

FERNANDO BANDEIRA,
JOÃO CASQUEIRA CARDOSO, GLÓRIA JÓLLUSKIN,
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Leituras em Ação
Humanitária e
Cooperação para o
Desenvolvimento

Readings in
Humanitarian Action
and Cooperation
for Development

VOLUME II

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Health Care Access Disparities across mainland Portugal: Challenges to Pursue the UN 2030 Agenda for Sustainable Development

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Abstract

The UN 2030 Agenda for Sustainable Development defines the need to “ensure healthy lives and to promote well-being for all at all ages” as the Sustainable Development Goal 3 (SDG 3). This purpose is in alignment with the Portuguese National Health Service pillars that has established health care services as an universal service for all population. Despite there have been improvements on the national health care services, access to health care services continues to be an inequality issue in the Portuguese society. In the mainland, health services are clustered at the littoral while depopulated interior regions still suffer from lack of prompt specialized and adequate health services,

especially in urgent situations. The present study, supported by data from two last census (2001 and 2011), focuses on how mortality is related to health services distribution – facilities and professionals – and how populations’ characteristics influence this situation. The results clearly exhibit a strong association between mortality and health services distribution, an association that is stronger in aged and illiterate populations. These results also suggest that public policies design should be reformulated according to the specificities and needs of each region population. This is a relevant issue to pursue the Sustainable Development Goals of the UN 2030 Agenda, namely to accomplish the SDG 10: “Reduce inequalities within and among countries”.

Keywords: sustainable development goals; health equity; health services; health disparities.

Resumo

A Agenda 2030 da ONU para o Desenvolvimento Sustentável define como objetivo “garantir vidas saudáveis e promover o bem-estar para todos em todas as idades” (ODS 3). Este objetivo está em sintonia com os princípios fundadores do serviço nacional de saúde português que proporciona serviços de saúde universais para toda a população. Apesar dos reconhecidos esforços na melhoria do Serviço Nacional de Saúde, ainda se verificam desigualdades no acesso aos cuidados de saúde. No continente, os serviços de saúde estão aglomerados no litoral enquanto as regiões interiores despovoadas carecem de serviços de saúde especializados e adequados a situações urgentes. Este estudo, apoiado em dados dos dois últimos censos (2001 e 2011), centra-se na forma como a mortalidade está relacionada com a distribuição dos serviços de saúde – infraestruturas e profissionais – e como as características das populações influenciam essa situação. Os resultados do estudo revelam uma forte associação entre a mortalidade e a distribuição dos serviços de saúde, associação que é mais forte em populações envelhecidas e com maior número de analfabetos. Os resultados sugerem a reformulação das políticas públicas de acordo com as especificidades e necessidades da população de cada região. Este é um problema relevante na prossecução dos objetivos do desenvolvimento sustentável da Agenda 2030 das Nações Unidas, concretamente no que diz respeito à “Redução das desigualdades dentro e entre países” (ODS 10).

Palavras-chave: objetivos para o desenvolvimento sustentável; equidade em saúde; serviços de saúde; disparidades em saúde.

1. Introduction – Towards Health Equity

With the mission to reconcile development with sustainability, the United Nations 2030 Agenda for Sustainable Development defines 17 Goals (SDGs) and 169 targets (Leadership Council of the Sustainable Development Solutions Network, 2015; United Nations, 2015). The interconnection between them is the most innovative approach to human development: the success of sustainable development is only visible if all the 17 goals are achieved. This ambitious vision and philosophy of the human being and the planet implies huge efforts from the society, namely from academia, stakeholders and political decision-makers.

Sustainable Development has been at centre of European Union priorities, visible in many policies such as the Europe 2020 strategy (European Commission, 2010), the European Pillar of Social Rights (European Commission-Directorate-General for Employment Social Affairs and Inclusion, 2017) and the adoption

(and adaptation) of the SDGs in the European context (European Commission, 2016a, 2016b). In this framework, wellbeing is at the heart of Sustainable Development: to establish conditions that foster human development in healthy, peaceful, informed and prosperous societies (Oliveira and Archer, 2015). Wellbeing and quality of life are the main pillars of any society because population's needs should come first. The challenges to pursue the implementation of Sustainable Development goals are political, social, economic and environmental interrelated. Two SDG goals are directly related to health promotion and inequalities in a multidimensional perspective, namely SDG 3 – Ensure healthy lives and promote wellbeing for all at all ages – and SDG 10 – Reduce inequalities within and among countries. The amount of scientific evidence discussing the relationship between socioeconomic determinants and health outcomes (Bambra *et al.*, 2010; Costa *et al.*, 2019; Mitsakou *et al.*, 2018; Oliveira *et al.*, 2019; Portuguese Ministry of Health, 2018; Vidal *et al.*, 2019) highlights the need to develop tools and public policies to promote equal opportunities in health domains. Inequity in health is more than just inequalities. It also involves the failure to avoid or overcome inequalities that infringe on fairness and human rights norms (Whitehead, 1992; World Health Organization (WHO), 2019). Despite this, inequity in health care access persists in many regions worldwide. These inequities result in health care access inequalities, expressed (as the worst outcome) in amenable mortality considered as deaths preventable by timely and effective health care (Charlton *et al.*, 1983; Davis, 2014; Gianino *et al.*, 2017; Rutstein *et al.*, 1976). Although several studies shown a decrease in amenable mortality, namely in the European region (Gay *et al.*, 2011; Mackenbach *et al.*, 2017; Mackenbach, Bouvier-Colle, & Jouglu, 1990; Nolte, & McKee, 2004, 2008), others shown that within countries (namely Portugal), disadvantaged groups have more barriers to access quality health care. In isolated areas and in poor educated and aged populations the situation is worst (Arruda, Maia, & Alves, 2018; Barreto, 2017; Doetsch *et al.*, 2017; Vidal *et al.*, 2018).

The Portuguese National Health Service (NHS) was founded on the grounds of universal access to all citizens, independently of their social and economic conditions, as well as to foreigners (in a reciprocal basis), stateless and political refugees (Assembly of the Portuguese Republic, 1979). NHS covers the management of integrated health care services, health promotion, disease prevention, diagnostic and treatment for patients as well as their social and clinical rehabilitation. In the last forty years, public investment in NHS has resulted in population health gains, as reported by several studies (Santana, 2010; Santana, & Almendra, 2018). Notwithstanding, a mismatch between offered services and populations' needs persists across the country (Simões, Augusto, & Hernández-Quevedo, 2017), and is worse by the increasing complexity of the administrative procedures and the introduction of access fees for most of the services (OECD/European Observatory on Health Systems and Policies, 2017). Also, the distribution of health services (infrastructures and professionals) as a function of population density tends to accentuate the inequalities of the system, because this criterion does not take into account populations characteristics. In the mainland, this reality comes along with two demographic phenomena: littoralisation marked by a population concentration along the coast from the north to the centre; and bipolarization, visible by the concentration of the population in the metropolitan areas of Lisboa and Porto (Ribas-Mateos, 2015). Although less intense at present, one of the biggest fragility of NHS is the lack of health professionals and infrastructures serving populations living outside urban areas.

In this context, this paper aims to study how mortality is related to health care services geographical distribution and socioeconomic determinants, based on official statistical data (census) and by territory typology (at municipal level): Predominantly urban, semiurban and predominantly rural. The research question is: Is there equity in health services distribution across mainland Portugal?

2. Material and Methods

2.1. Study area

This cross-sectional study is based on official statistical data from PORDATA – Portuguese contemporary database – referring to the years 2001 and 2011 (census). In 2011, Portugal registered a population of 10 557 560 (Pordata, 2018). The study target area are the municipalities (N = 278) of mainland Portugal (89 102 km²), an European south-eastern country, located on the Iberian Peninsula. Due to scarcity of available statistical data for the selected variables, the Portuguese archipelagos of “Madeira” and “Açores” were excluded from the present study. The country municipalities were classified in three territory typologies according to INE (INE, 2014) (Figure 1): predominantly urban (PU) territories (N = 33) are characterized by population density higher than 500 inhabitants /km²; semiurban (SU) territories (N = 76) correspond to regions of 100 to 500 inhabitants /km²; and in predominantly rural (PR) territories (N = 169) population density is under 100 inhabitants /km².

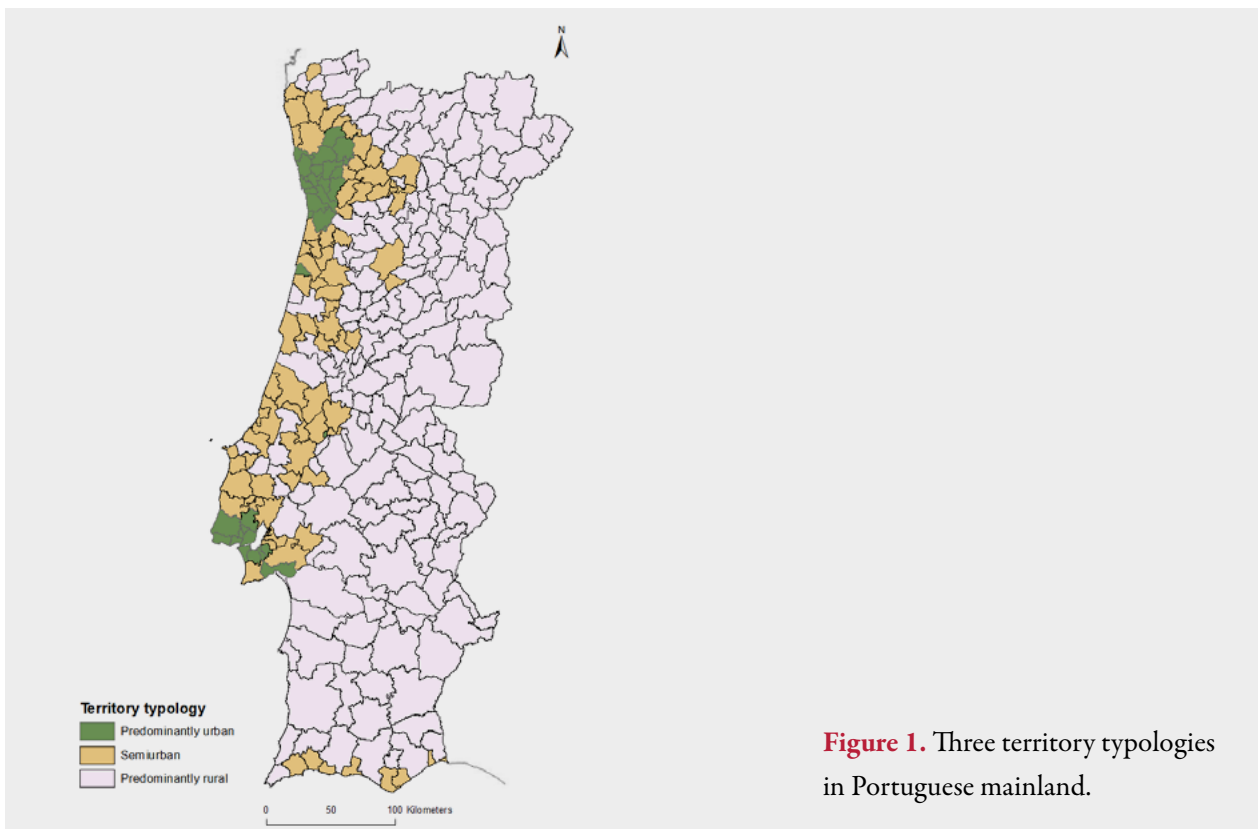


Figure 1. Three territory typologies in Portuguese mainland.

2.2. Variables studied

The variables selected to be tested are presented in Table 1. The quantitative dependent variable is gross death rate (number of deaths per resident population ($\times 1\,000$), in each year ‰). Independent quantitative variables are divided according to two groups. The 1st one is related to number of health infrastructures and of human resources, specifically: health centres density by 100 km², hospitals density by 100 km², medical doctors and nurses working at health centres and medical doctors and nurses working at hospitals. All data related to health considered only services from National Health Services, thus private health services are not considered. The second group of quantitative variables refers to population characteristics: illiteracy rate (resident population with 10 years or older who cannot read or write per resident population with 10 years or older in each year ‰) and ageing index (population with 65 years or older per population with less than 15 years in each year ‰).

Table 1. Variables selected to this study described according to their nature

| SDG | Variables (units) | Nature |
|-----|--|--------------------------|
| 10 | Territory typologies (No) | Qualitative Independent |
| 3 | Health centres (No) | Quantitative Independent |
| 3 | Hospitals (No) | |
| 3 | Medical doctors working at health centres (No) | |
| 3 | Nurses working at health centres (No) | |
| 3 | Medical doctors working at hospitals (No) | |
| 3 | Nurses working at hospitals (No) | |
| 4 | Illiteracy rate (%) | Quantitative dependent |
| 3 | Ageing index (%) | |
| 3 | Gross death rate (‰) | |

Studying the relation between these rates and mortality is crucial due to the fact that there are still inequalities in health services regarding life expectancy, thus revealing that people who live in less populated regions have lower life expectancy than urban / littoral populations (World Health Organization (WHO), 2010). In Portugal, regions with higher vulnerability to death are those located in Centro and in Alentejo, which are sparsely populated, rural and interior regions. This is in accordance with reduced health care access and higher vulnerability to preventable death (Freitas, & Costa, 2015). It is of the utmost importance to test these variables interaction across territory typology because populations living in rural regions still face social barriers – specially the elderly – related to poor health services (lack of infrastructures and human resources), distance to education, culture, health services and vulnerable work conditions. At present, one million of the Portuguese population are more than 75 years old (Portuguese Ministry of Health, 2018). People living far away from urban centres, in remote and rural areas with limited infrastructures, have lower access to quality health services and to qualified health professionals, like medical doctors and nurses (International Council of Nurses, 2011).

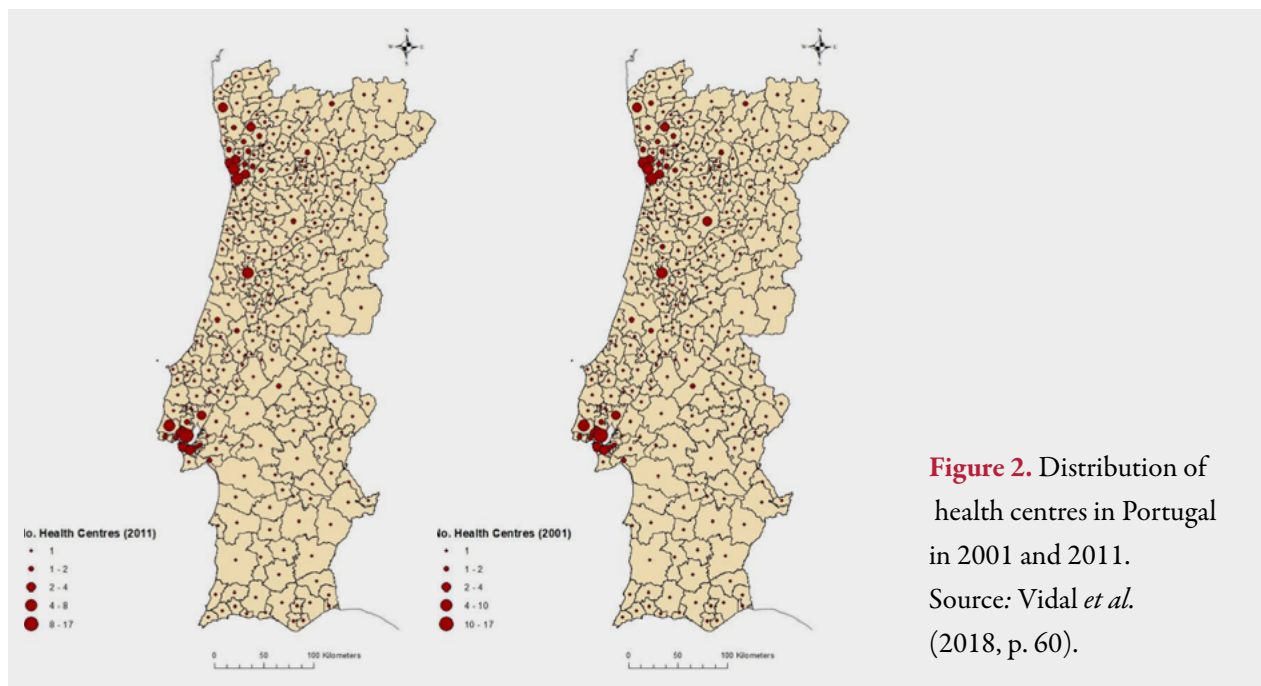
2.3. Statistical analysis

Statistical analysis was performed with IBM® SPSS® Statistics vs.25.0 software and, in all comparative analyses, a confidence level of 95% or 99% ($\alpha = 0.05$; $\alpha = 0.01$) was used. Data distribution was analysed by *Kolmogorov-Smirnov test* but normality in data distribution was not verified. Nevertheless, parametric tests were still applied because the condition $n > 30$ was verified for all variables. Comparison of variables “Health centres density by 100 km²”, “Hospitals density by 100 km²” and “Gross death rate” by territory typology was conducted by *one-way ANOVA* of multiples comparisons with the *Tukey test (a posteriori)*. *Spearman* correlation test was applied to verify association among variables. Paired Samples t Test was performed to verify the existence of mean differences between 2001 and 2011 for “Health centres”, “Hospitals density by 100 km²”, “Medical doctors working at health centres”, “Nurses working at health centres”, “Medical doctors working at hospitals”, “Nurses working at hospitals” and “Gross death rate”.

ArcGIS 10.5 (ESRI) software was used to spatially represent the distribution of health services – number of health centres and hospital – normalized by 100 km². This presentation of results puts in evidence which populations are most deprived of health services and, naturally, more distant from the services.

3. Results and Discussion

Portugal is a small country, both in population and in area, but profound differences were found across mainland. Although littoral/interior territories are a classic dichotomy, significant differences in the results were identified between these two regions typologies. Figure 2 represents Portuguese health centres distribution in 2001 and 2011 in mainland territory.



Asymmetries of health services distribution are visible, namely in the number of health centres available. Urban areas, mostly located in littoral metropolitan areas, such as *Porto* and *Lisboa*, are those where services are more clustered which could result in better access to quality health care (Simões, Barros, & Pereira, 2017). It is also visible that the number of health centres responsible for health promotion at local level (Furtado and Pereira, 2010a; Portuguese Ministry of Health, 2018) remained mostly stagnant from 2001 to 2011. Based on the principle of equity in health, and in alignment with the sustainable development goals framework, the access to adequate health care services should combine multiple dimensions: good health perceiving and service response; adaptation of health services to populations' needs; proximity to health services; direct-costs related to health services acquisitions; indirect-costs related to transports to health centres or hospitals; quality of health services organization (Furtado, & Pereira, 2010b; United Nations, 2015). Another important point visible in Figure 2 is that the municipalities further away from the littoral are those with only one health centre.

Due to the fact that the aim of this work is to study relation between mortality and the access to health care services (which is a consequence of both geographical distance and response time), Figure 3, referring to 2011, clearly reveals asymmetries in health centres and hospital density by 100 km² across the country.

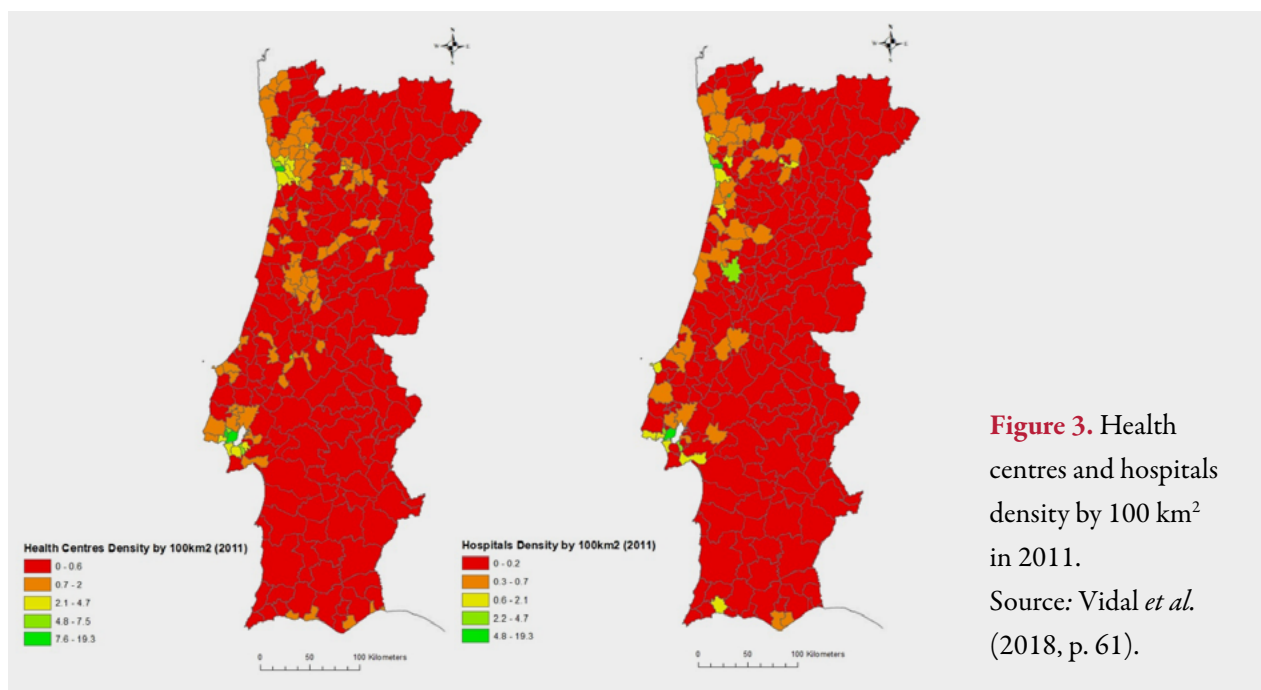


Figure 3. Health centres and hospitals density by 100 km² in 2011.

Source: Vidal *et al.* (2018, p. 61).

In 2011, the majority of mainland municipalities (n = 186; 66.9 %) count with between 0 and 0.6 health centres by 100 km². Municipalities with higher density of health centres per 100 km² were: *Porto* (19), *Lisboa* (16), *Amadora* (12), *S. João da Madeira* (12) and *Odivelas* (7), all of them belong to the two metropolitan areas of *Porto* and *Lisboa*. On the other hand, municipalities with lower density of health centres are all located in the interior and extreme interior regions at the centre-south region of the mainland. These results underline the polarization and the uneven distribution of health services. The same situation occurs in hospitals' distribution but it should be remembered that the

number of these infrastructures is much lower. According to Figure 3, only municipalities in urban (n =14) and semiurban (n =3) areas count with hospitals. In addition, only a few municipalities count on more than 1 hospital per 100 km² (n =17; 6.1 %).

A mean comparison for health infrastructures and Gross Death Rate was performed to identify possible differences across territory typologies. These results are presented in Table 1.

Table 2. Studied variables mean differences grouped in territories typologies and data of the statistical tests performed (2011).

| Variables | Descriptive statistics | | | Tukey H.S.D. | | | One-way ANOVA | | |
|---|------------------------|-----|------|--------------|-----------------|-------|---------------|-------|--------|
| | Territory typologies | N | Mean | Typologies | Mean Difference | p | F | p | |
| Health Centres density (number /100 km ²) | PU | 33 | 4.38 | PU | SU | 3.62 | <0.001 | 83.6 | <0.001 |
| | SU | 76 | 0.77 | | PR | 3.99 | <0.001 | | |
| | PR | 169 | 0.40 | SU | PR | 0.37 | >0.05 | | |
| | Total mainland | 278 | 0.97 | | | | | | |
| Hospitals Centres density (number /100 km ²) | PU | 33 | 2.30 | PU | SU | 2.07 | <0.001 | 28.5 | <0.001 |
| | SU | 76 | 0.24 | | PR | 2.28 | <0.001 | | |
| | PR | 169 | 0.02 | SU | PR | 0.22 | >0.05 | | |
| | Total mainland | 278 | 0.35 | | | | | | |
| Gross Death Rate (number of deaths per resident population (×1000), in each year) ‰ | PU | 33 | 7.92 | PU | SU | -1.91 | <0.05 | 107.2 | <0.001 |
| | SU | 76 | 9.83 | | PR | -6.96 | <0.001 | | |
| | PR | 169 | 14.9 | SU | PR | -5.05 | <0.001 | | |
| | Total mainland | 278 | 12.7 | | | | | | |

PU – Predominantly urban; SU – Semiurban; PR – Predominantly rural

Between predominantly urban and predominantly rural territories is identified a mean reduction of -3.99 health centres by 100 km² ($p < 0.001$) and of -2.28 in hospitals by 100 km² ($p < 0.001$). In the case of Gross Death Rate is also identified a significant mean reduction from predominantly urban to semiurban in -1.91 ‰ ($p = < 0.05$) and, more intense, from predominantly urban to predominantly rural in -6.96 ‰ ($p = < 0.001$). The biggest disparity found among territory typologies is related to Gross Death Rate ($F = 107.2$; $p = < 0.001$). This is related, in part (obviously taking into account that it is in these regions that the highest percentage of people over 65 live), to an uneven distribution of health services, a fact that could be confirm by the existence of only one health centre in most of the interior and extreme interior municipalities. These results are in accordance with Santana and Ferreira study (Santana, & Ferreira, 2017), revealing that, in 2016, considering a population of 5 210 785 health users, the number of available family doctors was only 2 936, corresponding to a mean rate of 1 775 patients (users) per family doctor. In agreement with these results, other study (Furtado, & Pereira, 2010b) conclude, that rural areas, particularly in interior regions, continue to be more distant from specialized health services than other regions.

Distribution of Gross Death Rate across mainland is cartographic represented in Figure 4. Between 2001 and 2011, Gross Death Rate trend is similar, and the littoral-interior dichotomy is maintained. Extreme interior regions, by the Spain border, exhibit the highest gross death rate values.

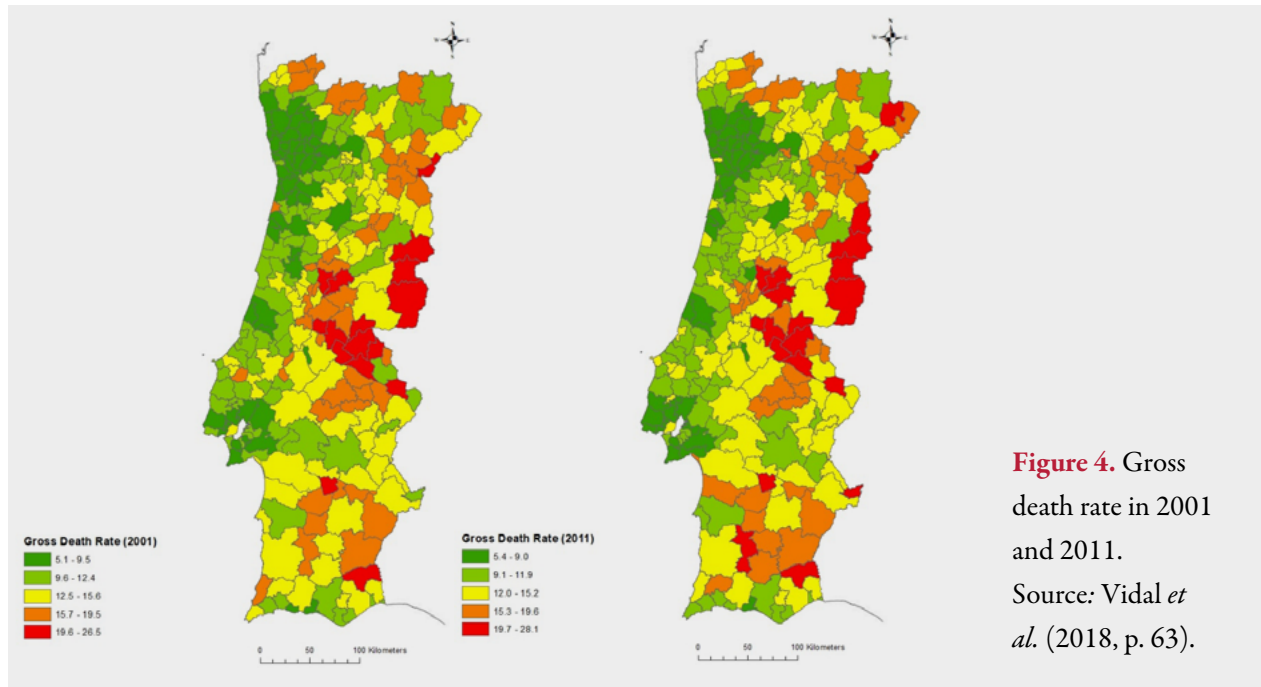


Figure 4. Gross death rate in 2001 and 2011. Source: Vidal *et al.* (2018, p. 63).

The mean gross death rate is higher (by 5.9 points) in extreme interior when compared to littoral. In order to identify variables correlations, *Spearman* test was performed and results are presented on Table 3.

A positive strong association is identified between Gross Death Rate and Illiteracy Rate ($r_s = 0.826$; $p < 0.01$) and, also, with Ageing Index ($r_s = 0.889$; $p < 0.01$). These results suggest that in municipalities with more illiterate and aged populations the vulnerability to death is higher. A moderate negative correlation is identified between the number of health professionals working in health centres and the Gross Death Rate, namely medical doctors ($r_s = -0.734$; $p < 0.01$) and nurses ($r_s = -0.649$; $p < 0.01$). It is also visible a moderate negative correlation between the ageing index and health professionals working in health centres: the number of medical doctors ($r_s = -0.666$; $p < 0.01$) and the number nurses ($r_s = -0.599$; $p < 0.01$). A moderate correlation between health centres density by 100 km² and gross death rate ($r_s = -0.543$; $p < 0.01$) was also found.

Another result of this study that may be relevant for the prevention of death is unveiled by the strong correlations relating medical doctors ($r_s = -0.734$; $p < 0.01$) and nurses ($r_s = -0.649$; $p < 0.01$) working at health centres, when compared with weak correlations concerning the same professionals but working at hospitals: medical doctors ($r_s = -0.367$; $p < 0.01$) and nurses ($r_s = -0.368$; $p < 0.01$).

Paired Samples t Test results are exhibit in Table 4 enabling comparisons between years 2001 and 2011. Only two variables “nurses working at health centres” and “nurses working at hospitals” show statistically significant mean differences ($p < 0.001$).

Table 3. Correlations between variables studied (2011)

| Variables | Gross Death Rate | Health Centres density by 100 km ² | Hospitals density by 100 km ² | Medical Doctors Working at Health Centres | Nurses Working at Health Centres | Medical Doctors Working at Hospitals | Nurses Working at Hospitals | Illiteracy Rate | Ageing Index |
|---|------------------|---|--|---|----------------------------------|--------------------------------------|-----------------------------|-----------------|--------------|
| Gross Death Rate | 1 | | | | | | | | |
| Health Centres density by 100 km ² | -0.543** | 1 | | | | | | | |
| Hospitals density by 100 km ² | -0.404** | 0.141* | 1 | | | | | | |
| Medical Doctors Working at Health Centres | -0.734** | 0.252** | 0.670** | 1 | | | | | |
| Nurses Working at Health Centres | -0.649** | 0.142* | 0.639** | 0.914** | 1 | | | | |
| Medical Doctors Working at Hospitals | -0.367** | 0.061 | 0.934** | 0.659** | 0.637** | 1 | | | |
| Nurses Working at Hospitals | -0.368** | 0.050 | 0.941** | 0.659** | 0.637** | 0.993** | 1 | | |
| Illiteracy Rate | 0.826** | -0.618** | -0.494** | -0.772** | -0.667** | -0.452** | -0.454** | 1 | |
| Ageing Index | 0.889** | -0.540** | -0.342** | -0.666** | -0.599** | -0.310** | -0.314** | 0.800** | 1 |

* Correlation significant at 0.05 level; ** Correlation significant at 0.01 level

Source: Vidal *et al.* (2018, p. 63).

Table 4. Paired Samples t Test applied to variables for 2001 and 2011

| Variables | Mean | Mean Difference | CI | P |
|--|-------|-----------------|-----------------------|-------|
| Health Centres Density by 100 Km ² - 2001 | 0.998 | - 0.027 | (95%, -0.009 – 0.062) | 0.149 |
| Health Centres Density by 100 Km ² - 2011 | 0.972 | | | |
| Hospitals Density by 100 Km ² - 2001 | 0.360 | - 0.011 | (95%, -0.029 – 0.051) | 0.595 |
| Hospitals Density by 100 Km ² - 2011 | 0.349 | | | |
| Medical Doctors Working at Health Centres - 2001 | 25 | 0.471 | (95%, -2.38 – 0.971) | 0.628 |
| Medical Doctors Working at Health Centres - 2011 | 25.5 | | | |
| Nurses Working at Health Centres - 2001 | 23.2 | 4.95 | (95%, -6.34 – 0.703) | 0.000 |
| Nurses Working at Health Centres - 2011 | 28.1 | | | |
| Medical Doctors Working at Hospitals - 2001 | 52.4 | 12.8 | (95%, -27.828 – 2.21) | 0.094 |
| Medical Doctors Working at Hospitals - 2011 | 65.2 | | | |
| Nurses Working at Hospitals – 2001 | 72 | 43.1 | (95%, -63.2 – -22.9) | 0.000 |
| Nurses Working at Hospitals – 2011 | 115 | | | |
| Gross Death Rate - 2001 | 12.7 | 0.045 | (95%, -0.184 – 0.274) | 0.700 |
| Gross Death Rate - 2011 | 12.7 | | | |

Source: Vidal *et al.* (2018, p. 64).

For all the other variables – Medical doctors working both at health centres and at hospitals and health centres and hospitals density by 100 km² –, means values were not statistically different. On the other hand, Gross Death Rate does not present a significant decrease, following others variables' trend. This fact is emphasized in the OECD Report (OECD/EU, 2016) that refers to Portugal as a country with a higher medical doctor's ratio per 1 000 inhabitants (4.4) when compared to the mean European ratio (3.5). On the other hand, the of ratio nurses per 1 000 inhabitant (also 4.4) is about half of the European mean (8.4) ranking Portugal at 10th position.

4. Conclusions

The importance of an efficient and universally attainable national health service is related with its capacity to eliminate health inequalities, contributing to a more fair and equitable society. Health protection and promotion are fundamental rights to enable human life, health, promote wellbeing and the quality of life. These main principles are keys to pursue the implementation of sustainable development goals at the local level, with priority to develop policies to eradicate poverty, health inequalities and education gaps within and among countries.

Notwithstanding the recognized importance of National Health Service in Portugal and the health gains through its forty years of activity, this work results puts in evidence the fact that mortality is associated with health services distribution – number of infrastructures and professionals' services – and populations characteristics related to illiteracy and ageing. Therefore, supported on these results, the main conclusion of the present work is related to the way that health public policies are design. The results show that health services are distributed only according to population density. In most ageing areas was identified a decrease availability of health services which contributes to a differential mortality. Population's socioeconomic realities constrains the access to health care, suggesting the need of health public policies reformulation, in particular by emphasizing the specificities and needs of each region.

If equity in health care was to be merely accountable by the number of inhabitants served by a health infrastructure, then the existence of fewer health infrastructures in less populated regions would become rational. However, this criterion alone does not take into consideration neither the response time to acute situations nor the availability of diverse medical specialities, diagnose and treatment means that, at present, only exist at main central hospitals. Although lower population density is usual in these territories, their correspondent geographical area is large, consequently, the distance from population residences to health services is considerable.

A world with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being are assured to all, continues to be a challenge for academics, stakeholders and central/local authorities to address.

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