



# POLICY PAPER 31

## Intergenerational Health Justice Index

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# 1. Introduction

Health and public health policies have an intergenerational potential that is not dispensable, and it is necessary to consider the long-term effects of the decisions associated with these policies. The socio-economic determinants of health, the economic development and the sharing of resources have implications for the health of future generations and therefore deserve specific attention. In fact, in health, the benefits and contributions to health investments are captured differently throughout the life of each individual, but also between individuals of different generations. The potential discrepancies between the various generations therefore motivate the analysis of the evolution of intergenerational justice in health and the calculation of an intergenerational justice index.

## 2. The health dimension

The concept of intergenerational health is related to the amount of health *capital* that is transmitted from one generation to the next, which implies an analysis of the determinants of the production and accumulation of this *capital*. The concept of health *capital* considered here coincides with that proposed by Grossman (1972). According to this perspective, health *capital* should be seen as a durable asset, which each individual enjoys at birth, but which depreciates over time and therefore also with age. Despite its depreciation over time, health *capital* can be replenished or improved with investments in health (using medical and non-medical care) and is therefore also an asset co-produced by each individual.

Each individual's health *capital* is determined by a wide range of factors (Dahlgren and Whitehead 1991), including factors of a biological nature, cultural factors, as well as institutional factors linked to the health system or working conditions. These determinants of health influence each individual's health capital over time, with potential intergenerational implications. While some determinants can make an advantageous contribution to future health capital, such as better housing conditions and schooling, other determinants can have a negative effect, such as environmental degradation and excessive use of agro-chemicals in food production.

It follows that the provision of health care should be interpreted as one of the factors - among many others - that contributes to greater accumulation of health capital. One health determinant that should be highlighted that favors health capital is directly related to the country's health system. It is this institutional structure that responds to the population's health needs and contributes directly to the improvement and growth of the population's health capital (Murrey, Frenk and WHO 1999). Thus, a health system that is characterized by a high number of unmet health needs contributes less to population health and greater health inequalities. On the other hand, a health system that has a greater commitment to maternal and child health care functions to the detriment of geriatric health or prevention may influence the distribution of health across different age groups, which in the long term will influence the health capital of the different cohorts and on the health of the population.

Despite these determinants, health capital is not a limited resource distributed between and within generations and cannot be directly traded or exchanged. There is evidence of some intergenerational transmission of health at the individual (micro) level. The literature suggests that socio-economic advantages throughout life are reflected in health benefits over several generations. In other words, the intergenerational transmission of income, wealth, social support, and human capital in the family is associated with better levels of health in the descendant generations (Marmot 2005, Ahlburg 1998, Halliday et al. 2020).

From an aggregate point of view, it is also accepted that there is a positive correlation between the health of the population and economic growth, and that the causal relationship can go in both directions. The general idea is that a healthy population increases the country's human capital by increasing productivity and thus contributes to economic growth. On the other hand, economic growth can contribute to improving the macroeconomic, institutional, environmental and cultural determinants of health and, therefore, to the health of the population (Bloom, 2008; Bloom, 2018; Lange, 2017). This macroeconomic perspective is dynamic, longitudinal in nature, and therefore expresses relationships between different generations (Mayer-Foulkes, 2004). In fact, there are a number of macro-determinants of population health that can be transmitted between generations and, for this reason, it is important to assess the intergenerational health (WHO, 2015). What is expected, due to the relational process of "economic growth - health", is that the next generation will have greater and/or better-quality health capital than the previous generation. In the case of an economic downturn (an economic recession), the transmission of health capital to the next generation can be expected to be smaller or of lower quality.

However, due to other health determinants such as social inequalities, climate change, population ageing and unexpected factors (e.g. pandemic crises), the hypothesis regarding the evolution of health capital between generations cannot always be verified. In this way, it can be observed that the next generation will inherit, create and enjoy a lower health capital than the previous generation.

On the other hand, the determinants of health have the capacity to influence health capital in the long term, i.e. they influence the risk factors for loss of health, starting at the time of a woman's conception and pregnancy. Thus, the intergenerational health capital can be the result of the determining factors that the previous generation shaped or influenced. In this case, we could consider an inter-temporal production function, whose inputs at time  $t$  have an impact on the output (health *capital*) at time  $t+n$ . For example, the generation of young people in the 1960s experienced high infant mortality rates, while the generation of young people in the 2020s does not have the same disadvantage; however, the generation of young people in the 1960s was less likely to contract a disease associated with pollution or agrochemical excesses than the current generation of young people in the 2020s. These changes in life expectancy and quality of life are the result of health determinants and not a direct transmission of health capital between generations.

### 3. Intergenerational health indexes

There is little literature on this subject and on the operationalization of the concept of intergenerational justice in health. In particular, the empirical studies have different limitations and are often aimed at specific perspectives such as public health policy, the well-being of the population or the provision of health care.

Thus, the diversity of indicators considered in the few scientific articles that deal with the subject suggests that the methodology for assessing intergenerational justice in health is not consensual in the literature. Table 1 shows a summary of the indicators found in some of these empirical studies. Several studies used indicators linked to the evolution of average life expectancy, as well as the population's self-reported state of health and other social determinants of the population's state of health.

Table 1: Summary of existing indicators in the literature

<b>Authors and countries</b>	<b>Used indicators</b>
Feltrin (2020); Italy	Life expectancy at birth Major depression rate and perceived mental health status Health expenditure (% of GDP)
Gagné et al. (2016); Quebec e Ontario	Life expectancy at birth Health expenditure (% of GDP)
Fetzer & Moog (2021); Germany	Intertemporal health expenditure
Gál & Monostori (2017); several countries	Life expectancy Expected median age Survival probabilities Health conditions
Kingman et al. (2016); EU	Hospitalization days for patients over 60
Kingman (2018); UK	Self-reported health status Self-reported mental health Smoking prevalence
McQuilkin (2018); several countries	Infant mortality and adjusted for GDP
Miller, Meyricke, Dixie (2020); Australia	Average life expectancy at birth Prevalence of obesity Prevalence of disability Suicide rates
Monti (2017); Italy	Self-reported health status in younger generations Proportion of hospitalization days in younger generations

OECD (2020); OECD countries	Self-reported health status Suicide rates Traffic accidents
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# 4. The IPP/FCG Intergenerational Health Justice Index

## 4.1 Sub-dimensions of the IJI in health

To calculate the intergenerational justice in health index (IJIs), it is important to monitor the evolution of a set of indicators grouped into two sub-dimensions (Figure 1). On the one hand, the **health capital** sub-dimension, which aims to measure the evolution of the population's health status over time. This sub-dimension includes indicators to capture i) the quantity of health, ii) the quality of health and iii) well-being.

On the other hand, the aim is to analyze the contribution of the health system's performance to improving health capital, i.e. **health system coverage**. In this sub-dimension, indicators are considered i) in terms of access to health care, to measure the population's difficulties in accessing health care and ii) in terms of the prevention-oriented coverage of the health system; a health system that tends to contribute to younger health capital tends to have a significant focus on prevention, i.e. a concern for health promotion alongside the treatment of disease.

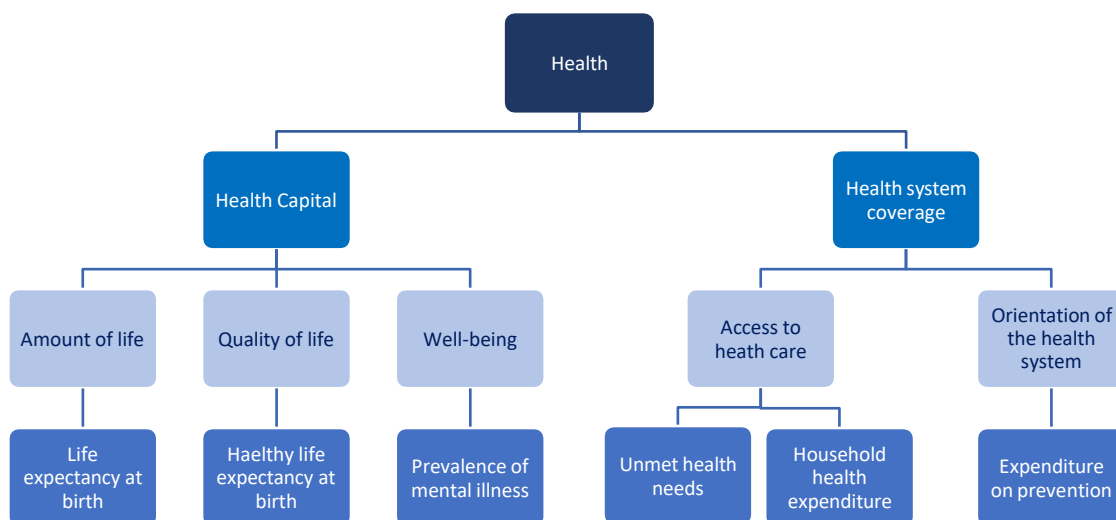


Figure 1: Sub-dimensions and indicators in health

## 4.2 Indicators

In the **health capital** sub-dimension, three indicators were considered: life expectancy at birth (EVN), healthy life expectancy at birth (EVS) and prevalence of mental illness (PDM), corresponding to the measurement of quantity of life, quality of life and well-being, respectively.



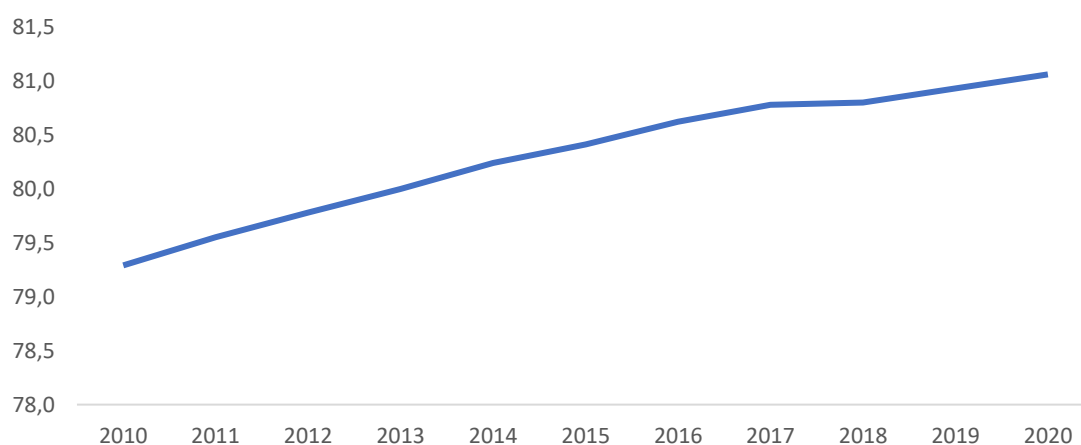
## Life expectancy at birth

Regarding health capital, the aim is to analyze the evolution of the quantity of this capital captured by the evolution of life expectancy at birth (EVN), measured in number of years. This indicator represents the average number of years left to live from birth, subject to current and age-specific mortality conditions.

The growth of this indicator over time means that future generations have greater health capital than previous generations. In this case, it is assumed that the evolution of health determinants, including dimensions related to the evolution of the health system and technology, allows new generations to achieve higher levels of life expectancy than previous generations. This indicator centrally represents the evolution of health capital over time and an increase in this value translates into a growing benefit to be accumulated by future generations.

As might be expected, life expectancy at birth has been increasing over time (graph 1), currently exceeding the European Union (27) average of 80.1 years in 2021. The countries with the highest figures are Spain and Sweden, where people live an average of 83.3 and 83.1 years, respectively. In contrast, Romania and Bulgaria have the lowest average number of years lived, 72.8 and 71.4 respectively.

Graph 1: Life expectancy at birth in Portugal (years; 2010 – 2020)



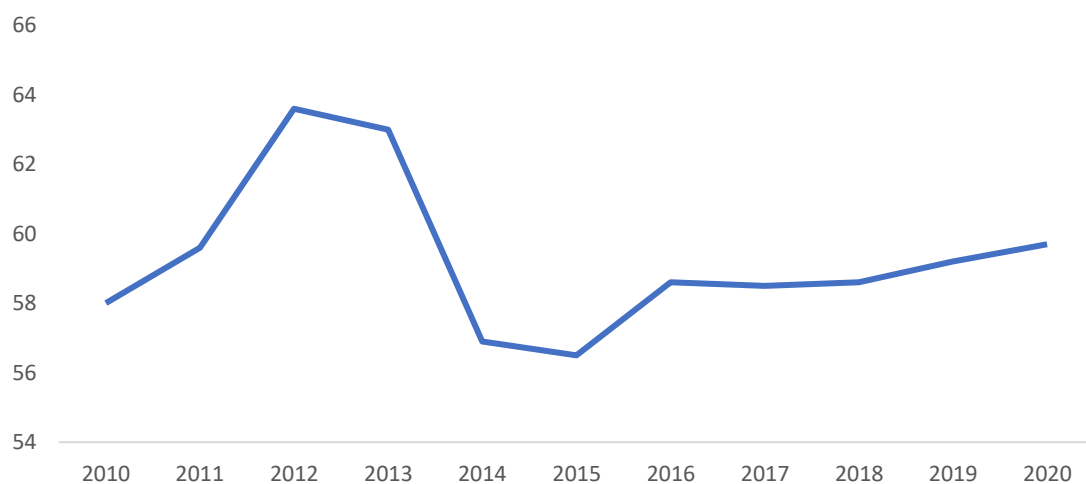
## Healthy life expectancy at birth

Life expectancy ignores quality, i.e. it ignores non-fatal illness, morbidity and disability during life. For this reason, an indicator has been introduced to assess the evolution of

healthy life expectancy at birth (EVS). This indicator corresponds to the expected number of years of healthy life at birth and therefore measures the number of years a person is expected to live without moderate or severe illness or disability; in other words, it combines mortality data with data on the health status of the population. An increase in this indicator over time signals the accumulation of better health capital by future generations.

Although healthy life expectancy can be related to life expectancy, an increase in one variable does not necessarily translate into an increase in the other. This is because the two indicators capture different information about the population's average state of health. The fact that there is an upward trend in life expectancy at birth does not guarantee that there will be an equal upward trend in the number of healthy life years of the population, as can be seen from the evolution of this indicator over time (graph 2). After falling between 2012 and 2015, this indicator resumed a positive trend between 2015 and 2020, reaching a value of less than 60 years. The latest figures point to an EU average of 63.6 years in 2021, with Sweden and Malta having the best records at 68.4 and 68.7 years respectively; against values of 53.8 and 56.5 years in Latvia and Estonia respectively.

Graph 2: Health life expectancy in Portugal (years; 2010 - 2020)



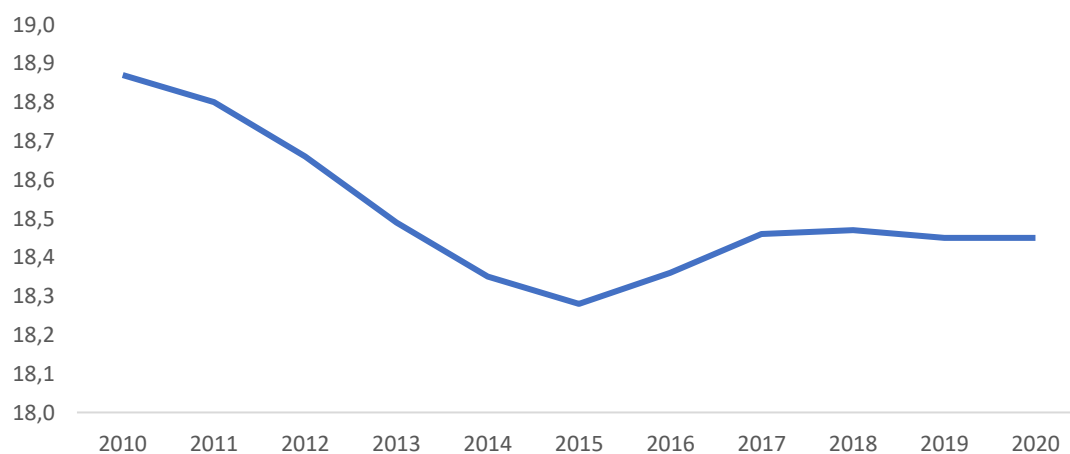
### Prevalence of mental illness

Quality of life is potentially affected by multiple dimensions. One of the main ones is mental health, which has received increasing attention in recent years, especially after the COVID-19 pandemic. However, quality and quantity of life indicators tend not to fully reflect variations in mental health status. On the other hand, historically, health systems themselves have not had mental health at the center of their care priorities. For these

reasons, it was considered relevant to highlight the problems associated with mental health by including an indicator relating to the prevalence of mental illness (PDM) in the population. An increase in this indicator over time signals a deterioration in the mental health status of current generations compared to previous generations.

The indicator of the prevalence of mental illness is given by the percentage of the population with mental health problems<sup>1</sup>. If the value of this indicator increases, then it could be said that there is a burden on descendant generations who will have to deal with worse mental health throughout their lives. However, what we can see is that over time there has been a trend towards a slight reduction in the percentage of the population affected by mental illness (graph 3), with this value always being below the average found for Europe (WHO) of 12.65% in 2019.

Graph 3: Prevalence of mental illness in Portugal (% population; 2010 - 2020)



Within the **health system coverage** sub-dimension, three indicators are considered: unmet health needs (NSNS), household health expenditure (DF) and expenditure on prevention (DP), which correspond to two areas of analysis. The first two indicators are combined in a geometric mean to create a measure of access to healthcare. On the other hand, expenditure on prevention reflects the coverage orientation of the health system.

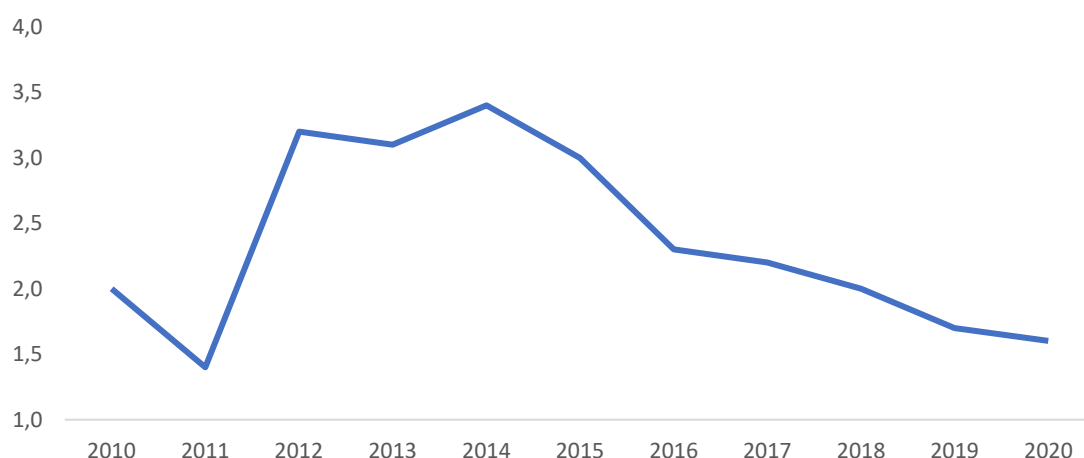
<sup>1</sup> This indicator was introduced after discussion with health experts. However, its value has not varied significantly over time. The mental illnesses included in this indicator are depression, anxiety, bipolar disorder, eating disorders and schizophrenia.

## Unmet health needs

The unmet health needs indicator (NSNS) represents the percentage of the population that reports not having been able to access healthcare in the last 12 months due to financial barriers, long waiting lists or transportation problems. This indicator is self-reported and calculated from sample data, which can introduce some biases, but it does provide an estimate of the potential barriers to accessing the health system. A health system that has little capacity to respond to the health needs of its population is a system that will tend to be unproductive of health capital. The coverage of health needs reflects the broad objective of a health system, which is universal health coverage (coinciding with Sustainable Development Goal 3.8). Covering these needs is a way of ensuring the financial protection of those who access health care and of guaranteeing the recovery and maintenance of people's health so that they can participate in society. An increase in this indicator signals a growing difficulty for current generations to access the health system, with repercussions for future health.

This indicator, after a shock from the Troika's bailout plan, increased significantly in 2011, but has been falling ever since (graph 4). In the EU in 2021, the average percentage of the population reporting unmet needs was 2%. But the dispersion of this indicator across the EU is large. In Germany, Cyprus and Malta only 0.1% of the population reports unmet needs, but in Greece and Estonia this indicator is 6.4% and 7.6% respectively.

Graph 4: Unmet health needs in Portugal (% population; 2010 - 2020)



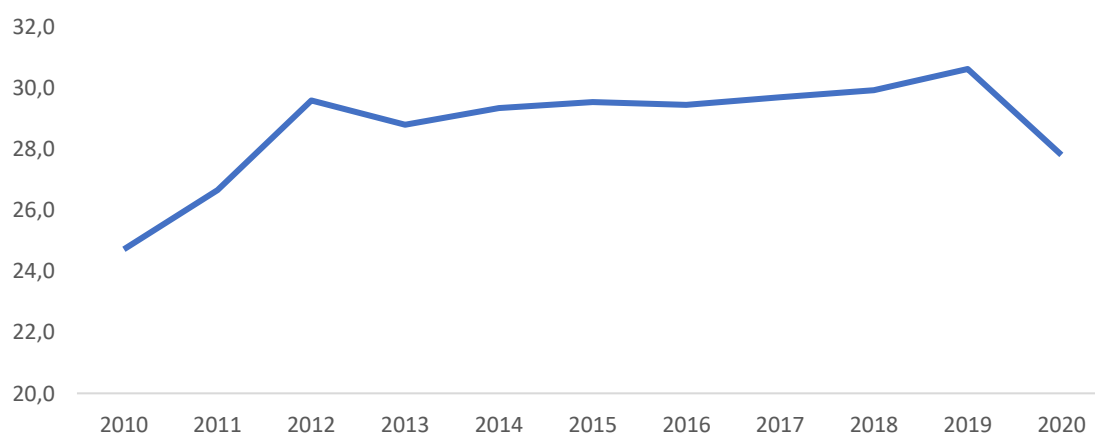
## Household health expenditure

Direct payments made by families to access health goods and services are measured annually as a percentage of total current health expenditure. This indicator represents the lack of financial protection when it comes to accessing healthcare. This household health expenditure (DF) is made up of households' primary income or savings.

A health system with a high proportion of direct payments in total health expenditure has weaknesses in its function of guaranteeing financial protection for those who access and need health care. Depending on the direct cost borne by families at the time of health care provision, so will their access to health care, generating inequalities that can be passed on to future generations, as indicated by the diverse microeconomic empirical evidence. Higher levels of direct health expenditure by families mean that new generations have to make a greater financial effort to access health care, reducing their disposable income for other essential goods and services.

Portugal has one of the highest values in the EU for this indicator. In 2020, the average value of this indicator in the EU was 14.4% of total health expenditure. While Bulgaria and Greece have similarly high values, 35.5 and 33.4% respectively; Luxembourg and France have values of around 8.4 and 8.9% of total health expenditure.

Graph 5: Direct household health payments in Portugal (% total health expenditure; 2010 - 2020)



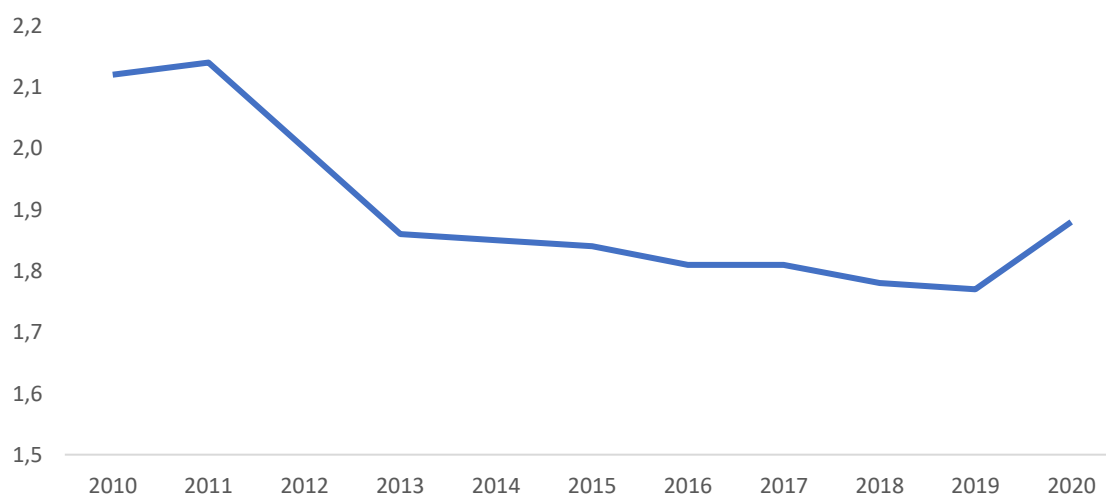
## Expenditure on prevention

Health status is affected by several factors beyond the direct provision of health care. Adopting healthy behaviors and focusing on disease prevention can contribute to improving people's state of health. For this reason, health systems should be geared towards disease

prevention and health promotion. This dimension includes the indicator of expenditure on health activities linked to preventive care aimed at avoiding or reducing the incidence or severity of accidents and illnesses, as well as their complications and after-effects. An upward trend in this expenditure mainly benefits future generations who will reap the benefits of the investment made in health.

The percentage of total health expenditure allocated to prevention has been falling, especially since 2011, with a reversal in 2019. However, Portugal allocates a low percentage of health expenditure to prevention, below the EU average of around 3.4% in 2020. The countries that give the least importance to prevention are Slovakia and Malta, 1.03 and 1.45% respectively, in clear opposition to Finland and Italy, which devote 5.6 and 5.48% of health expenditure to prevention.

Graph 6: Health expenditure on prevention in Portugal (% total health expenditure; 2010 - 2020)



### 4.3 Indicators summary

Table 1 shows the abbreviation and statistical source for each of the indicators.

Table 1: Indicator abbreviations and sources

Abbreviations	Statistical Indicator	Source
S <sub>1</sub> =EVN	Life expectancy at birth (years)	Eurostat
S <sub>2</sub> =EVS	Healthy life expectancy at birth (years)	Eurostat
S <sub>3</sub> =PDM	Prevalence of mental illness (% <u>population</u> )	OWID <sup>2</sup>

<sup>2</sup>This indicator is compiled and estimated by *Our World in Data* (OWD) from data provided by *the Institute for Health Metrics and Evaluation, Global Burden of Disease*.

S <sub>4,1</sub> =NSNS	Unmet health needs (% population)	Eurostat
S <sub>4,2</sub> =DF	Household direct health expenditure (% of total health expenditure)	Eurostat
S <sub>5</sub> =DP	Expenditure on prevention (% of total health expenditure)	Eurostat

## 5. Method

The indicators selected for calculating the IJIs were manipulated as follows: i) calculation of a 3-year moving average, ii) normalization to values in the [0,1] range, iii) calculation of the IJI value and numerical corrections.

i) The time series of each indicator is smoothed using a moving average of the last 3 years, for the period 2015 to 2020.

ii) Indicators are normalized according to whether they are favorable or unfavorable to creating health capital or improving health coverage. Normalization aims to find values for the indicators in the [0,1] range (table 2).

iii) Calculation of the Intergenerational Justice Index in health using the following formula:

$$IJI_{Health} = IJI_{2,i} = \left( \prod_{i=1}^5 S_i \right)^{1/5}, \text{ as } i=1,\dots,5,$$

Where  $S_1 = EVN$ ,  $S_2 = EVS$ ,  $S_3 = PDM$ ,  $S_5 = DP$  and the index relating to access to health care is obtained by calculating a geometric mean  $S_4 = \sqrt{S_{4,1}S_{4,2}}$ ,  $S_{4,1} = NSNS$  and  $S_{4,2} = DF$ .

In case of indicator value  $S_i$  is equal to 0 in a given year, a positive infinitesimal variation (equal to 0.001) is considered in order to cancel out the absorbing effect of the value 0 in the multiplication.

This method of calculating the various indicators implies that an increase in the indicator is interpreted as a benefit for future generations. In other words, values close to 1 indicate intergenerational health advantages for future generations, while values close to 0 reflect intergenerational health disadvantages for future generations.

Table 2 lists the normalization formulas for each indicator, considering whether a higher value should be interpreted positively (for example, regarding life expectancy) or negatively (for example, regarding direct payments). The maximum values have been increased by 5% and the minimum values minimized by 5% to widen the range of variation of the denominator to prevent extreme values.

Table 2: Indicator normalization formula

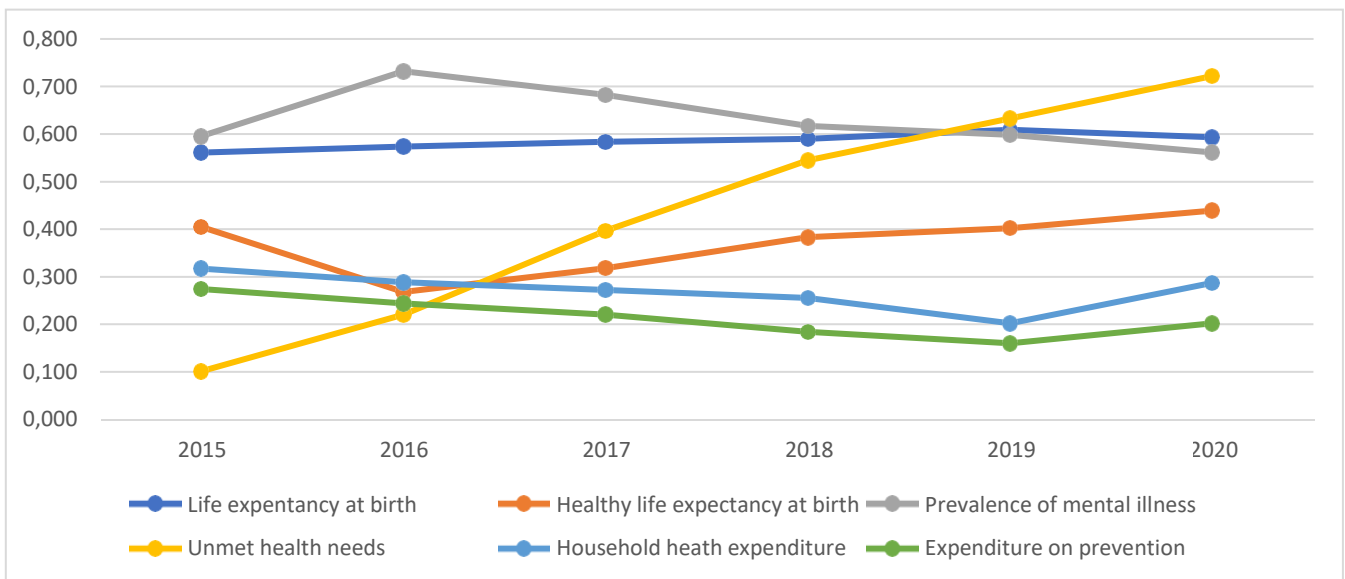
Statistical indicator	Formula
$S_1 = EVN$	$(z - \min(z)) / (\max(z) - \min(z))$
$S_2 = EVS$	$(z - \min(z)) / (\max(z) - \min(z))$
$S_3 = PDM$	$(z - \max(z)) / (\min(z) - \max(z))$
$S_{4,1} = NSNS$	$(z - \max(z)) / (\min(z) - \max(z))$
$S_{4,2} = DF$	$(z - \max(z)) / (\min(z) - \max(z))$
$S_5 = DP$	$(z - \min(z)) / (\max(z) - \min(z))$
as $z = S_i$ in each year	



## 6. Results

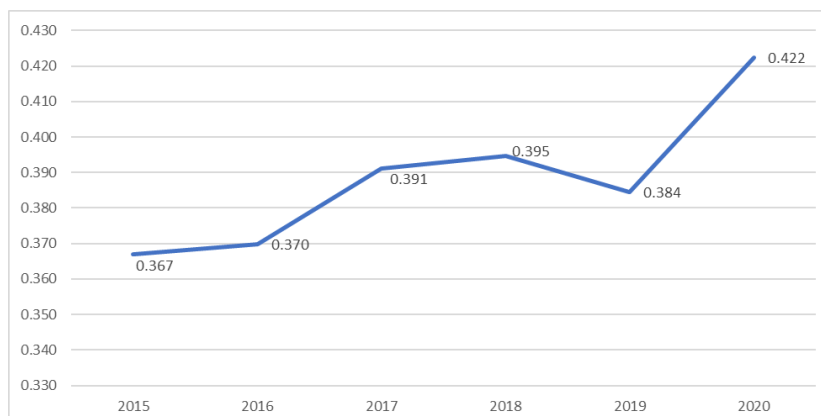
The normalization of the indicators and their respective evolution over the 2015-2020 period is shown in Graph 7. The evolution of the indicators does not follow the same trend over the period, with the exception of life expectancy at birth, which is always increasing, as would be expected from the previous presentation of each of the indicators.

Graph 7: Evolution of standardized indicators (2015 – 2020)



The intergenerational health index has had a relatively stable trajectory over the period 2015-2019, varying from 0.37 in 2015 to 0.38 in 2019. This is the result, on the one hand of a slight improvement in both the life expectancy at birth indicator and the healthy life expectancy at birth indicator. On the other hand, the indicators for the prevalence of mental illness and spending on prevention have deteriorated.

Graph 8: Evolution of the IJI in health in the period of 2015-2020



## 7. Public policies and intergenerational justice

All public policies potentially have an impact on health (*health in all policies*<sup>3</sup>), so it is not possible to identify policies with a specific and quantifiable impact on health.

Regarding previous policies with particular relevance to the health of the younger generation, we can point to the policies to control salt in bread<sup>4</sup>, sugar in sugary drinks<sup>5</sup> and the places where tobacco<sup>6</sup> is sold and consumed. These are policies with a strong prevention vocation and whose effects will only be felt in the future. On the other hand, the recent creation of the Secretary of State for Health Promotion, if translated into a greater share of prevention spending in total health spending, could also contribute to benefits for the younger generations. In the long term, these investments in prevention could translate into gains in health, both in quantity and quality.

The implementation of the Mental Health Reform (which includes measures such as the generalization of Community Mental Health Team models, the requalification of acute hospitalization, among others) could also contribute to reducing the prevalence of mental illness, with benefits for the younger generations.

We can also point to the absence of policies to solve structural problems in the health system, such as the lack of family doctors<sup>7</sup> to ensure that the health needs of a high percentage of the population are covered. This lack of primary health care for a significant portion of the population means that, in the future, there will be damage to the population's health outcomes. In the case of younger people, this will mean more years with a lower quality of life.

Finally, as far as future policies are concerned, and since this paper is not intended to propose future policy measures, we can turn to the recently presented work of the PHSSR - *Partnership for Health System Sustainability and Resilience for Portugal*<sup>8</sup>, which lists 43

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<sup>3</sup> See OMS at <https://www.who.int/activities/promoting-health-in-all-policies-and-intersectoral-action-capacities>.

<sup>4</sup> See example at <https://www.publico.pt/2021/02/21/sociedade/noticia/protocolo-reducao-sal-pao-significara-consumo-ate-menos-meio-grama-diario-1951581>; The maximum limits for salt content in bread are defined in Law no. 75/2009 of August 12, 2009.

<sup>5</sup> See analysis of the impact of the excise duty on sugary drinks at <https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3D%3DBAAAAB%2BLCAAAAAAABAzM7I0AQCQMv8BAAAAA%3D%3D>.

<sup>6</sup> See example at <https://sicnoticias.pt/saude-e-bem-estar/2023-06-08-Lei-do-Tabaco-afinal-em-que-locais-vai-ser-permitida-a-venda--c3fa6741>; See government information at <https://www.portugal.gov.pt/pt/gc23/comunicacao/noticia?i=geracao-sem-tabaco-ate-2040>.

<sup>7</sup> <https://www.dn.pt/sociedade/17-milhoes-sem-medico-de-familia-e-numero-aumentara-enquanto-nao-formos-capazes-de-os-reter-no-sns-16466864.html>

<sup>8</sup> See the report for Portugal at <https://www.phssr.org/findings>.

health policy recommendations. Of these recommendations, we highlight 3 that are particularly relevant to intergenerational health:

i) Invest in health promotion through initiatives (e.g. exercise and healthy eating) at municipal level, using a transfer of responsibilities in the decentralization process,

ii) Develop intersectoral campaigns (involving health and education) to promote literacy about modifiable disease risk factors, and

iii) Regulate commercial activities and practices that affect health, such as advertising and easy access to harmful products (tobacco, unhealthy food and/or alcohol).

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