



EUROPEAN COMMISSION

**PROTOTYPE DASHBOARD FOR MONITORING THE SOCIAL AND ECONOMIC DIMENSION OF  
RESILIENCE<sup>1</sup>**

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<sup>1</sup> This publication is a technical paper by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It provides background for the dashboards presented in the 2020 Strategic Foresight Report of the European Commission (Strategic foresight – charting the course towards a more resilient Europe, COM(2020) 493). Colleagues from several Commission Services have contributed with useful comments on the choice of the indicators.

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## Contents

1. INGREDIENTS OF THE DASHBOARD .....	3
1.1. Social and economic aspects .....	3
1.2. Health aspects .....	4
1.3. Reading the dashboard .....	5
2. THE DASHBOARD .....	6
REFERENCES .....	8
ANNEX 1: INFORMATION ON THE INDICATORS.....	9
ANNEX 2: CORRELATION ANALYSIS .....	17

## 1. INGREDIENTS OF THE DASHBOARD

The proposed dashboard aims to capture social, economic, and health aspects related to COVID-19, using a first selection of easily available and ready-made indicators from publicly available data sources: the Social Scoreboard, and additional variables from Eurostat, Eurobarometer, the World Economic Forum's Global Competitiveness Index, the World Bank, the JRC, the European Institute for Gender Equality, the European Quality of Life Survey (EQLS), and research studies. Their novelty is rather in their multidimensional selection and resilience focus than in the creation of new indicators from raw data.

The dashboard presents vulnerability and resilience capacity indicators. They use the latest statistical year (usually 2018 or 2019, sometimes earlier). As such, they depict the pre-crisis situation of countries.

The first group of indicators points to specific vulnerable groups, or country features that can exacerbate the spreading of the virus and its potential social and economic impacts. The resilience capacity side looks into the abilities of a country to cope with the COVID-19 crisis in a resilient way, by absorbing, adapting, or transforming in response to the shock.

### 1.1. Social and economic aspects

For social aspects, the selection of indicators strongly builds on the Social Scoreboard<sup>2</sup> of the Commission. In order to limit the number of variables, a few representatives from those indicators that are closely linked to COVID-19-related vulnerable groups and resilience capacities are selected. They are extended with elements of social cohesion, other aspects specific to the COVID-19 context (like access to services and food), and a direct measure of individual resilience.

The starting point for the economic aspects was a proposed list of resilience factors developed for the Eurogroup (European Commission, 2017), which was elaborated further in an issue of the Quarterly Report on the Euro Area (European Commission, 2018). Some of the resilience characteristics from Alessi et al. (2020) have also been included. Overall, both the structure and the selection of these variables echo quite closely a similar dashboard of the World Bank (World Bank, 2019). A complete list of the variables with precise definitions is available in Table 2.

Indicators on social vulnerabilities relate to vulnerable groups, either because of their pre-existing precarious situation or due to measures introduced to tackle the emergency (lockdown, social distancing, ...). In particular, the social dimension takes into account aspects of social distress due to pre-existing vulnerabilities related to people at **risk of poverty (AROPE)**, people living in an **overcrowded household** or those who **are not able to face unexpected expenses**. These groups have likely experienced difficulties to satisfy their basic needs during the lockdown period and will have less resources for recovering. Furthermore, people with **precarious (short-term) contracts** might be more likely to lose their job because of the lockdown phase or the economic recession and/or can experience difficulties in finding a new job. Similarly vulnerable are those who have issues with finishing school (**early school leavers**) or are unable to enter the labour market (young people neither in employment nor in education and training, **NEET**).

Another set of vulnerability indicators relates to issues with the availability of services and food: **access to local services** and **food import dependence**. During the COVID-19

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<sup>2</sup> <https://composite-indicators.jrc.ec.europa.eu/social-scoreboard/>

outbreak and the lockdown, having access to services such as small markets or health facilities helped people to cope more easily and successfully with the emergency. At the same time, the flow of goods within and across the EU borders have been for a short period less smooth than usually, due to the travel restrictions. Dependence on non-domestic supply of important food items<sup>3</sup> might cause fear among people about the supply security of food.

In terms of economic vulnerabilities, the core is the financial structure (**indebtedness of households, firms, and banking sector leverage**) of a country and its **unemployment rate**. A measure of **market concentration** is also included, as economic shocks may have a higher impact on a concentrated economy; finally, a measure of the importance of the **tourism sector** is added, as this is being severely hit and will recover with difficulties compared to other sectors.

The resilience capacities part encompasses different aspects of the socioeconomic system to absorb and react to the effect of this crisis. Some variables are strictly associated with the quality and availability of social support: general **social expenditures**, those aimed at **families and children**, or the ability of the **tax and benefit system to reduce poverty**.

Individual resilience capacities and social cohesion make societies better equipped to face crises. The **ability to bounce back** in case of distress is an essential element of individual resilience. Countries where **women and men are equally empowered, inequalities are smaller**, and people engage more in **voluntary activities** are more able to manage through the impact and recovery phases of the crisis. Engaging in voluntary activities is also a sign of trust in people<sup>4</sup>.

In terms of economic resilience capacities, the dashboard looks at the economic and financial structure (**household saving rate, goods market efficiency, financial market development**). The dynamism and reallocation capacities are represented by **R&D expenditures** and the **investment rate** in general, and by **adult participation in learning**, the ability to **limit long-term unemployment**, and the use of **active labour market policies** in labour markets in particular. The last major aspect is institutional quality, assessed by the **ease of doing business, trust in institutions**, and **government effectiveness**.

## 1.2. Health aspects

The public health dimension of the dashboard aims to provide an overview of the pre-crisis features of the health conditions, contextual factors, and healthcare capacities that shape countries' readiness to face the COVID-19 emergency. A detailed overview of the variables with precise definitions is available in Table 3.

The vulnerability side looks at specific vulnerable groups who proved to be at higher risk of experiencing adverse events during the pandemic: these are **the elderly**, and individuals with a **longstanding illness** and certain **non-communicable diseases** (comorbidities). An indicator of **unmet health needs** is also included, as it points to problems with access to healthcare. Vulnerability might lie also in suboptimal conditions in the healthcare system, revealed through **healthcare associated infections**. The dashboard also presents some features that could have played a role in spreading the virus such as the **movement of people** within (**commuting**) and across (**air passengers**) the countries<sup>5</sup>.

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<sup>3</sup> The particular choice was the crops category of the material flows accounts, which is both a major food-related raw material category and exhibits a non-negligible import dependence for many EU countries.

<sup>4</sup> Indeed, they are highly correlated.

<sup>5</sup> Many potential indicators, of air, sea, rail and road transport, both of people and goods have been tested.

The resilience capacity side looks at the ability of the healthcare system to mobilise its resources and staff for facing the health emergency. On the one hand, it assesses the financial resources dedicated to healthcare and, to some degree, its performance. The first item is **public healthcare expenditure**, with the underlying assumption that a more generous healthcare expenditure should lead to a better readiness to face distress. The second item looks at **gross fixed capital formation in the health sector**, as investment in infrastructures, machinery and equipment creates new capacities and maintains the level and quality of existing ones. The dashboard goes more in detail about specific parts of expenditures: it provides an overview of the expenditure on **preventive care programmes** (epidemiological surveillance and risk and disease control, healthy condition monitoring, early disease detection, and disaster and emergency response) and **laboratory capacities**. It includes **low treatable mortality**, an indicator that also captures the actual performance of the health system.

The last part of the health side looks at the availability of resources, like medical professionals (practicing **doctors** and **nurses**) and hospital facilities (**hospital beds**). It includes two measures that indicate the available buffers in health resources: **low prevalence of respiratory diseases** and high seasonal flu **vaccination** rates for the elderly can both increase the available capacities.

### 1.3. Reading the dashboard

By its nature, the dashboard presents a multidimensional picture where different variables are placed next to each other, letting the reader assess country performance across a number of dimensions even within a specific topic. The main scope of the dashboard is not to rank countries, but rather to highlight strengths and areas for improvement, for further analysis. For this purpose, it is important to look at all of them in parallel.

For each variable, a scale of three colours indicates country performance, from dark blue (most resilient/least vulnerable) to light yellow (least resilient/most vulnerable), through light blue (medium levels). The colour scheme is relative, and shows the performance of EU countries in the latest available (statistical) year compared to the pooled values of all available data since 2007<sup>6</sup>. Hence, countries in the yellow range can still do well in absolute terms (and vice versa for the blue range).<sup>7</sup>

In particular, colours are assigned based on the distance from the mean of the underlying distribution in terms of standard deviations. The dashboard presented below refers to one standard deviation, but this value can be modified.

It is important to bear in mind the following aspects and limitations of such dashboards.

Unlike composite indicator frameworks, they do not have a hierarchic structure, nor assign importance weights to the different indicators. Extreme values in a single indicator may point to vulnerabilities or resilience bottlenecks, despite good performance in other aspects.

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<sup>6</sup> Data availability across countries may vary from year to year. In the current exercise, all values have been taken into account. It means that countries with longer available data series will get a somewhat bigger importance in the distribution.

Moreover, if, for example, there is no data for a variable in 2007, the 2007-2019 distribution automatically refers to the latest available values. The 2007-2019 average thus becomes identical to the 2008-2019 average.

<sup>7</sup> For example, the cutoff level for strong performance in poverty is around 16.4%, which does not necessarily indicate a strong absolute performance.

Moreover, one needs to be careful when relating the dashboard to the observed performance of countries, as both the total health toll (like the number of cases or fatalities) and the social and economic impacts are still only unfolding. The proposed indicators refer to vulnerability and resilience conditional on a comparable shock across countries. Though one may argue that the COVID-19 shock was common for all EU countries, there were important cross-country differences in its starting size and intensity. Most importantly, countries can differ in the latent, undiscovered diffusion of the virus they had before the first official infections were identified. Random factors like major international sports events could have further contributed to a different starting situation.

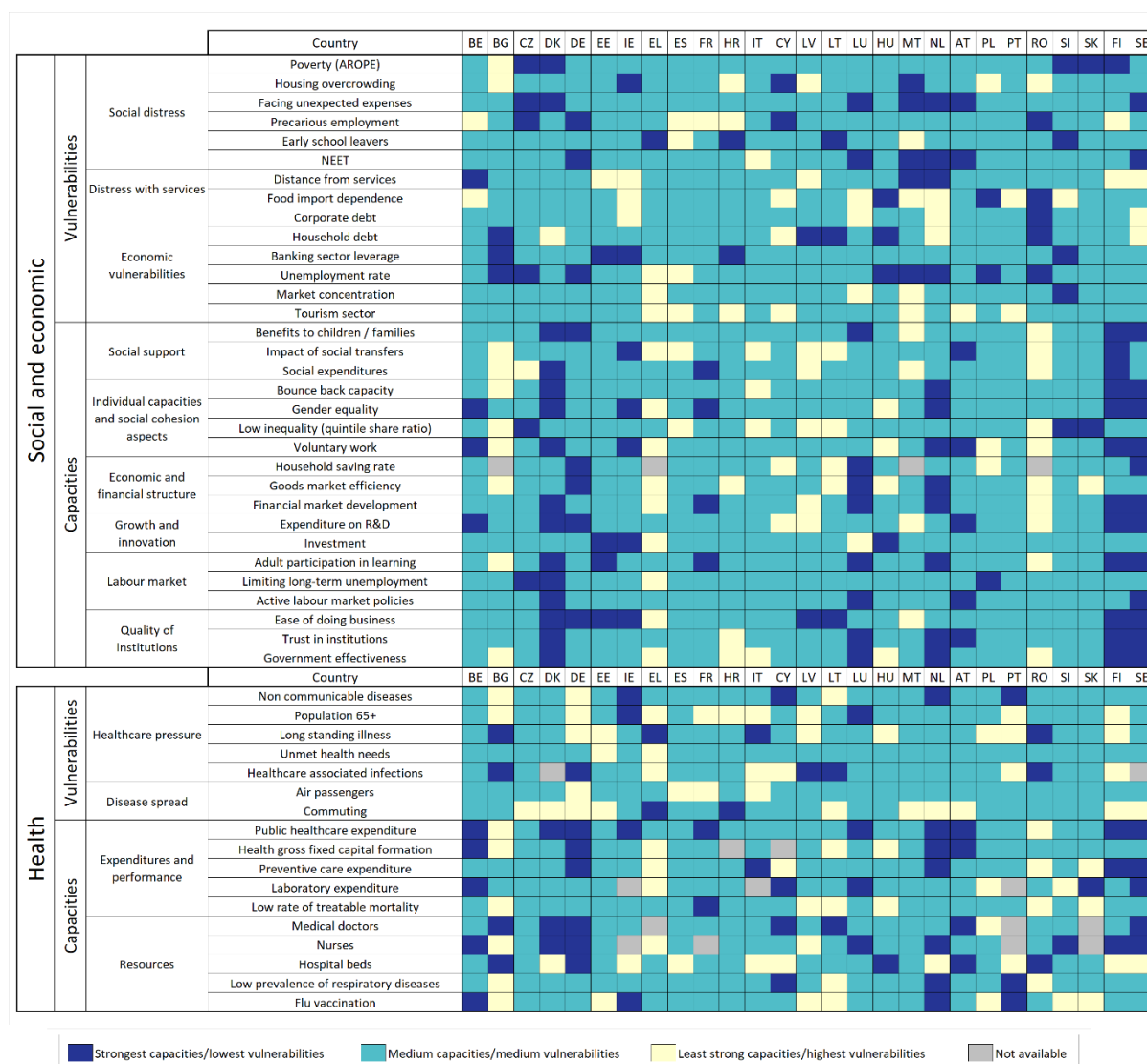
## **2. THE DASHBOARD**

Table 1 presents the dashboard related to social, economic, and health aspects. Countries are reported in the Eurostat protocol order (alphabetic order of country names in their own language). Tables 4 and 5 in Annex 2 report the full correlation structure of the underlying raw data (for the latest available statistical year).

The dashboard allows getting a sense of the patterns of relative vulnerabilities and resilience capacities, as well as common patterns, in Member States. For instance, in the health area, population ageing and rising travel (in the pre-crisis period) are common vulnerabilities.

**Table 1: Prototype dashboard on social, economic, and health aspects related to the COVID-19 crisis**

Note: The dashboard includes a set of indicators important to grasp the level of vulnerability and resilience capacities within a country, relative to others. Data typically refers to 2018 and 2019 (see also Tables 2 and 3 in Annex 1). The colours indicate the distance from the mean of all the available values for EU countries in the 2007-2019 period. Dark blue indicates a value that is at least one standard deviation better, while yellow indicates a value that is at least one standard deviation worse than the mean.



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## ANNEX 1: INFORMATION ON THE INDICATORS

**Table 2: Variables on social and economic aspects**

Note: The vulnerability indicators are such that the higher the more vulnerable. The resilience capacity indicators are such that the higher the more resilient.

Variable	Motivation	Full definition	Source	Year
<b>VULNERABILITIES</b>				
<i>Social distress</i>				
Poverty (AROPE)	People at risk of poverty and social exclusion are more likely to be strongly hit by health and economic shocks, and have typically less resources to cope.	Share of the population who are at risk of poverty after social transfers, severely materially deprived or living in households with very low work intensity.	Eurostat series sdg_01_10	2019, 2018 (BE, CY, DE, ES, FR, IE, IT, LT, LU, MT, PT, SK)
Housing overcrowding	People who are constrained to live in an overcrowded household are more likely to experience distress during the lockdown period.	Share of the population living in an overcrowded household. A person is considered as living in an overcrowded household if the household does not have a minimum number of rooms equal to: a room for the household; a room per couple, a room for each single aged 18 or more, a room per pair of single of the same gender adolescent age, a room for each single person adolescent age not included in the previous category, a room per pair of children aged 12 or less.	Eurostat series ilc_lvho05a, based on EU-SILC. Total (by age, sex and poverty status).	2019, 2018 (BE, CY, DE, ES, FR, IE, IT, LT, LU, PT, SK)
Facing unexpected expenses	People who are not able to face unexpected expenses in normal times are more likely to be more exposed to serious financial distress during the lockdown period and the recovery phase.	Share of people in the total population who have responded that they cannot face unexpected financial expenses.	Eurostat series ilc_mdex04, based on EU-SILC. Total (by household type and poverty status).	2019, 2018 (ES, IE, IT, LU)
Precarious employment	Individuals with a very short-term contract could face a higher risk of losing their job and of having difficulties in finding a new one later on.	Share of employees with a short-term contract of up to 3 months. Age group 15-64, total.	Eurostat series lfsa_qoe_4ax1r2	2019
Early school leavers	Early school leavers may lack skills, qualifications and competences useful to be successfully employable and actively participate in the life of their community. These lacks may make them more strongly hit by shocks, and also less able to respond to them in a resilient way.	Share of the population aged 18 to 24 with at most lower secondary education, who were not involved in any education or training during the four weeks preceding the survey.	Eurostat series sdg_04_10	2019
NEET	Such young people tend to lack the qualifications, skills and competences to enter successfully into the labour market. These lacks may also make them more vulnerable to shocks, and less able to respond/adapt in a resilient way (e.g. finding or changing a job).	Young people Neither in Employment nor in Education and Training (% of the population aged 15 to 29).	Eurostat series sdg_08_20	2019

Variable	Motivation	Full definition	Source	Year
<i>Distress with services</i>				
Distance from services	Higher distance from services may make it more difficult to successfully tackle the lockdown period.	Average road distance (in kilometres) per person to the nearest generic local facility, serving ideally 5 to 10 thousand people within 5 kilometres range. Schools, small health facilities, childcare services, sports facilities, small markets are examples of local facilities.	LUISA Cohesion Report (Reference year 2011) <a href="https://doi.org/10.1016/j.scs.2018.11.047">https://doi.org/10.1016/j.scs.2018.11.047</a>	2011
Food import dependence	The higher the food dependency, the riskier the supply security of food. This might cause fear and distress among the population.	Food dependency is the share of imports (both EU and non-EU) over total material input (the sum of exports and domestic material consumption). It refers to crops, an important category with a non-negligible import dependence at the EU level.	JRC elaboration, Eurostat series env_ac_mfa, crops (MF11)	2018
<i>Economic vulnerabilities</i>				
Corporate debt	Corporate debt is a source of vulnerability in case of decreased economic activity and sales revenues.	Total financial liabilities of non-financial corporations. Consolidated, as % of GDP.	Eurostat series nasa_10_f_bs	2019, 2018 (AT, BG, CY, CZ, DK, EE, FR, HR, IE, IT, LT, LU, LV, MT, NL)
Household debt	Financial disturbance like a job loss (even temporary) would hit harder heavily indebted households, who have higher debt service obligations.	Stock of liabilities (debt securities and loans) held by households and Non-Profit institutions serving households. Consolidated, as % of GDP.	Eurostat series tipspd22	2019, 2018 (AT, BG, CY, CZ, DK, EE, FR, HR, IE, IT, LT, LU, LV, MT, NL)
Banking sector leverage	Poorly capitalized financial institutions are more exposed to shocks and they may suffer more in case of a worsening of their portfolio performance.	Consolidated banking leverage, domestic and foreign entities (Total assets / Total equity) , in %.	ECB CBD2. W0.67._Z._Z.A.A.I34 00	2019
Unemployment rate	High level of unemployment indicates a weak pre-crisis economic situation, which makes a country more vulnerable to an economic shock. The unemployed also represent a vulnerable group.	The number of unemployed persons as a percentage of the labour force, based on the ILO definition. Age group 15-74.	Eurostat series tps0203	2019
Market concentration	Sectoral shocks have higher country-level impacts in a concentrated economy.	Sectoral concentration of gross value added (GVA), two digit sectors. GVA in current prices, million of euros. The concentration is measured by the Herfindahl index of the sectoral shares from GVA.	JRC elaboration based on Eurostat series nama_10_a64	2018, 2019 (CZ, FI, MT, SK), 2017 (BE, CY, DE, EL, ES, FR, HR, IE, IT, LT, LU, LV, PL, PT, SE)

<b>Variable</b>	<b>Motivation</b>	<b>Full definition</b>	<b>Source</b>	<b>Year</b>
Tourism sector	Tourism oriented activities are particularly vulnerable to a drop in demand due to the limited movement of people, in relation to the COVID-19 emergency.	Share of sector I (accommodation and food service activities) from total gross value added.	Eurostat series:nama_10_a64 code I and total	2018, 2019 (CZ, DK, FI, FR, IT, MT, SK), 2017 (EL, HR)
<b>CAPACITIES</b>				
<i>Social support</i>				
Benefits to children / families	The general availability of targeted benefits dedicated to children and families indicates better support to families facing difficulties.	Social protection benefits to children and families as % of GDP.	Eurostat series spr_exp_ffa	2018, 2017 (AT, CY, DE, EE, EL, ES, FI, FR, IE, LU, MT, NL, PL, RO, SE, SI, SK)
Impact of social transfers	A larger impact of social transfers on poverty shows the ability of the welfare system to insulate people from poverty, which is expected to work also under crisis.	Relative reduction in the share of people at risk of poverty rate due to social transfers (excluding pensions).	Eurostat series tespm050, total.	2019, 2018 (BE, CY, DE, ES, FR, IE, IT, LT, LU, MT, PT, SK)
Social expenditures	High social expenditures indicate that the government is investing in measures that can foster promotion and protection.	Government social expenditures (excluding pensions) as % of GDP.	Eurostat series gov_10a_exp, general government.	2018
<i>Individual capacities and social cohesion aspects</i>				
Bounce back capacity	The ability of an individual to bounce back fast from a distressful experience is a major component of resilience.	Share of survey respondents who agree or strongly agree that they can return to normal fast when things go wrong in their life.	Special Eurobarometer 471 QA1_15	2017
Gender equality	A society that gives men and women more equal opportunities empowers all people equally, and mobilises their full potential to face distress.	Composite indicator that measures the complex concept of gender equality in several domains: work, money, knowledge, power, time, and health.	European Institute for Gender Equality	Index of 2019, using reference year 2017
Low inequality (quintile share ratio)	Less marked differences between the poorest and the richest can increase social cohesion and societal resilience.	Inequality is the ratio of total income received by the 20% of the population with the highest income (top quintile) to that received by the 20% of the population with the lowest income (bottom quintile). Income refers to household equivalised disposable income.	Eurostat series sdg_10_41 negative (its)	2019, 2018 (BE, CY, DE, ES, FR, IE, IT, LT, LU, PT, SK)

Variable	Motivation	Full definition	Source	Year
Voluntary work	Engagement in voluntary work is often associated with self-realization and shared values. It creates social capital and it is also related to trust in people. These are all ingredients of individual and societal resilience. Volunteer activities were also important for softening the impact of the lockdown on people.	Share of respondents (aged 18 and above) involved in voluntary work. Voluntary work includes community and social services (Q29a); educational, cultural, sports, or professional associations (Q29b), social movements (Q29c), and other voluntary organizations (Q29e). Trade unions and political parties (Q29d) are not included.	European Quality of Life Survey (EQLS) question Q29a, b, c, and e	2016
<i>Economic and financial structure</i>				
Household saving rate	Savings represent the main short-run buffer households may use to absorb economic and financial problems and to smooth the effects of a potential job loss.	The gross saving rate of households (including Non-Profit Institutions Serving Households) is defined as gross saving divided by gross disposable income, with the latter being adjusted for the change in the net equity of households in pension funds reserves. Gross saving is the part of the gross disposable income which is not spent as final consumption expenditure.	Eurostat series tec00131	2018, 2019 (FI, IT, PT, SE, SK), N.A. (BG, EL, MT, RO)
Goods market efficiency	Countries with high goods market efficiency are characterised by strong competition and high incentives to invest and create new businesses. It facilitates the ability to recover and renew after financial and economic distress.	Pillar 7 Product market of the World Economic Forum. Composite indicator based on expert opinion average scores (like the complexity of tariffs, prevalence of non-tariff barriers...), combined with trade tariffs.	World Economic Forum, Global Competitiveness Index 4.0	Index of 2019
Financial market development	High development of financial markets helps to absorb and adapt to financial and economic shocks in the short term. In the long term, it can provide resources to boost recovery, adaptation, restructuring and transformation.	Pillar 9 of the World Economic Forum. Composite indicator from expert opinion scores on financing of SMEs, venture capital availability, soundness of banks; and combined with domestic credit to private sector, market capitalization, volume of insurance premium, non-performing loans, credit gap and banks' regulatory capital ratio.	World Economic Forum, Global Competitiveness Index 4.0	Index of 2019
<i>Growth and innovation</i>				
Expenditure on R&D	Research and development represent the basis for swift responses to shocks, making countries more ready to change and bounce forward after a downturn.	Total expenditures on research and development (% of GDP).	Eurostat series sdg_09_10, all sectors	2018
Investment	Higher investment rates imply more capital for production. It increases the capacity to face economic shocks by having buffers, and being able to channel resources to new sectors during adaptation and transformation.	Gross fixed capital formation (% of GDP).	Eurostat series nama_10_gdp	2019
<i>Labour Market</i>				
Adult participation in learning	Reskilling and upskilling can help workers (and the self-employed) to make a smooth transition to other tasks or jobs. This makes adult learning a key capacity for recovery.	Share of survey respondents (in the age group of 25 to 64 years old) who stated that they received formal or non-formal education and training in the four weeks preceding the survey.	Eurostat series sdg_04_60	2019

<b>Variable</b>	<b>Motivation</b>	<b>Full definition</b>	<b>Source</b>	<b>Year</b>
Limiting long-term unemployment	A small number of long-term unemployed people indicates the ability of the labour market to provide people with jobs and to reallocate workers in response to long term structural changes. The long-term unemployed also represent a vulnerable social group.	Long-term unemployed is defined as the share of the economically active population aged 15 to 74 who has been unemployed for 12 months or more.	Eurostat series sdg_08_40 (one minus)	2019
Active labour market policies	Active labour market policies are very important in facilitating re-employment and reallocation during economic difficulties. By normalizing with the number of unemployed, the indicator is less distorted by the current economic situation.	Public expenditure on labour market programmes (categories 2-7) in million euro, per the unemployed (total).	DG EMPL series lmp_expsumm, and Eurostat series une_rt_a	2018, 2017 (EL, FR)
<i>Quality of Institutions</i>				
Ease of doing business	The more regulation is business friendly, the faster and the easier an economy can adapt to and recover from financial and economic distress.	It measures business regulation, the protection of property rights, and their effect on businesses.	World Bank	Index of 2020, using reference year 2019
Trust in institutions	Trust in institutions plays a crucial role in making citizens accept hard measures needed in case of distress. It is also necessary for institutions to be able to play their role in responding to the crisis and boost social and individual resilience.	Simple average of the share of people who tend to trust the national legal system, the national government, and the national parliament.	Eurobarometer, various issues. The last one used is 92.3, questions QA6a.7,QA6a.12,QA6a.13	2019
Government effectiveness	Government effectiveness is needed to design and implement new and sound policies to manage all phases of the crisis.	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	World Bank, Worldwide Governance Indicators, variable 'gee, estimate'	2018

**Table 3: Variables on health aspects**

Note: The vulnerability indicators are such that the higher the more vulnerable. The resilience capacity indicators are such that the higher the more resilient

Variable	Motivation	Full definition	Source	Year
<b>VULNERABILITIES</b>				
<i>Healthcare pressure</i>				
Non communicable diseases	High morbidity due to cardiovascular diseases, diabetes mellitus, and chronic respiratory diseases is expected to lead to worse prognosis and higher mortality due to COVID-19.	Hospital discharges for cardiovascular diseases, diabetes mellitus, and chronic respiratory diseases, by the principal diagnosis, i.e. the main condition diagnosed at the end of the hospitalisation. Rate per 100,000 inhabitants.	Eurostat series hlth_co_disch2t, causes I, E10–E14, and J30–J98. Some subcomponents are missing for EE.	2018, 2017 (DE, MT), 2016 (DK, LU), 2015 (PT), 2014 (EL)
Population 65+	The elderly population has shown to be particularly vulnerable to COVID-19, with a much higher mortality rate than other segments of the population.	Population aged 65+ as % of total population.	Eurostat series demo_pjangroup	2019
Long standing illness	The population with comorbidities is particularly vulnerable because they can develop more severe health consequences and face higher mortality risk due to COVID-19.	Share of the population aged 16 and over who report having long-standing illness or health problems.	Eurostat series hlth_silc_05	2019, 2018 (BE, CY, DE, ES, FR, IE, IT, LT, LU, PT, SK)
Unmet health needs	A high share of people who feel not to be well-supported by the healthcare system indicates problems with access to healthcare. It can lead to worse health outcomes for this group, and can also exacerbate the pandemic.	Share of the population aged 16 and over who report self-assessed unmet needs for medical care due to one of the following reasons: ‘Financial reasons’, ‘Waiting list’ and ‘Too far to travel’.	Eurostat series sdg_03_60; from EU SILC	2019, 2018 (BE, CY, DE, EE, ES, FR, HR, IE, IT, LT, LU, PT, SK)
Healthcare associated infections	This indicator points to healthcare practices in terms of hygiene. Several studies suggest that simple infection-control procedures can help prevent healthcare related infections. Effective hygiene practices and the ability to isolate COVID-19 patients and dedicated departments have proven to be key in the current emergency.	Share of patients with health care-associated infections, which are defined as infections occurring with a patient during the process of care in a hospital or other health care facility, which was not present or incubating at the time of admission.	Suetens et al. (2018), Table 2, column 3.	2017 N.A. (DK, SE)
<i>Disease spread</i>				
Air passengers	Intensive movement of people might increase the cross-border and –region transmission of the virus.	The total number of passengers on board of the aircraft upon landing at the reporting airport or at taking off from the reporting airport, aggregated at the country level.	Eurostat series avia_paoa, all reporting airports.	2019
Commuting	Daily commuting might increase the local transmission of the virus.	Number of people commuting for work in the same or other region normalized by population size (age group 15-64).	Eurostat series lfst_r_lfe2ecomm	2019

Variable	Motivation	Full definition	Source	Year
<b>CAPACITIES</b>				
<i>Expenditures and performance</i>				
Public healthcare expenditure	This variable proxies the overall size of the public healthcare system. Higher expenditure is expected to yield better results.	Government healthcare expenditure quantifies the economic resources dedicated to health functions, excluding capital investment. It is expressed in millions of euro per inhabitant.	Eurostat series gov_10a_exp, item GF07 (Health), total government (S13), divided by total population (demo_pjan).	2018
Health gross fixed capital formation	Investment in the healthcare sector creates new capacities and maintains the level and quality of existing ones.	Gross fixed capital formation of human health and social work activities, as % of GDP.	Eurostat series nama_10_a64_p5, category Q, total fixed assets, gross fixed capital formation; divided by GDP (nama_10_gdp). All in current prices.	2018, 2019 (CZ, FI, MT, SK), 2017 (EL, ES, IT, LT, NL, PT), 2016 (DK), N.A. (CY, HR)
Preventive care expenditure	Specific expenditure on preventive care and emergency response should improve the capacity to respond to the pandemic outbreak.	Healthcare expenditure on preventive care, which includes, for example, epidemiological surveillance and risk and disease control programmes, healthy condition monitoring programmes, early disease detection programmes, and preparing for disaster and emergency response programmes. It is expressed in PPS per inhabitant.	Eurostat series hlth_sha11_hc, category HC6	2018, 2017 (BG, CZ, DE, EE, ES, FI, LV, MT, PT, SI, SK), 2016 (PL)
Laboratory expenditure	Higher expenditure on laboratory services could point to a better capacity to track the contagion in the population.	Total healthcare expenditure on laboratory services and capacities, expressed in terms of PPS per inhabitant.	Eurostat series hlth_sha11_hc, category HC41	2018, 2017 (BG, CZ, DE, EE, ES, FI, LV, MT, SI, SK), 2016 (PL), N.A. (IE, IT, PT)
Low rate of treatable mortality	Lower treatable mortality indicates a better capacity of the healthcare system to ensure optimal life expectancy.	Causes of death that can be mainly avoided through timely and effective health care interventions, including secondary prevention and treatment (i.e. after the onset of diseases, to reduce case-fatality). Treatable mortality is expressed as standardised death rate per 100,000 persons, under 75. <a href="https://ec.europa.eu/eurostat/cache/metadata/Annexes/hlth_cdeath_esms_an3.pdf">https://ec.europa.eu/eurostat/cache/metadata/Annexes/hlth_cdeath_esms_an3.pdf</a>	Eurostat series hlth_cd_apr (its opposite)	2017, 2016 (FR)
<i>Resources</i>				
Medical doctors	A higher number of doctors enables the healthcare system to cope with an outbreak better, especially considering that a high share of personnel is strongly exposed to contagion and can become sick.	The total number of practising medical doctors per 100,000 inhabitants.	Eurostat series hlth_rs_prs1, category OC221, practising.	2018, 2017 (LU, PL, SE), 2014 (FI), N.A. (EL, PT, SK)

Variable	Motivation	Full definition	Source	Year
Nurses	A higher number of nurses enables the healthcare system to cope with an outbreak better, especially considering that a high share of personnel is strongly exposed to contagion and can become sick.	The total number of practising nurses per 100,000 inhabitants.	Eurostat series hlth_rs_prsns, category OC2221_3221 (nurses), practising.	2018, 2017 (BE, LU, DE, PL), 2014 (FI), N.A. (FR, IE, PT, SK)
Hospital beds	A higher number of beds indicates a healthcare system that can respond more properly to the new needs dictated by the pandemic.	Total number of available beds in hospitals, per 100,000 inhabitants. These include curative care (acute care) beds, rehabilitative care beds, long-term care beds (excluding psychiatric care beds), and other hospital beds.	Eurostat series hlth_rs_bds, category HBEDT	2018, 2017 (DE)
Low prevalence of respiratory diseases	Low saturation of healthcare services due to seasonal influenza and other types of respiratory issues leaves a higher capacity of the health system to tackle extraordinary situations like a respiratory type pandemic.	Number of hospital discharges for the entire class of respiratory diseases (as principal diagnosis), per 100,000 inhabitants.	Eurostat series hlth_co_disch2t, causes J (its opposite)	2018, 2017 (DE, MT), 2016 (DK, LU), 2015 (PT), 2014 (EL)
Flu vaccination	A higher flu vaccination rate of the elderly lowers the pressure on the healthcare system, as the vaccinated would get sick less probably. As a result, the healthcare system is expected to be more capable to deal with the emergency of a pandemic outbreak.	Share of population aged 65 and over with vaccination against influenza.	Eurostat series hlth_ps_immu	2018, 2019 (ES, HR, IT, LV), 2017 (DE, PT), 2014 (AT, BG, CY, PL)



## ANNEX 2: CORRELATION ANALYSIS

**Table 4: Correlation matrix for the indicators on social and economic aspects.**

Note: Correlation is computed using the raw data in the latest available year. In the dashboard, scores are applied to the negative of vulnerability indicators, as their higher value indicates higher vulnerability and hence a worse situation.

	Poverty (AROPE)	Housing overcrowding	Facing unexpected expenses	Precarious employment	Early school leavers	NEET	Distance from services	Food import dependence	Corporate debt	Household debt	Banking sector leverage	Unemployment rate	Market concentration	Tourism sector	Benefits to children / families	Impact of social transfers	Social expenditures	Bounce back capacity	Gender equality	Low inequality (quintile share ratio)	Voluntary work	Household saving rate	Goods market efficiency	Financial market development	Expenditure on R&D	Investment	Adult participation in learning	Limiting long-term unemployment	Active labour market policies	Ease of doing business	Trust in institutions	Government effectiveness
Poverty (AROPE)	1.00	0.51	0.69	-0.17	0.30	0.61	0.22	-0.17	-0.14	-0.35	-0.29	0.44	0.21	0.30	-0.42	-0.78	-0.52	-0.47	-0.40	-0.89	-0.55	-0.42	-0.41	-0.57	-0.60	-0.26	-0.46	-0.48	-0.41	-0.30	-0.48	-0.60
Housing overcrowding	0.51	1.00	0.52	-0.02	-0.03	0.53	0.23	-0.61	-0.56	-0.59	-0.48	0.02	-0.24	-0.09	-0.14	-0.56	-0.50	-0.50	-0.59	-0.49	-0.61	-0.33	-0.65	-0.62	-0.45	-0.23	-0.54	-0.20	-0.41	-0.16	-0.62	-0.72
Facing unexpected expenses	0.69	0.52	1.00	0.05	-0.15	0.60	0.37	-0.28	-0.31	-0.39	-0.44	0.42	-0.14	0.35	-0.45	-0.53	-0.43	-0.40	-0.54	-0.50	-0.52	-0.65	-0.60	-0.74	-0.60	-0.09	-0.57	-0.45	-0.56	-0.10	-0.71	-0.58
Precarious employment	-0.17	-0.02	0.05	1.00	-0.20	0.15	0.11	-0.18	0.02	0.03	0.11	0.29	-0.16	0.12	0.17	0.15	0.40	0.15	0.35	0.22	0.19	0.02	0.01	0.33	0.22	0.02	0.23	-0.09	0.02	0.11	-0.17	0.10
Early school leavers	0.30	-0.03	-0.15	-0.20	1.00	0.26	-0.36	0.01	-0.14	-0.04	-0.01	0.01	0.08	0.14	-0.29	-0.38	-0.21	-0.25	-0.01	-0.36	-0.26	0.02	-0.01	0.05	-0.21	-0.10	-0.13	0.01	-0.13	-0.25	-0.06	-0.27
NEET	0.61	0.53	0.60	0.15	0.26	1.00	-0.03	-0.46	-0.38	-0.36	-0.35	0.51	-0.13	0.33	-0.44	-0.50	-0.32	-0.65	-0.48	-0.39	-0.52	-0.45	-0.61	-0.56	-0.47	-0.19	-0.59	-0.62	-0.46	-0.36	-0.69	-0.78
Distance from services	0.22	0.23	0.37	0.11	-0.36	-0.03	1.00	-0.27	0.05	-0.20	-0.15	0.10	-0.14	-0.18	0.14	0.12	-0.11	0.20	0.05	-0.18	0.03	-0.20	-0.10	-0.14	-0.02	0.35	0.30	0.03	-0.06	0.46	0.03	0.11
Food import dependence	-0.17	-0.61	-0.28	-0.18	0.01	-0.46	-0.27	1.00	0.62	0.36	0.10	-0.10	0.56	0.19	-0.20	0.17	0.01	0.21	0.30	0.22	0.39	0.25	0.45	0.24	-0.05	0.05	0.19	0.14	0.18	-0.25	0.37	0.41
Corporate debt	-0.14	-0.56	-0.31	0.02	-0.14	-0.38	0.05	0.62	1.00	0.49	0.31	-0.06	0.47	-0.16	0.19	0.41	0.31	0.53	0.59	0.14	0.60	0.45	0.53	0.52	0.16	0.41	0.51	0.22	0.58	0.07	0.59	0.58
Household debt	-0.35	-0.59	-0.39	0.03	-0.04	-0.36	-0.20	0.36	0.49	1.00	0.71	0.13	0.21	0.13	0.31	0.40	0.71	0.74	0.62	0.39	0.70	0.28	0.67	0.64	0.49	-0.12	0.63	0.06	0.65	0.24	0.64	0.66
Banking sector leverage	-0.29	-0.48	-0.44	0.11	-0.01	-0.35	-0.15	0.10	0.31	0.71	1.00	0.15	0.20	-0.15	0.44	0.30	0.71	0.66	0.65	0.16	0.63	0.27	0.66	0.75	0.59	-0.19	0.66	0.08	0.59	0.29	0.63	0.66
Unemployment rate	0.44	0.02	0.42	0.29	0.01	0.51	0.10	-0.10	-0.06	0.13	0.15	1.00	0.30	0.58	-0.22	-0.31	0.07	-0.07	-0.01	-0.20	-0.15	-0.23	-0.15	-0.14	-0.13	-0.39	-0.04	-0.90	-0.16	-0.19	-0.24	-0.16
Market concentration	0.21	-0.24	-0.14	-0.16	0.08	-0.13	-0.14	0.56	0.47	0.21	0.20	0.30	1.00	0.24	-0.02	-0.15	-0.06	0.03	0.06	-0.14	0.02	0.25	0.13	0.12	-0.30	-0.31	0.13	-0.27	0.22	-0.54	0.26	0.14
Tourism sector	0.30	-0.09	0.35	0.12	0.14	0.33	-0.18	0.19	-0.16	0.13	-0.15	0.58	0.24	1.00	-0.43	-0.30	-0.22	-0.27	-0.26	-0.07	-0.19	-0.29	-0.21	-0.29	-0.27	-0.41	-0.27	-0.53	-0.33	-0.43	-0.33	-0.28
Benefits to children / families	-0.42	-0.14	-0.45	0.17	-0.29	-0.44	0.14	-0.20	0.19	0.31	0.44	-0.22	-0.02	-0.43	1.00	0.50	0.69	0.55	0.45	0.21	0.52	0.52	0.51	0.58	0.69	0.01	0.54	0.35	0.71	0.44	0.55	0.57
Impact of social transfers	-0.78	-0.56	-0.53	0.15	-0.38	-0.50	0.12	0.17	0.41	0.40	0.30	-0.31	-0.15	-0.30	0.50	1.00	0.57	0.59	0.57	0.72	0.71	0.32	0.51	0.56	0.64	0.49	0.59	0.42	0.55	0.41	0.59	0.67
Social expenditures	-0.52	-0.50	-0.43	0.40	-0.21	-0.32	-0.11	0.01	0.31	0.71	0.71	0.07	-0.06	-0.22	0.69	0.57	1.00	0.72	0.71	0.45	0.74	0.44	0.68	0.78	0.77	0.02	0.65	0.13	0.74	0.48	0.60	0.72
Bounce back capacity	-0.47	-0.50	-0.40	0.15	-0.25	-0.65	0.20	0.21	0.53	0.74	0.66	-0.07	0.03	-0.27	0.55	0.59	0.72	1.00	0.81	0.37	0.79	0.47	0.75	0.75	0.64	0.18	0.83	0.32	0.71	0.54	0.73	0.83
Gender equality	-0.40	-0.59	-0.54	0.35	-0.01	-0.48	0.05	0.30	0.59	0.62	0.65	-0.01	0.06	-0.26	0.45	0.57	0.71	0.81	1.00	0.26	0.84	0.56	0.81	0.87	0.69	0.25	0.83	0.26	0.66	0.47	0.63	0.79
Low inequality (quintile share ratio)	-0.89	-0.49	-0.50	0.22	-0.36	-0.39	-0.18	0.22	0.14	0.39	0.16	-0.20	-0.14	-0.07	0.21	0.72	0.45	0.37	0.26	1.00	0.46	0.28	0.23	0.37	0.46	0.24	0.34	0.20	0.26	0.11	0.35	0.42
Voluntary work	-0.55	-0.61	-0.52	0.19	-0.26	-0.52	0.03	0.39	0.60	0.70	0.63	-0.15	0.02	-0.19	0.52	0.71	0.74	0.79	0.84	0.46	1.00	0.60	0.84	0.79	0.76	0.30	0.76	0.35	0.73	0.45	0.72	0.82
Household saving rate	-0.42	-0.33	-0.65	0.02	0.02	-0.45	-0.20	0.25	0.45	0.28	0.27	-0.23	0.25	-0.29	0.52	0.32	0.44	0.47	0.56	0.28	0.60	1.00	0.56	0.63	0.58	0.08	0.49	0.24	0.55	-0.09	0.53	0.51
Goods market efficiency	-0.41	-0.65	-0.60	0.01	-0.01	-0.61	-0.10	0.45	0.53	0.67	0.66	-0.15	0.13	-0.21	0.51	0.51	0.68	0.75	0.81	0.23	0.84	0.56	1.00	0.81	0.68	0.06	0.74	0.34	0.65	0.40	0.78	0.84
Financial market development	-0.57	-0.62	-0.74	0.33	0.05	-0.56	-0.14	0.24	0.52	0.64	0.75	-0.14	0.12	-0.29	0.58	0.56	0.78	0.75	0.87	0.37	0.79	0.63	0.81	1.00	0.72	0.14	0.81	0.38	0.73	0.36	0.74	0.82
Expenditure on R&D	-0.60	-0.45	-0.60	0.22	-0.21	-0.47	-0.02	0.05	0.16	0.49	0.59	-0.13	-0.30	-0.27	0.69	0.64	0.77	0.64	0.69	0.46	0.76	0.58	0.68	0.72	1.00	0.16	0.65	0.24	0.61	0.54	0.62	0.68
Investment	-0.26	-0.23	-0.09	0.02	-0.10	-0.19	0.35	0.05	0.41	-0.12	-0.19	-0.39	-0.31	-0.41	0.01	0.49	0.02	0.18	0.25	0.24	0.30	0.08	0.06	0.14	0.16	1.00	0.20	0.45	0.15	0.44	0.20	0.22
Adult participation in learning	-0.46	-0.54	-0.57	0.23	-0.13	-0.59	0.30	0.19	0.51	0.63	0.66	-0.04	0.13	-0.27	0.54	0.59	0.65	0.83	0.83	0.34	0.76	0.49	0.74	0.81	0.65	0.20	1.00	0.32	0.67	0.50	0.81	0.83
Limiting long-term unemployment	-0.48	-0.20	-0.45	-0.09	0.01	-0.62	0.03	0.14	0.22	0.06	0.08	-0.90	-0.27	-0.53	0.35	0.42	0.13	0.32	0.26	0.20	0.35	0.24	0.34	0.38	0.24	0.45	0.32	1.00	0.32	0.40	0.40	0.39
Active labour market policies	-0.41	-0.41	-0.56	0.02	-0.13	-0.46	-0.06	0.18	0.58	0.65	0.59	-0.16	0.22	-0.33	0.71	0.55	0.74	0.71	0.66	0.26	0.73	0.55	0.65	0.73	0.61	0.15	0.67	0.32	1.00	0.36	0.77	0.68
Ease of doing business	-0.30	-0.16	-0.10	0.11	-0.25	-0.36	0.46	-0.25	0.07	0.24	0.29	-0.19	-0.54	-0.43	0.44	0.41	0.48	0.54	0.47	0.11	0.45	-0.09	0.40	0.36	0.54	0.44	0.50	0.40	0.36	1.00	0.32	0.55
Trust in institutions	-0.48	-0.62	-0.71	-0.17	-0.06	-0.69	0.03	0.37	0.59	0.64	0.63	-0.24	0.26	-0.33	0.55	0.59	0.60	0.73	0.63	0.35	0.72	0.53	0.78	0.74	0.62	0.20	0.81	0.40	0.77	0.32	1.00	0.81
Government effectiveness	-0.60	-0.72	-0.58	0.10	-0.27	-0.78	0.11	0.41	0.58	0.66	0.66	-0.16	0.14	-0.28	0.57	0.67	0.72	0.83	0.79	0.42	0.82	0.51	0.84	0.82	0.68	0.22	0.83	0.39	0.68	0.55	0.81	1.00

**Table 5: Correlation matrix for the indicators on health aspects.**

Note: Correlation is computed using the raw data in the latest available year. In the dashboard, scores are applied to the negative of vulnerability indicators, as their higher value indicates higher vulnerability and hence a worse situation.

	Non communicable diseases	Population 65+	Long standing illness	Unmet health needs	Healthcare associated infections	Air passengers	Commuting	Public healthcare expenditure	Health gross fixed capital formation	Preventive care expenditure	Laboratory expenditure	Low rate of treatable mortality	Medical doctors	Nurses	Hospital beds	Low prevalence of respiratory diseases	Flu vaccination
Non communicable diseases	1.00	0.23	-0.05	-0.01	-0.66	-0.07	0.08	-0.32	-0.23	-0.19	-0.45	-0.70	0.24	-0.18	0.83	-0.86	-0.69
Population 65+	0.23	1.00	0.16	0.17	0.21	0.32	-0.10	-0.23	0.09	0.14	-0.57	-0.02	0.27	-0.07	0.07	-0.08	0.04
Long standing illness	-0.05	0.16	1.00	0.15	-0.05	-0.01	0.19	-0.04	0.27	0.13	-0.06	0.03	0.01	0.27	0.07	0.27	-0.19
Unmet health needs	-0.01	0.17	0.15	1.00	0.05	-0.22	0.00	-0.32	-0.28	-0.24	-0.12	-0.25	-0.29	-0.27	-0.06	-0.07	-0.27
Healthcare associated infections	-0.66	0.21	-0.05	0.05	1.00	0.19	-0.14	0.03	0.03	-0.01	0.01	0.60	-0.20	-0.04	-0.64	0.52	0.59
Air passengers	-0.07	0.32	-0.01	-0.22	0.19	1.00	-0.01	0.17	0.32	0.36	-0.05	0.41	0.10	0.05	-0.04	0.17	0.37
Commuting	0.08	-0.10	0.19	0.00	-0.14	-0.01	1.00	0.27	0.38	0.29	0.00	0.13	0.26	0.32	-0.08	-0.16	-0.01
Public healthcare expenditure	-0.32	-0.23	-0.04	-0.32	0.03	0.17	0.27	1.00	0.60	0.77	0.38	0.68	0.13	0.74	-0.34	0.27	0.55
Health gross fixed capital formation	-0.23	0.09	0.27	-0.28	0.03	0.32	0.38	0.60	1.00	0.53	0.29	0.53	0.20	0.66	-0.08	0.31	0.42
Preventive care expenditure	-0.19	0.14	0.13	-0.24	-0.01	0.36	0.29	0.77	0.53	1.00	0.11	0.61	0.19	0.73	-0.31	0.25	0.45
Laboratory expenditure	-0.45	-0.57	-0.06	-0.12	0.01	-0.05	0.00	0.38	0.29	0.11	1.00	0.30	0.05	0.27	-0.33	0.44	0.27
Low rate of treatable mortality	-0.70	-0.02	0.03	-0.25	0.60	0.41	0.13	0.68	0.53	0.61	0.30	1.00	0.11	0.48	-0.61	0.62	0.75
Medical doctors	0.24	0.27	0.01	-0.29	-0.20	0.10	0.26	0.13	0.20	0.19	0.05	0.11	1.00	-0.06	0.03	-0.19	-0.02
Nurses	-0.18	-0.07	0.27	-0.27	-0.04	0.05	0.32	0.74	0.66	0.73	0.27	0.48	-0.06	1.00	-0.17	0.21	0.39
Hospital beds	0.83	0.07	0.07	-0.06	-0.64	-0.04	-0.08	-0.34	-0.08	-0.31	-0.33	-0.61	0.03	-0.17	1.00	-0.57	-0.67
Low prevalence of respiratory diseases	-0.86	-0.08	0.27	-0.07	0.52	0.17	-0.16	0.27	0.31	0.25	0.44	0.62	-0.19	0.21	-0.57	1.00	0.53
Flu vaccination	-0.69	0.04	-0.19	-0.27	0.59	0.37	-0.01	0.55	0.42	0.45	0.27	0.75	-0.02	0.39	-0.67	0.53	1.00