GENERAL IXTAPAN DE LA SAL	30	4,281	20.32%
254	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	11,827	18.18%

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Best performing hospitals 2011 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	146	15,830	22.92%
2	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	90	5,182	28.04%
3	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	3,175	14.83%
4	VZSSA002434	30 - VERACRUZ DE IGNACIO DE L/	072 - HUAYACOCOTLA	HOSPITAL DE LA COMUNIDAD DE HUAYACOC	11	300	29.00%
5	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,224	15.81%
6	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,968	26.58%
7	QRSSA018001	23 - QUINTANA ROO	008 - SOLIDARIDAD	HOSPITAL GENERAL DE PLAYA DEL CARMEN	60	4,076	28.97%
8	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	6,698	41.39%
9	CHSSA001755	08 - CHIHUAHUA	036 - JIMENEZ	HG DE JIMENEZ	15	2,183	27.53%
10	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,857	31.48%
11	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	93	11,610	28.47%
12	GTSSA017414	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL HID	44	5,425	20.11%
13	GTSSA017023	11 - GUANAJUATO	037 - SILAO	HOSPITAL GENERAL SILAO	43	5,901	25.88%
14	MSSSA000080	17 - MORELOS	003 - AXOCHIAPAN	HG DE AXOCHIAPAN DR. ANGEL VENTURA NI	30	3,912	42.00%
15	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	6,073	27.19%
16	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	2,846	24.21%
17	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,568	14.43%
18	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ GAI	HOSPITAL REGIONAL YAHUALICA	30	3,125	19.97%
19	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,896	32.81%
20	JCSSA000894	14 - JALISCO	018 - LA BARCA	HOSPITAL REGIONAL DE LA BARCA	40	6,579	26.54%
21	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	50	6,857	33.02%
22	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN T.	60	5,559	31.01%
23	TLSSA001376	29 - TLAXCALA	038 - TZOMPANTEPEC	H.G.R. EMILIO SANCHEZ PIEDRAS	62	8,044	20.19%
24	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,856	27.29%
25	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	29	4,479	19.96%
26	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	21,279	17.44%
27	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	6,842	19.63%
28	MNSSA002965	16 - MICHOACAN DE OCAMPO	082 - TACAMBARO	HG MA. ZENDEJAS (TACAMBARO)	31	3,388	32.44%
29	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	20	4,907	27.35%
30	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	20,898	22.16%

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Worst performing hospitals 2011 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
276	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,311	15.87%
275	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,422	41.05%
274	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,311	8.14%
273	NLSSA004046	19 - NUEVO LEON	046 - SAN NICOLAS DE LOS GARZA	HOSPITAL METROPOLITANO	224	15,268	41.28%
272	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	60	5,223	16.45%
271	MCSSA001011	15 - MEXICO	013 - ATIZAPAN DE ZARAGOZA	H.G. DR.SALVADOR GONZALEZ HERREJON	144	10,130	45.93%
270	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,872	38.89%
269	CSSSA002611	07 - CHIAPAS	040 - HUIXTLA	HOSPITAL GENERAL HUIXTLA	34	7,544	29.47%
268	MCSSA010280	15 - MEXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMERICAS	98	16,359	34.32%
267	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	4.51%
266	OCSSA016764	20 - OAXACA	014 - CIUDAD IXTEPEC	HG CIUDAD IXTEPEC	30	1,656	16.55%
265	HGSSA000156	13 - HIDALGO	003 - ACTOPAN	HOSPITAL GENERAL ACTOPAN	30	3,390	16.52%
264	MCSSA001636	15 - MEXICO	024 - CUAUTITLAN	H.G. JOSE VICENTE VILLADA	144	15,619	36.07%
263	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FL	50	3,295	26.98%
262	QRSSA000011	23 - QUINTANA ROO	001 - COZUMEL	HOSPITAL GENERAL DE COZUMEL	30	2,314	29.17%
261	CHSSA001026	08 - CHIHUAHUA	021 - DELICIAS	HG DELICIAS	62	7,687	28.85%
260	OCSSA020030	20 - OAXACA	318 - SAN PEDRO MIXTEPEC -DTO. 2	HG PUERTO ESCONDIDO	30	3,504	17.29%
259	CSSSA018875	07 - CHIAPAS	108 - VILLAFLORES	HOSPITAL GENERAL BICENTENARIO VILLAFLO	60	6,963	39.61%
258	NLSSA003911	19 - NUEVO LEON	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GAR	30	4,168	11.61%
257	HGSSA001590	13 - HIDALGO	030 - IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUIT	60	6,982	22.00%
256	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	40.35%
255	JCSSA007054	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE ZAPOPAN (CIVIL)	20	1,412	35.55%
254	DGSSA001446	10 - DURANGO	018 - EL ORO	HOSPITAL GENERAL DE SANTA MARIA DEL OI	30	1,724	8.06%
253	MCSSA007661	15 - MEXICO	106 - TOLUCA	H.G. DR. NICOLAS SAN JUAN	144	12,574	32.81%
252	ASSSA000404	01 - AGUASCALIENTES	003 - CALVILLO	HOSPITAL GENERAL CALVILLO	33	2,708	25.22%
251	CLSSA002734	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL DE SALTILLO	106	10,070	28.31%
250	DFSSA001540	09 - DISTRITO FEDERAL	007 - IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	10,311	52.18%
249	CLSSA000050	05 - COAHUILA DE ZARAGOZA	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	32	2,127	26.38%
248	ZSSSA000152	32 - ZACATECAS	010 - FRESNILLO	HOSPITAL GENERAL FRESNILLO (DR. JOSE HA	90	13,526	42.30%
247	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS K	120	14,951	25.33%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2012 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges
1	QTSSA001052	22 - QUERÉTARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,936
2	QTSSA012935	22 - QUERÉTARO	016 - SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	101	6,258
3	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSÉ G. PARRES	137	14,735
4	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,521
5	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN R	60	6,921
6	DGSSA000116	10 - DURANGO	004 - CUENCAMÉ	HOSPITAL REGIONAL DE CUENCAME	26	1,077
7	MCSSA004231	15 - MÉXICO	058 - NEZAHUALCÓYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	14,796
8	GTSSA017414	11 - GUANAJUATO	002 - ACÁMBARO	HOSPITAL GENERAL ACAMBARO MIGUEL HI	60	5,510
9	SRSSA000504	26 - SONORA	017 - CABORCA	HOSPITAL GENERAL CABORCA	30	2,730
10	JCSSA005584	14 - JALISCO	093 - TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,717
11	MNSSA003735	16 - MICHOACÁN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	8,132
12	GTSSA002760	11 - GUANAJUATO	023 - PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32	5,351
13	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,583
14	GTSSA001454	11 - GUANAJUATO	015 - GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,382
15	QTSSA000475	22 - QUERÉTARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,483
16	GTSSA002101	11 - GUANAJUATO	020 - LEÓN	HOSPITAL GENERAL REGIONAL DE LEÓN	189	21,420
17	VZSSA001384	30 - VERACRUZ DE IGNACIO DE I	045 - COSAMALOAPAN DE CARPIO	HOSPITAL GENERAL COSAMALOAPAN DR. V	30	3,537
18	TCSSA000306	27 - TABASCO	002 - CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,265
19	MNSSA002965	16 - MICHOACÁN DE OCAMPO	082 - TACÁMBARO	HG MA. ZENDEJAS (TACAMBARO)	31	3,189
20	CHSSA000022	08 - CHIHUAHUA	002 - ALDAMA	HG DE ALDAMA	6	8
21	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	6,107
22	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	33	3,100
23	CSSSA018764	07 - CHIAPAS	078 - SAN CRISTÓBAL DE LAS CASA	HOSPITAL DE LAS CULTURAS SAN CRISTOBA	65	5,439
24	VZSSA007660	30 - VERACRUZ DE IGNACIO DE I	016 - LA ANTIGUA	HOSPITAL GENERAL DE CARDEL	31	2,038
25	CSSSA008264	07 - CHIAPAS	109 - YAJALÓN	HOSPITAL GENERAL YAJALÓN	34	3,220
26	MCSSA000871	15 - MÉXICO	009 - AMECAMECA	H.G. AMECAMECA	30	3,552
27	CLSSA001421	05 - COAHUILA DE ZARAGOZA	033 - SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,489
28	GRSSA004753	12 - GUERRERO	038 - ZIHUATANEJO DE AZUETA	DR. BERNARDO SEPULVEDA GUTIÉRREZ	55	4,864
29	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	22,981
30	SPSSA000945	24 - SAN LUIS POTOSÍ	024 - RIOVERDE	HOSPITAL GENERAL DE RÍOVERDE	42	6,778

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2012 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
277	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,525	14.50%
276	MCSSA001011	15 - MÉXICO	013 - ATIZAPÁN DE ZARAGOZA	H.G. DR.SALVADOR GONZÁLEZ HERREJON	144	11,848	40.94%
275	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,052	9.98%
274	NTSSA000660	18 - NAYARIT	009 - DEL NAYAR	HOSPITAL GENERAL MIXTO JESÚS MARÍA	12	1,286	47.82%
273	NLSSA004046	19 - NUEVO LEÓN	046 - SAN NICOLÁS DE LOS GARZA	HOSPITAL METROPOLITANO	238	15,140	36.74%
272	MCSSA001636	15 - MÉXICO	024 - CUAUTITLÁN	H.G. JOSÉ VICENTE VILLADA	144	15,371	32.69%
271	CHSSA000676	08 - CHIHUAHUA	019 - CHIHUAHUA	HG CENTRAL DEL ESTADO	120	11,848	37.23%
270	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	17,731	21.47%
269	VZSSA006815	30 - VERACRUZ DE IGNACIO DE I	189 - TUXPAN	HOSPITAL GENERAL TUXPAN DR. EMILIO AL	60	4,510	18.43%
268	MCSSA004074	15 - MÉXICO	057 - NAUCALPAN DE JUÁREZ	H.G. DR. MAXIMILIANO RUÍZ CASTAÑEDA	144	14,238	26.11%
267	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTÉMOC	HOSPITAL GENERAL DR. GREGORíO SALAS F	50	3,503	23.38%
266	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	63	5,207	15.25%
265	OCSSA020030	20 - OAXACA	318 - SAN PEDRO MIXTEPEC -DTO.	HG PUERTO ESCONDIDO	30	3,930	17.48%
264	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	23,300	29.62%
263	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,774	8.27%
262	BCSSA018046	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL MATERNO INFANTIL	40	11,185	56.33%
261	CSSSA018875	07 - CHIAPAS	108 - VILLAFLORES	HOSPITAL GENERAL BICENTENARIO VILLAFL	60	7,374	36.80%
260	DGSSA017761	10 - DURANGO	012 - LERDO	HOSPITAL GENERAL LERDO.	38	5,157	30.75%
259	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	211	18,793	38.31%
258	VZSSA000310	30 - VERACRUZ DE IGNACIO DE I	010 - ALTOTONGA	HOSPITAL GENERAL ALTOTONGA EUFROSIN	28	3,091	34.75%
257	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	11,351	13.86%
256	ASSSA000614	01 - AGUASCALIENTES	006 - PABELLÓN DE ARTEAGA	HOSPITAL GENERAL PABELLÓN DE ARTEAGA	30	4,156	36.02%
255	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	1,889	20.28%
254	MCSSA002020	15 - MÉXICO	031 - CHIMALHUACÁN	H.G. CHIMALHUACÁN	90	6,208	27.01%
253	MCSSA002872	15 - MÉXICO	042 - IXTLAHUACA	HOSPITAL GENERAL IXTLAHUACA VALENTIN	30	4,939	30.27%
252	MCSSA007661	15 - MÉXICO	106 - TOLUCA	H.G. DR. NICOLÁS SAN JUAN	144	12,214	36.13%
251	MCSSA007265	15 - MÉXICO	104 - TLALNEPANTLA DE BAZ	H.G. VALLE CEYLAN	127	9,372	27.98%
250	PLSSA016835	21 - PUEBLA	043 - CUETZALAN DEL PROGRESO	HOSPITAL GENERAL DE CUETZALAN	30	2,379	33.33%
249	BSSSA001131	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL DE CABO SAN LUCAS	24	3,208	22.29%
248	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEP	HG TUXTEPEC	50	6,573	15.70%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2013 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	QTSSA001052	QUERÉTARO	JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	4,237	29.45%
2	QTSSA012935	QUERÉTARO	SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	92	9,216	26.78%
3	MSSSA000466	MORELOS	CUERNAVACA	HG DE CUERNAVACA DR. JOSÉ G. PARRES	137	14,808	21.76%
4	MSSSA000961	MORELOS	JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN I	60	7,298	19.61%
5	SLSSA018113	SINALOA	SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	35	3,973	21.55%
6	QTSSA001740	QUERÉTARO	QUERÉTARO	HOSPITAL DE ESPECIALIDADES DEL NIÑO Y I	141	21,398	25.52%
7	MCSSA004231	MÉXICO	NEZAHUALCÓYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	16,595	16.90%
8	CLSSA001421	COAHUILA DE ZARAGOZA	SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,365	29.39%
9	MSSSA002373	MORELOS	TEMIXCO	HG DE TEMIXCO	30	3,049	42.93%
10	SPSSA000945	SAN LUIS POTOSÍ	RIOVERDE	HOSPITAL GENERAL DE RÍOVERDE	84	6,684	31.66%
11	CHSSA000372	CHIHUAHUA	CAMARGO	HG CAMARGO	33	2,933	15.14%
12	QTSSA000475	QUERÉTARO	CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,549	27.21%
13	GTSSA000310	GUANAJUATO	SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL SAN MIGUEL ALLENDE"	63	7,224	13.75%
14	CSSSA008264	CHIAPAS	YAJALÓN	HOSPITAL GENERAL YAJALÓN	34	3,850	22.34%
15	MNSSA003735	MICHOACÁN DE OCAMPC	URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	10,195	27.20%
16	TCSSA000306	TABASCO	CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,011	22.69%
17	SRSSA000504	SONORA	CABORCA	HOSPITAL GENERAL CABORCA	30	2,335	30.24%
18	CHSSA001755	CHIHUAHUA	JIMÉNEZ	HG DE JIMÉNEZ	15	1,939	27.23%
19	MSSSA000080	MORELOS	AXOCHIAPAN	HG DE AXOCHIAPAN DR. ÁNGEL VENTURA I	30	3,584	41.55%
20	CCSSA000544	CAMPECHE	CHAMPOTÓN	HOSPITAL GENERAL DE CHAMPOTÓN	13	1,605	29.66%
21	JCSSA005584	JALISCO	TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,612	24.61%
22	GTSSA003361	GUANAJUATO	SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,228	10.59%
23	MNSSA002965	MICHOACÁN DE OCAMPC	TACÁMBARO	HG MA. ZENDEJAS (TACAMBARO)	30	3,118	35.34%
24	NTSSA002084	NAYARIT	BAHÍA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	2,887	13.02%
25	GTSSA002101	GUANAJUATO	LEÓN	HOSPITAL GENERAL LEÓN	221	20,648	17.47%
26	GTSSA001454	GUANAJUATO	GUANAJUATO	HOSPITAL GENERAL GUANAJUATO	60	7,599	14.66%
27	SLSSA018265	SINALOA	CULIACÁN	HOSPITAL GENERAL EL DORADO	26	1,548	18.60%
28	OCSSA000524	OAXACA	HEROICA CIUDAD DE HUAJUAP.	HG HUAJUAPAN ENF. MARÍA DEL PILAR SÁI	30	3,650	11.18%
29	GTSSA004003	GUANAJUATO	SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	26	2,572	8.09%
30	VZSSA015411	VERACRUZ DE IGNACIO DI	ISLA	HOSPITAL GENERAL ISLA	44	1,538	16.25%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2013 – childbirth

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
282	DFSSA002672	DISTRITO FEDERAL	TLALPAN	HOSPITAL GENERAL TORRE MÉDICA TEPEPA	110	627	4.78%
281	SLSSA001120	SINALOA	ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,408	14.31%
280	HGSSA001590	HIDALGO	IXMIQUILPAN	HOSPITAL GENERAL DEL VALLE DEL MEZQUI	60	7,217	19.37%
279	NTSSA000660	NAYARIT	DEL NAYAR	HOSPITAL GENERAL MIXTO JESÚS MARÍA	12	1,243	53.10%
278	DFSSA000881	DISTRITO FEDERAL	GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	5,801	8.76%
277	MCSSA001011	MÉXICO	ATIZAPÁN DE ZARAGOZA	H.G. DR.SALVADOR GONZÁLEZ HERREJON	144	9,296	28.09%
276	BCSSA018046	BAJA CALIFORNIA	MEXICALI	HOSPITAL MATERNO INFANTIL	80	10,491	44.09%
275	CHSSA001026	CHIHUAHUA	DELICIAS	HG DELICIAS	61	7,339	30.75%
274	NLSSA004046	NUEVO LEÓN	SAN NICOLÁS DE LOS GARZA	HOSPITAL METROPOLITANO	266	16,214	33.77%
273	MCSSA007661	MÉXICO	TOLUCA	H.G. DR. NICOLÁS SAN JUAN	144	11,616	37.28%
272	YNSSA001224	YUCATÁN	TIZIMÍN	HOSPITAL GENERAL SAN CARLOS	36	5,739	13.19%
271	TSSSA001772	TAMAULIPAS	REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSÉ	120	8,713	13.60%
270	DFSSA003384	DISTRITO FEDERAL	CUAUHTÉMOC	HOSPITAL GENERAL DR. GREGORíO SALAS F	50	3,886	36.34%
269	DFSSA018154	DISTRITO FEDERAL	TLÁHUAC	HOSPITAL GENERAL TLÁHUAC	120	7,607	37.24%
267	CHSSA000676	CHIHUAHUA	CHIHUAHUA	HG CENTRAL DEL ESTADO	120	9,990	39.35%
266	TSSSA001031	TAMAULIPAS	MATAMOROS	HG HOSPITAL GENERAL DE MATAMOROS DI	124	9,079	32.07%
265	OCSSA019873	OAXACA	SALINA CRUZ	HG SALINA CRUZ	63	5,532	15.47%
264	DFSSA001540	DISTRITO FEDERAL	IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,548	38.90%
263	VZSSA004860	VERACRUZ DE IGNACIO DI	RÍO BLANCO	HOSPITAL REGIONAL RÍO BLANCO	133	11,477	29.55%
262	OCSSA020030	OAXACA	SAN PEDRO MIXTEPEC -DTO. 22	HG PUERTO ESCONDIDO	30	3,202	21.80%
261	SRSSA001670	SONORA	NAVOJOA	HOSPITAL GENERAL NAVOJOA	63	5,271	16.28%
260	DFSSA003162	DISTRITO FEDERAL	BENITO JUÁREZ	HOSPITAL GENERAL XOCO	199	7,059	4.89%
259	DFSSA003722	DISTRITO FEDERAL	VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,703	10.10%
258	CSSSA006403	CHIAPAS	TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	16,874	21.86%
257	MCSSA010123	MÉXICO	ATLACOMULCO	HOSPITAL GENERAL ATLACOMULCO	60	5,965	28.80%
256	MCSSA002020	MÉXICO	CHIMALHUACÁN	H.G. CHIMALHUACÁN	90	5,885	24.91%
255	JCSSA007066	JALISCO	ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	25,227	26.05%
254	NLSSA003911	NUEVO LEÓN	SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GA	34	4,541	10.26%
253	DGSSA001446	DURANGO	EL ORO	HOSPITAL GENERAL DE SANTA MARÍA DEL (	24	1,313	5.03%
252	HGSSA000156	HIDALGO	ACTOPAN	HOSPITAL GENERAL ACTOPAN	30	3,280	16.77%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 30 beds; 3th and 4th quintile: 30-100 beds; 5th quintile: more than 100 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Appendix 5.3.5 Stroke

Best performing hospitals 2005

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,032	0.15%
2	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	40	5,518	0.13%
3	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,879	0.26%
4	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDR(	30	3,404	0.18%
5	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	30	5,603	0.27%
6	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	36	3,458	0.17%
8	MNSSA002591	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	H.G. BENITO JUAREZ	40	3,590	0.19%
9	TLSSA001376	29 - TLAXCALA	038 - TZOMPANTEPEC	H.G.R. EMILIO SANCHEZ PIEDRAS	60	8,032	0.20%
10	TLSSA001142	29 - TLAXCALA	033 - TLAXCALA	H.G. TLAXCALA DE XICOHTENCATL	80	7,875	0.43%
11	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	32	3,152	0.16%
13	GTSSA001290	11 - GUANAJUATO	014 - DOLORES HIDALGO CUN	HOSPITAL GENERAL CUNA DE LA INDEPENDE	30	5,479	0.33%
14	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	30	3,745	0.19%
15	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,550	0.24%
16	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLEND	HOSPITAL GENERAL FELIPE G. DOBARGANES	34	4,281	0.30%
18	BSSSA000332	03 - BAJA CALIFORNIA SUR	003 - LA PAZ	HOSPITAL GENERAL "JUAN MARIA DE SALVA	109	6,786	0.34%
19	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,059	0.26%
20	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	4,821	0.35%
21	VZSSA001355	30 - VERACRUZ DE IGNACIO DE L	044 - CORDOBA	HOSPITAL GENERAL CORDOBA YANGA	71	8,089	0.15%
22	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	3,800	0.39%
23	VZSSA003595	30 - VERACRUZ DE IGNACIO DE L	108 - MINATITLAN	HOSPITAL GENERAL DE MINATITLAN	51	5,929	0.08%
24	CMSSA000125	06 - COLIMA	002 - COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	114	9,181	0.35%
27	NLSSA000732	19 - NUEVO LEON	011 - CERRALVO	HOSPITAL GENERAL DE CERRALVO	30	2,388	0.25%
32	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	120	9,794	0.32%
34	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	62	5,927	0.30%
35	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	19	2,589	0.50%
38	SPSSA000356	24 - SAN LUIS POTOSI	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	12,598	0.37%
40	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,271	0.40%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2005 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
140	VZSSA003361	30 - VERACRUZ DE IGNACIO DE L	102 - MARTINEZ DE LA TORRE	HOSPITAL GENERAL MARTINEZ DE LA TORRE	47	5,653	0.09%
139	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZ	HOSPITAL GENERAL BALBUENA	185	8,381	0.07%
138	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	14,503	0.12%
137	DGSSA000676	10 - DURANGO	007 - GOMEZ PALACIO	HOSPITAL GENERAL DE GOMEZ PALACIO	74	6,943	0.13%
136	MCSSA007673	15 - MEXICO	106 - TOLUCA	HOSPITAL MATERNO PERINATAL MONICA PR	159	6,582	0.17%
135	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VEL/	30	2,199	0.23%
134	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	70	6,334	0.21%
133	TSSSA001550	28 - TAMAULIPAS	027 - NUEVO LAREDO	HG HOSPITAL GENERAL NUEVO LAREDO	70	4,112	0.15%
132	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	7,026	0.48%
131	PLSSA001440	21 - PUEBLA	071 - HUAUCHINANGO	HOSPITAL GENERAL HUAUCHINANGO.	33	3,744	0.16%
130	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	121	4,726	0.42%
129	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,159	0.33%
128	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	8,810	0.70%
127	NLSSA003911	19 - NUEVO LEON	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GAR	22	2,857	0.32%
125	MCSSA001122	15 - MEXICO	014 - ATLACOMULCO	H.G. ATLACOMULCO	30	4,122	0.24%
122	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	9,118	0.27%
121	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	239	15,219	0.11%
120	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	238	16,173	0.26%
119	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ I	100	7,149	0.22%
118	CSSSA001030	07 - CHIAPAS	019 - COMITAN DE DOMINGU	HOSPITAL GENERAL MARIA IGNACIA GANDU	90	9,699	0.57%
116	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	32	3,576	0.25%
115	TSSSA000850	28 - TAMAULIPAS	021 - EL MANTE	HG HOSP CIVIL DR VIRGILIO R HINOJOSA	37	6,003	0.20%
114	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	140	12,116	0.25%
112	BCSSA000913	02 - BAJA CALIFORNIA	004 - TIJUANA	HOSPITAL GENERAL TIJUANA	140	13,530	0.13%
111	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	5,989	0.80%
109	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	123	3,905	0.31%
108	VZSSA001150	30 - VERACRUZ DE IGNACIO DE L	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DI	102	7,790	1.19%
106	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	90	5,045	0.97%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2006 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,066	0.16%
2	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,907	0.41%
3	VZSSA003740	30 - VERACRUZ DE IGNACIO DE LA LI	109 - MISANTLA	HOSPITAL GENERAL DE MISANTLA	35	3,267	0.18%
4	TLSSA000483	29 - TLAXCALA	013 - HUAMANTLA	H.G. HUAMANTLA	36	5,436	0.17%
5	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	32	4,227	0.17%
6	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,733	0.38%
7	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	3,939	0.41%
8	VZSSA004913	30 - VERACRUZ DE IGNACIO DE LA LI	141 - SAN ANDRES TUXTLA	HOSPITAL GENERAL SAN ANDRES TUXTLA. DR. BEI	45	5,557	0.16%
11	MNSSA003735	16 - MICHOACAN DE OCAMPO	102 - URUAPAN	HG DR. PEDRO DANIEL MARTINEZ	90	8,472	0.41%
13	OCSSA000524	20 - OAXACA	039 - HEROICA CIUDAD DE HUAJUAF	HG HUAJUAPAN ENF. MARIA DEL PILAR SANCHEZ	29	2,304	0.26%
14	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	4,416	0.23%
16	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	4,076	0.15%
18	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,329	0.69%
21	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	30	3,440	0.35%
22	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	2,967	0.37%
26	HGSSA015532	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	30	3,687	0.57%
27	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	60	4,938	0.26%
31	TLSSA001142	29 - TLAXCALA	033 - TLAXCALA	H.G. TLAXCALA DE XICOHTENCATL	80	7,018	0.41%

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Worst performing hospitals 2006 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
153	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,970	0.24%
152	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	142	6,935	0.36%
151	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MENC	536	35,295	0.03%
150	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN TAPIA	60	6,932	0.10%
149	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	90	5,438	0.81%
148	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTAIEDA	144	10,923	0.56%
147	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	188	15,228	0.09%
146	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	134	5,649	0.39%
145	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	6,609	0.35%
144	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	3,254	0.25%
142	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	10,052	0.28%
141	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	70	7,570	0.32%
140	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA LI	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VA	111	7,913	1.16%
139	MCSSA007673	15 - MEXICO	106 - TOLUCA	HOSPITAL MATERNO PERINATAL MONICA PRETEL	60	7,690	0.21%
138	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	11,657	0.25%
137	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	17,675	0.33%
136	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	120	10,160	0.24%
135	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,270	0.78%
132	TSSSA002805	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL CIVIL CIUDAD VICTORIA D	102	7,265	0.41%
129	HGSSA000156	13 - HIDALGO	003 - ACTOPAN	HOSPITAL GENERAL ACTOPAN	30	3,212	0.16%
128	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	8,952	0.30%
126	DFSSA003553	09 - DISTRITO FEDERAL	016 - MIGUEL HIDALGO	HOSPITAL GENERAL DR. RUBEN LENERO	121	4,628	0.63%
124	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	7,983	0.39%
123	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	16,419	0.29%
121	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	12,225	0.53%
120	GRSSA004490	12 - GUERRERO	035 - IGUALA DE LA INDEPENDENCIA	DR. JORGE SOBERON ACEVEDO	60	5,131	0.23%
119	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	70	11,192	0.11%
113	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	10,190	0.67%

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Best performing hospitals 2007 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	4,403	0.50%
2	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	32	4,369	0.11%
3	SRSSA000726	26 - SONORA	019 - CANANEA	HOSPITAL COMUNITARIO CANANEA	24	1,699	0.29%
4	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,574	0.62%
5	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	5,976	0.17%
7	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	41	6,016	0.13%
8	GRSSA002863	12 - GUERRERO	022 - COYUCA DE CATALAN	DR. GUILLERMO SOBERON ACEVEDO	60	4,199	0.12%
9	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	21	3,128	0.32%
10	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	31	2,173	0.41%
11	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	2,387	0.46%
13	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	5,829	0.36%
15	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN ROMAN	60	6,756	0.13%
16	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,149	0.23%
17	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,288	0.63%
18	OCSSA005383	20 - OAXACA	482 - SANTIAGO PINOTEPA NACIONAL	HG PINOTEPA PEDRO ESPINOZA RUEDA	30	3,347	0.24%
19	TCSSA001665	27 - TABASCO	005 - COMALCALCO	HOSPITAL GENERAL DE COMALCALCO	31	4,970	0.30%
20	TCSSA004564	27 - TABASCO	016 - TEAPA	HOSPITAL GENERAL DE TEAPA DR. NICANDRO L. ME	33	3,653	0.38%
21	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	34	5,998	0.57%
22	VZSSA004744	30 - VERACRUZ DE IGNACIO DE LA	131 - POZA RICA DE HIDALGO	HOSPITAL REGIONAL POZA RICA DE HIDALGO	100	9,669	0.13%
24	VZSSA006313	30 - VERACRUZ DE IGNACIO DE LA	174 - TIERRA BLANCA	HOSPITAL GENERAL DE TIERRA BLANCA JESUS GAR(	30	3,482	0.20%
25	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	120	8,061	0.37%
26	QRSSA000373	23 - QUINTANA ROO	004 - OTHON P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	63	3,769	0.53%
27	CLSSA000581	05 - COAHUILA DE ZARAGOZA	018 - MONCLOVA	HOSPITAL GENERAL MONCLOVA	21	3,636	0.36%
28	NLSSA000855	19 - NUEVO LEON	014 - DOCTOR ARROYO	HOSPITAL GENERAL DOCTOR ARROYO	32	2,623	0.76%
29	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	4,512	0.33%
39	CHSSA001615	08 - CHIHUAHUA	032 - HIDALGO DEL PARRAL	HOSPITAL GENERAL PARRAL	30	2,346	0.72%
41	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	32	4,086	0.20%
46	TSSSA001772	28 - TAMAULIPAS	032 - REYNOSA	HG HOSPITAL GENERAL REYNOSA DR. JOSE MARIA (	124	9,568	1.08%

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Worst performing hospitals 2007 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
143	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	103	5,979	0.35%
142	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FLORES	50	4,765	0.15%
141	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	189	6,655	0.18%
140	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	9,447	0.58%
139	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	5,023	0.16%
138	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	17,789	0.07%
136	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,515	0.30%
135	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TI	123	11,189	0.26%
133	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	12,868	0.12%
132	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	7,041	0.61%
131	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	10,646	0.22%
130	CLSSA000914	05 - COAHUILA DE ZARAGOZA	025 - PIEDRAS NEGRAS	HOSPITAL GENERAL PIEDRAS NEGRAS	30	3,611	0.42%
129	MCSSA002184	15 - MEXICO	033 - ECATEPEC DE MORELOS	H.G. DR. JOSE MARIA RODRIGUEZ	144	8,616	0.26%
127	VZSSA006815	30 - VERACRUZ DE IGNACIO DE LA LL	189 - TUXPAN	HOSPITAL GENERAL TUXPAN DR. EMILIO ALCAZAR	60	5,185	0.27%
126	HGSSA001503	13 - HIDALGO	029 - HUICHAPAN	HOSPITAL GENERAL HUICHAPAN	30	2,980	0.17%
121	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	13,391	0.43%
120	VZSSA006972	30 - VERACRUZ DE IGNACIO DE LA LL	193 - VERACRUZ	HOSPITAL DE ALTA ESPECIALIDAD DE VERACRUZ	265	16,454	0.35%
119	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA LL	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VALE	111	8,427	0.87%
118	QTSSA001752	22 - QUERETARO	014 - QUERETARO	HOSPITAL GENERAL QUERETARO	85	5,316	0.51%
117	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,676	0.61%
115	MCSSA005095	15 - MEXICO	074 - SAN FELIPE DEL PROGRESO	HOSPITAL GENERAL SAN FELIPE DEL PROGRESO	55	6,625	0.12%
114	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	6,833	0.38%
113	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	10,739	0.56%
112	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	17,133	0.47%
110	NTSSA002084	18 - NAYARIT	020 - BAHIA DE BANDERAS	HOSPITAL GENERAL SAN FRANCISCO	25	3,223	0.19%
100	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	5,067	0.83%

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Best performing hospitals 2008 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	6,561	0.61%
2	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	61	6,500	0.28%
3	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	3,884	0.31%
4	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	4,193	0.36%
5	JCSSA005584	14 - JALISCO	093 - TEPATITLAN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	40	6,182	0.10%
7	TCSSA002003	27 - TABASCO	006 - CUNDUACAN	HOSPITAL GENERAL DE CUNDUACAN	32	4,077	0.22%
8	CSSSA004595	07 - CHIAPAS	065 - PALENQUE	HOSPITAL GENERAL PALENQUE	45	5,935	0.10%
9	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	51	6,961	0.11%
10	TCSSA000014	27 - TABASCO	001 - BALANCAN	HOSPITAL GENERAL DE BALANCAN	34	3,188	0.28%
11	MNSSA003945	16 - MICHOACAN DE OCAMPO	108 - ZAMORA	HG ZAMORA	64	6,960	0.32%
12	JCSSA006890	14 - JALISCO	118 - YAHUALICA DE GONZALEZ GALLO	HOSPITAL REGIONAL YAHUALICA	30	2,985	0.17%
13	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,302	0.36%
14	CMSSA001023	06 - COLIMA	009 - TECOMAN	HOSPITAL GENERAL TECOMAN	45	5,276	0.19%
15	VZSSA003595	30 - VERACRUZ DE IGNACIO DE LA LL	108 - MINATITLAN	HOSPITAL GENERAL DE MINATITLAN	51	6,879	0.25%
16	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	5,892	0.32%
17	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,060	0.67%
18	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	32	5,433	0.17%
19	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAUL A. CARRILLO	22	3,427	0.15%
20	MCSSA010053	15 - MEXICO	045 - JILOTEPEC	H.G. JILOTEPEC	30	4,326	0.55%
21	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	30	4,052	0.32%
22	HGSSA015532	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	60	5,613	0.39%
23	SRSSA000726	26 - SONORA	019 - CANANEA	HOSPITAL COMUNITARIO CANANEA	24	1,545	0.32%
24	GTSSA000100	11 - GUANAJUATO	002 - ACAMBARO	HOSPITAL GENERAL ACAMBARO	40	4,762	0.52%
26	JCSSA001401	14 - JALISCO	024 - COCULA	HOSPITAL REGIONAL COCULA	30	3,955	0.56%
28	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	30	2,226	1.17%
29	BCSSA017590	02 - BAJA CALIFORNIA	005 - PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	30	2,677	0.34%
31	CLSSA000581	05 - COAHUILA DE ZARAGOZA	018 - MONCLOVA	HOSPITAL GENERAL MONCLOVA	21	4,170	0.41%
33	MCSSA010123	15 - MEXICO	014 - ATLACOMULCO	HOSPITAL GENERAL ATLACOMULCO	42	7,399	0.47%
35	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	21	2,904	0.52%
37	GTSSA002760	11 - GUANAJUATO	023 - PENJAMO	HOSPITAL GENERAL PENJAMO	30	5,090	0.14%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2008 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
109	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	120	13,177	0.27%
110	CSSSA001030	07 - CHIAPAS	019 - COMITaN DE DOMiNGUEZ	HOSPITAL GENERAL MARiA IGNACIA GANDULFO CO	90	11,882	0.44%
113	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	16,453	0.32%
115	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,282	0.29%
116	GTSSA003233	11 - GUANAJUATO	027 - SALAMANCA	HOSPITAL GENERAL SALAMANCA	30	5,898	0.53%
119	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA LL	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VALE	112	9,695	0.81%
120	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	17,294	0.50%
121	PLSSA001884	21 - PUEBLA	085 - IZUCAR DE MATAMOROS	HOSPITAL GENERAL IZUCAR DE MATAMOROS	30	3,470	0.58%
122	OCSSA003406	20 - OAXACA	295 - SAN PABLO HUIXTEPEC	HG SAN PABLO HUIXTEPEC DR. MANUEL VELASCO S	30	3,262	0.25%
123	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENTENA	75	2,771	0.79%
124	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	6,687	0.18%
127	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPEC	HG TUXTEPEC	60	5,694	0.30%
129	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN ROMAN	60	7,282	0.12%
132	CHSSA000664	08 - CHIHUAHUA	019 - CHIHUAHUA	HG DR. SALVADOR ZUBIRAN ANCHONDO	152	10,421	0.21%
133	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TI	123	11,493	0.29%
134	ASSSA000404	01 - AGUASCALIENTES	003 - CALVILLO	HOSPITAL GENERAL CALVILLO	33	2,459	0.57%
137	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	27,531	0.08%
138	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,287	0.14%
139	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	11,639	0.27%
140	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	11,275	0.43%
141	MCSSA002184	15 - MEXICO	033 - ECATEPEC DE MORELOS	H.G. DR. JOSE MARIA RODRIGUEZ	144	12,018	0.29%
143	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	64	3,979	0.30%
144	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	120	8,059	0.69%
145	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,997	0.33%
146	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	14,001	0.41%
147	CHSSA001026	08 - CHIHUAHUA	021 - DELICIAS	HG DELICIAS	57	7,063	0.17%
148	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	6,407	0.81%
149	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAM	161	16,558	0.64%
150	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	11,530	0.17%
151	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	11,760	0.49%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2009 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SLSSA001255	25 - SINALOA	011 - GUASAVE	HOSPITAL GENERAL GUASAVE	46	6,626	0.09%
2	TCSSA002423	27 - TABASCO	008 - HUIMANGUILLO	HOSPITAL GENERAL DE HUIMANGUILLO DR. ADELFO S. AGUI	15	3,138	0.19%
3	VZSSA004744	30 - VERACRUZ DE IGNACIO DE LA LL	131 - POZA RICA DE HIDALGO	HOSPITAL REGIONAL POZA RICA DE HIDALGO	100	9,514	0.11%
4	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,290	0.61%
5	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	30	2,206	0.77%
6	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	30	4,277	0.28%
7	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	2,797	0.25%
8	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,201	0.56%
9	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	2,638	0.38%
10	JCSSA000631	14 - JALISCO	015 - AUTLAN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	30	4,320	0.58%
11	SPSSA000945	24 - SAN LUIS POTOSI	024 - RIOVERDE	HOSPITAL GENERAL DE RIOVERDE	42	6,380	0.28%
12	MNSSA016533	16 - MICHOACAN DE OCAMPO	069 - LA PIEDAD	HG LA PIEDAD	60	5,770	0.17%
13	TSSSA002192	28 - TAMAULIPAS	035 - SAN FERNANDO	HG HOSPITAL GENERAL SAN FERNANDO	40	2,801	0.57%
14	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,310	0.19%
15	JCSSA003496	14 - JALISCO	055 - MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	30	4,661	0.19%
16	HGSSA015532	13 - HIDALGO	076 - TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	60	6,599	0.14%
17	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHITAI	HG JUCHITAN DR. MACEDONIO BENITEZ FUENTES	60	5,641	0.18%
20	GRSSA008101	12 - GUERRERO	066 - TLAPA DE COMONFORT	HOSPITAL DE TLAPA	30	4,352	0.18%
23	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,318	0.48%
24	GTSSA004650	11 - GUANAJUATO	041 - URIANGATO	HOSPITAL GENERAL URIANGATO	63	5,907	0.29%
25	MNSSA000170	16 - MICHOACAN DE OCAMPO	006 - APATZINGAN	HG RAMON PONCE ALVAREZ	43	4,435	0.32%
26	MCSSA010123	15 - MEXICO	014 - ATLACOMULCO	HOSPITAL GENERAL ATLACOMULCO	53	8,161	0.60%
31	CHSSA000570	08 - CHIHUAHUA	017 - CUAUHTEMOC	HG DR. JAVIER RAMIREZ TOPETE	45	4,234	1.25%
36	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	105	10,403	0.70%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2009 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
162	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	185	5,624	0.09%
161	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	104	12,216	0.26%
160	OCSSA001125	20 - OAXACA	073 - PUTLA VILLA DE GUERRERO	PUTLA VILLA DE GUERRERO.	24	2,611	0.31%
159	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARID/	H.G. DR. FERNANDO QUIROZ GUTIERREZ	60	7,117	0.41%
158	MCSSA005095	15 - MEXICO	074 - SAN FELIPE DEL PROGRESO	HOSPITAL GENERAL SAN FELIPE DEL PROGRESO	60	6,665	0.14%
157	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPE	HG TUXTEPEC	65	4,962	0.30%
156	GTSSA016912	11 - GUANAJUATO	032 - SAN JOSE ITURBIDE	HOSPITAL GENERAL SAN JOSE ITURBIDE	30	3,339	0.15%
155	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	139	5,053	0.18%
154	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,997	0.29%
153	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAMOS BOI	161	16,316	0.54%
152	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TREVINO	123	11,769	0.20%
150	BCSSA000440	02 - BAJA CALIFORNIA	002 - MEXICALI	HOSPITAL GENERAL DE MEXICALI	163	15,624	0.11%
149	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	14,356	0.35%
144	DGSSA000191	10 - DURANGO	005 - DURANGO	HOSPITAL GENERAL DE DURANGO	208	19,388	0.43%
142	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZALEZ GUEVARA"	133	13,338	0.28%
140	MCSSA004231	15 - MEXICO	058 - NEZAHUALCOYOTL	H.G. DR. GUSTAVO BAZ PRADA	144	13,391	0.17%
137	GTSSA000766	11 - GUANAJUATO	007 - CELAYA	HOSPITAL GENERAL CELAYA	126	13,150	0.44%
136	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA LL	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VALENTIN GC	112	10,147	0.60%
135	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	10,921	0.52%
134	YNSSA000565	31 - YUCATAN	050 - MERIDA	HOSPITAL GENERAL AGUSTIN O'HORAN	242	16,575	0.36%
131	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	133	6,702	1.73%
130	SLSSA000666	25 - SINALOA	006 - CULIACAN	HOSPITAL GENERAL CULIACAN	120	8,099	0.62%
129	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	126	8,759	0.76%
128	TSSSA002431	28 - TAMAULIPAS	038 - TAMPICO	HG HOSPITAL GENERAL TAMPICO DR. CARLOS CANSECO	185	9,679	0.66%
127	ZSSSA000502	32 - ZACATECAS	017 - GUADALUPE	HOSPITAL GENERAL ZACATECAS	90	6,080	0.82%
125	VZSSA006972	30 - VERACRUZ DE IGNACIO DE LA LL	193 - VERACRUZ	HOSPITAL DE ALTA ESPECIALIDAD DE VERACRUZ	265	18,784	0.40%
122	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	5,216	1.07%
120	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	144	14,919	0.36%

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Best performing hospitals 2010 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	CSSSA000453	07 - CHIAPAS	009 - ARRIAGA	HOSPITAL GENERAL JUAREZ ARRIAGA	34	2,764	0.18%
2	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,986	0.68%
3	VZSSA003595	30 - VERACRUZ DE IGNACIO DE LA LL	108 - MINATITLAN	HOSPITAL GENERAL DE MINATITLAN	51	7,178	0.14%
4	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	4,035	0.50%
5	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,461	0.54%
6	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	51	8,230	0.07%
7	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,628	0.33%
9	TLSSA000483	29 - TLAXCALA	013 - HUAMANTLA	H.G. HUAMANTLA	30	5,931	0.17%
10	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,250	0.22%
11	OCSSA003715	20 - OAXACA	324 - SAN PEDRO POCHUTLA	HG POCHUTLA	60	5,037	0.14%
12	SPSSA000752	24 - SAN LUIS POTOSI	020 - MATEHUALA	HOSPITAL GENERAL DE MATEHUALA	21	3,009	0.23%
14	MNSSA003945	16 - MICHOACAN DE OCAMPO	108 - ZAMORA	HG ZAMORA	64	8,322	0.13%
15	MCSSA006430	15 - MEXICO	088 - TENANCINGO	H.G. TENANCINGO	60	3,746	0.13%
16	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	30	2,471	1.13%
17	TCSSA017420	27 - TABASCO	005 - COMALCALCO	HOSPITAL DR. DESIDERIO G. ROSADO CARBAJAL	42	6,387	0.45%
18	TCSSA004296	27 - TABASCO	014 - PARAISO	HOSPITAL GENERAL DE PARAISO	20	1,951	0.67%
19	TSSSA002192	28 - TAMAULIPAS	035 - SAN FERNANDO	HG HOSPITAL GENERAL SAN FERNANDO	40	2,772	0.72%
20	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	32	6,740	0.16%
21	BSSSA001131	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL DE CABO SAN LUCAS	24	2,862	0.28%
22	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	3,268	0.18%
23	TCSSA000014	27 - TABASCO	001 - BALANCAN	HOSPITAL GENERAL DE BALANCAN	30	3,212	0.53%
24	MNSSA000170	16 - MICHOACAN DE OCAMPO	006 - APATZINGAN	HG RAMON PONCE ALVAREZ	43	4,717	0.13%
25	JCSSA001401	14 - JALISCO	024 - COCULA	HOSPITAL REGIONAL COCULA	30	4,399	0.50%
27	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	62	6,978	0.09%
28	TLSSA001142	29 - TLAXCALA	033 - TLAXCALA	H.G. TLAXCALA DE XICOHTENCATL	80	7,541	0.23%
30	CSSSA007540	07 - CHIAPAS	101 - TUXTLA GUTIERREZ	HOSPITAL REGIONAL DR. RAFAEL PASCASIO GAMBO	140	23,702	0.38%
32	MCSSA007982	15 - MEXICO	110 - VALLE DE BRAVO	H.G. VALLE DE BRAVO	44	3,675	0.27%
36	SLSSA001540	25 - SINALOA	012 - MAZATLAN	HOSPITAL GENERAL DE MAZATLAN	105	10,687	0.53%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2010 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
172	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN TAPIA	60	6,074	0.20%
171	MCSSA010292	15 - MeXICO	058 - NEZAHUALCOYOTL	HOSPITAL GENERAL LA PERLA NEZAHUALCOYOTL	144	14,923	0.06%
170	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	19,340	0.04%
169	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MENCHA	476	33,677	0.03%
168	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,000	0.15%
167	DFSSA003384	09 - DISTRITO FEDERAL	015 - CUAUHTEMOC	HOSPITAL GENERAL DR. GREGORIO SALAS FLORES	50	2,950	0.17%
166	PLSSA004404	21 - PUEBLA	186 - TLATLAUQUITEPEC	HOSPITAL GENERAL TLATLAUQUITEPEC	20	2,934	0.17%
165	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	126	8,932	0.50%
164	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	14,387	0.38%
163	SRSSA018313	26 - SONORA	033 - HUATABAMPO	HOSPITAL GENERAL DEL BAJO RIO MAYO	31	2,310	0.22%
162	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TR	123	12,050	0.18%
161	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	100	3,385	0.97%
160	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,808	0.62%
159	VZSSA002970	30 - VERACRUZ DE IGNACIO DE LA LL	087 - XALAPA	HOSPITAL REGIONAL DE XALAPA DR. LUIS F. NACHO	150	10,045	0.07%
158	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	139	4,422	0.23%
157	DFSSA003162	09 - DISTRITO FEDERAL	014 - BENITO JUAREZ	HOSPITAL GENERAL XOCO	199	7,262	0.47%
156	MCSSA000871	15 - MEXICO	009 - AMECAMECA	H.G. AMECAMECA	30	2,982	0.34%
155	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAM	158	16,852	0.59%
154	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENTENA	80	8,271	0.18%
153	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	144	15,906	0.30%
152	HGSSA001503	13 - HIDALGO	029 - HUICHAPAN	HOSPITAL GENERAL HUICHAPAN	30	3,146	0.19%
150	MNSSA001891	16 - MICHOACAN DE OCAMPO	053 - MORELIA	HG DR. MIGUEL SILVA	219	20,870	0.22%
149	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	11,942	0.50%
148	SRSSA000562	26 - SONORA	018 - CAJEME	HOSPITAL GENERAL CD.OBREGON	85	9,942	0.17%
147	VZSSA001355	30 - VERACRUZ DE IGNACIO DE LA LL	044 - CORDOBA	HOSPITAL GENERAL CORDOBA YANGA	75	8,708	0.14%
146	YNSSA001224	31 - YUCATAN	096 - TIZIMIN	HOSPITAL GENERAL SAN CARLOS	36	5,079	0.22%
144	PLSSA003663	21 - PUEBLA	156 - TEHUACAN	HOSPITAL GENERAL TEHUACAN	120	8,831	0.26%
143	CSSSA006403	07 - CHIAPAS	089 - TAPACHULA	HOSPITAL GENERAL TAPACHULA	68	11,991	0.39%
140	CCSSA000363	04 - CAMPECHE	003 - CARMEN	H.G. MA. SOCORRO QUIROGA AGUILAR	45	5,585	0.36%
139	QRSSA001044	23 - QUINTANA ROO	005 - BENITO JUAREZ	HOSPITAL GENERAL DE CANCUN DR. JESUS KUMATE	120	14,097	0.54%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 100 beds. Only top/bottom 120 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2011 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	BSSSA001131	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL DE CABO SAN LUCAS	24	3,261	0.21%
2	TCSSA003514	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	30	3,992	0.38%
3	MSSSA000961	17 - MORELOS	012 - JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN ROMAN	60	6,424	0.16%
4	QTSSA000475	22 - QUERETARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,896	0.42%
5	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,568	0.36%
6	MNSSA002446	16 - MICHOACAN DE OCAMPO	066 - PATZCUARO	HG PATZCUARO	20	4,907	0.16%
7	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,311	0.30%
8	OCSSA003715	20 - OAXACA	324 - SAN PEDRO POCHUTLA	HG POCHUTLA	60	4,434	0.11%
9	QTSSA001052	22 - QUERETARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,857	0.16%
10	TLSSA001142	29 - TLAXCALA	033 - TLAXCALA	H.G. TLAXCALA DE XICOHTENCATL	76	8,140	0.12%
11	JCSSA003250	14 - JALISCO	053 - LAGOS DE MORENO	HOSPITAL GENERAL DE LAGOS DE MORENO	29	4,479	0.11%
12	YNSSA001434	31 - YUCATAN	102 - VALLADOLID	HOSPITAL GENERAL VALLADOLID	51	7,638	0.14%
13	VZSSA005560	30 - VERACRUZ DE IGNACIO DE LA LL	155 - TANTOYUCA	HOSPITAL GENERAL TANTOYUCA	34	2,295	0.31%
14	CHSSA000372	08 - CHIHUAHUA	011 - CAMARGO	HG CAMARGO	30	3,175	0.47%
15	TLSSA017831	29 - TLAXCALA	006 - CALPULALPAN	HOSPITAL GENERAL DE CALPULALPAN	45	4,377	0.23%
16	VZSSA004370	30 - VERACRUZ DE IGNACIO DE LA LL	124 - PAPANTLA	HOSPITAL GENERAL PAPANTLA DR. JOSE BUILL BELEN	44	3,294	0.27%
17	CSSSA018875	07 - CHIAPAS	108 - VILLAFLORES	HOSPITAL GENERAL BICENTENARIO VILLAFLORES	60	6,963	0.14%
18	JCSSA001326	14 - JALISCO	023 - ZAPOTLAN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	33	7,549	0.32%
19	QTSSA002131	22 - QUERETARO	016 - SAN JUAN DEL RIO	HOSPITAL GENERAL SAN JUAN DEL RIO	90	5,182	0.17%
20	OCSSA000640	20 - OAXACA	043 - HEROICA CIUDAD DE JUCHITAN	HG JUCHITAN DR. MACEDONIO BENITEZ FUENTES	60	6,305	0.19%
22	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,533	0.45%
23	TCSSA000306	27 - TABASCO	002 - CARDENAS	HOSPITAL GENERAL DE CARDENAS	30	6,787	0.32%
24	TCSSA003922	27 - TABASCO	012 - MACUSPANA	HOSPITAL GENERAL DE VILLA BENITO JUAREZ	30	2,305	0.22%
25	VZSSA004913	30 - VERACRUZ DE IGNACIO DE LA LL	141 - SAN ANDRES TUXTLA	HOSPITAL GENERAL SAN ANDRES TUXTLA. DR. BERN/	45	4,674	0.15%
26	NLSSA003911	19 - NUEVO LEON	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GARZA	30	4,168	0.58%
27	GTSSA002101	11 - GUANAJUATO	020 - LEON	HOSPITAL GENERAL REGIONAL DE LEON	221	21,279	0.19%
29	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,224	0.25%
32	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	30	2,373	0.80%
33	VZSSA003595	30 - VERACRUZ DE IGNACIO DE LA LL	108 - MINATITLAN	HOSPITAL GENERAL DE MINATITLAN	51	7,123	0.31%
40	SLSSA018113	25 - SINALOA	015 - SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	30	3,924	0.56%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2011 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
175	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUAREZ	HG OAXACA DR. AURELIO VALDIVIESO	180	20,668	0.05%
174	DFSSA018166	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL AJUSCO MEDIO	73	3,521	0.34%
173	MCSSA002020	15 - MEXICO	031 - CHIMALHUACAN	H.G. CHIMALHUACAN	90	8,716	0.21%
172	MNSSA004044	16 - MICHOACAN DE OCAMPO	112 - ZITACUARO	HG ZITACUARO	34	2,846	0.18%
171	MSSSA000355	17 - MORELOS	006 - CUAUTLA	HG DE CUAUTLA DR. MAURO BELAUZARAN TAPIA	60	5,559	0.09%
170	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAM	158	17,641	0.49%
169	CLSSA000050	05 - COAHUILA DE ZARAGOZA	003 - ALLENDE	HOSPITAL GENERAL ALLENDE	32	2,127	0.71%
168	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUAREZ	HOSPITAL GENERAL ACAPULCO	126	8,689	0.77%
167	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	119	6,145	0.24%
166	OCSSA019873	20 - OAXACA	079 - SALINA CRUZ	HG SALINA CRUZ	60	5,223	0.25%
165	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	103	8,422	0.75%
163	GTSSA001652	11 - GUANAJUATO	017 - IRAPUATO	HOSPITAL GENERAL IRAPUATO	102	12,219	0.14%
162	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,119	0.23%
161	MCSSA018412	15 - MEXICO	099 - TEXCOCO	H.G. TEXCOCO GUADALUPE VICTORIA BICENTENARIC	60	5,729	0.24%
160	MCSSA004074	15 - MEXICO	057 - NAUCALPAN DE JUAREZ	H.G. DR. MAXIMILIANO RUIZ CASTANEDA	144	13,878	0.32%
159	MCSSA008945	15 - MEXICO	122 - VALLE DE CHALCO SOLIDARIDAI	H.G. DR. FERNANDO QUIROZ GUTIERREZ	63	7,536	0.58%
154	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MENCHA	476	36,791	0.04%
153	VZSSA001150	30 - VERACRUZ DE IGNACIO DE LA LL	039 - COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VALEN	112	10,657	0.50%
152	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	12,308	0.45%
150	MCSSA000871	15 - MEXICO	009 - AMECAMECA	H.G. AMECAMECA	30	3,114	0.19%
149	MCSSA005095	15 - MEXICO	074 - SAN FELIPE DEL PROGRESO	HOSPITAL GENERAL SAN FELIPE DEL PROGRESO	60	5,450	0.22%
148	MSSSA000466	17 - MORELOS	007 - CUERNAVACA	HG DE CUERNAVACA DR. JOSE G. PARRES	146	15,830	0.27%
145	CLSSA002734	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL DE SALTILLO	106	10,070	0.29%
141	CHSSA001801	08 - CHIHUAHUA	037 - JUAREZ	HG JUAREZ	108	5,209	2.30%
139	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TRI	123	11,402	0.32%
136	PLSSA004071	21 - PUEBLA	174 - TEZIUTLAN	HOSPITAL GENERAL TEZIUTLAN	86	5,801	0.55%
130	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENTENAR	80	10,496	0.24%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 100 beds. Only top/bottom 120 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2012 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	JCSSA001326	14 - JALISCO	023 - ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38	7,599	0.20%
2	GTSSA003361	11 - GUANAJUATO	028 - SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,430	0.44%
3	QTSSA000475	22 - QUERÉTARO	004 - CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,483	0.65%
4	TCSSA002003	27 - TABASCO	006 - CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,386	0.23%
5	GTSSA000310	11 - GUANAJUATO	003 - SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL FELIPE G. DOBARGANES	58	7,521	0.16%
6	TCSSA000306	27 - TABASCO	002 - CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,265	0.19%
7	TCSSA002353	27 - TABASCO	007 - EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	30	2,372	0.63%
8	TCSSA017420	27 - TABASCO	005 - COMALCALCO	HOSPITAL DR. DESIDERIO G. ROSADO CARBAJAL	30	7,823	0.27%
9	GTSSA016912	11 - GUANAJUATO	032 - SAN JOSÉ ITURBIDE	HOSPITAL GENERAL SAN JOSÉ ITURBIDE	30	4,119	0.15%
10	CLSSA001421	05 - COAHUILA DE ZARAGOZA	033 - SAN PEDRO	HOSPITAL GENERAL SAN PEDRO	33	2,489	0.24%
11	YNSSA001224	31 - YUCATÁN	096 - TIZIMÍN	HOSPITAL GENERAL SAN CARLOS	36	5,575	0.20%
12	MCSSA006430	15 - MÉXICO	088 - TENANCINGO	H.G. TENANCINGO	60	4,995	0.38%
13	HGSSA004093	13 - HIDALGO	077 - TULANCINGO DE BRAVO	HOSPITAL GENERAL TULANCINGO	60	9,961	0.06%
14	VZSSA003595	30 - VERACRUZ DE IGNACIO DE LA LL	108 - MINATITLÁN	HOSPITAL GENERAL DE MINATITLAN	51	6,509	0.26%
15	SLSSA001120	25 - SINALOA	009 - ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,525	0.20%
16	OCSSA002146	20 - OAXACA	184 - SAN JUAN BAUTISTA TUXTEPEC	HG TUXTEPEC	50	6,573	0.15%
17	JCSSA005584	14 - JALISCO	093 - TEPATITLÁN DE MORELOS	HOSPITAL REGIONAL TEPATITLAN	50	6,717	0.13%
18	VZSSA004913	30 - VERACRUZ DE IGNACIO DE LA LL	141 - SAN ANDRÉS TUXTLA	HOSPITAL GENERAL SAN ANDRÉS TUXTLA. DR. BERN	45	5,190	0.21%
19	ZSSSA000613	32 - ZACATECAS	020 - JEREZ	HOSPITAL GENERAL JEREZ	30	3,902	0.21%
20	GTSSA002101	11 - GUANAJUATO	020 - LEÓN	HOSPITAL GENERAL REGIONAL DE LEÓN	189	21,420	0.22%
21	ZSSSA000152	32 - ZACATECAS	010 - FRESNILLO	HOSPITAL GENERAL FRESNILLO (DR. JOSÉ HARO ÁVI	90	12,488	0.26%
23	BSSSA000595	03 - BAJA CALIFORNIA SUR	008 - LOS CABOS	HOSPITAL GENERAL RAÚL A. CARRILLO	30	2,618	0.69%
24	NLSSA003911	19 - NUEVO LEÓN	044 - SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GARZA	30	4,407	0.39%
25	MNSSA016521	16 - MICHOACÁN DE OCAMPO	075 - LOS REYES	HG LOS REYES	30	2,863	0.63%
26	QTSSA001052	22 - QUERÉTARO	009 - JALPAN DE SERRA	HOSPITAL GENERAL JALPAN	30	3,936	0.25%
27	GTSSA002760	11 - GUANAJUATO	023 - PÉNJAMO	HOSPITAL GENERAL PÉNJAMO	32	5,351	0.64%
29	TLSSA017831	29 - TLAXCALA	006 - CALPULALPAN	HOSPITAL GENERAL DE CALPULALPAN	27	4,311	0.28%
32	MCSSA010123	15 - MÉXICO	014 - ATLACOMULCO	HOSPITAL GENERAL ATLACOMULCO	60	5,869	0.27%
37	VZSSA004370	30 - VERACRUZ DE IGNACIO DE LA LL	124 - PAPANTLA	HOSPITAL GENERAL PAPANTLA DR. JOSÉ BUILL BELE	44	3,376	0.27%
41	JCSSA000631	14 - JALISCO	015 - AUTLÁN DE NAVARRO	HOSPITAL REGIONAL DE AUTLAN	32	4,512	0.47%

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Worst performing hospitals 2012 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
178	MCSSA010280	15 - MÉXICO	033 - ECATEPEC DE MORELOS	HOSPITAL GENERAL LAS AMÉRICAS	123	15,180	0.07%
177	MCSSA002020	15 - MÉXICO	031 - CHIMALHUACÁN	H.G. CHIMALHUACÁN	90	6,208	0.56%
176	SRSSA002085	26 - SONORA	055 - SAN LUIS RÍO COLORADO	HOSPITAL GENERAL SAN LUIS RÍO COLORADO	39	4,144	0.22%
175	MCSSA004074	15 - MÉXICO	057 - NAUCALPAN DE JUÁREZ	H.G. DR. MAXIMILIANO RUÍZ CASTAÑEDA	144	14,238	0.18%
174	OCSSA000985	20 - OAXACA	067 - OAXACA DE JUÁREZ	HG OAXACA DR. AURELIO VALDIVIESO	197	18,956	0.04%
173	SRSSA000562	26 - SONORA	018 - CAJEME	HOSPITAL GENERAL CD.OBREGÓN	156	9,687	0.08%
172	PLSSA002490	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DR EDUARDO VAZQUEZ N	119	6,161	0.54%
171	DFSSA018166	09 - DISTRITO FEDERAL	012 - TLALPAN	HOSPITAL GENERAL AJUSCO MEDIO	69	7,221	0.24%
170	TSSSA002810	28 - TAMAULIPAS	041 - VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO TF	123	10,958	0.26%
169	PLSSA015230	21 - PUEBLA	114 - PUEBLA	HOSPITAL GENERAL DE LA ZONA NORTE BICENTENA	120	12,224	0.20%
168	SRSSA001110	26 - SONORA	030 - HERMOSILLO	HOSPITAL GENERAL DEL ESTADO "DR. ERNESTO RAN	158	17,754	0.49%
167	GRSSA000010	12 - GUERRERO	001 - ACAPULCO DE JUÁREZ	HOSPITAL GENERAL ACAPULCO	131	7,499	0.75%
166	DFSSA003722	09 - DISTRITO FEDERAL	017 - VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,774	0.25%
164	JCSSA002224	14 - JALISCO	039 - GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA "JUAN I. MENCH/	476	35,143	0.18%
163	HGSSA002430	13 - HIDALGO	048 - PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	11,351	0.55%
161	MCSSA008945	15 - MÉXICO	122 - VALLE DE CHALCO SOLIDARIDAD	H.G. DR. FERNANDO QUIROZ GUTIÉRREZ	61	8,283	0.58%
159	CLSSA000033	05 - COAHUILA DE ZARAGOZA	002 - ACUÑA	HOSPITAL GENERAL CD. ACUÑA	32	3,219	0.31%
158	JCSSA007066	14 - JALISCO	120 - ZAPOPAN	HOSPITAL GENERAL DE OCCIDENTE	215	23,300	0.13%
157	DFSSA000881	09 - DISTRITO FEDERAL	005 - GUSTAVO A. MADERO	HOSPITAL GENERAL VILLA	150	6,052	0.23%
154	MCSSA018412	15 - MÉXICO	099 - TEXCOCO	H.G. TEXCOCO GUADALUPE VICTORIA BICENTENARI	56	7,999	0.39%
153	CLSSA002734	05 - COAHUILA DE ZARAGOZA	030 - SALTILLO	HOSPITAL GENERAL DE SALTILLO	106	11,005	0.25%
151	PLSSA004071	21 - PUEBLA	174 - TEZIUTLÁN	HOSPITAL GENERAL TEZIUTLAN	86	5,814	0.41%
150	VZSSA001355	30 - VERACRUZ DE IGNACIO DE LA LL	044 - CÓRDOBA	HOSPITAL GENERAL CORDOBA YANGA	75	8,768	0.11%
149	ASSSA000030	01 - AGUASCALIENTES	001 - AGUASCALIENTES	HOSPITAL GENERAL TERCER MILENIO	64	5,079	0.33%
148	QTSSA001752	22 - QUERÉTARO	014 - QUERÉTARO	HOSPITAL GENERAL QUERETARO	85	6,384	0.42%
147	GTSSA004003	11 - GUANAJUATO	033 - SAN LUIS DE LA PAZ	HOSPITAL GENERAL SAN LUIS DE LA PAZ	30	4,441	0.16%
145	NTSSA001594	18 - NAYARIT	017 - TEPIC	HOSPITAL CIVIL "DR. ANTONIO GONZÁLEZ GUEVAR/	133	11,987	0.21%
144	CHSSA001801	08 - CHIHUAHUA	037 - JUÁREZ	HG JUÁREZ	119	5,320	1.77%
143	SPSSA000356	24 - SAN LUIS POTOSÍ	013 - CIUDAD VALLES	HOSPITAL GENERAL CD. VALLES	96	11,509	0.55%
142	BCSSA000015	02 - BAJA CALIFORNIA	001 - ENSENADA	HOSPITAL GENERAL DE ENSENADA	110	9,131	0.66%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3rd and 4th quintile: 45-120 beds; 5th quintile: more than 100 beds. Only top/bottom 120 hospitals whose deviation from the mean is statistically significant are reported.

Best performing hospitals 2013 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
1	SLSSA001120	SINALOA	ESCUINAPA	HOSPITAL GENERAL DE ESCUINAPA	30	4,408	0.23%
2	GTSSA003361	GUANAJUATO	SALVATIERRA	HOSPITAL GENERAL SALVATIERRA	30	3,228	0.25%
3	OCSSA000524	OAXACA	HEROICA CIUDAD DE HUAJUAP	HG HUAJUAPAN ENF. MARÍA DEL PILAR SÁNCHEZ V	30	3,650	0.14%
4	QTSSA000475	QUERÉTARO	CADEREYTA DE MONTES	HOSPITAL GENERAL CADEREYTA	65	7,549	0.60%
5	JCSSA001326	JALISCO	ZAPOTLÁN EL GRANDE	HOSPITAL REGIONAL DE CIUDAD GUZMAN	38	7,264	0.36%
6	BCSSA017590	BAJA CALIFORNIA	PLAYAS DE ROSARITO	HOSPITAL GENERAL PLAYAS DE ROSARITO	35	3,544	0.20%
7	TCSSA002353	TABASCO	EMILIANO ZAPATA	HOSPITAL GENERAL DE EMILIANO ZAPATA	34	2,273	0.70%
8	SRSSA018313	SONORA	HUATABAMPO	HOSPITAL GENERAL DEL BAJO RIO MAYO	34	2,552	0.20%
9	VZSSA007730	VERACRUZ DE IGNACIO DE LA L	VERACRUZ	HOSPITAL GENERAL DE TARIMOYA (VERACRUZ)	61	6,022	0.17%
10	VZSSA003595	VERACRUZ DE IGNACIO DE LA L	MINATITLÁN	HOSPITAL GENERAL DE MINATITLAN	51	5,872	0.24%
11	NLSSA003911	NUEVO LEÓN	SABINAS HIDALGO	HOSPITAL GENERAL VIRGINIA AYALA DE GARZA	34	4,541	0.20%
12	TCSSA003514	TABASCO	MACUSPANA	HOSPITAL GENERAL DE MACUSPANA	32	3,927	0.56%
13	CMSSA001356	COLIMA	MANZANILLO	HOSPITAL GENERAL DE MANZANILLO	60	5,810	0.22%
14	TCSSA000306	TABASCO	CÁRDENAS	HOSPITAL GENERAL DE CÁRDENAS	30	7,011	0.40%
16	TCSSA004296	TABASCO	PARAÍSO	HOSPITAL GENERAL DE PARAÍSO	20	2,001	0.85%
17	JCSSA003496	JALISCO	MAGDALENA	HOSPITAL REGIONAL DE MAGDALENA	30	4,277	0.33%
18	GTSSA002101	GUANAJUATO	LEÓN	HOSPITAL GENERAL LEÓN	221	20,648	0.30%
19	HGSSA015520	HIDALGO	HUEJUTLA DE REYES	HOSPITAL GENERAL DE LA HUASTECA	30	5,602	1.43%
20	SLSSA018113	SINALOA	SALVADOR ALVARADO	HOSPITAL GENERAL DE GUAMUCHIL	35	3,973	0.48%
21	GTSSA000310	GUANAJUATO	SAN MIGUEL DE ALLENDE	HOSPITAL GENERAL SAN MIGUEL ALLENDE¨ FELIPE	63	7,224	0.35%
22	GTSSA004650	GUANAJUATO	URIANGATO	HOSPITAL GENERAL URIANGATO	63	5,097	0.29%
23	TSSSA018951	TAMAULIPAS	VALLE HERMOSO	HG HOSPITAL GENERAL VALLE HERMOSO DR. ROD	23	3,072	0.20%
25	MNSSA003735	MICHOACÁN DE OCAMPO	URUAPAN	HG DR. PEDRO DANIEL MARTÍNEZ	90	10,195	0.09%
26	MCSSA006430	MÉXICO	TENANCINGO	H.G. TENANCINGO	60	5,465	0.40%
27	MSSSA000961	MORELOS	JOJUTLA	HG DE JOJUTLA DR. ERNESTO MEANA SAN ROMÁN	60	7,298	0.14%
29	CMSSA000125	COLIMA	COLIMA	HOSPITAL REGIONAL UNIVERSITARIO	119	10,962	0.25%
30	MCSSA010053	MÉXICO	JILOTEPEC	H.G. JILOTEPEC	30	4,228	0.31%
31	TCSSA002003	TABASCO	CUNDUACÁN	HOSPITAL GENERAL DE CUNDUACAN	30	4,290	0.26%
34	OCSSA016764	OAXACA	CIUDAD IXTEPEC	HG CIUDAD IXTEPEC	30	1,851	0.70%
36	CHSSA000570	CHIHUAHUA	CUAUHTÉMOC	HG DR. JAVIER RAMÍREZ TOPETE	49	4,638	0.50%

Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 120 beds. Only top/bottom 30 hospitals whose deviation from the mean is statistically significant are reported.

Worst performing hospitals 2013 – stroke

Ranking	Hospital ID	State	Municipality	Hospital	Hospital Beds	Total discharges	ToC as % of Total Discharges
132	QRSSA001044	QUINTANA ROO	BENITO JUÁREZ	HOSPITAL GENERAL DE CANCUN DR. JESÚS KUMAT	120	16,350	0.51%
137	JCSSA002224	JALISCO	GUADALAJARA	HOSPITAL CIVIL DE GUADALAJARA JUAN I. MENCH	476	31,500	0.24%
140	TSSSA000401	TAMAULIPAS	CIUDAD MADERO	HG HOSPITAL GENERAL CIVIL CIUDAD MADERO	82	6,696	0.43%
147	MCSSA018412	MÉXICO	TEXCOCO	H.G. TEXCOCO GUADALUPE VICTORIA BICENTENAI	56	8,761	0.43%
149	HGSSA015532	HIDALGO	TULA DE ALLENDE	HOSPITAL GENERAL DE TULA	60	6,074	0.23%
151	GTSSA000766	GUANAJUATO	CELAYA	HOSPITAL GENERAL CELAYA	143	12,567	0.28%
153	VZSSA001150	VERACRUZ DE IGNACIO DE LA L	COATZACOALCOS	HOSPITAL REGIONAL DE COATZACOALCOS DR.VAL	112	9,665	0.44%
155	CHSSA001801	CHIHUAHUA	JUÁREZ	HG JUÁREZ	119	5,594	0.79%
157	MSSSA000466	MORELOS	CUERNAVACA	HG DE CUERNAVACA DR. JOSÉ G. PARRES	137	14,808	0.21%
159	BCSSA000440	BAJA CALIFORNIA	MEXICALI	HOSPITAL GENERAL DE MEXICALI	129	6,269	0.51%
160	DFSSA018154	DISTRITO FEDERAL	TLÁHUAC	HOSPITAL GENERAL TLÁHUAC	120	7,607	0.30%
163	GRSSA000010	GUERRERO	ACAPULCO DE JUÁREZ	HOSPITAL GENERAL ACAPULCO	131	8,006	0.60%
164	QTSSA012935	QUERÉTARO	SAN JUAN DEL RÍO	HOSPITAL GENERAL SAN JUAN DEL RÍO	92	9,216	0.23%
165	PLSSA004071	PUEBLA	TEZIUTLÁN	HOSPITAL GENERAL TEZIUTLAN	86	6,254	0.56%
167	MCSSA007661	MÉXICO	TOLUCA	H.G. DR. NICOLÁS SAN JUAN	144	11,616	0.22%
168	DFSSA018166	DISTRITO FEDERAL	TLALPAN	HOSPITAL GENERAL AJUSCO MEDIO	69	7,149	0.15%
169	MCSSA008945	MÉXICO	VALLE DE CHALCO SOLIDARIDA	H.G. DR. FERNANDO QUIROZ GUTIÉRREZ	60	6,675	0.54%
170	MNSSA001891	MICHOACÁN DE OCAMPO	MORELIA	HG DR. MIGUEL SILVA	219	18,534	0.18%
172	GTSSA017385	GUANAJUATO	VALLE DE SANTIAGO	HOSPITAL GENERAL VALLE DE SANTIAGO	30	5,167	0.29%
173	MCSSA004074	MÉXICO	NAUCALPAN DE JUÁREZ	H.G. DR. MAXIMILIANO RUÍZ CASTAÑEDA	144	18,815	0.18%
175	SLSSA000024	SINALOA	AHOME	HOSPITAL GENERAL LOS MOCHIS	120	12,191	0.28%
176	CSSSA002611	CHIAPAS	HUIXTLA	HOSPITAL GENERAL HUIXTLA	31	8,555	0.06%
177	TSSSA002810	TAMAULIPAS	VICTORIA	HG HOSPITAL GENERAL VICTORIA DR. NORBERTO T	123	10,931	0.13%
178	DFSSA003722	DISTRITO FEDERAL	VENUSTIANO CARRANZA	HOSPITAL GENERAL BALBUENA	178	6,703	0.16%
180	DFSSA003162	DISTRITO FEDERAL	BENITO JUÁREZ	HOSPITAL GENERAL XOCO	199	7,059	0.41%
181	QRSSA000373	QUINTANA ROO	OTHÓN P. BLANCO	HOSPITAL GENERAL DE CHETUMAL	90	4,399	0.32%
182	SRSSA000562	SONORA	CAJEME	HOSPITAL GENERAL CD.OBREGÓN	156	10,295	0.39%
183	HGSSA002430	HIDALGO	PACHUCA DE SOTO	HOSPITAL GENERAL PACHUCA	167	10,991	0.56%
184	SRSSA001110	SONORA	HERMOSILLO	HOSPITAL GENERAL DEL ESTADO DR. ERNESTO RAI	158	15,224	0.37%
185	DFSSA001540	DISTRITO FEDERAL	IZTAPALAPA	HOSPITAL GENERAL REGIONAL IZTAPALAPA	144	9,548	0.05%

Hospitals ranked in a descending order (i.e. hospital at the top of the list has been identified as the worst performer). Facilities classified as general hospitals according to the Secretaría de Salud (2015) dataset. Hospital size distribution-1st and 2nd quintiles: up to 45 beds; 3th and 4th quintile: 45-120 beds; 5th quintile: more than 100 beds. Only top/bottom 120 hospitals whose deviation from the mean is statistically significant are reported.