Review

An Evidence Review of Ageing, Long-Term Care Provision and Funding Mechanisms in Turkey: Using Existing Evidence to Estimate Long-Term Care Cost

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Abstract: Turkey is transitioning from an ageing to aged population at a fast pace. This process requires immediate policy and practice planning and actionable strategies. Formulating and implementing such policies needs to acknowledge parallel demographic and socio-economic changes to ensure adequate resources and appropriate services are developed to enhance the growing older population's quality of life and wellbeing. Limited long-term care (LTC) provision, funding mechanisms and reliance on informal support primarily provided by women pose considerable challenges to all stakeholders, including the state, families and older people. This paper provides an evidence review on older people's status and their health and care needs, current LTC policies, provision and funding mechanisms in Turkey. It employs a mixed review methodology, making use of published statistics, indicators and literature. The study also adapts existing LTC funding estimation models to predict LTC cost for Turkey. The review highlights the increasing share of older people in Turkey, the fast pace of population ageing, and escalating health and LTC unmet needs. Older people are reported to have high levels of depression, loneliness and co-morbidity with regional, gender and educational differentials. The Turkish LTC and welfare models rely on the family, particularly women, in meeting increased demand. A hierarchical model with random intercept was implemented and estimated the LTC cost in Turkey to be 0.02% of GDP, acknowledging the high proportion of people at labour participation age range and low female employment levels.

Keywords: older people; ageing; Middle East; welfare model; social services; caregivers; health needs; LTC spending models; LTC cost

1. Introduction

The vast majority of countries in the Middle East, including Turkey, are experiencing population ageing much faster than previous experiences in Europe and North America [1–3]. Population ageing in Turkey is manifested in the increased proportion of older individuals. This is combined with a backdrop of earlier trends of high fertility rates resulting in large cohorts of people ageing at once [4]. Such phenomenon presents many policy and practice challenges, especially in countries traditionally not equipped to meet older people's aspirations, expectations and health and care needs [5,6]. In Turkey, and most countries in the region, the infrastructure and underpinning Long-Term Care (LTC) services are not well-prepared to meet escalating demands associated with population ageing. LTC is defined as services and support mechanisms provided to people with care needs outside of hospital settings such as their homes, the community or residential care homes. Older people in Turkey rely on their families and informal networks to meet their ongoing personal care needs. Such reliance is not sufficient to meet increasing LTC

demands due to a range of factors, including the ability, and availability, of such informal spheres of care to provide adequate support [1,3,4,7]. The state is under increasing pressures to develop proper strategies and support mechanisms, including resources and services, to meet increasing LTC and health demands associated with population ageing [8]. Furthermore, older people's opportunities to meaningfully participate in various economic and societal activities are currently minimal, requiring further developments [9].

One of the main differences of Turkey's ageing process compared to that historically observed in Europe is the speed and pace of such a process. Turkey is projected to observe a transformation from an ageing to aged population within 20 years compared to over 100 years in some European countries such as France and England [2,5].

While both life expectancy and healthy life expectancy are increasing in most countries, the latter is not growing as fast as the former. Medical advances have successfully prevented death from diseases that previously led to higher levels of mortality across different groups of the population. However, there appears to be a 'natural limit' to life, with gains in life expectancy reflecting delays in the onset of disease and disability rather than eliminating morbidity [10]. Several empirical studies have shown that healthy life expectancy gains are not equivalent to overall life expectancy improvements [11]. This means that years spent in morbidity and ill-health at later life are also increasing, and many countries observe extended disease burden with multi-morbidity prevalence [12].

These differentials between life expectancy and healthy years create escalating demands in LTC needs with significant consequences on the family as primary care providers and health and care systems. Furthermore, older people's specific experiences, health status and needs are influenced by many factors, including gender, educational level and co-morbidity. It becomes essential to understand the situation of older people in Turkey, the existing LTC models and provisions, and how they are currently financed within this context. Such understanding is vital for policy planning and implementation required to occur over the coming decades to ensure the quality of life of older people's growing size and proportion.

This article has three main aims: to provide up-to-date evidence on (1) the experience of older people in Turkey and associated demands on long-term care services and (2) current LTC policies in Turkey as a country influenced by both the European and the Middle East and North Africa (MENA) contexts. The third aim is to estimate the economic implications of LTC demands in Turkey to assist with LTC policy development in Turkey and the MENA region.

2. Materials and Methods

Due to the relatively limited published evidence on ageing and associated challenges in Turkey and the MENA region in general and more specifically to funding models [13], we adopted a mixed-method review process that combines different evidence and data sources. The review of evidence draws on three primary sources. First, we examined available statistics and indicators of ageing in Turkey and the surrounding region; second, we conducted a rapid review of published literature. Third, we reviewed methods employed to estimate the cost of LTC at a country level. We then utilised the latter element's results to adapt a well-tested estimating model to estimate the LTC cost in Turkey as a proportion of its GDP; this is the first attempt for such an estimate for Turkey. Each of these elements of the evidence review is detailed in the following sub-sections.

2.1. A Review of Statistical Ageing Indicators in the Region

We used the World Bank Applications Programming Interface (API) for accessing and data retrieval of economic and health indicators. Accessing through the API allows us to access the metadata for both existing indicators, the pipeline, and the World Bank's closed projects' operational data (see https://datahelpdesk.worldbank.org/knowledgebase/articles/889386-developer-information-overview (accessed on 11 February 2019)). Browsing through the metadata reveals a whole new range of indicators about ageing that are being

pipelined. Those indicators can be seen in the metadata but were not available for retrieval. We used the API to retrieve various statistics and indicators on ageing and GDP per capita for Turkey and surrounding countries for model estimations. The female labour force participation rates were obtained from the Organisation for Economic Co-operation and Development (OECD) stats; the OECD references the World Bank as the original source.

2.2. A Review of the Literature

We adopted a rapid review methodology defined as '*a type of knowledge synthesis in which components of the systematic review process are simplified or omitted to produce information in a short period of time*' [14] to collate existing evidence that is specific to the following questions:

1. What are the size, characteristics and state of older people, and what are the determinants of LTC needs in Turkey?
2. What are the current LTC policies and provisions in Turkey?
3. How is LTC funded in Turkey?

We developed a search protocol with search terms to capture the population of interest (with synonyms) and that (1) focused on older people or long-term care needs (and their synonyms) and (2) included long-term care provision or funding (and their synonyms); the rapid review protocol is provided in S1 in Supplementary Materials. We performed an initial electronic literature search of three major databases (PubMed; CINAHL Plus with Full Text through EBSCO and Social Care Online) followed by an analysis of the titles and abstracts of retrieved papers to check whether our search strategy needed any refinement. As a next step, we replicated our literature search across an additional five databases (APA PsychINFO through EBSCO; Web of Science Core collection; Cochrane Library; Abstracts in Social Gerontology through EBSCO; Social Policy and Practice through Ovid). The grey literature was searched through the following databases: PROSPERO, OpenGrey, EThOS e-theses online service, and ProQuest Dissertations & Theses Global. The review included published outputs in English since 2010, and all types of studies covering quantitative, qualitative, mixed methods and review methodologies. We complemented these electronic searches by searching the reference lists of included full-text reports and articles.

All the citations identified were downloaded and duplicates removed in a combined library. First, titles and abstracts of the complete list of identified papers were divided equally and assessed by S.H. and M.I. Both authors then met on several occasions to discuss studies selected for inclusion. The inclusion of records for the full-text stage was agreed upon during the discussions, and those not relevant were rejected. We did not formally assess the quality of studies included in the review.

Figure 1 shows the Prisma flow diagram of the literature retrieval process. The searches identified 2183 records; following removal of duplicates and title screening, 280 records were included in the next stage of abstract screening. The process resulted in the retrieval of the full text of 99 documents. Following the full-text assessment, 33 records were included in the synthesis. An additional 23 records were further identified through cross-references checks. This process resulted in 56 records included in the final analysis presented in the 'Findings' section. The majority of this literature is relatively recent, with only six outputs published before 2015.
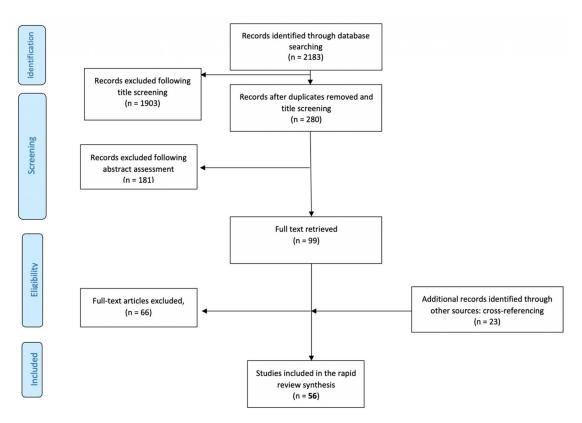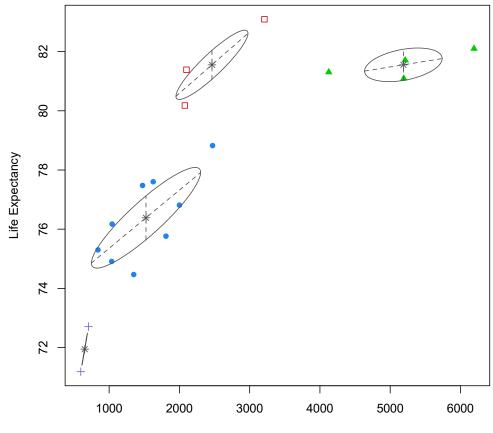
Figure 1. Rapid review PRISMA flow diagram.

2.3. Using Existing Projection LTC Funding Models to Estimate the Cost of LTC in Turkey

Following a review of existing projections for LTC costs in Europe, we propose a model to estimate the financial cost of ageing in Turkey as a percentage of its GDP considering the preferred familial care model and the young age structure and female employment rates in Turkey. The literature shows that OECD's attempt to use a regression model to estimate the likely cost of LTC for its members [15]. The same model was further used by another team [16] to estimate the impact of GDP on LTC spending. Given that Turkey is a member of the OECD, it is reasonable to use the data available on the OECD website and follow a similar choice of determinates to that used by OECD to develop a model for estimating expected LTC spending in Turkey.

However, we made some adjustments to the modelling. First, we used a Bayesian estimation instead of a maximum likelihood approach to overcome the small sample size (n = 28) as maximum likelihood-based estimation can suffer from a small sample size. On the other hand, Bayesian estimation methods are known to cope with a small sample size, assuming a proper choice of prior distributions [17,18]. Second, the previous modelling takes a common starting point for all countries towards LTC spending before being further guided by a few parameters. While this assumption is easier to implement, it also implicitly assumes all countries are sharing similar cultural and political ideologies. Thus, it is only a matter of GDP size, the age dependency ratio, and the informal care level that determines each country's LTC spending level. Considering the diversity of countries included and their related indicators [15], these countries have different cultures and political histories, which is likely to influence the fiscal decision related to LTC spending. The OECD countries vary in economic and demographic characteristics. Investigating the possibilities of grouping them is likely to improve accuracy in the modelling and highlight potential commonalities. Classifying them according to the indicators of life expectancy and health expenditure per capita could be a starting point for this investigation.

We conducted model-based (finite mixture model) clustering to investigate the possibility of classifying them into groups. The classification was based on the relationship

between life expectancy and current health expenditure per capita. The classification process was based on fitting different finite Gaussian mixture models to the data, representing different classification's possibilities and then choosing the optimal model according to BIC criterion. However, the best-fitted model suggested four different groups of countries with no clear boundaries between other groups. The unclear boundaries are visualised by having several countries fall between the ellipses in Figure 2. This led us to dismiss the idea of dividing these countries into groups. We instead assumed that even though all countries have some commonality, every country has its individuality. We assigned different starting points for each country to capture cultural and policy differences in the modelling. This led us to develop a hierarchical model with random intercept. Each country has its own intercept; however, all intercepts are drawn from a common distribution.

Figure 2. Model-based clustering according to current health expenditure per capita and life expectancy.

All model variants sought to estimate the share of LTC expenditure of GDP (source: OECD stats) as a function of the following determinants:

o   GDP per capita represents the share of total productivity.
o   Female labour force participation rate is used as a proxy for informal care provision.
o   Age dependency ratio: the population aged 65 (OECD uses the 80 years threshold) and
     above to the total population. This parameter is considered a control parameter [15].

We carried out estimations on the log scale, and we used leave-one-out cross-validation (LOO) and the widely applicable information criterion (WAIC) to compare models. In doing so, we implemented additional calculations to calculate the log-likelihood evaluated at the posterior simulations of the parameter values as explained in [19]. These methods favour the model with the least out-of-sample deviance for better prediction accuracy. All the models' variants and comparison calculations were developed using CmdStan [20]. All other calculations and graphs were generated using R [21].
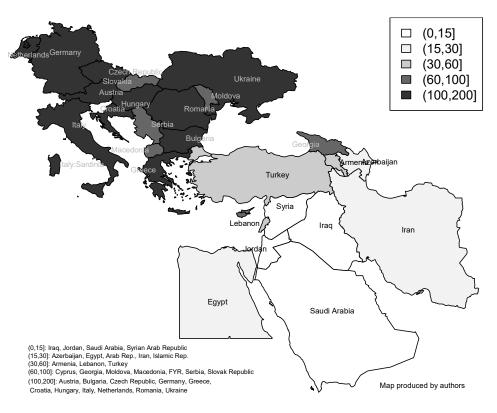
3. Findings

3.1. Population Ageing in Turkey

Turkey is a relatively young country compared to other European or OECD countries, with people 65 and over constituting only 8.5% of the population in 2017. However, similar to many countries in the MENA region, this proportion is expected to increase to 20.8% in 2050 [13]. In 2017, the average life expectancy at birth in Turkey was 78 years; 75.3 years for men and 80.7 years for women. The average life expectancy at birth in İstanbul, the city with the highest population in Turkey, is slightly higher than the Turkish average at 78.7 years, with 75.8 years for men and 81.5 years for women [13]. Using API, as explained in the 'Methods' section, we calculated the ageing index for Turkey and surrounding countries listed in Table 1. The ageing index is calculated as the number of older persons (65 years or above) per 100 persons younger than 15 years old in a specific population. The smaller the ageing index in a country, the younger the population, and vice versa.

Table 1. Ageing index and ageing index group in Turkey and surrounding countries.

Country	Population Aged 65 and Above (% of the Total Population)	Population Aged 0–14 (% of the Total Population)	Ageing Index	Ageing Index Group
Iraq	3.1	41.0	7.5	(0,15]
Saudi Arabia	2.9	28.6	10.0	(0,15]
Jordan	3.8	35.5	10.7	(0,15]
Syria	4.1	37.1	10.9	(0,15]
Egypt, Arab Rep.	5.2	33.2	15.7	(15,30]
Iran, Islamic Rep.	5.1	23.6	21.4	(15,30]
Azerbaijan	5.6	21.9	25.7	(15,30]
Turkey	7.5	25.7	29.4	(15,30]
Lebanon	8.1	24.0	33.9	(30,60]
Armenia	10.8	18.4	58.9	(30,60]
Moldova	10.0	15.7	63.3	(60,100]
Macedonia, FYR	12.3	17.0	72.7	(60,100]
Cyprus	12.8	16.6	77.6	(60,100]
Georgia	14.0	17.3	80.9	(60,100]
Slovak Republic	13.8	15.1	91.5	(60,100]
Ukraine	15.3	14.9	102.5	(100,125]
Serbia	17.1	16.3	104.8	(100,125]
Netherlands	18.2	16.5	110.3	(100,125]
Romania	17.3	15.5	111.6	(100,125]
Czech Republic	18.1	15.0	120.2	(100,125]
Hungary	17.8	14.6	122.4	(100,125]
Croatia	18.9	14.9	127.2	(125,150]
Austria	18.8	14.2	132.0	(125,150]
Bulgaria	20.0	14.1	141.6	(125,150]
Greece	21.4	14.6	146.5	(125,150]
Italy	22.4	13.7	163.5	(150,200]
Germany	21.2	12.9	164.8	(150,200]

To understand Turkey's position concerning ageing compared to other surrounding countries, we produced a map of the ageing index, presented in Figure 3. It can be observed on the map that the MENA region, in general, is much younger than its European neighbours. Countries including Iraq, Jordan, Saudi Arabia and Syria have young populations, with an ageing index of less than 15. Other countries in the region, such as Egypt and Iran, with an ageing index of 16 and 21, respectively, are also considerably young populations. The same argument could be extended to Turkey, with an ageing index value of 29. The picture becomes more apparent when compared to nearest Eastern European countries such as Cyprus, Georgia, Moldova, Macedonia, Serbia and the Slovak Republic, with ageing index values ranging between 60 and 100. Other European neighbours such as

Italy and Germany have ageing indices of 164, clearly indicating complete transitions to aged populations.

Legend:
- (0,15]
- (15,30]
- (30,60]
- (60,100]
- (100,200]

(0,15]: Iraq, Jordan, Saudi Arabia, Syrian Arab Republic
(15,30]: Azerbaijan, Egypt, Arab Rep., Iran, Islamic Rep.
(30,60]: Armenia, Lebanon, Turkey
(60,100]: Cyprus, Georgia, Moldova, Macedonia, FYR, Serbia, Slovak Republic
(100,200]: Austria, Bulgaria, Czech Republic, Germany, Greece,
 Croatia, Hungary, Italy, Netherlands, Romania, Ukraine

Map produced by authors

Figure 3. Map of ageing index in Turkey and selected neighbouring countries.

Recent research shows that older people in Turkey have high levels of disease and risk factors, including a high rate of obesity at 25% [4]; an increasing prevalence of dementia from 2.7% in 2010 to 4% in 2014 [14]; high rates of restricted functions (65%) [9]; high levels of dependency (18%) in activities of daily living [22]; and severe frailty [6]. Amini et al. (2019) show that while Turkey is currently relatively young compared to Japan and Singapore, it has the fastest ascending trend in years lived with a disability compared to other Asian and North African countries [23]. The authors explain these differences about faster increases in dementia and Alzheimer's disease prevalence to be associated with the rapid population ageing process.

Falls among older people in the community is estimated at 32%, with women having significantly more falls inside and outside of the home [24]. Cinar and Tas (2015) indicate that in Turkey, 60% of all cancer cases and 70% of cancer-related deaths occur among people aged 60 or older [25]. Alzheimer's disease and other forms of dementia disproportionally affect people with lower educational attainment who are less likely to be eligible for pensions associated with formal employment [26]. There is also evidence of trends towards extended hospitalisations [27], use of emergency services [28] and the admission of frail, older people to health facilities due to lack of LTC services in the community [29].

Furthermore, significant health inequalities are observed among older people in Turkey with educational level, household wealth and regional differences, particularly among older women [30,31]. Ergin and Kunst (2015) show that disability rates among older men were significantly higher in rural areas than in urban settings [30]. However, Çakmur (2015), while confirming a higher prevalence of frailty in rural areas, found no significant gender effects [31]. On the other hand, the gender differences in health status at old age, with women reporting worse health indicators, were reported in several studies specific to Turkey's different regions [32,33]. Several studies showed poverty and low educational attainment to have significant adverse effects on older people's health status

and quality of life [30,31,33–35]. These differentials appear more pronounced among highly disadvantaged groups of older people, such as in-prison populations [36].

Analysing recent data on health utilisation, it was found that since the implementation of the Turkish health system in 2003, under the Health Transformation Program, the levels of unmet health needs, especially among the older population, have been declining [37]. This downward trend of unmet needs among older people was particularly evident since 2011 following some recovery from the global financial crisis in 2008. Their study also shed light on some of the reasons that might explain unmet health needs among older people. These include the inability of an older person to find the time to seek health care due to work and caring responsibilities, attitudes towards delaying medical investigations, lack of accessible local health services and 'fear' of medical examinations. Indeed, Yardim and Uner (2018) highlight the higher prevalence of unmet health care needs due to both cost and availability in Turkey's rural settings [38]. These were also highest among individuals with lower educational attainment and the unemployed, attributed to higher morbidity rates among these groups. However, in their study, they found older people and men least likely to report unmet needs, which might link to cultural attitudes toward health and health care utilisation at later life.

Loneliness and exclusion of older people from social and community activities in Turkey have been frequently reported in the literature [39–42]. There is a strong relationship between loneliness and entry to a nursing home or residential aged care facilities in later life. Loneliness is more prevalent among older women partially due to gender differences in widowhood and remarriage rates, among other factors. For example, the percentage of older men who live without spouses, being widowed or divorced, was reported to be only 13% compared to 51% among women aged 60 years or older [4]. Aylaz et al. (2020), based on a sample of 290 older people in Turkey, found the prevalence of depression to be significantly higher among older individuals with no spouses, those living with their children and who are unable to access care [33]. Depression and daily activities have also been significantly correlated among older Turkish people [41].

Considering elder abuse, the rapid growth in population ageing, reliance on family care and increased stress associated with modern life and urbanisation were identified to be associated with an increased prevalence of elder abuse in Turkey [43]. Investigating reports of physical abuse among the older population in one Turkish council (Eskisehir) it was found that the perpetrator was the victim's son in nearly half of the reported cases [44]. These findings resonate with another study [33], which found 48% of elder abuse cases to be caused by children, followed by 25% by spouses. Another study found that older people are more vulnerable to crime, including homicide, with a high likelihood of crimes occurring in the older person's home and the perpetrator being known to the victim [45].

3.2. Welfare Model and LTC Provision in Turkey

Generally speaking, care for older people in Turkey, as in most of the MENA region, is primarily provided informally by the family and the community. While the cultural and policy developments in the region firmly situate care provision within the family sphere, socio-demographic dynamics—such as changes in family structures, migration and rate of women's formal employments, among others—pose an unavoidable reality of inconsistent availability of such care. According to the World Bank [46], in 2019, the female labour participation rate is under 35% compared to 78% among men in Turkey. However, these statistics do not account for informal and undocumented work arrangements and other dynamics, such as internal and international migration, in shaping the availability of the informal/family LTC network [8].

There has been some recent recognition of the need for formal LTC provision and to develop various ageing policies and strategies across the MENA region [47,48]. However, such policies continue to be inspired by the traditional norms and the vital role of inter-generational mechanisms in the provision of care for older people, those with disabilities or with LTC needs. These efforts are framed within family-based LTC policies such as

cash-for-care schemes and broadening the care services' market, mainly through expanding community care and the role of non-governmental organisations and social capital [49]. Recent evidence highlights the role of informally employed domestic and migrant live-in care workers to provide LTC at home when the family cannot meet such needs, funded either through cash-for care schemes or out-of-pocket by the private households [50]. When LTC is provided formally within care settings, women remain the primary providers. With low female labour participation rates, LTC is seen as a potentially suitable sector to enhance women's training and employability [51,52].

Several countries in the region, including Turkey, have been actively reviewing their social development strategies to include specific elements of LTC provisions. These developments recognise both the institutional framework as well as the cultural context in shaping welfare arrangements. Such policies focus on maintaining the family's central role, ensuring care provision at home and in the community with a clear emphasis on 'intergenerational solidarity' [47,50].

In 2017, Turkey developed a 'National Plan for Aged Care' and a 'National Dementia Care Plan' [4,7]. Both of these plans endorse a 'system of care' approach that is person-centred and enables independent living in the community for as long as possible. The plans, especially the NDCP, recognised the need to develop well-organised and culturally sensitive residential care services with nursing for older people with severe conditions and at advanced stages of dementia. Extensive fieldwork and stakeholder interviews conducted in Turkey during 2016–2017 to inform the development of these plans indicated that the Ministry of Family and Social Policy (MoFSP) had developed several social assistance programs to meet some of the needs of different vulnerable groups. These are primarily means-tested cash benefits to older people, pensioners and people with disabilities, and some in-kind benefits such as care-at-home, retirement homes and admission to care homes. In particular, home care has been viewed as a culturally appropriate option when the immediate family cannot provide such care [34].

Over the past decade, the MoFSP has piloted new elderly care interventions such as shared living and some elderly care centres, albeit on a small scale. These peer-living 'houses' are organised by the state for groups of older people to live together with support workers attending to their needs during the day. In 2017, there were 123 houses across Turkey [4]. This model was developed to minimise isolation among older people and as an alternative to residential care settings, which carry a certain level of stigma [53]. Palliative care services in Turkey have also undergone some considerable development; since 2010, the Turkish Ministry of Health implemented a new national community-based palliative care program, the Pallia-Turk project [54]. This program was associated with the National Turkish palliative care policy, making it the only country in the MENA region, along with Israel, to have such policies.

3.3. Financing Long-Term Care in Turkey

The literature did not identify any studies focusing specifically on financing LTC in Turkey or the MENA region. However, a small number of articles included scattered information on this topic. Such sparse evidence reflects the lack of a specific financial model for LTC services and schemes in Turkey. Current support mechanisms appear to stem from a social protection model that is usually means-tested or associated with pension schemes for formally employed individuals. More generally, Turkey does not have a comprehensive LTC program. Hence, responsibilities and provision of LTC are fragmented and distributed across different governmental departments [55], similar to other countries in the region [48].

The responsibility of organising LTC services in Turkey comes under three ministries: the Ministry of Health, the Ministry of Family and Social Policies and the Ministry of Labour and Social Security [53]. Local municipalities also have an essential role in providing LTC services, including establishing care homes and day-care for the most vulnerable groups of older people.

One of Turkey's first means-tested social assistance schemes was introduced in 1979, providing allowances to older people and those living with disabilities who do not have any legally responsible relatives to look after them [56]. Further cash-for-care schemes targeting older people and those with disabilities were introduced in 2007, initially reaching 30,638 recipients and increasing to 513,276 recipients in 2018 [50]. The most recent aged care plan (2017) prioritized home-based care services with responsibilities at the municipal level. It highlighted the need for institutional care, especially for older people with complex conditions, including dementia [4].

3.4. Estimating LTC Expenditures in Turkey Using Existing Evidence and Data

The scarce research and evidence on LTC financing models in Turkey and the MENA region, identified through the rapid review, calls for a better understanding of the potential implications of population ageing on state funding projections. As explained in the 'Methods' section, we used an existing LTC funding projection model developed by the OECD to estimate projected LTC expenditures in Turkey. The model considers female participation in the labour market, the degree of ageing in the population and the country's gross domestic product per capita. This is specifically useful in the case of Turkey, where women play an essential role in its familialist care model, and it takes into account current population dividends. The model also considers the experience of surrounding countries in Eastern Europe, Asia and the MENA region. The results suggest the random intercept model as the most likely to represent the data compared to other models. Table 2 shows the results for calculating the LOO and WAIC results for the two best models.

Table 2. Main parameters estimation (mean, STD. dev., credible intervals and the median values) for the random intercept model. Values are evaluated at the posterior simulations. Values of the widely applicable information criterion (WAIC) and the leave-one-out cross-validation (LOO) of the two models in comparison. They are evaluated at each model posterior simulations for estimating out-of-sample prediction accuracy.

Parameter	Mean	Std. Dev.	5%	50%	95%
α	−13.73	3.28	−18.95	−13.74	−8.34
β_1	1.71	0.77	0.45	1.7	2.97
β_2	1.79	0.42	1.1	1.78	2.48
β_3	1.78	1.36	−0.43	1.77	4.01
σ	0.2	0.03	0.16	0.2	0.26

Model Description	WAIC	LOO	WAIC Diff	LOO Diff	
Common intercept	11.3 (SE = 7.2)	11.8 (SE = 7.3)	4.3 (SE = 0.9)	0.4 (SE = 0.4)	
Random intercept	2.7 (SE = 5.3)	11.1 (SE = 7.4)			

'LOO diff' is the estimated difference of expected leave-one-out prediction errors between the two models, along with the standard error. 'WAIC diff' is the estimated difference of WAIC between the two models. It is clear from Table 2 that the Random Intercept model has lesser out-of-sample deviance for both measures. Equation (1), shows the full implemented hierarchical model with random intercept.

$$
\begin{aligned}
&log(LTC_i/GDP_i) \sim N(\mu_i, \sigma) \\
&\mu_i = \alpha_{country[i]} + \beta_1 log(oAdp_i) + \beta_2 log(Prod_i) + \beta_3 log(PR_i) \\
&\alpha_{country[i]} \sim N(\alpha, \tau) \\
&\alpha \sim N(0, 100) \\
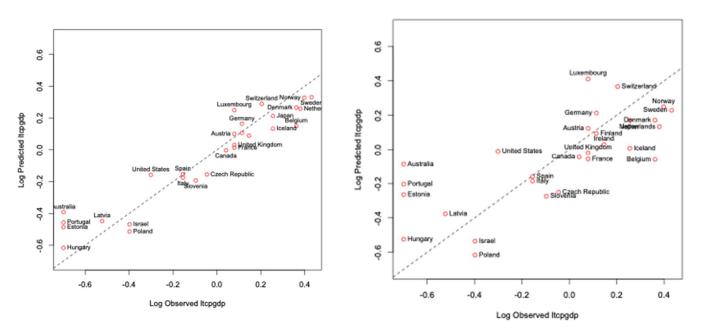&\tau \sim HalfCauchy(0, 2) \\
&\sigma \sim HalfCauchy(0, 2) \\
&\beta_j \sim N(0, 10), j = 1..3
\end{aligned}
\tag{1}
$$

Equation (1): The implemented hierarchical model with random intercept to estimate LTC expenditures.

Where α is the estimation of the random intercept and $\beta_{1,2,3}$ are the estimated regression coefficients for the age dependency, the GDP and the female labour participation. All indicators entered the model on the log scale. The values for each parameter are calculated from the posterior distribution; 5% and 95% are the values on the credible intervals' boundaries; 50% is the median value.

We noted from Table 2 the credible intervals for β_3, the regression coefficient for female labour participation includes the value of zero, an indication that the female labour participation indicator could be removed from the model. As we found out, removing this determinant resulted in a model with higher out-of-sample deviance (WAIC = 3.5 (SE = 5.2); LOO = 11.6 (SE = 7.1)). Therefore, we left this determinant in the model for better prediction accuracy.

As part of our final model implementation, we re-estimated all LTC spending values and plotted them against the original values to visualise the prediction model's ability. We did the same for the common intercept model, and visual comparison, shown in Figure 4, favours the random intercept model. The model predicts Turkey needs to spend 0.02% of GDP per capita on LTC. A relatively small proportion determined by the young population (7.5% aged 65 or older), low female labour force participation rate of 35% and GDP per capita of USD 24,266. Compare these indicators with those of its neighbour OECD country Hungary, which has the closest determinant values—GDP per capita of USD 26,446, female labour participation ratio of 62% and a share of over 65 of 17.5%. Given that the OECD estimates Hungary to spend 0.2% of its GDP on LTC, it seems adequate to estimate the value of 0.02% in the case of Turkey.

Figure 4. The mean values of the percentages of LTC spending as percentage of GDP as predicted by the final model (**left** panel) against the values observed by the OECD on the logarithmic scale. The **right** panel shows the results for the common intercept model.

4. Discussion

Like most countries in the Middle East and North Africa region, Turkey is going through a fast transition into an aged population. This escalating growth in the proportions and numbers of older people is associated with increased LTC needs. The current Turkish LTC model relies on family and social assistance programs, with some evidence of recent attention on developing a range of care services through the state and the private market. Evidence of the status of older people, their LTC needs and quality of life in Turkey is beginning to emerge. However, such evidence is scattered, with gaps in knowledge in particular areas such as the scope, range and reach of LTC services; access to LTC services;

and funding sources of LTC. This multi-method evidence review gathered available information and published literature to understand the status of older people, current policies and provision and funding mechanisms in Turkey. The purpose of this mixed-method review is to inform the process of policy formulation, planning and implementation to meet the growing needs of older people in Turkey and the MENA region.

The review highlights the increasing share of older people in Turkey and the country's fast pace of population ageing. However, Turkey is still at a considerably younger age compared to neighbouring European countries, including Eastern European countries, yet older than some other Asian and MENA countries. Current evidence shows that older people have a high level of health needs, including a considerable level of unmet health and care needs. Furthermore, the review also highlights concerning levels of depression, loneliness, exclusion and abuse among older people. Education attainment, gender and rurality all appear to influence the level of needs and access to services.

Along with many other MENA countries, Turkey does not have a coherent welfare model that acknowledges the increasing demand for LTC. While there have been some recent developments in policies linked to older people in Turkey, these are primarily framed within the family obligation structure. They are motivated to enable the family to continue care provision through cash-for-care and social assistance schemes.

The lack of formal long-term care services, especially institutional care, stems from two roots. First, the ageing population phenomenon is relatively new in the region, despite growing research and policy attention. Policy development in the MENA region mainly focuses on poverty reduction, youth unemployment and health care [3,48], yet the rights to equality of older people in most countries in the region are entrenched in their constitutions. There has been growing attention to ageing, and long-term care needs to provide such services away from institutions. Second, the drive towards community and home care is shaped by cultural norms associated with caring for older people. The region is characterised by strong family connections and filial obligations, where both the families and older people would prefer to continue living at home at old age.

Like some countries in Southern Europe, such as Italy, and most countries in the MENA region, Turkey's welfare regime adopts a familialist model, with reliance on informal care arrangements and limited formal social care services [52,56]. This is further shaped by religious values and recent laws reflecting the ruling AKP conservative party (Adalet ve Kalkınma Partisi). Akkan (2018) describes women's assigned roles as '*blessed mothers, protected wives, and devoted care providers*' (p. 72) to continue the traditional 'sacred' family conceptualisation [57]. Within this context, while escalating LTC needs appear to be triggering some forms of public and state response, recognising LTC as a 'public' responsibility has not yet been achieved. Current policy formulation shape this within the circles of privatised caring, maintaining LTC as a private/familial matter [56]. Here, the private burden of care in general and LTC, in particular, follows gender and class hierarchies [8,51,52,58].

Despite this, the review pointed to recent developments in LTC provision, especially in the community, while the family and social networks remain the primary source of support for older people in Turkey. Furthermore, it is unclear if LTC provided informally by the family meets older people's needs in the best way [59]. For example, Aydin et al. (2016) estimate that only 2.8% of people aged 65 years or older who require home care receive formal care in a rural Turkish community [60]. On the other hand, the reliance on family members, primarily women, to provide this care has documented adverse implications on the informal caregivers' well-being and quality of life [61]. These implications are particularly evident among family members caring for older people with a high level of needs such as frailty [6], Parkinson and Alzheimer's disease [62,63] and cancer [64].

The literature on LTC funding mechanisms in Turkey is very sparse. The few articles mentioning this aspect indicate that both LTC funding and provision are fragmented and distributed across several ministries. Recent reports show a mixed market of state and privately funded services with significant disparities in quality and prices [4,7]. LTC

financing in Turkey, and many countries in the MENA region, is characterized by cash-for-care programs through social protection policies for those deemed in need of state support, primarily if they lack the help of the 'immediate family'. These cash-for-care mechanisms accompanied by a lack of social care services constitute a residual LTC approach [65].

One of the critical components of such a process is understanding the potential cost of LTC provision. We used existing evidence and adapted the OECD's LTC expenditure projection model to provide a novel estimate of LTC cost in Turkey as a percentage of its GDP, taking into account the experience of surrounding countries. The model also acknowledges the significant role of informal care provision, particularly of women, in reducing the cost of LTC at the state level. The model is guided by key parameters to capture the stage of population ageing, women's participation rate in the labour market and the country's income. The model predicts that Turkey needs to spend 0.02% of its GDP per capita on LTC. While this estimate might appear relatively small compared to other European countries, it reflects the low labour market participation rate among women and the current youth bulge enjoyed by Turkey through population dividends. Previous research on LTC expenditure showed similar findings where differences in health and LTC spending emerge across OECD countries, partly reflecting differing demographic trends, income levels, and informal LTC supply [15]. The same study showed Turkey, along with Chile and Korea, to expect the most significant increases in health and LTC expenditure by 2060 due to the speed of demographic changes in these countries.

5. Conclusions

Despite providing evidence to fill a significant knowledge gap and presenting novel estimates of LTC cost in Turkey, this review has some limitations. First, the quality and scope of published literature concerning ageing and long-term care in Turkey and the MENA region in general and to that specific to the economic cost and funding of LTC, in particular, are relatively limited. The review did not identify any publications specific to LTC funding models. This is likely to be related to the lack of research in this area, as ageing is considered a relatively new phenomenon in the region. The vast majority of retrieved records were published in the past five years alone. The second relates to the availability of detailed, granular data or indicators specific to ageing, funding and LTC uptake in Turkey and the MENA region. This lack of detailed data enforces the use of proxy country-level indicators to estimate costs relaying on various assumptions, which might not be fully representative of the actual cost of LTC.

Current evidence highlights the increasing demand for LTC services in Turkey. While there have been some notable efforts in implementing and expanding LTC provision, there remain considerable gaps in provision and access to services. The Turkish LTC and welfare models rely on the family, particularly women, to provide care and state support usually comes from financial assistance to the most vulnerable groups. Evidence indicates that such reliance on the family might not be sustainable or suitable in meeting the significantly increasing LTC burden. However, due to current large cohorts of young people in the labour participation groups, linked to population dividends and low female labour participation rates, LTC expenditures in Turkey is estimated at only 0.02% of its GDP. This rate is considerably lower than its neighbouring European countries and acknowledges the current state of its young population and the role the family plays in LTC provision. There is currently a window of opportunity for Turkey to further develop and expand LTC provision before transitioning from ageing to an aged society over the next couple of decades.

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