



D5.2 Final version of the guidelines on monitoring and measuring medical deserts

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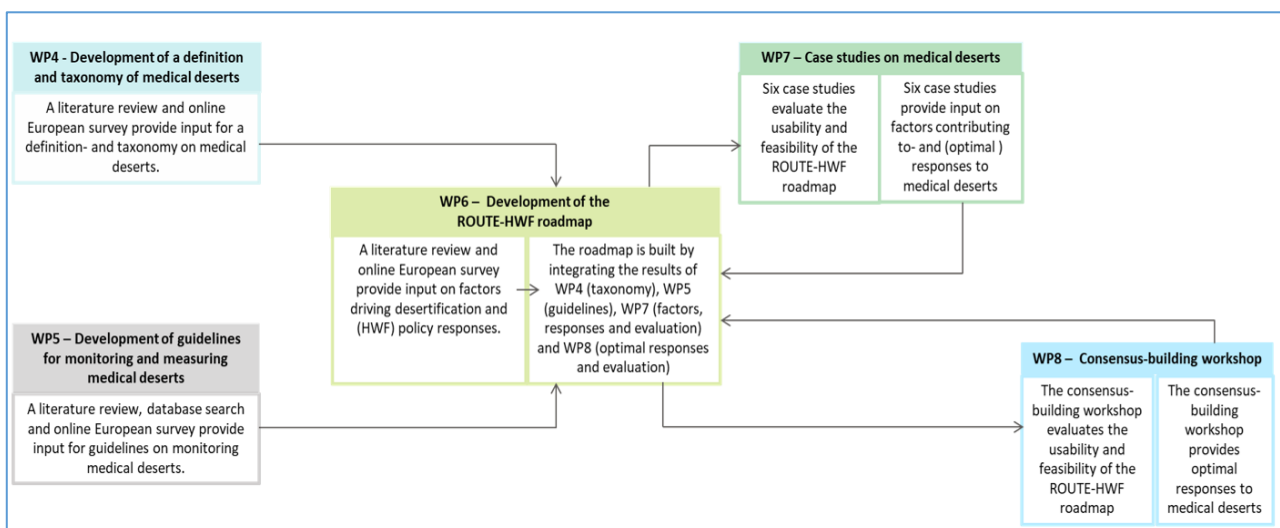
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1. Introduction

The aim of this Deliverable 5.3, which is the third deliverable of Work Package 5, is to provide the final version of guidelines on measuring and monitoring medical deserts at national and subnational levels. The guidelines are designed to help public authorities and health professionals to gain a better understanding of (1) the origin and development of medical deserts, (2) how to monitor them, and (3) how to investigate and evaluate the effects of health workforce (HWF) policy measures to mitigate or eliminate medical deserts which is now often lacking.

Together with the definition and taxonomy (as developed in Work Package 4), the measuring and monitoring guidelines will feed into the creation of the ‘Roadmap out of medical deserts’ that will be created in Work Package 6. The interplay between the definition and taxonomy, measuring and monitoring guidelines and the ROUTE-HWF roadmap is presented in Figure 1 below, along with the corresponding Work Packages (WPs) and methods of data collection and stakeholder engagement.

Figure 1. The interplay between the ROUTE Work Packages on the definition and taxonomy, measuring and monitoring guidelines, that feed into the ROUTE-HWF roadmap on medical deserts



This third and final deliverable of Work Package 5 will provide a third version of the monitoring and measuring guidelines based on six country case studies and the final event during which the guidelines will be presented to stakeholders and feedback received.

The measuring and monitoring guidelines are directly aligned with the third and final taxonomy of medical deserts (in parallel provided in Deliverable D4.3). The ROUTE-HWF roadmap will support EU Member States in a tailored manner, i.e., supporting them to design and implement specific policies related to specific types of medical deserts. It will provide a rationale for public authorities and health professionals at national and subnational levels to apply an optimal mix of HWF policies to their particular medical deserts – taking the context-sensitivity of these policies and medical deserts into account. The final goal is to mitigate the effects of medical deserts and dissolving these, and hence to improve access to healthcare as well as quality of healthcare for citizens living in these areas, now and in the future.

2. From the second to the third version of the ROUTE-HWF taxonomy

This third set of guidelines on measuring and monitoring medical deserts builds upon the first and second version of the ROUTE-HWF taxonomy of medical deserts (see [Deliverable 4.1](#) and [Deliverable 5.1](#)). We recall here that both versions of the taxonomy are based on four dimensions or elements that jointly drive the process of desertification. The four elements concern two factors that drive the demand for health services in medical desert regions:

1. Aging of the population
2. Poor economic resources of the population

And two factors that drive the supply of health services in medical desert regions:

3. Shortages of healthcare workers
4. Lower accessibility of health services.

These four elements were subsequently operationalized into four dichotomous 'Objects', each defining two exclusive and relative scores that regions within a country can obtain:

Ad 1: The proportion of inhabitants aged 65 and over living in the geographic area of interest is *higher* than this proportion of all inhabitants aged 65 and over in the country ('true/false');

Ad 2: The proportion of inhabitants below the poverty line living in the geographic area of interest is *higher* than this proportion of all inhabitants below the poverty line living in the country ('true/false');

Ad 3: The health professional-to-population ratio in the geographical area, is lower than this ratio in the country ('true/false');

Ad 4: The average travel time by public transport to the nearest public healthcare facility in the geographic area of interest is *longer* than the average travel time at the national level within the country ('true/false').

Combining the four Objects resulted into a set of 5 unique types of medical deserts, applying the principles (1) that each of the four Objects should be considered as dichotomous variables ('true'/'false'), (2) a taxonomy should focus on a limited number of unique combinations, that (3) include *at least three of the four* Objects. This way, the types of medical deserts in scope are characterized by at least one Object at the supply side, and one Object at the demand side of the regional healthcare system. This second version of the ROUTE-HWF taxonomy as depicted in figure 2 below:

Figure 2. Second version of the ROUTE-HWF taxonomy to define and classify 5 ‘main’ different types of medical deserts by four objects/dimensions (‘x’ in the cells indicate that the object is ‘true’ or applicable for the specific type of medical desert area/region)

	DEMAND FOR HEALTH SERVICES – POPULATION AND HEALTHCARE DEMAND OBJECTS		SUPPLY OF HEALTH SERVICES – AREA AND HEALTHCARE SUPPLY OBJECTS	
	Object 1: Aging of the population	Object 2: poor economic resources of the population	Object 3: Shortages of health workers	Object 4: limited accessibility and proximity of health services
<i>Type of medical desert</i>	<i>The proportion of inhabitants aged 65 and over living in this area, is <u>higher</u> than this proportion at the country level</i>	<i>The proportion of inhabitants below the poverty line living in this area, is <u>higher</u> than this proportion at the country level</i>	<i>The health professional-to-population ratio in this area, is <u>lower</u> than this ratio at the country level</i>	<i>The average travel time by public transport to the nearest public healthcare facility in this area is <u>longer</u> than the average travel time at the country level</i>
1	x	x	X	x
2	x	x	x	
3	x	x		x
4	x		x	x
5		x	x	x

The third and final version of the ROUTE-HWF taxonomy further restricts the previous selection of medical desert types from 5 to 4. As a further refinement and development, we argued that one essential (and therefore non-excludable) Object is the shortages of health workers. Shortages of health workers or professionals (that can be measured and monitored by health professional-to-population ratios in an area), was acknowledged as a necessary element for defining medical deserts as ‘underserved areas’ by the experts consulted in the six case studies (see D7.1) and the expert workshop (see D8.1) within the ROUTE-HWF project. Another argument is that the shortages of health workers show to be always present in the common definitions of medical deserts (see our literature reviews: Seils et al., 2023; Flinterman et al., 2023 and Bes et al., 2023). And additionally, our ROUTE-HWF results show that all solutions to mitigate these areas at least address policy measures to recruit and retain health professionals to and in underserved areas. Therefore, mitigating or managing the process of desertification implies structural investments in HWF staffing, to meet the specific healthcare needs of the underserved area or type of medical desert. Figure 3 below shows this third and final ROUTE-HWF taxonomy, defining and classifying the four ‘main’ different types of medical deserts that all include a shortages of health workers as an Object that applies.

Figure 3. The third and final version of the ROUTE-HWF taxonomy, defining and classifying four ‘main’ different types of medical deserts by four objects/dimensions (‘x’ in the cells indicate that the object is ‘true’ or applicable for the specific type of medical desert area/region)

	DEMAND FOR HEALTH SERVICES – POPULATION AND HEALTHCARE DEMAND OBJECTS		SUPPLY OF HEALTH SERVICES – AREA AND HEALTHCARE SUPPLY OBJECTS	
	Object 1: Aging of the population	Object 2: poor economic resources of the population	Object 3: Shortages of health workers	Object 4: limited accessibility and proximity of health services
<i>Type of medical desert</i>	<i>The proportion of inhabitants aged 65 and over living in this area, is <u>higher</u> than this proportion at the country level</i>	<i>The proportion of inhabitants below the poverty line living in this area, is <u>higher</u> than this proportion at the country level</i>	<i>The health professional-to-population ratio in this area, is <u>lower</u> than this ratio at the country level</i>	<i>The average travel time by public transport to the nearest public healthcare facility in this area is <u>longer</u> than the average travel time at the country level</i>
↓				
1	x	x	x	x
2	x	x	x	
3	x		x	x
4		x	x	x

3. Guidelines: How can countries best apply the (final) ROUTE-HWF taxonomy of medical deserts?

Introduction

While the third version of the ROUTE-HWF taxonomy defines four instead of five types of medical deserts, its empirical application remains to be based on the four objects as recalled in the previous section:

1. Measuring the 'aging of the population' by the proportion of inhabitants aged 65 living in this area, compared to this proportion at the country/national level.
2. Measuring 'economic resources of the population' by the proportion of inhabitants below the poverty line living in this area, compared to this proportion at the country/national level.
3. Measuring 'population-provider ratio' by the health professional-to-population ratio in this area, compared to that ratio at the country/national level.
4. Measuring 'accessibility of health facilities' by the average travel time by public transport to the nearest public healthcare facility in this area, compared to the average travel time at the country/national level.

In this Deliverable, we give more detailed guidelines for countries to execute the measurement of the four taxonomy objects. Empirical and conceptual input for this was provided by over 150 experts consulted in the six case studies (see D7.1) and the expert workshop (see D8.1) that were executed within the ROUTE-HWF project. They specifically contributed to the refinement of this third and final version of the guidelines on measuring and monitoring medical deserts.

Below we present the new and final guidelines in three parts. First, more detailed guidelines on how to interpret and use the four objects and how to use them with the data available in a country. Secondly, we will go more in depth on the regional level of the data. Third and finally, we provide guidelines in how to prioritize the different areas that are defined as medical deserts in a country.

Guideline 1: Use multiple and detailed indicators for the 4 objects in the taxonomy

This first guideline provides more detailed instructions with regard to the indicators for each the four Objects of the (final) ROUTE-HWF taxonomy. The foundation of this guideline is to use *multiple and detailed indicators per Object* as much as possible, to create *sets* of indicators that allows for comparison and will increase the robustness of the indicators. Obviously, a requirement is that the data sources for the indicators enable measurements at the national and all regional levels and at the sectoral or occupational level (if applicable). For example, if a countries' medical desert areas specifically deal with primary care shortages and accessibility, data should be available on the capacity of *multiple* primary care professionals (e.g. general practitioners, primary care nurses) and *multiple* travel times to primary health care facilities (e.g. by public transport or car) to create sets of indicators.

1. Measuring the proportion of inhabitants aged 65 and over living in an area (compared to this proportion at the country/national level)

The indicators for this first Object of the ROUTE-HWF taxonomy countries are, in principle, straightforward and standardized as age statistics are commonly available across countries and regions. However, specification of this Object can be achieved in terms of multiple indicators. A valid additional indicator for which data can be available in countries, is the number of patients aged 65 and older with a higher need of care, e.g. in terms of having chronic diseases, or multimorbidity. Another specification regards the cut-off point by the age of 65 and over. As life expectancy increases, it does make sense to distinct population proportions that are aged 70 or 80 years and over as well. Likewise, these proportions can also be specified (or: 'granulated') by health status, i.e. chronic diseases and multimorbidity as valid indicators for (expected) levels and complexity of health care needs or demands.

2. Measuring the proportion of inhabitants below the poverty line living in an area (compared to this proportion at the country/national level)

Economic resources of the population is second Object of the ROUTE-HWF taxonomy, that can be indicated through international data sources by (1) the proportion of inhabitants that live below the poverty line, and/or (2) the proportion that is at risk of social exclusion. In Deliverable 5D.2 we showed however, that data on these indicators are typically less available at the regional level for multiple countries. Therefore, collecting and retrieving data nationally to create additional indicators is of specific relevance for this Object. Alternative or additional indicators are the number of people that are unemployed, disabled, deprived or have a low social economic status (SES). As a set or cluster, these indicators can compensate lack of data at the required (granular) regional level for countries.

3. Measuring the health professional-to-population ratio in an area (compared to this ratio at the country/national level)

The indicators for this Object are critical, as our final ROUTE-HWF taxonomy is based on the principle that health workforce shortages are a constant and key characteristic of any type of medical desert. Higher levels of detail can particularly be achieved here, for countries to refine their medical desert identification in terms of health professional to population ratios. Next to the (internationally) 'standard' physicians-to-population ratio, data on other professions can provide multiple additional indicators. For most countries, data on the density of GPs, nurses, dentists, pharmacists, physiotherapists and health care assistants or social workers are relevant to collect or retrieve. Next, the validity of these indicators will increase if not only data in headcounts but also in full-time equivalents is available – in order to take into account parttime working which is common in the lower educated health occupations, but also growing by the new generations entering the health labour market. Finally, the 'power' of the professional-to-population indicators will increase if data is available on the age and gender of health workers (nationally and regionally) as these backgrounds strongly effect their (expected) retirement, mobility and retention.

Data availability and quality limitations on the regional and occupational level can obviously be a barrier to achieve the proposed extensions of Object 3 indicators. E.g., data on health professionals is more often available about their home/living location instead of the working residence. As an alternative, data can be collected from healthcare facilities retrieving their personnel information (HR) systems.

4. *Measuring the average travel time by public transport to the nearest public healthcare facility in an area (compared to the average travel time at the country/national level)*

Travel time as an indicator for accessibility or proximity of health facilities is a key Object of our final ROUTE-HWF taxonomy as well. Here, specificity of indicators can first be increased by granulating travel time by public transport, car, plane, boat, bike or foot – depending on the existing infrastructure and landscape of a country. Secondly, a valid extension of indicators is to specify the type of health facilities to be reached by populations. For instance, travel times will mostly be longer for hospitals than for primary care facilities. Another relevant specification is between public and private health facilities, depending on the countries' health system. Finally, indicators for this Object can be combined with the previous Object indicators, to retrieve data on the commuting distances for health professionals to their work location, and the attractiveness of regions/areas for health professionals to settle including their spouses and families.

Guideline 2: Collect and use detailed regional data whenever possible

In the previous versions of the guidelines for monitoring and measuring (see D5.2), Eurostat data was retrieved as a pilot to empirically apply our second version taxonomy on European (EEA) countries and their regions. The result of this pilot was the important notion, that Eurostat does not provide regional data for a number of 'small' countries with regard to the four Objects/indicators, and that for multiple other countries the regional data available was undetailed or not granulated enough to reach the aimed medical desert identifications. This strengthens the guideline that countries need to collect and use their regional data at the highest/detailed geographical level possible, to optimize the use and added value of our taxonomy. From our size case studies and the expert workshop, it became clear that most countries do have more detailed data on the four Objects/indicators than the (international) NUTS-2 level supplies. Data on NUTS-3 level or lower is desirable, but remains on its availability and what are 'meaningful' regional divisions in the country. Part of this guideline is the final notion that countries can use different types of regional classification, mostly of them based on historical or administrative considerations. But for the case of medical desertification, other regional divisions might be more relevant that address the location of health facilities, training locations and concentration of populations. Here, the four Objects of our taxonomy can also help to define relevant regional division for countries, and to better aim their medical desert policies.

Guideline 3: Define thresholds for the difference between regional values and the national average

We defined each of the indicators for the four Objects in our taxonomy as relative measures of the region compared to the national level or average. Here, a guideline for improvement is to take into account (1) the relative level of the national level *internationally*, and (2) the actual difference regional values deviate from the national value or level. This implies to standardize how much regional percentages or ratios deviate from the national average, for each indicator. Apart from an increase in measurement validity and specificity, this will also help countries to *prioritize* in which regions the needs for interventions or dedicated policies are larger. In addition, it support countries in monitoring regions that are evolving to a (certain type of) medical desert, in terms of moving to or from the national averages of each Object/indicator. Considering the need for more evaluation data from medical desert policy interventions, following how regions are deviating from the national average year after year, provides a better insight in how regions evolve, if they improve or not, and possible problems in regions to be identified in an early stage. Next to that, by regularly measuring (i.e.

monitoring) all indicators, countries can also improve the quality of the data required for their medical desert identification and policy solutions.

4. Conclusion and implications

In this deliverable, the third and final version of the guidelines on measuring and monitoring medical deserts at national and subnational levels is described and presented. The guidelines are designed to help public authorities and health professionals to gain a better understanding of (1) the origin and development of medical deserts, (2) how to monitor them, and (3) how to investigate and evaluate the effects of health workforce (HWF) policy measures to mitigate or eliminate medical deserts which is now often lacking.

The third and final version of the guidelines on measuring and monitoring medical deserts at national and subnational levels are based on the third and final version of the ROUTE-HWF taxonomy (see D4.3). This taxonomy version further restricts the selection of medical desert as defined in the second version, arguing that one essential Object is the shortages of health workers. Shortages of health workers or professionals can be measured and monitored by health professional-to-population ratios in an area and is acknowledged as a necessary element for defining medical deserts as ‘underserved areas’.

The experts consulted in the six case studies (see D7.1) and the expert workshop (see D8.1) within the ROUTE-HWF project also contributed to the refinement of this third and final version of the guidelines on measuring and monitoring medical deserts. Using the results of these action, the first and second guideline is to develop multiple (sets of) indicators per Object, and to collect and use detailed regional data as much as possible in measuring and monitoring the four taxonomy Objects:

1. the proportion of inhabitants aged 65 and over living in an area (compared to this proportion of all inhabitants in the country)
2. the proportion of inhabitants below the poverty line living in an area (compared to this proportion of all inhabitants in the country)
3. the health professional-to-population ratio in an area (compared to this ratio in the country; *being the constant and key Object in our final ROUTE-HWF taxonomy*)
4. the average travel time by public transport to the nearest public healthcare facility in an area (compared to the average travel time at the national level of the country)

A third guideline is that all four Objects of the taxonomy should consider the average in the country while indicating *how much* the region indicator value can/should deviate from this average. By defining these thresholds – i.e. defining how much the regional value deviates from the national average – can help to prioritize in which regions the ‘needs for change’ are larger. Also, the deviation from the national average *through time* provides insights in how regions evolve: do they improve or not, and are possible problems in regions identified in an early stage? Threshold definitions can also contribute to the quality of indicators and the data.

As stated, this third and final version of the ROUTE-HWF guidelines on measuring and monitoring medical deserts is directly related to two other final deliverables of the ROUTE-HWF project, being the third version of taxonomy (provided in deliverable D4.3) and the likewise the third version of the ROUTE-HWF Roadmap ‘out of medical deserts’ (see deliverable D6.3). As a ‘package’, the taxonomy, its monitoring and measuring, and the Roadmap, support countries in identifying their specific types of medical deserts and helping them to exchange tailored solutions for the desertification processes in different types of underserved areas. This

mutual learning between countries is an essential part of the ROUTE-HWF Roadmap, motivating them to continuously develop specific policy solutions for each type of medical desert.

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