Cataract Surgical Services in Palestine

Ranad Maswadi[1,2], Covadonga Bascaran[1], Gerry Clare[3], Maged Abu Ramadan[4], Alaa AlTalbishi[5], Allen Foster[1]

[1]*London School of Hygiene and Tropical Medicine, London, UK*

[2]*Guy's and St Thomas' NHS Foundation Trust, London, UK*

[3]*Moorfields Eye Hospital, London, UK.*

[4]*Gaza Eye Centre, Gaza Strip, Palestine*

[5]*St John Eye Hospital, Hebron, West Bank, Palestine*

The corresponding author:

Ranad Maswadi, MD

Address:

Westminster Bridge Road, London, UK

SE1 7EH

Phone number: 00447743266502

Email: dr_ranad_ms@hotmail.com,

ranad.maswadi@gstt.nhs.uk

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Ranad Maswadi: Performed literature review, composed the study methodology and data collection tools, performed data collection, analysis and interpretation, manuscript writing, and figures and tables composition.

Covadonga Bascaran: suggested the study idea, contributed to the methodology and study design, helped obtaining ethical approval, and acquisition of funding, provided guidance in data analysis and interpretation, composed and edited tables and figures, and revised the manuscript drafts.

Gerry Clare: Contributed to the methodology and study design, facilitated data collection from participants at eye health centres, composed and edited figures, and revised the manuscript draft.

Maged Abu Ramadan: Provided preliminary data on cataract services in Gaza strip, ensured participant centres cooperation in the study, facilitated the data collection from cataract centres in Gaza strip, and revised manuscript draft.

Alaa AlTalbishi: Provided preliminary data on cataract services in the West Bank, provided the contacts of the stakeholders at the cataract surgical centres involved in the study, facilitated data collection in West Bank; and revised manuscript draft.

Allen Foster: Contributed to the methodology and study design and revised the manuscript draft.

All authors approved the final paper draft and agreed to be accountable for all aspects of the work.

Abstract

Purpose

Cataract surgery, quantity and quality, is an indicator of ophthalmic care. A comprehensive assessment of cataract surgical services has never been carried out in Palestine, including West Bank, Gaza Strip and East Jerusalem. The objective of this study was to estimate the cataract surgical rate in 2015 to and to explore the modes of payment and referral systems.

Methods

A cross- sectional study conducted between June and August 2016. Medical Directors from Cataract Surgical Centres in Palestine were interviewed using a structured questionnaire to extract data on cataract output and surgical techniques. Additionally, data were collected on modes of payment for cataract services. The cataract surgical rate was calculated by dividing the total cataract output in 2015 by the estimated population of Palestine in millions.

Results

In 2015, 9908 cataract surgeries were carried out in 22 centres. The cataract surgical rate was 2,117 operations per million population. Phacoemulsification was the most common technique (73.4%), however in government centres 67% were performed by extracapsular cataract extraction. In the Gaza Strip, 56.6% of cataract surgeries were operated at government centres, and 42.8% were operated at NGO centres while in West Bank, only 12% of cataract surgeries were operated at government centres, with two thirds of cataracts diagnosed at governmental centres being referred to private and NGO centres. Seventy eight percent of cataract surgeries were funded by insurance, of which the government insurance scheme contributed 65%.

Conclusion

The cataract surgical rate in Palestine falls short of the required WHO target. The majority of cataract surgeries are funded by insurance.

Introduction

Cataract is responsible for around 50 percent of people blind in the world, the majority of whom reside in low-income countries, [1,2]. The need for cataract surgery is on the increase due to population growth and increased longevity.[2,3] While cataract extraction with lens replacement is one of the most common surgical procedures in high income countries, it is not yet readily available to many living in low income countries.[4] Although cataract surgery is considered one of the most cost effective health interventions, the price charged for cataract surgery remains a major barrier to uptake in low income populations.[5] Cataract surgical services are a useful indicator of a country's general ophthalmic healthcare.

In addition to epidemiological surveys of blindness, supplementary data on infrastructure, personnel, and equipment are needed for planning services.[6] The WHO global action plan (GAP) 2014-2019 identified priority indicators for eye care services including information on human resources (HR), cataract surgical coverage (CSC), cataract surgical rate (CSR), and the prevalence of avoidable visual impairment.[7] CSC is the proportion of people with cataract (at different visual acuity levels) who have undergone cataract surgery. CSR is the number of cataract surgeries performed per million population per year.

The population of Palestine was estimated to be 4.8million in 2016; 2.9 m in West Bank (WB) and 1.9m in Gaza Strip (GS). Of those in the WB, 0.4m live in East Jerusalem, which is administered by Israel.[8]

Overall, the Palestinian population is a young population, with 50% below 20 years of age, and only 10% above the age 50 years in 2016. Refugees living in Palestine constitute 41% of the population (26% in WB and 68% in GS), and 75% of Palestinians live in urban areas.[9] The gross domestic product (GDP) per capita was 1,745 US dollars

126 in 2015,[10] placing Palestine in the lower-middle-income band of world economies. As a
127 consequence of the poor economy and political instability, the Palestinian Authority
128 (PA) relies mainly on external donors for finances, making it an unsustainable
129 economy.[11] The Palestinian health system has four main financial providers: the
130 Palestinian Ministry of Health (MOH), the UN Relief and Works Agency (UNRWA),
131 non-government organizations (NGOs) and private providers.[12,13]

132 Cataract services in Palestine are delivered through a collaborative referral
133 system between different providers. Government centres refer cases that are beyond
134 their capacity to NGO or private centres with which they have referral agreements. The
135 process of government insurance referrals is financed through the Palestinian MOH.
136 Government referral costs are the second highest budget line for the PA, after salaries.
137 Additionally, UNRWA provides services through primary eye care clinics, and has
138 referral agreements for cataract surgery with selected NGOs in WB and GS.

139 The referral pattern is usually to NGO or private centres within the same region.
140 Inter-regional referrals include; GS to WB or East Jerusalem, and WB to East
141 Jerusalem. There are no referrals from East Jerusalem to another region, and there are
142 no referrals from other regions to GS. Patients from GS and WB (not resident in East
143 Jerusalem), whose medical treatment necessitates traveling outside their region, must
144 apply for access permits from the Israeli authorities to travel for medical purposes
145 between the regions and to East Jerusalem.

146 In 2011, 82% of the Palestinian population (97% of Gazans and 73% of West
147 Bankers) had health insurance,[9] the three main types being government insurance,
148 UNRWA insurance (for Palestinian refugees), and Israeli insurance. The Palestinian
149 MOH provides insurance mainly for workers at government organizations and their
150 families, poor families through social welfare, and voluntary applicants, covering 65%

of the population (53% WB, 83% GS). UNRWA, a UN agency dedicated to the development of Palestinian refugees, provides insurance covering 37% of the population in 2011(17% WB, 69% GS).[9] Palestinian residents of East Jerusalem are subject to Israeli law as they hold permanent residence in Israel, and are insured through payment of monthly premiums to the Israeli National Insurance Institute.[9,14] Eye care for Palestinians in Jerusalem is provided mainly by one NGO in East Jerusalem, and to a lesser extent, by two centres in West Jerusalem, depending on the insurance health plan. Finally, there are a few people with private insurance.

A Rapid Assessment of Avoidable Blindness (RAAB) study in 2010, reported a prevalence of bilateral blindness (VA<3/60 in the better eye with available correction) in people aged 50 years and over of 3.4% (95% CI: 2.7–4.0), 2.0% (95% CI: 1.4–2.5) for severe visual impairment (VA≥3/60 and <6/60), and 7.4% (95% CI: 6.4–8.3) for visual impairment (VA≥6/60 and <6/18). [15] Cataract was the cause of 55% of blindness in Palestinians aged 50 and over, and the CSC was found to be 86% in people with <3/60 vision in the better eye due to cataract, and 62% for those with <6/18 vision bilaterally.[15] At the time, the number of practicing ophthalmologists in Palestine was 142. The CSR was estimated in a WHO Eastern Mediterranean Regional report in 2003 to be 843 cataract operations / million population / year, lower than Jordan (1,366) and Egypt (1,100) , and much lower than the Eastern Mediterranean Regional (EMR) target of 2500.[16] It is noteworthy that Palestine is one of the few nations that did not have a plan to implement VISION 2020 - the global initiative to eliminate avoidable blindness by the year 2020.

The objective of this study was to estimate the CSR in Palestine in 2015 and to explore the modes of referral and payment. This study will complement the RAAB survey in understanding the current delivery of cataract services and provide

information for policy-makers to use in national planning and prioritization of the scarce resources available.[17]

Methods

This was a cross-sectional descriptive study, targeting all cataract surgical centres in Palestine (defined as any entity - stand-alone or within a general hospital - providing cataract surgery of any type). Data were collected between June and August 2016 using a structured quantitative questionnaire and secondary data analysis of both published and unpublished Palestinian MOH data.

The data variables collected by the questionnaire were;

The number of cataract surgeries operated at each centre (cataract output) in the years 2011, 2012, 2013, 2014, and 2015. For the year 2015, number of cataract surgeries by gender: number of cataract surgeries by surgical technique: number of cataract surgeries paid for privately, by insurance, (by Palestinian government, by UNRWA by private insurance, by Israeli insurance) and the mean price of privately-paid cataract surgery.

In WB, data were collected from the medical director and other key informants. The questionnaire was administered in person by the principal investigator. Data on surgical output from WB centres were manually verified from hospital surgical records by the principal investigator by cross-checking the individual medical records in those centres that consented to have them checked.

In GS, due to inability of the main investigator to gain an access permit to enter the region, the questionnaire was administered by telephone, fax and electronic messaging. Output data from GS was not manually verified. Data on government

199 referrals from the individual centres were corroborated in consultation with the MOH
200 Referral Department.
201 The CSR was calculated by dividing the total cataract output by the estimated
202 population of Palestine in millions for each year (2011-2015). Whereas the national
203 CSR estimation in 2015 included all cataract surgical centres in Palestine, the CSR
204 trend calculations from 2011 to 2014, were based on cataract surgical centres that had
205 an output of more than 20 surgeries in 2015. Population data were obtained from the
206 Palestinian Central Bureau of Statistics (PCBS), and data were analysed using Stata
207 Statistical Software (StataCorp. 2015, Release 14. College Station, TX).
208 The LSHTM Ethics Committee approved the study, and local approval was
209 obtained from the Palestinian MOH in Ramallah and the MOH branch in Gaza City.

210 **Results**

211 All 22 centres performing cataract surgery in Palestine were contacted and
212 agreed to participate in the study (Figure 1). Five government-run facilities, eight NGOs
213 and nine private clinics were assessed (Table 1). In two of the centres, both in GS, fewer
214 than 20 cataract surgeries were carried out in 2015. Although these centres were
215 included in the 2015 CSR calculation, their cataract output in previous years was
216 negligible, so they were excluded from the 2011-2014 analysis. In the WB, permission
217 was given to the principal investigator to manually verify the surgical output data in 9 of
218 15 centres (60%). The other 6 centres either had policies against direct access to
219 surgical records or could not agree access to records in a timely manner. Data from GS
220 could not be verified due to lack of access.
221 The type of cataract service providers varied between the regions (Figure 1). The
222 total number of cataract surgeries carried out in 2015 at the 22 centres was 9,908 (Table

1). In WB, NGO centres had the highest cataract output (54%), whereas in GS, it was the government centres (57%). Analysis from the 22 centres, showed that only 62% specified the gender. Analysis of the gender-stratified cataract surgical output data for 2015 in Palestine showed 50.3% in males, with a similar ratio in the two regions.

All routine surgeries included implantation of an intraocular lens as standard procedure. The most commonly used surgical technique was phacoemulsification (73%), which was more frequent in WB than in GS. Extracapsular cataract extraction (ECCE) technique was performed in 67% of cataract surgeries in government centres. Manual small incision cataract surgery (MSICS) was offered at one NGO centre (Table 2).

Table 3 shows data on CSR between 2011 and 2014 using data from 20 cataract surgical centres and the CSR in 2015 with data from 22 centres. Over the five years the national CSR ranged between 1,920 to 2,222 operations/ million / year. The CSR was similar in WB and GS apart from 2014 (Figure 2).

Overall, the cataract surgical trends from 2011-2015 indicate a steady output from NGO and government facilities, whereas the private sector output showed an overall increase, between 2012 and 2014, and saw a decline in 2015.

The mean price for cataract surgery paid at private centres in 2015 was 3000 NIS (New Israeli Shekels) (680 GBP), and 2500 NIS (537 GBP) at NGO centres. The price varied among centres and for different surgical techniques; the price range for PHACO was 2000 – 4000 NIS (454 – 907 GBP); for ECCE was 2000 – 3600 NIS (454 - 816 GBP); and for MSICS at the one NGO centre where it was offered was 2000 NIS (454 GBP).

The source of payment information was lacking for 18% of cases, but for those cataract cases with information, 78% were paid by insurance; of which government

248 insurance contributed 65%, UNRWA insurance (21%), private insurance (8%), and
249 Israeli insurance (6%).

250 In 2015, government centres in GS operated almost all of their cataract cases,
251 while in WB government centres referred 66.3% of cataract cases, two thirds to NGO
252 centres, and one third to private centres. The MOH referral department reported that of
253 the patients requiring referral for cataract treatment in 2015, at least 49% required
254 access permits from the Israeli authorities, in order to move from one region to the
255 other. Figure 3 illustrates the referral system for cataract services in Palestine in 2015.

256 **Discussion**

257 As in other countries within the WHO EMR, cataract is the main cause of blindness in
258 Palestine.[15,16] An understanding of cataract service provision, and of the barriers to
259 ophthalmic healthcare faced in Palestine, is only possible in the context of
260 socioeconomic and geopolitical factors, which have resulted in internal differences
261 within the health system.

262 The CSR for Palestine in 2015 was found to be 2,117 cataract operations/
263 million pop / year. Since there were no data from Israeli centres concerning the number
264 of Palestinian East Jerusalemites having cataract surgery in their facilities, or of
265 Palestinians having cataract surgery in other countries, this is a minimum estimate, but
266 undocumented cases are likely to be few. The CSR is significantly higher than the 2003
267 figure of 843,[16] which, considering the lack of data from Palestine noted in other EMR
268 reports,[18] was probably an underestimation. The increase in CSR could be attributed to
269 the increase in number of cataract surgical centres in Palestine in the last decade.
270 Nonetheless this CSR is lower than the WHO recommended minimum of 2500 by the
271 year 2010, and 3000 by the year 2020 for the EMR countries. It compares unfavourably

to neighbouring Egypt's estimated 3674 in 2014.[19] This could be related to the higher number of ophthalmologists in Egypt, estimated at 65/million population compared to 35/million in Palestine.[15, 1 20] Additionally, CSR is associated with socioeconomic indicators, and has a linear correlation with GDP per capita.[21] It is likely, therefore, to reflect the fact that the Palestinian GDP is considerably lower than Egypt's. Comparable EMR countries to Palestine in terms of GDP per capita are Yemen and Sudan.[9] The CSR was 2473 in Yemen in 2012,[22] and 2025 in Sudan in 2010.[23] Other factors, like the percentage of ophthalmologists trained in cataract surgery, availability of equipment and consumables, and the number and distribution of other eye health cadres are potential reasons for the low CSR.

The CSR showed a decline between 2012 and 2013, which could be related to the PA economic crisis, caused by reduced external donations and to Israeli withholding of Palestinian tax revenue.[24] In response to its increasing inability to cover the two main areas of expenditure, salaries and health referrals, the Palestinian MOH reduced the services offered. In addition, sporadic health workers' strikes led to cancellations of non-emergency surgeries. In 2014, the CSR in GS was the lowest of the five years, despite an increase in CSR in WB in the same year. This reflects the geo-political separation between the two regions and the challenge of providing equitable services in these circumstances. The 2014 Gaza war took a heavy toll on healthcare services, evidenced by damage to healthcare infrastructure and the loss of health workers.[25] A reduction in basic health services has been an inevitable consequence of serious conflicts and the challenges of providing equitable services in these circumstances remains significant.[26]

Women in the EMR are more likely to be blind and have less access to eye care than men.[27] In Egypt, females had 7% fewer cataract surgeries than males.[19] The RAAB

study from Palestine in 2010 found that the CSC was lower for females, and that they had poorer outcomes than males.[15] In this study the cataract output was similar for males and females. While women often face greater financial difficulties in accessing eye care, our study found that the majority of operated cataract patients in 2015 were insured. Moreover, according to data from 2011, women in Palestine had a higher percentage of insurance coverage than men.[12] Our findings are based on gender data for only 62% of the cataract cases in Palestine, which is a potential source of bias. Our study doesn't provide data on the proportion of women and men with cataract in Palestine and therefore we can't assume that the output implies gender equity in access to cataract services. Data from the RAAB are more likely to be robust due to random sampling and the high response rate.

In keeping with high income countries,[28] 73% of cataract surgeries in Palestine in 2015 were performed by phacoemulsification; however, at government centres the ECCE technique was performed in 60.5% of cases in GS and 86.5% in WB. WHO recommends MSICS as the cataract surgical technique of choice to implement in developing countries.[29] MSICS permits sutureless surgery[30] and requires less technology than phaco, making it less costly. [30,31] The application of MSICS has delivered positive results in many low- and middle-income countries.[31] However, this study found that in Palestine, the transition in surgical technique was from ECCE surgery to phacoemulsification, without the introduction of MSICS. This pattern has also been seen in Egypt.[19] The application of MSICS may be a useful adjunct in centres currently performing ECCE as part of the public health response to cataract blindness in Palestine.

In Palestine, the number of cataract surgeries carried out in NGO centres between 2011 and 2015 was almost the same as the combined number of surgeries from

private and government centres; this is in contrast to Egypt and Yemen where the main providers were private.[19,22] Government centres compensated for shortages in their service provision by making referral agreements with NGO or private providers, yet this varied between the two regions. While government centres in WB had the lowest cataract output and relied heavily on making referrals, government centres in GS had a cataract output that outweighed that of NGOs with few referred patients. This difference in referral rates could reflect different regional policies. Verification of data from GS, however, was not possible, due to lack of access.

Collaboration between public, private and non-government healthcare providers is common to all health services in Palestine.[21,25] However unlike some other health services, cataract surgery is not contracted out to other countries, in compliance with the 'nationalization of services' strategy of the Palestinian MOH. Besides generating financial savings for the government, this implies that the cataract surgical centres in Palestine are generally competent in addressing the need. In 2015, the price range of cataract surgery, including PHACO and ECCE, through out-of-pocket payment was 2000 - 4000 NIS (454 - 907 GBP), similar to neighbouring countries like Jordan (548-950 GBP) and lower than Israel (860-1290 GBP). The effects of pricing on consumer decisions on eye surgery are likely to be complex.

The authors of the 2010 RAAB study concluded that only 54.5 % of eyes operated for cataract in the Palestine had a good visual outcome, much lower than WHO target of >80%, and that visual outcomes were worse in GS than in WB.[15] It was beyond the scope of this study to examine cataract surgical outcomes. Further studies should examine factors like infrastructure, human resources, training, and co-morbidities as possible factors for poor visual outcome to cataract surgery in Palestine.

This study describes cataract surgical services in Palestine, which has a unique historical, social and political context that influences its health system dynamics. However, parallels and generalizations can be made with other settings. Firstly, conflict affecting health services, and eye care services specifically, has been described in other countries, like Egypt.[19] Anticipating these events can improve health systems resilience and forward planning of coping mechanisms. Secondly, the indicators presented are standard WHO indicators for cataract surgical services and therefore can be compared with other countries for reference.[7] Thirdly, the possible effect of insurance systems in closing the gender gap in cataract surgical services can also be of interest to other countries where gender inequity in access to eye care has been demonstrated.[27]

Conclusion

The CSR in Palestine falls short of the target CSR for the Eastern Mediterranean Region. In the West Bank, a high referral rate from government centres was found, suggesting that these centres lacked the capacity to deal with demand. In Gaza, on the other hand, government centres operated on almost all the cases seen. Seventy eight percent of cataract surgeries in 2015 in Palestine were financed by health insurance. Further studies are needed to identify the magnitude and causes of poor visual outcomes from cataract surgery in Palestine, since surgical techniques, variations in surgical skill, and co-morbidities such as diabetes may all have an impact. In addition, an assessment of services from the patients' perspective would be a welcomed additional study. Finally, although Palestine never joined in implementing VISION 2020, there is now an opportunity to join the global eye health community in prioritizing universal eye health.

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374

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World Blindness. *Surg Innov.* 2015; 22(2):189-93. doi:
10.1177/1553350614537120.

477 Table 1. Cataract output in West Bank (WB) and Gaza Strip (GS), 2015

Region	Governorate	Cataract output			
		Type of facility			Total
		Government	Private	NGO	
West Bank	Hebron	66	302	358	726
	Bethlehem	--	--	689	689
	Jerusalem	--	--	2307	2307
	Ramallah	197	1171	--	1368
	Nablus	489	550	--	1039
	Jenin	--	104	--	104
	Total WB	**752** ***(8%)***	**2127** ***(21%)***	**3354** ***(34%)***	**6233** ***(63%)***
Gaza Strip	Gaza city	1518	19	1465	3002
	Khan yunis	563	--	90	653
	Rafah	--	--	20	20
	Total GS	**2081** ***(21%)***	**19** ***(0.2%)***	**1575** ***(16%)***	**3675** ***(37%)***
Palestine	**Total Palestine**	**2806** ***(28%)***	**2146** ***(22%)***	**4929** ***(50%)***	**9908** ***(100%)***

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479

480 Table 2. Regional cataract output by surgical technique, 2015

481

Region	Phaco		ECCE		MSICS		Unknown		Total	
	n	%	n	%	n	%	n	%	n	%
WB	5194	52.4	1039	10.5	0	0.0	0	0.0	**6233**	62.9
GS	2077	21.0	1469	14.8	90	0.9	39	0.4	**3675**	37.1
Total Palestine	7271	73.4	2508	25.3	90	0.9	39	0.4	**9908**	100

482 ECCE: Extracapsular cataract extraction, MSICS: Manual small incision cataract surgery, WB: West

483 Bank, GS: Gaza Strip.

484

485 Table 3. Cataract Surgical Rates, 2011 – 2015

Region		2011	2012	2013	2014	2015
WB	Cataract output	5330	5104	5166	6909	6233
	Population in millions	2·58	2·64	2·71	2·79	2·86
	CSR	2065	1933	1906	2476	2179
GS	Cataract output	3414	3133	3443	3205	3675
	Population in millions	1·58	1·64	1·7	1·76	1·81
	CSR	2160	1910	2025	1821	2030
Total Palestine	Cataract output	8744	8237	8609	10114	9908
	Population in millions	4·16	4·29	4·42	4·55	4·68
National CSR		2101	1920	1947	2222	2117

486 CSR: Cataract Surgical Rate, WB: West Bank, GS: Gaza Strip.

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List of Figures:

492 Figure 1. Map of Palestine and cataract surgical facilities by type and region

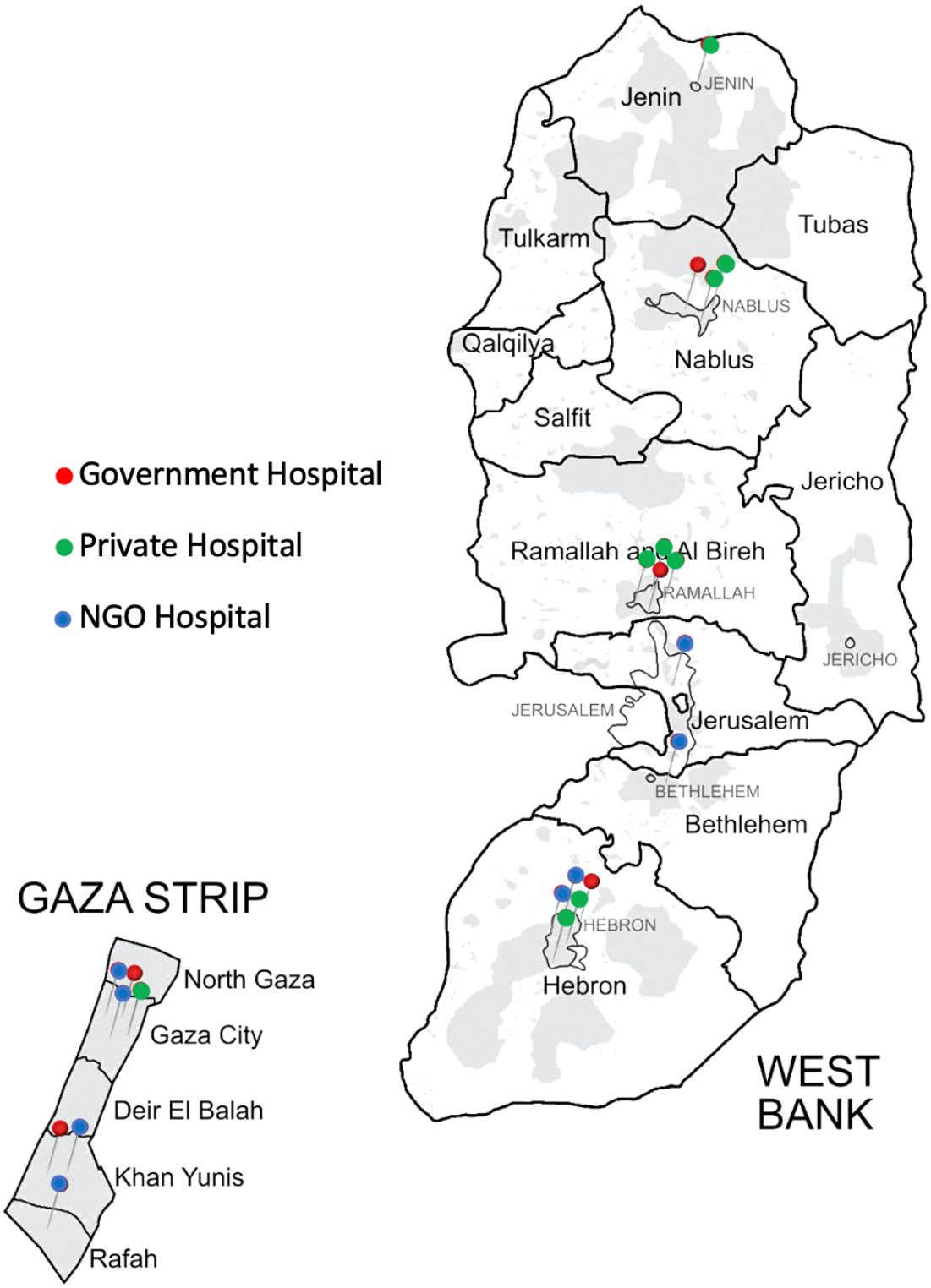

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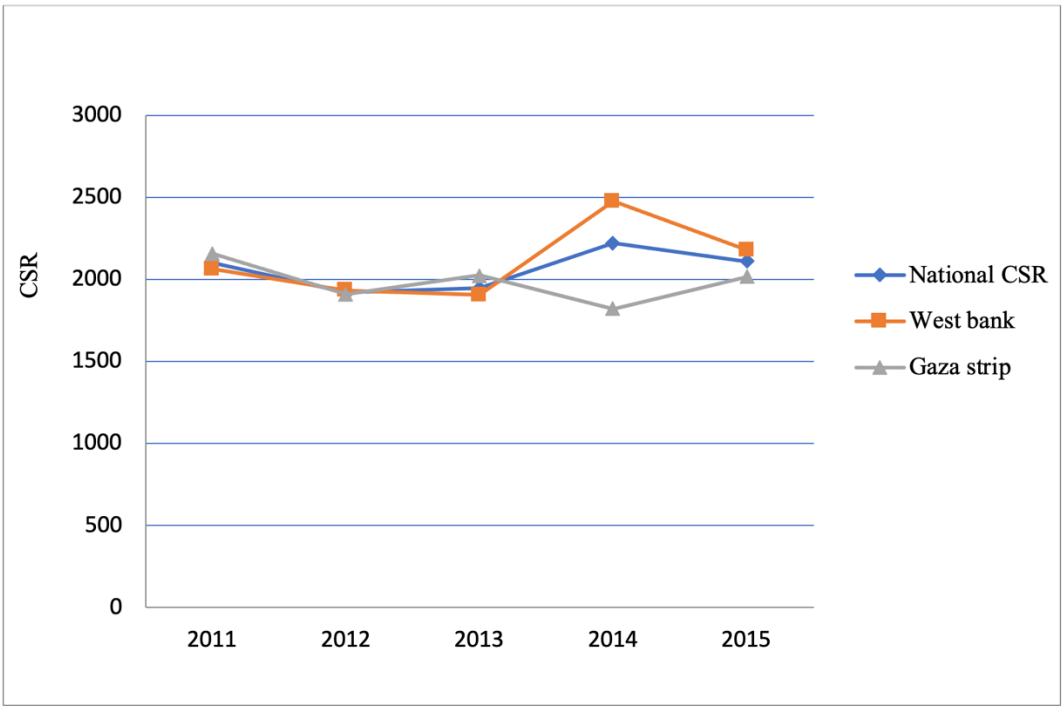
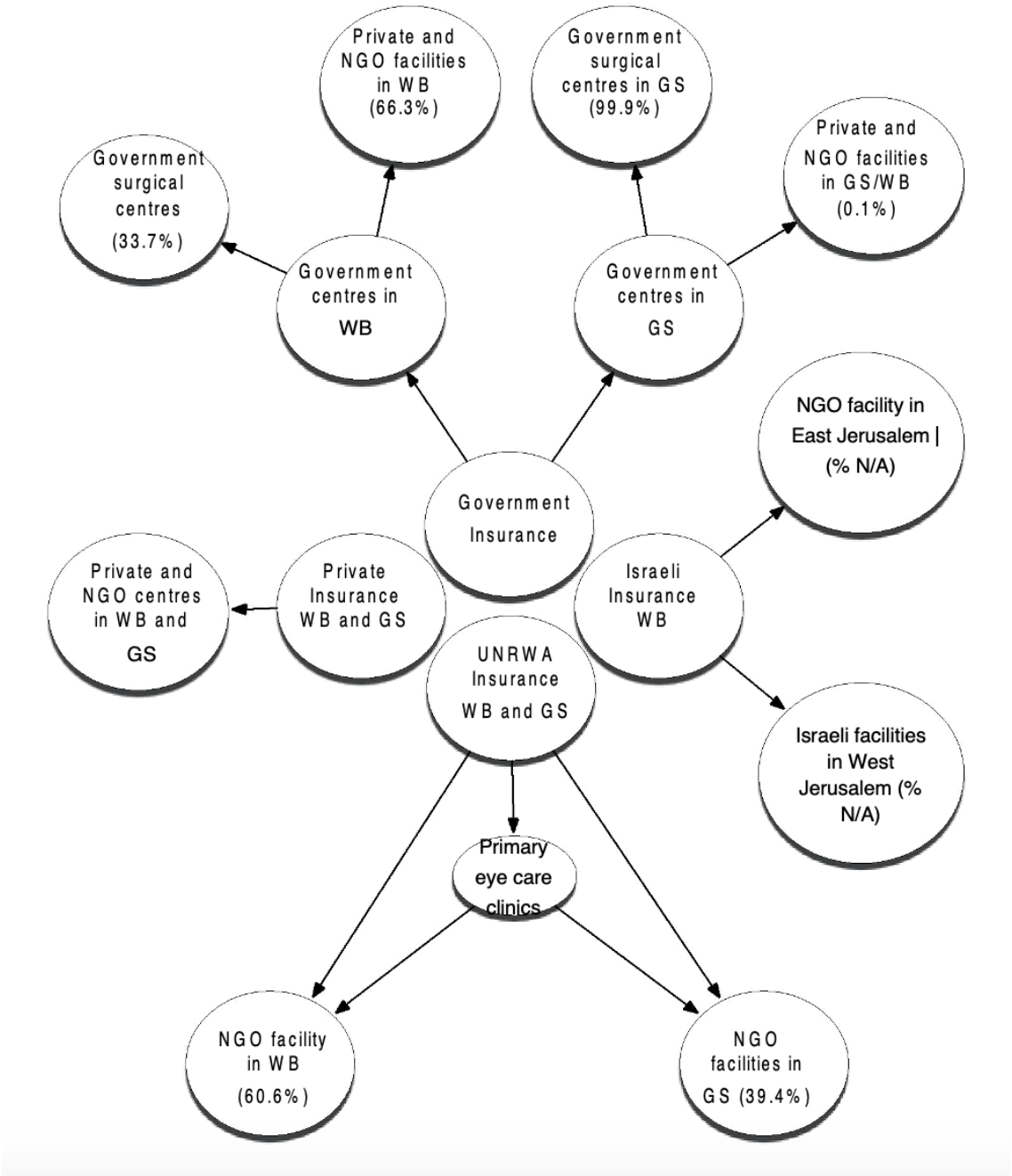
Figure 2. Trend of Cataract Surgical Rate among the regions of Palestine.



512 Figure 3. Referral system for cataract services in Palestine in 2015.



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