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Latvia Healthcare Facilities Master Plan 2016-2025

MAIN REPORT

Prepared by the World Bank Group with Sanigest Internacional

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Acronyms and Abbreviations

A&E	*Accident and Emergency*
ALOS	*Average Length of Stay*
BUA	*Build-up area*
CAPEX	*Capital Expenditure*
Cath Lab	*Catheterization Laboratory*
CGIS	*Center of Geographic Information System*
CON	*Certificate of Need*
CSF	*Clinical Services Framework*
CT	*Computed Tomography*
DC	*Diagnostic Center*
DTC	*Diagnostic & Treatment Center*
ENT	*Ear, Nose and Throat*
FF&E	*Furniture, Fixtures and Non-Medical Equipment*
FTE	*Full Time Equivalent*
GIS	*Geographic Information System*
GP	*General Practitioner*
HC	*Health Center*
HDTC	*Diagnostic and Treatment Center with Hemodialysis capability*
HWC	*Health and Wellness Center*
ICU	*Intensive Care Unit*
IP	*Inpatient*
IR/ CL	*Interventional Radiology/ Catheterization Laboratory*
LHFMP	*Latvia Healthcare Facilities Master Plan*
LINAC	*Linear Accelerator*
Litho	*Lithotripter*
LTC	*Long-Term Care*
Mammo	*Mammography*
MDPS	*Ministry of Development Planning and Statistics*
MME	*Major Medical Equipment*
MMUP	*Ministry of Municipality and Urban Planning*
MOI	*Ministry of Interior*
MRI	*Magnetic Resonance Imaging*
NCCCR	*National Center for Cancer Care and Research*
NCS	*National Cancer Strategy 2011-2016*
NDC	*National Development Centres*
NHS	*National Health Strategy 2011-2016*
NICU	*Neonatal Intensive Care Unit*
OECD	*Organization for Economic Co-Operation and Development*
OP	*Outpatient*
PCP	*Primary Care Provider*
PET	*Positron Emission Tomography*
PHCC	*Primary Health Care Corporation*
PICU	*Pediatric Intensive Care Unit*
PRM	*Physical and Rehabilitation Medicine*
LHFMP	*Latvia Healthcare Facilities Master Plan*
RAD/ RF	*General Radiology/ Fluoroscopy*
RDC	*Regional Development Centres*
TOD	*Transit Oriented Development*
UK	*United Kingdom*
USA	*United States of America*
USD	*US Dollar*
WHO	*World Health Organization*

Introduction

The present efforts represent an evidence based policy approach to define a long-term planning perspective for key resources in the Latvian health system. Excess capacity in terms of infrastructure, equipment, and staff represents a costly burden on any healthcare system and optimizing the capacity can result in savings for the system, improvements in quality, and improved access and satisfaction for the population. The underlying approach is based on estimating long-term needs for services and setting the level of supply based on these needs and the expected demographic and epidemiological changes that are expected for the population through 2025.

While the healthcare system of Latvia has experienced advancements in many areas, there is still much room for growth and improvement. Latvia struggles with chronic diseases and an ageing and declining population and must make adjustments to its healthcare system if it wishes to address these burdens. Based on the burden of disease, the master planning exercise focuses specifically on four major areas of concern: cardiovascular disease, cancer, maternal and perinatal health, and mental health. Death rates for these conditions are comparatively high in Latvia, with cardiovascular disease, cancer and mental health conditions accounting for the most significant burdens of disease in the country. In order to meet the demands of the population and address these four target areas, many changes and reforms must be made to the existing system, especially with regard to infrastructure and human resources.

In addition, Latvia will potentially face problems with gaps in health infrastructure and equipment and shortages in healthcare personnel, in addition to issues related to access to appropriate technology for the four main disease priorities. Like many other systems, Latvia is attempting to shift its service provision to outpatient settings, which has drastically affected overall provision of care, specifically with regard to health infrastructure.

Progress has been made in the country with a 67% decline in the total number of hospital beds from 1990 to 2010 (from 36,000 to 12,000, respectively). The number of hospitals decreased from 88 in 2008 to 67 in 2010 and to only 42 NHS contracted facilities in 2015. Despite the efforts to move to a more outpatient-focused system, inpatient discharges and bed-occupancy have not declined at the same rate as the reductions in certain infrastructure and considerable excess capacity still exists.

Health personnel shortages pose a significant problem to the Latvian healthcare system as well. The number of general practitioners has increased, but there are still shortages in primary care with a number of municipalities lacking access to a GP. Latvia also has a low proportion of nurses compared to the average in the European Union and other countries in the region. The density of nursing and midwifery personnel is 4.73 per thousand, which is significantly lower than in Lithuania (7.17) and in Estonia (6.43) (WHO, 2015). These shortages put a strain on the system, requiring existing personnel to take on tasks either above or below their skill levels in order to provide the adequate care needed.

This is compounded by an uneven distribution of health personnel across the country. For example, only one-third of the population lives in the capital of Riga, yet nearly 60% of Latvian physicians practice in this area (WHO, 2010). Health personnel are not the only components of the healthcare system unevenly distributed –as cancer care, cardiovascular care, and key technology are mostly concentrated in urban and affluent areas. These uneven distributions

must be addressed in order to improve the healthcare system in Latvia and deliver the highest quality of care to its citizens.

In order to improve this situation, the Government of Latvia has requested the World Bank to (i) identify and quantify the importance of key health system bottlenecks, (ii) identify the underlying problems and causes of observed bottlenecks, and (iii) identify solutions and develop tools to drive their implementation. As part of this engagement, a master plan has been developed to support a service-based planning approach for investments in health infrastructure and human resources, as well as an investment plan to identify future investment needs in infrastructure and equipment.

It is important to note that the Latvia Health Master Plan is a 'living' tool that is not intended to be prescriptive. It is expected that the proposals outlined in this document should be subject to broad stakeholder consultation and discussion to ensure a consensus on the changes in the system that are required to achieve the 2025 goals that are outlined. The strategy emphasizes strengthening regional capacity and in particular improving access to care for the more vulnerable regions. In this regard, the strategy outlined very much relies on a dual strategy of centralization of highly specialized services into centres of excellence while at the same time ensuring better access for the population to basic services.

1. Background

The development of a well-organized, sustainable health service network is a fundamental element of a health care system that aims to deliver high quality services. The Government's commitment to deliver better care and services for the Latvian people within its four priority disease areas requires a fundamental reorganization of the way hospital services are financed and delivered. The strategy on the development of the master plan and optimization plans will propose changes in the health care network and an appropriate sequencing of these reforms.

The Health Master Plan is underpinned by five guiding objectives. These are the essential criteria that a government needs to consider and balance when looking at how to best provide hospital services to the population through national referral hospitals. These objectives are:

1. Timely access to hospital services for all;
2. Safe, quality hospital services delivered according to international standards of care;
3. An equitable distribution of resources between primary care and hospital services;
4. Development of a sustainable financing framework that adjusts the services delivered to the resources available; and
5. Creation of hospital centres of excellence delivering the highest level of care to the entire population.

In considering these objectives, the current approach to restructuring establishes as a basic principle that services need to be built around the needs of the people, not institutions, and that the services offered should be sustainable within the existing financial framework. The current exercise takes an integrated approach to analysing the population's health needs, understanding the available resources for the sector, and bringing in best practice and benchmarking to compare the current situation in the Latvian provider network with best practice. The development of planning parameters and guidelines for the Latvia Master Planning exercise are based both on best practice in European hospital networks as well as an evaluation of what is required specifically for the Latvian population based on a newly conducted Health Needs Assessment (HNA) and Facility Assessment (FA).

Thus, the main areas considered in the Master Plan are:

- **Expected service levels:** The analysis of hospital discharge information at the national and regional levels provides the basis to analyse the demand for services. By combining historical population demand by service type with international benchmarks by service line, the planning parameters define the minimum expected production levels for each catchment area.
- **Infrastructure standards:** Based on expected service levels and benchmarks for physical space and bed numbers by specialty, the Master Plan proposes a reconfiguration of the hospital network in terms of the required number of beds, the location of the specialty beds, and future needs to 2025 for hospital and primary care services. This permits an estimation of the needed changes in infrastructure in terms of new construction and reconstruction.

- **Equipment standards:** Changes in medical technology have the potential to produce dramatic improvements in quality, patient safety, and efficiency. The Master Plan provides input to the Ministry of Health and the NHS on the minimum requirements for equipment (on a population basis) and highlights areas where technology advancements are required.
- **Staffing standards:** The Human Resource Mapping uses population-based standards to propose the future staffing needs throughout the system. The standards are outlined in section 4 with a summary of the Human Resource Mapping (HRM). The proposals are in line with guidelines from the World Health Organization (WHO) and other European Union (EU) countries regarding the number of specialists and the types of specialties in the provider network. Based on a comparison with existing levels by department, the HRM provides a gap analysis outlining the surplus or deficit in each facility.

These four sub-components share methodological aspects. First, HNA utilizes patient data provided through the NHS as well as data on quality of care, existing capacity (beds, human resources and equipment), and population trends in order to identify potential resource gaps. The analyses also use additional information obtained through other deliverables of the World Bank RAS, including policy and practice reviews of key health system functions (i.e. human resources and capital investment planning, benefits package design, and the organization of service delivery).

The infrastructure, equipment, and staffing needs assessments also use Geographic Information Systems (GIS) data to ensure that geographical access is maintained or improved through the implementation of the proposals in the master plan. The GIS is a highly useful policy tool which will specifically assist in:

- Graphically showing the distribution of resources across the regions;
- Identifying gaps in coverage or excessive levels of coverage in the system;
- Estimating accessibility by population to different levels of care (for example, with GIS it is possible to determine what percentage of the population lives within 30 minutes of a secondary level hospital after the proposed reorganization is completed);
- Providing the government authorities with a working database of all the information collected, which can be updated on an on-going basis.

Throughout the approach, the Master Plan employs a benchmarking analysis approach that compares Latvian results with best practice and therefore provides further justification for the proposals outlined in the report. This allows policy makers to compare the current service delivery in terms of personnel, activity, resources, and the quality of health outcomes against international standards and to compare regional indicators to national standards, to assess whether service delivery is both efficient and effective. When used appropriately, this kind of benchmarking can be an effective tool for identifying opportunities for large performance improvements.

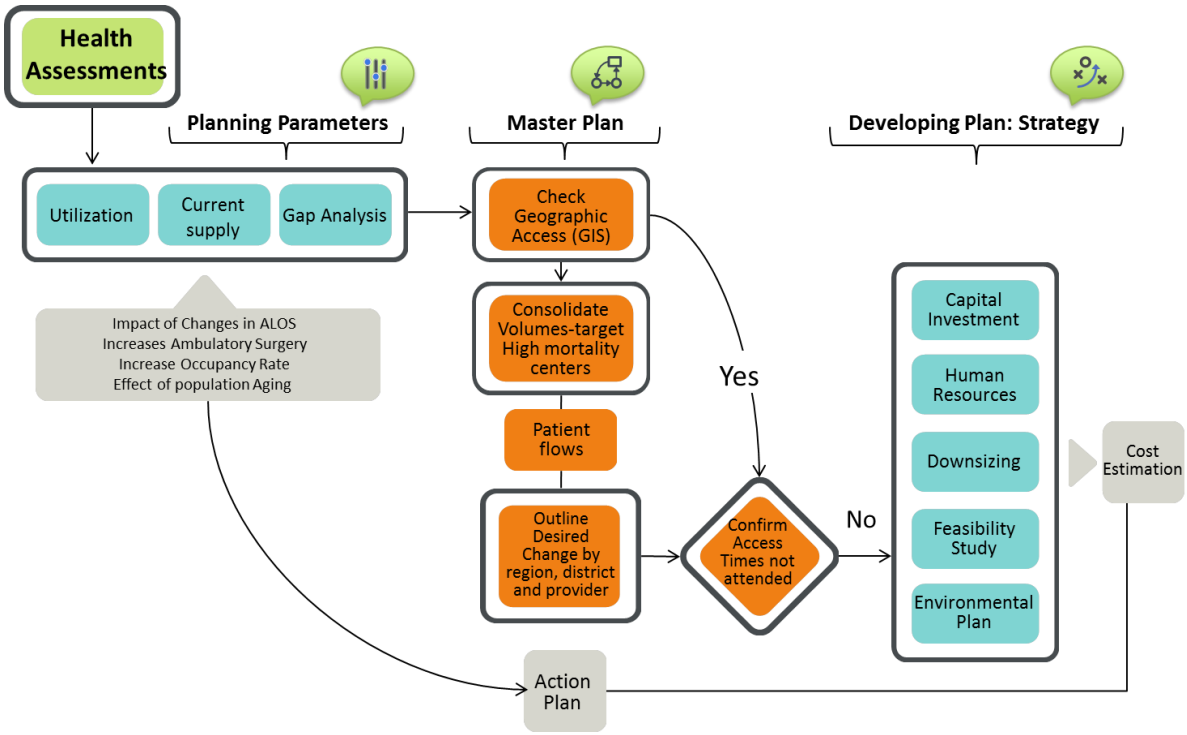
Finally, the Master Plan is heavily focused on addressing the burden of the four major disease areas: (i) cardiovascular disease; (ii) cancer; (iii) maternal and child health; and (iv) mental illness. By estimating the demand for care by specialty and by type of hospital, based on

consultations with experts and a review of other master planning exercises, the current Master Plan develops a proposal to redistribute facility needs by level and type of care.

2. Data and methodology

The general approach to restructuring used in the current Master Plan has been developed based on previous master plan experiences in Latvia, Kazakhstan, Albania, Azerbaijan, Moldova, Macedonia, Serbia, and Slovakia. The process is outlined in the following algorithm.

Figure 1: An integrated approach to health sector reconfiguration



Source: Sanigest Internacional

As detailed in Figure 1, the Master Plan is derived from a Health Needs Assessment that forecasts the demand for health services within the four priority disease areas and assesses existing capacity. In summary, the following key issues were considered during the elaboration of the Master Plan: demographics, socioeconomic status, technology advances, existing network of providers, staffing, epidemiological profile, and quality standards. This methodology includes proposed benchmarks or standards of health service planning based on efficient international practice, in the context of what is needed and affordable in Latvia.

In addition to these planning parameters from international best practice, hospital restructuring in Latvia should also take into account two additional factors. First, changes in medical and pharmaceutical technology would allow for significant reductions in hospital care and would lead to overall improvements in health. Second, current overcapacity of the healthcare system in the Republic of Latvia should be addressed by a combination of planning and economic mechanisms that will lead to a better organized, more efficient hospital system.

Some of the key issues in Latvia that the Master Plan will address when proposing a path towards optimization of the network are:

1. Long-term planning based on service needs and changing population dynamics.
2. Duplications – of beds and facilities.
3. High hospitalization rates

4. High average length of stay (ALOS), low discharge/bed ratios[1]
5. Unsafe medical practice (for example, low number of surgeries per department)
6. Inadequate condition of physical infrastructure / equipment
7. Opportunities to free up financial resources

2.1. Main analyses

There are three overarching analysis areas which have been used to create this integrated Master Plan document:

1. Health facilities (infrastructure) and equipment needs
2. Human resources needs
3. Investment needs

To areas assess these various needs, a variety of data sources were used, and a number of different methodological approaches were incorporated.

The following sources of data were drawn on during the analyses:

Table 1: Data sources

Analysis area	File name	Format	Source
Staff	Outpatient manipulation_2014/Outpatient_2014 Inpatient payment data.zip Hc_Persons_Clean	Stata format (.dta) Stata format (.dta)	Uploaded by WB Group
Equipment	Report of medical equipment, by hospital	Excel Format (xlsx)	Information received from different facilities
Infrastructure investment	Report of infrastructure investment, by hospital	Excel Format (xlsx)	Information received from different facilities
Beds	Hospital Beds Utilization from 2009-2014	Excel Format (xlsx)	Uploaded by WB Group
Medical Institutions	Institutions_Clean	Stata format (.dta)	Uploaded by WB Group
Emergency calls	Sems_2011-2014_clean	Stata format (.dta)	Uploaded by WB Group
Population	Census 2011	Excel Format (xlsx)	www.csb.gov.lv

2.2. Methodological approaches

2.2.1. Population projections

Population projections were conducted using the 2011 Population Census obtained from the Central Statistical Bureau of Latvia as the base population. [2] The projection was calculated up

[1] WHO data includes many CIS hospitals which have very long lengths of stay, and we are making reference to a preferred scenario where we compare with the optimal ALOS that should be achieved. If you look at the new table included you will see that acute hospital ALOS in Latvia (8 days, including psychiatric inpatient care) is longer than the lower acute hospital lengths of stay in say UK and Nordic countries which are below 6 days. There are no psychiatric beds included and we consider only the contracted hospitals.

[2] predef_tables_ts2011_fin2_en.xlsx downloaded from http://www.csb.gov.lv/en/statistikas-temas/population-census-30761.html on 10 April 2016.

to 2025 using a growth rate for each region separately, calculated according to the behaviour of the population during the most recent years of available information, with the growth/decrease rates shown below in Table 2.

The population projections were created using the following formula:

$$Pop_{Future} = Pop_{Present} * (1 + i)^n$$

Where:

Pop_{Future} = Future population

$Pop_{Present}$ = Present population

i = Growth rate

n = Number of years

For the final step in the population projections, an adjustment was made to take into account that people tend to access care in Riga rather than their own region for specialist care. As such, for each region other than Riga, the analysis assumed a population reduced by 20 percent, which was instead applied to Riga's 2020 and 2025 population sizes. It should be noted that this adjustment was not applied for the primary care provider analyses, as the assumption is that people should be accessing primary care services in their own regions.

Table 2: Population projection assumptions

Region	Population 2011	Estimated Growth Rate (2011-2015)	Estimated Growth Rate (2015-2025)	Base 2020	Base 2025	Adjusted 2020	Adjusted 2025
Riga	658,640	-0.29% to -0.01%	-0.07%	628,782	617,329	884,762	861,783
Pierīga	371,431	-0.16% to 0.03%	0.03%	370,099	372,987	296,080	298,390
Vidzeme	211,309	-0.39% to -0.27%	-0.29%	184,596	171,767	147,677	137,413
Kurzeme	270,498	-0.36% to -0.26%	-0.26%	238,321	223,320	190,577	178,656
Zemgale	254,461	-0.32% to -0.21%	-0.22%	228,390	215,962	182,712	172,769
Latgale	304,032	-0.45% to -0.33%	-0.33%	258,597	238,234	206,877	190,587
Total	**2,070,371**			**1,908,784**	**1,839,599**	**1,908,685**	**1,839,598**

Source: Based on Data from the Central Statistical Bureau

For any municipality level population projections (for example in the primary care provider section), the regional level growth rate was assumed for all municipalities within the region. So, for example, for Ventspils, the population growth rates for Kurzeme were applied.

The projections for Latvia in 2020 from Eurostat are slightly different (1.5% lower) at 1,880,087 and 4.6% lower for 2025 at 1,755,404 than those used in these analyses. The main reason for the different projections is that the current analysis has assumed a higher fertility rate. In addition, increasing levels of life expectancy have been included in these projections, due to the expected positive impact that the interventions in health sector will have on continuing improvement in access to care. As a result, all projections are based on this "highest-possible population" scenario. If the population only increases to the levels of Eurostat, slightly lower numbers of equipment, staff and other resources would be required.

2.2.2. Analyses utilised in human resources mapping

Human resources standards for Latvia

This document includes a human resources map for Latvia, including three major groupings of HR:

1. Specialists
2. Primary Care Providers
3. Nursing and Other Support Staff

In order to estimate of projected needs for human resources in health, a series of steps are followed for each area (with some specific additional methods employed dependent on the staffing area). The steps are outlined in this methodology section.

Specialist standards for Latvia

The review of physician standards is approached as a multi-step process. This process combines the analysis of the current situation with best international experience, with the estimates of population needs across the regions and allows for adjustments in each region based on prevailing geographic access conditions (i.e. travel times). The international comparisons for doctors are all listed as physicians per 100,000 to allow for comparability across benchmarks. Medical specialties were re-grouped into broad categories - for example, a new category of dentistry was created which included Orthodontist, Paradontology, Children's Dentist, Dental Prosthetist, Endodontics, Dental Dresser, Denture Master (Technician), Dental Hygienist, Dental Technician and Dentist. The full list of specialties and their categories is shown in Annex 12.

The steps involved in proposing the final standard for specialist physicians were:

1. Review of the international levels of staffing and a comparison of that level with the current level in Latvia;
2. Estimation of the expected number of physicians by specialty based on current levels and declining population numbers;
3. Re-estimation of the required number of physicians to meet the projected bed scenario in the preferred alternative of the hospital network based on a demand-based approach that used the number of cases to be seen by a physician per year to estimate the required level of beds, in addition to assumptions about the ratio of physicians to beds by specialty;
4. Based on the above results, proposal of a standard that would ensure adequate coverage of physicians to meet the future demand and that allows for changes in practice patterns (for example, those that would result in declining hospital utilization).

It is important to note that in the process of developing the proposed physician standard, it became clear that there is a difference between specialists working in hospitals and physicians working in outpatient settings, which puts Latvia's current staffing profiles in sharp contrast with those observed in the OECD. In Latvia, only an estimated 35 percent of physicians work in hospitals, whereas on average among OECD countries, more than 75 percent of specialists work in hospitals and only 25 percent work in the non-hospital sector. In fact, the trend in Europe is an increasing share of physicians in hospitals, with many countries such as Denmark with rates rising to over 85 percent in the last few years. Because of this important difference, the third step outlined above essentially presents the hospital-only physicians that are needed.

Specialists - Step 1: Review of international and current Latvian staffing levels

"Comparing countries is always difficult because of differences in how data are reported, differences in categories and nomenclature, and the aggregation of information into groups which are not always compatible and the issues associated with different. However, over

recent years, and in a large part because of harmonization processes across the EU, there is now greater consistency across countries and more transparency in terms of what numbers are included. To this extent, there is increasing convergence in the numbers of staff across the databases WHO, EuroStat, OECD and other sources data[3] ". For the purposes of this exercise, data is presented from the OECD which had the latest years available for our estimates.

The following table provides a summary of the available data for specialties, presented per 100,000 population. Although complete information for all specialties is not available, major trends are distinguishable. The table shows, from left to right for each medical specialty in Latvia; the current level of physicians in Latvia per 100,000 population using a maximum FTE of 1.5 per physician (see more details on the detailed FTE methodology later in this chapter); the current level of physicians in Latvia per 100,000 population using a maximum FTE of 1.0 per physician (see more details on the detailed FTE methodology later in this chapter); the level of specialists in the United States, the United Kingdom, Australia, and Canada—all per 100,000 inhabitants; the average for non-Central and Eastern European (CEE) countries from the database; and the OECD median value.

Even using the most conservative methodology of a maximum 1.0 FTE per physician (i.e., no doctor working more than 40 hours per week, regardless of the number of jobs they are contracted for) Latvia's current levels are significantly higher than most other benchmarks in almost every speciality. In some areas, such as paediatrics and obstetrics and gynaecology, the density of specialists in Latvia appears to be twice as high as the OECD median for surgical specialists. However, there are several fields where the levels in Latvia are lower than at least one of the benchmarks (such as Accident & Emergency and the US benchmark) or for which it is unclear how many providers have a specific certification in (such as Geriatric Medicine) as Latvia's specialities don't directly correlate – as such there appears to be an absence of providers in those areas.

Table 3. International comparison of current specialist FTE versus selected OECD benchmarks, per 100,000 population

	Current MDs per 100K (Max FTE 1.5)[4]	Current MDs per 100K (Max FTE 1.0)	USA	UK	Australia	Canada	OECD Median
Paediatrics (General)	**22**	**16**	25	15	9	9	13
Obstetrics & Gynaecology	**29**	**21**	14	12	9	8	13
Surgical Specialties[5]	**66**	**50**	39	76	60	40	61
Mental Illness & Disabilities	**19**	**15**	14	19	16	17	17

Source: www.oecd-ilibrary.org/social-issues-migration-health/data/oecd-health-statistics_health-data-en

[3] OECD (2016), Doctors (indicator). doi: 10.1787/4355e1ec-en (http://www.oecd.org/health/workforce.htm).
Merritt Hawkins, A Review of Physicians to Population ratios (http://www.merritthawkins.com/pdf/Merritt-Hawkins-Physician-to-Population-Ratios.pdf)
Eurostat (2013), Healthcare personnel statistics – physicians, Data extracted in October 2015. Most recent data: Further Eurostat information, Main tables and Database. Planned article update: October 2016. (http://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_personnel_statistics_-_physicians)

[4] As described in detail further in the methodology section, the main analysis used throughout the report relies on a maximum of 1.5 FTE per individual provider (i.e., maximum 60 hours working) which can be spread around multiple regions and across various specialties they have a contract for. The other option (provided in the Annexes) is to have a maximum FTE of 1.0 FTE (i.e., no provider works more than 40 hours). Both options are shown here for illustrative purposes.

[5] It should be noted that the Surgery grouping in OECD includes Accident & Emergency and Anesthesia and Critical Care which in Latvia are roughly equal to 30 FTE indicating that the overall Surgery for OECD if compared directly to Latvia would be much larger.

These figures are presented as an illustration of the potential reduction in staff that could be possible were productivity to be increased across the board.

Specialists - Step 2: The effect of declining population on staffing levels

The second step requires examining future staffing needs by keeping current staffing patterns constant and using projected populations to reflect the change in demand. This scenario effectively models a "do nothing" scenario (that is, no changes in productivity or demand other than what would be implied from population growth / decline) and shows how total staff needs would change based solely on a declining workload resulting from a reduction in the population (i.e., international best practice is ignored). However, even in this scenario, the following table shows that the need for physicians would decline from current levels of over 7300 FTE total to 6539 by 2025.

Table 4: Projected physician needs with declining population

	MDs per 100K (Max FTE 1.5)	Current FTE	FTE Needed 2020 (based on current numbers)	FTE Needed 2025 (based on current numbers)
Medical Specialities	**188.3**	**4025.0**	**3594.1**	**3464.0**
Accident & Emergency	**6.9**	138.1	131.7	126.9
Critical Care & Anaesthesia	**22.5**	449.7	429.5	413.9
Cardiology	**12.2**	244.7	232.9	224.4
Dermatology	**9.9**	197.8	189.0	182.1
Endocrinology & Diabetes	**4.2**	83.7	80.2	77.3
Gastroenterology	**4.8**	95.5	91.6	88.3
Geriatric Medicine	**0**	***2.2.3.***	0.0	0.0
Infectious Diseases	**2.7**	54.8	51.5	49.7
Internal Medicine	**24.3**	486.4	463.8	447.0
Medical Oncology	**4.1**	82.2	78.3	75.4
Neurology	**16.1**	322.3	307.3	296.2
Nuclear Medicine	**0**	***2.2.4.***	0.0	0.0
Renal Medicine	**2.2**	44.0	42.0	40.5
Rheumatology	**1.1**	22.8	21.0	20.2
Paediatric	**28.5**	**570.1**	**544.0**	**524.3**
Paediatrics	**21.7**	434.1	414.2	399.2
Neonatology	**4**	80.4	76.3	73.6
Paediatric Surgery	**2.8**	55.6	53.4	51.5
Obstetrics & Gynaecology	**29.2**	**584.0**	**557.3**	**537.2**
Surgical Specialties	**66**	**1317.6**	**1259.7**	**1214.1**
General Surgery	**20.5**	410.0	391.3	377.1
Trauma & Ortho Surgery	**11.4**	227.8	217.6	209.7
Cardiothoracic Surgery	**0.7**	13.7	13.4	12.9
Neurosurgery	**2.9**	57.8	55.4	53.3
Ophthalmology	**14.4**	287.5	274.9	264.9
Oral & Maxillofacial Surgery	**1.5**	30.5	28.6	27.6
ENT	**9.3**	186.1	177.5	171.1
Plastic Surgery	**1.3**	25.6	24.8	23.9
Urology	**3.9**	78.6	74.4	71.7
Mental Illness & Disabilities	**18.8**	**374.9**	**358.8**	**345.8**
Child & Adolescent Psych	**1**	19.8	19.1	18.4
General Psychiatry	**14.5**	289.8	276.8	266.7
Forensic Psychiatry	**0.7**	13.6	13.4	12.9
Psychotherapy	**2.6**	51.7	49.6	47.8

Pathology & Radiology	**24.7**	**495.2**	**471.4**	**454.4**
Chemical Pathology	**2.8**	55.0	53.4	51.5
Clinical Genetics	**0.7**	14.0	13.4	12.9
Clinical Neurophysiology	**0**	***2.2.5.***	0.0	0.0
Clinical Radiology	**17.2**	344.5	328.3	316.4
Haematology	**1.2**	23.7	22.9	22.1
Histopathology	**0**	***2.2.6.***	0.0	0.0
Immunology	**0.8**	15.2	15.3	14.7
Microbiology / Virology	**2.1**	41.8	40.1	38.6
Overall	**355.5**	**7366.8**	**6785.4**	**6539.8**

This shows that despite an expected decrease in physicians due to retirement, the number of physicians may be sufficient in many speciality areas to cover future demand due to the declining population.

Specialists - Step 3: Re-estimating required specialists based on future demand and bed needs

This step looks at the need for hospital specialists based on the projection of bed needs to 2025 which is taken as the preferred model for hospital demand in the future. This model is a normative based standard taken from a review of OECD countries' staffing ratios of physicians by specialty and the ratio of physicians per bed. Overall, there is generally 1 physician per 4 beds or a ratio of 0.25 per bed, although there are variations per bed which range from 1:1 for intensive care to 0.10 for mental health and long term care. In this approach, Table 5 shows the estimated number of physicians needed by specialty based on the number of beds that are projected for 2025 which is outlined in Annex 2. This bed estimate is taken from the preferred scenario presented in the section "Estimating future requirements for ". It is important to note that this estimate includes only the hospital-based physicians and is therefore intended as a guide for hospital contracting not an estimate for the total number of physicians required in the system. Table 4 shows the ratio of physicians per bed and the estimations of the required number of hospital physicians based on this ratio and the projected count of beds by 2025.

As shown in Table 5, the number of exclusively hospital physicians (that is, hospital physicians with no outpatient work) would be roughly 25 percent of the total estimated by alternative means. This implies that roughly 75 percent of the projected physicians would remain in the outpatient setting. However, based on previously cited information from EU countries which have the opposite ratio, a number of these physicians would be expected to either shift to inpatient settings or exit the system in the next ten years.

Table 5: Estimated Hospital Only Physicians Required Based on a Bed Projection

Specialties	Proposed beds 2025	Ratio Physicians per bed	Strict Hospital Physician Needs
Medical Specialities	**2,396**		**1,037**
General Medicine	420	0.38	160
Accident and Emergency	350	1.00	350
Anaesthetics (including Intensive Care)	186	1.00	186
Cardiology	305	0.28	85
Dermatology	8	0.20	2
Endocrinology and Diabetes Mellitus	25	0.19	5
Gastroenterology	52	0.50	26
Geriatric Medicine	45	0.65	29
Infectious Diseases	156	0.15	23
Medical Oncology	217	0.20	43
Neurology	515	0.20	103
Pulmonology	107	0.20	21
Nuclear Medicine	-	0.33	-
Renal Medicine	-	0.37	-
Rheumatology	8	0.27	2
Pediatric	**624**		**233**
Paediatrics	278	0.25	69
Infectious Ped	148	0.25	37
Neonatology	54	1.00	54
Paediatric Surgery	144	0.50	72
Obstetrics and Gynaecology	**604**	**0.31**	**187**
Surgical Specialties	**1,104**		**314**
General Surgery	547	0.22	120
Trauma and Orthopaedic Surgery	102	0.40	41
Cardiothoracic Surgery	165	0.16	26
Neurosurgery	105	0.20	21
Ophthalmology	47	0.94	44
Oral and Maxillo Facial Surgery	-	0.27	-
ENT	28	0.50	14
Plastic Surgery	6	0.65	4
Urology	104	0.42	43
Pathology and Radiology	**59**		**12**
Chemical Pathology	-		-
Clinical Genetics	-		-
Clinical Neurophysiology	-		-
Clinical Pharmacology and Therapeutics	-		-
Clinical Radiology	-		-
Haematology	59	0.20	12
Histopathology	-		-
Immunology	-		-
Medical Microbiology & Virology	-		-
Total Acute	**4,786**		**1,783**

Specialists - Step 4: Developing the proposed standards

Having completed the previous three steps, the development of proposed standards now takes into account the current level, the demand for care, and international standards, to propose a standard of physicians per 100,000 inhabitants for Latvia. The proposed standard is outlined in the following table at the macro specialty level with an explanation for the justification of the proposed standard in Annex 16 for each of the specialties.

Table 6: Proposed specialist standards

Departments	Current FTE per 100K	International	Proposed Standard	Justification for Proposed Standard
Medical Specialties	**188.3**	**81.4**	**155.0**	The proposed standard for internal medicine is higher than the international benchmarks due to higher prevalence of infectious disease, relatively higher use of occupational medicine physicians and use of general medicine beds
Paediatric	**28.5**	**16.1**	**19.5**	Level of physicians required in paediatrics is higher in LV due to the higher share of children <14, higher fertility rate increasing in the future and the nearly 2x utilization rate in other EU countries. Still significant decrease projected

Obstetrics & Gynaecology	**29.2**	**13.0**	**20.0**	Assumes 150 births per Obgyn and projected increased in births by 20%. This allows for an additional 30% for outpatient and gynaecology over strict demand based estimate which is closer to averages
Surgical Specialties	**65.9**	**61.0**	**30.3**	Despite the fact that expansion in surgery is expected, estimates assume that up to 40% of surgeries can be done on ambulatory basis in 10 years. It should be noted the international benchmark is substantially higher as they also include specialties such as Accident & Emergency and Anaesthesia and Critical Care which are not included in the Latvian definition used here (i.e., they have been excluded in the standard comparison).
Mental Illness & Disabilities	**18.8**	**17.0**	**10.8**	The proposed standard for psychiatric care is below the benchmarked rates given the lower share of the population over 65 in LV but lower than the current rate to allow for future aging and to increase community level care for mental illness.
Pathology & Radiology	**24.7**	**22.5**	**15.6**	The rate is significantly below existing levels to encourage optimisation.
Overall	**355.4**	**186.5**	**251.2**	

If the proposed standards are compared to the other EU and OECD standards evaluated in Step 1, it is clear that that proposed standards are still between 50 percent to 100 percent higher than the other countries. This allows for a reasonable transition to modern care practices and higher levels of productivity that are experienced in the comparator countries. Based on the review of hospital based staff presented earlier in Step 3, it is clear that Latvia should push for increasing productivity of physicians across the board and that will allow for normalization of current staffing levels. Additionally, another step will examine the projected impact of retirement on potential gaps in staffing, compared to the proposed standard.

To calculate local productivity levels, the following steps were taken:

- The four inpatient payment databases for 2014 were merged into a single database using the unique variable "ipr_id" present in all databases. This is a variable that the World Bank created. It stands for inpatient record number and is a combination of case ID and institution ID.
- The newly created 2014 inpatient database was further merged with agreed upon specialty codes for providers (see Annex 12) and regional codes for the facilities (see Annex 14). Less than 5% of all providers and facilities could not be matched because of missing IDs.
- For the inpatient dataset, in the next step, payment data was used to calculate the number of cases / procedures billed by provider id (HC_Person_ID). Again the analysis was done by region.
- Once that was complete, the volume of procedures was divided by the number of unique providers to obtain the average volume per specialty.
- A similar exercise was conducted with the outpatient databases to determine outpatient productivity levels.

Specialists: Calculation of existing staffing levels

In order to determine the staffing needs for Latvia, in addition to the standards and population projections explained above, an estimate of the current levels of human resources

throughout the country are needed in order to see whether there is a current surplus or deficit in staffing numbers.

Overall, it is more useful to incorporate Full Time Equivalent (FTE) human resources for policy planning purposes than actual headcounts, as they are a better indicator of the actual workload that can be completed. Moreover, the standards proposed for the distribution of specialists by region are based on FTE planning since that allows for the NHS to ensure that the adequate number of FTE are contracted to guarantee population access by region.

As such, two measures were created in the new analysis:

Primary scenario: The maximum FTE that any one unique person can be counted as is 1.5 (best scenario, and used throughout the main body of the report)
Additional scenario: The maximum FTE that any one unique person can be counted as is 1.0 (shown in the annexes, but not recommended to be used)

In both scenarios the following initial methodological steps were employed:

(1) Using the HC_persons database the regions / divisions were merged in based on the institutions location (there were 72 provider records for whom their facilities' division (Latgale, Kurzeme, etc.) couldn't be matched and therefore were eliminated)
(2) Records were eliminated for any contract with a termination date (for example, providers could listed as having a "Main Job" contract at Facility A from 2002-2009 for Speciality Z, they had an additional contract as a Main Job at the same Facility A for Speciality Z from 2010 and no end of contract date – the first example with a contract end date in 2009 was eliminated).

Scenario 1: Maximum FTE of 1.5
In this scenario the following methodology was then employed:

(1) Doctors could either have said a job was their main job or not their main job. For records with a main job, a value 0f 1.0 FTE was assigned to that record (for that facility's division and that speciality).
(2) As noted by the reviewers previously, most doctors have multiple records indicating contracts at multiple facilities, in many specialties.
The TOTAL maximum FTE that a doctor could be allocated was 1.5 FTE.

A FTE of 1 was always assigned to the main job, with therefore a maximum of 0.5 being available for additional jobs.

So, for example, if a doctor worked as an ObGyn in Facility A in Riga as his "main job" that was awarded 1.0 FTE for ObGyn Riga.

If, in addition, he said he had a job at a Facility B in Riga as a paediatrician and a job as an ObGyn in Latgale as an ObGYN, his total allowance of 0.5 "extra" FTE was awarded between the two jobs for 0.25 to each. If he had 5 "extra jobs" they would each have been awarded 0.1 FTE.

Given that over 50% of doctors reported multiple jobs, this is the preferred methodology, as it allows policy planning to take into account the fact that many doctors are likely working more than 40 hours per week.

However, it should be noted that it is not possible to create an exact FTE for each position, as some doctors with part-time jobs may be working 70 hours per week, split 40 to their main job, 20 to one part time job and 10 to another part time job, while another might work 40 on

their main job and only 5 at one part-time job and 10 at another part-time job. However, it was felt that the average of 60 hours per week was felt as the best average of individuals who are working two jobs.

Scenario 2: Maximum FTE of 1.0
In this scenario the following methodology was then employed:

(1) Each unique provider ID was analysed to determine if that provider had only one job or multiple jobs.
(2) For all providers with JUST one main job, a value of 1.0 was assigned to that job's division and specialty.
(3) For all provider IDs with both a main job and additional (non main) jobs, all main jobs were assigned a value of 0.8 FTE.
(4) The TOTAL maximum FTE that a doctor could be allocated was 1.0 FTE so therefore a maximum of 0.2 was available for all additional jobs.

So, in the same example, if a doctor worked as an ObGyn in Facility A in Riga as his "main job" that was awarded 0.8 FTE for ObGyn Riga. If in addition he said he had a job at a facility B in Riga as paediatrician and a job as an ObGyn in Latgale as an ObGYN, his total allowance of 0.2 "extra" FTE was awarded between the two jobs for 0.1 to each. If he had 5 "extra jobs" they would each have been awarded 0.04 FTE.

As described in the first methodology, it is not possible to calculate an exact FTE per position. However, by ascribing only an FTE of 1 as a maximum per provider, that is assuming no doctors in Latvia work over 40 hours per week, which believe would be a definite underestimate of the capacity of the physician workforce.

Specialists: Estimations of actual staffing needs

After creating the key components described above, the actual numbers of staff required, by region and speciality were than calculated for the future using the basic formula of:

Current unadjusted needs for specialists:

$$need_{current} = standard_{speciality} \times \left(\frac{population_{current}}{100000}\right)$$

2020 unadjusted future needs for specialists:

$$need_{2020} = standard_{speciality} \times \left(\frac{population_{2020}}{100000}\right)$$

2025 unadjusted future needs for specialists:

$$need_{2025} = standard_{speciality} \times \left(\frac{population_{2025}}{100000}\right)$$

The gap for each year is then calculated as follows:

$$gap_{speciality} = need_{speciality} - supply_{speciality}$$

For example, in the case of obstetricians and gynaecologists, the recommended standard for Latvia for ObyGyns in 2020 is 20 / 100000 population which would equal:

$$20.0 \times \left(\frac{1908684}{100000}\right) = 382\ ObGyn$$

If all things remained the same, there would be no need for additional ObGyn in Latvia.

However, another important component of HR planning is to take the aging of the workforce into account.

As such, an additional analysis was conducted to determine the percentage of a subgroup of key priority speciality areas (cardiology, mental health, obstetrics and gynaecology and oncology) that would reach age 62 by 2020 and 65 by 2025.

Specialists: Impact of an aging workforce on priority specialities

To conduct this specific analysis, a number of databases were merged in order to obtain a provider's age, speciality and region:

(1) The provider database was merged with a database provided by the NHS, which matched the health care provider ID to an anonymous personal ID, and a new database was created which included the provider ID, specialist ID and the anonymous personal ID.

(2) The new database was further merged with the database of socio-economic provided by the Central Statistical Bureau on the basis of the anonymous personal ID in order to determine the provider's date of birth.

(3) That newly created database (containing provider ID, specialty, anonymous ID and DOB) was then merged with the HC_persons_clean.dta database in order to determine the region(s) in which each provider works.

Using the database whose creation was detailed above, two new variables were created, *retire2020* and *retire 2025* as follows:

(1) the provider's year of birth was deducted from (a) 2020 and (b) 2025 to create two variables – *age2020* and *age2025*

(2) a binary variable was created where *retire2020* was equal to 1 if the provider's age in 2020 was ≥62 and *retire2025* was equal to 1 if the provider's age in 2025 was ≥65, and for both variables the value was equal to 0 if the age would be less 62 or 65, respectively[6].

As a result, for each region, the FTE for each type of speciality group that would be over the age of 62 in 2020 and 65 in 2025 was calculated in each region to create a projected number of retired and non-retired doctors per speciality per region.

Primary care providers

A specific set of analyses were conducted to analyse the primary care provider (PCP) network in Latvia. As with the key speciality areas above, the analysis adjusts for (i) the aging of the provider population but also (ii) differences in demographics across the country. The same methodology used for adjusting the future numbers of specialities above was used to estimate the availability of PCPs in 2020 at the municipality level

To adjust for the demographic differences across municipalities, age and sex adjustments were introduced to create "weighted populations". To keep this adjustment as simple as possible, the following primary care adjustors (normally used for capitation purposes) were utilised from the United Kingdom.

[6] The actual retirement scheme depends on the year of birth for each person and would require a much more complex analysis but for the sake of simplicity a simple cut-off of 62 years was established.

Age	Males	Females
0-4	1.8	1.7
5–14	0.5	0.5
15-44	0.5	1
45-64	1	1.5
65+	2.2	2.4

For each municipality, the 2011 census population in the above age and sex bands were projected forward to 2020 using the regional level adjustors described above. Each band was then adjusted according to the weight above in order to provide a sex-gender adjusted population for needs purposes when considering access to primary care.

As an example:

	Males					Females				
	0–4	5–14	15–44	45–64	65+	0–4	5–14	15–44	45–64	65+
Jekabpils city	670	1222	5273	2885	1306	681	1155	4913	3701	2829

The adjustors were multiplied to each category to get these risk-adjusted population totals based on the expected utilisation needs of each grouping:

	Males					Females				
	0–4	5–14	15–44	45–64	65+	0–4	5–14	15–44	45–64	65+
Jekabpils city	1206	611	2637	2885	2873	1158	578	4913	5552	6790

That "risk-adjusted" total population of 29,201 was then adjusted using the regional growth factors for Zemgale to end up with a risk-adjusted 2020 population of 27213.

To determine the need of each municipality with regards to primary care providers, a standard of 1667 population per PCP was used.

$$PCP_{municipality} = \frac{adjustedpopulation_{municipality}}{1667}$$

In Jekabpils city therefore, the following calculation was performed:

$$\frac{27213}{1667} = 16.3\ FTE$$

Nurses and other staff levels

Nursing staff

In analysing the number of nurses required, two approaches were employed. First, standards were defined based on the ratio of nurses to patients (based on safety and responsiveness criteria), separated by type of patient (or department). Second, benchmarks from OECD and EU countries were used. In the analysis, the results of the these methods were compared, and additional care model approaches were included to come up with a specific set of standards for Latvia that were applied within regions to determine nursing needs for 2020.

Nursing staff - Approach 1: Nurse to patient ratios

The specific hospital-based nurse to patient ratios suggested by international literature to ensure optimal patient safety and responsiveness are shown in the following table.

Table 7: Nurse to patient staffing ratios used for standards development

Hospital Unit	Nurse to Occupied Bed Ratios
Emergency Departments	**1 to 4**
Triage (RN only)	**1 to 1**
Paramedic Base Station Radio RN	**1 to 1**
Trauma	**1 to 1**
Critical Care patients	**1 to 2**
General Medical Surgical floor	**1 to 5**
ICU/CCU	**1 to 2**
Labour and delivery	**1 to 2**
Ante Partum (not active labour)	**1 to 4**
Post Partum (mothers)	**1 to 6**
Cuplets (moms and babies)	**1 to 4**
Combined Labour and delivery	**1 to 3**
Mixed Units	**1 to 6**
Neonatal ICU (RN's Only)	**1 to 2**
Operating Room	**1 to 1**
Paediatrics	**1 to 4**
Post Anaesthetic Recovery Room	**1 to 2**
Specialty Care (Dialysis & Oncology)	**1 to 4**
Step down unit	**1 to 4**
Telemetry Unit	**1 to 4**
Well Baby Nursery	**1 to 8**
Behavioural Health and Psych Units	**1 to 6**
Long-term care	**1 to 8**

Sources: Sanigest Internacional

The standards shown above were then applied to each region, based on their specific discharge profiles, and projected forward to 2020 utilising the previously discussed population projections. For nurses in the primary care setting a ratio of two nurses per primary-care doctor was projected forward to 2020, while for outpatient specialist doctors a ratio of 0.5 nurses per doctor was used.

Nursing staff - Approach 2: Projections based on EU benchmarks

The second approach for estimating the future of nurses in Latvia in 2020 was based on the OECD average of 800 nurses per 100,000 population. Estimates were also made based on the levels of hospital activity and nurses across countries. The table below shows an overall average of .07 nurses per discharge.

Table 8: Nurse discharge ratios across the EU

Country	Nurses	Discharges	Nurse/discharge
Austria	52,795	1,627,438	0.032
Belgium	139,577	1,154,001	0.121
Croatia	23,852	383,711	0.062
Czech Republic	86,989	1,423,900	0.061
Denmark	51,787	676,874	0.077
Estonia	8,803	173,822	0.051
Finland	45,040	681,540	0.066

Country	Nurses	Discharges	Nurse/discharge
France	483,380	8,126,600	0.059
Germany	644,000	13,135,456	0.049
Greece	36,434	1,357,194	0.027
Hungary	90,889	1,481,604	0.061
Iceland	2,760	24,207	0.114
Ireland	67,245	320,444	0.210
Italy	413,000	5,545,884	0.074
Lithuania	24,804	586,306	0.042
Luxembourg	4,678	51,705	0.090
Poland	178,781	4,191,119	0.043
Portugal	50,955	683,614	0.075
Romania	85,785	3,179,352	0.027
Slovakia	34,038	591,112	0.058
Slovenia	15,361	205,168	0.075
Spain	322,600	3,138,891	0.103
Sweden	98,378	905,101	0.109
Switzerland	59,833	835,423	0.072
United Kingdom	284,578	4,626,195	0.062
		Average	0.073

Sources: Sanigest Internacional

Thus future nursing needs were based on the expected volume of hospitalized patients using the lowest projected volume of discharges of 342,000 cases in 2020.

Other medical staff

This category includes a wide variety of technical staff that assist in activities as patient care assistants (PCAs) ranging from radiography assistants to emergency room technicians. This is an important category as it takes pressure off nursing and physicians for the more “manual” tasks and allows for an optimization of the workforce.

It is a more difficult category to make final standards for because it depends on legal and policy changes in terms of the type of services that can be provided by assistants. However, an analysis was conducted to compare current Latvian levels of medical assistants to other EU and OECD countries. Finally, US-based benchmarks were used to create potential targets for Latvia moving forward.

2.2.11. Analyses utilised in health facility (infrastructure) & equipment planning

In estimating the health facility (infrastructure) and equipment needs for Latvia, all individual analyses began with the first step of an estimate of the demand for care by region and speciality in 2014, 2020 and 2025.

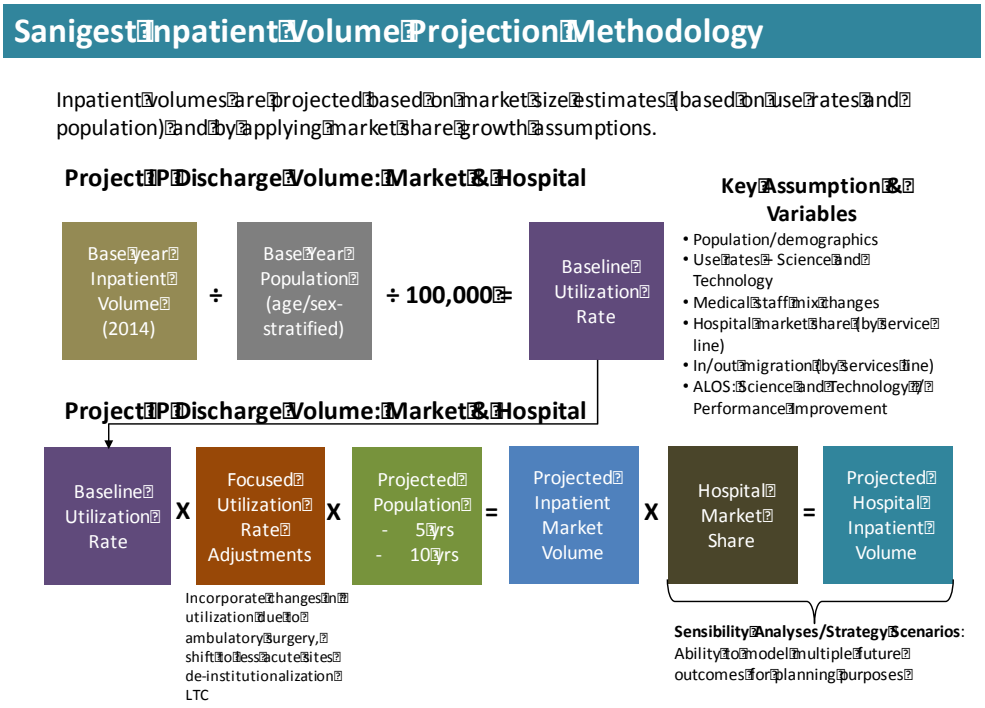
Estimate of demand in 2014, 2020 and 2025

Using the population projections outlined earlier and existing utilization rates, an estimation of healthcare demand was developed. The estimated demand for care in 2025 was calculated in the following way:

- Analysis of existing hospitalization and outpatient visit rates per 1,000 people by region and by specialty departments
- Preparation of a demand for care model with the following inputs:
    - Population estimation, as stated above
    - Hospitalization and outpatient visit current demand, as presented in the previous point
    - Adjustment of initial projections by incorporating age and geographic adjustors.
        - Children, elderly groups and women of child-bearing age have higher health service utilization rates than teenagers and adults. For that reason, regions with a higher proportion of those groups (as a share of the region population) will experience a higher demand for care.
        - Rural and remote locations will require a special adjustment to compensate for their specific needs.
    - Establishment of specific assumptions regarding ambulatory surgery (projected 25 percent increase in the share of ambulatory surgery by 2025) and use of modern practices.

The following figure summarizes the methodology used to project inpatient demand.

Figure 2 Inpatient volume projection methodology



Source: Sanigest International

Creation of bed standards and estimates for Latvia

To estimate the hospital bed needs for Latvia, information from the database of Hospital Beds Utilization (2009-2014) was used.

The following steps were followed after analysing the projected demand for hospital care:

1. Determination of current levels of beds per 100,000 population across regions and specialties
2. Review of international benchmarks and current best-practices in terms of volume standards and clinical practice
3. Proposal of the new set of standards regulating in-patient care arrangements

To complete Step 2, the team first reviewed international trends in terms of the rates of beds observed in other countries using the World Global Health Observatory database (World Health Organization), Eurostat and OECD, as well as compiling country-specific data from local institutes of health or research centres. The following table shows examples of the international beds / 100,000 rates across specialities in select European countries.

Table 9: Beds / 100,000 population in select countries

	UK	Sweden	Austria	Germany	Average
Bed Profiles	**165**	**208**	**331**	**382**	**289**
General Medicine	80	71	190	226	142
Accident and Emergency	1	n/a	n/a	n/a	1
Anaesthetics (including Intensive Care)	1	n/a	6	n/a	3
Cardiology	8	5	n/a	18	10
Child and Adolescent Psychiatry	1	65	70	74	52
Dermatology	1	n/a	12	7	7
Endocrinology and Diabetes Mellitus	1	1	n/a	2	1
Gastroenterology	4	n/a	n/a	13	8
Geriatric Medicine	56	40	25	11	33
Infectious Diseases	1	10	n/a	n/a	6
Medical Oncology	2	7	n/a	n/a	4
Neurology	3	5	28	23	15
Renal Medicine	4	2	n/a	4	3
Rheumatology	2	2	n/a	4	3

The analysis of Step 3 started with the existing bed days in Latvia by region and the desired standard for Latvia based on best-practices. The main assumptions included: (a) an increase in ambulatory surgery, reflected by a 25 percent increase in the share of ambulatory surgery; (b) continuing reductions in general medicine beds due to a reduction in ambulatory care sensitive conditions and a further shift to day care and home care; (c) de-institutionalization of long term care patients as mental health and substance abuse cases can increasingly be treated in community based care settings; and (d) projected increases in the birth rate and subsequent increases in paediatric cases. In this scenario, an occupancy rate of 85 percent was targeted for most specialties with the exception of obstetrics which was lowered to 75 percent.

After completing the estimation of the previous values, the next step was a review of best-practices in hospital care – in particular, international standards for access considerations, an efficient volume of services and related inputs (for instance, Neonatal ICU beds), and recommended clinical practices (for example, productivity indicators such as the minimum level of surgeries per physician per day and minimum beds per department).

Figure 3. Example of international standards considered for Latvia

Volume thresholds	Per Center
Abdominal aortic aneurysm (AAA) repair	30
Abdominoperineal resection (APR)	>109
Carotid endarectomy (CEA)	100 (dropped volume limit in 2005)
Coronary angioplasty	400
Coronary artery bypass (CABG)	>450
Cystectomy (total)	11
Esophageal resection	13
Esophagectomy	7
Coronary transplant	9
Kidney transplant	25
Knee anthroplasty (total)	50
Liver transplant	20
Lower extremity arterial bypass	20
Nephrectomy	33
Pancreatic resection (pancreatectomy)	11
Percutaneous Cardio Interventions (PCI)	400
Prostatectomy (radical)	60
Stem cell transplant	25

Volume thresholds	Per Center
Births (regional perinatal center)	8,000
Cardiac care	500
Stroke care	20
Cervical cancer screen	20000 (preferably 50,000)

Source: Sanigest Internacional

Creation of equipment standards for Latvia

The approach to estimating the medical equipment needs for the healthcare facilities network can be categorized as a five (5) stage process

1. Definition of major medical equipment units to assess
2. Estimation of existing equipment levels at facility and regional level
3. Development of equipment standards per 100,000 populations for Latvia
4. Estimation of major medical equipment needs
5. Distribution of additional units to the appropriate facilities

Definition of major medical equipment list

The major medical equipment (MME) list was developed based on the estimated diagnostic and preventive needs of the population and are directly related to the four (4) diseases with the greatest burden of disease: cardiovascular diseases, diabetes, cancer and neuropsychiatric conditions. The list is further restricted by the following criteria:

- High-cost units directly linked with treatment and diagnosis that represent the highest financial burden to healthcare systems,
- Information on availability and international population-based standards.

Estimation of existing equipment levels

The analysis was based on data obtained from the most recent facilities survey provided by the World Bank through a data request sent to representatives of 41 hospitals. A total of 34 facilities provided details on the equipment capacity of the specific equipment list, with the addition in some cases of equipment other than what was on the list, but the list was kept to the original 49 units for which there are standards available. The information was categorized by region in order to obtain the total number of units per region for each equipment.

The list of equipment reported on by the hospitals is presented below:

Table 10: List of reported equipment

Devices List			
Anesthesy Unit	Developing machine AGFA CURIX	Laparoscopy Unit	Sterilizer, Ethylene Oxyde
Angiography, digital unit (DSA)	Echograph, general purpose	Laser apparat ALTO-0,5	Sterilizer, Plasma
Angiography, Ophthalmology	Echograph, Mammography	Laser, Surgical	Sterilizer, Steam
Apparatus ED-410	Echograph, Ophthalmologic	Linear Accelerator	Surgical Lamp, ceiling
Apparatus for electro therapy seizures	Electrocardiograph	Lithotripter, Extracorporeal	Tonometer, Electronic
Aqua distiller DE-4	Electroencephalograph	Mammography Unit	Ultrasonograph Sonoace with probe
Arthroscopy Unit	Electromyograph	Med.patient monitor PM-8000	Ultrasound diagnostic equipment
Automatic biochemical analyzer Cobas Mira	Endocavital probe	Microscope, Electronic	UV sterilizer
Automatic defibrillator Biphasic HeartOn A10	Endoscope, flexible	MRI - Magnetic Resonance Imaging	Ventilator, Adult
Biochemical analyzer Cobas C111	Endoscopic Unit	Negatoscope QUAL"X	Ventilator, Neonatal
Blood Gas Analyzer	Endoscopy, Video System	Neuro machine Malahit	Ventilator, Pediatric
Blood pressure measurement OMPON	Extracorporeal Unit	Operating Table	Visual diagnostic apparatus DUO Diagnost
BRAND FIT TEST APARAT Fit Test	Gamma Camera	Patient Monitor	Water Purification System
Cardiograph Cardio M plus	Hematology Analyser	Perfusors Sy-O ARGUS600	X-Ray Fluoroscopic Unit, Image Intense
Clinical Chemistry Analyzer	Hemodialysis Unit	PET scanners	X-Ray Hemodynamic Unit
CT Scanner	Incubator, Infant	Ppparatus Tonuss-2	X-Ray Unit
Defibrillator/Monitor	Incubators, Infant, Intensive Care	Refrigerator, Blood Bank	X-Ray Unit, Mobile, Image Intense
Dental equipment	Laboratory centrifuge CM-6M	Sensitometrs / Densitometer	CT Scanner + angiography
Dental Unit	Laboratory centrifuge LMC-3000	Slit Lamp	Tonometer, Mehanic

Development of equipment standards

The equipment standards were developed based on the median levels of equipment available in 31 OECD countries since 1980 modified according to context-specific epidemiological projections, current demand in Latvia, and clinical best practice. Details on the estimation of each standard are included in Annex 9. A few examples of their development are as follows:

- Anaesthesia Unit (10 per 100 thousand): A typical anaesthesia unit can do on average of 3 surgeries per day for 260 days or 780 per year, with an expected number of surgical procedures of between 5 to 8 thousand per 100,000.
- Gamma Camera (1 per 100 thousand): This is based on the expected scans per 100 thousand from OECD/EU statistics and capacity of machine.
- PET scans (0.1 per 100 thousand): This is based on the expected scans per 100 thousand from OECD/EU statistics and capacity of machine.

Estimation of MME needs

The projected needs of equipment were estimated using population projections for each region, which were calculated using information from the Central Statistical Bureau of Latvia. The population data showed negative population growth rates for all regions, with an average of negative 0.19% for 2015. The growth rates for 2015 were then kept constant for the projection per region to 2020 and 2025. The total estimated population was then used to estimate equipment needs and subsequently any additional units required to meet the international benchmark using the following formulas:

1. $Equipment_{NEED} = \frac{Population_{2025}}{100{,}000} \times Standard$
2. $Gap = Equipment_{NEED} - Current\ Capacity$

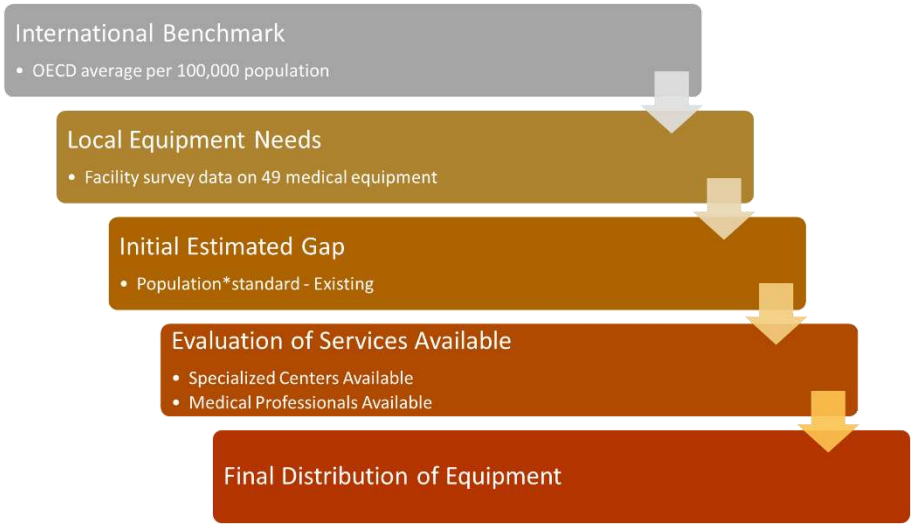
The gap was estimated for both 2020 and 2025, using the amount for 2025 to estimate investment needs.

Distribution of additional MME

The distribution of additional equipment to specific facilities was then guided by the actual facilities that already offer the services, that have current solving capacity, and that see the

highest number of patients, with a few modifications due to the objectives of centralization/regionalization. The process is summarized in the following figure.

Figure 4: Process for defining location of new equipment



Source: Sanigest Internacional

Infrastructure estimates

As with the equipment information, estimates of current infrastructure investments were derived from data obtained from the 34 surveyed hospitals. The infrastructure investment information request was in the following format and includes the variables described below.

Table 11: Information request

Requested Information	*Data*	Observations
Year constructed		
Size (in m^2)		
# of buildings		
Number of beds		
2016 - m^2 renovated / atjaunotā platība kv.m.		
2016 - renovation Investment (in euro)		
2015 - m^2 renovated		
2015 - renovation Investment (in euro)		
2006 - m^2 renovated		
2006 - renovation Investment (in euro)		

The Master Plan approach for analysing the need for infrastructure changes and future investments looks at several dimensions, including:

1. Review of the age of buildings and refurbishment over the past 10 years.
2. Analysis of existing bed capacity and the projection of bed needs based on service need estimates into the future.
3. Application of benchmark standards by specialty and changes in key assumptions such as average length of stay and ambulatory surgery rates, to estimate the future need for beds.
4. Proposals for shifting the balance between acute care beds and long term care beds

and ambulatory services that should reduce the need for acute care beds.

The following steps were followed:

Step 1: Generate database with information obtained from the institutions of Latvia.

Step 2: Analysis of investment in infrastructure by hospital during 2006-2016.

Based on the information available the following variables were estimated:

- Total investment by hospital during the time period available.
- Total investment by region during the time period available.
- Total investment per capita by region using the 2014 population.
- Total square meters renovated and size of hospitals, by region.
- Average age of buildings and elapsed time since the last renovation.

All analyses cover two time periods: the years 2006-2010 and 2011-2016.

Final methodological considerations

The final estimates outlined in the Master Plan incorporate a number of other factors in the planning scenarios to estimate future need. These are generally considered as either demand or supply side based factors. The key issues are outlined below. These factors go beyond the changing demographics and consider other factors that could have a major impact on the demand for care to 2025.

Lifestyles

Like many western countries, Latvia's lifestyle is changing. The increase of adverse health indicators such as the growth in obesity and alcohol consumption as well as an increase in stress related diseases, such as high blood pressure and heart problems, asthma, obesity, diabetes, headaches, depression and anxiety. Gastrointestinal problems and Alzheimer's disease will all impact Latvia health need into the future. Latvia has some of the lowest consumption of fruits and vegetables in the EU, and as in many other Western countries, the BMI of the Latvia population increased dramatically from 2000 to 2010. This will result in chronic diseases, such as diabetes, becoming more prevalent.

The health market

Like any other, the health industry is subject to changes in the market. This includes:

- Health and technology innovation, which change the scope of treatments
- Unmet demand, such as existing outpatient waiting lists or demand not met because of financial barriers to access
- Patient expectations, which change how consumers access the health system and the demand for technology (drugs and devices).

Health innovation

There are increasing innovations in health technology and a shift to more mobile technology. Within five years it is likely that the smartphone will provide physicians with ECGs, Ultrasounds and lab tests. Clearly, technology over the last twenty years has facilitated a move towards less intensive and invasive care often completed in outpatient settings. It is

likely that this general trend will continue to 2025 with changes in diagnostic and treatment technologies, rather than policy interventions, allowing conditions to be managed in settings other than inpatient beds.

- Innovation in clinical care could either increase or decrease utilisation of health services. New technologies, procedures and medicines all contribute to increasing the number of conditions that are treatable. Many ulcers today are treated with medications whereas a decade ago they were surgically treated.
- Further, how they are adopted across Latvia depends on a multitude of factors including funding, regulation and clinical practice patterns. NHS now pays a number of procedures on the assumption they are done as day case. This has contributed to the day case rates for these procedures increase in hospitals.
- Many of the innovations will be key drivers in achieving the goals outlined in the Master Plan to reduce hospitalization and shift to less invasive procedures that will allow for shorter lengths of stay. The key innovations likely to impact Latvia acute bed requirements between now and 2025 highlighted by stakeholders and international peer review are summarised in the following table.

Table 12: Overview of key innovations

Innovation	Impact on acute provision	Overview
Minimally invasive approaches to diagnosis and treatment	Should reduce demand for acute beds	**Less invasive procedures require a shorter recovery time. Continuing development of "minimally" and/or less invasive approaches to surgical procedures (lap chole, hip replacement, thoracic surgery, open-heart surgery) and diagnosis (Fast CT, PET) will support reductions in length of stay and the shift of care from inpatient to outpatient settings.**
Replacement of surgery with medical therapy	Could reduce demand for acute beds	**Medical and pharmaceutical treatments have replaced some surgical interventions. Within cardiovascular care, for example, the widespread use of statin drugs together with the use of angioplasty and drug-eluting stents may eventually replace a substantial portion of open heart surgery. Advances in treatments now enable administration of some chemotherapy drugs, intravenous antibiotics or long-acting drugs for long-term conditions, outside of the hospital.**
New inpatient surgical procedures – proliferation of devices	Could cause both reduction and increase in demand for acute beds	**There are many new implantable devices that may boost intervention rates (such as ventricular assist devices, artificial hearts, insulin pumps, bio-artificial livers) and support care outside the hospital (monitoring devices).**
New imaging technologies	Could cause increase in demand for acute beds	**New imaging technologies such as virtual colonoscopy and CT heart scans, may dramatically increase the number of people screened and the volume of abnormalities identified and treated.**

Innovation	Impact on acute provision	Overview
Advances in telemedicine	**Could reduce demand for acute beds**	**Developments in information technology now mean that monitoring patients at home is now a practical alternative to keeping people in hospitals. This is particularly important with the ageing population. Remote consultation and monitoring, combined with the emergence of the expert patient could reduce dependence on acute care.**

Patient expectations and unmet demand

The Ministry of Health or the National Health Service can introduce innovation to strengthen primary health care and further reduce hospital demand. For example, the United States and the UK use urgent care or walk-in centres to keep people out of the emergency room and reduce waiting times. Establishing more capacity in the outpatient centers in at least all National Development Centres will have an important effect on reducing unnecessary hospitalization.

Incorporating health demand

Predicting the changes in health demand due to market influences is extremely difficult. It is the composite of dozens of health innovations and changes in how each individual chooses to access health services. Paediatric utilization rates in Latvia, for example, are 4 times higher than in the US. How fast Latvia can adjust to the best practice standard however is relatively unknown.

Given the uncertainty, the approach outlined in the report uses micro data from Latvia and trends seen in other countries. Changes in health demand due to key drivers are therefore incorporated in a number of ways;

- A cumulative increase of 20 percent in births by 2025 due to the increasing trend in total fertility.
- An increase in the elderly and the paediatric populations and slightly lower population decreases than official statistics.
- To meet international targets for best practice, the following actions have been built into all models of the new hospital network:
    - A decrease in the ALOS by 25% for all specialties with particular emphasis in surgery, TB and shifting from acute to non-acute, long-term care.
    - An increase ambulatory surgery to 25% of all surgery cases.
    - An increase in access to non-hospital based abortions, through improvements in ambulatory techniques and pharmaceutical alternatives.
    - A decrease in ambulatory care sensitive conditions to less than 10 percent of admissions

3. The current state of the Latvian health system

The analysis of the current state of population demographics, healthcare facilities, patient activity patterns and medical equipment sets the foundation for demand and capacity planning for healthcare infrastructure.

Table 13: Summarized estimated current utilisation of healthcare services (2014)

	2014
Profile	
Total Population	1.997.745
Births	21.543
Paediatric Population	310.000
>65 population	391.000
Key Output	
Total Hospitalizations	357.462
Cardiovascular	55.029
Oncology	31.940
Obgyn	34.705
Paediatrics	39.925
Mental health	36.430
Beds by specialty	
Medical Specialities	2.628
Obstetrics and Gynaecology	542
Paediatric	856
Surgical Specialties	2.673
Long-term care	1.664
Mental Illness and Disabilities	2.101
Total Acute Beds (preferred scenario0	8.492
Total Mental health and LTC	2.741
Total Beds	11.233
3.1.1.	***3.1.2.***

Source: Sanigest Internacional

3.2. Population

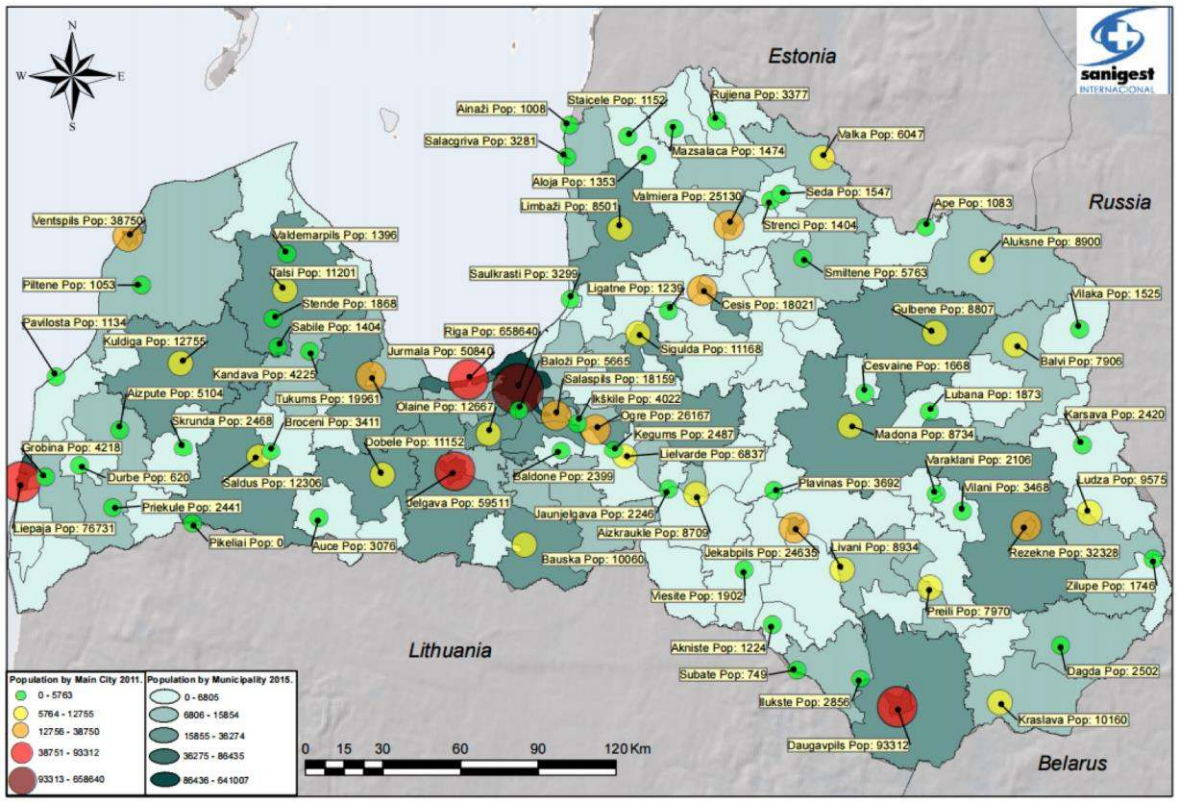
According to the population count published by the MDPS, the population of Latvia, as of 31 May 2014, was 2,174,035 (MDSP, 2014). However, the most recent census with detailed

demographics of Latvia was published in 2010 with a total population count of 2,070,371 (QSA, 2010). The Latvia 2010 Population and Housing Census (Latvia Census 2010) has been used in to describe the current population demographics.

3.2.1. Population by geography

Latvia's population may be geographically divided in several ways. Officially, Latvia is divided into six regions: Riga, Kurzeme, Vidzeme, Zemgale, Pieriga and Latgale. As shown on the map below, Riga Municipality accounts for 31 percent of Latvia's population, followed by Daugavpils City, which accounts for 5 percent.

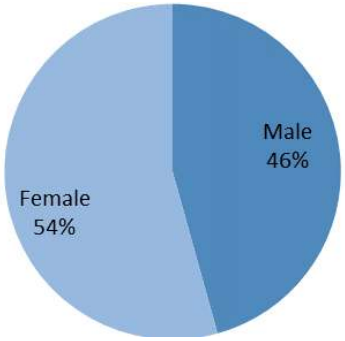
Figure 5: Map of Latvia's population by municipality



3.2.2. Population by gender

In Latvia, according to Census 2011 males make up 46 percent of the total population as shown in the figure below.

Figure 6: Latvia population by gender

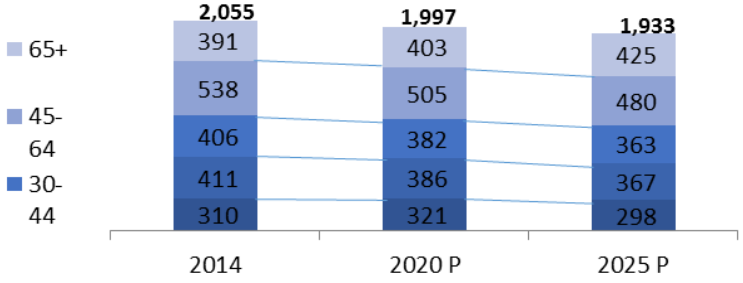


Source: Data from Census 2011

2.1.1 Population by age group

The vast majority (67 percent) of Latvia's population belongs to the 15-59 age group, compared to those aged 0-14 (14 percent) and seniors aged 60 and above (18 percent).

Figure 7: Latvian population by age group (thousands)



Source: Data from Census 2011

3.3. Acute Hospital Care

3.3.1. Healthcare Facilities

This section provides an overview of the existing major acute hospital healthcare facilities in Latvia, based on available data. The data was largely collected from providers.

In order to forecast the future supply of healthcare service delivery, it is important to acknowledge the major planned healthcare facilities in the country. Planned facilities are of two types:

- Facilities that are categorized by the Healthcare Facilities Licensing Department as being "under construction", which means that the applicant has received approval to start developing their facility.
- Facilities that are not reported within the Healthcare Facilities Licensing Department's list of "under construction", but which are known through official sources to be in strategic or physical development

The following table includes details of the facilities and services provided and considered in the Master Plan.

Table 14: Facilities providing acute inpatient services in Latvia

Inpatient services	*3.3.2.*
• Kuldīga Hospital	• Riga 2nd Hospital
• Liepaja Regional Hospital	• Riga East Clinical University Hospital
• Prielukes Hospital	• Riga Maternity Hospital
• Saldus Medical Center	• University Children's Hospital
• Ziemeļkurzemes Regional Hospital	• Traumatology and Orthopedics Hospital
• Daugavpils Regional Hospital	• Alūksne Hospital
• Krāslava Hospital	• Balvi and Gulbene Hospital Association
• Līvāni Hospital	• Cēsu Clinic
• Ludza Medical Center	• Madona Hospital
• Preiļi Hospital	• Smiltene Red Cross Hospital
• Hospital Jurmala	• Vidzeme Hospital
• Ogre District Hospital	• Aizkraukle Hospital
• Sigulda Hospital	• Bauska Hospital
• Tukums Hospital	• Dobele Hospital
• Pauls Stradiņš Clinical University Hospital	• Jēkabpils Regional Central Hospital

Inpatient services	*3.3.2.*
	• Jelgavas City Hospital

Source: Provider data

The table below shows the latest number of available beds in all acute hospitals (contracted and non-contracted), by bed type classification (mental health and long term care are examined later).

Table 15: Total number of beds by specialty

Bed Profile	Total Beds
Medical Specialities	2.628
Paediatric	1.126
Obstetrics and Gynaecology	542
Surgical Specialties	2.673
Pathology and Radiology	499
Overall	**11.233**

Source: Data from providers

Table 16: Classification of inpatient beds

Beds Profile	Adult / Paediatric	Male / Female	Includes invasive monitoring capability	Ratio of nurse to patients ≤ 1:2	Expected ALOS ≥ 24 Hours	Includes hospital infrastr. (diagnostic & treatment)	Includes fixed head wall	Comments
General medical/surgical beds	Adult	Both	No	No	Yes	Yes	Yes	All specialties & conditions requiring hospital infrastructure excluding Paediatrics, OBSGYN, Psychiatry and PRM
Obstetrics and gynaecology beds	Adult	Female	No	No	Yes	Yes	Yes	All women at all stages of delivery cycle (antenatal & postnatal) excluding actual delivery
Paediatric beds	Paediatric	Both	No	No	Yes	Yes	Yes	All non-adults that do not require intensive care
Wellness and rehabilitation beds	Both	Both	No	No	No	No	No	Rehabilitation including Physical and Neurological conditions
Psychiatric/behavioural health beds	Both	Both	No	No	Yes	No	No	Includes Psychiatry for substance abuse post-acute phase
Skilled nursing and geriatric beds	Adult	Both	No	No	Yes	No	No	Includes all non-rehab, sub and post-acute
ICU beds	Adult	Both	Yes	Yes	Yes	Yes	Yes	All specialties & conditions requiring ≤ 1:2 nurse to patient ratio + invasive monitoring. Patient completely unable to care for themselves
NICU/PICU beds	Paediatric	Both	Yes	Yes	Yes	Yes	Yes	Excludes nursery cots (non-licensed) Includes incubators (licensed) Excludes all normal births

Source: Sanigest Internacional

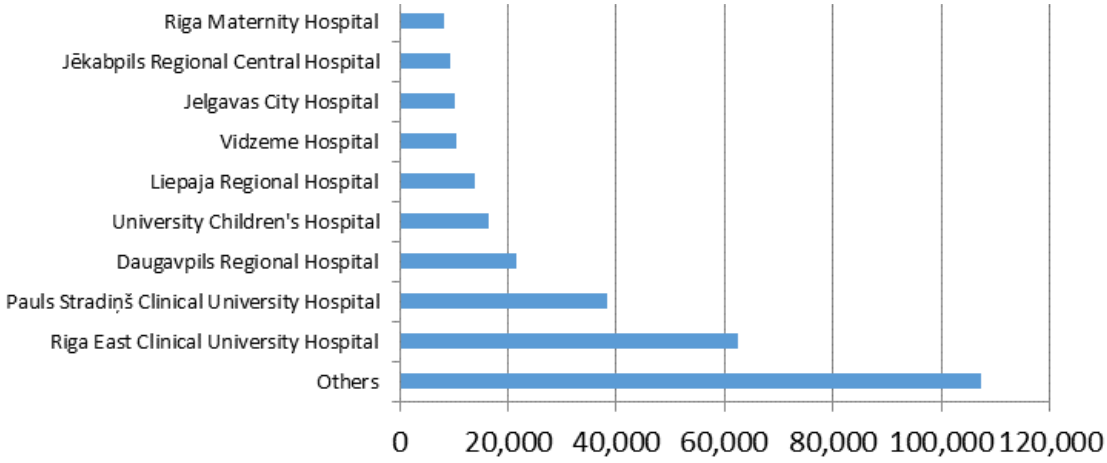
3.3.3. Inpatient activity

This section of the report provides an overview of the inpatient activity in Latvia in 2014. Inpatient admissions are services that require patients to stay in a hospital, a rehabilitative or residential care facility for 24 hours or more. Data from 2014 was used because that was the most recent year with comprehensive data available from providers on the number of inpatient admissions by specialty, diagnostic tests, and treatments by type.

Inpatient admissions by provider

Data collected from providers indicate that the total number of inpatient admissions reported in contracted facilities for 2014 was 305,319. As demonstrated in the graph below, the data show that nine facilities account for more than two thirds of all hospital admissions, led by Riga East Clinical University Hospital as the major provider of inpatient services in Latvia with approximately 20 percent (62,384) of the total activity reported in that year.

Figure 8: Total inpatient admission by hospital (top nine)



Source: Sanigest Internacional Analysis

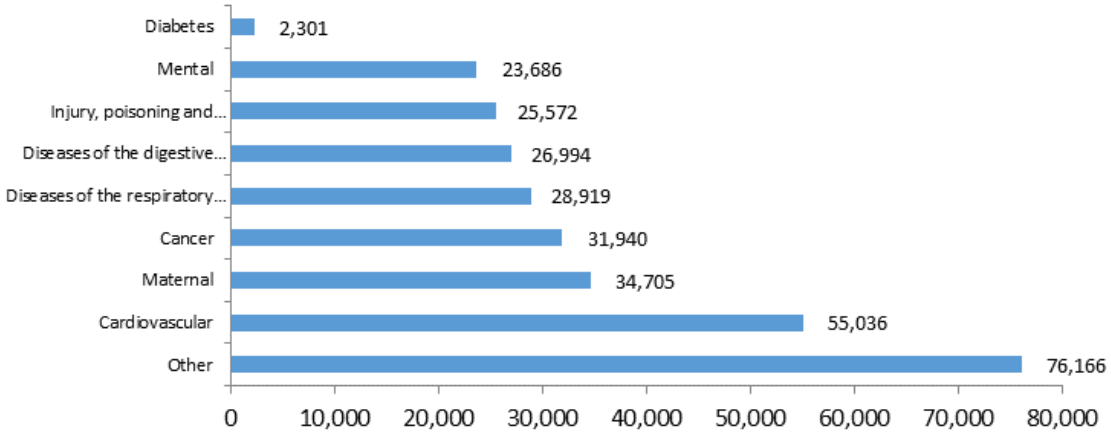
Pauls Stradins Clinical University Hospital was the second biggest provider, covering 11 percent of the activity reported in 2014, followed by Daugavpils Regional Hospital which accounted for 7 percent of total inpatient activity in 2014.

Inpatient admissions by specialty

As shown in the following graph, 18 percent (55,036) of inpatient admissions reported in 2014 were for a cardiovascular diagnosis, followed by 11 percent (34,705) for a maternal condition, and 10 percent (31,940) cancer patients.

Only 2,301 cases were for diabetes in 2014. This may be due to misreporting of patient statistics and grouping of patients under broad specialties also must be noted that in some cases management of diabetes in the hospital is generally considered secondary in importance compared with the condition that prompted admission. Similarly, Emergency Medicine, Endocrinology, Skilled Nursing and Geriatrics, and Interventional Radiology patients reported no activity according to 2011 data.

Figure 9: Inpatient activity by disease (main diseases in 2014)



Source: Sanigest Internacional analysis

Combined, the main diseases account for 48 percent of all inpatient activity.

3.4. Ambulatory and outreach care

3.4.1. Healthcare facilities

This section provides an overview of existing outpatient healthcare facilities in Latvia. The following table includes details of the facilities and services provided and considered in the Master Plan.

Table 17: Facilities providing outpatient services in Latvia

• The outpatient departments of hospitals. • Primary Health Care Corporation Health Centers • Ministry of Interior health canters. • Rigs SCH primary health care centers operated by Latvia Red Crescent Society • Various private health centers and clinics located throughout Latvia.

3.4.2. Outpatient activity

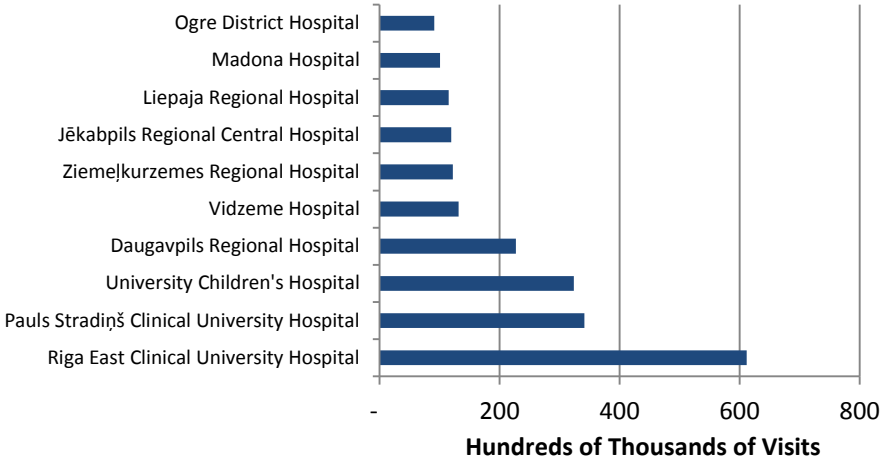
This section of the report provides an overview of the outpatient activity in Latvia in 2014. Outpatient services are defined as services provided to patients through the outpatient department at hospitals and through health centers/ clinics in the community where no overnight stay is involved.

Outpatient visits by provider

The number of outpatient visits reported in 2014 totalled more than 13,481,872. Data collected from providers indicates that Riga East Clinical University Hospital received the highest number of patient visits in 2014 - proximately 5 percent of the activity reported for that year.

As is defined in Latvia Public Health Strategy[7] the number of outpatient visits to a primary health care doctor must be 3.2 per one patient annually, as well as 2.8 visits per patient annually for medical specialists. The total number of outpatient visits is projected to reach 12,880,839 in 2020 and 12,414,607 in 2025. Figure 13 displays the top ten outpatient visits by hospital for the years 2020 and 2025.

Figure 10: Outpatient visits per hospital (top ten)



Source: Sanigest Internacional Analysis

3.5. Emergency / urgent care services

The Emergency Medical Systems are a crucial part of a complete healthcare plan, but normally it doesn't receive the necessary attention. Even in modern societies is a service that is given for granted, but considering the amount of lives that can be saved by its existence, it has to become an important focus of research and funds even for poor settings regions (de Ramirez et al., 2014). Furthermore, there's an increase in the usage of this service around the world, demanding a better response from the system, using standards of practice and training (Page et al., 2013)

Specifically, the ambulance EMS is a service that provides pre medical service and transportation and its performance is measured on the efficiency of the service (Hafiz et al., 2013). The Ambulance service also is an integral support for the Referral system of the health care network in any given country, region or city. Therefore, the ambulance service has to be able to get to a specific location in time and provide the proper first aid or specialized care.

Since 2010, Latvia had a major change in their EMS service by making a unified system of providers of EMS under the name of SEMS. The aforementioned change allowed a unified approach of the service with common regulations and a set of benefits that can be summarized as:

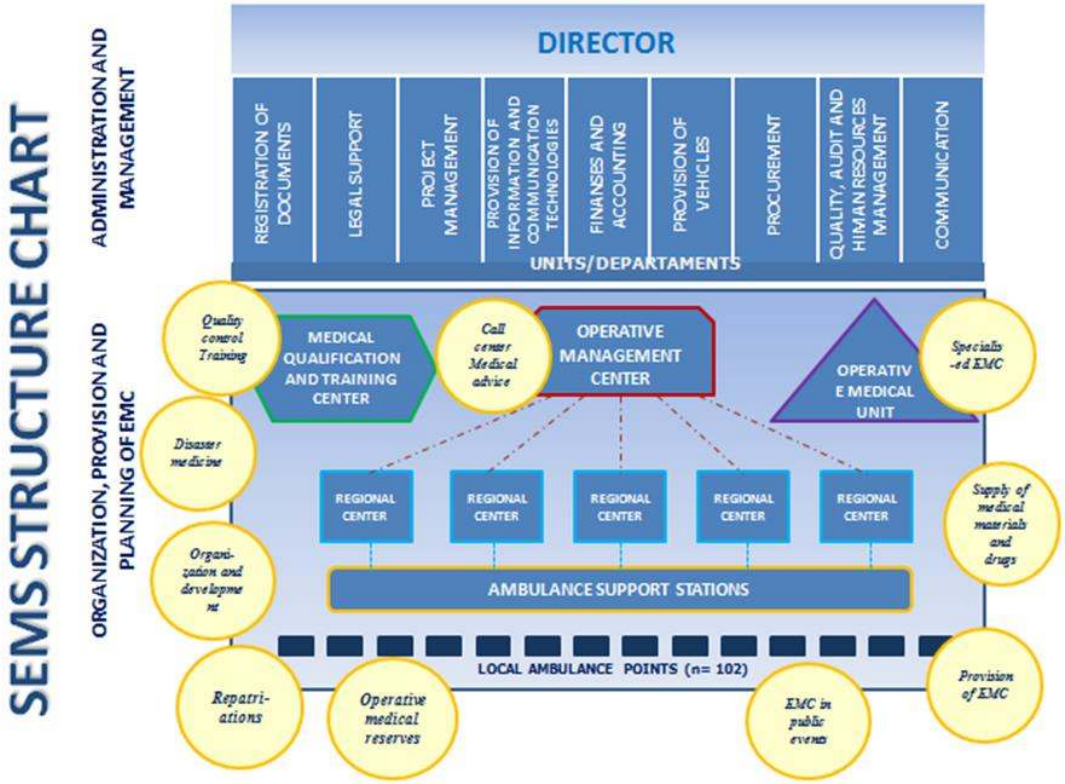
- Better communication between crew teams and the emergency hospitals
- Faster transportation to a medical center
- Unified equipment, information system, medical records, administration, quality management, regulations and guidelines.

[7] Ministry of Health of the Republic of Latvia. Public Health Strategy for 2011-2017, adopted by Cabinet of Ministers order No. 504, dated 5 October 2011

By the years of 2011-2012 they were granted the internationally certified quality management system ISO 9001:2008 (certified areas - disaster medicine, specialized emergency care and pre-hospital emergency care).

The whole EMS system is controlled by the SEMS, a state agency institution under the direct control of the Ministry of Health, which consists of five call centers that receives calls from all over Latvia and dispatches emergency crews. The structure and the organization of the SEMS can be reviewed in the following figure.

Figure 11: EMS structure in Latvia



Source: SEMS, 2015

The medical personnel are employed by the agency and the vehicles are owned or rented to other private companies. For 2015, the estimation was of a 50:50 ratio between the private ambulances and the ones owned by the SEMS. All the vehicles are staffed by qualified personnel that consist in vehicle drivers (all trained as EMTs), physicians, nurses and assistants.

Finally, their whole system has some basic performance indicators that allow a system of EMS to be in constant feedback and perform a quality check. Some of these indicators are:

- Rate of ambulance visits per 1 000 population (funded by state)
- Response time interval (% in 15 minutes) in urban areas for highest priority cases
- Response time interval (% in 25 minutes) in rural areas for highest priority cases
- Average response time interval in urban areas for highest priority cases, minutes
- Average response time interval in rural areas for highest priority cases, minutes
- Number of ambulance localization points (at the end of year)
- Number of ambulances

- Average number of ambulances on duty per 24h
- Average number of ambulance visits per team in 24h
- Number of ambulance visits
- Number of ambulance visits resulting with patient transportation to hospital
- Percentage of ambulance visits resulting with patient transportation to hospital
- Number of patient transfers
- Percentage of patient transfers
- Percentage of ambulance visits when patient is found in health and life threatening situation
- Number of ambulance visits when patient is not found in health and life threatening situation
- Percentage of ambulance visits when patient is not found in health and life threatening situation
- Number of calls resulting with consultation
- Mileage of ambulance cars, km

3.5.1. Accident & Emergency visits

Ensuring rapid access to an emergency department for urgent care is an important component of any health care system. Patients accessing emergency departments are generally triaged according to a 5-point scale as follows:

- Level I – Immediate: life threatening
- Level II – Emergency: could become life threatening
- Level III – Urgent: not life threatening
- Level IV – Semi-urgent: not life threatening
- Level V – Non-urgent: needs treatment when time permits.

In Latvia there are both Emergency Departments located in higher level institutions as well as outpatient urgent care facilities which function for some patients as an urgent care facility for levels III, IV and V of the triage scale. The following table shows that for accident and emergency visits in the outpatient utilisation database, there were a total of 440,232 visits, which translates to a per capita rate of 22.0 visits / 100 population. This is less than half the US rate of 42 / 100 population and the rates for Canada (49/100) and lower than the 34 / 100 population in the UK. [8,9,10]

It should also be noted that in certain regions, the levels are extremely low, with Latgale only reporting 5.4 A&E visits per 100 population, compared to Riga with 35.0 visits per 100 population. This is likely an indication of low levels of access in some of the regions, potentially linked to the socio-economic status of those areas – Latgale being the lowest income area of the country. Periga's low levels are likely skewed with individuals accessing care in Riga, and Riga's may be higher than expected for their population due to visits there being reflective of residents of both Riga and Periga.

[8] CDC/NCHS, National Hospital Ambulatory Medical Care Survey 2010 Summary Tables
[9] Canadian Institute for Health Information, Health Care Cost Drivers, April 28, 2011
[10] http://www.nhsconfed.org/resources/key-statistics-on-the-nhs accessed on August 6th, 2014

Table 18: Accident & Emergency visits in Latvia (2014)

Location of A&E Dept:	# of Visits	Rate per 100 population
Latgale	15,543	5.4
Periga	23,509	6.4
Kurzeme	52,661	20.5
Vidzeme	43,536	21.6
Zemgale	80,139	32.8
Riga	224,844	35.0
Total Latvia	**440,232**	**22.0**

Source: Analysis of Outpatient Database

Recommendations for future analyses of A&E visits

This initial analysis provides only an overview of emergency visits in Latvia. It is recommended in the future that additional data be analysed to see not only patients who receive care at the ED but also those who leave the ED without being seen (LWBS), as it is an important outcome-orientated measure of impaired access to emergency care. The outpatient database provided a diagnosis code for every visit, indicating that individuals who showed up at the Emergency Department and left without being seen were not registered in the database – which could partially account for the lower than expected number of visits. For example, in Australia the rate in 2003-2004 was 5.2% (Institute of Health and Welfare 2005). In Canada estimates based on single-facility studies are 1.4% (Fernandes et al. 1994) and 3.6% (Monzon et al. 2005). Baibergenova et al. 2006 found that 3% of patients who went to Ontario EDs in 2003–2004 left before being seen by a physician. A multi-facility study of 9.2 million ED visits to 262 hospitals in California showed that the percentage who left without being seen varied greatly over hospitals, ranging from 0% to 20.3% (median of 2.6%)[11]. It could be helpful in further analyses to examine the proportion of patients who are leaving EDs in Latvia without being seen.

According to reported evidence, patient- and hospital-related issues result in patients leaving the emergency room. Patient centred reasons could be due to acute psychological distress at the time of visit (Weissberg et al. 1986), pressing commitments elsewhere (Fernandes et al. 1994), perceived poor communication with staff (Fernandes et al. 1994; Arendt et al. 2003) and low acuity with spontaneous resolution of symptoms while waiting. A hospital-related factor identified in many studies is prolonged waiting time to see a physician (Baibergenova et al. 2006). Unfortunately there is no data on waiting times to receive care in Latvian EDs.

3.5.2. Emergency transport services

The main goal of Emergency Medical Services is to provide treatment to patients in need of urgent medical care and/or to transport the patient to another facility of definitive care. As of 2015, the Ministry of Health reported a total of 194 ambulances distributed in different locations around the country. The locations are divided in Regional Management and Dispatch Center, District Ambulance Support Station and Locale Ambulance Point.

Table 19: Ambulance distribution

Structure	Number of Locations	Number of Ambulance Teams
Regional Management and Dispatch Center	5	72

[11] Hsia RY, Asch SM, Weiss RE, et al. Hospital Determinants of Emergency Department Left Without Being Seen Rates. Annals of emergency medicine. 2011;58(1):24-32.e3. oi:10.1016/j.annemergmed.2011.01.009.

District Ambulance Support Station	15	51
Locale Ambulance Points	101	71
Total	**121**	**194**

Source: Sanigest International with SEMS data (2014)

The following table provides standardizes emergency response rates for the different regions.

Table 20: Service activity in Latvia (2014)

Region	# of Emergency Reponses	Rate per 100 population
Periga	12,155	3.3
Kurzeme	20,580	8.0
Zemgale	23,105	9.5
Latgale	32,885	11.5
Vidzeme	24,086	12.0
Riga	117,866	18.3
Total Latvia	231,914	11.6

Source: Analysis of SEMS Database

As with Accident and Emergency visits analysed before, there is large regional variation in the number of emergency service transport runs – from a low of 3.3 / 100 population in Periga to a high of 18.3 in Riga. That compares with some international levels of activity shown in the table below. Differences in protocols and other factors mean these comparisons are simply provided for context. As can be seen, with just under 12 responses per 100 population, Latvia actually is very similar to many of the jurisdictions with available data.

Table 21: Service activity in selected jurisdictions (2008)

Jurisdiction	# of Emergency Reponses	Population	Rate per 100 population
New Zealand	320,000	4,200,000	7.6
Wales	269,108	2,900,000	9.3
East Midlands	468,656	4,600,000	10.2
Scotland	520,460	5,000,000	10.4
British Colombia	530,000	4,300,000	12.3
South Australia	216,000	1,500,000	14.4
Queensland	698,000	3,900,000	17.9

Source: The New Zealand Ambulance Service Strategy 2008[12]

However, another factor –which the database does not allow analysis of – is the number of emergency calls which are not responded to, based on the fact they are not "urgent" calls. In an article in 2014, it was estimated that "Of 1,200 emergency calls made each day, half of the patients are left at home, meaning they did not need to go to hospital..."[13] If the estimate of 1200 / per day is correct, that would coincide with 50% actually being left at home, as the reported number of actual transports (231,914) would be just less than 53% of the 438,000 estimated calls per year. State Emergency Medical Service spokeswoman Ilze Beča did note that a system was introduced in 2012 to contact the family doctor of patients who called an ambulance more than five times a month, and that was providing some improvement.[14] It

[12] New Zealand Ambulance Sector Office. 2008. *The New Zealand Ambulance Service Strategy: Getting it done!* Wellington: National Ambulance Sector Office.

[13] www.rebaltica.lv/en/investigations/health_in_latvia/a/1066/latvia's_unhealthy_healthcare_system.html

[14] www.rebaltica.lv/en/investigations/health_in_latvia/a/1066/latvia's_unhealthy_healthcare_system.html

would be useful to conduct further analysis to better determine how emergency calls are being responded to at this point.

The table below shows, for 2014, the number of people who had more than one ambulance run. As can be seen, almost 25,000 people had two ambulance transports, over 2200 had five or more transports and almost 250 people had over 10 ambulance runs throughout the year.

Table 22: Multiple ambulance runs per person (2014)

# of Ambulance Runs in 2014	# of People
1	137,295
2	24,970
3	6,567
4	2,379
5	979
6	471
7	268
8	157
9	93
≥ 10 runs	249

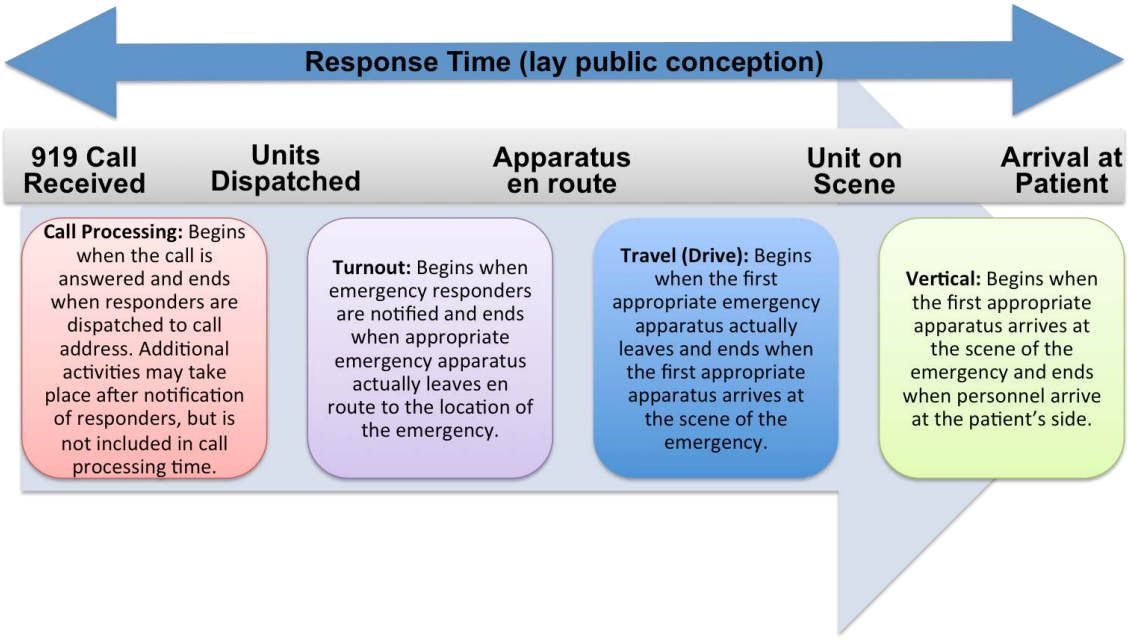
Source: Analysis of SEMS Database

Recommendations for future analyses of Emergency Transport Services

One of the most widely used performance indicators for EMS is total response time, which encompasses the time elapsed between the receipt of a call and the arrival of personnel at the patient´s side (see Figure 12). Response time is directly linked to the patient's survival probability, as brain damage occurs when oxygen flow stops for more than six minutes. (TriData, 2007). According to an OPALS study, reaching 90 percent or more of patients within 5 minutes resulted in a 12 percent increase in survival rate, when compared to the previously 8-minute target established in the 1990s (OSHA, 2009: Emergency Services Review: A comparative review of international Ambulance Service best practice).

The current Latvian database provided on Emergency Transport does not permit an analysis of how Latvia compares to international benchmarks, but it should be considered an important area for future review.

Figure 12: Total response time



Source: Based on TriData (2007). "Assessment of City of Alexandria Fire Department", Page 32

The following tables provide some context and include first response standards from the European Emergency Data (EED) Project, followed by some total response times from different international studies.

Table 23: EED project (Life-threatening emergency response time standards)

System	Time	Compliance
Copenhagen, Denmark	4:45	N/A
Genoa, Italy	8:00	N/A
Bonn, Germany	7:59	90%
Richmond, USA	8:59	90%
Ulleval, Norway	9:39	N/A
West Midlands, UK	8:00	75%

Source: OSHA, 2009

Table 24: Response time benchmark

	Average Response time (minutes)	Ground ambulance (%)
Nuevo Leon, Mexico	4.5	100
Victoria, Australia	18.7	58
Manchester, Yorkshire, Mersey, Trent, UK	7.8	70
King Country, UK	10	85
Montreal, Canada	9.8	100

Source: based on Roudsari, B.S. et al. (2007) "Emergency Medical Service (EMS) systems in developed and developing countries" *INJURY International Journal of the Care of the Injured.* Vol 38, 1001-1013.

Target response time must be adjusted to consider geographical setting and population density. As an example, the locally agreed US target for rural settings was 15 minutes for 90 percent of cases (OSHA, 2009). It is important to note that the first response by a basic life support (BLS) provider (to commence CPR) should be less than four minutes.

In addition to average response time for all ambulance runs, it is important to analyse response time by the type of service, since research shows that BLS should, on average, have a shorter response time, especially if followed by advanced life support (ALS). Alternatively, if serious medical emergencies are categorized as advanced life support and given priority, receiving the nearest ambulance, BLS categorized cases may have on average longer response time than ALS given limited number of ambulances and the probability of a unit being outside the area. This is the case with standard response times set in the City of Alexandria.[15]

Some of the best practices applied internationally which aim at increasing the efficiency of emergency services include:

- Reduce the response time of ambulances to the site of emergency. This through a health network more efficient and with better access times (scenario#2).
- Create an ambulance system more dynamic using your GPS, which enables the mobilization of units to areas of the city where there is a greater number of emergency calls.

An alternative method to evaluate ambulance services is the Unit Hour Utilization, which is estimated based on the number of transports per period of time divided by the number of unit hours for same time period. Besides measuring delays in runs, this may also signal to delays in other locations, such as queues at the hospital. Unit hour utilization, according to the OSHA report, was 0.2 in Canada, 0.31 in the US and 0.22 in Europe.

3.6. Mental and long term care

3.6.1. Healthcare facilities

This section provides an overview of the existing inpatient long term care healthcare facilities in Latvia, based on available data The following table includes details of the facilities and services provided and considered in the Master Plan.

Table 25: Facilities providing outpatient services in Latvia

Inpatient long term care services provided through nine contracted hospitals:
1. Daugavpils Neuropsychiatric Hospital
2. Child Neuropsychiatric Hospital "Ainaži",
3. National Rehabilitation Centre "Vaivari "
4. Riga Psychiatry and Addiction Centre
5. Piejūras Hospital
6. Straupe Addiction Hospital
7. Strenču Neuropsychiatric Hospital
8. Aknīstes Mental Hospital
9. Hospital Ģintermuiža

Table 26: Total number of beds by specialty

Bed Profile	Total Beds
Long-term care	1.664
Mental Illness and Disabilities	2.101
Overall	**11.233**

[15] TriData (2007)

Source: Data from providers

Table 27: Classification of inpatient beds

Beds Profile	Adult / Paediatric	Male / Female	Includes invasive monitoring Capability	Ratio of Nurse to Patients ≤ 1:2	Expected ALOS ≥ 24 Hours	Includes Hospital Infrastr. (Diagnostic &Treatment)	Includes Fixed Head Wall	Comments
Wellness and rehabilitation beds	Both	Both	No	No	No	No	No	Rehabilitation including Physical and Neurological conditions
Psychiatric/behavioural health beds	Both	Both	No	No	Yes	No	No	Includes Psychiatry for substance abuse post-acute phase
Skilled nursing and geriatric beds	Adult	Both	No	No	Yes	No	No	Includes all non-rehab, sub and post-acute

Source: Sanigest Internacional

4. Key features in designing the future Latvian health system

To predict the future needs, a demand model was created, which yielded estimated demand for inpatient services, outpatient services, and diagnostic and treatment services up to 2025. Outputs of the demand and gap analysis focus on the years 2014 and 2025. The findings in the future state section form the basis for planning the distribution of healthcare facilities and services across the country. The table below is a reference summary of some key statistics.

Table 28: Summarized estimated demand for healthcare services (2014 and 2025)

	2014	2025
Profile		
Total Population	1.997.745	1.839.598
Births	21.543	26.929
Paediatric Population	310.000	301.500
>65 population	391.000	425.000
Key Output		
Total Hospitalizations	357.462	330.292
Cardiovascular	55.029	50.679
Oncology	31.940	29.411
Obgyn	34.705	43.381
Paediatrics	39.925	37.539
Mental health	36.430	33.939
Beds by specialty		
Medical Specialities	2.628	2.235
Obstetrics and Gynaecology	542	396
Paediatric	856	873
Surgical Specialties	2.673	1.592
Long-term care	1.664	1.620
Mental Illness and Disabilities	2.101	1.030
Total Acute Beds (preferred scenario0	8.492	5.175
Total Mental health and LTC	2.741	2.650
Total Beds	11.233	7.825

Source: Sanigest Internacional

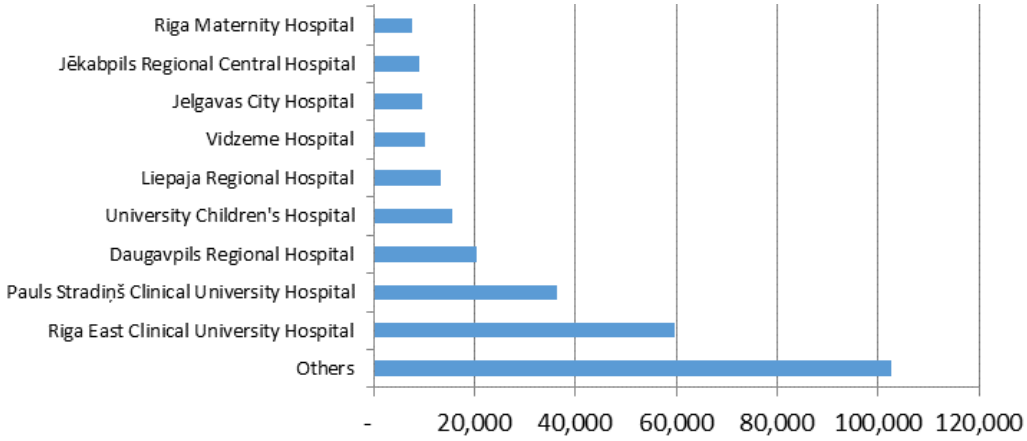
4.1. Projections of demand for care

4.1.1. Demand projection results: inpatient admissions

The total number of inpatient admissions is projected to reach 357,462 in 2020 and 330,292 in 2025. The below graphs display the top ten inpatient admission categories estimated for the years 2020 and 2025. Annex 11 includes a projection of all specialty categories for 2025 which is the basis of estimating demand in the future.

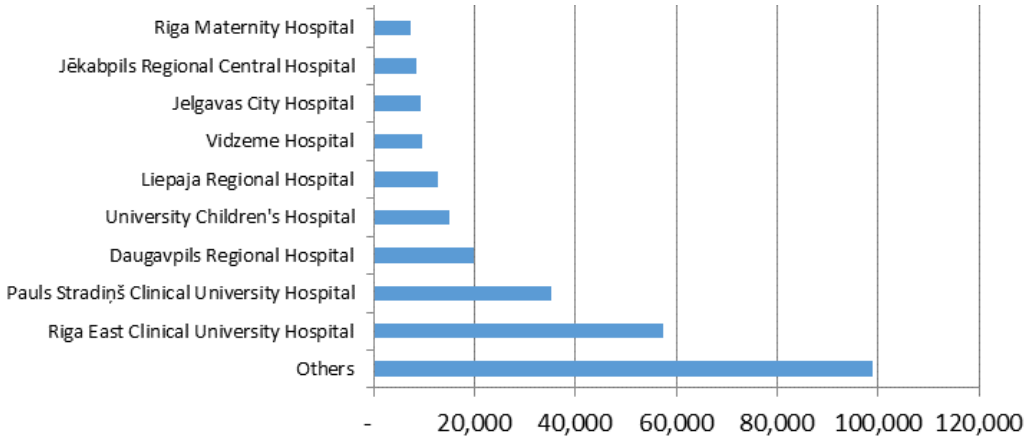
Going forward, the distribution of total inpatient admissions is projected to remain concentrated in the nine facilities that now account for more than 60 percent of all admissions. Increases are projected for some of the regional centres that will increase capacity, however, declining admissions from improvements in the care model and a further shift to outpatient care will generally offset the overall increases.

Figure 13: Total inpatient admissions by hospital (top nine, 2020)



Source: Sanigest Internacional

Figure 14: Total inpatient admission by hospital (top nine, 2025)



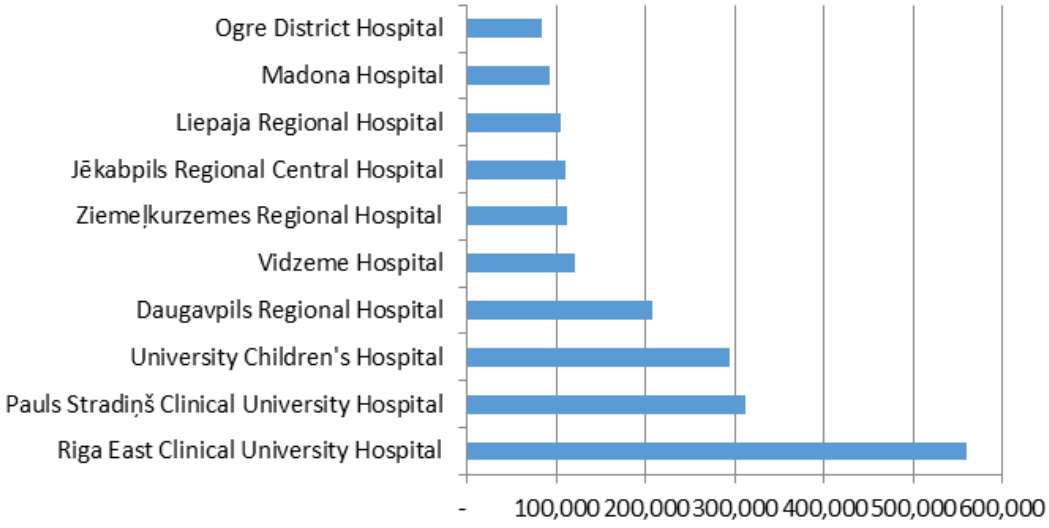
Source: Sanigest Internacional

4.1.2. Demand projection results: outpatient care

Medical Day Cases and Surgical Day Cases are expected to significantly increase between 2016 and 2025. Medical Day Cases are expected to increase by 100%, while Surgical Day Cases are

expected to increase by 235[16]%, (further details of this expectation are included in the following section). This increase in day cases is mainly due to the expected shift away from inpatient services, in line with the model of care designed for Latvia.

Figure 15: Outpatient visits per hospital (top ten, 2025)



Source: Sanigest Internacional

The significant increase in outpatient visits is mainly due to the adjustment of utilization rates that take into consideration the shift of services away from the Emergency Department and the shift away from inpatient services, in line with the agreed model of care.

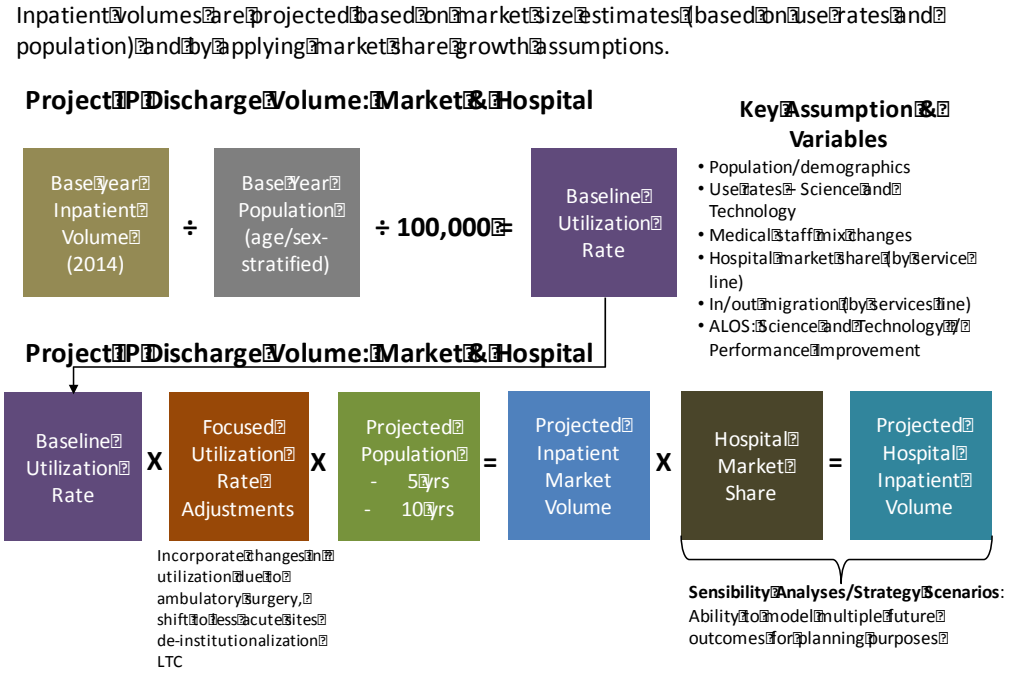
4.2. Estimating future requirements for beds

The distribution of beds by specialty is estimated based on the changes in utilization expected from shifts in healthcare technology, population decreases, and changes in the disease profile. The current bed level and distribution is then compared with the projected needs to 2025 to determine the gap in hospital services across the network of hospital providers.

The distribution of services by specialty is determined by the complexity of cases expected by level of care and expert opinion on which services are delivered at which level in the future. This determines the distribution of beds and level. The model determines the bed needs based on the recommended occupancy rate for each specialty and the ALOS set by specialty. Figure 11 provides an overview of the approach.

[16] The preferred model based on the LHFMP is estimated to achieve 40% of day surgeries from the total surgical procedures, which results in a 235% from the current 17% rate (20/17x100)

Figure 16 Inpatient volume projection methodology



Source: Sanigest International

Based on this approach, two alternative bed estimation methodologies were utilised.

- First, a **baseline approach** which outlines the bed needs based on maintaining the current utilization rate but projecting the demographic changes that will reduce the overall population in 2025. In this regard, population decreases offset potential increases in demand from expanded chronic disease demand.
- The **preferred model approach** introduces changes in the care model and assumes that international best practices are targeted to achieve important improvements in health system productivity. In this regard, the main scenarios assumed include:

  (a) an increase in ambulatory surgery[17], reflected by a 25% increase in the share of ambulatory surgery;

  (b) continuing reductions in general medicine beds due to a reduction in

[17] A list of 28 procedures was flagged based on international experiences in targeting those procedures that could be done on an ambulatory (day surgery) basis for most patients. These procedures are typically performed through day surgery in upwards of 65% in top performing health systems. The preferred model for Latvia would achieve at least 40% ambulatory day surgery but the modeling in scenario 2 considers a target of only 25% to maintain a gradual transition from a situation where very limited day surgery is done to ramp up toward a goal of more than 40 percent.
Rates of day surgery in IAAS surveys (2009) for a list of procedures and as a % of total surgical activity or of planned surgery in Europe and the United States. United States (83.5%), Denmark (89%), Spain (87%), Finland (63%), Italy (64%), UK (62%), Sweden(80%). Source: INTERNATIONAL ASSOCIATION FOR AMBULATORY SURGERY (IAAS)
Given the lower share of actual surgical procedures as a % of all surgery department discharges and desire to set a conservative target that we propose a 25% goal. Optimally the goal should be to reach 50% but this would require important changes in practice that may not be feasible within 10 years. Current numbers appear well below the target for all surgeries.

ambulatory care sensitive conditions and a further shift to day care and home care;

(c) de-institutionalization of long term care patients as mental health and substance abuse cases can increasingly be treated in community based care settings; and

(d) projected increases in the birth rate and subsequent increases in paediatric cases. In this scenario, an occupancy rate of 85% is targeted for most specialties with the exception of obstetrics which is lowered to 75 percent.

The following table provides a high level summary of the results under each scenario. In each scenario, the 2014 level of beds by macro specialty are shown as "current" and compared to the estimated bed needs for 2020 and 2025. The results are shown for acute care and non-acute care facilities. The results show that the expected decrease in bed needs would range from nearly a 9 percent decrease in the bed needs in scenario 1 to a 27 percent decrease in the preferred bed model.

Table 29: Current and projected number of beds based on bed model methodologies

Acute Care Hospitals	Approach 1			Approach 2		
Bed Profiles	2014	2020	2025	2014	2020	2025
Medical Specialities	2,596	2,478	2,387	2,596	2,390	2,297
Paediatric	856	810	775	856	643	619
Obstetrics and Gynaecology	542	512	490	542	383	368
Surgical Specialties	2,673	2,534	2,426	2,673	1,569	1,508
Pathology and Radiology	499	477	460	499	415	403
Sub-total Acute	7,166	6,811	6,538	7,166	5,400	5,195

Long Term Care Hospitals	Approach 1			Approach 2		
Bed Profiles	2014	2020	2025	2014	2020	2025
Long-term care	1,664	1,619	1,587	1,664	1,449	1,428
Mental Illness and Disabilities	2,101	1,964	1,859	2,101	2,211	2,097
Paediatric	270	266	263	270	201	199
Medical Specialities	32	30	28	32	5	5
Sub-total long-term	4,067	3,879	3,737	4,067	3,866	3,729
Total	11,233	10,690	10,275	11,233	9,266	8,924

Source: Sanigest International

In this context, and based purely on the population growth and the current number of beds, the number of beds needed in Latvia is projected to decline from current levels of 11,233 to 10,690 in 2020, and 10,275 in 2025.

In terms of demand by region for acute care hospitals, the analysis suggests that in 2020 the majority of beds will be needed in Riga (45%), Latgale, and Pieriga (both with 14%), with the remaining to be distributed across the other three regions. In 2025 these numbers will remain similar, with the exception that Latgale will drop to 13% and Periga that will rise to the second position with 15%, in line with expected population shifts.

Table 30: Demand for beds by regions under approach 1

Regions	Population	Current, 2014		2020		2025	
Kurzeme	13%	973	11%	900	11%	844	11%
Latgale	14%	1,239	15%	1,123	14%	1,034	13%
Pieriga	18%	1,158	14%	1,169	14%	1,178	15%
Riga	32%	3,784	45%	3,664	45%	3,569	46%
Vidzeme	10%	602	7%	552	7%	514	7%

Regions	Population	Current, 2014		2020		2025	
Zemgale	12%	701	8%	655	8%	620	8%
Region unknown	***4.2.1.***	17	0%	16	0%	16	0%
Total	**100%**	**8,474**	**100%**	**8,080**	**100%**	**7,774**	**100%**

Source: Sanigest International

If this bed model is applied strictly to the hospitals that will be under NHS contracts, the bed demand based purely on the expected volume of patients according to population shifts will be 7,006 by 2020 and 6,710 by 2025. Based on estimations about specific characteristics of the Latvia's health network functioning, such a projected increase in outpatient surgeries would produce a decrease in ALOS and bed days, an increase of the occupancy rate, and a reduction in general medical expenditures, and thus it is estimated that the bed demand in this case would reach 5,778 beds by 2020 and 5,554 by 2025.

4.3. Critical Issues in framing the future state

Despite the dramatic reduction in the overall number of acute care facilities over the past decade, Latvia continues to have more than 40 percent of all the facilities with fewer than 100 beds and many of the facilities with fewer than 50 beds – which is generally considered an inefficient size to maintain an acute care facility[18]. Furthermore, the distribution of services across the network needs to be reconsidered to reflect the resource need and availability.

Based on the projected demand of beds based on bed needs from international standards, Sanigest has developed a new configuration for Latvia's hospital network aiming at maximizing resources and providing the necessary structure to achieve the targeted 5,000 acute beds by 2025 but proposing even more investment in the areas where hospitals have already made investments, like in the case of Daugavpils that has made major investments, such as a catheterization laboratory and linear accelerator.

It is important to note that this reconfiguration is based on the 42 hospitals under contract, and the scenarios presented below are based on 31 acute care hospitals. However, Sanigest also carried out a reconfiguration of long-stay hospitals (such as psychiatric, trauma and rehabilitation hospitals), and wellness or day care centres that provide outpatient services. These long term beds projections, including neuropsychiatric, psychiatry, and addiction and rehabilitation centres are described in a separate section below.

4.3.1. Defining levels of care

In order to develop a new configuration for Latvia's health facility network, hospitals were categorized into four levels of care:

1. **Level 1:** The first level of hospital care is that which is performed by all hospitals that provide inpatient and outpatient services, such as general surgery, paediatrics, OBGYN, and internal medicine. These facilities also provide emergency services for adult and paediatric patients, clinical laboratory and radiology services (for example, x-rays, CAT scans, and ultrasounds), acute psychiatric inpatient services (in order to

[18] Economic Analysis for Management and Policy. Understanding public health, open university press (2005)

stabilize and refer to specialists), physiotherapy, and intensive care that includes anaesthesia.

2. **Level 2:** The second level of hospital care includes the above and additionally provides the following clinical specialties: cardiology, gastroenterology, infectious diseases, urology, nephrology (dialysis), neurology, neonatology, and a radiology department that includes MRI scans.

3. **Level 3**: The third level of hospital care includes the first and second levels plus a unit for burn patients, endocrinology, surgical dermatology [19] , pulmonology, ENT, cardiovascular surgery, maxillofacial surgery, paediatric surgery, chest surgery, reconstructive plastic surgery, neurosurgery, gastroenterology, pathology, radiation therapy, and angiography.

4. **Level 4:** The fourth level of hospital care corresponds to specialized institutions such as paediatrics, maternity, trauma hospitals, and university hospitals.

5. **Community Day Hospitals:** This would be a facility for low complexity cases, which may or may not be a day hospital, where patients receive specific treatments that do not require hospitalization on an outpatient basis. Among the services offered at a Community Day Hospital are: general medicine, clinical laboratory, pharmacy, PAP smear, breast exam, family planning, prevention and treatment of sexually transmitted diseases, immunizations, allergies, travel vaccination, nutrition counselling, tobacco cessation, physical therapy, palliative care, among others. These centers are not open 24 hours and depending on demand may operate for only 8 hours to 12 hours. A total of 568 outpatient beds would be re-located from current acute hospitals that will be downgraded as wellness beds in order to strengthen the capability of this level.

Annex 23 includes a detailed description of the minimum and optimal services that are recommended for each level of hospital care.

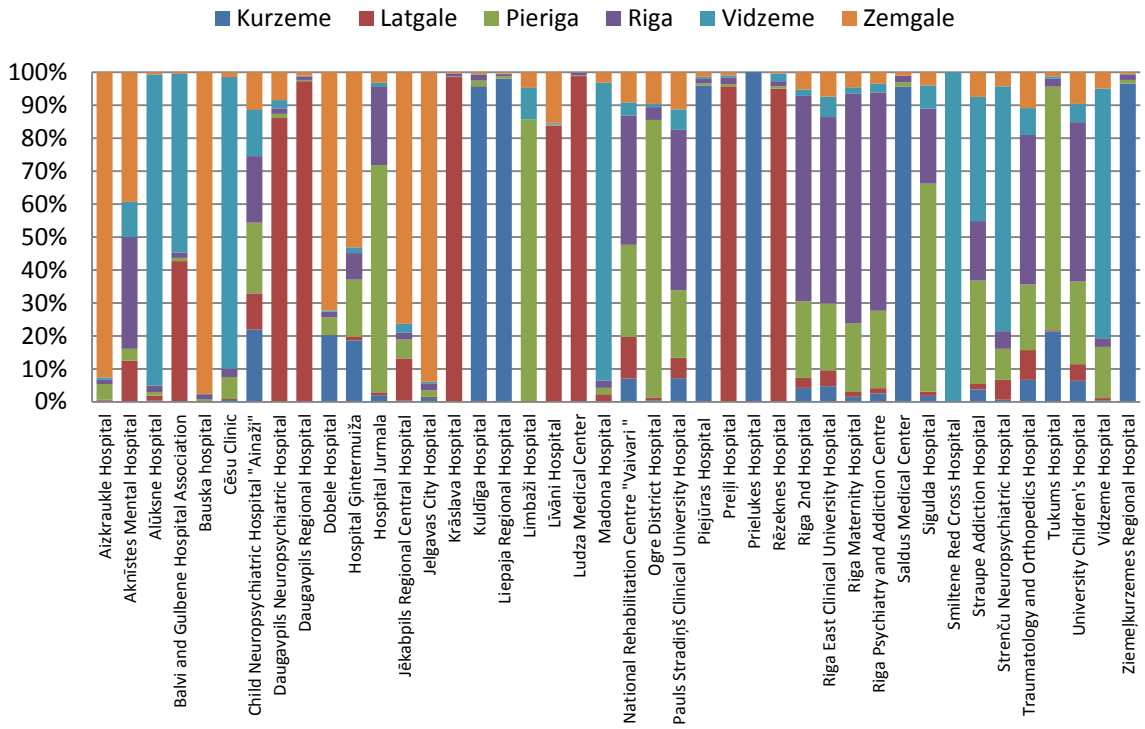
4.3.2. Defining catchment populations

The definition of catchment populations is a critical aspect of Master Planning since it is population-based and derived from actual service needs. It is clear in this regard that according to the definition of levels of hospital care, it is anticipated that most level 1 hospitals serve their locality, or municipality, regional hospitals serve their regions and national hospitals serve the entire population. In practice, however, the analysis of actual admissions by origin of the patient shows that real catchment areas should actually take into account different population areas based on the actual access to services by the population. The

[19] Dermatology services are recommended to remain at the same facilities that are providing the service today located in Riga. Ideally, level 3 regional hospitals should also include dermatology as a specialty to avoid having patients travel >90 minutes to obtain this service exclusively in Riga. It is worth noting that Latvia has the fifth highest death rate due to skin cancer in the world . 4.62 per 100,000 pop and this is another justification to decentralize the specialty at least to regional centers. http://www.worldlifeexpectancy.com/cause-of-death/skin-cancers/by-country/. The proposal for dermatology in level 3 is included as 'optimal' but not required.

following figure shows the de facto catchment areas for various hospitals to show how most of the national hospitals serve disproportionately the Riga and Pieriga population while the small hospitals actually serve on a predominant basis their municipal populations.

Figure 17: Patient origin by region



Source: Sanigest International

Based on the analysis of these patient flows and actual population projections, the master plan has proposed a catchment area for each hospital. These figures are used in combination with the total population figures based on census data. The need to define a proposed population catchment area and level of service is a critical step for estimating the required beds, staff, and technology for each of the facilities.

4.3.3. Geographic access

The health system in Latvia currently limits access to specialized health care services within several regions. Because of this misallocation of resources, many patients need to travel long distances to access larger and better equipped centers outside their own regions. This situation is a real problem for those municipalities farther away from Riga, since it considerably affects timely access times and costs.

Based on these circumstances, the proposed reconfiguration not only provides a concentration and expansion of services in strategic hospitals to optimize resources, but also enables timely access to hospital services at the highest levels in less time.

The following standards set the parameters of accessibility for care health services in the Republic of Latvia. These standards are based on time of travel and hospital profiles. The proposed standards by level of care are outlined in the following table:

Table 31: Access time standards

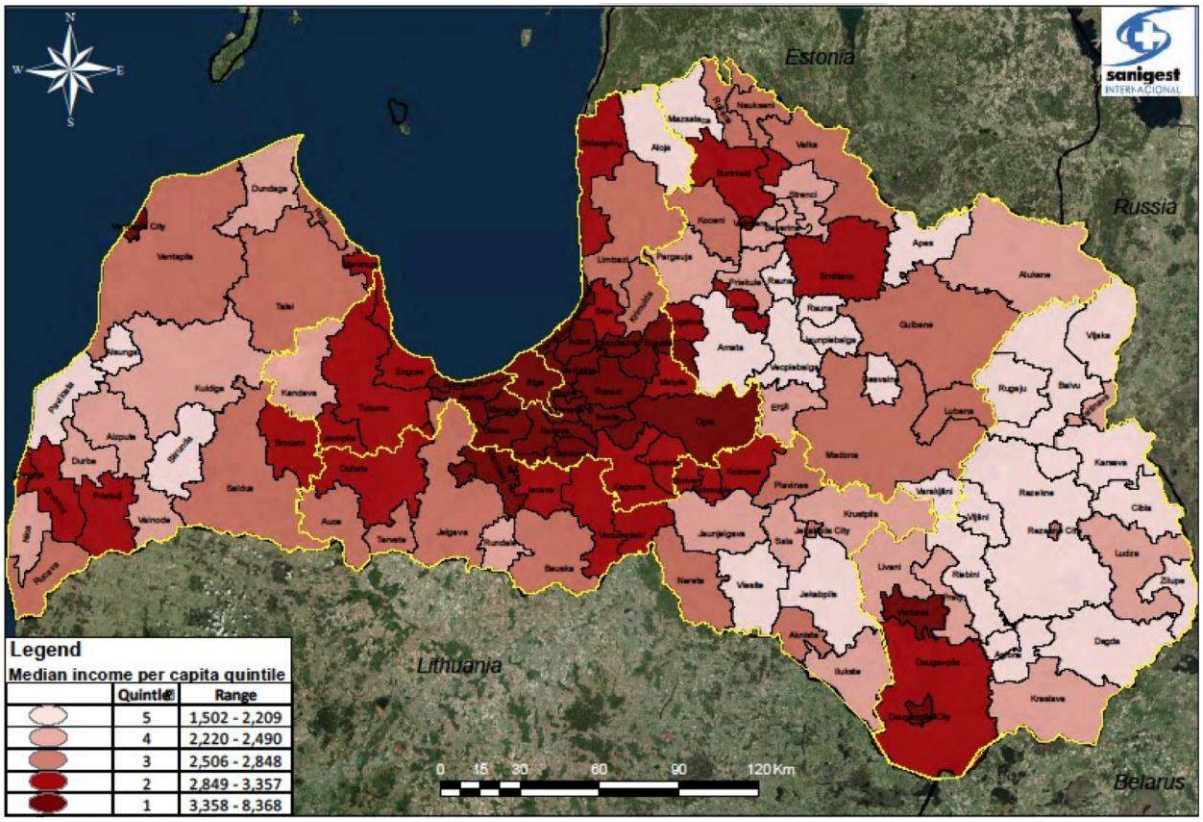
Level of Care	Access Standard
Day care or Community Day Hospitals	< 30 minutes
Level 1 Hospital (Locality or Municipality)	< 30 minutes
Level 2 Hospital (Regional- Municipality)	less than 1 hour
Level 3 Hospital (Regional)	1 hour
Level 4 Hospital (National Centre of Excellence)	less than 3 hours

Source: Sanigest International

4.3.4. Socioeconomic needs

In analysing the distribution of spatial median per-capita income in Latvia it can be noticed that the municipalities in the regions of Riga and Pieriga are the ones which concentrate the most revenue, along with the major cities of each region such as Daugavpils City, Ventspils City, Rezeknes, Valmiera City, Jelgavas City, and Liepaja City. Undoubtedly these are not only the municipalities with the highest concentration of population but at the same time offer the best job opportunities and hence highest incomes.

Figure 18: Socioeconomic situation by municipality



Source: Sanigest International. Note: *Gulf of Bothnia* should read *Gulf of Riga*.

The proposed reconfiguration of the hospital network takes into account the described socioeconomic situation and proposes to (i) concentrate specialized centers and Level III and IV hospitals in high demand located in municipalities with higher incomes, social investment, and development in infrastructure; and (ii) strengthen Level II hospitals in North and Jelgavas City. This new reconfiguration covers most of the population and facilitates access to health services, since these strategic centers currently have more and better mobility options resulting in lower access times. A special situation is presented in Latgale, where two Level III

hospitals (Regional Hospital of Daugavpils and Rezeknes) are proposed. Having Hospital Rezeknes in one of the country's poorest areas will allow its poorest residents to have access and at lower costs to specialized services.

4.4. Modelling considerations

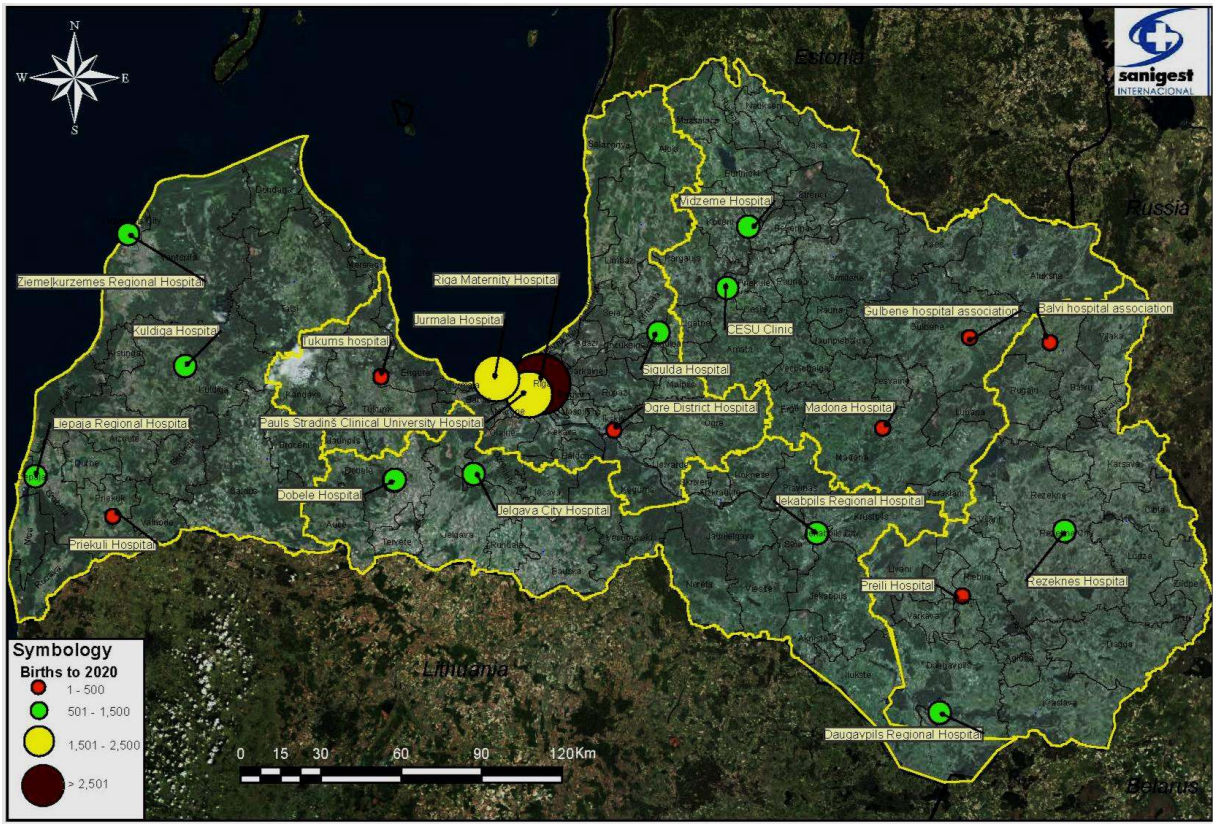
4.4.1. Maternity services

The number of births per year has been recovering over the past five years and has now nearly reached pre-crisis levels. In 2025, it is projected that there will be close to 24,000 births. New planning guidelines are recommended to keep the minimum number of deliveries to 500 per year for a certified obstetrics/maternity unit. This is significantly below the Nordic countries standards which are above 1,000 but will allow for greater consolidation without a significant decrease in access. In this regard, the proposed planning standards will target an occupancy rate of 75% with an optimal size of a delivery department of 24-40 beds. The ALOS should be 3-4 days and the proposed distribution of the facilities is shown in the following table. For the purposes of the projection, Table 10 shows a fixed ALOS of 4 days even though some of the hospitals have an actual ALOS of less than 4 days.

Our current proposal is the closure of OBGYN beds in facilities that serve fewer of 500 births by year and transfer those cases to other medical centers, allowing a better optimization of resources. The transfer of cases will be based on three criteria: facilities that are currently attending more than 500 births, installed capacity of the receiving hospitals, and geographic proximity (see Annex 4 for detailed information).

Figure 17 shows the projected distribution by 2020 of the annual births by medical center. The red highlighted areas are the ones with less than 500 births and that should be consolidated within another hospital in the same region.

Figure 19: Projection of births, 2020



Source: Sanigest Internacional

The following table assumes redistribution of births from (i) Balvi and Gulbene, (ii) Tukums, (iii) Preiļi Hospital, (iv) Cesu and (v) Ogre district hospital all which have fewer than 500 births and should no longer be facilitated as obstetric centers. Madona, which also has fewer than 500 births, is maintained to ensure adequate geographic access for the population. In total, the estimates show that there would be a requirement for an additional 41 beds in total. The largest number of beds to be added would be at the Riga Maternity Hospital and significant expansion in Stradins, Jurmala, and Vidzeme. Based on the excess beds in other areas of these hospitals, the proposal is to re-allocate beds to cover the potential expansion in maternity. At the same time, it is important to note that if the ALOS were reduced from 4 to 3 the need for beds would basically be eliminated. In other words, improved management of maternity beds could result in the reduction or near elimination of any shortages due to the projected increase in births. At the same time, it is important to note that the projection assumes a significant increase in births over the existing levels so rather than expand capacity, in the short term, the efforts should be on improving case management to reduce the ALOS to 3 or even lower for normal births and to avert the bottleneck if births do rise in the future.

Table 32: Redistribution of births, 2025

hospital	births (Current)	Population 2020	Estimated Births 2020	ALOS 2014	ALOS to 2020	Number of obstetrical beds	Bed Needs 2020	c-section ratio	Surplus/Deficit (2020)
Prielukes Hospital	5	238,221	6	2	4	0	0	n/a	(0)
Tukums Hospital	338	370,099		3	4	9	-		
Balvi and Gulbene Hospital Association	329	184,596		4	4	5	-		
Dobele Hospital	616	228,390	691	4	4	10	10	9.9	(0)
Madona	398	184,596	619	4	4	5	9	16.8	(4)
Preiļi Hospital	412	258,597		3	4	10	-		
Rēzeknes Hospital	585	258,597	1,003	4	4	12	15	13.8	(3)
Ogre District Hospital	384	370,099		4	4	7	-		
Ziemeļkurzemes Regional Hospital	633	238,221	703	3	4	15	10	17.5	5
Kuldīga Hospital	581	238,221	645	4	4	8	9	20.1	(1)
Cēsu Clinic	510	184,596		4	4	10	-		
Jēkabpils Regional Central Hospital	627	228,390	704	4	4	15	10	22.6	5
Sigulda Hospital	818	370,099	991	3	4	5	14	17.5	(9)
Jelgavas City Hospital	1009	228,390	1,132	3	4	15	17	15.3	(2)
Liepaja Regional Hospital	1144	238,221	1,270	3	4	16	19	13.8	(3)
Daugavpils Regional Hospital	1052	258,597	1,331	5	4	30	19	16.4	11
Vidzeme Hospital	1118	184,596	1,792	4	4	14	26	26.6	(12)
Hospital Jurmala	1513	370,099	2,003	3	4	20	29	24.3	(9)
Pauls Stradiņš Clinical University Hospital	2094	628,782	2,629	3	4	22	38	32.1	(16)
Riga Maternity Hospital	7095	628,782	8,794	4	4	86	128	19.8	(42)
	21543	1,908,684	24,307		4	314	355	20.2	(41)

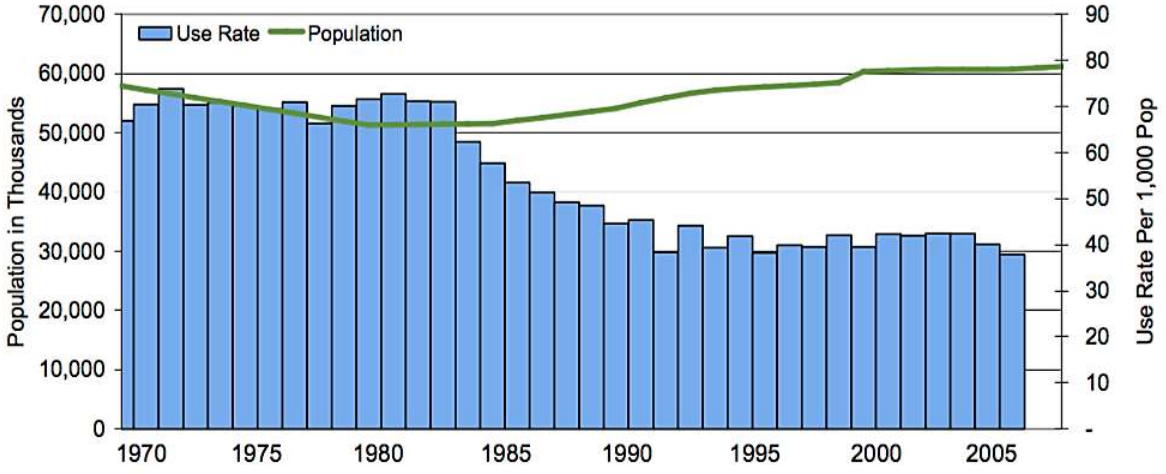
Source: Sanigest Internacional based on data of the National Health Service of Latvia

4.4.2. Paediatrics

The reconfiguration of the health network also takes into account estimations about specific characteristics of Latvia's health network functioning, such as a projected increase in outpatient surgeries producing a decrease in ALOS and bed days; an increase of the occupancy rate; and a reduction in general medical expenditures, as described previously in the second approach used for bed calculations. For example, a reduction in the number of admissions has been observed over the past years across countries.

The following chart shows how the number of paediatric admissions in the United States (US) has come down over time. Despite this trend, currently in Latvia, paediatric admissions are double what the US reported in 1970 and 3.5 times higher than present US levels (Latvia is at 15 per 100 compared to 4 per 100 in the United States).

Figure 20: US Historical Population and Inpatient Use-Rates / 1,000 Children <15, 1970-2006



Source: Population Division, U.S. Census Bureau. National Hospital Discharge Survey, Centers for Disease Control and Prevention.
Note: 1987 Use-rate estimated based on 1986 and 1988 data. Use-rate data is not available for 2007 or 2008.

Based on this trend, it is expected that the average length of stay for the paediatric profile beds will decrease to an average of 5 in 2025, assuming advances in ambulatory surgical treatment and increases in outpatient diagnostics and treatment. Further reductions are expected in terms of the institutionalization of children in psychiatric hospitals (this is further addressed in the section on long-term care).

Since the number of births is rising, with a total increase of roughly 20 percent expected over the next ten years, there should be an increase in the total number of children of paediatric care age. The demand forecast is based on an assumption that the morbidity rate structure will be similar to the present one and no fundamental discoveries will be made which would have a radical impact on the quality of medical technology or treatment services. Based on these estimations the minimal size of the departments in order to provide appropriate quality in general paediatrics and paediatric surgery is 20 beds. The optimal bed occupancy rate is 85%, except in the case of infected NICU beds, which should have a 70% occupation.

At hospital level 4, the proposal is to ensure that the Neonatal Intensive Care Unit (NICU) of the Children's Hospital can meet Level III for all infants, including those less than 32 weeks, and accommodate a level IV Advanced Neonatal Services Centre with specialized services, such as care for complex congenital heart defects, or ECMO. Riga Maternity Hospital will have a NICU for short stays to stabilise patients as required and the most complex cases will be transfer to the Advanced Neonatal Services Centre of the Children's Hospital. The same procedure described for the Riga Maternity will be running for the Pauls Stradiņš Clinical University Hospital with its NICU and Paediatric Intensive Care Unit (PICU) services.

At level III hospitals (Liepaja Regional Hospital, Jekabpils Regional Central Hospital, Vidzeme Hospital, Daugavpils Hospital, and Rezeknes Hospital), a Level II NICU should be in place to ensure that they can provide intermediate or special care, directed at infants 32 weeks and older. This distribution assures that more than 97 percent of the population will have access to a level II NICU within an hour or less.

At level II hospitals (Madona Hospital, Balvi and Gulbene Hospital association, Jelgavas City Hospital, Jurmala Hospitaland Ziemejkurzemes Regional Hospital) NICU level I should be assured to provide basic or well born care, directed at infants 35 weeks and older. These levels and services for NICU are based on the 2012 Neonatal Levels of Care of the American Academy of Paediatrics.

4.4.3. Cardiovascular

The demand for cardiovascular care is expected to increase by 20 percent over the coming decade. This will be due to changing demographics and an assumed increasing burden of disease in this area. In this regard, the number of the specialized (tertiary) cardiologic care services (coronary angiography, coronary angioplasty, electrocardiostimulator implantation, catheterablation and heart surgery) must increase in order to achieve the European average number of invasive diagnostic and treatment procedures per a million population.

Latvia is on track to deliver a reasonable volume of services on a population basis, and further considerations should be given to access times for a large share of the population that does

not live within the golden hour for catheterisation or access to specialized cardiovascular care. Given the geography of the country and relatively short access times, the Master Plan recommends that eight catherization labs are set up with two in Riga and five in regional hospitals and Rēzeknes Hospital. These cardio hubs would be limited to the angiography and angioplasty, while the implantation and cardiovascular surgeries would be done in national centres of excellence at Pauls Stradins and the Riga East University hospitals.

The increase in the number of specialized invasive and cardio-surgical procedures and operations must be planned for 2020 in line with the following assumptions. The assumptions maintain that a minimum of 500 angioplasty procedures should be done per year in the case of stents and similar estimates for the number of cardio-thoracic surgery cases. Evidence points to greater specialization in these invasive procedures.

Table 33: Specialized invasive and cardio-surgical procedures

Area of Demand	2020
Angiography standard per 100,000	750
Angiography in the Republic	14,624
Angioplasty standard per 100,000	250
Angioplasty in the Republic	4,875
CABG and valves standard per 100,000	160
Cardio-surgical operations in Latvia	3,120
ECS (Electrocardiostimulator) implantation in the Republic	1800
Primary ECS	1200
Catheterablation in the Republic	550
ICD (Defibrillation) per 100,000	1.2

Source: Sanigest Internacional

Angiography and angioplasty can increasingly be done on a day basis and increasing the capacity for day cases initially in the two university hospitals and eventually in the three regional centers will allow for further reduction in the number of beds.

Based on the volumes outlined above, the expansion should be focused on the regional centers that require strengthening by planning the facilities with the expensive technologies. Initial estimates point to the need to purchase 4 modern digital angiographic pieces of equipment within the period of 5 years. Based on volumes, the hospitals of Daugavpils and Liepaja, where the cardiology departments have 20 – 30 beds, must be reconstructed (including 6 cardiology beds for intensive therapy). In order to provide quality in these cardiology departments, on average 500 coronarographies must be performed a year. The minimal size of the department in the heart surgery would be 30-35 beds to provide quality.

Within a period of five years, the Cardiology Centre of Latvia should be stabilized, where invasive cardiology, electrocardiostimulations, and heart surgery care will be provided where the number of these procedures per specialist is high enough to provide quality. Then the number of specialized diagnostic procedures will gradually increase in two other multi-profile hospitals in Riga as well as in the hospitals of Daugavpils and Liepaja. Within five years, established cardiology departments must develop outpatient and day hospital care in these hospitals. By optimising the inpatient cardiology care, the bed occupancy rate should be 80-85%.

4.4.4. Oncology

During the last six years the number of the newly diagnosed oncology patients has increased by roughly 40 percent (in the cancer registry the number of patients increased from 7,166 to 9,922 in 2014). This increase is also reflected in the number of hospitalizations due to cancer, which increased from 27,000 in 2010 to over 31,000 in 2014. Overall, cancer now accounts for roughly 10 percent of all hospitalizations in the country and is expected to continue increasing over time as the population ages and the negative consequences of a high prevalence of alcohol consumption and smoking have their consequences on the population.

Despite the increase in demand, modern chemotherapy and radiotherapy can be delivered without extended hospitalization. In fact, assuming appropriate non-acute housing, patients should be able to visit the facility daily during their treatment without any overnight stay. The average length of stay should therefore decline significantly in the acute care facilities. The master plan suggests that day care areas should be created for an increasing volume of chemotherapy patients in all regional hospitals and that the number of radiotherapy centers with LINACS should be increased to five regional centers in addition to the Riga facilities. Furthermore, some living (hotel-esque) facilities should be considered for patients that come from longer distances in all centers that have LINACS.

The proposed planning guidelines advocate that not less than 30 beds must be in the oncological departments with a target bed occupancy rate of 85%.

4.4.5. Traumatology and orthopaedics

Demand will increase due to the lack of trauma prevention. Trauma in general and traumatism caused by alcohol drinking have increased, and the severity of the traffic traumas has also increased. The demographic data testify to the process of population ageing. The demand for total hypo-orthoplasty with endoprothesis will increase. At present patients must wait for 8 years for total hypo-orthoplasty with endoprothesis for a knee-joint.

Over the next 10 years, it is possible to decrease the average length of stay in a hospital to up to 7-8 days. This will be related to strengthening primary health care, as well as the development of day hospitals. After having been discharged from hospital patients will be provided with rehabilitation services and required follow-up care.

The size of the traumatology and orthopaedic department in hospitals providing secondary and tertiary care could be 40-50 beds. In the multi-profile emergency care hospitals and in the regional centre hospitals, a traumatology-orthopaedic department could have 30-40 beds, with a registration in each profile. The departments with no less than 20 beds could be recommended among multi-profile local hospitals.

In local hospitals in the districts, traumatology-orthopaedic beds are included in the surgery department structure with a separate registration, with this providing the required treatment quality for the sick with treatment opportunities in the regional centres.

For the next 5-10 years the bed occupancy rate recommended is 85-90%, with a fraction of patients admitted to day hospitals.

4.4.6. Surgery

Surgery is one of the main sources of potential savings in bed days. At present, top health systems perform more than 50 percent of all surgeries in an ambulatory care environment, with length of stay under 24 hours, and have a high percentage of all hospitalizations in the surgical area. In the UK, for example, project Hope shows that more than 65 percent of all hospitalizations are for surgery and almost 65 percent of those cases are done on an ambulatory basis. For this reason, the UK has one of the lowest ratios of beds per 100,000 population in the OECD.

The present master plan targets an increase in volume for surgery and a decrease in the length of stay. The assumptions for the future state analysis are based on 85 percent occupancy, an increase to 40 percent of all surgeries on a day basis, and ward sizes between 30 and 50 beds depending on the facility level. Surgery in the municipal hospitals could be supplemented by expanded skills of primary care physicians to make minor surgeries in outpatient settings.

4.4.7. Neurology

The service of neurology is expected to require further strengthening, specifically for stroke treatment, and should undergo significant changes in the next few years with an increased emphasis on early intervention and rehabilitation on an outpatient basis. In this regard, the number of the beds will decrease to 515 per 100,000 population. This index can change depending on the distribution of the rehabilitation beds (0.3 per 1000 inhabitants would be optimal) and an increase level in the number of neurological long-term care beds (1.5 per 1000 population has been forecast). In Latvia, the number of the practicing neurologists would decrease to a standard of 11000 individuals per neurologist.

The average length of stay for a neurological patient in the future could decrease to 11 days, with 30 beds the minimal size of the neurological department. The department should be in a multi-profile hospital. The specialized cerebral thrombosis (“stroke”) units would be established in Riga with 16 beds and in Ventspils, Liepaja, Daugavpils, and Jelgava with 4 beds each. The optimal bed occupancy rate is 85%.

4.4.8. General medicine

The analysis of ambulatory care sensitive conditions (ACSC) shows that an estimated 14 percent of all hospitalizations are avoidable with the improvement of primary care and stricter admission criteria. Table 11 shows estimates by specialty. Assuming that improvements are made in these areas, the hospitalization rate for general medicine cases should decrease by 10 percent over the next five years, and this assumption has been incorporated into the estimates of bed needs. The average length of stay is set at 5 days and the occupancy rate target for general medicine is 85 percent.

4.5. Medical equipment and technologies

The final component of the Master Plan’s resource requirements is based on the review of the top 49 pieces of medical equipment (high tech) in the NHS contracted hospitals. The equipment list was developed based on the estimated diagnostic and preventive needs of the population, and the equipment are directly related to the four (4) diseases with the greatest burden of disease: cardiovascular diseases, diabetes, cancer and neuropsychiatric conditions. The list is further restricted by the following criteria:

- high-cost units directly linked with treatment and diagnosis that represent the highest financial burden to healthcare systems,
- information on availability and international population-based standards, and
- current solving capacity in hospitals that have the highest number of patients.

Sanigest developed standards per 100,000 for these high tech equipment items and has made an estimate of the total need based on the projection of population (equipment has a shorter planning cycle than hospitals).[20] The estimated equipment needs are compared with the existing level of equipment in the regions to determine future needs.

The identification of specialized medical technology is one of the key components of the master plan. Increasing the availability of high technology will expand access for the population, improve early diagnosis of diseases, and reduce travel time and costs for patients who live outside of the capital cities. The expansion of high technology will be concentrated in NHS contracted hospitals of the national and regional development centres identified in section 3.2 to ensure access.

The equipment data was gathered through a data request sent by the World Bank to representatives of 41 hospitals. There was an 83 percent response rate (34 facilities provided data) with a 17 percent no response rate. The survey responses included additional equipment than what was on the list, but the list was kept to the original 49 units for which there are standards available.

4.5.1. Major medical equipment

The whole list of 49 units was further analysed to identify major medical equipment (MME) in order to obtain parameters for the prioritization of the investment needs. In order to establish the parameters for MME identified and discussed in the Master Plan, the following three points of reference were used:

1. OECD health equipment data on diagnostic or therapeutic medical technologies;[21]
2. Medical Equipment having a cost threshold of USD $1 million and above;
3. Medical Equipment that may not be in the OECD list or may not exceed the cost threshold of USD $1 million, but that is necessary and critical to treat diseases specific to the health and demographics of Latvia's population, as agreed with stakeholders.

Reference point one, the OECD, is an international organization comprised of 34 member countries that tracks a variety of data from the member countries and updates that data on an annual basis. The OECD has the most comprehensive set of statistical and historical international information as it relates to medical equipment in an international setting. The data tracked by the OECD is continually updated and reported in an accessible database for analysis.

Pertinent to this report, the OECD tracks eight MME units in its annual reports and analyses. The annual reports relate the equipment to the current state of healthcare and outcomes

[20] Based on the median of equipment available in OECD countries since 1980 modified according the health needs in Latvia.
[21] OECD (2016), Health equipment data (indicators).

across its member countries and the world. Because this data is annually refreshed, it allows for a closer comparison along measurable data sets between its 34 member countries and that of Latvia, for both the current state as well as the future state.

The eight MME modalities tracked and documented by the OECD as being integral to healthcare delivery in its 34 member countries are:

- CT scanners
- MRI units
- PET scanners
- Gamma Cameras
- Digital Subtraction Angiography units
- Mammogram machines
- Radiation Therapy equipment
- Lithotripters

Reference point two, used to establish a monetary benchmark for defining MME, is based on the monetary value of the quoted equipment in the United States. In the United States, the dollar amount expenditure for medical equipment projects to be considered major ranges from USD $400,000 to USD $6 million.

However, because the OECD list of equipment modalities includes medical equipment such as mammography machines that fall below a USD $1 million threshold, this report includes all of the units listed by OECD as MME regardless of the monetary threshold.

Additional MME listed in this report includes Linear Accelerators located within facilities in Latvia. This is because they are capital intensive and provide a level of healthcare provision that should be noted in the current and future state report. As a point of clarification, Linear Accelerators are a modality used in Radiation Therapy. However, because the OECD data does not break out all of the modalities used for Radiation Therapy that also include Gamma Knife, Cyber Knife, Proton Beam and Conventional Beam Therapies, only Linear Accelerators are identified in this report because of their specific application to Latvia.

Reference point three is comprised of medical equipment that was noted as being critical to healthcare delivery in Latvia. Specifically, there are a significant number of dialysis centres in Latvia, pointing to a high prevalence of chronic renal failure. Furthermore, when the initial gap estimation was done, the number of haemodialysis units stood out. Therefore, equipment relating to the treatment of this medical condition will be included in the list.

By defining MME using these criteria, all equipment that can be benchmarked, analysed and referenced to an international standard has been identified. All other devices that do not fit the identified criteria are not included as they are not comparable to any international measurable standard, or were not identified as being critical to healthcare delivery in Latvia.

4.5.2. Definitions and descriptions

The table below summarizes the list of devices considered in this report, mapping each device to the reference from which it was derived:

Table 34: Reference points for MME

MME Type	Notes
CT scanner	Maps to CT scanners in OECD list

Digital Angiography Unit	Maps to Digital Subtraction Angiography units in OECD list and included in the Cath Lab
Gamma Camera	Radiation Therapy equipment.
Haemodialysis Unit	Related to the number of existing Dialysis centres and reported lack of equipment
Linear Accelerator	Type of Radiation Therapy equipment (OECD list)
Lithotripter	Maps to Lithotripters in OECD list
Mammography machine	Maps to Mammograms in OECD list
MRI unit	Maps to MRIs in OECD list
PET scanner	Maps to PET scanners in OECD list

Below are brief descriptions of each device and a summary of its utilization.

Computed tomography

Computed tomography is a diagnostic radiographic tool that uses x-rays to run cross-sectional scans, or slices that are interpreted by computers to create images of soft tissues.

Gamma camera

The Gamma Camera is a diagnostic imaging technique used to map the process and functions of the body by emitting radiation from a tracer to target different systems in the body including the brain, thyroid, lungs, liver, gallbladder, kidneys, and skeleton.[22]

Haemodialysis

Dialysis machines are units that are used to remove waste from blood by means of pumping blood outside the human body utilizing dialysate as a cleaning agent. This unit is used in treatment for those patients that have lost or have limited functionality of their kidneys.

Interventional radiology/catheterization laboratory

Interventional radiology (IR) is the utilization of radiographic modalities such as MRI, CT, ultrasound, or x-rays, to provide real time imaging of soft tissues during surgery that permits the use of minimally invasive procedures.

A catheterization laboratory, also referred to as “Cath Lab”, is very similar to IR in that it utilizes x-rays to provide imaging during surgical procedures specific to catheterization procedures. Cath Labs come in either single plane, which only has one x-ray generator, or bi-plane, which has two x-ray generators and allows for better visibility of soft tissues.

Lithotripter

Lithotripters are used outside the human body to shatter or pulverize kidney stones and gallstones utilizing sound waves.

Mammography

A Mammogram machine is a low ionizing unit used to examine the soft tissue of human breasts.

Magnetic Resonance Imaging

[22] IOP (2016) “Gamma cameras” (Accessed 13 June 2016). Available at: http://www.iop.org/education/teacher/resources/teaching-medical-physics/gamma/page_54689.html

Magnetic Resonance Imaging is a non-x-ray imaging device that uses an extremely powerful superconducting magnet to align nuclei within atoms of a patient to image soft tissues for diagnostic procedures.

General Radiology / Fluoroscopy

General Radiology uses an ionizing radiation method to examine hard tissue within the human body. Fluoroscopy utilizes the same ionizing radiation continuously to observe movements.

Linear Accelerator

Linear Accelerator is a particle accelerator that is utilized to target very specific locations for radiation therapy.

Positron Emission Tomography

PET utilizes contrast materials that have a short lived radioactive half-life to provide three dimensional images of targeted tissue types.

4.5.3. Major medical equipment by site

By reviewing and processing the data collected for the current state review and data from the hospitals in all five regions of Latvia, MME by type has been summarized in the following table. By reviewing the information it can be ascertained that the majority of the MME is within the Pauls Stradinš Clinical University Hospital and Eastern Clinical University Hospital in Riga.

Table 35: Current MME by region

Region	Angiography (digital)	CT	Gamma Camera	Haemodialysis	Linear Accelerator	Lithotripter	Mammography unit	MRI
Kurzeme	1	6	0	26	1	0	3	2
Latgale	1	6	0	28	1	0	4	2
Riga	9	19	5	92	6	2	6	5
Vidzeme	0	4	0	24	0	0	3	0
Zemgale	1	4	0	13	0	0	3	0
Total	12	39	5	183	8	2	19	9

Source: Based on survey data submitted by hospitals

A more detailed distribution by facility within each region is included in the table in Annex 1.

4.5.4. Current MME distribution

CT Scanner: By reviewing the current state, it is noted that the majority of CTs - 23 percent of the entire CT inventory - are located in Eastern Clinical University Hospital in Riga. This is followed by Pauls Stradinš Clinical University Hospital and Liepaja Regional Hospital, which have 8 percent of total CT inventory each. Most hospitals reported having one scanner.

Dialysis: Half of the haemodialysis units are located in Riga (92 total), where Pauls Stradinš Clinical University Hospital has 23 percent of the inventoried dialysis units, Eastern Clinical University Hospital almost 16 percent, and Rezeknes Hospital 11 percent.

Digital angiography: The data in the table above show that half of the angiography (digital) machines are located in the Pauls Stradinš Clinical University Hospital,

while 25 percent are in Eastern Clinical University Hospital in Riga. Only three other units are available in the regions - one each in Liepaja Regional Hospital, Daugavpils Regional Hospital and Dobele Hospital.

Gamma camera: A total of five cameras are available in the hospitals surveyed, two in Eastern Clinical University Hospital in Riga, two in Pauls Stradinš Clinical University Hospital and the remaining camera in the University Children's Hospital.

Linear accelerator: Currently, Latvia has 8 linear accelerators, five of which are in Eastern Clinical University Hospital.

Lithotripter: Latvia currently has 2 Lithotripters within the hospitals, one in Eastern Clinical University Hospital and another in Pauls Stradinš Clinical University Hospital.

Mammography: Mammography is fairly evenly distributed in terms of numbers by region, with all regions having a total of 3 units, with the exception of Latgale and Riga, where there are 4 and 6 cameras (one third of all units), respectively. The distribution represents one unit per facility represented, with the exception of Daugavpils Regional Hospital, Eastern Clinical University Hospital and Seaside Hospital, which noted 2 units.

MRI: As shown in the table above, the majority of MRI distribution in Latvia is unequal from an access standpoint, as 56 percent of the MRI capabilities within the country are concentrated in Riga and two machines (22 percent) each in Kurzkeme and Latgale respectively.

Positron Emission Tomography: There are currently 3 PET scanners, one in Latgale, one purchase in 2015 in Riga and another reported in Zemgale

4.5.5. Distributing specialized services

Once the analysis of the available technology was completed by regions and facility, an equipment gap was established for diagnosis, treatment, and monitoring of high cost pathologies like cardiovascular disease, stroke, cancer, and chronic kidney disease.

The distribution of new technology has to be focused not only on the sites of greatest need but also by the need to create specialized units within appropriate facilities that should have the physical and human resources necessary to provide the required services.

Table 36: Distribution of additional medical technology in specialized units by 2020

Region	Hospital	Angiography (digital)	CT Scanners	Gamma Camera	Haemodialysis Units	LINAC	Lithotripter, extracorporeal	Mammography Unit	MRI
Kurzeme	Liepaja Regional Hospital	2		2		1	2		
	Norther Regional Hospital						1		
Latgale	Daugavpils Regional Hospital	2		2		1	2		
	Rezeknes Hospital						1		
Riga	Eastern Clinical University Hospital of Riga	2		2		2	2	1	
	Pauls Stradinš Clinical University Hospital						2	1	
	University Children's Hospital								
Vidzeme	Madona Hospital								
	Vidzeme Hospital						2		1
Zemgale	Dobele Hospital								
	Jekabpils City Hospital	2		2	5	1	1		1
	Jelgava City Hospital				4	1	1		1
	TOTAL	**7**	**0**	**8**	**11**	**6**	**14**	**2**	**3**

Source Sanigest Internacional

The table above shows the distribution of medical technology needed for strengthening the following units:

Cardiovascular unit: implementing 2 DSA units each in Liepaja Regional Hospital, Daugavpils Regional Hospital, Eastern Clinical University Hospital of Riga and Jakabpils Regional Hospital, respectively.

Cancer unit: It is proposed to install two gamma cameras in Liepaja Regional Hospital, Daugavpils Regional Hospital, Eastern Clinical University Hospital of Riga and Jekabpils Regional Hospital; and, in each of these and in Jelgava City Hospital, there should be a linear accelerator. In the case of mammography, there should be a unit in Eastern Clinical University Hospital of Riga and Pauls Stradins Clinical University Hospital.

Hemodialysis: An additional 11 hemodialysis chairs and equipment are to be divided across hospital units in Zemgale's Dobele Hospital, Jekabpils Regional Hospital, and Jelgava City Hospital.

Radiology Unit: CT scanners are not required given the already high level of penetration, but 3 new MRI are recommended, one in each of the following hospitals: Vidzeme Hospital, Regional Hospital Jekabpils, and Jelgava City Hospital.

High-volume hospitals and surgeons are shown to deliver better outcomes than institutions or physicians with lower volumes of activity across different medical conditions and procedures.[23] With this in mind, the proposal in this document is based on the redistribution of services among different providers, taking into account the population distribution, so that it reaches the best international standards that have proven to generate better health outcomes.

An important component of the Master Plan is to allocate services and technologies where they will provide the best value-for-money. Based on the present analysis, there are several areas where greater centralization will yield important gains in terms of improved outcomes while there are other areas where bringing the services closer to the population should improve access and outcomes, especially for those more disadvantaged regions, such as Latgale. In this regard, the master plan proposes the following measures:

Table 37: Master plan recommendations for specialized services

Proposed Measure	Master Plan Recommendation
Centralization	• Consolidate cardio-thoracic surgery into 2 sites, Pauls Stradins and East Riga Clinical • Consolidate into larger facilities those hospitals with fewer than 500 births • Increase consolidation of long term psychiatric beds • Increase consolidation of trauma and orthopaedic beds
Decentralization	• Place DSA units in Liepaja Regional Hospital, Daugavpils Regional Hospital, Eastern Clinical University Hospital of Riga and Jekabpils Regional Hospital • LINAC in Liepaja Regional Hospital, Daugavpils Regional Hospital, Eastern Clinical University Hospital of Riga, Jekabpils Regional Hospital and Jelgava City Hospital.

[23] Hospital Volume and Quality of Care in Latvia, World Bank 2016

	• Expand access to hemodialysis services by opening additional units in Dobele Hospital, Jekabpils City Hospital, and Jelgava City Hospital. • Expanded access to day care beds and long term beds through the conversion of smaller hospitals into non-acute facilities. • Increasing community based mental health and substance abuse brings these services into smaller population units.

Source Sanigest Internacional

5. Emergency / Urgent Care Services

A complete EMS service has to be sure to secure a quick response to the zone of the emergency and a future transportation to a specialized medical facility for continuous care. The present service of the SEMS establishes their average response time in the urban areas of 15 minutes, with an increase to 25 minutes when the emergency takes place in a rural environment. This quality of service is provided due to the amount of ambulances and especially to the amount of set locations where the ambulances can be dispatched.

Nevertheless, due to the change of different hospital services in this project, according to the Scenario 2, a revision was made to assure the system of EMS can continue to provide a quality service. The particular changes that could affect the most were the changes of some facilities to Community Day Hospital and Daycare institutions, which will not be able to provide the emergency attention required

5.1. Levels of Emergency Care

General recommendations for the definition of the emergency care network could be organized based on typical levels. The basic 'certification' criteria for each level are outlined below.

Level	Description
1. Resuscitation	Conditions that are threats to life or limb (or imminent risk of deterioration) requiring immediate aggressive interventions. Examples of types of conditions that would be Level 1 are: cardiac/respiratory arrest, major trauma, shock states, unconscious patients, severe respiratory distress.
2. Emergent	Conditions that are a potential threat to life limb or function, requiring rapid medical intervention or delegated acts. Examples of types of conditions which would be Level 2 are altered mental states, head injury, severe trauma, neonates, MI, overdose and CVA.
3. Urgent	Conditions that could potentially progress to a serious problem requiring emergency intervention. May be associated with significant discomfort or affecting ability to function at work or activities of daily living. Examples of types of conditions which would be Level 3 are moderate trauma, asthma, GI bleed, vaginal bleeding and pregnancy, acute psychosis and/or suicidal thoughts and acute pain.
4. Semi-urgent	Conditions that are related to patient age, distress, or potential for deterioration or complications would benefit from intervention or reassurance within 1-2 hours). Examples of types of conditions which would be Level 4 are headache, corneal foreign body and chronic back pain.
5. Non-urgent	Conditions that may be acute but non-urgent as well as conditions which may be part of a chronic problem with or without evidence of deterioration. The investigation or interventions for some of these illnesses or injuries could be delayed or even referred to other areas of the hospital or health care system. Examples of types of conditions which would be Level 5 are sore throat, URI, mild abdominal pain which is chronic or recurring, with normal vital signs, vomiting alone and diarrhea alone.

The specific criteria for each level would be:

Level I (Level 4 hospitals and some Level 3 regional hospitals)

A Level I Trauma Center is a comprehensive regional resource that is a tertiary care facility central to the trauma system. A Level I Trauma Center is capable of providing total care for every aspect of injury – from prevention through rehabilitation. A Level I Trauma Center should :

- Provide 24-hour in-house coverage by general surgeons, and prompt availability of care in specialties such as orthopaedic surgery, neurosurgery, anaesthesiology, emergency medicine, radiology, internal medicine, plastic surgery, oral and maxillofacial, paediatric and critical care.
- Serve as a referral resource for communities in nearby regions.
- Provide leadership in prevention, public education to surrounding communities.
- Provide continuing education of the trauma team members.
- Incorporate a comprehensive quality assessment program.
- Operate an organized teaching and research effort to help direct new innovations in trauma care.
- Provide a program for substance abuse screening and patient intervention.
- Meet a minimum requirement for annual volume of severely injured patients.

Level II *(Level 3 or 4 hospitals)*

A Level II Trauma Center is able to initiate definitive care for all injured patients. A Level II Trauma Center should:

- Provide 24-hour immediate coverage by general surgeons, as well as coverage by the specialties of orthopaedic surgery, neurosurgery, anaesthesiology, emergency medicine, radiology and critical care.
- Address tertiary care needs such as cardiac surgery, hemodialysis and microvascular surgery
- Provide trauma prevention and continuing education programs for staff.
- Incorporate a comprehensive quality assessment program.
- Refer to a Level I Trauma Center

Level III *(Level 2 and 3 hospitals)*

A Level III Trauma Center has demonstrated an ability to provide prompt assessment, resuscitation, surgery, intensive care, and stabilization of injured patients and emergency operations. A Level III Trauma Center should:

- Provide 24-hour immediate coverage by emergency medicine physicians and the prompt availability of general surgeons and anaesthesiologists.
- Incorporate a comprehensive quality assessment program
- Develop transfer agreements for patients requiring more comprehensive care at a Level I or Level II Trauma Center.
- Provide back-up care for rural and community hospitals.
- Offer continued education of the nursing and allied health personnel or the trauma team.
- Be involved with prevention efforts and must have an active outreach program for its referring communities.

Level IV *(Level 1 hospital and larger urban area polyclinic or PHC center)*

A Level IV Trauma Center has demonstrated an ability to provide advanced trauma life support (ATLS) and advanced cardiac life support (ACLS) prior to transfer of patients to a higher level trauma center. It provides evaluation, stabilization, and diagnostic capabilities for injured patients. A Level IV Trauma Center should:

- Have basic emergency department facilities to implement ATLS protocols and 24-hour laboratory coverage and trauma nurse(s) and physicians available upon patient arrival.
- Provide surgery and critical-care services if available.
- Develop transfer agreements for patients requiring more comprehensive care at a Level I or Level II Trauma Center.
- Incorporate a comprehensive quality assessment program
- Be involved with prevention efforts and have an active outreach program for its referring communities.

Level V *(least complex PHC polyclinics)*

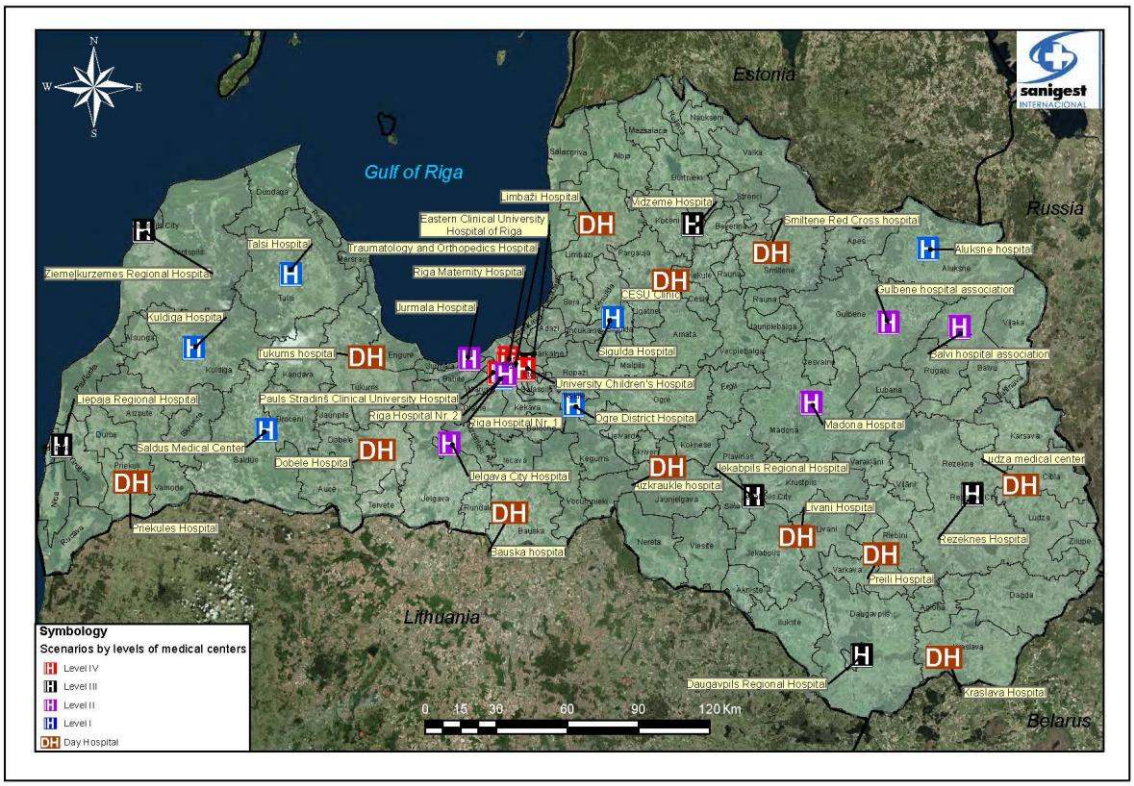
A Level V Trauma Center provides initial evaluation, stabilization, and diagnostic capabilities and prepares patients for transfer to higher levels of care. A Level V Trauma Center should:

- Have basic emergency department facilities to implement ATLS protocols and advanced cardiac life support (ACLS)
- Available trauma nurse(s) and physicians available upon patient arrival.
- After-hours activation protocols if facility is not open 24-hours a day.
- Provide surgery and critical-care services if available.
- Develop transfer agreements for patients requiring more comprehensive care at a Level I though III Trauma Center.

5.2. Distribution of proposed EMS

In the following Figure illustrates the location of the proposed Hospitals that are level I,II and III plus the different ambulance according to the preferred restructuring scenario presented in the LHFMP and the Levels of care specified above.

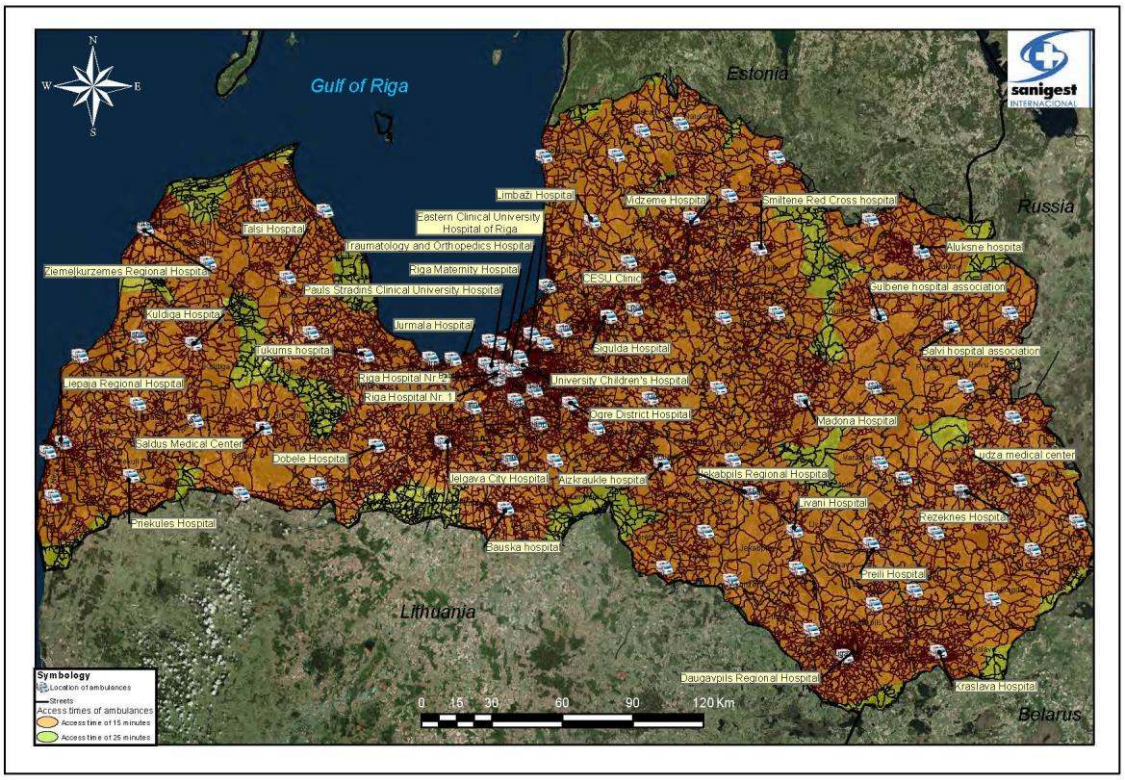
Figure 21: Ambulance and Hospitals' Location



Source: Sanigest International, 2016

According to the literature, it is important for the system to assure an access time to a healthcare facility in less than an hour (Seow & Lim, 1993; Weerheijm et al., 2012). This access time includes the time of response from the ambulances crew and the travel time to a healthcare facility. In it can be detailed the different locations from where the ambulances are dispatched plus their range response time of 15 or 25 minutes in the country.

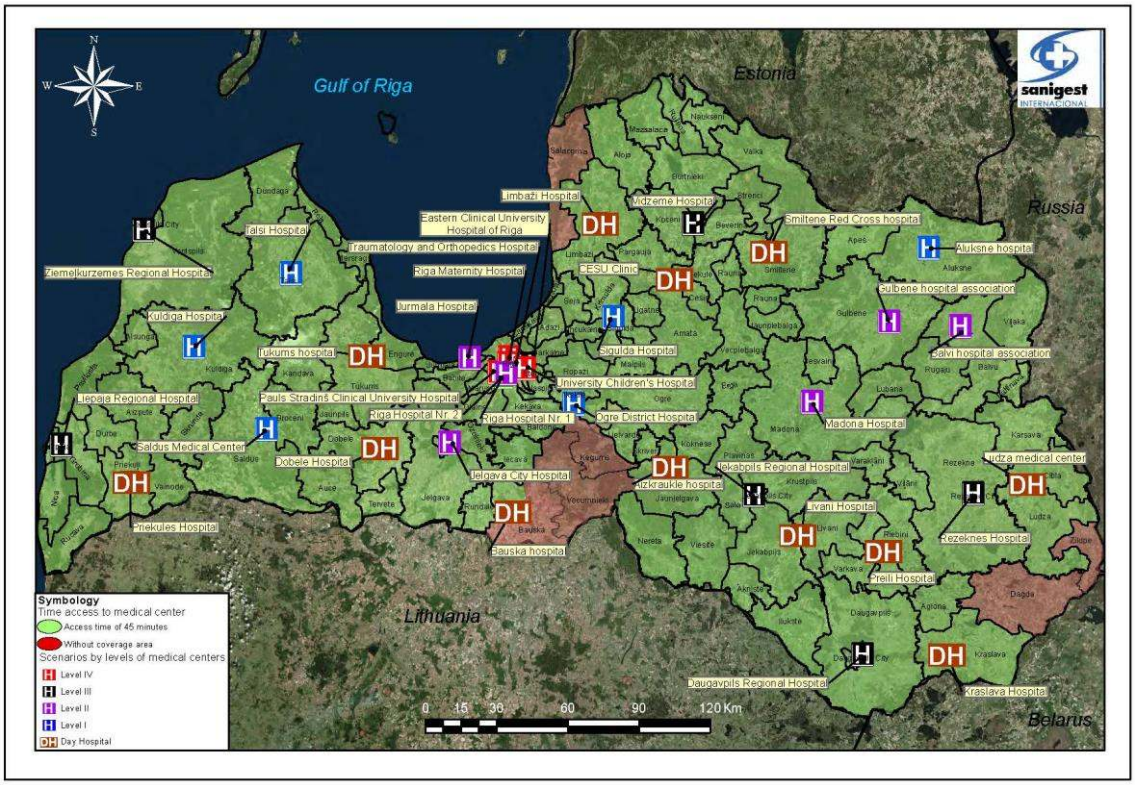
Figure 22: Ambulance response time coverage at 15 minutes



Source: Sanigest International, 2016

Since the average response time is of 15 minutes in the urbanized areas, a travel time of 45 minutes was calculated from each of the health facilities to accomplish an average emergency service of an hour, calculating from the moment the call is made to the moment the person arrives to a healthcare facility. The capacity to access certain locations is determined by the speed of the vehicles in the determined area. For the following calculations an average speed of 70km/h was determined.

Figure 23: Access time of 45 minutes to a Hospital



Source: Sanigest International, 2016

As seen in Figure 23, with the Scenario 2 of the project, 2.4% of the country cannot have the full access in one hour of service, which is detailed in Table 38. In the case of the access time at south of the Ogre District Hospital, the coverage distance is limited due to the Daugava River. Although, it is important to mention that the coverage becomes of a 100% when the response time maintains its average of 15 minutes but the transportation to a facility goes from 45 minutes to 60 minutes.

Table 38: Municipalities without 45 minutes access to a Hospital

Municipality	Population
Bauska Municipality	14,248
Dagda Municipality	7,647
Kegums Municipality	5,546
Salacgriva Municipality	7,959
Vecumnieki Municipality	8,375
Zilupe Municipality	3,080
Total	**46,855**

Source: Sanigest International, 2016

For the system to be able to cover a 100% of their population it would require to do investments. Without the construction of new health facilities or changing the structure of a

Daycare, the best solutions would be around how to provide better times of response by improving road access. For example, if the Ogre Hospital could access the municipality of Kegums without traveling more minutes to the bridge to cross the Daugava River it will decrease the access time for part of the population. Improving road conditions, or traffic could allow better traveling times reducing the area that is not covered within the 1 hour standard.

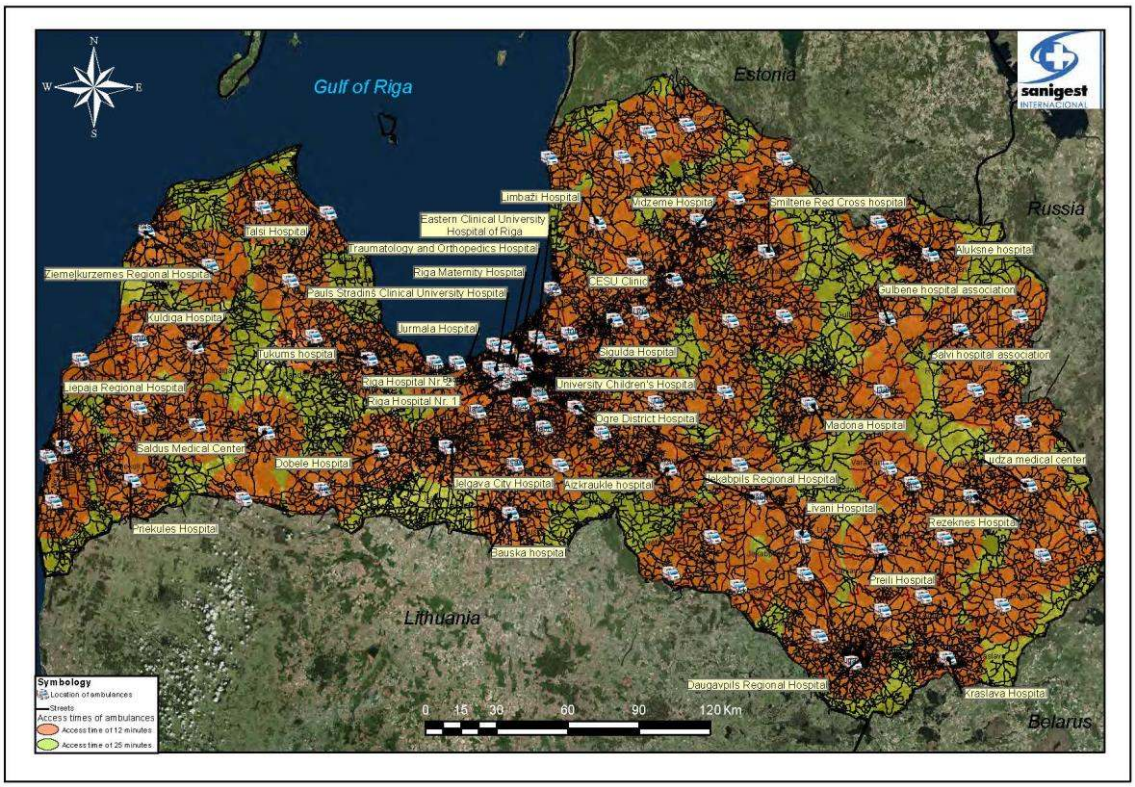
Around the changing some of the facilities, an option would be to create a basic level of urgency room for the Daycare Hospital of Bauska. This construction will habilitate the easy access to an emergency room to the inhabitants of Bauska, Kegums and Vecumnieki for a total of 28,169 citizens with better access of transportation after being assisted by an emergency vehicle.

5.3. Suggested Scenario for the improvement of the EMS

As mentioned before, the standard to measure most of the EMS around the world has been the response time. Therefore, with the goal of acquiring a more efficient service, the following scenario proposes to modify the response max time to 12 minutes, instead of the previous 15 minutes established.

In Figure 24, the areas of coverage of the ambulance locations have been reduced due to the 12 minutes restrictions from the ambulance locations to different places of the country. This has left an approximate of 66,767 citizens of the country uncovered within the suggested standard, deriving in the necessity to create more ambulance locations to respond in the expected time frame.

Figure 24: Ambulance response time coverage at 12 minutes

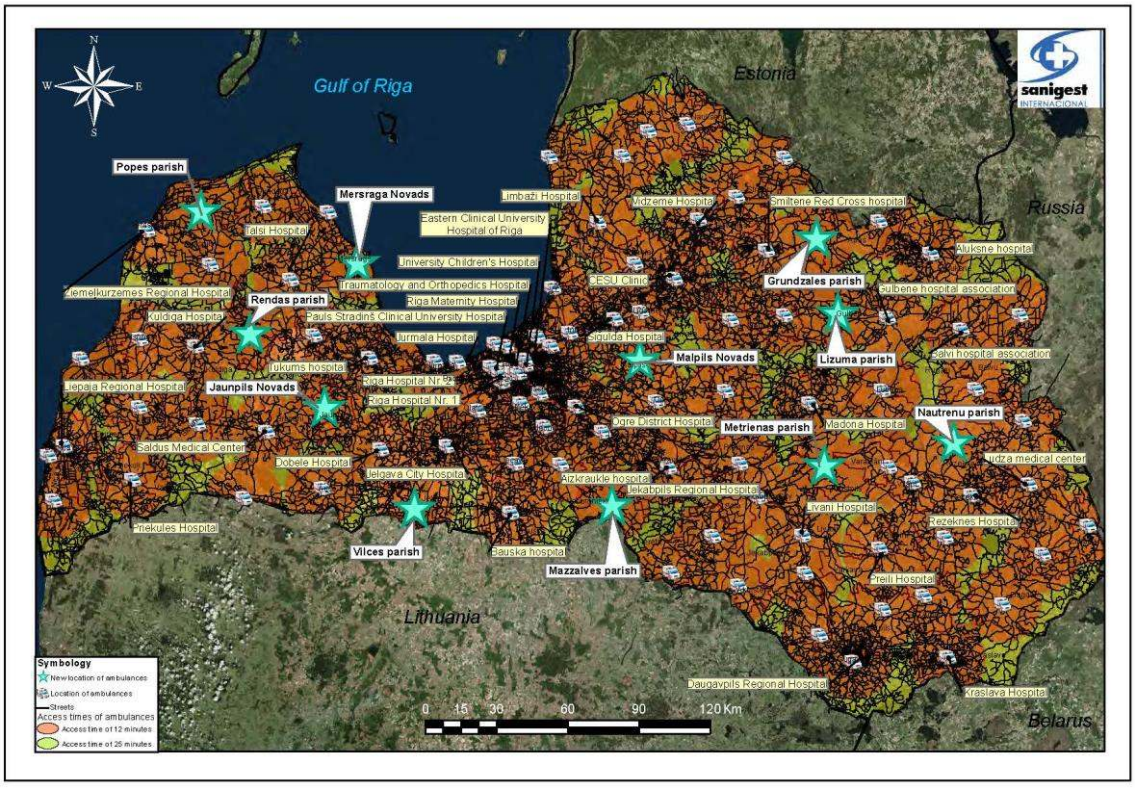


Source: Sanigest International, 2016

The new investment in ambulance locations will allow coverage to a 98% of the population within the new standard, as it can be seen in the figure bellow (Figure 25). The new locations will be established in the municipalities of Jaunpils, Mersrags and Malpils, and also in the parishes of Grundzales, Lizuma, Mazzalves, Metrienas, Nautrenu, Popes, Rendas and Vilces. These locations were selected over other areas of Latvia because of two important variables:

- Amount of population in the zone
- Geographic positioning to be able to access a good quantity of the territory.

Figure 25: New ambulance locations



Source: Sanigest International, 2016

Finally, is important to notice that the previous set of changes in the maximum response time standard to 12 minutes also implied the review of the access time from the emergency area to a hospital capable of taking the emergency in less than 48 minutes, to be able to perform the whole response system in less than an hour. However, there are no differences between this and the other scenario, and as such, the same recommendations apply for improving that part of the service.

5.3.1. System improvement from a stationary to a dynamic model

The SEMS realize continues efforts to improve their system, by recollecting great amount of data and even making changes at the end of the year to relocate ambulances accordingly to the areas of more emergencies in the territory, nevertheless, is possible to improve this system if the actions made to relocate were taking sooner. Currently, the system described

by SEMS and exposed in the previous scenarios is of a stationary system, nevertheless, new systems have emerged denominated dynamic systems.

Within this new system the idea is to maximize the effectiveness of the GPS in the ambulances, but also of the information of where and when the accidents are happening throughout the country. By combining this information, a dynamic model can be established in the future that will perform the following changes:

- Possible relocations or establishing of more bases
    - With the day to day information recollected, plus the capacity of having a GPS location online system on the ambulances, it is possible for the team in charge of dispatching the units to relocate the ambulances based on sites where it could more needed in certain time of day, considering the possibility of traffic or just for better distribution of the on call units. It can also allow for the establishment of new bases or temporary ones in case they are needed for a better response (Bélanger et al., 2016).
- Reduce the numbers of ambulances
    - With a dynamic model, the system becomes more effective, allowing the possibility of reducing the number of ambulance needed to cover the region.
- Reduce the response time of the EMS units
- Augmented coverage of the region from 98%, since ambulance in the road will increment their line of coverage
- It will increase the costs of usage and maintaining of ambulances

The new model brings lots of benefits to the efficiency of the system, but also means that the ambulances will be used for more distances, even without patients.

5.3.2. Important considerations for implementation:

Part of the proposal to achieve this goal is a well-functioning Dispatch Centre, which will be responsible for sorting, addressing, and coordinating transportation for the attention of emergencies in the most efficient and timely manner as possible. Dispatch systems exist within the system and any improvements would be in ensuring that patients are allocated to the appropriate facility based on the severity of the cases.

After hours PHC should be considered based on international experiences in New Zealand, UK and Australia which have incorporated incentives for primary care physicians to contribute to after hours care arrangements. In New Zealand, for example, for every 2,000 people enrolled, a GP would be expected to provide at least five hours per week to a polyclinic that is providing 24/7 after hours care.

Finally, the availability of the health line, providing an initial triage point should incorporate the most modern technology to allow a first diagnosis by a nurse, followed by a referral to a GP for telephone triage as well. Thereafter, patients could be referred to the most appropriate facility based on the above levels if the nurse or GP cannot provide sufficient support to the patient.

6. Ambulatory and outreach care

Success in the provision of ambulatory personal health services, i.e. providing individuals with treatment for acute illness and preventive health care on an ambulatory basis, is the most significant contributor to the health care system's performance in most developing countries. Ambulatory personal health care has the potential to contribute the largest immediate gains in health status in populations, especially for the poor24. With this in mind, it is planned to implement the strengthening of the primary care level and the expansion of coverage of outpatient services nationwide. This strategy needs not only the realization of an economic effort to have the necessary infrastructure, but also need to have human resources and training programs and continuing education in place.

The master plan proposes investments for strengthening ambulatory and outreach care. Two types of investments are contemplated here:

- Infrastructure and equipment for approximately €50 million;
- Recruitment of about 568 PHC providers (physicians) by 2020.

6.1. Infrastructure costs

Many health systems concentrate their capital investment on hospitals, and Latvia follows this trend. Primary care facilities are often under-equipped, especially for diagnostics, and they can be in poor condition. This tendency means that patients might need to rely on specialist care anyway, even for basic diagnostics such as spirometry or electrocardiograms (ECGs). Professional bodies have argued that insufficient diagnostics (including imaging and physiological measurements) are holding primary care back from diagnosing and treating more people.

The shift to offer a more integrated, holistic, PHC model requires a change in not only function but also form. The transition to creating PHC infrastructure that responds to the modern needs of primary care are underlined by the following trends:

- primary care provides a place to which people can bring a wide range of health problems, rather than vertically focused "priority diseases";
- primary care is a hub from which patients are guided through the health system with staff that includes social workers and educators. Individual GP offices will be replaced in higher density centres will be replaced with team oriented, multi-GP practices that will provide dental clinic, ultrasound, diabetic clinic, general X ray, mental health, home visit team and pharmacy services as well as promotion and prevention activities;
- primary care centres should facilitate relationships between patients and clinicians, within which patients participate in decision-making about their health and health care; it builds bridges between personal health care and patients' families and communities;

[24] http://www.who.int/bulletin/archives/78(6)791.pdf

- primary care centres serve as a focal point for opportunities for disease prevention and health promotion as well as early detection of disease;
- primary care centres are the hub for teams of health professionals: physicians, nurse practitioners, and assistants with specific and sophisticated biomedical and social skills; and
- primary care requires adequate resources and investment and can then provide much better value for money than its alternatives.

To facilitate the transition to more integrated PHC – at least in urban areas – the Master Plan proposes to introduce modern, integrated and community oriented PHC centres in the 8 NDP National Centres. Riga City has been excluded from the proposal for additional PHC centres, given that the city currently counts on a well-developed primary care network and it is therefore not a priority to further develop that level of care in Riga City. The NDP included in the investment proposal are:

- Liepaja City
- Ventspils City
- Daugavpils City
- Rezekne City
- Jurmala City
- Valmiera City
- Jekabpils City
- Jelgava City

These urban centres would follow a people-centred integrated primary care model, and the services available would roughly follow those in Table 39.

Table 39: Services available at the Urban PHC

Clinical Services	Single GP	Multi-GP	PHC Center
Exam/Treat Clinics: Male, Female, Paeds	✓	✓	✓
Dental Clinics		✓	✓
Ultrasound		✓	✓
Diabetic Clinic		✓	✓
General X-Ray Room		✓	✓
Pharmacy		✓	✓
Community Day Hospital			✓
Smoke Cessation			✓
Dietician			✓
Physiotherapy			
Emergency Trauma Treat/Stabilize			✓

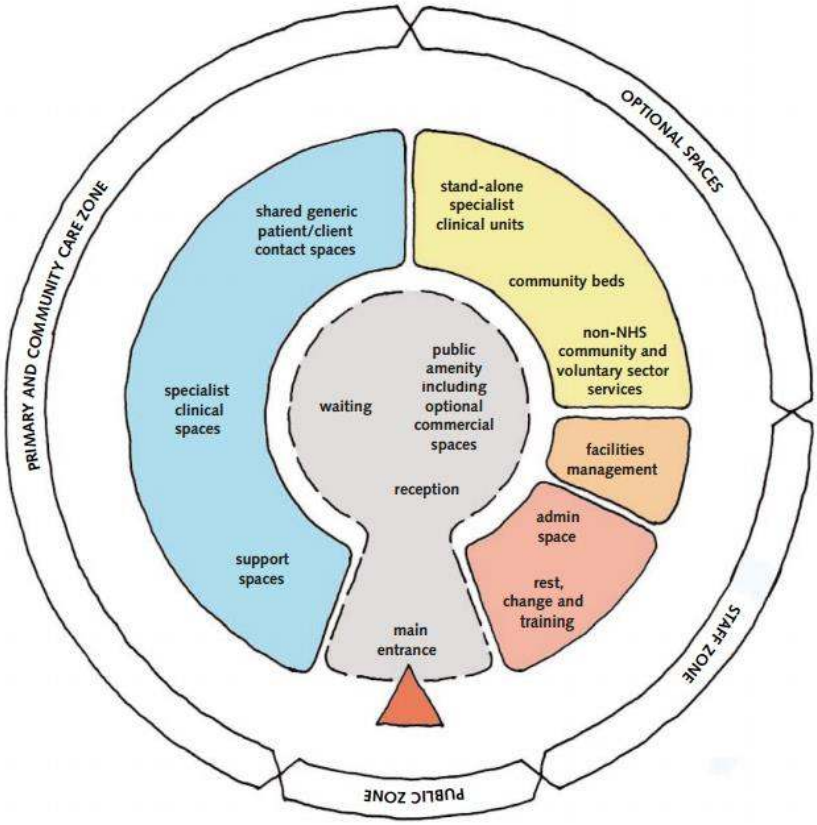
Source: Sanigest Internacional

The advantages of multi-GP practices with an integrated community care component, will have a number of advantages.

- Community mental health
- Promoting exercise and health promotion
- Better sharing of information among colleagues
- Space for team approach to PHC.

These new facilities would look more like community centres offering services that go beyond clinical scope and integrate both health and social care. Example of the spatial design and the facility are included in the following figures.

Figure 26: Zoning of PHC centres



Source: DPH (2013)

Figure 27: Example of Integrated Centre offering primary and community health services c

Source: Images of Bunny Hill Customer Service Centre from DPH (2013)

The following table summarizes the key levels for Primary Care Centres, targeted initially to the priority NDP cities. In future investment stages, it is likely that the modernization of PHC infrastructure could be expanded to the other 21 Regional Development Centres from the NDP.

Table 40: Key levels of PHC Centres

PHC Level	Population Catchment	Size
Mobile teams	<500	The mobile teams could be organized from the multi-GP offices or urban centers to ensure coverage. The mode of transport could be from home care teams in small vans to full complex mobile health trailers (see image)
Single GP office	500-2,000	100 to 200 m2
Multi-GP office	2,000 – 15,000	200 to 1,600 m2 For every 2,000 people, 1 physician with 2 exam rooms per physician @ 150 m2 per FTE.
Urban PHC Center	15,000-50,000	1,200 to 5,000 m2

Source: Department of Health (2013)[25]

These levels do not include specialist outpatient services that are considered in the context of polyclinics associated with hospitals. At the same time, it is important to note that the proposed guidance is scalable based on population and physicians FTE. For example, in the case of the multi-GP offices, the starting size is 150 m^2 which should be adequate for 1,667 people. For every 1,667 additional people the increased size would expand based on 1 FTE per 1,667 population and 150 m^2 per physician. At the larger sized clinics, additional spaces like community centres and gyms would be included, increasing the starting size to 200 m^2 per physician.

The Department of Health (2013) Health Building Note on primary and community care services notes that the room sizes included in table Table 41 "provide a good fit for most generic rooms in primary and community care buildings" based on experience and ergonomic analysis[26].

Table 41: PHC standardised room sizes according to service provided

Room size	Generic Patient/ Client Contact Spaces	Specialist Clinical Spaces	Support Space
8 m^2	Interview (with or without clinical basin)	Adult hearing test	Clean or Dirty Utility Disposal Hold Cleaners Near Patient Testing 1-Person office
12 m^2	Interview Examination/ therapy Single person recovery Physical Measurement		Clear o Dirty Utility Disposal Hold

[25] Department of Health (2013). *Health Building Note 11-01 – Facilities for primary and community care services*. UK Government National Archives. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/148509/HBN_11-01_Final.pdf

[26] For more details regarding the layout of each type of room refer to the graph on page 12 of to the DPH (2013) document.

Room size	Generic Patient/ Client Contact Spaces	Specialist Clinical Spaces	Support Space
16 m^2	Consulting/ examination Treatment Group Podiatry Physical Therapy Plaster	Dental treatment Ophthalmology C/E ADL bed ENT C/E Paediatric hearing test ADL bath	
32 m^2	Large group Exercise Equipment Free Movement Exercise In-Patient Social		

Source: Department of Health (2013): page 12

In populations where there are more than 15,000, the proposal centres on expanding the number of PHC centres. Applying these planning guidelines, the following table outlines the estimated number of units required in each of the priority cities. Riga is not considered in this projection as access to high quality PHC is less urgent[27]. As described in more detail later, initially only one additional Urban PHC per city is recommended, to allow for a progressive evolution of how and where patients access primary health care services.

Table 42: PHC Centres

Name of the medical center	Catchment Population	No. Urban PHC
Liepaja City	76,731	1
Ventspils City	38,750	1
Daugavpils City	93,312	1
Rezekne City	32,328	1
Jurmala City	50,840	1
Valmiera City	25,130	1
Jekabpils City	24,635	1
Jelgava City	59,511	1
Total	401,237	8

Source: Sanigest Internacional

The expansion of the multi-GP model would allow for a modern stamp on the PHC network and provide more than 400 thousand people with a new level of care, with high quality diagnostics and a community oriented PHC model. A subsequent section on investment planning outlines the estimated cost of developing the PHC network with a focus on these new urban centres.

In total, the *infrastructure costs* for strengthening this sub-sector are about €49 million.

Proposed investments	**Total estimated costs (in € million)**
Adding 8 urban PHC	21.1
Creating 8 mobile health units	0.7

27 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/148509/HBN_11-01_Final.pdf

Proposed investments	Total estimated costs (in € million)
Creating 8 ambulatory surgery centers	27.0
TOTAL	**48.8**

Source: Sanigest Internacional

6.2. Urban Primary Health Care Centers (PHC)

Based on the rules of planning a Primary Health Care (PHC) Centre set out in the previous section, Sanigest estimated the primary health care needs based on the catchment population and the following standards:

- 60 General Practitioners (GPs) per 100,000 populations, which equates approximately 1,667 people per GP
- 150 m^2 per GP
- Unitary cost per m^2 of € 806[28]

During a first phase, Sanigest estimates the investment need of developing 8 Urban PHC Centres. The new centres are not expected to cover 100% of the population of each city, as people will continue to seek care in existing providers, while at the same time the Urban PHC centres will serve as a pilot of the extended primary care network. The following table summarized the PHC needs based on the planning standards and the resulting catchment population coverage of the proposed centres for the first phase. For cities with over 50 thousand inhabitants, the proposed centre has the largest suggested size of 5,000 m^2. On the other hand, the centres in cities with a population of 25 thousand or less have the minimum size of 1,200 m^2, while the remaining two cities (Ventspils and Rezekne) have centres which are roughly half in size of the estimated need.

Table 43: NDC PHC urban centres needs and proposed additional space

Cities	Population	Needed		Proposed		% of population covered	Cost
		GPs	m^2	m^2	GPs		
Liepaja City	76,731	46	6,900	5,000	25	54%	€ 4.0
Ventspils City	38,750	23	3,450	1,725	9	37%	€ 1.4
Daugavpils City	93,312	56	8,400	5,000	25	45%	€ 4.0
Rezekne City	32,328	19	2,850	2,000	10	52%	€ 1.6
Jurmala City	50,840	31	4,650	5,000	25	82%	€ 4.0
Valmiera City	25,130	15	2,250	1,200	6	40%	€ 1.0
Jekabpils City	24,635	15	2,250	1,200	6	41%	€ 1.0
Jelgava City	59,511	36	5,400	5,000	25	70%	€ 4.0
Total	**401,237**	**241**	**36,150**	**26,125**	**131**	**52%**	**€ 21.1**

Source: Sanigest Internacional

Based on the above estimation, the population in the eight NDP cities require over 36 thousand m^2 of space for 241 GPs to provide extended PHC service in urban PHC centres. The resulting proposed centres provide PHC coverage for at least 37% of the catchment population of each city, with the centre in Jurmala providing up to 82% coverage. The total

[28] Based on day care standard cost of USD $900 and average exchange rate.

investment cost per region is summarized in the following table, which amount to approximately €21 million.

Table 44:Total Investment cost for new Urban PHC centres per region

Region	Cost
Kurzeme	€ 5
Latgale	€ 6
Periga	€ 4
Vidzeme	€ 1
Zemgale	€ 5
Total	**€ 21**

Source: Sanigest Internacional

6.3. Mobile teams and ambulatory surgery

In addition to hospital infrastructure, the team also proposes the development of two different types of ambulatory healthcare services: (1) mobile health units and (2) surgical centres, one of which is to be developed in each NDC. The cost of these were estimated using the following criteria:

1. **Mobile Health Units**: with an average cost of USD $100 thousand, which results in €89.5 thousand.

2. **Ambulatory Surgical Centres**: each is designed to have 10 beds and 2 surgical theatres. Based on international standards for day care, the centres will have 50 m^2 per bed, built at an average cost of € 806 (USD $900), while each theatre is estimated to cost €1.5 million to build. Based on these specification, each centre would cost € 3.4 million.

The following table includes the cost for the two types of units by region according to the technical and financial criteria set for 8 mobile health teams and 8 ambulatory surgical centres.

Table 45: Estimated cost of ambulatory specialized units

Region	NDC Hospital	Mobile Health Units Cost per Region	Ambulatory Surgical Centres Cost per Region
Kurzeme	Liepaja Regional Hospital	€ 179,080	€ 6,805,860
	Northern Regional Hospital		
Latgale	Daugavpils Regional Hospital	€ 179,080	€ 6,805,860
	Rēzeknes Hospital		
Periga	Jurmala Hospital	€ 89,540	€ 3,402,930
Vizeme	Vidzeme Hospital	€ 89,540	€ 3,402,930
Zemgale	Jēkabpils Regional Central Hospital	€ 179,080	€ 6,805,860
	Jelgava City Hospital		
6.3.1.	**Total**	**€ 716,320**	**€ 27,223,440**

Source: Sanigest Internacional

The development cost to strengthen ambulatory and outreach care through mobile health units and ambulatory surgical centres would equal almost € 28 million.

6.4. Human resources requirements: primary care providers

International evidence indicates that good access to primary care is critical to cost-effectively improving a population's health. In areas with more primary care providers per person, death rates for cancer, heart disease, and stroke are lower and people are less likely to be hospitalized[29]. Additionally, total health care costs have been demonstrated to be lower when individuals have a primary care provider overseeing and coordinating their care[30]. This section will provide an overview of international standards for primary care provider (PCP) staffing and recommended staffing levels for the Latvian PHC system.

6.4.1. Review of international levels of staffing

There are a number of different recommendations for the "ideal" population size to be served by a primary care provider, though not one single internationally recognized standard. In the United States, a region is considered a Health Professional Shortage Area if there is a population greater than 3,500 being served per primary care provider, and in areas with higher need (older population, more socio-economically vulnerable, greater burden of disease) the level is 3,000.[31] However, most primary care providers see between 1500 – 2000 patients, which is largely based on the practical limitation of how many patients a provider can see on a daily basis and still provide quality care services.

The time per patient for a physician is between 10-20 minutes across different countries, and a norm of 15 minutes per patient is an acceptable timeframe to consider as a standard visit in Latvia. Time less than 15 minutes has been deemed to decrease quality of care and patient satisfaction. On average, the full-time equivalent (FTE) of a PCP is 35-40 hours per week, but in the countries listed below the actual working hours exceed the standard. As seen in the below table, it ranges between 43 hours per week in Australia to 60 hours per week in the United Kingdom.

Table 46: GP supply and workload (selected countries)

	PCP panel size	PCPs per 100,000 inhabitants	Doctor consultations per capita per year	PCP Outpatient visits per capita	Number of hours/ week	Time per patient (min)
Australia	839	110	6.5	5.1	43	15
Denmark	1598	68	4.6	4.1	46	13
Spain	1351	74	7.5	-	44	10
Turkey	3715	52	7.6	-	46	19
United States	2300	137	-	-	45	19

[29] L. Shi et al., "Primary Care, Self-Rated Health, and Reductions in Social Disparities in Health," Health Services Research 37, no. 3 (2002): 529-550.
Starfield B, Shi L, Macinko J. Contribution of Primary Care to Health Systems and Health. The Milbank Quarterly. 2005;83(3):457-502. doi:10.1111/j.1468-0009.2005.00409.x.
C. Schoen et al., "New 2011 Survey of Patients with Complex Care Needs in 11 Countries Finds That Care Is Often Poorly Coordinated," Health Affairs Web First, Nov. 9, 2011.
[30] Increasing Value for Money in the Canadian Healthcare System, Hollander et al. Healthcare Quarterly Vol 12 No. 4 2009
[31] http://kff.org/other/state-indicator/primary-care-health-professional-shortage-areas-hpsas/

	PCP panel size	PCPs per 100,000 inhabitants	Doctor consultations per capita per year	PCP Outpatient visits per capita	Number of hours/ week	Time per patient (min)
United Kingdom	1432	78	5.0	-	60	8
Kazakhstan	2259	26	6.7	-	40	15

Sources: OECD Statistics database, Activity reports for Australia, Masseria et al. Primary Care in Europe

6.4.2. Current primary care staffing shortages in Latvia

A number of different analyses have been conducted on the available data regarding primary care providers in Latvia:

(1) Analysis of current FTE providers using projected 2016 population numbers

(2) Estimates of current shortage of FTE providers using projected 2016 population numbers

(3) Analysis of future shortages of FTE providers using projected 2020 population numbers that take the aging workforce and gender / age differences into consideration

All analyses utilised the following methodology:

This analysis examined primary care providers who were present in both the HC_persons_clean.dta and GP_payments_2014_clean.dta databases. The GP_payments_2014_clean.dta database was merged into the HC_persons_clean.dta which had already been cleaned to remove any providers whose institutions could not be matched to a region or division. There were 32 Provider IDs from the payment database which could not be matched to the HC_persons database.

A new variable was then created (PCP), to analyse providers who were listed as having that specific contract record as being certified as a General (Family) Physician or a Paediatrician, based on Latvia's definition of a Primary Care Provider.

Next, the previously described database containing providers' ages was merged in, and there were only 6 PCP IDs which could not be matched.

In both Analysis 1 and Analysis 2, it was assumed no PCPs had retired between 2014 and 2016, and that the number of patients that should be attended by one PCP is 1,667 as follows from them PCP Standard of 60 PCPs per 100,000 population.

For Analysis 3, it was assumed that PCPs over the age of 63 would be retired (based on retirement age having been set at 62 in 2014, with that age increasing by 3 months every year).

6.4.3. Analysis of current FTE providers

There were a total of 1495 primary care provider FTE considered for 2016. The average numbers of patients per region in Latvia that one primary care provider would care for ranges from some regions with no listed FTE (Strenči county, Cibla county and Varkava county), and some like Engure county with only one PCP FTE for its population of over 5,000 to small regions like Alsunga county, which have 2.5 FTE PCPs for a projected number of only 1,376 people for 2016 (only 550 patients per FTE).

The map below shows the PCP density per 100,000 people across the municipalities estimated for 2016. The reference range typically used for OECD countries is between 60 and 80 PCPs per 100,000. The map shows that 50 percent of the municipalities are above 80 PCP FTEs per 100,000 and 31.1 percent below the 60 PCP FTEs per 100,000 rate indicating it may be useful to conduct further analysis of the priority areas with the highest and lowest levels. The figures below show the ten municipalities with the lowest PCP density per 100,000 population and the ten with the highest – ranging from zero PCP FTEs up to 182 per 100,000 population.[32]

Figure 28: Municipalities with the lowest PCP density per 100,000 population

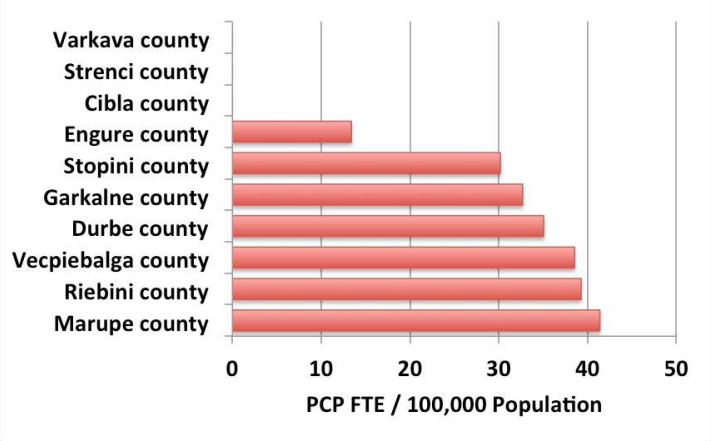
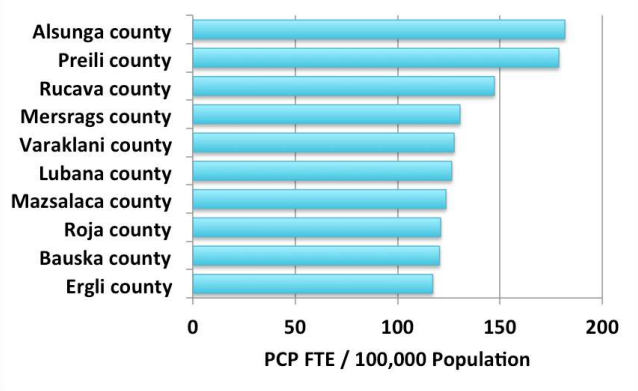


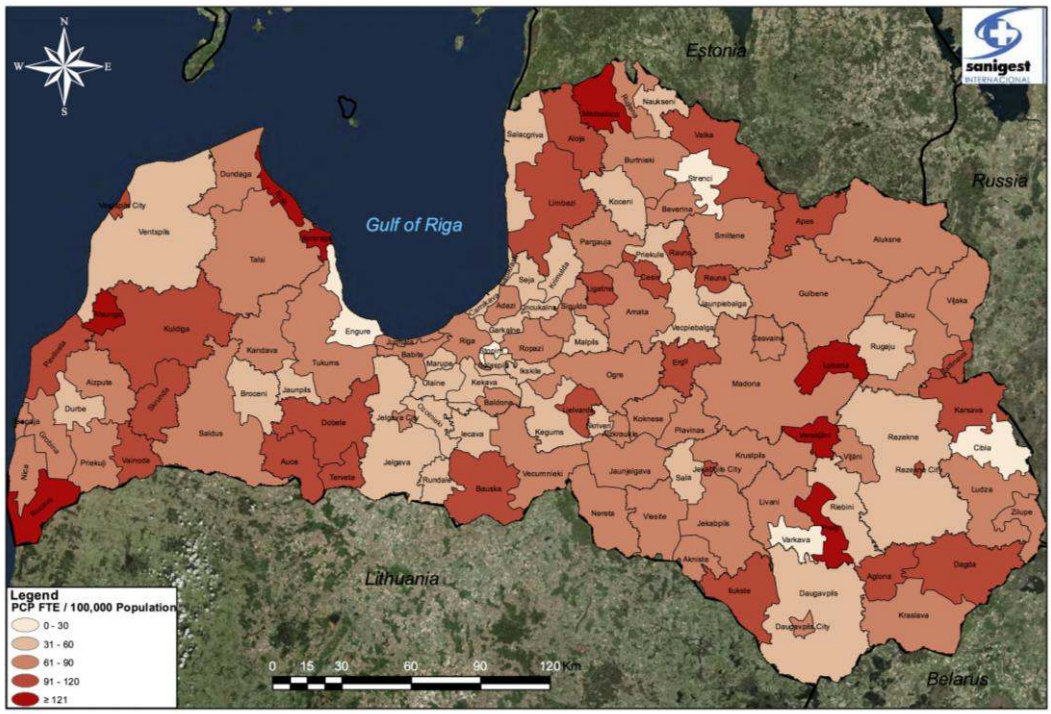
Figure 29: Municipalities with the highest PCP density per 100,000 population



Source: Sanigest Internacional based on Census 2011 data

[32] Caution on interpreting the municipalities with zero PCP FTEs as data may be missing rather than actual conditions.

Figure 30. PCP FTE density per 100,000 people across the municipalities estimated for 2016



Source: Sanigest Internacional

6.4.4. Estimates of current shortages of PCPs

Based on the data, in addition to the three municipalities without any PCP, there are three more municipalities that would meet the US definition of a Health Professional Shortage Area in terms of each FTE PCP in the counties having to serve over either 3,000 or 3,500 people, and all are located in Periga.

Table 47: Primary care provider shortage areas, 2016

Region	Municipality	Population 2016	PCP FTE	Population/ FTE
Periga	Stopini county	9941	3	3314
	Garkalne county	7649	2.5	3060
	Engure county	7459	1	7459

Source: Sanigest Internacional

Additionally, the following 36 municipalities which are considered to have a deficit of primary care providers in their area, based on the standard of having one FTE per 1667 patients. The gap in provider resources ranges from the small (only 0.1 FTE more needed) to the large of 3.5 FTE more in Engure. In contrast there are a substantial number of municipalities where the number of FTE PCP providing services in the area is much greater than the population would indicate are needed – up to a surplus of over 80 in Riga where there are an estimated 464 FTE PCP compared to the 383 FTE needed.

6.4.5. Projected primary care staffing shortages in Latvia for 2020

A further analysis was conducted to estimate the projected primary care provider staffing shortages across municipalities in Latvia for 2020. These staffing shortage analyses have made two additional adjustments to the base analyses conducted for 2016:

(1) Each municipality's population was risk adjusted for their specific age-sex composition as per the 2011 Census using UK risk-adjustors described earlier.[33]

(2) Each municipality's PCP workforce was decreased according to the percentage of its PCPs that would be at retirement age of 63 in 2020.[34]

Following with the standard that the ideal number of patients per provider is 1667, almost all the municipalities (89.1%) will be projected to need more primary care providers in 2020 (if no new graduates entered the workforce), though those gaps range from only one or two more PCP FTEs needed in most of the municipalities but up to 162 additional FTE needed in Riga where over 35 percent of its PCP FTE would be eligible for retirement in 2020. It should be noted that doctors in urban areas generally see a higher sized patient panel for a variety of reasons including the fact there is less need for travel for home visits. If the patient panel was increased to 2000 for Riga, the deficit in 2020 would be reduced to only 85 additional FTE.

Overall, using risk-adjusted population figures (which in essence increase the PCP needs for populations with a higher number of elderly or the very young) and removing the potentially retiring PCP population, the estimated maximum number of new PCP FTEs that Latvia would need for 2020 is 568. However, given the current practice of many providers working well past 65, bridging such high a deficit may not be needed. For example, 20% of the PCPs in 2014 were over the age of 62, the retirement age at the time. If it is assumed that 20% of the retirement age doctors will actually be working in 2020, the need would drop from 568 new PCP FTE to 438.

Table 48: Projected PCP shortages in 2020

Region	Municipality	PCPs 2014	% >63 in 2020	Projected PCPs 2020	Risk-Adjusted 2020 Pop	PCPs needed 2020	Gap 2020
Kurzeme	Aizpute county	6.9	65.6%	2.4	10565	6.3	(4.0)

[33] DH Financial Planning and Allocations Division. Resource Allocation: Weighted Capitation Formula (Seventh Edition). 2011

[34] Because not 100% of providers may retire at this age, this analysis provides a "maximum" number of doctors that may be required in 2020.

Region	Municipality	PCPs 2014	% >63 in 2020	Projected PCPs 2020	Risk-Adjusted 2020 Pop	PCPs needed 2020	Gap 2020
	Alsunga county	2.5	60.0%	1.0	1663	1.0	0.0
	Broceni county	3.5	57.1%	1.5	6934	4.2	(2.7)
	Dundaga county	3.0	66.7%	1.0	4736	2.8	(1.8)
	Durbe county	1.0	100%	0.0	3436	2.1	(2.1)
	Grobina county	6.2	83.8%	1.0	10305	6.2	(5.2)
	Kuldiga county	22.9	33.3%	15.3	27326	16.4	(1.1)
	Liepaja city	54.5	48.2%	28.3	86226	51.7	(23.5)
	Mersrags county	2.0	50.0%	1.0	1906	1.1	(0.1)
	Nica county	2.7	0.0%	2.7	4091	2.5	0.2
	Pavilosta county	2.5	60.0%	1.0	3299	2.0	(1.0)
	Priekule county	3.2	63.2%	1.2	6515	3.9	(2.7)
	Roja county	4.5	10%	0.0	4527	2.7	(2.7)
	Rucava county	2.5	50.0%	1.3	2146	1.3	(0.0)
	Saldus county	17.5	51.4%	8.5	27697	16.6	(8.1)
	Skrunda county	5.5	81.8%	1.0	5961	3.6	(2.6)
	Talsi county	22.2	40.0%	13.3	34410	20.6	(7.3)
	Vainode county	2.3	44.4%	1.3	3010	1.8	(0.6)
	Ventspils city	33.0	33.7%	21.9	43467	26.1	(4.2)
	Ventspils county	6.7	22.5%	5.2	13251	7.9	(2.8)
Latgale	Aglona county	4.0	0.0%	4.0	4497	2.7	1.3
	Baltinava county	1.0	100%	0.0	1329	0.8	(0.8)
	Balvi county	10.8	48.8%	5.5	15637	9.4	(3.9)
	Cibla county	0.0	-	0.0	3206	1.9	(1.9)
	Dagda county	7.0	14.3%	6.0	9247	5.5	0.5
	Daugavpils city	67.8	48.3%	35.0	103516	62.1	(27.1)
	Daugavpils county	10.5	14.3%	9.0	28125	16.9	(7.9)
	Ilukste county	7.3	34.4%	4.8	9047	5.4	(0.7)
	Karsava county	5.3	19.0%	4.3	7164	4.3	(0.0)
	Kraslava county	10.0	20.0%	8.0	19856	11.9	(3.9)
	Livani county	9.4	53.5%	4.4	13863	8.3	(4.0)
	Ludza county	11.8	40.4%	7.0	15882	9.5	(2.5)
	Preili county	17.6	48.3%	9.1	11883	7.1	2.0
	Rezekne city	33.9	54.2%	15.5	35390	21.2	(5.7)
	Rezekne county	14.7	49.4%	7.4	30730	18.4	(11.0)
	Riebini county	2.0	100%	0.0	6207	3.7	(3.7)
	Rugaji county	1.0	0.0%	1.0	2561	1.5	(0.5)
	Varkava county	0	-	0.0	2418	1.5	(1.5)
	Vilaka county	4.0	75.0%	1.0	6341	3.8	(2.8)
	Vilani county	4.3	47.1%	2.3	7196	4.3	(2.1)
	Zilupe county	2.5	0.0%	2.5	3638	2.2	0.3
Periga	Adazi county	7.5	40.0%	4.5	10782	6.5	(2.0)

Region	Municipality	PCPs 2014	% >63 in 2020	Projected PCPs 2020	Risk-Adjusted 2020 Pop	PCPs needed 2020	Gap 2020
	Aloja county	5.5	45.5%	3.0	6324	3.8	(0.8)
	Babite county	6.0	16.7%	5.0	10264	6.2	(1.2)
	Baldone county	4.0	100%	0.0	6164	3.7	(3.7)
	Carnikava county	3.0	0.0%	3.0	8027	4.8	(1.8)
	Engure county	1.0	100%	0.0	9284	5.6	(5.6)
	Garkalne county	2.5	60.0%	1.0	8361	5.0	(4.0)
	Ikskile county	4.0	50.0%	2.0	9865	5.9	(3.9)
	Incukalns county	4.0	50.0%	2.0	9202	5.5	(3.5)
	Jaunpils county	1.0	100%	0.0	2776	1.7	(1.7)
	Jurmala city	37.5	54.7%	17.0	60717	36.4	(19.4)
	Kandava county	5.5	100%	0.0	10167	6.1	(6.1)
	Kegums county	3.2	31.6%	2.2	6690	4.0	(1.8)
	Kekava county	10.5	42.9%	6.0	24356	14.6	(8.6)
	Krimulda county	3.0	66.7%	1.0	6146	3.7	(2.7)
	Lielvarde county	10.0	55.0%	4.5	11929	7.2	(2.7)
	Limbazi county	16.5	57.6%	7.0	21126	12.7	(5.7)
	Malpils county	2.0	100%	0.0	4140	2.5	(2.5)
	Marupe county	6.5	15.4%	5.5	16898	10.1	(4.6)
	Ogre county	26.6	43.6%	15.0	42378	25.4	(10.4)
	Olaine county	10.0	40.0%	6.0	22766	13.7	(7.7)
	Ropazi county	4.2	48.0%	2.2	7661	4.6	(2.4)
	Salacgriva county	4.0	50.0%	2.0	9913	5.9	(3.9)
	Salaspils county	13.0	38.5%	8.0	25137	15.1	(7.1)
	Saulkrasti county	3.0	0.0%	3.0	7316	4.4	(1.4)
	Seja county	1.0	0.0%	1.0	2608	1.6	(0.6)
	Sigulda county	11.0	68.2%	3.5	19373	11.6	(8.1)
	Stopini county	3.0	33.3%	2.0	11093	6.7	(4.7)
	Tukums county	23.8	66.3%	8.0	35094	21.1	(13.1)
Riga	Riga city	464.1	35.3%	300.2	770727	462.3	(162.1)
Vidzeme	Aluksne county	13.9	55.1%	6.3	19188	11.5	(5.3)

Region	Municipality	PCPs 2014	% >63 in 2020	Projected PCPs 2020	Risk-Adjusted 2020 Pop	PCPs needed 2020	Gap 2020
	Amata county	3.3	30.8%	2.3	6270	3.8	(1.5)
	Ape county	3.5	28.6%	2.5	4311	2.6	(0.1)
	Beverina county	2.8	45.5%	1.5	3568	2.1	(0.6)
	Burtnieki county	5.3	37.5%	3.3	8733	5.2	(1.9)
	Cesis county	15.8	60.3%	6.3	20592	12.4	(6.1)
	Cesvaine county	2.0	50.0%	1.0	3150	1.9	(0.9)
	Ergli county	3.5	71.4%	1.0	3774	2.3	(1.3)
	Gulbene county	14.8	39.0%	9.0	25230	15.1	(6.1)
	Jaunpiebalga county	1.0	100%	0.0	2687	1.6	(1.6)
	Koceni county	2.5	60.0%	1.0	6963	4.2	(3.2)
	Ligatne county	3.5	0.0%	3.5	4220	2.5	1.0
	Lubana county	3.0	0.0%	3.0	2895	1.7	1.3
	Madona county	19.8	59.7%	8.0	28002	16.8	(8.8)
	Mazsalaca county	4.0	75.0%	1.0	4067	2.4	(1.4)
	Naukseni county	1.0	0.0%	1.0	2159	1.3	(0.3)
	Pargauja county	2.3	44.4%	1.3	4385	2.6	(1.4)
	Priekuli county	6.8	33.3%	4.5	9175	5.5	(1.0)
	Rauna county	3.8	34.8%	2.5	4073	2.4	0.1
	Rujiena county	4.5	44.4%	2.5	6460	3.9	(1.4)
	Smiltene county	9.0	66.7%	3.0	14403	8.6	(5.6)
	Strenci county	0.0	-	0.0	4539	2.7	(2.7)
	Valka county	9.2	54.5%	4.2	10881	6.5	(2.4)
	Valmiera city	20.6	60.6%	8.1	28004	16.8	(8.7)
	Varaklani county	4.3	35.3%	2.8	4161	2.5	0.3
	Vecpiebalga county	1.5	0.0%	1.5	4627	2.8	(1.3)
Zemgale	Aizkraukle county	6.3	32.0%	4.3	9967	6.0	(1.7)

Region	Municipality	PCPs 2014	% >63 in 2020	Projected PCPs 2020	Risk-Adjusted 2020 Pop	PCPs needed 2020	Gap 2020
	Akniste county	2.5	60.0%	1.0	3340	2.0	(1.0)
	Auce county	7.7	87.0%	1.0	8446	5.1	(4.1)
	Bauska county	29.1	50.2%	14.5	28049	16.8	(2.3)
	Dobele county	20.8	24.1%	15.8	24439	14.7	1.1
	Iecava county	5.0	20.0%	4.0	9856	5.9	(1.9)
	Jaunjelgava county	4.8	42.1%	2.8	6525	3.9	(1.2)
	Jekabpils city	26.3	50.5%	13.0	27213	16.3	(3.3)
	Jekabpils county	3.0	66.7%	1.0	5883	3.5	(2.5)
	Jelgava city	48.4	39.2%	29.4	65763	39.5	(10.0)
	Jelgava county	14.0	57.1%	6.0	27157	16.3	(10.3)
	Koknese county	4.5	0.0%	4.5	5974	3.6	0.9
	Krustpils county	4.0	37.5%	2.5	7016	4.2	(1.7)
	Nereta county	3.0	66.7%	1.0	4376	2.6	(1.6)
	Ozolnieki county	5.0	80.0%	1.0	10671	6.4	(5.4)
	Plavinas county	4.5	55.6%	2.0	6584	3.9	(1.9)
	Rundale county	1.5	0.0%	1.5	4190	2.5	(1.0)
	Sala county	2.0	0.0%	2.0	4098	2.5	(0.5)
	Skriveri county	2.0	100%	0.0	4394	2.6	(2.6)
	Tervete county	3.5	100%	0.0	4120	2.5	(2.5)
	Vecumnieki county	7.0	14.3%	6.0	9795	5.9	0.1
	Viesite county	2.8	54.5%	1.3	4733	2.8	(1.6)
TOTAL		**1495.1**	-	**845.1**	**2355594**	**1413.1**	**(568.0)**

Sources: Sanigest Internacional

6.5. Human resources: nurses (for primary care providers)

For primary care nurses the recommended rate is 2 nurses for every physician. Projections for 2020 yield a need for 1413 PCP FTE (which is slightly lower than present levels), but would stand as a minimum threshold, and for 2,826 nurses for PHC.

See Annex 17 through Annex 20 for more details.

7. Mental health and long term care

Analysing access to long term care and mental health services and projecting the number of bed needed by 2025 starts with the analysis of population needs and the projected population. It is clear that the aging of the population places a greater burden on long-term care beds. At the same time, the transition toward greater community mental health services should reduce institutionalization significantly.

Current policies encourage the institutionalization of mental health patients by only providing financial coverage of in-patient care. The LHFMP promotes community-based mental health care to deinstitutionalize people and realign the reimbursement mechanisms with more cost effective, consolidated, mental healthcare services aimed at reducing the burden of disease. This is in line with World Health Assembly approved a "Comprehensive Mental Health Action Plan for 2013-2020", which will require the reduction of psychiatric facilities and reduction of longer term care beds. “Community mental health care is associated with continuity of care, greater user satisfaction, increased adherence to treatment, better protection of human rights, and prevention of stigmatisation” (Thornicroft and Tansella, 2003 as cited in Joint Action on Mental Health and Well-Being, 2015).

To improve the lives of people living with mental disorders, mental healthcare should also include:

- rehabilitating long-stay mental hospital patients in the community,
- implementing anti-stigma programmes for communities,
- Initiating population-based effective preventive interventions; and
- Ensuring full participation and integration of people with mental disorders within the community.[35]

More specifically, the LHFMP propose a shift from institutionalized to community-based programs for psychiatric and substance abuse patients, as well as an increase in rehabilitation services in non-acute setting. The Plan considers four (4) levels of mental healthcare:

1. Primary Health Care and community-based care
2. Ambulatory outpatient mental health specialists
3. Acute psychiatric in general hospitals, and
4. Long term care in psychiatric institutional care

The first two levels rely on a strengthened primary care network, expected to improve the identification and treatment of people with mental disorders (Joint Action on Mental Health and Well-Being, 2015), as well as a well-developed referral system within an integrated mental healthcare approach. The specific services to be covered at each level are included in

[35] WHO (2007) “Community mental health services will lessen social exclusion, says WHO” *Media centre*. Available at: http://www.who.int/mediacentre/news/notes/2007/np25/en/

the following table, which also comprises a brief reference to the staff needs, while striving to maintain a team-based approach.

Table 49: Proposed Mental Healthcare Levels of Care

Level of Mental Health Care	Scope of Services	Staff Composition
1. Primary and Community-based Care	• Full range to primary care services • Prevention programmes • Diagnosis and treatment • Walk-in Support • Integrated Care Plans • Referral to Specialists • Home visits	The PHC team composed of physicians and registered nurses, among others, should also include psychiatrist, as well as case management and occupational therapists.
2. Ambulatory Outpatient Specialists	• Treatment and Maintenance of Referred Cases	Specialized clinics require qualified mental health specialist.
3. Acute Psychiatric Care in General Hospitals	• Crisis and Emergency Care • Patient stabilization • Inpatient care • Discharge planning to transition to community or LTC	High staff-to-patient ratios with specialized clinical programming require mental health clinicians
4. Long-term Care in Psychiatric Institutions	• Patient admission • Care Plans • Treatment • Discharge planning to transition to community	24-hour care requires the staff team to include mental health clinicians, registered nurses, health care aids, and social works, all of which would have mental health training

Source: Based on Bibliography

Based on the scope of service by level of care, the patients

Table 50: Proposed Patient by Mental Healthcare Levels of Care

Level of Mental Health Care	Patients
1. Primary and Community-based Care	• Mild forms of mental illness • Support for psychological problems: alcohol dependence, substance abuse, depression • Physician treatment of people with mental health needs
2. Ambulatory Outpatient Specialists	• Mild to moderate mental health problems • Secondary mental health care for serious and complex psychiatric disorders: ADHD, anxiety disorder
3. Acute Psychiatric Care in General Hospitals	• Serious and complex psychiatric episodes that require stabilization.
4. Long-term Care in Psychiatric Institutions	• Chronically mentally ill

Source: Based on Bibliography

The primary health care system aims at preventing, diagnosing and treating illnesses, including mental illnesses, which requires the creative use of technology (e-health), training of PHC staff to allow then to address basic mental health issues, and outreach programs.

Outreach programs carried out by registered nurses and case managers include home visits and community group sessions, which allow for the support of patients with limited mobility and the timely referral to polyclinics in the regional and national development centers. The multidisciplinary teams in Urban PHC/ polyclinics and outpatient clinics in RDC and NDC will include psychiatrists who can properly diagnose and treat the patient, and otherwise refer them to other specialist or facilities.

The proposed restructuring in the LHFMP implies the reduction in the average length of stay in the inpatient setting and transition to ambulatory care settings for patients currently institutionalized. As the average length of stay reduces and inpatient psychiatric care is transformed to reduce overall demand, fewer people with need acute and long term care for mental health, resulting in a bed surplus for mental illness and disability of over 1,200 beds.

Furthermore, when combined with access time considerations for psychiatric care, it would indicate that anything under 90 minutes is acceptable, the analysis shows that only 1,032 are needed, and that with those facilities the appropriate number of beds could be included within the existing infrastructure without the need to make additional investment in any particular location. The following table summarizes the proposed restructuring to current health care facilities that would cover the aforementioned services in order to better serve current and projected population needs by 2025.

Table 51: Restructuring by level of care

Level of Mental Health Care	Relevant Restructuring
1. Primary and Community-based Care	Strengthening of primary care network through the creation of 8 Urban PHC, one in each NDC that offer services that go beyond the clinical scope and include community mental health and social care.
2. Ambulatory Outpatient Specialists	No infrastructure restructuring.
3. Acute Psychiatric Care in General Hospitals	The following hospitals would continue to have acute inpatient beds of psychiatric patients: 1. Piejūras Hospital 2. University Children's Hospital A few Level 3 and 4 hospitals will include acute psychiatric care: 1. Riga East Clinical University Hospital 2. Pauls Stradiņš Clinical University Hospital 3. Liepaja Regional Hospital 4. Jēkabpils Regional Central Hospital 5. Vidzeme Hospital One hospital is recommended for closure that currently has psychiatric beds: 1. Hospital Ģintermuiža
4. Long-term Care in Psychiatric Institutions	Specialized facilities recommended for closure: 1. Child Neuropsychiatric Hospital "Ainaži" and 2. Aknistes Mental Hospital ***7.1.1.*** Consolidations of facilities to decrease the surplus of psychiatric care beds: • Psychiatry and Addiction Center of Riga would cover the cases of the Hospital Guintermuiza.

Level of Mental Health Care	Relevant Restructuring
	• Strenci Mental Hospital would receive the psychiatric care patients from the Child Neuropsychiatric Hospital "Ainaži" • Daugavpils Neuropsychiatric Hospital would receive the psychiatric care patients from the Aknistes Mental Hospital

Source: Sanigest Internacional

The reconfiguration of the mental health care network will be a medium to long-term process to reach the ideal number of beds. Even with the closure of hospitals and long-term care facilities, there is still a 403 bed surplus, which allows for the decrease in psychiatric beds over time and/or transition of the beds to cover other long term care services, such as rehabilitation and palliative care.

In moving forwards towards a community-based mental health approach within an integrated mental health care system, the NHS and government authorities must consider the following specific action points:

- Promote the active involvement of users and carers in the delivery, planning and reorganization of services;
- Develop facilities and programmes such as integrated programmes with case management, outreach or mobile mental health teams, E-Health, self-help and users and carer groups;
- Develop structured cooperation between mental health services, social services and employment services;
- Develop efficient mechanisms for funding mental health care that are commensurate to the needs of the population; including incentives that promote the development of community-based care.[36]
- Include Care Management Programs to coordinate the care across all services levels, which requires at least a set of common clinical protocols and the ability to convey common information for clinical services.[37]

The following section provides a more detailed description of the relevant mental and long-term care restructuring.

7.2. Proposed infrastructure changes

This section presents the results of the preferred network reconfiguration option as it applies to long-term care (LTC) and mental healthcare for NHS contracted facilities. The option includes the downgrade and closure of groups of facilities, but still considers the total projected population-based discharges. The following table provides an overview of the

[36] Based on Joint Action on Mental Health and Well-Being (2015) key finding.
[37] Division of Mental Health (2006). "The Vermont Mental Health Futures Plan: Proposal to Transform and Sustain a Comprehensive Continuum of Care for Adults with Mental Illness" Department of Health.

current state of bed capacity, which includes specialized facilities and acute care hospitals that offered LTC and mental health services, totalling 3,556 beds.

Table 52: Existing long term and mental health care beds available

Region/ Hospital	Beds
Kurzeme	288
Liepaja Regional Hospital	77
Piejūras Hospital	160
Prielukes Hospital	3
Saldus Medical Center	23
Northern Regional Hospital	25
Latgale	631
Daugavpils Neuropsychiatric Hospital	430
Daugavpils Regional Hospital	116
Krāslava Hospital	2
Līvāni Hospital	20
Ludza Medical Center	47
Preiļi Hospital	5
Rēzeknes Hospital	11
Periga	378
Child Neuropsychiatric Hospital "Ainaži"	80
National Rehabilitation Centre "Vaivari "	245
Sigulda Hospital	53
Riga	933
Riga 2nd Hospital	14
Riga East Clinical University Hospital	365
Riga Psychiatry and Addiction Centre	528
University Children's Hospital	26
Vidzeme	445
Balvi and Gulbene Hospital Association	8
Smiltene Red Cross Hospital	14
Straupe Addiction Hospital	70
Vidzeme Hospital	17
Strenci Mental Hospital	336
Zemgale	881
Aizkraukle Hospital	62
Aknīstes Mental Hospital	400
Bauska hospital	40
Hospital Ģintermuiža	364
Jēkabpils Regional Hospital	15
Total	3,556

Source: Sanigest Internacional

The facilities can be classified according to seven basic long term care and mental healthcare types:

1. Long Term Care:
   - (i) Tuberculosis
   - (ii) Substance Abuse
   - (iii) Palliative Care
   - (iv) Rehabilitation
   - (v) Rehabilitation for Children
2. Mental Health:
   - (vi) General Psychiatry
   - (vii) Child and Adolescent Psychiatry

The data show a concentration of LTC and mental healthcare beds in Riga and Zemgale, corresponding to 26 percent and 25 percent of all beds, respectively. The greatest number of beds (58 percent) in Latvia belong to general psychiatric care services, 13 percent to tuberculosis, and 11 percent to palliative care beds. The distribution by region and category are included in the following table.

Table 53: Existing long term and mental healthcare beds by region and category

Region	TB	Substance abuse	Palliative	Rehabilitation	Rehabilitation Child	General Psychiatry	Child & Adolescent Psychiatry	Total
Kurzeme	32	14	76	6	-	148	12	288
Latgale	68	34	96	3	-	400	30	631
Periga	-	-	50	150	98	-	80	378
Riga	335	40	44	-	5	488	21	933
Vidzeme	-	70	36	3	-	336	-	445
Zemgale	15	40	102	-	-	694	30	881
Total	**450**	**198**	**404**	**162**	**103**	**2,066**	**173**	**3,556**

Source: Sanigest Internacional based on survey information from facilities

The methodology used to estimate the bed needs by 2025 is based on total discharges projected based on population growth rates and specific assumptions of the change in discharges for each type of care and a corresponding increase in efficiency reflected on a set of ALOS. The following table summarizes the assumptions regarding discharge rate, ALOS used, and occupancy rate.

Table 54: Assumptions for bed estimations

Category	Decrease in Discharge	Adjusted ALOS	Occupancy rate
Long-term care			
TB	-50%	30	85%
Substance abuse	-10%	5	85%
Palliative	-10%	11	85%
Rehabilitation	+15%	8.3	85%
Rehabilitation Child	+15%	9	85%
Mental Illness and Disabilities			
General Psychiatry	-40%	30	90%
Child and Adolescent Psychiatry	-40%	30	90%

Source: Sanigest Internacional

The sharp decrease in expected TB patient admissions is a result of a declining incidence over the last five years, which point to a continuing reduction in demand for TB beds. Furthermore, under the WHO recommended DOTS protocol, most patients can be treated on an outpatient basis, which follows the general trend towards reducing institutionalization of long term and mental health care.

Based on the assumptions, the following algorithms were used to estimate the total number of beds per specialization and hospital.

1) $Discharges_{2025} = \frac{Discharges_{2014}}{Population_{2014}} \times Population_{2025}$
2) $Discharges_{PF} = Discharges_{2025} \times (1 - \%\,\Delta)$
3) $Bed\ Days_{PF} = Discharges_{PF} * ALOS_{PF}$
4) $LTC\ Bed\ needs_{PF} = \frac{Bed\ Days_{PF}}{365 \times Occupancy\%}$
5) $LTC\ bed\ gap_{PF} = LTC\ Bed\ needs_{PF} - Current\ LTC\ bed\ capacity$

The algorithms were applied at a hospital level to all facilities providing the relevant services to account for the total demand of the population. The total bed needs by type of care and region resulted in the following total beds to be required by 2025.

Table 55: Projected bed needs for 2025

	Long-term care					Mental Illness and Disabilities	
	TB	Substance abuse	Palliative	Rehabilitation	Child Rehabilitation	General Psychiatry	Child and Adolescent Psychiatry
Kurzeme	11	12	52	2		65	10
Letgale	24	63	99	-		213	9
Pieriga	6	8	147	514	44	19	13
Riga	298	70	46	0	4	340	28
Vidzeme	0	31	36	29	-	173	0
Zemgale	4	16	103	0	0	138	22
Total	**344**	**199**	**483**	**545**	**48**	**949**	**82**

Source: Sanigest Internacional based on survey information on discharges and standards

The following estimates consider the following reconfiguration items:

1. The consolidation of Hospital Guintermuiza within the Psychiatry and Addiction Center of Riga
2. Elimination of psychiatric care in the Aknīstes Mental Hospital and transfer of cases to Daugavpils Regional Hospital.
3. Elimination of paediatric psychiatric care at Child Neuropsychiatric Hospital "Ainaži" and transfer of cases to Strenci Mental Hospital.
4. Downgrading of specialized facilities into Community Day Hospitals

Greater detail on the rationale for these recommendations are included in the psychiatric care section of the strategic recommendations. A summary of the current capacity of each of the downgraded facilities is included in Annex 7, while the following table includes a summary of the current capacity of the LTC and mental health beds and hospitals remaining after the reconfiguration.

Table 56: Current capacity of LTC and mental health facilities after reconfiguration

Region/ Hospital	Current Bed Capacity
Kurzeme	**262**
Liepaja Regional Hospital	77
Northern Regional Hospital	25
Piejūras Hospital	160
Latgale	**557**
Daugavpils Neuropsychiatric Hospital	430
Daugavpils Regional Hospital	116

Region/ Hospital	Current Bed Capacity
Rēzeknes Hospital	11
Periga	**245**
National Rehabilitation Centre "Vaivari "	245
Riga	**933**
Riga 2nd Hospital	14
Riga East Clinical University Hospital	365
Riga Psychiatry and Addiction Centre	528
University Children's Hospital	26
Vidzeme	**431**
Balvi and Gulbene Hospital Association	8
Straupe Addiction Hospital	70
Strenci Mental Hospital	336
Vidzeme Hospital	17
Zemgale	**15**
Jēkabpils Regional Hospital	15
Total	**2,443**

Source: Based on facility survey

The methodology yields an overall surplus of 136 LTC and mental healthcare beds. More specifically, there is a 583 surplus estimated for TB, paediatric rehabilitation, and general psychiatry, while there is a total 447 bed gap for substance abuse, rehabilitation and child and adolescent psychiatry. This overall surplus excludes the 345 gap in palliative care beds, given the proposed transition of patients to community and home-care based care. A summary by region is provided in the following table.

Table 57: Estimated LTC and mental health bed gap/surplus based on preferred option

	Long-term care					Mental Illness and Disabilities	
Region	TB	Substance abuse	Palliative	Rehabilitation	Rehabilitation Child	General Psychiatry	Child and Adolescent Psychiatry
Kurzeme	21	2	(2)	4	-	83	2
Letgale	44	(29)	(77)	3	-	187	21
Pieriga	(6)	(8)	(147)	(367)	54	(19)	(13)
Riga	37	(30)	(2)	-	1	148	(7)
Vidzeme	-	39	(14)	(26)	-	163	-
Zemgale	11	(16)	(103)	-	-	(138)	(22)
Total	**106**	**(41)**	**(345)**	**(386)**	**55**	**423**	**(19)**

Source: Sanigest Internacional

Analysing current network availability and the estimated gap and surpluses of beds by category of care, the team puts forth the following recommendations to transition towards the population-based LTC and mental health care bed needs by 2025 summarized in table by region and hospital. It is worth noting that the proposals consider regional proximity in order to continue providing services to the whole population. For example, even though closing the Daugavpils Neuropsychiatric Hospital in Latgale would most closely solve the bed surplus in terms of total numbers (430 beds in the hospital compared to the 423 total surplus), it would

leave most of the population in the south-east part of the country without adequate access to psychiatric care.

Table 58: LTC and mental health restructuring recommendations to reach 2025 bed needs

	TB	Substance abuse	Palliative care	Rehabilitation	Psych
Kurzeme	**Liepaja Regional Hospital-** decrease by 65%, by 21 beds	**Liepaja Regional Hospital-** can decrease by 2 beds, can extend palliative care for non-OP patients			**Piejūras Hospital-** Decrease by 83 beds
Latgale	**Daugavpils Regional Hospital-** decrease 40 TB beds, and re-allocate to: strengthen narcology by 29 beds to cover deficit 11 can expand existing palliative care until transitioned to OP setting				**Daugavpils Neuropsychiatric Hospital-** Decrease 187 beds in general psychiatry: 62 beds could cover any palliative care deficit 21-bed surplus of child psychiatry would potentially cover the 22-bed gap in Zemgale
Periga	**Riga East Clinical University Hospital-** covers 6-bed gap from Periga, and still can decrease	**Straupe Addiction Hospital-** can cover 38-bed from Riga and Periga within network, or can be covered by several facilities outside network in Riga		**National Rehabilitation Centre "Vaivari "-** 54 excess child rehab beds: • 20 to absorb child psychiatry patients from Riga and Periga • 34 beds to adult rehabilitation services	**Riga Psychiatry and Addiction Centre-** the 148-bed surplus can cover: • 138 gap from Zemgale • 10-bed from Periga
			Sigulda hospital- 50 beds from palliative to Rehab		
Riga					
Vidzeme			**Strenci Mental Hospital-** Decrease by 163 beds, could expand services to other LTC like rehabilitation and palliative services (40 bed gap total)		
Zemgale	**Jēkabpils Regional Hospital-** decrease all 15 beds, TB patients can go to Daugavpils and those beds can cover the gap in Substance Abuse				

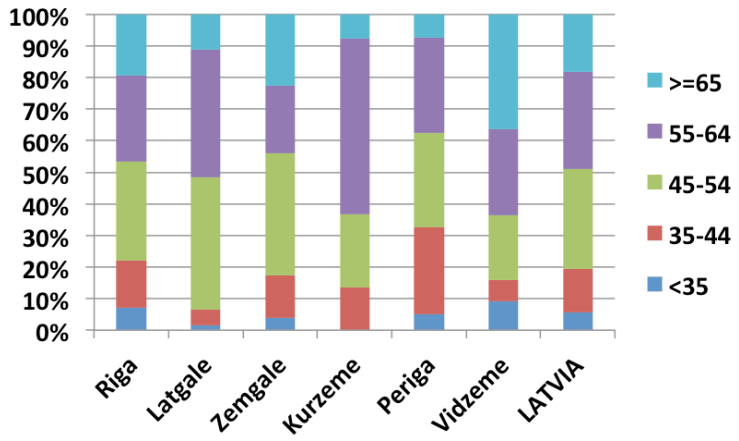
Source: Sanigest Internacional

7.3. Estimated projections for mental health specialists

The mental health group is composed of a total of 375 FTE in the fields of Child and Adolescent Psychiatry, Forensic Psychiatry, General Psychiatry and Psychotherapy. Riga has the highest concentration, with 55 percent of the total FTE available in Latvia allocated there.

Mental health faces challenges with a high concentration of physicians already over retirement age and a large share reaching retirement age within the next decade. As shown, on average 18 percent of all mental health FTE are already over retirement age in 2016, and in Vidzeme it is already over 36 percent at retirement age.

Figure 31: Mental health specialists FTE by age group



Source: Sanigest Internacional

The table below shows the current situation and estimated need according to standard requirements as well as the estimated percentage of retirees in 2025 for each of the regions (assuming retirement age of 65). The table also shows gaps resulting from comparing the current situation against the projection.

Table 59. Estimated percentage of retirees to 2025 for each of the regions

	2014 FTE	2014 Need	2014 Gap	Projected Need 2025	Projected Retired % (≥65 2025	Projected FTE 2025	2025 Gap
Kurzeme	34.2	35	(0.8)	30	60.9%	13.4	(17.0)
Latgale	38.8	39	0.1	32	50.0%	19.4	(13.0)
Pieriga	20.1	50	(29.7)	51	43.0%	11.4	(39.2)
Riga	206.0	155	50.9	146	49.3%	104.4	(41.8)
Vidzeme	26.2	27	(1.1)	23	61.6%	10.1	(13.3)
Zemgale	49.7	33	16.5	29	51.8%	23.9	(5.4)
Total	374.9	339	35.8	312	51.3%	182.6	(129.7)

Source: Sanigest Internacional

For 2014, two of the regions have surpluses of specialists when compared to established standards. Riga region has a surplus of 51 FTE, followed by the region of Zemgale with an extra 16.5 FTE according to the standard. On the other hand Periga is the region which has the largest negative gap, with a deficit of 29.7 FTE specialists.

Due to potential retirement of so many Mental Health specialists (over 50% will be eligible for retirement at age 65 in 2025), there will be a sizeable deficit in mental health by 2025, with a total gap of almost 130 FTE specialists.

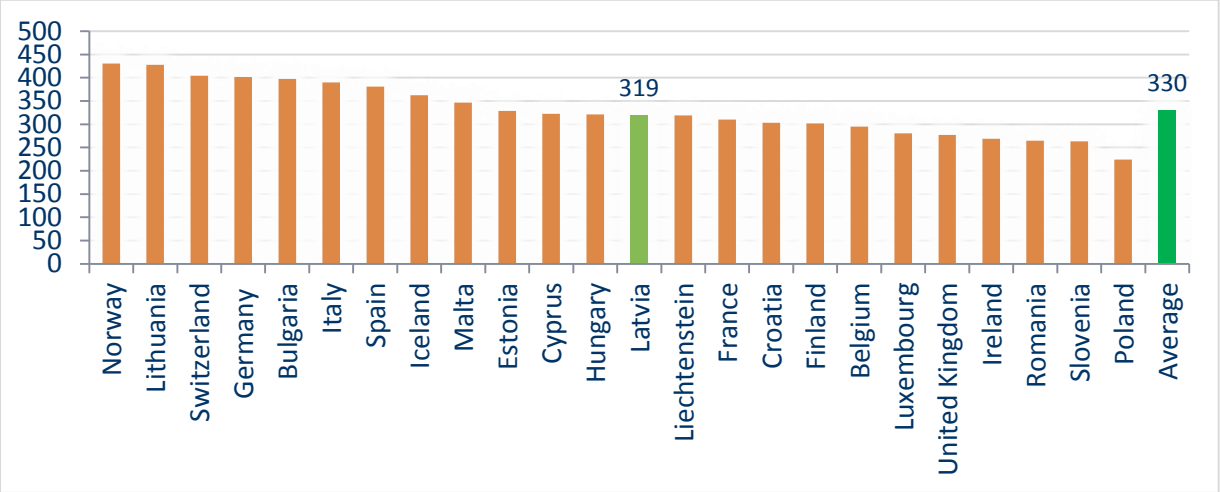
To promote more community based mental health, it will be necessary to ensure an adequate distribution of psychologists across regions. Use of psychotherapists, increased training of GPs to address mental health issues, and increasing graduate specialists in psychology would have an important impact in addressing such a challenge.

8. Human resources in the Latvian health system

8.1. Doctors (Specialists)

The projection of staff needs is one of the more complex aspects of any master planning exercise. This is further complicated in Latvia by the format in which staff numbers are reported and the limited information on Full Time Equivalent (FTE) staff positions by facility. However, based on the database on human resources, estimates were made of the number of FTE staff by specialty and the estimated need for staff based on standards. These standards are based on the volume of services provided, which have also been compared with other EU countries. The following table provides an overview of the number of medical staff per 100,000 population across a number of countries. The figure shows that there are quite large variations and those are typically related to differences in care patterns and the traditional former Soviet style staffing standards which were based on low productivity standards. Overall, the following graph shows that the level of specialists in Latvia is generally below the average EU country levels but very close to the median level.

Figure 32: Physician Specialties Rates per 100.000 Inhabitants across Euro Countries



Sources: Sanigest Internacional

Setting a standard, or a target, for human resource (HR) capacity planning begins with setting expected parameters on the volume of patients and the productivity of staff by specialty. Thereafter, relating these levels to a population based standard allows for the projection of staff needs across specialties and regions. An easy example is the case of surgery. A reasonable level of surgical procedures per 100,000 population would be 5,000 procedures. Working through the assumptions outlined, with high and low productivity levels, shows that with high productivity the expectation is that around 11 surgeons per 100,000 would be reasonable while at the lower productivity range the level would be 22 per 100,000. If that is compared with the OECD levels, the UK has the lowest levels at a rate of 10 per 100,000, which could be considered a minimum threshold. A slightly higher level might be set to allow for some buffer in terms of the number of outpatient visits that are expected for surgeons as pre- and post-surgery visits. Currently in Latvia, there are 20.6 surgeons per 100,000 which is right at Sanigest's suggested standard of 20 surgeons that it is based on a projection of future demand and standards of productivity. The surgical rate in Latvia per 100,000 population is

likely to increase in the future as the population ages and the ability to carry out day surgery increases. Such increases projected into the future will lead to an increase in the demand for surgeons and therefore provides for some justification for the higher level proposed to estimate future needs.

Table 60: Surgeon staffing levels assumptions

Calculations	Surgery
Population base	100,000
Surgeries per year	5,000
Work days per year	230
Surgeries per day (low)	1
Surgeries per day (high)	2
Surgeries per year (high)	230
Surgeries per year (low)	460
Surgeons (current)	20.6
Surgeons required (low)	21.74
Surgeons required (high)	10.87

Sources: Sanigest Internacional

Similar efforts were made to determine the standards for all specialties. These are reflected in Annex 16. For obstetrics, for example, the key driver is the number of births. For 2020, the Master Plan projects a total of 24,000 births which is a considerable increase over existing levels. It is generally assumed that obstetricians can handle between 120 to 200 births per year, considering all antenatal and postnatal care as well as delivery. This would imply that levels could range from 6 to 11 physicians per 100,000 population, when including obstetric care only. Considering the other care provided by obstetricians and the additional 25-30 percent for gynaecology, with additional time for outpatient activities, the proposed standard increases to 20 per 100,000. This will also allow for future increases in birth rate as conditions improve. This is also very close to the EU averages for peer countries. Compared with the existing level in Latvia of Obstetrics and Gynaecology, it indicates that there is still some overstaffing, but by region, there may be a need to strengthen care in some regions. The details will be discussed later on in this chapter.

The differences in establishing standards per 100,000 also varies due to differences in staff productivity between the specialties. The following table shows that the current number of discharges per physician varies from a high of 247 for cancer to a low of 148 for maternity. The low level of cases per year for cardiovascular, for example, points to opportunities to expand coverage with a higher level of productivity. As indicated earlier, the normal workload for an ObGyn is a minimum of 150 births per year, but in Latvia the average obstetrician sees 40 pregnant women per year, if the total of 584 obstetrician FTE is taken and applied to the total of 21,000 births pointing to the fact that Latvian productivity levels are nearly 70 percent below that threshold. For outpatient visits, the inpatient-only physicians are excluded to show the total number of outpatient specialists and the number of outpatient visits. The analysis shows that only cardiovascular and cancer approach a reasonable standard of 20 patients a day while the OBGYNs are at an average of 1 per day. It is important to note here that many

pregnancy visits are likely mis-classified as normal GP visits and therefore the total number of maternity visits highlighted may underestimate the actual volume.

Table 61: Physician discharges and outpatient visits, by specialty

Specialty	Discharges 2014	Hospital Physicians	Discharges per physician
Cardiovascular	21,287	161	132
Cancer	13,558	55	247
Maternity	28,794	195	148
Paediatrics	40,989	239	172
Mental health	23,369	141	166

Specialty	Outpatient Visits	Physicians	Outpatient physicians	Per day
Cardiovascular	2,181,584	293	7,446	30
Cancer	499,042	111	4,496	18
Maternity	104,467	528	198	1
Mental health	470,259	618	761	3

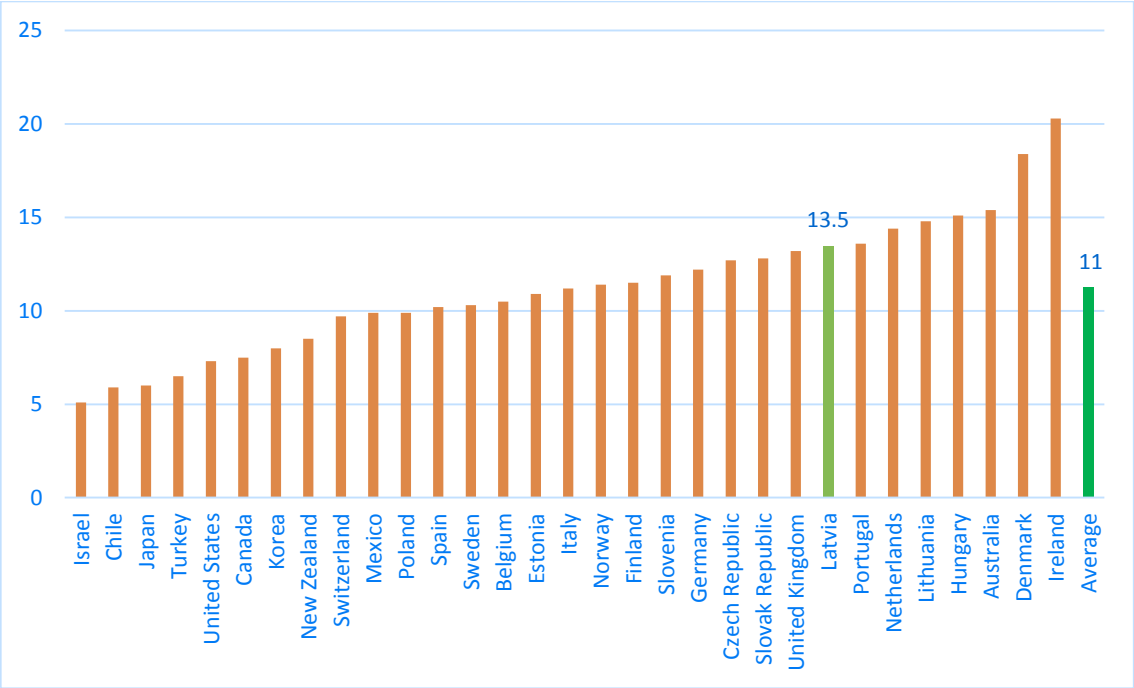
Sources: Sanigest Internacional

It is also important to note that many of the cancer outpatient visits may be for chemotherapy or other outpatient procedures that are not seen by physicians directly. Either way, the analysis points to opportunities to increase productivity of Latvian physicians.

8.1.1. Impact of graduate students on supply

Another key factor that determines how quickly the supply of physicians will change over time is due to medical graduates and the supply of residents to support full time physicians. The level of medical graduates in Latvia is 20 percent higher than the OECD average and ensures that there is a yearly flow of more than 270 physicians. The BISS qualitative study points out that over the past several years there were 100 more graduates than the positions available.

Figure 33: Medical graduates per 100,000 population, 2013

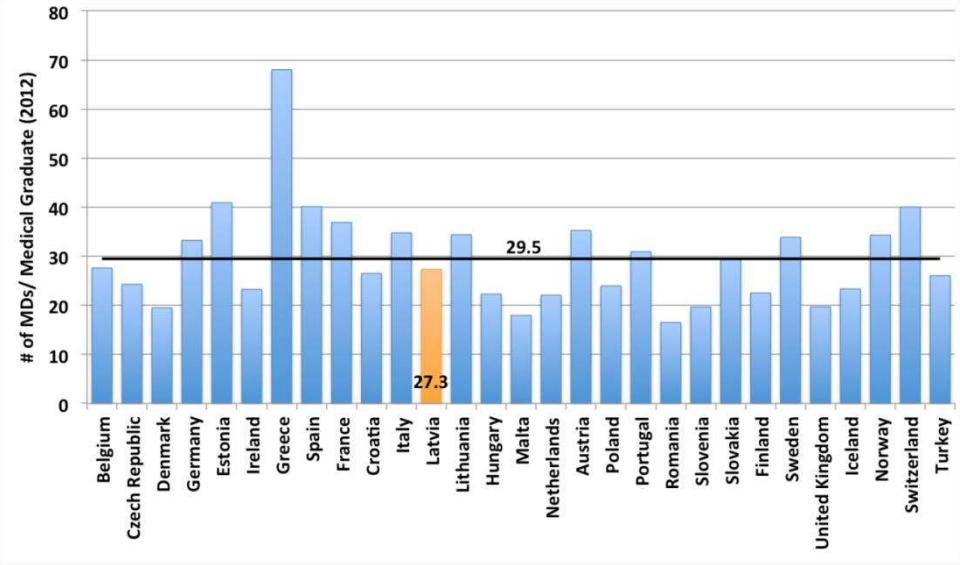


Sources: OECD Statistics database, health resources, medical graduates

In many countries, residents constitute an important part of the physician labour market. This is also the case in Latvia where regional hospitals actively recruit residents to fill gaps in staffing. The figure shows a comparison of the number of medical graduates[38] to practising physicians, according to eurostat (http://ec.europa.eu/eurostat). As displayed in the figure, Latvia, at 27.3 medical graduates to physicians, is just slightly below the European average of 29.5. Based on this information, the current flow of graduates and residents seems to be consistent with needs and is reflected by the standards proposed for human resource planning. The single caveat in this conclusion is regarding the level of medical migration which is reported to be high in Latvia and may increase in the near future (BISS 2015). The proposed standards are slightly higher than the most streamlined systems like those in Nordic and UK, to allow for the higher turnover and the more aged workforce in Latvia.

[38] Number of students who have graduated in medicine from medical faculties or similar institutions, i.e., who have completed basic medical education in a given year.
Exclusions:
-Graduates in pharmacy, dentistry / stomatology, public health and epidemiology
-Individuals who have completed post-graduate studies or training in medicine.
Note: In the European Union, a Directive has defined basic medical training as comprising a total of at least six years of study or 5,500 hours of theoretical and practical training provided by, or under the supervision of, a university (article 24, Directive 2005/36/EC of the European Parliament and of the Council)

Figure 34: Number of medical doctors per medical graduates in selected European countries



Source: OECD Statistics database

8.1.2. Impact of multiple specialties per provider

Additionally, the analysis of existing staffing levels and the definition of standards is complicated in the case of Latvia because multiple positions are often held by the same specialist. The standards and estimates outlined in this master plan are based on Full Time Equivalent positions required to deliver the services. The Master Plan cannot comment on the number of unique persons, however, and this should be considered in making final recommendations for contracting.

The remaining sections regarding HR review the future staffing needs based on the standards that have been developed through consideration of the demand for services, the review of international population based standards, and specific epidemiological considerations – such as an increasing birth rate – that may affect future demand. The projections are made for three main categories: (a) medical staff; (b) nurses; and (c) non-medical staff.

8.2. Summary of current specialist physician needs

A brief analysis was conducted of the current situation regarding specialists in Latvia, in comparison to the numbers of total specialists there would "ideally" be in the country based on the standards created. As can be seen in the table below, there is a large overall surplus for 2014, but that is also partially explained by the large surplus of PCPs which was explained in detail earlier. There are, however, certain specialities, which currently have a large deficit, such as A&E doctors (a deficit of almost 62 FTE) and Occupational Medicine (deficit of over 111 FTE).

Table 62: Current Deficits and Surpluses in Specialists in Latvia

FTE Specialists per Speciality	Actual FTE 2014	FTE 2014 based on Standards	Gap 2014
Medical Specialties	**4025.0**	**3112.5**	**912.5**
Accident and Emergency	138.1	199.8	**-61.7**
Critical Care (including Anaesthesia)	449.7	305.7	**144.1**
Cardiology	244.7	87.9	**156.8**
Dermatology	197.8	38.0	**159.8**

Endocrinology/ Diabetes Mellitus	83.7	30.0	**53.7**
Gastroenterology	95.5	51.9	**43.5**
General Medicine (GP)	1539.0	1198.6	**340.4**
Geriatric Medicine	0	24.0	**-24.0**
Infectious Diseases	54.8	59.9	**-5.1**
Internist	486.4	499.4	**-13.0**
Medical Oncology	82.2	40.0	**42.3**
Neurology	322.3	139.8	**182.4**
Nuclear Medicine	0	20.0	**-20.0**
Occupational Medicine	148.5	259.7	**-111.2**
Pneumonology	115.5	119.9	**-4.4**
Renal Medicine	44.0	22.0	**22.0**
Rheumatology	22.8	16.0	**6.8**
Mental Illness and Disabilities	**374.9**	**339.1**	**35.8**
Child and Adolescent Psychiatry	19.8	35.6	**-15.8**
Forensic Psychiatry	13.6	31.4	**-17.8**
General Psychiatry	289.8	228.2	**61.7**
Psychotherapy	51.7	44.0	**7.7**
Obstetrics and Gynaecology	**584.0**	**399.5**	**184.4**
Obstetrics and Gynaecology	584.0	399.5	**184.4**
Paediatric	**570.1**	**389.6**	**180.6**
Paediatrics	434.1	299.7	**134.5**
Neonatology	80.4	59.9	**20.4**
Paediatric Surgery	55.6	30.0	**25.7**
Pathology and Radiology	**495.2**	**311.6**	**183.5**
Chemical Pathology	55.0	61.9	**-6.9**
Clinical Genetics	14.0	8.0	**6.0**
Clinical Neurophysiology	0	4.0	**-4.0**
Clinical Pharmacology and Therapeutics	1.0	8.0	**-7.0**
Clinical Radiology	344.5	155.8	**188.6**
Haematology	23.7	24.0	**-0.3**
Histopathology	0	30.0	**-30.0**
Immunology	15.2	12.0	**3.2**
Medical Microbiology & Virology	41.8	8.0	**33.8**
Surgical Specialties	**1317.6**	**641.3**	**676.3**
General Surgery	410.0	219.8	**190.3**
Trauma and Orthopaedic Surgery	227.8	119.9	**107.9**
Cardiothoracic Surgery	13.7	20.0	**-6.3**
Neurosurgery	57.8	30.0	**27.8**
Ophthalmology	287.5	99.9	**187.6**
Oral and Maxilla Facial Surgery	30.5	16.0	**14.6**
ENT	186.1	59.9	**126.2**
Plastic Surgery	25.6	26.0	**-0.4**
Urology	78.6	49.9	**28.6**
Overall	**7366.8**	**5193.6**	**2173.1**

However, as this national level analysis does not take into account the regional variations which are known to exists in human resources (as with PHC providers earlier), a more detailed analysis of how the situation regarding specialists, across regions of Latvia, is provided below when considering planning to 2025.

8.3. Estimating physician needs to 2025

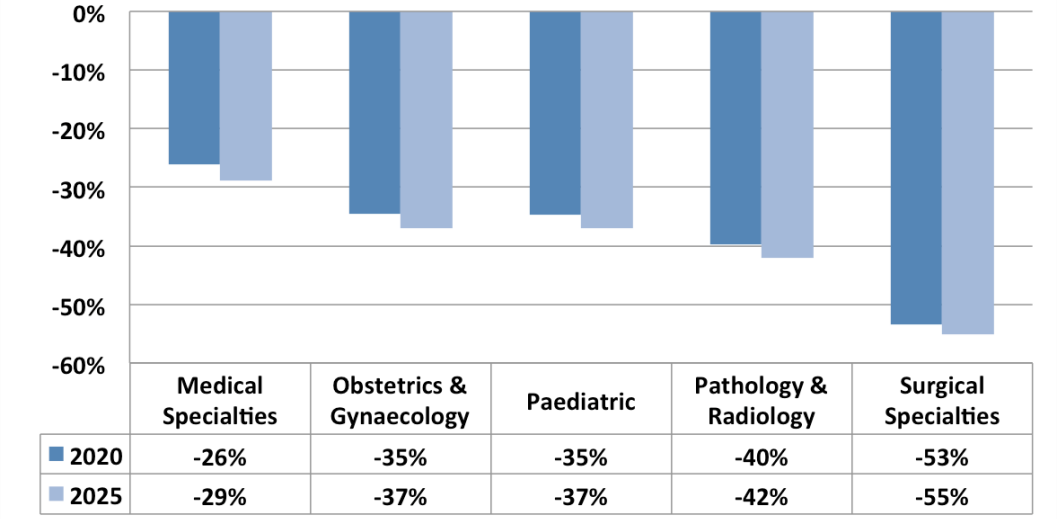
Following the logic outlined at the outset of this section, a set of standards for physicians are proposed per 100,000 population. This allows for the determination of projected supply needs per region and specialty. Applying the standards in Annex 16 by specialty, the following table shows staffing levels recommendations for the projected populations of 2020 and 2025. These are contrasted with the current level of physician FTE, by specialty. In general, the current situation shows that at the national level there are no overall deficits in the number of staff required in any speciality area. For some of the specialities, applying the projection to 2025 (not reflecting potential changes due to retirement) shows a surplus as high as 20 percent over the existing levels (see **Error! Reference source not found.**). It should be noted that due to the ability of a provider to be listed as having more than one speciality, these numbers are not FTE, and therefore the "true" surplus might be quite a bit lower than this, but that is not able to be accurately estimated given the data limitations.

Table 63: Proposed development of staffing situation

8.3.1.	**Actual FTE**	**Proposed FTE**	**Proposed FTE**	**Current vs. Proposed FTE Gap**	
8.3.2.	**2014**	**2020**	**2025**	**2020**	**2025**
Population	**1,997,745**	**1,908,684**	**1,839,598**	***8.3.3.***	***8.3.4.***
Medical Specialties	4,025	2,974	2,866	1,051	1,159
Mental Illness and Disabilities	375	324	312	51	63
Obstetrics and Gynaecology	584	382	368	202	216
Paediatric	570	372	359	198	211
Pathology and Radiology	495	298	287	197	208
Surgical Specialties	1,318	613	591	705	727
Overall	**7,367**	**4,962**	**4,782**	***8.3.5.***	***8.3.6.***

Source: Sanigest Internacional

Figure 35: Proposed changes for physicians (%)



Source: Sanigest Internacional

At the regional level, however, there are gaps that require careful planning to ensure adequate population coverage. The surplus overall should allow opportunities to use labour market leverage to adjust the deficits in some regions. Large differences can be observed between Riga, which has a high concentration of physicians, and Periga or Vidzeme or

Zemgale, for example. The table below shows the regional variation expected for 2025 (but does not take retirement age into account which is discussed in more detail later).

Table 64: Projected Staffing Surplus / Deficit in 2025, by Region

Medical Staff per specialty	Riga	Periga	Vidzeme	Kurzeme	Zemgale	Latgale
Medical Specialties	**850**	**-49**	**92**	**93**	**61**	**112**
Accident and Emergency	38	-27	-7	-16	-16	-18
Critical Care (including Anaesthesia)	189	-26	6	5	-7	2
Cardiology	135	4	0	6	7	12
Dermatology	131	7	6	6	5	9
Endocrinology/ Diabetes Mellitus	41	2	3	4	4	1
Gastroenterology	47	-3	0	1	-1	3
General Medicine (GP)	10	57	74	96	97	102
Geriatric Medicine	-10	-4	-2	-2	-2	-2
Infectious Diseases	13	-9	0	-1	-2	-1
Internist	63	-21	0	-7	-10	0
Medical Oncology	42	-4	1	3	0	3
Neurology	136	2	16	12	6	20
Nuclear Medicine	-9	-3	-1	-2	-2	-2
Occupational Medicine	-26	-16	-8	-9	-13	-18
Pneumonology	13	-4	2	-3	-5	2
Renal Medicine	25	-3	0	0	1	0
Rheumatology	13	-2	-1	0	-1	0
Mental Illness and Disabilities	**60**	**-31**	**3**	**4**	**20**	**6**
Child and Adolescent Psychiatry	-6	-2	-2	-1	-1	-1
Forensic Psychiatry	-9	-5	-2	-2	0	3
General Psychiatry	51	-18	9	9	21	8
Psychotherapy	24	-6	-2	-1	0	-4
Obstetrics and Gynaecology	**146**	**0**	**16**	**24**	**12**	**18**
Obstetrics and Gynaecology	146	0	16	24	12	18
Paediatric	**161**	**-11**	**17**	**12**	**11**	**21**
Paediatrics	112	-7	15	10	9	18
Neonatology	21	-2	3	2	2	0
Paediatric Surgery	29	-2	-2	0	-1	3
Pathology and Radiology	**200**	**-21**	**5**	**10**	**1**	**14**
Chemical Pathology	15	-9	-3	-2	-5	1
Clinical Genetics	11	-1	-1	-1	-1	-1
Clinical Neurophysiology	-2	-1	0	0	0	0
Clinical Pharmacology & Therapeutics	-3	0	-1	-1	-1	-1
Clinical Radiology	142	-1	13	17	11	18
Haematology	10	-3	-2	-1	-2	-1
Histopathology	-13	-4	-2	-3	-3	-3
Immunology	10	-2	-1	-1	-1	-1
Medical Microbiology & Virology	31	-1	0	1	2	1
Surgical Specialties	**556**	**17**	**37**	**39**	**35**	**44**
General Surgery	130	7	11	22	19	19
Trauma and Orthopaedic Surgery	89	3	12	9	2	2
Cardiothoracic Surgery	5	-3	-1	-2	-2	-2
Neurosurgery	37	-3	-2	-2	-2	3
Ophthalmology	144	9	8	6	13	15
Oral and Maxilla Facial Surgery	22	-2	-1	-1	-1	-1
ENT	87	11	8	7	9	9
Plastic Surgery	8	0	0	-2	-2	-2
Urology	33	-5	3	2	-1	1

Overall	1973	-95	169	182	140	215

As can be seen, there are certain specialities like Occupational Medicine which have deficits across all regions, while others like Accident and Emergency would be projected to have a surplus in Riga only, but a deficit in all other areas.

Periga is the only region to show an overall deficit, and a projected deficit across almost all specialties, which might be influenced by its proximity to Riga.

While some of the surpluses may be linked to historical over-production, the projections are also linked to a constant projected decrease in the population and relatively low levels of productivity in some specialties. It is also important to point out that at the regional level, there are many information gaps that reduce the precision in allocating staff to specific positions. The specific information gap therefore should be reviewed carefully in the future. The main areas where there is a need to shift from the current levels are highlighted below, and Annex 17 shows detailed surplus numbers by specialty.

- **Large Surplus:** There are potential large national surpluses in 2025 (greater than 150 surplus total for country) in the following specialties: Critical Care (including Anaesthesia), Cardiology, Dermatology, General Medicine (GP), Neurology, Obstetrics and Gynaecology, Paediatrics, Clinical Radiology, General Surgery, Ophthalmology. However, as will be discussed in further detail in the next section, the specialist workforce is aging rapidly, and other than for Dermatology (at 38%), over 40% of all the FTE in those specialities will be at retirement age in 2025, with GPs, paediatricians and nurology all being over 50%.

- These numbers could be highlighting the need to limit future production of these specialties, allowing for attrition to reduce the rates. In the short term, the excesses should allow for redistribution to some regional positions that are lacking. For example, for some hospitals it will be proposed to close some departments while increasing the volume in others. Additionally, while retirement will impact some of those specialities and lead to deficits if new graduates do not fill their places (PCPs as discussed earlier and paediatrics, along with Critical Care (including Anaesthesia) and Obstetrics and Gynaecology) the majority of them would still all have surpluses at the national level, even if all those over 65 in 2025 chose to retire.

- **Deficit at regional level:** There are certain specialities with fairly large deficits nationally, and others which in certain regions, require more planning for additional resources to be made available. Periga is a special case given its proximity to Riga and the use of facilities in Riga by many individuals in Periga. However, looking at the other regions, as already mentioned, Accident and Emergency and Occupational Medicine both have considerable deficits at the national and regional levels and should be a focus of additional recruitment efforts. Other specialities in need of attention across multiple regions include: Geriatric Medicine, Nuclear Medicine, Child and Adolescent Psychiatry, Forensic Psychiatry, and Histopathology. Additionally, Kurzeme and Zemgale will appear to suffer fairly important deficits in Internal Medicine, even without retirement being take into account (and given 49%

of Internists will be over 65 in 2025, will likely be a larger deficit than that forecast in the table above).

- In addition to Riga, Latgale shows a sizable overall surplus with their FTE specialists supply (over 200 in surplus). Annex 18 compiles the data for surpluses and deficits at regional level by specialty.

- **Small Surplus or Generally appropriate level for:** Current levels are generally appropriate for the majority of the specialties with either only a small surplus which will likely be addressed through attrition, or very small deficits which should be addressed by new graduates in the speciality without additional special attention being required.

8.4. The impact of an aging specialist workforce

The previous HR needs estimates did not take into detailed account another factor that is important when making manpower projections: the age of the workforce. In Latvia, as in many other countries, the aging of the workforce should be considered when making projections. In this section, a series of analyses are provided for specialists in four priority disease areas: oncology, cardiology, obstetrics and gynaecology and mental health.

There are two main things to bear in mind throughout this section: (a) retirement offers a natural mechanism to adjust staffing downward (b) at the same time, for those specialties that are close to the proposed staffing levels at present, imminent retirement of large physician numbers will result in a shortage and could exacerbate the shortages across regions. The following table provides an overview of the share of physicians in each of the priority areas by age group as of 2016, and it can be seen that already 20% of the FTE available in both obstetrics and gynaecology and are well over the retirement age of 62 (as of 2016) with mental health at over 18% and cardiology as the "youngest" speciality still having over 10% already at retirement age.

Table 65: Share of physicians by age group in 2016: priority specialist areas

Specialty	<35	35-44	45-54	55-64	>=65
Obstetrics & Gynaecology	3.1%	14.5%	32.4%	30.2%	19.9%
Oncology	5.6%	16.5%	21.0%	37.3%	19.7%
Cardiology[39]	5.7%	15.8%	31.8%	34.5%	12.2%
Mental Health[40]	5.5%	13.8%	31.8%	30.6%	18.3%

Source: Sanigest analysis

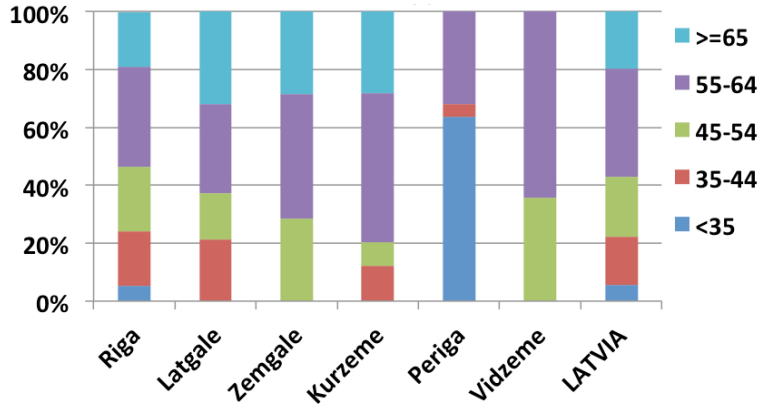
8.4.6. Medical oncology

The following graph shows the distribution by current age (as of 2016) of the FTE oncologist supply in the database for all providers with an identifiable birthdate across regions. It should be noted that the number of FTE oncologists in regions other than Riga is very small (ranging from 3 – 7), so the data needs to be interpreted cautiously. However, this is the current

[39] Cardiology here includes both Cardiology and Cardiothoracic Surgery
[40] Mental Health includes the following four specialties: Child and Adolescent Psychiatry, Forensic Psychiatry, General Psychiatry, Psychotherapy

situation, so planning should be based on whatever data is available. The figure shows that for most regions the highest concentration of Oncologist FTEs is found in the age group 55-64, with 37 percent of all Latvian oncology FTE in that range. Overall, the average age of oncologists is 55.9, reflecting the need to attract additional specialists in this area. The strategy outlined in the master plan to decentralize cancer care to regional hospitals will require further adjustments in staffing to ensure adequate coverage.

Figure 36: Oncology specialists by age group

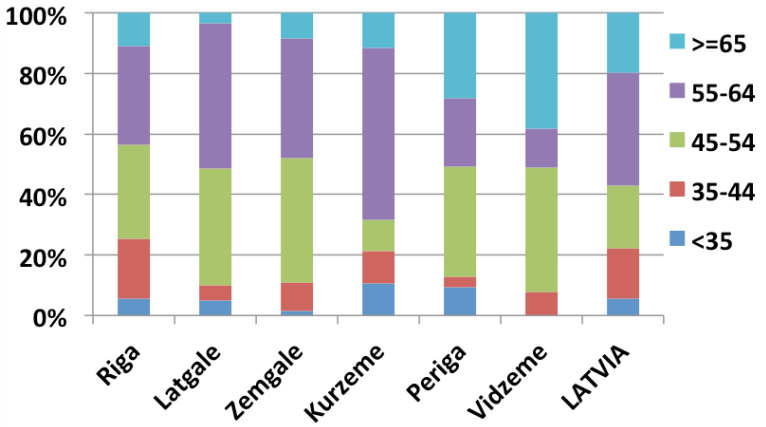


Source: Sanigest

8.4.7. Cardiology and Cardiothoracic Surgery

Similar to oncologists, the majority of cardiologist and cardiothoracic surgeon FTEs are in the age grouping of 55-64 years of age. There is quite significant variation by age across regions, and while again sample sizes are small, it is worth noting that already over 38% of the FTE in Vidzeme are over 65 years of age, compared to less than 4% in Latgale. The average age of cardiologists and cardiothoracic surgeons is 51.5, somewhat younger than for the oncologists, but all regions have less than 11 percent of their cardiology FTEs under 35.

Figure 37. Cardiology by age group



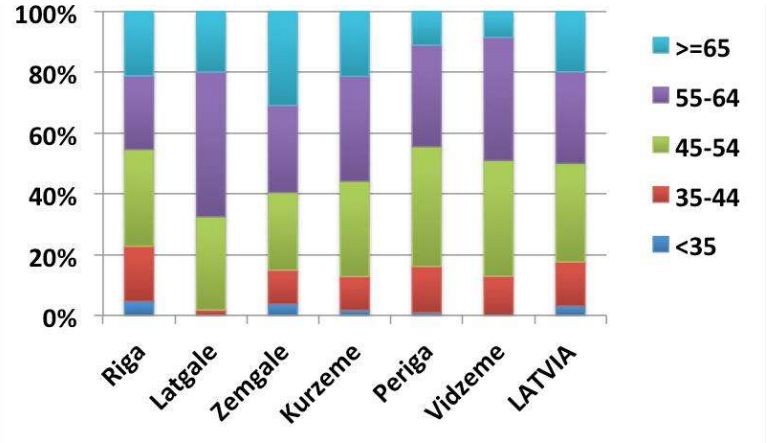
Source: Sanigest

8.4.8. Obstetrics & Gynaecology

Obstetrics and gynaecology has the highest share of FTE specialists currently as retirement age (19.9%) among the specialty groups being discussed in detail. The figure below shows that the regional variation is not as great as for cardiology there is still quite a spread, ranging

from 9% over 65 in Vidzeme to 31% in Zemgale. The average age for Obstetrics and gynaecology is 53.1. No region has over 5% of its ObGyn FTEs under 35 years of age.

Figure 38. Obstetrics and gynaecology specialists by age group



Source: Sanigest

Mental Health was already discussed earlier.

8.4.9. Potential impact of retirement on the specialist workforce

This section builds on the analysis of current and future retirement age specialists in the four priority disease areas and applies them the current numbers of physicians to re-assess the need gap for human resources based on the previously outlined projected need. The needs for each specialty were previously identified based on project service levels and population projections and these values are now compared to the estimated workforce after retirement using the analysis of the share of each specialty that are facing retirement in 2020 and 2025. For each region, the proportion of FTE for each type of speciality group that would be over the age of 62 in 2020 and over the age of 65 in 2025 was calculated. In this way, the difference represents the need for specialists by specialty and by region for HR planning purposes, assuming no new medical doctors entered that speciality.

Error! Reference source not found. shows the average percentage of each specialty group that would be potentially lost to retirement in 2020 and 2025. Oncology, forensic psychiatry and general psychiatry will all have over 50 percent of existing FTE in those specialties over retirement age (65) in 2025. As the table shows, the mean age for all specialties is over 50 years, underscoring the need to increase intake for many specialties.

Table 66: Potential percentage of specialty groups lost to retirement

	2016 FTE	Mean Age 2016	% ≥62 in 2020	% ≥65 in 2025
Obstetrics & Gynaecology	572.0	53.1	35.4%	44.9%
Medical Oncology	79.7	55.9	36.0%	56.6%
Cardiology	237.2	51.6	30.9%	41.9%
Cardiothoracic Surgery	13.7	51.0	20.1%	32.0%
Mental Health:				
Child/Adolescent Psych	19.8	52.5	42.1%	49.4%
Forensic Psychiatry	13.6	61.5	59.5%	68.7%
General Psychiatry	283.3	54.8	44.3%	53.0%
Psychotherapy	45.7	50.9	12.0%	23.0%

Source: Sanigest Internacional

As shown below, in all instances, there is a gap in the number of FTE needed for all specialties in Latvia for 2025, other than for Cardiology. In 2020, the only two without national deficits are Medical Oncology and Cardiology. The deficits range from a low of two extra FTE psychotherapists in 2020 to a more significant gap of 77 FTE general psychiatry specialists and 53 ObGyn FTE in 2025. In contrast, there appears to be an ample supply of cardiologists and medical oncologists within Latvia, so that even with retirement age taken into account there will be sufficient staff available in 2020 and 2025, and a surplus of still over 50 cardiologists even in 2025.

Table 67: Potential gaps in specialist workforce due to retirement, 2020 and 2025

	Latvia 2020			Latvia 2025		
	Need[1]	Estimated[2]	Gap[3]	Need[1]	Estimated[2]	Gap[3]
Obstetrics & Gynaecology	381.7	369.6	(12)	367.9	315.2	(53)
Medical Oncology	38.2	51.0	13	36.8	34.6	(2)
Cardiology	84.0	163.9	80	80.9	137.7	57
Cardiothoracic Surgery	19.1	10.9	(8)	18.4	9.3	(9)
Mental Health:				0.0		-
Child/Adolescent Psych	34.0	11.5	(23)	32.8	10.0	(23)
Forensic Psychiatry	30.0	5.5	(25)	28.9	4.3	(25)
General Psychiatry	218.0	157.8	(60)	210.1	133.1	(77)
Psychotherapy	42.0	40.2	(2)	40.5	35.2	(5)

Source: Sanigest Estimates

Notes: [1]Need is based on standards and population projections to 2020 / 2025 [2]Estimated number of specialists is based on methodology described above [3]The gap is the difference between projected need and estimated availability.

Error! Reference source not found. shows the summary result for the estimated gap in each region reflecting the total surplus or deficit in each of the specialist areas. Not surprisingly, given the national numbers, the table shows that General Psychiatry is the area which will likely see the greatest shortfall if no new providers enter the speciality, as all regions demonstrate a deficit in 2025 (from a small gap of only 1 FTE in Zemgale to a potentially high shortfall of 26 FTE in Riga and Periga). Additionally, child and adolescent psychiatry and forensic psychiatry show deficits in all regions across 2020 and 2025 for all regions. Obstetrics and Gynaecology, Cardiothoracic Surgery and Psychotherapy show potentials for a shortfall in all regions other than Riga in both 2020 and 2025, but the absolute numbers of actual providers required to meet the gap are all relatively low. Annexes 17 and 18 shows the actual estimated need and the projected number by specialty and region.

Table 68: Projected gaps in selected speciality areas based on the aging workforce, 2020 and 2025

Specialist Category	Riga		Periga		Vidzeme		Kurzeme		Zemgale		Latgale	
	2020	2025	2020	2025	2020	2025	2020	2025	2020	2025	2020	2025
Obstetrics & Gynae	29	15	(17)	(25)	(2)	(6)	(1)	(8)	(11)	(15)	(11)	(13)
Medical Oncology	20	10	(4)	(4)	1	(1)	(1)	(2)	(3)	(2)	0	(1)
Cardiology	78	62	(3)	(5)	(3)	(3)	1	(1)	2	1	5	2
Cardiothoracic Surg	2	1	(3)	(3)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)
Mental Health:												
Child/Adol Psych	(11)	(11)	(3)	(3)	(3)	(2)	(3)	(3)	(2)	(2)	(2)	(2)
Forensic Psychiatry	(13)	(13)	(5)	(5)	(2)	(2)	(3)	(3)	(1)	(1)	(1)	(0)
General Psychiatry	(19)	(26)	(25)	(26)	(8)	(7)	(4)	(10)	3	(1)	(8)	(7)

Psychotherapy	13	8	(6)	(6)	(2)	(2)	(2)	(1)	(1)	(1)	(4)	(4)

Source: Sanigest Internacional

8.5. Nurses (Hospital-based)

Given the lack of facility-level data on nurses (FTE), the team has used several estimates, including one assuming that hospital nurses accounted for about 50 percent of the total of nurses.

Needs have been estimated through patient staffing ratios, driven by the number of patients and safe nursing level standards that are recommended across departments. For example in an ICU there might be a recommendation of one nurse to each patient, while in a general medicine/surgical department it would be four patients per nurse, and in long-term care it might be closer to 1 nurse for 8 patients. The specific ratios suggested by international literature and experts to ensure optimal patient safety and responsiveness are shown in the following table. It should also be noted that the standards assume that the number of nurses required for the third (night) shift would be half the normal amount. In other words, a normal surgery ward (1:5 ratio) with 20 occupied beds would require roughly 10 nurses (4 + 4 + 2) for round-the-clock staffing.[41] Variations may be introduced by type of hospital as well, with the tertiary facilities having more intensive nursing needs. Based on these standards and the projected number of occupied beds in 2020, it is possible to estimate a need for nurses by specialty.

Table 69: Nurse to patient staffing ratios used for standards development

Hospital Unit	Nurse to Occupied Bed Ratios
Emergency Departments	**1 to 4**
Triage (RN only)	**1 to 1**
Paramedic Base Station Radio RN	**1 to 1**
Trauma	**1 to 1**
Critical Care patients	**1 to 2**
General Medical Surgical floor	**1 to 5**
ICU/CCU	**1 to 2**
Labour and delivery	**1 to 2**
Ante Partum (not active labour)	**1 to 4**
Post Partum (mothers)	**1 to 6**
Cuplets (moms and babies)	**1 to 4**
Combined Labour and delivery	**1 to 3**
Mixed Units	**1 to 6**
Neonatal ICU (RN's Only)	**1 to 2**
Operating Room	**1 to 1**
Paediatrics	**1 to 4**
Post Anaesthetic Recovery Room	**1 to 2**

[41] The following reference provides detailed recommendations by type of bed and was used as the basis for the table. https://www2.rcn.org.uk/__data/assets/pdf_file/0008/78551/001934.pdf

Hospital Unit	Nurse to Occupied Bed Ratios
Specialty Care (Dialysis & Oncology)	**1 to 4**
Step down unit	**1 to 4**
Telemetry Unit	**1 to 4**
Well Baby Nursery	**1 to 8**
Behavioural Health and Psych Units	**1 to 6**
Long-term care	**1 to 8**

Sources: Sanigest Internacional

The bed staffing ratios provide an excellent method to estimate the need for hospital nurses. Hospital nurses may account for 50 percent of the total nurses required in the system, taking into account ratios for ambulatory physicians that typically range from 1-2 nurses per doctor. The following table shows the estimated hospital nurses required by region, following this staffing rule standard. Overall, the estimated number of hospital based nurses would be a minimum of 4,974 based on the prevailing level of bed occupancy, as shown in the table below. These figures are projected forward to 2020 based on population and discharges.

Table 70: Optimal inpatient nurse staffing

Hospital Unit	Nurse to Occupied Bed Ratios	Total Nurses needed	Riga	Kurzeme	Latgale	Zemgale	Vidzeme	Pieriga
Emergency Departments	1 to 4	422	151	51	67	52	64	37
General Medical Surgical floor	1 to 4	1,068	660	119	140	80	31	39
ICU/CCU	1 to 2	85	54	11	2	8	5	6
Labour and delivery	1 to 2	196	64	24	38	26	19	24
Neonatal ICU (RN's Only)	1 to 2	29	11	2	8	4	3	-
Paediatrics	1 to 4	473	177	37	70	41	38	111
Specialty Care (Dialysis & Oncology)	1 to 4	393	216	40	69	24	23	21
Telemetry Unit	1 to 4	288	33	32	40	43	19	121
Behavioural Health and Psych Units	1 to 6	1,378	334	96	254	454	216	25
Long-term care	1 to 8	641	189	21	42	23	43	323
TOTAL	***8.5.1.***	**4,973**	***8.5.2***	***8.5.3.***	***8.5.4.***	***8.5.5.***	***8.5.6.***	***8.5.7.***

Sources: Sanigest Internacional

Overall, the preferred scenario for hospital configuration would require close to 5,000 nurses, versus an existing number of roughly 3,300.

See Annexes 18 - 20 for additional details.

9. Future facility network configuration

In order to create proposals for Latvia's future health facility network, two different scenarios were created:

- Scenario 1: An allocation with strict adherence to the National Development Plan
- Scenario 2: An optimal allocation

The details of each scenario are provided in the sections below.

9.1. Scenario 1: Allocation with strict adherence to the National Development Plan

The reconfiguration of services under this scenario strictly follows the National Development Plan, leading to a deep strengthening of existing hospitals, focusing mainly on getting some facilities to have all the services to be Level-3 and Level-1 hospitals.

This scenario would maintain access in the 21 regional development centers by ensuring that at least a Level 1 hospital is maintained in these centers and Level 2 or 3 in the 8 National Centers. The level of service, however, would be downgraded in some cases to offer only the four specialties.

The increase in the number of beds in small facilities required to provide the minimum of services demanded as general Level 1 hospital would possibly cause the need for reconstruction of some of these hospitals. It is important to note that in forcing this scenario we are likely leaving an additional 662 beds in the network that are not strictly necessary, even though the increase in outpatient is considered explicitly in all the modelling.

This scenario proposes the following structure of the health network (see Annex 5 for hospital number of beds by 2025 and a geographic illustration on a map of Latvia).

Table 71: Scenario 1 proposed changes

Hospital name	Proposed Changes
Five Level-4 Hospitals	
1. University Children's Hospital	It is proposed to include reconstructive plastic surgery, perinatology level IV, and acute psychiatry for children. No new beds are required.
2. Riga Maternity Hospital	Include adult ICU. Bed needs: +38 beds.
3. Traumatology and Orthopaedics Hospital	Include neurology, neurosurgery trauma related, and reconstructive plastic surgery. No new beds required.
4. Riga East Clinical University Hospital	It is proposed to include interventional cardiology and acute psychiatry. Pathology and radiology beds are not considered as hospital beds within these scenarios. No new beds are required.
5. Pauls Stradiņš Clinical University Hospital	Upgrade including acute psychiatry, interventional cardiology, geriatrics, haematology. Bed needs: +180 beds.
Five Level-3 Hospitals	
1. Daugavpils	It is proposed to include hematology, geriatrics, radiology & chemotherapy, paediatric surgery, interventional cardiology, and acute psychiatry. No new beds are required Palliative care and dentistry beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.

	Hospital name	Proposed Changes
2.	Liepaja Regional Hospital	It is proposed to include rheumatology, infectious diseases, radiology & chemotherapy, interventional cardiology, neurosurgery, ophthalmology, and acute psychiatry. No new beds are required for rheumatology and infectious diseases Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
3.	Jēkabpils Regional Central Hospital	It is proposed to include medical oncology, rheumatology, radiology & chemotherapy, perinatology level II, acute psychiatry, and ophthalmology. No new beds are required Rheumatology. Pathology and radiology beds are not considered as hospital beds within these scenarios.
4.	Rēzeknes Hospital	It is proposed to include oncology for outpatient only, dermatology, endocrinology, geriatrics, gastroenterology, hematology, ophthalmology, pulmonology, rheumatology, A&E, physiotherapy, radiology & chemotherapy, perinatology Level II, ophthalmology, and vascular surgery. No new beds are required Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios
5.	Vidzeme Hospital (Valmiera and Valka)	It is proposed to include medical oncology, rheumatology, radiology & chemotherapy, perinatology level II, acute psychiatry. It is important to note that Vidzeme Hospital data from Valmiera and Valka were provided unified in the database. No new beds required. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
Five Level-2 Hospitals		
1.	Madona Hospital	Reconfiguration of services to classify as General Hospital Level 2, providing cardiology, general medicine, and neurology as medical specialities; obstetrics and gynaecology, paediatric (neonatology (perinatology Level I) and paediatrics), general surgery and trauma, and orthopaedic surgery. Pathology and radiology beds are not considered as hospital beds within these scenarios. Bed needs: +6 beds.
2.	Balvi and Gulbene Hospital Association	Data from Balvi and Gulbene hospitals were merged in the data provided to the World Bank. Reconfiguration of services to classify as General Hospital Level 2, providing cardiology, general medicine, and neurology as medical specialities; obstetrics and gynaecology, paediatric (neonatology (perinatology Level I) and paediatrics), general surgery and trauma, and orthopaedic surgery. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
3.	Jelgavas City Hospital	Reconfiguration of services to classify as General Hospital Level 2 and it is proposed to include dermatology, rheumatology, cardiology, radiology & chemotherapy (NO LINAC), and urology. No new beds are required.
4.	Hospital Jurmala	Reconfiguration of services to classify as General Hospital Level 2 and it is proposed to include medical oncology and rheumatology. Bed needs: +212 beds.

Hospital name	Proposed Changes
5. Ziemeļkurzemes Regional Hospital	Reconfiguration of services to classify as General Hospital Level 2 and it is proposed to include dermatology, geriatrics, haematology, radiology & chemotherapy (No LINAC), endocrinology, and oncology outpatient. No new beds required. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
Eighteen Level-1 Hospitals	
1. Cēsu Clinic	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed.
2. Ogre District Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. • Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed. Bed needs: +4 beds.
3. Dobele Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. Long-term care, neurology, medical microbiology & virology, and trauma and orthopaedic surgery beds will be closed.
4. Riga 2nd Hospital	It will provide 1st level services including: general medicine, paediatrics, and general surgery.
5. Tukums Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • +11 beds. Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed.
6. Aizkraukle Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: Palliative care beds will be closed.
7. Alūksne Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: Trauma and orthopaedic surgery beds will be closed.
8. Bauska hospital	It will provide 1st level services including: general medicine, Obstetrics and Gynaecology, Paediatrics, and General Surgery: • Palliative care beds will be closed. Bed needs: +8 beds.
9. Krāslava Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: Long-term care, palliative care, neurology, and trauma and orthopaedic surgery beds will be closed.
10. Kuldīga Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: Long-term care and trauma and orthopaedic surgery beds will be closed.
11. Līvāni Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. Palliative care and trauma and orthopaedic surgery beds will be closed.
12. Ludza Medical Center	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery.

Hospital name	Proposed Changes
	• Palliative care beds will be closed. Bed needs: +1 beds.
13. Preiļi Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care beds will be closed. Bed needs: +18 beds.
14. Saldus Medical Center	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care beds will be closed. Bed needs: +25 beds.
15. Sigulda Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Long-term care, palliative care, neurology, and trauma and orthopaedic surgery beds will be closed. Bed needs: +37 beds.
16. Smiltene Red Cross Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care beds will be closed. Bed needs: +18 beds.
17. Limbaži Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. Bed needs: +48 beds.
18. Prielukes Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care, neurology, and trauma and orthopaedic surgery beds will be closed. Bed needs: +35 beds.

Source: Sanigest Internacional

In summary, the following table presents an overview of the application of the described approach to the Latvia population rates for 2025.

Table 72: Bed need under Scenario 1

Bed Profile	Current Beds	Bed need	Gap (2025)
	2014 (Contracted)	2025	2025
Medical Specialties	2,258	2,411	-153
Paediatric	853	1,080	-227
Obstetrics and Gynaecology	514	440	74
Surgical Specialties	2,523	1,815	708
Pathology and Radiology	499		
Mental health and Disabilities		79	-79
Long Term care	3,406	2,650	756
Total	10,053	8,475	1,578
Acute Care Only	6,647	5,825	822

Source Sanigest Internacional

9.2. Scenario 2: Optimal allocation

This scenario targets the optimal hospital network based on best practice planning guidelines and the bed level estimates that were highlighted in the previous sections. The target for this scenario is to achieve the goal of providing 5,000 hospital beds within the Latvia's health network by 2025 based on populations, travel times, etc. This scenario provides significant consolidation of the acute care network in only 23 hospitals across the country. Further consolidation of maternity services would be considered limited to those Level 1 facilities that remain.

The remaining 12 facilities would be shifted to non-acute facilities, offering day care services and wellness serves or to long term or residential facilities. These facilities would be operated with only nursing staff and patient care assistants rather than a full medical staff. Palliative care beds will be closed as acute beds and will be shifted as long term care beds, meaning that these beds will be re-located within these non-acute centers.

This scenario proposes the following structure of the health network. The Level 4 hospitals would require the same changes and structure as what was presented in Scenario 1 for this level (see Annex 5 for hospital number of beds by 2025).

Table 73: Scenario 2 proposed changes

Hospital name	Proposed Changes
***Five level-4 hospitals**:*	
1. University Children's Hospital	It is proposed to include reconstructive plastic surgery, perinatology level IV and acute psychiatry for children. No new beds are required.
2. Riga Maternity Hospital	Include adult ICU and NICU. Bed needs: +38 beds.
3. Traumatology and Orthopaedics Hospital	Include neurology, neurosurgery trauma related, and reconstructive plastic surgery. No new beds required.
4. Riga East Clinical University Hospital	It is proposed to include interventional cardiology and acute psychiatry. Pathology and radiology beds are not considered as hospital beds within these scenarios. No new beds are required.
5. Pauls Stradiņš Clinical University Hospital	Upgrade including acute psychiatry, interventional cardiology, geriatrics, haematology. Bed needs: +180 beds. It will absorb 50% of Tukums Hospital catchment population, since Tukums Hospital will become a wellness and day care facility.
Six level-3 hospitals	
1. Daugavpils	It is proposed to include haematology, geriatrics, radiology & chemotherapy, paediatric surgery, interventional cardiology, and acute psychiatry. No new beds are required Palliative care and dentistry beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
2. Liepaja Regional Hospital	It is proposed to include rheumatology, infectious diseases, radiology & chemotherapy, interventional cardiology, neurosurgery, ophthalmology, and acute psychiatry. No new beds are required for rheumatology and infectious diseases It will absorb Prielukes Hospital catchment population, since Prielukes Hospital will become a wellness and day care facility. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.

	Hospital name	Proposed Changes
3.	Jēkabpils Regional Central Hospital	It is proposed to include medical oncology, rheumatology, radiology & chemotherapy, perinatology level II, acute psychiatry, ophthalmology. No new beds are required Rheumatology. Pathology and radiology beds are not considered as hospital beds within these scenarios.
4.	Rēzeknes Hospital	It is proposed to include oncology for outpatient only, dermatology, endocrinology, geriatrics, gastroenterology, haematology, ophthalmology, pulmonology, rheumatology, A&E, physiotherapy, radiology & chemotherapy, perinatology Level II, ophthalmology and vascular surgery. No new beds are required Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios
5.	Vidzeme Hospital (Valmiera and Valka)	It is proposed to include medical oncology, rheumatology, radiology & chemotherapy, perinatology level II, acute psychiatry. No new beds required. It is important to note that Vidzeme Hospital data from Valmiera and Valka were provided unified in the database. No new beds required. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
6.	Ziemeļkurzemes Regional Hospital	Reconfiguration of services to classify as General Hospital Level 3 and it is proposed to include dermatology, geriatrics, haematology, radiology & chemotherapy (No LINAC), endocrinology, and Infectious diseases, oncology outpatient. No new beds required. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
Five level-2 hospitals:		
1.	Madona Hospital	Reconfiguration of services to classify as General Hospital Level 2, providing cardiology, general medicine and neurology as medical specialities, obstetrics and gynaecology, paediatrics (neonatology (perinatology Level I) and paediatrics), general surgery and trauma and orthopaedic surgery. Pathology and radiology beds are not considered as hospital beds within these scenarios. Bed needs: +6 beds.
2.	Balvi and Gulbene Hospital Association	Data from Balvi and Gulbene hospitals were merged in the data provided to the World Bank. Reconfiguration of services to classify as General Hospital Level 2, providing cardiology, general medicine and neurology as medical specialities, obstetrics and gynaecology, paediatrics (neonatology (perinatology Level I) and paediatrics), general surgery and trauma and orthopaedic Surgery. Palliative care beds will be closed. Pathology and radiology beds are not considered as hospital beds within these scenarios.
3.	Jelgavas City Hospital	Reconfiguration of services to classify as General Hospital Level 2 and it is proposed to include dermatology, rheumatology, cardiology, radiology & chemotherapy (NO LINAC) and urology. No new beds are required. It will absorb Dobele Hospital catchment population, since Dobele Hospital will become a wellness and day care facility.
4.	Jurmala Hospital	Reconfiguration of services to classify as General Hospital Level 2 and it is proposed to include medical oncology and rheumatology. Bed needs: +212 beds.

Hospital name	Proposed Changes
	It will absorb 50% of Tukums Hospital catchment population, since Tukums Hospital will become a wellness and day care facility.
5. Riga 1 Slimnīca	Reconfiguration of services to classify as General Hospital Level 2
Seven level-1 hospitals	
1. Ogre District Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. • Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed. Bed needs: +4 beds.
2. Saldus Medical Center	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. • Palliative beds will be closed. Bed needs: +22 beds.
3. Kuldīga Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery.
4. Sigulda Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care beds will be closed. Bed needs: +37 beds.
5. Alūksne Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: Trauma and orthopaedic surgery beds will be closed.
6. Riga 2nd Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery: • Palliative care beds will be closed.
7. Talsi Hospital	It will provide 1st level services including: general medicine, obstetrics and gynaecology, paediatrics, and general surgery. Talsi number of beds are included within the Ziemeļkurzemes Regional Hospital total number of beds since their information is unified.
Twelve day care or Community Day Hospitals:	
1. Aizkraukle Hospital	It has only palliative care beds which will be closed as hospital beds and work as wellness and day care.
2. Bauska hospital	It has only palliative care beds which will be closed as hospital beds and work as wellness and day care.
3. Krāslava Hospital	22 trauma and orthopaedic beds will be closed and the rest of services will be absorbed by Daugavpils Hospital.
4. Līvāni Hospital	20 palliative care beds will be closed and trauma and orthopaedic beds will be absorbed by Daugavpils Hospital.
5. Ludza Medical Center	It has only palliative care beds which will be closed as hospital beds and work as wellness and day care.
6. Preiļi Hospital	8 palliative care beds will be closed and trauma and orthopaedic beds will be absorbed by Daugavpils Hospital. Catchment population will be absorbed by Rezeknes Hospital.
7. Smiltene Red Cross Hospital	It has only palliative care beds which will be closed as hospital beds and work as wellness and day care.
8. Limbaži Hospital	There is no data for number of beds.
9. Prielukes Hospital	Only 13 beds, the demand of services will be absorbed by Liepaja Hospital.

Hospital name	Proposed Changes
10. Dobele Hospital	Long-term care, neurology, medical microbiology & virology and trauma and orthopaedic surgery beds will be closed. The demand of services will be absorbed by Jelgavas Hospital.
11. Tukums Hospital	Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed. The demand of services will be absorbed 50% by Jurmala Hospital and the other 50% by Pauls Stradiņš Clinical University Hospital.
12. Cēsu Clinic	Long-term care, neurology, and trauma and orthopaedic surgery beds will be closed. The demand of services will be absorbed by Vidzeme Hospital.

Source: Sanigest Internacional

In summary, the following table presents an overview of the application of the described approach to Latvia's population rates for 2025.

Table 74: Bed need under Scenario 2 by 2025

Bed Profile	Current Beds 2014 (Contracted)	Bed need 2025	Gap (2025) 2025
Medical Specialties	2,258	2,292	-34
Paediatric	853	892	408
Obstetrics and Gynaecology	514	440	74
Surgical Specialties	2,523	1,645	878
Pathology and Radiology	499		
Mental health and Disabilities		79	-79
Long Term care	3,406	2,650	756
Total	**10,053**	**7,998**	**2,055**
Acute Care Only	6,647	5,348	1,299

Source Sanigest Internacional

This section focuses now on drilling down on the bed distribution for the preferred, or optimal scenario. The previous section outlined the distribution of facilities by levels of care, and this section now looks at the next step which is to outline the placement of beds in the hospital network. This task has been completed according to a multi-staged approach and based on the methodology identified earlier.

This scenario targets the bed need estimates in the preferred model to project the proposed distribution of services in the hospital network targeting the roughly 5,000 acute beds for 2025 and 3,000 long term beds. In considering the optimal distribution of facilities across the regions, the following parameters were considered in the analysis.

Table 75: Criteria for optimizing the hospital network

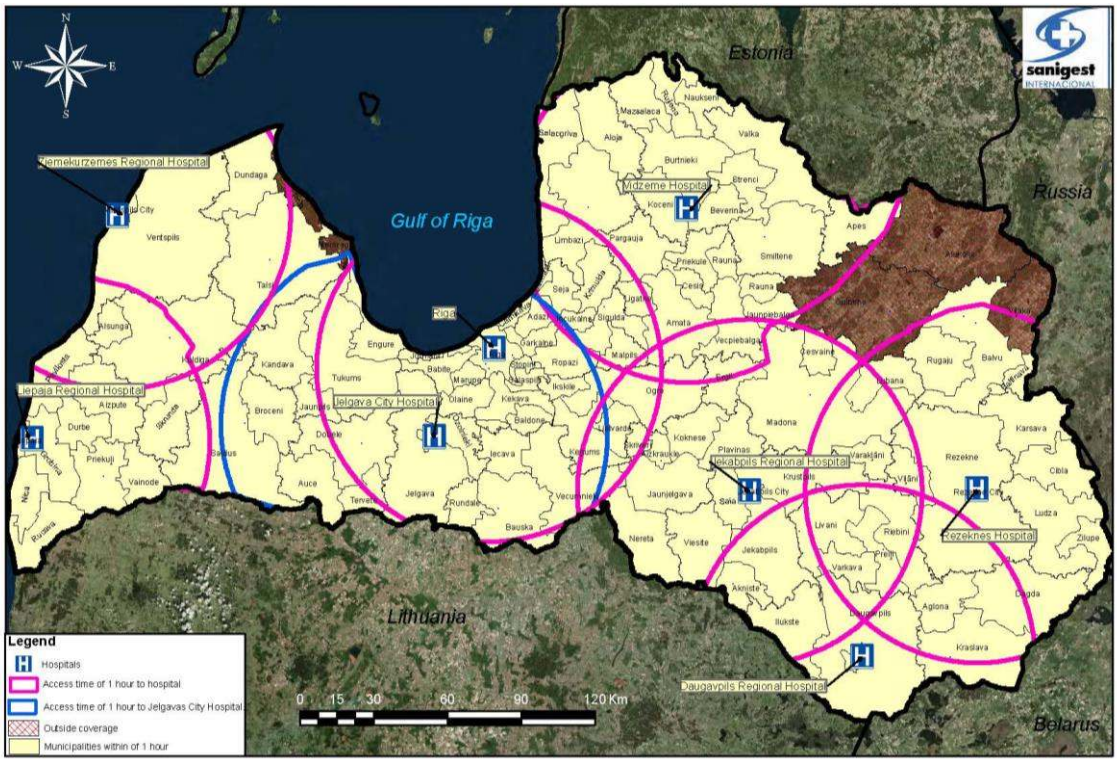
Approach	Justification
Support goal of expanding access to highly specialized care for the population	Requires the decentralization of some key services to ensure adequate access for the entire population.
Centralization of highly specialized care	Services such as cardiothoracic surgery should be centralized to ensure optimal outcomes and greater efficiency. For example, evidence shows that facilities performing fewer than 500 births per year do not have sufficient proficiency to deliver optimal results.
Geographic access	Access times by level are: (i) < 30 minutes; (ii) less than 1 hour; (iii) 1 hour; and (iv) less than 3 hours.

Approach	Justification
Increasing ambulatory procedures	Many services ranging from chemotherapy to the majority of general surgeries can now be done on an ambulatory basis. Continuing reductions in hospital utilization are expected across most specialties but more dramatic changes in surgery and cancer care.
Shifting to non-acute settings	As the increase in ambulatory procedures increases in the future and the capacity to address patient needs in non-acute settings rises, there will be an increasing need for day bed facilities and long term care settings. This is also influenced by the trend to de-institutionalize mental illness and substance abuse patients.

Source: Sanigest Internacional

Based on the parameters of access time standards and the socioeconomic situation, the preferred scenario for network reconfiguration proposes expanding the availability of services in key Level III hospitals and strengthening one Level II hospital (Jelgavas City Hospital) in order to improve access. These Level III and Level II hospitals are shown in the following map surrounded with a ring that illustrates the area covered within 1 hour of access time. This distribution allows a coverage of 97.5 percent of the national population.

Figure 39: Access times to level III and level II hospitals



Source: Sanigest Internacional

Level IV hospitals, which have a level of highly specialized services and excellence, are located in the region of Riga, and have access times of less than 3 hours. Their domestic demand originates mostly from Riga and Pieriga, although they are considered national centers that serve patients from all regions across the country. These level IV hospitals are the University Children's Hospital, Riga Maternity Hospital, Traumatology and Orthopaedics Hospital, Riga East Clinical University Hospital, and Pauls Stradiņš Clinical University Hospital.

Community palliative care is comprehensive patient care at an advanced stage of disease at his residence. It has great advantages and some drawbacks for the patient and for the family. It is the essence of palliative care and can give good quality of life and dignified death in patients with advanced terminal illness.

Advantages for the patient keeps his social and family role, has its time and distributes, maintains their privacy, and their occupational activities, is in a familiar environment, has the affection of his family and is found that there is increased quality of life regarding hospitalized patients.

Family benefits include familiar environment, ease of movement, satisfaction with active participation in care, facilitating the grieving process, respect for the will of the patient. Benefits for the health system include a decrease in the number of days of hospitalization, economic savings, improved quality of care and increased healthcare coverage.

Drawbacks: the patient may be alone, present uncontrolled symptoms, requiring specific palliative treatments in a stressful environment or physical or mental exhaustion of caregivers.

Finally, allocating Ogre District Hospital, Saldus Medical Center, Kuldīga Hospital, Alūksne Hospital, and Sigulda Hospital as Level I within the preferred scenario responds to the fact that these health centers have low rates of mortality; greater access to medical facilities that are Level II, III and IV; and lower travel times. Likewise, their geographical distribution best complement the other services offered at higher levels of care.

9.3. Additional considerations for allocation of hospitals

9.3.1. Hospital performance ranking

A ranking of facilities was carried out by taking into account the occupancy rate, mortality rate, a concentration index, and the total number of beds to ensure that the preferred model proposes the allocation of beds that takes into account existing performance. The following table highlights the ranking based on a normalization of each of the three streams. Annex 10 shows the full list of variables and performance of the facilities.

Table 76: Hospital performance ranking

Hospital	Ranking (higher=worse)
Aizkraukle Hospital	7.67
Preiļi Hospital	7.56
Ogre District Hospital	7.44
Cēsu Clinic	7.42
Tukums Hospital	7.33
Bauska hospital	7.16
Riga 2nd Hospital	7.08
Hospital Jurmala	6.55
Jelgavas City Hospital	6.48
Madona Hospital	6.28
Sigulda Hospital	4.85
Krāslava Hospital	4.55
Kuldīga Hospital	4.50
Alūksne Hospital	4.50
Dobele Hospital	4.40
Smiltene Red Cross Hospital	4.03
Limbaži Hospital	4.00
Līvāni Hospital	3.58

Daugavpils Regional Hospitals	3.54
Rēzeknes Hospital	3.51
Jēkabpils Regional Central Hospital – Zemgale	3.47
Ludza Medical Center	3.38
Vidzeme Hospital- (Valka) Vidzeme	3.33
Balvi and Gulbene Hospital Association	3.30
Prielukes Hospital	2.97
Liepaja Regional Hospital- Kurzeme	1.54
Ziemeļkurzemes Regional Hospital	0.62
Saldus Medical Center	0.50

Source: Sanigest Internacional

9.3.2. Maternity and child services

Based on the projection of the number of births by 2025, along with our proposal of closing OBGYN beds in facilities that serve fewer than 500 births per year, transferring cases to other medical centers would allow a better optimization of resources within the network for this scenario. Table 20 shows the projected number of births by region.

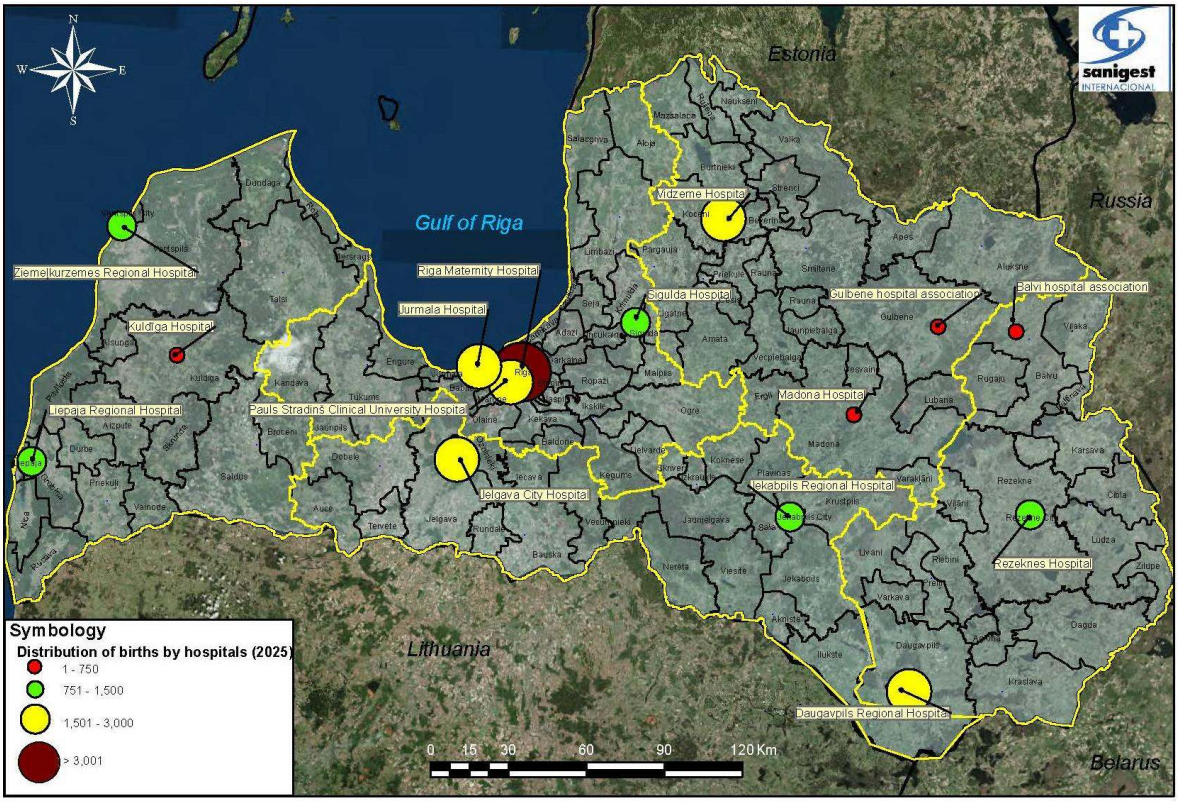
The proposed redistribution also conforms to the WHO proposed standard for Emergency Obstetric and Neonatal Care (EmONC) which considers that "the availability of EmONC services is measured by the number of facilities that perform the complete set of signal functions in relation to the size of the population. The minimum acceptable level is five (5) EmONC facilities for every 500,000 population, at least one of which must provide comprehensive care". Based on this standard, we have adjusted the number of hospitals we are proposing to leave as birthing points with the emergency obstetric and neonatal care. Following the WHO standard, at national level there must be around 15 centres that have been distributed among the regions as shown below.

Table 77: Birth centers and EmONC

Regions	Population 2025	Number of Births by 2025	Birth Centers
Riga	617,329	11,027	Riga Maternity Hospital
			Pauls Stradiņš Clinical University Hospital
Pieriga	372,987	3,664	Hospital Jurmala
			Sigulda Hospital
Vidzeme	171,767	2,826	Madona Hospital
			Vidzeme Hospital
Kurzeme	223,320	2,836	Liepaja Regional Hospital
			Ziemeļkurzemes Regional Hospital
			Kuldiga Hospital
Zemgale	215,962	2,702	Jēkabpils Regional Central Hospital
			Jelgavas City Hospital
Latgale	238,234	2,459	Daugavpils Regional Hospital
			Rēzeknes Hospital,
Latvia	1,839,599	25,852	

Source: Sanigest Internacional

Figure 40: Distribution of birth centers, 2025



Source: Sanigest Internacional

9.3.3. Specialized units

The network services will require a reconfiguration for specialized units. The following table shows the facilities in which specialized units are to be set for Stroke, AMI + CAT Lab, and LINAC.

Table 78: Specialized unit location

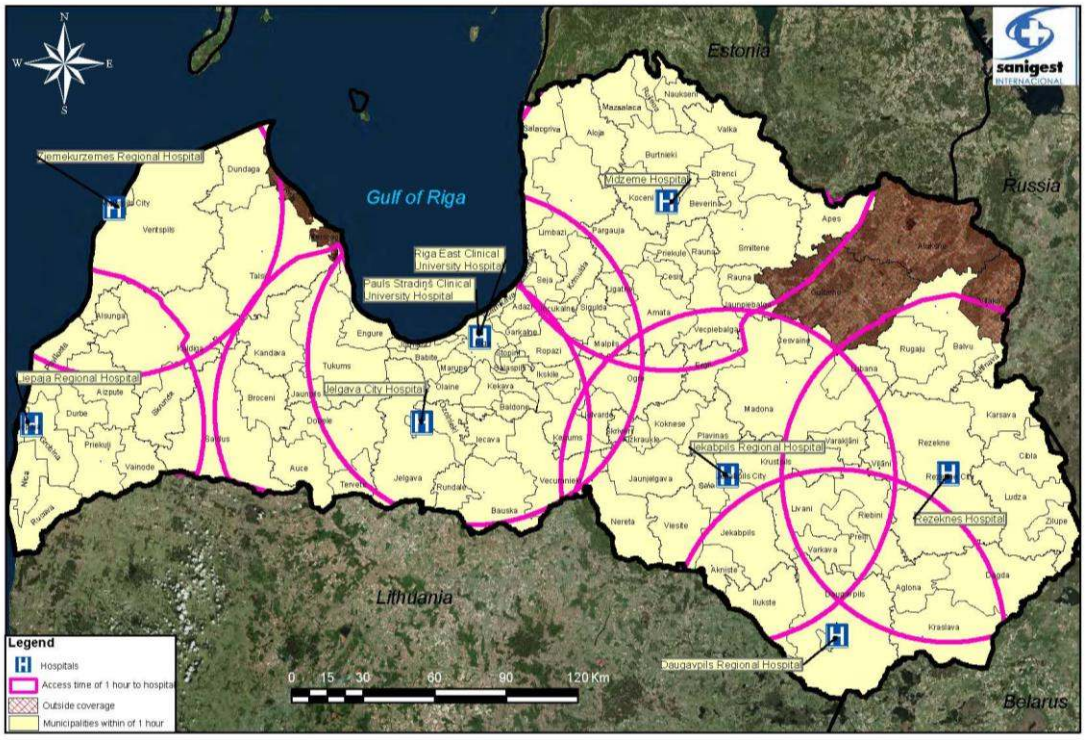
Type	Region	Hospital
Stroke	Riga	Pauls Stradiņš Clinical University Hospital
		Riga East Clinical University Hospital
	Latgale	Daugavpils Regional Hospital
		Rēzeknes Hospital
	Kurzeme	Leipaja Regional Hospital
		Northern Regional Hospital
		Jelgava City Hospital
	Zemgale	Jēkabpils Regional Central Hospital
	Vidzeme	Vidzeme Regional Hospital
AMI + CATH LAB	Riga	Pauls Stradiņš Clinical University Hospital
		Riga East Clinical University Hospital
	Latgale	Daugavpils Regional Hospital
		Rēzeknes Hospital
	Kurzeme	Liepaja Regional Hospital
		Northern Regional Hospital
	Vidzeme	Vidzeme Regional Hospital
	Zemgale	Jēkabpils Regional Central Hospital
LINAC	Riga	Pauls Stradiņš Clinical University Hospital

Type	Region	Hospital
		Riga East Clinical University Hospital
	Latgale	Daugavpils Regional Hospital
	Kurzeme	Liepaja Regional Hospital
	Zemgale	Jelgava City Hospital
		Jēkabpils Regional Central Hospital

Source: Sanigest Internacional

For special units for handling stroke, the standard access time is less than an hour and a half, and to achieve this, the implementation of technology needs to be done at the Northern Regional Hospital, Jegavpils Regional Central Hospital, and in Vidzeme Regional Hospital. This way 9 specialized units for stroke could cover 97.5 percent of the population in less than an hour as shown in Figure 41.

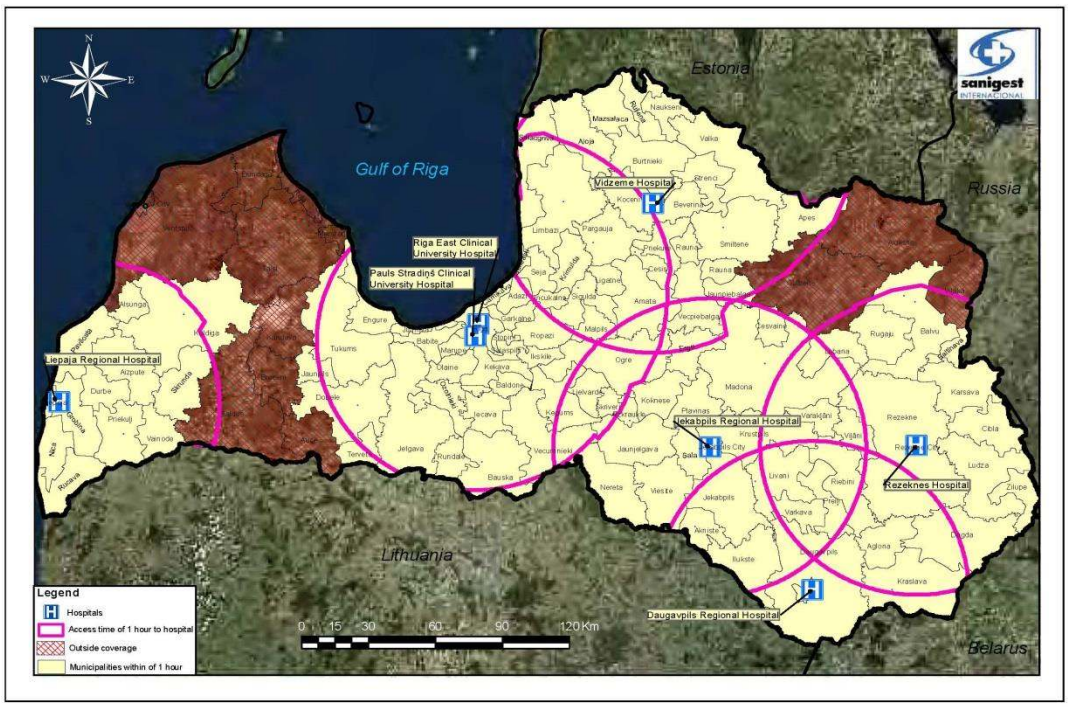
Figure 41: Specialized units for stroke



Source: Sanigest Internacional

For special units for AMI+CATH Lab the goal is to have access in less than an hour. To accomplish this, new units will be placed in Rezeknes Hospital, Vudzeme Regional Hospital and Jekabpils Regional Central Hospital as shown in figure 38.

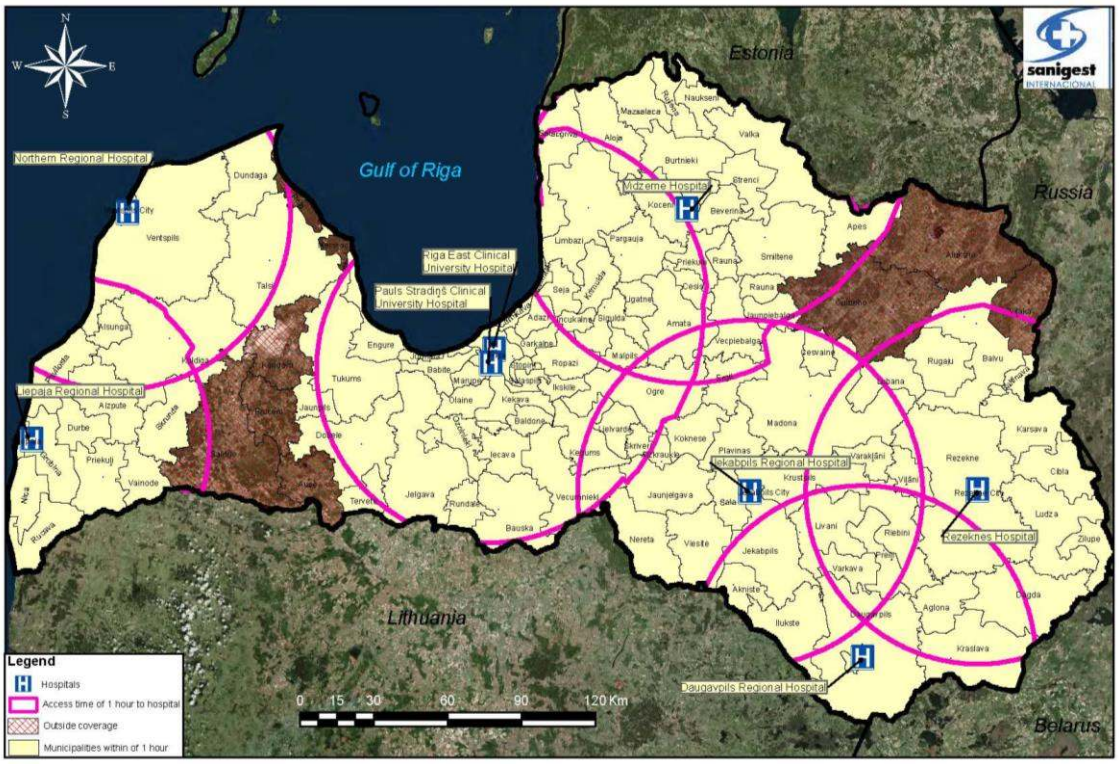
Figure 42: Specialized units for AMI+CATH



Source: Sanigest Internacional

With this distribution, 91 percent of population will access required care within an hour, so we are proposing to include Northern Regional Hospital to close the gap. With this change 95 percent of population will access an AMI unit in one hour or less as shown in Figure 15.

Figure 43: AMI units



Source: Sanigest Internacional

Finally, for specialized centres for linear accelerator therapy, hospitals will be reinforced with new equipment, and the population requiring this services will be served in Pauls Stradins Clinical University Hospital, Riga East Clinical University Hospital, Daugavpils Regional Hospital, Liepaja Regional Hospital Jekabpils Regional Central Hospital and Jelgava City Hospital as shown in Figure 44.

Figure 44: Linear accelerator therapy

Source: Sanigest Internacional

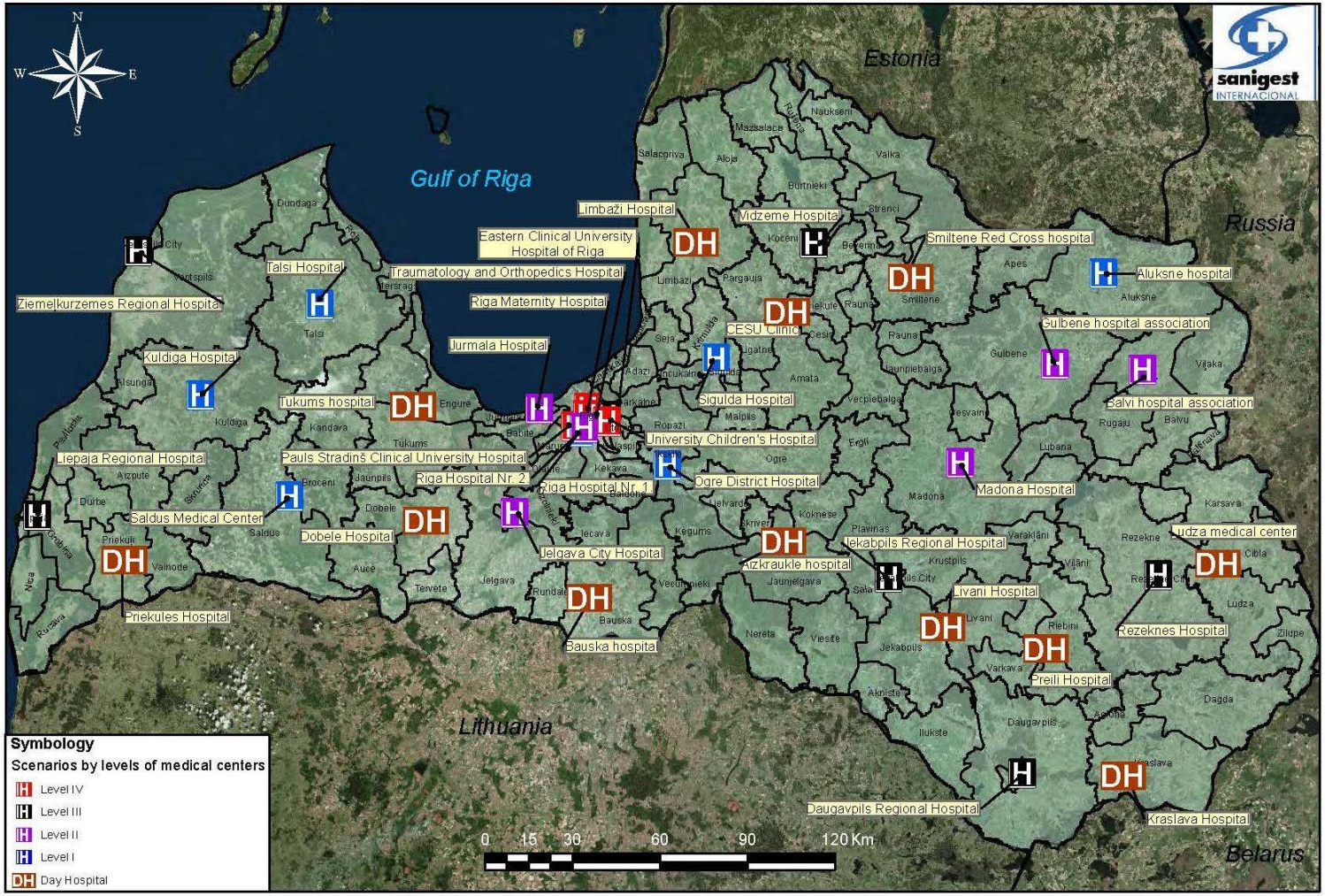
This not only guaranteed access times, but the reference system should be adjusted to optimize the use of available resources.

9.4. Final recommended distribution of facilities

The proposed reconfiguration of the network is therefore guided by the elements outlined in this chapter. First, the proposal targets the overall level of beds by specialty to ensure that the projected demand for care is met by the level of beds that are proposed. Second, the reconfiguration considers the distribution of services by level of care to ensure that the right services are delivered at the right place and at the right time. Finally, the criteria outlined above are considered to ensure that the allocation of services considers actual population needs, access issues, and evidence based recommendations regarding the production of medical services.

In the first stage, the allocation of recommended beds by health care function is applied to the projected population of the 6 regions in 2025. The second stage is based on the allocation of the total number of beds among the four levels of care proposed. Additional analyses lead to the estimated number of critical beds that will be required. Finally, estimates were provided of the specific bed requirements for each facility based on the recommendations according to the proposed scenarios regarding the future role of each hospital, the total number of beds required in the network, and recommendations to ensure adequate access and offer of care throughout the network. The following map shows the hospital reconfiguration by levels of care and presenting the distribution of the centres within the regions.

Figure 45: Facility distribution under Scenario 2



Source: Sanigest International

The current situation (2014 data) is presented in the following table and compared against the projected scenario, showing the target number of beds for 2025 by specialty. This provides a general notion of where the surplus or deficit lies to ensure appropriate future planning in order to achieve the target for reconfiguration as the network evolves.

Table 79: Bed recommendations, by health care specialty group

Bed Profile	Current Situation, 2014	Scenario 2 Target 2025	Proposed vs. Current
Medical Specialities	2,258	2,292	(-34)
Obstetrics and Gynaecology	514	440	74
Paediatric	853	892	(-39)
Surgical Specialties	2,523	1,645	878
Pathology and Radiology	494		
Mental Illness and Disabilities	-	79	(-79)
Overall	6,647	5,348	1,299

Source: Sanigest Internacional

The second stage further breaks down bed needs by both health care function and hospital level. These numbers were arrived at after consultations with experts and a review of other master planning exercises and provide a tool for long-term facility planning.

Table 80: Bed recommendations by level of Care and health care specialty for year 2025

Bed Profile	Scenario 2			
	Level1	Level2	Level3	Level4
Medical Specialities	163	323	618	1,188
Obstetrics and Gynaecology	48	87	115	190
Paediatric	84	134	167	507
Surgical Specialties	144	226	343	932
Mental Illness and Disabilities	-	-	26	53
Total	439	770	1,081	2,292

Source: Sanigest Internacional

As previously mentioned, Table 81 shows the recommended number of beds by level and by region for the Latvia hospital network.

Table 81: Number of beds by region and level, 2025

Region	Scenario 2			
	Level1	Level2	Level3	Level4
Kurzeme	106		405	-
Latgale	-	-	492	-
Pieriga	204	308	-	-
Riga	69	100	-	2,870
Vidzeme	60	162	172	-
Zemgale	-	200	200	-
TOTAL	439	770	1,269	2,870
			5,348	

Source: Sanigest Internacional

9.4.1. Critical beds (ICU and similar units)

Critical beds for hospitals at all levels have been calculated, following international standards that guide the allocation of this type of bed. A typical distribution of critical beds from the Intensive Care Unit is as follows:

- 70% ICU (Adults)
- 5% ICU (Coronary Heart Disease)
- 20% NICU/SCBU (Neonatal Intensive Care Unit / Special Care Baby Unit)
- 5% PICU (Paediatrics)

The following table summarizes the estimated number of critical beds for 2020, based on a standard of 6 beds by 100,000 population for NICU/SCBU, 1 bed for PICU, and 19 beds for Other Critical care. Required beds for 2020 and 2025 show a decrease compared to the number of beds estimated for the current situation, based on population shifts and health needs.

Table 82: Critical care beds

Type Bed	2014 (Current)	2020	2025
1) NICU/SCBU	43	49	47
Live Births	21,543	24,313	23,433
Level 2	32	36	35
Level 3	11	12	12
2) PICU	40	38	37
3) Other Critical care	180	172	166
Total Critical Care	263	259	249

Source: Sanigest Internacional

The number of critical beds that have been estimated by level of care and for each facility according to its catchment population is presented in Annex 6.

9.5. Future network planning in Latgale

Latgale is the poorest region in Latvia with important geographic challenges in accessing specialized care in Riga. The Latgale Regional Development Plan recognized the two national development centers that are included in the Latvia National Development Plan, the five regional development centers, and seven additional counties of regional significance. The projected population for all municipalities are included in Table 83. As is the case with the rest of Latvia, the regional population is declining fairly steadily and by 2025, there will be an expected 245,000 people, in comparison with the estimate of nearly 280,000 for 2016. The decline in population demand will be partially offset by the high level of chronic disease in Latgale and the lower than average coverage of primary care and other healthcare services.

Table 83: Latgale projected population for all municipalities (2020 and 2025)

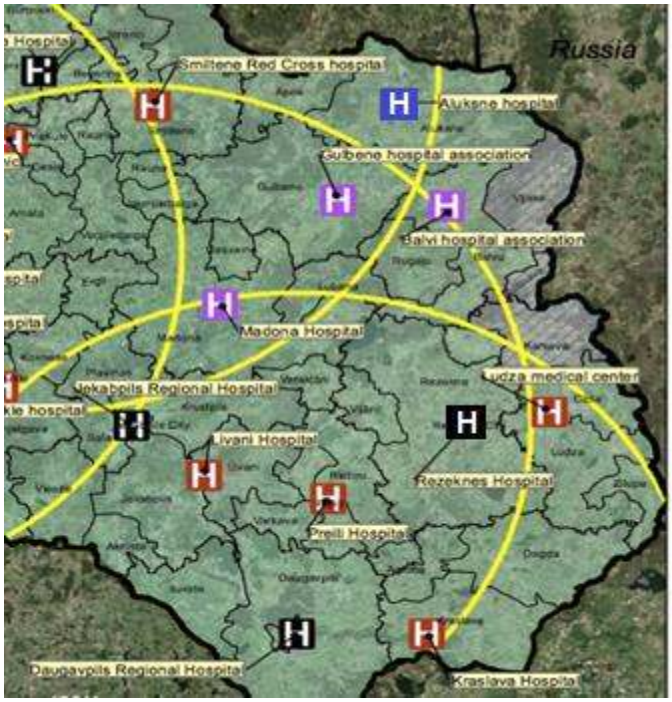
National Center	Municipality	2016 Population	2025 Population
Daugavpils	Daugvapils City	85,286	73,621

	Daugavpils muni	22,194	19,158
	Ilukste	7,206	6,220
	Kraslava	15,423	13,313
	Aglona	3,572	3,083
	Dagda	7,444	6,426
	Varkava	1,968	1,699
	Preli	9,754	8,420
	Livani	11,424	9,861
	Sub-Total	164,271	141,801
Rezeknes			
	Rugaji	2,234	1,928
	Balvi	12,687	10,952
	Vijaka	5,007	4,322
	Baltinava	1,062	917
	Karsava	5,667	4,892
	Cibla	2,661	2,297
	Ludza	12,941	11,171
	Zilupe	3,014	2,602
	Dagda	7,444	6,426
	Riebeni	5,092	4,396
	Vijani	5,895	5,089
	Rezeknes City	28,745	24,813
	Rezenkes Muni	26,707	23,052
	Sub-Total	119,156	102,857
Total Region		**283,427**	**244,658**

The basic planning standards that have been applied throughout this report have been used to propose a detailed network for Latgale. The main points standards used were:

- A target of 2,000 persons per GP for PHC (adjusted for expected retirement).
- Outpatient specialist services available at polyclinics with 10,000 people or more for basic specialties: internal medicine, paediatrics, obgyn, and general surgery.
- Outpatient specialists beyond these basic specialties available in the Level 2 and Level 3 hospital polyclinics.
- Staff numbers outlined in the section on staffing
- Targeted access times derived from the GIS analysis:
    - 30 minutes or less access time to GP
    - 30 minute or less access time to a Level 1 hospital
    - 60 minute or less access time to a Level 2 hospital
    - 90 minute or less access time to a Level 3 hospital
- A target of 262 acute care beds per 100,000 for 2025. This yields a need of just over 600 total acute beds, distributed according to the levels of care:
    - 86 beds for Level 1 hospital
    - 240 beds for Level 2 hospitals
    - 219 beds for Level 3 hospitals
    - an expected referral to national hospitals in Riga for a total of 50 bed equivalent.
- An estimate of 408 long term care beds that will be distributed along the following pattern:
    - Palliative – 99 beds
    - 222 beds in the Daugavpils psychiatric hospital (9 child and 213 adult)
    - Substance abuse – 60 + 2 in Daugavpils and Rezeknes, respectively.

- TB 24 long term beds in Daugavpils regional



The proposed master plan outlines a strengthened regional healthcare model whereby the regional hospitals would have the capacity to address many more of the specialized health needs that are presently available only in Riga, in most cases. Following the planning process outlined earlier in this report, the application to Latgale would maintain one Level 1 hospital, one Level 2 and one Level 3 regional hospital to ensure adequate coverage of the standards of ensuring that the population can reach Level 2 specialist care within 60 minutes and Level 3 specialized care within 90 minutes. Several of the smaller Level 1 hospitals would convert to only day care facilities offering non-acute care. Strengthening Daugavpils Regional Hospital with additional support and technology will enhance access to care for the entire population. The table below shows the projected need for primary care would be essentially balanced by 2025, taking into account the estimated retirement of primary care physicians in the future.

Table 84: Latgale projected PCPs

Region	Municipality	2025 Population	PHC Teams Needed	Current PHC	% in 2020	Available 2020 Est	Gap
Daugavpils	Daugvapils City	73,621	37.0	88.0	49%	44.6	7.6
	Daugavpils muni	19,158	10.0	9.0	43%	5.1	(4.9)
	ilukste	6,220	3.0	9.0	50%	4.5	1.5
	kraslava	13,313	7.0	4.0	29%	2.9	(4.1)
	aglona	3,083	1.5	3.0	0%	3.0	1.5
	dagda	6,426	3.0	7.0	17%	5.8	2.8
	varkava	1,699	1.0	-	0%	-	(1.0)
	preli	8,420	4.0	15.0	70%	4.5	0.5
	livani	9,861	5.0	8.0	71%	2.3	(2.7)
	Total	141,801	72	143		73	1
Rezeknes							
	Rugaji	1,928	1.0	1.0	0%	1.0	-
	Balvi	10,952	5.5	14.0	44%	7.8	2.3
	Vijaka	4,322	2.0	5.0	75%	1.3	(0.8)
	Baltinava	917	0.5	1.0	100%	-	(0.5)
	Karsava	4,892	2.0	4.0	50%	2.0	-
	Cibla	2,297	1.0	-	0%	-	(1.0)
	Ludza	11,171	6.0	10.0	50%	5.0	(1.0)
	Zilupe	2,602	1.0	3.0	0%	3.0	2.0
	Dagda	6,426	3.0	7.0	17%	5.8	2.8
	Riebeni	4,396	2.0	1.0	100%	-	(2.0)
	Vijani	5,089	2.5	4.0	67%	1.3	(1.2)
	Rezeknes City	24,813	12.0	37.0	59%	15.2	3.2
	Rezenkes Muni	23,052	11.5	15.0	50%	7.5	(4.0)
	Total	102,857	50	102		50	(0)

The following table shows the overall distribution of the healthcare network that would be applied for Latgale based on the standards outlined in this document.

Table 85: Latgale distribution of healthcare network

Level of Care	Explanation
Primary Health Care	An estimated 122 primary care GP led teams are estimated for the entire region, based on a target ratio of minimum 2,000 persons per GP. The need is distributed according to the population per geographic area in the previous table. Polyclinics with specialists are proposed for the major cities and the 5 municipalities which are regional development centers. In total then 8 polyclinics are proposed with 2 in Daugavpils, 1 in Rezeknes City and 5 others in (Balvi, Ludza, Preili, Kraslava and Livani)
Day Care/Wellness/Palliative	4 current district hospitals would be downgraded to day care and Community Day Hospitals offering non-acute care and palliative services for: Livani, Ludza, Kraslava and Preili.
Level 1 Hospital	Level 1 hospital would be maintained in Balvi operated under the Balvi and Gulbene association.
Level 2 Hospital	Rezeknes City would be a Level 2 facility serving the northern population of just over 100,000 people.
Level 3 Hospital	Daugavpils would be the strengthened Regional Hospital serving the total population of just under 250 thousand people projected for 2025 and also

Level of Care	Explanation
	serving the level 2 needs for the population of nearly 150 thousand people that inhabit the municipalities in the southern part of the region.
Long Term Care	1 psychiatric long term facility in Daugavpils Substance abuse in Rezeknes and Daugvapils Palliative in the 4 former Level 1 hospitals TB in Daugavpils Rehabilitation in the Daugavpils and Rezeknes
Emergency Centers	24/7 emergency care would be available through three different access points: • After hours urgent care centers in the polyclinics. • Emergency Department of the Level 1 and 2 hospitals in Rezeknes and Balvi. • Emergency Department for Daugavpils for the most urgent care as a Level 1 Emergency Care Center.
Laboratory	Four basic levels of laboratories are proposed: • Level 0 would be any point of care testing that may be available in GP offices. • Level 1 is available for polyclinics. • Level 2 is available at the Level 1 and 2 hospitals • Level 3 available at the Regional Hospital with the greatest level of consolidation and most sophisticated tests. Table 86 includes the proposed availability by level.

The proposed level of laboratory coverage is outlined in the following table.

Table 86: Latgale proposed laboratory network

				Availability by Level of Care			
Type of tests	Including	GP Offices	Polyclinic	Level 1 Hospital	Level 2 Hospital	Level 3 Hospital	Level 4 Hospital
general clinical	chemical and microscopic examination of biological fluids (urine, feces, sputum, duodenal contents, gastric contents, cerebrospinal fluid, transudate and exudate ejaculate discharge of female genital mutilation and other)	x	x	x	x	x	x
hematology	studies aimed at analyzing hemoglobin and its compounds, morphologic, cytochemical, and physiological characteristics of blood cells and bone marrow	x	x	x	x	x	x
cytology	morphological studies of biological materials obtained by different methods: puncture, exfoliative, and other endoscopic. Collection of pap can be done at any level and sample referred on				x	x	x
immunocytochemical	immunocytochemical studies with monoclonal antibodies, flow cytometry						x
biochemical	studies at the level of the chemical, physico-chemical component of biological material		x	x	x	x	x
coagulation	tests defining vascular-platelet and coagulation hemostasis, anticoagulant and fibrinolytic system		x	x	x	x	x
immunology and izoserology	laboratory studies that characterize the state of the immune system						x
chemic-toxicologic	chemical and toxicological studies of drugs for therapeutic monitoring;			x	x	x	x
microbiology	studies for the detection of microorganisms in biological materials (bacteriology, molecular biology, mycology, parasitology, immunoserologiya)			x	x	x	x
cytogenetic	study of the number and structure of chromosomes in the analyzed cells (cardiac research, molecular cytogenetic methods)						x
molecular-genetic	set of methods to detect changes in the structure of the genome at deoxyribonucleic and ribonucleic acids (polymerase chain reaction)						x
TB	special department in TB hospitals (real time PCR)					x	x

10. Investment planning: Acute inpatient infrastructure and equipment costs

As a member state of the European Union, Latvia is eligible for financial assistance aimed at promoting economic and social development by way of the European Regional Development Fund (ERDF), European Social fund (ESF) and Cohesion Fund (CF). For the planning period 2004-2013, Latvia received € 4.53 billion[42]. A total of €219.6 million were available to invest in health care services, 93% of which were foreseen for health care infrastructure development (€ 205.2 million. The programs eligible for these funds included:

- the increase in the quality of infrastructure for GPs,
- increase quality of outpatient services,
- develop the network of emergency care,
- optimize network of inpatient services,
- develop the infrastructure for oncology patients in Riga, Daugavpils and Liepaja,

Vidzeme hospital was a recipient of funds under 2 of the programs, part of which was the renovation of infrastructure in several stages for renovation of civil engineering networks, renovation of premises and acquisition of essential medical devices. The first project cost € 3.69 million and was finance in 85 percent by the ERDF, and a second project cost €1.8 million and was 84.1 percent covered by ERDF. During this same planning period, Pauls Stradins Clinical University Hospital received €24 million through the ERDF to finance part of the cost of a new building to expand and improve inpatient services[43].

Valka benefited from the development of a project to coordinate emergency rescue services between the city of Valga in Estonia and Valka, which were single city up until 1920. For this project the ERDF contributed € 1.9 million, almost 85 percent of the total investment cost.[44]

To continue to prioritize the investment needs in the health infrastructure in Latvia, the current approach for preparing the investment plan for hospitals in Latvia can generally be characterized by a three stage approach. The overall flow of the process is outlined in the following figure.

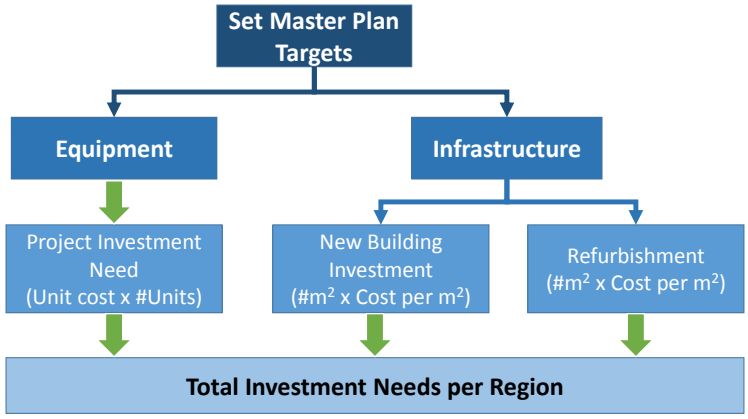
1. Estimate the changes required in infrastructure and equipment based on the master plan recommendations for each facility and the equipment projections.

2. Convert these changes into unit estimates, based on the M^2 to be constructed or refurbished, and the units of equipment required.

[42] Equity Action (2013) "Structural funds and health inequities: Latvia"
[43] European Commission (2016) "New infrastructure at Riga hospital to boost health care quality in Latvia". Online. Available at: http://ec.europa.eu/regional_policy/en/projects/latvia/new-infrastructure-at-riga-hospital-to-boost-health-care-quality-in-latvia
[44] European Commission (2016) "VV JRC – coordinated rescue services means more lives saved" Online. Available at: http://ec.europa.eu/regional_policy/en/projects/latvia/vv-jrc-coordinated-rescue-services-means-more-lives-saved

3. Monetize the investment needed by multiplying the number of units required times the cost per unit—either cost per M^2 for construction or cost per piece of equipment for technology.

Figure 46: The investment planning process



Source: Sanigest Internacional

Once the Master Plan allocation of facilities was made for each region, Sanigest analysed the hospital infrastructure network and separated the facilities according to 3 categories:

1. National Development Centre, which may include more than one facility
2. Regional Development Centres
3. Other Facilities without initial investment priority, including psychiatric, addiction and rehabilitation centres

The next step was to determine the extent of investment required and the potential cost of this investment for all facilities. Without obtaining a specific quote on construction or equipment, it is difficult to know with complete certainty the investment required. Further analysis would have to be made for each hospital in order to get exact investment estimates, but the estimates presented here should be robust to guide future investment planning on a case by case basis by presenting general needs.

Once the master plan targets were established for equipment and infrastructure, Sanigest developed estimates for the total investment need in each region. The four main parameters are:

- The **medical equipment investment need** is based on the unit cost for 49 pieces of equipment, based on 2012 prices obtained from European and US suppliers and adjusted to constant 2016 prices using the US consumer price indexes and then using the current exchange rate to obtain constant 2016 prices in Euros. The gap compares existing supply in each region and projected need for each piece of equipment in 2020

based on standards per 100 thousand population. The gap amount is then multiplied by the unit price to determine the required investment in equipment.

- For **refurbishment of facilities**, the percentage of deterioration in the hospital was taken from a survey of hospitals on previous investment, and the number of square meters (M^2) already refurbished during the past 5 years (2011-2016) gives a percentage of the infrastructure that needs to be repaired. This is used to estimate the number of M^2 of refurbishment that is required. The total investment required for refurbishment is therefore the cost per M^2 for refurbishment multiplied by the M^2 to be refurbished. This estimate is established for each hospital and then aggregated for the regional totals.

  The cost per M^2 is based on the average aggregated cost per M^2 for refurbishments undertaken already between 2006 and 2016. The average cost for the Kurzeme and Latgale regions was higher than the other four regions and was estimated at €850, while the rest of regions are estimated to have an average cost per M^2 of €400 for refurbishment. When considering the downgrade of existing facilities, a lower refurbishing cost of €300 is used.

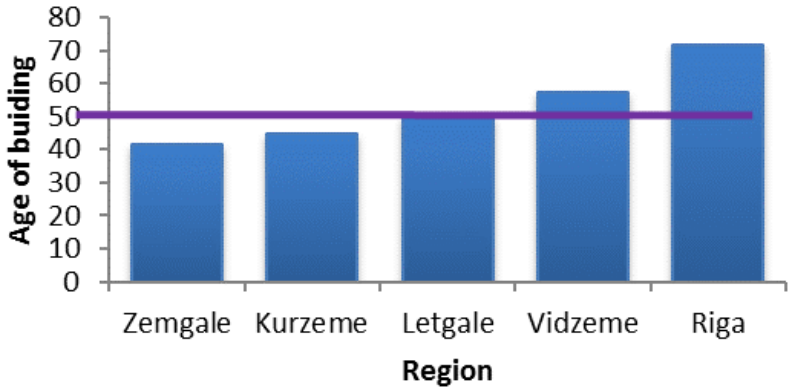
- The cost of **furniture, fixture, and equipment** (FF&E) is assumed to be proportional to the size of the cost of construction or refurbishment and constant across the different types of facilities and regions, accounting for 25 percent of the total.[45]

- For potential **new buildings** the investment needs have been based on the number of additional beds required in existing facilities and the standard space per bed according to international benchmarks. Typically, new infrastructure is proposed for hospitals that need to accommodate more than 25 new beds. The same bed numbers are used to determine the expected size of the facility based on the proposed standards of 150 M^2 per bed. The total M^2 of new construction is then multiplied by the expected cost of €1,500 per M^2 for new construction of hospitals.

Investment over the past 5 years was used for calculating refurbishing percentage and age. The average age of buildings is approximately 50 years, with Riga containing some of the oldest, with some built over a century ago (Figure 47). Because many of these buildings were not originally built to house a health facility, they have been more recently adapted and have not been considered for rebuilding.

[45] Navigant Consulting (2014). *Review of Conclusions and Recommendations in the Bond Advisory Committee Report to the Board of Directors.*

Figure 47: Age of hospital buildings



Source: Sanigest calculations, based on survey data submitted by hospitals

As mentioned above, the estimates/scenario include the refurbishment of priority NDC and RDC, FF&E, medical equipment. The cost of additional projects is independent of the refurbishing scenario and will be estimated in a separate section. The results are reported in five main categories: (i) hospital refurbishment, (ii) new MME, (iii) second priority medical equipment, (iv) other medical equipment needs, and (v) fixtures, furniture and equipment (FF&E). The investment totals at a national level are shown in the following table.

Table 87: Total investment needs by major category

Investment Category	Total Cost (in € million) (Scenario 1)	Total Cost (in € million) (Scenario 2)
Hospital Refurbishment	€ 211	€ 198
FF&E	€ 53	€ 50
MME Equipment	€ 30	€ 30
2nd Priority Equipment	€ 34	€ 34
Other Medical Equipment	€ 9	€ 19
Total	**€ 336**	**€ 320**

Source: Sanigest Internacional

10.1. Infrastructure costs

Whichever scenarios (for hospital network configuration) is retained, major costs are expected for refurbishing hospitals.

However, some marginal costs or savings are related to each scenario:

- Scenario 1 will require adding a few beds to Level 1 hospitals
- Scenario 2 will downgrade 14 facilities, thus generating some savings on infrastructure and equipment costs

Overall, the estimated infrastructure costs are the following:

Table 88: Total infrastructure costs (€ million)

Investment Category	Scenario 1	Scenario 2
NDC and RDC Refurbishing	€ 211	€ 180
HWC Refurbishing		€ 18
Furnishing	€ 53	€ 50
New building cost	€ 58	€ 54
Total Infrastructure Cost	**€ 322**	**€ 302**

Source: Sanigest Internacional

The estimates for the renovation depend on two essential variables that influence the total investment need. These variables include:

(i) estimated size of facility: based on reported refurbished percentages; and

(ii) expected cost per m^2 renovations: based on actual hospital renovations over the past decade.

The estimates for the building of additional space/building depends on:

(i) estimated number of additional beds; and

(ii) expected cost per m^2 renovations based on the level of care of the facility.

The refurbishing costs are estimated using the following formula:

$RC = (M^2) \times (1 - (\%\ Rf)) \times (UC)$, where

RC is the refurbishing cost in millions of euro for each facility

M^2 is the total are of the hospital in meters squared

% Rf is the percentage of the area of the hospital refurbished over the past 5 years

UC is the average unitary cost per meter squared to refurbish in euros

The model was used for all hospitals with the exception of the Eastern Clinical University Hospital of Riga. The hospital conducted an exercise to estimate the investment amount for the consolidation project. The € 35 million estimated investment need was increased to €40 million to account for additional investment needs given the current proposed restructuring. All hospital infrastructure refurbishing costs are included in Table 89.

Table 89: Refurbishing and furnishing costs (€ millions)

Region	National Development Centres		Regional Development Centres	
	Refurbish	Furnishing	Refurbish	Furnishing
Kurzeme	€ 12.0	€ 3.0	€ 26.9	€ 6.7
Latgale	€ 14.4	€ 3.6	€ 17.4	€ 4.3
Riga	€ 10.3.3	€ 25.8	€ 6.9	€ 1.7
Vidzeme	€ 8.8	€ 2.2	€ 6.3	€ 1.6
Zemgale	€ 9.0	€ 2.2	€ 5.8	€ 1.4
Total	**€ 147.5**	**€ 36.9**	**€ 63.3**	**€ 15.8**

Source: Sanigest Internacional

The cost of FF&E was estimated as a fixed percentage of the total refurbishing cost. Table 90 below provides details of the hospitals per regions and characteristics such as beds, age, and

area of each for both national and regional development centres. As mentioned in the section above, these two categories are the suggested priorities for refurbishing investment in Latvia.

Table 90: National Development Centres refurbishing costs

Region	Hospital	Beds	Age of building	M² total	% refurb.	Refurb. Cost (€million)	FF&E
Kurzeme	Northern Regional Hospital	289	n.a	21,347	34%	€ 12	€ 3
Latgale	Daugavpils Regional Hospital	737	30	n.a	n.a.		
	Rezeknes Hospital	302	31	22,196	24%	€ 14	€ 3.6
	Livani Hospital	60	83	3,403	100%	€ 0	€ 0
Riga	Riga Maternity Hospital	122	38	18,500	15%	€ 7	€ 2
	Jurmala Hospital	100	39	6,307	39%	€ 2	€ 0
	Pauls Stradinš Clinical University Hospital	861	107	62,334	6%	€ 26	€ 7
	Eastern Clinical University Hospital of Riga	2,120	116	196,110	16%	€ 40	€ 10
	University Children's Hospital	392	117	71,523	34%	€ 21	€ 5
	Traumatology and Orthopedics Hospital	210	131	19,122	21%	€ 7	€ 2
Vidzeme	Vidzeme Hospital	232	41	27,481	29%	€ 9	€ 2
Zemgale	Jelgava City Hospital	263	47	15,725	59%	€ 3	€ 1
	Gintermuiža Hospital	364	129	26,964	50%	€ 6	€ 2
Total		**6,052**		**491,012**		**€ 148**	**€ 37**

Source: Sanigest Internacional based on survey data submitted by hospitals

Most current National Development Centres have had at least 20 percent of more of their corresponding area refurbished over the past five years, with the exception of the Pauls Stradinš Clinical University Hospital and Eastern Clinical University Hospital of Riga, which together with the University Children's Hospital require the most investment. Over the past decade, these same hospitals have had a total of 42 percent, 21 percent, and 87 percent of the total square meters refurbished, but the current Capital Cost Model only considers the last 5 years since these facilities attend to the greatest volume of patients. Details of the refurbishment for all hospitals over the past decade is available in Annex 15.

The level of services and investment needs of the Pauls Stradinš Clinical University Hospital will need to be revised when considering the approved investment in a new hospital building, designated as A1, as part of the country's strategy to improve the quality of health care services. It is worth noting that the estimates for refurbishment included in the Master Plan are in line with the unitary cost of this two-stage investment project, where the A1 building in Riga will total 30,438 m^2.

In the case of Regional Centres, four facilities had less than 20 percent of infrastructure refurbished: Ludza Medical Center, Tukums, Madona and Dobele Hospitals. The Regional Hospital in Liepaja, Kurzeme is estimated to require the greatest amount of resources.

Table 91: Regional development centres refurbishing cost

Region	Hospital	Beds	Age of building	M² total	% refurb.	Refurb. Cost (€million)	FF&E
Kurzeme	Liepaja Regional Hospital	372	45	55,190	43%	€ 27	€ 7
	Kraslava Hospital	63	50	7,125	37%	€ 4	€ 1
Latgale	Ludza medical center	47	52	10,553	3%	€ 9	€ 2
	Preili Hospital	30	53	8,007	29%	€ 5	€ 1
	Sigulda Hospital	73	33	9,888	100%	€ 0	€ 0
Riga	Ogre District Hospital	95	53	7,292	63%	€ 1	€ 0
	Tukums Hospital	93	71	13,451	6%	€ 6	€ 1
	Aluksne Hospital	60	52	9,622	59%	€ 2	€ 0
Vidzeme	Balvi and Gulbene Hospital Association	82	52	3,991	100%	€ 0	€ 0
	Madona Hospital	79	IP 15/ OP 52	12,275	18%	€ 5	€ 1
	Dobele Hospital	85	27	15,033	14%	€ 6	€ 1
Zemgale	Bauska Hospital	40	40	2,116	100%	€ 0	€ 0
	Aizkraukle Hospital	62	53	7,166	100%	€ 0	€ 0
Total		**1,181**		**161,711**		**€ 63**	**€ 16**

Source: Sanigest Internacional based on survey data submitted by hospitals

10.1.1. Scenario 1: the impact (extra cost) of adding beds

The proposed reconfiguration of the NHS healthcare network detailed in the report results in the need to expand a number of Level I and IV hospitals to account for population-based service needs:

- Level I:
  - Prielukes Hospital needs 35 beds
  - Saldus Medical Center needs 22 beds
  - Sigulda Hospital needs 50 beds
- Level IV:
  - Riga Maternity Hospital needs 38 beds
  - Pauls Stradiņš Clinical University Hospital needs 180 beds

A 25-bed threshold was established below which the team considers no additional space is required to accommodate the extra beds needed. Given the aforementioned threshold, additional construction is need for all hospitals except Saldus Medical Center. The cost of the capital investment necessary uses the same methodology as the other scenarios and assumes:

- 100 m^2 per bed for Level I and 150 m^2 per bed for Level IV
- unitary construction cost of €1000 per m^2 for Level I and 1,500 per m^2 for Level IV
- furnishing (FF&E) equalling 25 percent of total building cost.

Approximately € 58 million are estimated to be required to build additional infrastructure for all beds. The breakdown by region and facility is included in the following table.

Table 92: Estimated cost of additional space (€ million)

Region	Building cost
Kurzeme	**€ 3.5**
Prielukes Hospital	€ 3.5
Riga	**€ 54.1**
Riga Maternity Hospital	€ 8.6
Pauls Stradiņš Clinical University Hospital	€ 40.5
Sigulda Hospital	€ 5.0
Total	**€ 57.6**

Source: Sanigest Internacional

10.1.2. Scenario 2: the impact (savings) of downgrading several hospitals

For the estimation of the second scenario, a different refurbishment estimation was made for the facilities to be downgraded, which include the following facilities:

1. Aizkraukle Hospital
2. Alūksne Hospital
3. Bauska hospital
4. Dobele Hospital
5. Krāslava Hospital
6. Līvāni Hospital
7. Limbaži Hospital*
8. Ludza Medical Center
9. Preiļi Hospital
10. Prielukes Hospital*
11. Riga 2nd Hospital*
12. Smiltene Red Cross Hospital*
13. Tukums Hospital

Even though Riga 2nd Hospital is not proposed to be turned into a HWC but a LTC facility, the same costing is used. Additionally, the Gintermuiza Hospital is excluded since it among the facilities proposed to be closed.

Based on the preferred restructuring scenario, there is a net savings of € 19 million in refurbishment and furnishing. Given the 17 percent non-response rate to the survey, there is no information on the size or refurbishment cost for 5 of these facilities (marked with an*), which would likely impact the potential savings on refurbishment. The following tables first include the total estimated refurbishment cost for NDC and RDC by region according to the new sample of facilities, followed by a breakdown by region of the downgrade refurbishment cost.

Table 93: Refurbishing costs-scenario 2 (€ millions)

Region	National Development Centres		Regional Development Centres	
	Refurbish	Furnishing	Refurbish	Furnishing

Region	National Development Centres		Regional Development Centres	
Kurzeme	€ 12.0	€ 3.0	€ 26.9	€ 6.7
Latgale	€ 14.4	€ 3.6		
Riga	€ 103.3	€ 25.8	€ 1.2	€ 0.3
Vidzeme	€ 8.8	€ 2.2	€ 4.5	€ 1.1
Zemgale	€ 2.9	€ 0.7	€ 5.8	€ 1.4
Total	**€ 141.5**	**€ 35.4**	**€ 38.4**	**€ 9.6**

Source: Sanigest Internacional

Table 94: Refurbishing costs for downgraded facilities (€ millions)

Region	National Development Centres	
	Refurbish	Furnishing
Latgale	€ 8.7	€ 2.2
Riga	€ 4.0	€ 1.0
Vidzeme	€ 2.9	€ 0.7
Zemgale	€ 2.8	€ 0.7
Total	**€ 18.4**	**€ 4.6**

Source: Sanigest Internacional

The majority of facilities to downgrade are in Latgale, followed by Zemgale and Vidzeme. The most notable change would be the downgrade of all regional development centres in Latgale instead of refurbishment. The cost of downgrading the facilities would require a case-by-case analysis depending on the type of service to provide in the wellness/ day-bed facility, and the cost estimates would have to consider, among other things:

- the size of the future facility
- potential repurposing of all or part of the building for commercial use
- refurbishment of the facility to suit the new service needs, and
- rebuilding of part of the facility.

10.2. Equipment costs

Based on the methodology and equipment standards described in previous sections, the team estimated the equipment gap for 2020 for the whole list of 49 medical equipment used to develop the MP. The whole list of equipment and resulting estimates is included in Annex 8. Overall, each region requires an average of approximately €14 million to cover the population needs related to medical equipment. The total amount per region according to population-based standards is included in the following table according to three equipment categories.

Table 95: Equipment investment costs (2016 constant €)

Region	Major Medical Equipment (MME)	2nd Priority	Other Equipment	Total Equipment Cost
Kurzeme	€ 6	€ 8	€ 2	€ 15
Latgale	€ 6	€ 8	€ 2	€ 15
Riga	€ 7	€ 12	€ 1	€ 20
Vidzeme	€ 2	€ 3	€ 1	€ 6
Zemgale	€ 9	€ 4	€ 3	€ 16
Total	€ 30	€ 34	€ 9	€ 72

Source: Sanigest Internacional

Equipment investment can be divided into three categories according to priority:

1. From the total of 49 items for which the equipment gap was estimated, eight Major Medical Equipment (MME) units are considered of first priority. The current regional capacity was analysed in more detail in the previous sections on the current situation analysis.

2. The second category of equipment includes those for which the price exceeds USD $100 thousand, and for which the cost to cover the estimated gap would cost over €1 million. This list includes 9 units.

3. The third and last category comprises the rest of equipment not included in the previous two categories.

The next section provides detail according to priority and location. It is worth noting that the equipment cost include only the purchase of the equipment. Additional resources will be required for the installation, which can be considered part of the refurbishing cost of the facilities.

10.2.1. MME needs

The following nine machines tracked by the OECD are considered of high priority are related to primary care and diagnostic services. The MME list includes:

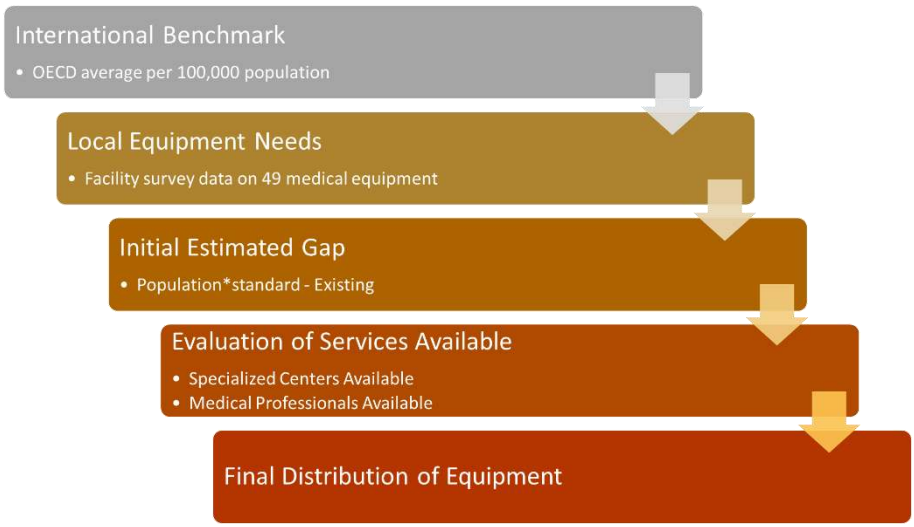
1. Angiography (digital)
2. CT Scanners
3. Gamma Camera
4. Haemodialysis Units
5. Linear Accelerators
6. Lithotripter
7. Mammography Units, and
8. MRI Machines
9. PET Scanner

The resulting equipment gaps using the population-based standards specified in the previous chapter are included in Table 96, which details the distribution of the seven MME according to region and to clinic.[46] The distribution of the equipment was guided by the actual facilities that already offer the services with few modifications. According to the gap estimates, Vidzeme is in need of two angiography units, but for the remainder of the estimates, these have been placed in Riga, were the Eastern Clinical University Hospital already offers the service. The same applies to two gamma cameras and two linear accelerators, where an additional one was located in the Eastern Clinical University Hospital of Riga to replace an existing accelerator.

The process is summarized in the following figure.

[46] The table does not include the CT or PET Scanner for which there are no estimated equipment gaps.

Figure 48: Process for defining location of new equipment



Source: Sanigest Internacional

Overall, the National and Regional Development Centres have the greatest need of haemodialysis units, followed by extracorporeal lithotripter, digital angiography unit and gamma cameras. All regions have a greater number of CT scanners per 100 thousand populations than the suggested standard and require no additional investment on this equipment or PET scanners.

According to the estimates, the largest negative gap corresponds to lithotripter equipment, as there are only 2 from the 16 proposed, which means that there are only 12 percent of what is required for 2020. All regions would require at least two to four lithotriper units since the current total number of units are concentrated only in three hospitals located in Riga (specifically the University Children's Hospital, Pauls Stradinš Clinical University Hospital and Eastern Clinical University Hospital). This may mean that today if a patient outside Riga is looking for attention, they have to travel to Riga or do not have access due to the deficit in the local facilities.

The second largest identified negative gap relates to haemodialysis equipment. All region cover or exceed the population-based number of units needed except for Zemgale. The gap of 11 units represent 6 percent of the actual equipment currently in the entire country, and 84% of the equipment needed in that particular region.

In the case of MRI machines and digital angiography equipment, the gap is approximately 44 percent and 31 percent, respectively, as a percentage of the total number of units required in 2020. Only Vidzeme does not require an angiography unit. Riga has 9 digital angiography units located only in two hospitals (from 11 in total) and only Pauls Stradinš Clinical University Hospital has six of them, pointing towards a strong concentration.

Comparing the number of equipment listed by Eurostat in 2013 and the information collected by Sanigest to date (Table 97), there is no significant difference for inpatient (IP) institutions related to the equipment gap for MME. It should also be noted that Eurostat data covers not only inpatient but also outpatient (OP) facilities. The Sanigest estimates do not distinguish between the two level of services since many of the health centres provide outpatient diagnostic services.

Table 96: First priority equipment gap by region and clinic

Region	Hospital	Angiography (digital)	Gamma Camera	Haemodialysis Units	Linear Accelerator	Lithotripter	Mammography Unit	MRI Machines
Kurzeme	Liepaja Regional Hospital	2	2		1	2		
	Regional Hospital Of Northern					1		
Latgale	Daugavpils Regional Hospital	2	2		1	2		
	Rezeknes Hospital					1		
Riga	Eastern Clinical University Hospital of Riga	2	2		2	2	1	
	Pauls Stradinš Clinical University Hospital					2	1	
	University Children Hospital							
Vidzeme	Madona Hospital							
	Vidzeme Hospital					2		1
Zemgale	Dobele Hospital			2				
	Jekabpils City Hospital	1	2	5	2	1		1
	Jelgava City Hospital			4		1		1
	TOTAL	**7**	**8**	**11**	**5**	**14**	**2**	**3**

Source: Sanigest Internacional

Table 97: Comparison of Eurostat (2013) and Sanigest estimates

Region	OP/ IP	Angiography units		CT		Gamma cameras		MRI		Mammography units		PET scanner	
		Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest
Kurzeme	OP	0		4		0		0		4		0	
	IP	1	1	5	5	0		2	2	4	3	0	
Latgale	OP	0		2		0		1		3		0	
	IP	1	1	5	4	0	0	2	2	2	3	0	1
Pieriga	OP	0		2		0		0		4		0	
	IP	0		4		0		0		1		0	
Riga	OP	2		18		1		8		16		0	
	IP	10	9	18	19	5	5	5	5	4	6	0	0
Vidzeme	OP	0		2		0		2		1		0	

Region	OP/ IP	Angiography units		CT		Gamma cameras		MRI		Mammography units		PET scanner	
		Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest	Eurostat	Sanigest
Zemgale	IP	0	0	4	4	0	0	1	0	2	3	0	0
	OP	0		1		0		0		2		0	
	IP	0	0	5	3	0	0	0	0	4	3	0	1
Total for IP facilities		12	11	41	35	5	5	10	9	17	18	0	2

Source: Sanigest Internacional based on Eurostat (2013)

Table 98: First priority equipment cost per region and clinic (€ millions)

Region	Hospital	Angiography (digital)	CT Scanners	Gamma Camera	Haemodialysis Units	Linear Accelerator	Lithotripter	Mammography Unit	MRI Machines	Region Total
Kurzeme	Liepaja Regional Hospital	€ 3.91		€ 0.99		€ 0.72	€ 0.04			€ 5.68
	Regional Hospital Of Northern						€ 0.02			
Latgale	Daugavpils Regional Hospital	€ 3.91		€ 0.99		€ 0.72	€ 0.04			€ 5.68
	Rezeknes Hospital						€ 0.02			
Riga	Eastern Clinical University Hospital of Riga	€ 3.91		€ 0.99		€ 1.44	€ 0.04	€ 0.18		€ 6.78
	Pauls Stradinš Clinical University Hospital						€ 0.04	€ 0.18		
	University Childrens Hospital									
Vidzeme	Madona Hospital									€ 2.32
	Vidzeme Hospital						€ 0.04		€ 2.28	
Zemgale	Dobele Hospital				€ 0.03					€ 9.16
	Jekabpils City Hospital	€ 1.95		€ 0.99	€ 0.08	€ 1.44	€ 0.02		€ 2.28	
	Jelgava City Hospital				€ 0.06		€ 0.02		€ 2.28	
		€ 13.68	**€ 0.00**	**€ 3.96**	**€ 0.17**	**€ 4.33**	**€ 0.28**	**€ 0.36**	**€ 6.83**	**€ 29.62**

Source: Sanigest Internacional

Table 98 estimates the cost per facility to be incurred in order for the region to meet the population based equipment needs that are included before in the future analysis section and summarized in Table 96. According to these estimates, the accumulated cost amounts to almost €30 million for the 9 units considered of first priority. Within this category, Riga and Zemgale have the greatest need for investment and Vidzeme the least. Lithotripters are in the greatest need in terms of volume, but digital angiography units represent the greatest overall cost (€13.4 million), followed by MRI machines (€6.8 million).

The cost to purchase new MME represent 41 percent of the estimated total €72 required to close the population based equipment gap for all 49 medical equipment units.

10.2.2. Secondary priority equipment needs

The second category of equipment, as mentioned before, includes medical equipment which was not considered MME, but still represents a significant investment, either because of the volume of units required or the unitary price of each. This category includes the following equipment:

1. Angiography (Ophthalmology)
2. Echograph (general purpose)
3. Echograph (Mammography)
4. Surgical Laser
5. Plasma Sterilizer
6. X-Ray Hemodynamic Unit
7. X-Ray Unit
8. Mobile X-Ray Unit, Image Intense

The following table provides a summary of the relevant prices for this set of medical units, as well as the total estimated cost to cover the gap. The cost of these eight types of equipment would amount to almost €34 million, which represents 47 percent of the total equipment cost for 2020. Riga has the greatest costs requirements, mostly due to angiography (ophthalmology) units, which across regions would require €15.6 million. The rest of equipment units require between €1 and €4 million for all the regions, except for the mobile X-Ray Unit that amounts to almost €6 million.

Table 99: Secondary priority equipment cost (€ millions)

Equipment Unit	Kurzeme	Latgale	Riga	Vidzeme	Zemgale
Angiography, Ophthalmology	€ 3.9	€ 3.9	€ 7.8	€ 0.0	€ 0.0
Echograph, general purpose	€ 0.3	€ 0.2	€ 0.0	€ 0.0	€ 0.9
Echograph, Mammography	€ 0.3	€ 0.7	€ 2.0	€ 1.0	€ 0.0
Laser, Surgical	€ 0.2	€ 0.2	€ 0.0	€ 0.3	€ 0.3
Sterilizer, Plasma	€ 0.4	€ 0.3	€ 0.9	€ 0.4	€ 0.4
X-Ray Hemodynamic Unit	€ 0.4	€ 0.5	€ 1.1	€ 0.4	€ 0.4
X-Ray Unit	€ 0.0	€ 0.0	€ 0.0	€ 0.0	€ 0.6
X-Ray Unit, Mobile	€ 2.0	€ 2.0	€ 0.0	€ 0.4	€ 1.5
Total	€ 7.5	€ 7.8	€ 11.8	€ 2.6	€ 4.2

Source: Sanigest Internacional

10.2.3. Other equipment needs

To fill the gap of the remainder of the equipment hospitals/authorities would need to incur a cost of approximately €8 million, which represent 12 percent of the total equipment investment cost estimated (€72).

Table 100: Estimated cost for other equipment (€ millions)

Region	Cost
Kurzeme	€ 1.6
Latgale	€ 2.0
Riga	€ 1.0
Vidzeme	€ 1.2
Zemgale	€ 2.8
Total	**€ 8.6**

Source: Sanigest Internacional

10.2.4. Potential savings

There are equipment amounts which are over the population-based recommended amounts. The details of the equipment need or surplus are included in Annex 8. When there is a surplus, the state of each machine must be further assessed to evaluate the possibility of reallocating equipment to other facilities within a same region and/or other regions where there is a gap.

For example, there are a total of 4 mobile X-Ray Units in Kurzeme, but according to the population standard of 5.5 per 100 thousand inhabitants, there should be 14, leaving a gap of 10 units. Alternatively, in Riga there are a total of 51 of this same type of equipment, but only 34 are required according to the standards. Hence, potentially 10 of the additional 17 X-Ray Units in Riga could be taken to Kurzeme, saving the cost of purchasing new equipment.

Assuming that all secondary and other equipment is in working state, that there are no legal or operational limitations, and that the relevant authorities agree, there are potential savings of approximately €27 and €59 million on secondary priority equipment and other equipment, respectively, through the reallocation and use of surplus equipment (Table 101). Similar to new first priority equipment, any reallocation of existing equipment should be based on existing services and the availability of specialised human resources. Furthermore, based on the state and ownership of the equipment, the reallocation of medical equipment will entail an additional in terms of transport, reinstallation and installation and ongoing maintenance.

Table 101: Estimated potential savings on secondary priority and other equipment (€ millions)

Region	Secondary priority equipment	Other Equipment
Kurzeme	€ 2.2	€ 2.8
Latgale	€ 0.5	€ 5.9
Riga	€ 23.3	€ 46.0
Vidzeme	€ 1.4	€ 3.3
Zemgale	€ 0	€ 0.8

Region	Secondary priority equipment	Other Equipment
Total	**€ 27.4**	**€ 58.8**

Source: Sanigest Internacional

The majority of equipment surplus is estimated to be in Riga for the two categories of equipment. Further analysis is necessary to establish the best allocation of new or existing equipment based on population needs and services and resources available.

10.3. EMS

The investment required for the expansion of the EMS under the preferred reconfiguration scenario includes new vehicles, medical equipment and the staff associated with the provision of the services. More specifically, it requires the following:

- **11 new ambulances** to be distributed throughout the Latvian territory based on hospital coverage change, which includes the purchase of fully equipped vehicles and set up of 11 dispatch locations.
- **4 physicians and 4 emergency medicine technicians (EMTs)** per vehicle are required to cover a full Pitman Shift Schedule, 24/7 services. The vehicle driver is recommended to be an EMT.

Table 104 describes the total amount of new equipment and staff needed as well as the estimated annual cost.

Table 102: EMS investment under Scenario 2

EMS investment	Quantity	Annual Cost
Ambulance Location Rent	11	€61,380
Ambulance Vehicles	11	€1,472,625
Ambulance Equipment	11	€785,400
Total		**€2,319,405**

Source: Sanigest International, 2016

Each of the new ambulance dispatch locations is allocated a new ambulance vehicle to be able to provide its service and to maintain the standard of one ambulance on each location for the majority of the small locations in Latvia. A future review of the service should be able to inform if more ambulances are needed to provide a better response of the emergencies. Each location is estimated to be 85 m^2 and cost €5.5 per m^2 to rent, making the total annual cost per location €5,580.

The average price of a new ambulance is of €133,875, while the equipment for every ambulance necessary to provide advance life support service is of €71,400, making the total cost per equipped vehicle more than €205 thousand.

Total initial investment costs for infrastructure and equipment amount to €2.3 million. Additional operational costs to consider include ongoing vehicle maintenance, gas, administrative staff and utilities. Table 105 summarize average costs of some of the aforementioned expenditures.

Table 103: Miscellaneous Expenses

Expenditures	Average Annual Cost
Vehicle Maintenance	€147,263
Insurance	€27,096
Diesel	€77,550
Utilities (electricity, heating, gas, etc.)	€22,968
Internet	€1,584
Total	€276,461

Source: Sanigest International, 2016

The operating costs were estimated based on the following assumptions:

- Vehicle maintenance is estimates at 10% of the initial cost of the vehicles
- Insurance would equal 1.2% of the total equipment and vehicle cost.
- Gas costs is based on the current average of €0.94 per litre, each ambulance traveling an average of 60,000 km per year and 1 litre consumed every 8km travelled. Therefore, each ambulance would consume approximately 7,500 litres a year at a cost of €7,050.
- Utility costs are estimated at an average of €174 a month, resulting in an annual expense of €2,088.
- Internet service was estimated to cost €12 for a monthly 10Mbps service, which represents a total of €144 per year.

Total operating costs are estimated at €274 thousand per year going forward. Further consideration is needed regarding the staff requirements, which will have to be based on the availability of staff for dispatch administration in existing health care centres or as part of the existing EMS system.

11. Recommended policy changes to complement the Master Plan

As discussed during commencement of the World Bank's engagement with the NHS and MoH, the reconfiguration of the health care network is a necessary reform, but it is not sufficient for improving access to timely, high quality services and ultimately improving health outcomes in the Latvia's four priority disease areas. The overall policy environment must also support an efficient use of any additional investments in human resources, infrastructure, and equipment.

Given the current analysis of the mapping exercise and the results from previous World Bank deliverables, there are two key reform agendas that the NHS and MoH should seriously consider implementing alongside elements of the current master plan: (i) provider payment reform and (ii) the development of clinical guidelines and clinical pathways linked to both provider payments (on the supply side) and the benefits package (on the demand side).

The mapping of human resources suggests deficits of both physicians and nurses outside of Riga but current surpluses at the national level in many specialties. Thus, the NHS/MoH will need to develop a strategy for reallocating and retaining health care personnel in the regions, as previously highlighted in reviews of the provider payment system and human resource planning and in the qualitative research led by the Baltic Institute of Social Science. Altering provider contracts would be a promising avenue for accomplishing this objective – for example, by offering higher payments for services delivered to underserved populations or by opening up the possibility of contracting individual providers as a group (as opposed to the current status quo of contracts with solo practices).

The proposed reconfiguration of the network – in particular, the strong shift towards outpatient care - would constitute a radical departure from both how physicians are accustomed to treating patients and how patients are used to accessing care. Both groups would require considerable guidance on what services should be offered in which setting and in which sequence. Thus, the joint development of clinical guidelines and clinical pathways would be critical for ensuring a smooth transition to a reconfigured and more efficient health care network. Moreover, some of the master plan's recommendations – in particular, the closure of long-term facilities for mental health care – might necessitate changes in the benefits package (such as inclusion of psychotherapy in outpatient settings for patients diagnosed with depression), and it would be important for such changes to reflect evidence-based guidelines and pathways.

Concurrent projects in Latvia related to e-health can help ensure that such guidelines and pathways would be used by both providers and patients (the online presentation of the NICE guidance of the United Kingdom is a good example of what can be done in this domain). Tying these clinical guidelines and pathways to provider payments is another way of supporting their implementation among providers. Linking them to coverage in the benefits package could be a mechanism for ensuring that patients follow the most efficient pathway through the reconfigured health system.

12. Next Steps

12.1. Refining some analyses

As mentioned in the report, the team could not obtain any data at facility-level on (i) the workforce, its skill mix, and working hours and (ii) the recurrent expenditures of facilities.

Collecting data on the workforce would help fine-tuning the HR recommendations. In particular, it would allow estimating the number of staff that can be reallocated throughout the system, after the downgrading of several acute care hospitals. An estimate of the efficiency gains could thus be calculated.

Having data on the recurrent expenditures for each hospital would also help determine the savings generated by the downgrading of these hospitals.

12.2. Consulting stakeholders

The changes proposed by this report are ambitious. For this reason, it should be discussed with a wide range of stakeholders. That would include not only Government officials from various Ministries, but also representatives of hospital managers, physicians (especially those from the national professional associations), nurses, staff unions, patients, and local politicians.

Two very influential groups deserve additional attention:

- The clinical leaders in the main disease groups (oncology, cardiology, ob-gyn / paediatrics and mental health) should be given an opportunity to develop (or refine if already developed) their own disease-specific strategy in relation to the proposed master plan;
- The local politicians representing the municipalities likely to be impacted by the proposed hospital downgrades should also be given some time to work with hospital managers or consultants on the precise consequences of these downgrades (especially in terms of HR and local economic impact).

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Annex 1. Details on the existing MME by hospital

Table 104: Major Medical Equipment for diagnostics and treatment by site (2016)

Facility Name	Angiography (digital)	CT	Gamma Camera	Hemodialysis	Linear Accelerator	Lithotripter	Mammography unit	MRI
Kurzeme								
Liepaja Regional Hospital	1	3		16	1			1
Northern Regional Hospital		2		3			1	1
Seaside Hospital		1					2	
Latgale								
Daugavpils Regional Hospital	1	3		8	1		2	1
Kraslava Hospital		1						
Livani Hospital								
Ludza Medical Centre		1					1	
Preili Hospital								
Rezeknes Hospital		1		20			1	1
Riga								
Child Mental Hospital "Ainaži"		1		17			1	
Eastern Clinical University Hospital	3	9	2	30	5	1	2	2
Jurmala Hospital		1						
National Rehabilitation Centre of "Vaivari"								
Ogre District Hospital		1					1	1
Pauls Stradinš Clinical University Hospital	6	3	2	43	1	1	1	1
Psychiatry and Addiction Center of Riga								
Maternity Hospital								
Sigulda Hospital		1						
Traumatology and Orthopedics Hospital		1						
Tukums Hospital		1					1	
University Children's Hospital		1	1	2				1
Vidzeme								
Aluksne Hospital		1						
Balvi and Gulbene Hospital Ass.		1					1	
Madona Hospital		1		7			1	
Straupe Addiction Hospital								
Strenci Mental Hospital								
Vidzeme Hospital		1		17			1	
Zemgale								

Aizkraukle Hospital		1					1	
Akniste Hospital								
Bauska Hospital		1						
Dobele Hospital	1	1		12			1	
Gintermuiza Hospital								
Jelgava City Hospital		1		1			1	
Total	**12**	**39**	**5**	**183**	**8**	**2**	**19**	**9**

Source: Author estimation

Annex 2. Bed standards per 100,000 by speciality

Projection method, benchmark and occupancy factor by service type summary table

Clinical Service	Projection Method	Benchmark	Occupancy	Comments
All Medical and Surgical acute beds	Population projection	Bed days/365	85%	All based on the projected discharges to 2020 and 2025 and changes in ambulatory surgery rate and hospitalization rate as outlined in the assumptions.
Renal Dialysis	3 sessions per patient per week	2 shifts per day, 312 days per annum	n/a	eurostat population standards revised
Day beds	Population projection	420 day patients per annum	n/a	
Linacs	Incidence of cancer	1.6 linacs per 1000 new cases	n/a	Estimated 50% of new cancer cases need radiotherapy. Also eurostat population standards revised
Palliative Care	Population based ratio	6.7 beds (public & private) per 100,000 population	n/a	90% of beds are considered public
Obstetric and gynaecology inpatients (overnight)	Projected births Projected population	Bed days/365	75%	Increase in total fertility and ALOS 3 days. For Gynaecology ALOS 4 days and roughly 30% of all bed days estimated from projected discharges and population adjustments
Neonatal Intensive Care Cots	Population based ratio	1.5 NICU cots per 1000 live births for level 2 and 0.5 level 3 NICU	70%	Projected increase in live births to 2025 and standards based on US and Australian neonatal standards. Indian standards reviewed at 3 per 100,000
Special Care Nursery Cots	Population based ratio	5.6 SCN cots per 1000 live births	70%	
Intensive Care Unit	% of inpatient beds	9 bed per 100,000 roughly 4.5% of acute adult overnight medical and surgical beds for distribution	70%	Planning standard Australia and UK as % of beds. Also estimated based on http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3551445/
Paediatric ICU	Population and discharge	2 beds per 100,000 people	70%	Derived from utilization rate for children converted to per 100k standard

Clinical Service	Projection Method	Benchmark	Occupancy	Comments
Acute Observation Unit	% of inpatient beds	2.5% of acute adult overnight medical and surgical beds	n/a	These are not located on ICU ward but distributed throughout the wards
Coronary Care Unit	% of inpatient beds	2.5% of acute adult overnight medical and surgical beds	n/a	Concentrated in level 2 facilities
Rehabilitation	Population based	30 beds per 100,000 population	85%	Propose to shift many to day cases
Stroke Unit	Access time based	Access to stroke unit within 90 minutes	85%	90% of the population should have access in <90 minutes to a stroke unit. Basically located in Level 3 and 4 hospitals and includes stroke ICU bed
Geriatric Medicine	Population based	2.5 beds per 1000 population aged over 70 years converted to per 100,000	85%	listed in long term other
Acute Mental Health	Population based	4 beds per 100,000	n/a	Based on projected acute mental health discharges in acute hospitals
Paediatric (overnight) beds	Population Projection	Bed days/365	75%	Projected increase in number children from increased fertility but declining admission rate
Ambulatory Surgery Centers	n/a	1 center in each major National Development Center	day	
Primary Health Centers	Population	1 center in each major National Development Center	day	Based on expected population and size estimated with 2,000 people per physician and size of town.

Acute Care	
	Bed Standard
Medical Specialities	**119**
General Medicine	23
Accident and Emergency	8
Anaesthetics (including Intensive Care)	10
Cardiology	17
Dermatology	0
Endocrinology and Diabetes Mellitus	1
Gastroenterology	3
Geriatric Medicine	2
Infectious Diseases	8
Medical Oncology	12
Neurology	28
Pulmonology	6
Nuclear Medicine	-
Renal Medicine	-
Rheumatology	0
Paediatric	**34**
Paediatrics	15
Infectious Ped	8
Neonatology	3
Paediatric Surgery	8
Obstetrics and Gynaecology	**33**
Surgical Specialties	**60**
General Surgery	30
Trauma and Orthopaedic Surgery	6
Cardiothoracic Surgery	9
Neurosurgery	6
Ophthalmology	3
Oral and Maxillo Facial Surgery	-
ENT	2
Plastic Surgery	0
Urology	6
Pathology and Radiology	**3**
Chemical Pathology	-
Clinical Genetics	-
Clinical Neurophysiology	-
Clinical Pharmacology and Therapeutics	-
Clinical Radiology	-
Haematology	3
Histopathology	-
Immunology	-
Medical Microbiology & Virology	-
Total Acute	**249**
Long term care	
Long-term care	**88**
TB	**19**
Substance abuse	**11**
Palliative	**26**
Rehabilitation	**30**
Rehabilitation Child	**3**
Mental Illness and Disabilities	**56**
General Psychiatry	**52**

Acute Care	
	Bed Standard
Child and Adolescent Psychiatry	**4**
Forensic Psychiatry	**-**
Psychotherapy	**-**
Old Age Psychiatry	**-**
Learning Disabilities	**-**
Total LT	**144**
Overall	**393**

Annex 3. Hospitals Currently Contracted

1. Aizkraukle Hospital Limited liability company
2. Akniste, State Limited Liability Company
3. Alūksne Hospital, Limited liability company
4. Balvi and Gulbene hospital association Limited liability company
5. Bauska hospital, Ltd.
6. CĒSU Clinic, Limited Liability Company
7. CHILD Mental Hospital "Ainaži" Public Limited Liability Company
8. Daugavpils Neuropsychiatric Hospital, the State limited liability company
9. Daugavpils Regional Hospital, Limited liability company
10. Dobele and Hospital Ltd.
11. Hospital Ģintermuiža, State Limited Liability Company
12. Hospital Jurmala, Limited liability company
13. Jēkabpils Regional Hospital, Limited liability company
14. Jelgava City Hospital, Ltd.
15. Krāslava Hospital, Limited liability company
16. Kuldiga hospital, Ltd.
17. Liepaja Regional Hospital, Limited liability company
18. Limbaži Hospital, Limited liability company
19. Līvāni Hospital Līvāni District Council municipal limited liability company
20. Ludza medical center Limited liability company
21. Madona Hospital, Madona District Municipality Ltd.
22. National Rehabilitation Centre "Vaivari" Public Limited Liability Company
23. Northern Regional Hospital, Ltd.
24. Ogre District Hospital, Limited liability company
25. Pauls Stradiņš Clinical University Hospital, State Limited Liability Company
26. Preiļi Hospital, Limited liability company
27. Priekules Hospital, Ltd.
28. Rēzeknes Hospital, Limited liability company
29. Riga 2nd Hospital, Riga municipal company with limited liability
30. Riga Eastern Clinical University Hospital, Limited liability company
31. Riga Maternity Hospital, Riga municipal company with limited liability
32. Riga Psychiatry and Addiction Centre, the State limited liability company
33. Saldus medical center Limited liability company
34. Seaside Hospital, State Limited Liability Company
35. Sigulda Hospital, Ltd.
36. Smiltene Red Cross hospital, Ltd.
37. Straupe Addiction Hospital, State Limited Liability Company
38. Strenci Mental Hospital, the State limited liability company
39. Traumatology and Orthopedics Hospital, State Limited Liability Company
40. Tukums Hospital, Limited liability company
41. University Children's Hospital, State Limited Liability Company
42. Vidzeme Hospital, Limited liability company

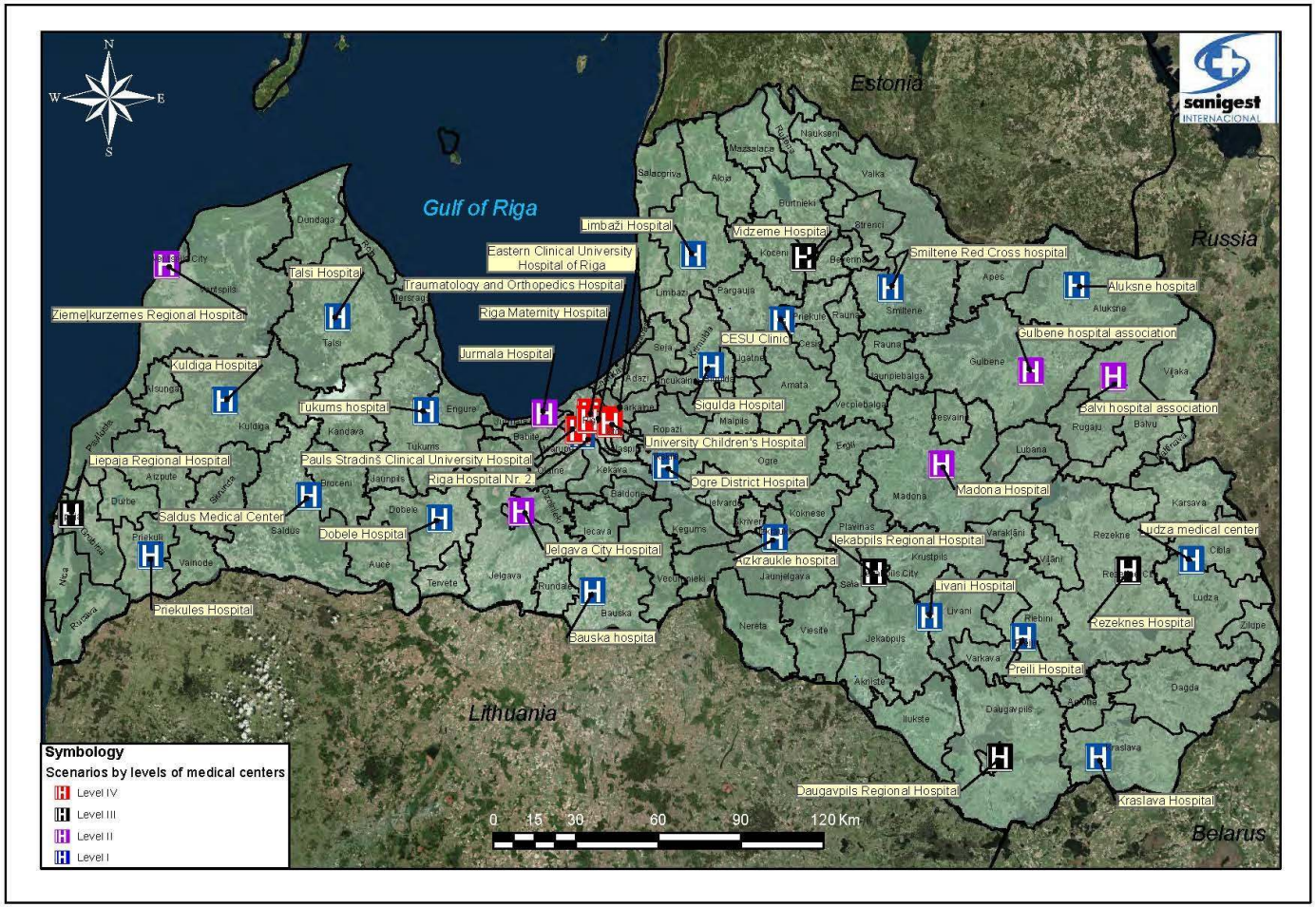
Annex 4. Child and Maternal healthcare services

Region	Hospital	Projected Births 2025	Birth Distribution 2025	ALOS 2014	ALOS 2020	Total current beds	# obstetric beds	Bed days 2025	Bed Needs 2025	C-section ratio	Total with Additional for gyne	Surplus/ Deficit (2025)
Kurzeme	Prielukes Hospital	6	-	2	3	13	0	-	-	n/a	-	-
Pieriga	Tukums Hospital	406	-	3	3	93	9	-	-	14.8	-	(9)
Vidzeme	Balvi & Gulbene Hospital Association	395	395	4	3	82	5	1,184	4	17.9	5.41	0
Zemgale	Dobele Hospital	739	-	4	3	85	10	-	-	9.9	-	(10)
Vidzeme	Madona	478	478	4	3	79	5	1,433	5	16.8	6.54	2
Latgale	Preiļi Hospital	494	-	3	3	30	10	-	-	17.7	-	(10)
Latgale	Rēzeknes Hospital	702	949.21	4	3	302	12	2,848	10	13.8	13.00	1
Pieriga	Ogre District Hospital	461	-	4	3	95	7	-	-	25.3	-	(7)
Kurzeme	Ziemeļkurzemes Regional Hospital	760	760	3	3	289	15	2,279	8	17.5	10.41	(5)
Kurzeme	Kuldīga Hospital	697	697	4	3	96	8	2,092	8	20.1	9.55	2
Vidzeme	Cēsu Clinic	612	-	4	3	90	10	-	-	25.1	-	(10)
Zemgale	Jēkabpils Regional Central Hospital	752	1,247	4	3	256	15	3,740	14	22.6	17.08	2
Pieriga	Sigulda Hospital	982	1,361.42	3	3	73	5	4,084	15	17.5	18.65	14
Zemgale	Jelgavas City Hospital	1,211	1,950	3	3	263	15	5,850	21	15.3	26.71	12
Kurzeme	Liepaja Regional Hospital	1,373	1,373	3	3	372	16	4,118	15	13.8	18.81	3
Latgale	Daugavpils Regional Hospital	1,262	1,509.62	5	3	737	30	4,529	17	16.4	20.68	(9)
Vidzeme	Vidzeme Hospital	1,342	1,954	4	3	232	14	5,861	21	26.6	26.76	13
Pieriga	Hospital Jurmala	1,816	2,160	3	3	100	20	6,481	24	24.3	29.59	10
Riga	Pauls Stradiņš Clinical University Hospital	2,513	2,513	3	3	861	22	7,539	28	32.1	34.42	12
Riga	Riga Maternity Hospital	8,514	8,514	4	3	122	86	25,542	93	19.8	116.63	31
Total		**25,852**	**25,860**		**3**	**4270**	**314**	**77,580**	**283**	**20.2**	**354.25**	**40**

Annex 5. Hospital beds under Scenario 1 and 2 by 2025

Scenario 1				
Level of Care	**#**	**Facilities**	**Current # Beds**	**Proposed # Beds**
4	5	University Children's Hospital	370	300
		Riga Maternity Hospital	122	160
		Traumatology and Orthopedics Hospital	210	210
		Riga East Clinical University Hospital	1,669	1,200
		Pauls Stradiņš Clinical University Hospital	820	1,000
		Total level 4	**3,191**	**2,870**
3	5	Liepaja Regional Hospital	296	217
		Jēkabpils Regional Central Hospital	231	200
		Daugavpils	639	311
		Rēzeknes Hospital	295	181
		Vidzeme Hospital and Valka Hospital	224	172
		Total level 3	**1685**	**1,081**
2	5	Madona Hospital	79	85
		Balvi and Gulbene Hospital Association	78	77
		Jelgavas City Hospital	255	200
		Hospital Jurmala	96	308
		Ziemeļkurzemes Regional Hospital and Talsi Hospital	281	163
		Total level 2	**789**	**833**
1	18	Kuldīga Hospital	90	64
		Saldus Medical Center	23	48
		Ogre District Hospital	90	94
		Sigulda Hospital	73	110
		Cēsu Clinic	87	64
		Dobele Hospital	75	48
		Krāslava Hospital	59	48
		Prielukes Hospital	13	48
		Aizkraukle Hospital	62	48
		Bauska hospital	40	48
		Līvāni Hospital	60	48
		Ludza Medical Center	47	48
		Preiļi Hospital	30	48
		Riga 2nd Hospital	69	69
		Tukums Hospital	89	64
		Smiltene Red Cross Hospital	14	48
		Alūksne Hospital	60	48
		Limbaži Hospital	-	48
		Total Level 1	**981**	**1,041**
		Total current	**6,647**	
			Total Scenario 1	**5,825**

Facility distribution under Scenario 1



Source: Sanigest International

Scenario 2				
Level of Care	**#**	**Facilities**	**Current # Beds**	**Proposed # Beds**
4	5	University Children's Hospital	370	300
		Riga Maternity Hospital	122	160
		Traumatology and Orthopedics Hospital	210	210
		Riga East Clinical University Hospital	1,669	1,200
		Pauls Stradiņš Clinical University Hospital	820	1,000
		Total level 4	**3,191**	**2,870**
3	6	Liepaja Regional Hospital- Kurzeme	296	217
		Jēkabpils Regional Central Hospital	231	200
		Daugavpils	639	311
		Rēzeknes Hospital	295	181
		Ziemeļkurzemes Regional Hospital and Talsi Hospital	281	188
		Vidzeme Hospital and Valka Hospital	224	172
		Total level 3	**1,966**	**1,269**
2	5	Madona Hospital	79	85
		Balvi and Gulbene Hospital Association	78	77
		Jelgavas City Hospital	255	200
		Hospital Jurmala	96	308
		Riga 1 Slimnīca	0	100
		Total level 2	**508**	**770**
1	7	Kuldīga Hospital	90	61
		Saldus Medical Center	23	45
		Ogre District Hospital	90	94
		Riga 2nd Hospital	69	69
		Alūksne Hospital	60	60
		Sigulda Hospital	73	110
		Total level 1	**405**	**439**
Wellness and Daycare	12	Cēsu Clinic	87	-
		Dobele Hospital	75	-
		Krāslava Hospital	59	-
		Prielukes Hospital	13	-
		Aizkraukle Hospital	62	-
		Bauska hospital	40	-
		Līvāni Hospital	60	-
		Ludza Medical Center	47	-
		Preiļi Hospital	30	-
		Tukums Hospital	89	-
		Smiltene Red Cross Hospital	14	-
		Limbaži Hospital	-	-
		Total Wellness and Daycare	**576**	
		Total current	**6,647**	
		Total Scenario 2		**5,348**

Annex 6. Estimated number of critical beds

Number of Critical Beds by hospital

Hospital	Catchment Area (Current)	Catchment Area 2020	Catchment Area 2025	2020				2025			
				Births	NICU/SCBU	PICU	Other Critical care	Births	Other Critical care	NICU/SCBU	PICU
Jelgavas City Hospital	187,928	171,340	163,706	1,132	55	65	294	1,091	51	60	271
Jurmala Hospital	280,098	288,523	298,658	2,003	97	110	496	1,931	90	110	494
Rēzeknes Hospital	131,290	112,569	103,646	-	-	43	193	-	-	38	172
Daugavpils Regional Hospital	286,238	258,296	235,011	1,331	65	99	444	1,283	60	86	389
Vidzeme Hospital	201,915	184,587	170,147	1,792	87	70	317	1,727	81	63	282
Liepaja Regional Hospital	258,034	238,162	221,602	1,270	62	91	409	1,224	57	82	367
Ziemeļkurzemes Regional Hospital	258,034	238,162	221,602	703	34	91	409	678	32	82	367
Jēkabpils Regional Central Hospital	244,875	228,525	214,900	704	34	87	393	679	32	79	356
Aizkraukle Hospital	48,013	42,758	39,893	-	-	16	73	-	-	15	66
Alūksne Hospital	21,011	17,399	15,746	-	-	7	30	-	-	6	26
Gulbene Hospital Association	22,794	20,223	18,900	-	-	8	35	-	-	7	31
Balvi Hospital Association	22,182	18,269	16,321	-	-	7	31	-	-	6	27

Hospital	Catchment Area (Current)	Catchment Area 2020	Catchment Area 2025	2020				2025			
				Births	NICU/SCBU	PICU	Other Critical care	Births	Other Critical care	NICU/SCBU	PICU
Bauska hospital	47,104	42,244	39,749	-	-	16	73	-	-	15	66
Cēsu Clinic	40,014	35,607	33,348	-	-	14	61	-	-	12	55
Dobele Hospital	33,248	28,604	26,327	691	34	11	49	666	31	10	44
Krāslava Hospital	29,722	24,055	21,305	-	-	9	41	-	-	8	35
Kuldīga Hospital	26,320	23,739	22,267	645	31	9	41	622	29	8	37
Līvāni Hospital	25,782	22,763	21,289	-	-	9	39	-	-	8	35
Ludza Medical Center	26,732	22,835	20,994	-	-	9	39	-	-	8	35
Madona Hospital	30,457	26,621	24,586	619	30	10	46	597	28	9	41
Ogre District Hospital	73,505	69,965	68,488	1,003	49	27	120	967	45	25	113
Preiļi Hospital	18,345	15,902	14,761	-	-	6	27	-	-	5	24
Priekules Hospital	23,371	20,587	19,097	6	0	8	35	6	0	7	32
Saldus Medical Center	31,837	27,726	25,743	-	-	11	48	-	-	9	43
Sigulda Hospital	45,445	45,712	46,329	991	48	17	79	955	45	17	77
Smiltene Red Cross Hospital	19,060	12,142	11,611	-	-	5	21	-	-	4	19

Hospital	Catchment Area (Current)	Catchment Area 2020	Catchment Area 2025	2020				2025			
				Births	NICU/SCBU	PICU	Other Critical care	Births	Other Critical care	NICU/SCBU	PICU
Tukums Hospital	49,524	45,118	43,193	-	-	17	78	-	-	16	72
Talsi Hospital	36,829	32,968	31,211	-	-	13	57	-	-	11	52
Valka Hospital	15,113	12,077	10,688	-	-	5	21	-	-	4	18
Riga 2nd Hospital	185,699	165,145	146,867	-	-	63	284	-	-	54	243
Limbaži Hospital	31,420	28,511	27,051	-	-	11	49	-	-	10	45
Riga East Clinical University Hospital	548,650	521,761	507,711	-	-	199	896	-	-	187	841
Pauls Stradiņš Clinical University Hospital	531,429	502,202	487,683	2,629	128	192	863	2,534	119	179	807
Riga Maternity Hospital	570,177	546,208	532,747	8,794	428	209	938	8,476	397	196	882
Traumatology and Orthopedics Hospital	524,971	494,868	480,172		-	189	850	-	-	177	795
University Children's Hospital	529,276	499,758	485,179		-	191	858	0	-	179	803
Overall	5,456,443	5,085,931	4,868,529	24,313	1,182	1,941	8,737	23,433	1,098	1,791	8,061

Source: Sanigest Internacional

Annex 7. Current capacity

Table 105:Current capacity of facilities to downgrade

Region/ Hospital	Current Capacity
Kurzeme	**26**
Prielukes Hospital	3
Saldus Medical Center	23
Latgale	**74**
Krāslava Hospital	2
Līvāni Hospital	20
Ludza Medical Center	47
Preiļi Hospital	5
Periga	**53**
Sigulda Hospital	53
Vidzeme	**14**
Smiltene Red Cross Hospital	14
Zemgale	**102**
Aizkraukle Hospital	62
Bauska hospital	40
Grand Total	**269**

Table 106: Current capacity of facilities recommended to close

Region/ Hospital	Current Capacity
Periga	**80**
Child Neuropsychiatric Hospital "Ainaži"	80
Zemgale	**764**
Aknīstes Mental Hospital	400
Hospital Ģintermuiža	364
Grand Total	**844**

Annex 8. Details of the current equipment for all medical centres

The following tables contain the details of the current equipment for all medical centres evaluated during this study, the corresponding standards and estimated gap by region and type of equipment.

Table 107: Kurzeme Equipment Gap Estimation

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Anesthesy Unit	20	10.4	26	(6)
Angiography, digital unit (DSA)	1	1.0	3	(2)
Angiography, Ophthalmology	-	1.3	3	(3)
Arthroscopy Unit	4	1.3	3	1
Blood Gas Analyzer	2	2.4	6	(4)
Clinical Chemistry Analyzer	4	1.3	3	1
CT Scanner	6	1.2	3	3
Defibrillator/Monitor	27	13.2	33	(6)
Dental Unit	15	7.9	20	(5)
Echograph, general purpose	11	5.7	14	(3)
Echograph, Mammography	2	1.3	3	(1)
Echograph, Ophthalmologic	3	1.3	3	-
Electrocardiograph	23	15.7	39	(16)
Electroencephalograph	1	2.6	7	(6)
Electromyograph	-	1.3	3	(3)
Endoscope, flexible	17	7.9	20	(3)
Endoscopic Unit	2	2.6	7	(5)
Endoscopy, Video System	8	1.3	3	5
Extracorporeal Unit	1	0.2	1	-
Gamma Camera	-	0.8	2	(2)
Hematology Analyser	5	2.4	6	(1)
Hemodialysis Unit	26	10.0	25	1
Incubator, Infant	9	5.3	13	(4)
Incubators, Infant, Intensive Care	2	5.5	14	(12)
Laparoscopy Unit	8	1.3	3	5
Laser, Surgical	1	1.3	3	(2)
Linear Accelerator	1	0.7	2	(1)
Lithotripter, Extracorporeal	-	1.0	3	(3)
Mammography Unit	3	1.3	3	-
Microscope, Electronic	6	1.1	3	3
MRI - Magnetic Resonance Imaging	2	0.7	2	-
Operating Table	25	8.1	20	5
Patient Monitor	147	26.4	66	81
PET scanners	-	0.1	-	-
Refrigerator, Blood Bank	10	2.6	7	3
Slit Lamp	3	2.6	7	(4)
Sterilizer, Ethylene Oxyde	1	1.3	3	(2)
Sterilizer, Plasma	-	1.3	3	(3)
Sterilizer, Steam	12	2.6	7	5
Surgical Lamp, ceiling	28	8.1	20	8
Tonometer, Electronic	94	2.6	7	87
Ventilator, Adult	30	15.7	39	(9)
Ventilator, Neonatal	5	4.0	10	(5)

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Ventilator, Paediatric	7	5.1	13	(6)
Water Purification System	8	2.6	7	1
X-Ray Fluoroscopic Unit, Image Intense	2	1.3	3	(1)
X-Ray Hemodynamic Unit	-	1.3	3	(3)
X-Ray Unit	14	4.0	10	4
X-Ray Unit, Mobile, Image Intense	5	5.5	14	(9)

Source: Sanigest Internacional

Table 108: Latgale Equipment Gap Estimation

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Anesthesy Unit	41	10.4	29	12
Angiography, digital unit (DSA)	1	1.0	3	(2)
Angiography, Ophthalmology	0	1.3	4	(4)
Arthroscopy Unit	9	1.3	4	5
Blood Gas Analyzer	4	2.4	7	(3)
Clinical Chemistry Analyzer	7	1.3	4	3
CT Scanner	6	1.2	3	3
Defibrillator/Monitor	31	13.2	37	(6)
Dental Unit	10	7.9	22	(12)
Echograph, general purpose	14	5.7	16	(2)
Echograph, Mammography	2	1.3	4	(2)
Echograph, Ophthalmologic	1	1.3	4	(3)
Electrocardiograph	41	15.7	43	(2)
Electroencephalograph	5	2.6	7	(2)
Electromyograph	0	1.3	4	(4)
Endoscope, flexible	4	7.9	22	(18)
Endoscopic Unit	11	2.6	7	4
Endoscopy, Video System	24	1.3	4	20
Extracorporeal Unit	0	0.2	1	(1)
Gamma Camera	0	0.8	2	(2)
Hematology Analyser	4	2.4	7	(3)
Hemodialysis Unit	28	10.0	28	-
Incubator, Infant	5	5.3	15	(10)
Incubators, Infant, Intensive Care	8	5.5	15	(7)
Laparoscopy Unit	16	1.3	4	12
Laser, Surgical	2	1.3	4	(2)
Linear Accelerator	1	0.7	2	(1)
Lithotripter, Extracorporeal	0	1.0	3	(3)
Mammography Unit	4	1.3	4	-
Microscope, Electronic	4	1.1	3	1
MRI - Magnetic Resonance Imaging	2	0.7	2	-
Operating Table	48	8.1	22	26
Patient Monitor	139	26.4	73	66
PET scanners	1	0.1	-	1
Refrigerator, Blood Bank	10	2.6	7	3
Slit Lamp	8	2.6	7	1
Sterilizer, Ethylene Oxyde	0	1.3	4	(4)
Sterilizer, Plasma	2	1.3	4	(2)
Sterilizer, Steam	22	2.6	7	15
Surgical Lamp, ceiling	40	8.1	22	18
Tonometer, Electronic	38	2.6	7	31
Ventilator, Adult	26	15.7	43	(17)

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Ventilator, Neonatal	7	4.0	11	(4)
Ventilator, Pediatric	1	5.1	14	(13)
Water Purification System	9	2.6	7	2
X-Ray Fluoroscopic Unit, Image Intense	5	1.3	4	1
X-Ray Hemodynamic Unit	0	1.3	4	(4)
X-Ray Unit	12	4.0	11	1
X-Ray Unit, Mobile, Image Intense	6	5.5	15	(9)

Source: Sanigest Internacional

Table 109: Riga Equipment Gap Estimation

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Anesthesy Unit	163	10.4	65	98
Angiography, digital unit (DSA)	9	1.0	6	3
Angiography, Ophthalmology	0	1.3	8	(8)
Arthroscopy Unit	9	1.3	8	1
Blood Gas Analyzer	20	2.4	15	5
Clinical Chemistry Analyzer	46	1.3	8	38
CT Scanner	19	1.2	7	12
Defibrillator/Monitor	166	13.2	83	83
Dental Unit	28	7.9	50	(22)
Echograph, general purpose	108	5.7	36	72
Echograph, Mammography	2	1.3	8	(6)
Echograph, Ophthalmologic	2	1.3	8	(6)
Electrocardiograph	138	15.7	98	40
Electroencephalograph	13	2.6	17	(4)
Electromyograph	5	1.3	8	(3)
Endoscope, flexible	97	7.9	50	47
Endoscopic Unit	71	2.6	17	54
Endoscopy, Video System	68	1.3	8	60
Extracorporeal Unit	10	0.2	1	9
Gamma Camera	5	0.8	5	-
Hematology Analyser	20	2.4	15	5
Hemodialysis Unit	92	10.0	63	29
Incubator, Infant	70	5.3	33	37
Incubators, Infant, Intensive Care	30	5.5	34	(4)
Laparoscopy Unit	15	1.3	8	7
Laser, Surgical	9	1.3	8	1
Linear Accelerator	6	0.7	4	2
Lithotripter, Extracorporeal	2	1.0	6	(4)
Mammography Unit	6	1.3	8	(2)
Microscope, Electronic	44	1.1	7	37
MRI - Magnetic Resonance Imaging	5	0.7	4	1
Operating Table	164	8.1	51	113
Patient Monitor	922	26.4	166	756
PET scanners	1	0.1	1	-
Refrigerator, Blood Bank	58	2.6	17	41
Slit Lamp	39	2.6	17	22
Sterilizer, Ethylene Oxyde	10	1.3	8	2
Sterilizer, Plasma	1	1.3	8	(7)
Sterilizer, Steam	103	2.6	17	86
Surgical Lamp, ceiling	246	8.1	51	195
Tonometer, Electronic	239	2.6	17	222
Ventilator, Adult	218	15.7	98	120

Device	Total Region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Ventilator, Neonatal	26	4.0	25	1
Ventilator, Pediatric	8	5.1	32	(24)
Water Purification System	70	2.6	17	53
X-Ray Fluoroscopic Unit, Image Intense	17	1.3	8	9
X-Ray Hemodynamic Unit	0	1.3	8	(8)
X-Ray Unit	48	4.0	25	23
X-Ray Unit, Mobile, Image Intense	51	5.5	34	17

Source: Sanigest Internacional

Table 110: Vidzeme Equipment Gap Estimation

Device	Total region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Anesthesy Unit	16	10.4	20	(4)
Angiography, digital unit (DSA)	0	1.0	2	(2)
Angiography, Ophthalmology	0	1.3	3	(3)
Arthroscopy Unit	2	1.3	3	(1)
Blood Gas Analyzer	5	2.4	5	-
Clinical Chemistry Analyzer	12	1.3	3	9
CT Scanner	4	1.2	2	2
Defibrillator/Monitor	24	13.2	26	(2)
Dental Unit	1	7.9	15	(14)
Echograph, general purpose	14	5.7	11	3
Echograph, Mammography	0	1.3	3	(3)
Echograph, Ophthalmologic	1	1.3	3	(2)
Electrocardiograph	35	15.7	31	4
Electroencephalograph	2	2.6	5	(3)
Electromyograph	0	1.3	3	(3)
Endoscope, flexible	23	7.9	15	8
Endoscopic Unit	8	2.6	5	3
Endoscopy, Video System	8	1.3	3	5
Extracorporeal Unit	0	0.2	-	-
Gamma Camera	0	0.8	2	(2)
Hematology Analyser	9	2.4	5	4
Hemodialysis Unit	24	10.0	20	4
Incubator, Infant	13	5.3	10	3
Incubators, Infant, Intensive Care	1	5.5	11	(10)
Laparoscopy Unit	7	1.3	3	4
Laser, Surgical	0	1.3	3	(3)
Linear Accelerator	0	0.7	1	(1)
Lithotripter, Extracorporeal	0	1.0	2	(2)
Mammography Unit	3	1.3	3	-
Microscope, Electronic	2	1.1	2	-
MRI - Magnetic Resonance Imaging	0	0.7	1	(1)
Operating Table	16	8.1	16	-
Patient Monitor	86	26.4	52	34
PET scanners	0	0.1	-	-
Refrigerator, Blood Bank	17	2.6	5	12
Slit Lamp	7	2.6	5	2
Sterilizer, Ethylene Oxyde	6	1.3	3	3
Sterilizer, Plasma	0	1.3	3	(3)
Sterilizer, Steam	12	2.6	5	7
Surgical Lamp, ceiling	23	8.1	16	7
Tonometer, Electronic	10	2.6	5	5
Ventilator, Adult	21	15.7	31	(10)

Device	Total region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Ventilator, Neonatal	2	4.0	8	(6)
Ventilator, Pediatric	3	5.1	10	(7)
Water Purification System	7	2.6	5	2
X-Ray Fluoroscopic Unit, Image Intense	3	1.3	3	-
X-Ray Hemodynamic Unit	0	1.3	3	(3)
X-Ray Unit	10	4.0	8	2
X-Ray Unit, Mobile, Image Intense	9	5.5	11	(2)

Source: Sanigest Internacional

Table 111: Zemgale Equipment Gap Estimation

Device	Total region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Anesthesy Unit	13	10.4	25	(12)
Angiography, digital unit (DSA)	1	1.0	2	(1)
Angiography, Ophthalmology	0	1.3	3	(3)
Arthroscopy Unit	2	1.3	3	(1)
Blood Gas Analyzer	2	2.4	6	(4)
Clinical Chemistry Analyzer	6	1.3	3	3
CT Scanner	4	1.2	3	1
Defibrillator/Monitor	15	13.2	31	(16)
Dental Unit	3	7.9	19	(16)
Echograph, general purpose	4	5.7	14	(10)
Echograph, Mammography	3	1.3	3	-
Echograph, Ophthalmologic	0	1.3	3	(3)
Electrocardiograph	20	15.7	37	(17)
Electroencephalograph	0	2.6	6	(6)
Electromyograph	0	1.3	3	(3)
Endoscope, flexible	8	7.9	19	(11)
Endoscopic Unit	4	2.6	6	(2)
Endoscopy, Video System	3	1.3	3	-
Extracorporeal Unit	0	0.2	-	-
Gamma Camera	0	0.8	2	(2)
Hematology Analyser	4	2.4	6	(2)
Hemodialysis Unit	13	10.0	24	(11)
Incubator, Infant	2	5.3	13	(11)
Incubators, Infant, Intensive Care	3	5.5	13	(10)
Laparoscopy Unit	4	1.3	3	1
Laser, Surgical	0	1.3	3	(3)
Linear Accelerator	0	0.7	2	(2)
Lithotripter, Extracorporeal	0	1.0	2	(2)
Mammography Unit	3	1.3	3	-
Microscope, Electronic	3	1.1	3	-
MRI - Magnetic Resonance Imaging	0	0.7	2	(2)
Operating Table	14	8.1	19	(5)
Patient Monitor	63	26.4	63	-
PET scanners	1	0.1	-	1
Refrigerator, Blood Bank	7	2.6	6	1
Slit Lamp	3	2.6	6	(3)
Sterilizer, Ethylene Oxyde	0	1.3	3	(3)
Sterilizer, Plasma	0	1.3	3	(3)
Sterilizer, Steam	8	2.6	6	2
Surgical Lamp, ceiling	23	8.1	19	4
Tonometer, Electronic	1	2.6	6	(5)
Ventilator, Adult	14	15.7	37	(23)

Device	Total region	Standard (100,000 inhab)	Proposed Equipment capacity (2020)	Gap 2020
Ventilator, Neonatal	2	4.0	9	(7)
Ventilator, Pediatric	3	5.1	12	(9)
Water Purification System	5	2.6	6	(1)
X-Ray Fluoroscopic Unit, Image Intense	3	1.3	3	-
X-Ray Hemodynamic Unit	0	1.3	3	(3)
X-Ray Unit	8	4.0	9	(1)
X-Ray Unit, Mobile, Image Intense	6	5.5	13	(7)

Source: Sanigest Internacional

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Annex 9. Standards used for medical equipment

Device	Proposed Standard per 100,000	Explanation of the Standard Calculation
Anesthesia Unit	10	Typical anesthesia unit can do on average of 3 surgeries per day for 260 days or 780 per year. With an expected # of surgical procedures of between 5 to 8k per 100,000 10 units is recommended
Angiography, digital unit (DSA)	1	Expected demand is between 200 and 400 per 100,000. Recommendations are that 500 procedures are done per unit so planning standard of 1 unit per 100k is proposed
Angiography, Ophthalmology	1	Expected demand is between 200 and 400 per 100,000. Recommendations are that 500 procedures are done per unit so planning standard of 1 unit per 100k is proposed
Arthroscopy Unit	1	Expected utilization between 100 and 400 cases per 100k per year.Each unit can do 200 cases per week so standard allows for excess capacity utilization
Blood Gas Analyzer	2	6,000 inpatients per 100,000 (20 lab tests), and 100,000 outpatients (1,5 lab test). 270,000 lab tests per 100,000 population. 25% hematology tests and assuming that for every hematology tests a blood gas analysis is conducted is = 67,500 blood gas tests. Blood gas analyzer can do up to 25 samples per hour (conservative estimate) = 52k + tests annually. For 67,500 tests one would need 2 blood gas analyzers.
Clinical Chemistry Analyzer	1	6,000 inpatients per 100,000 (20 lab tests), and 100,000 outpatients (1,5 lab test). 270,000 lab tests per 100,000 population. Clinical chemistry analyzer can handle well over 1,000,000 tests annually, and not all tests are chemistry tests.
CT Scanner	1	Based on the expected scans per 100k from OECD/EU statistics and capacity of machine.
Defibrillator/ Monitor	13	Heart failure rate is between 400 and 800 per 100k. When considering need for standby capacity and location of multiple units at different levels of care.
Dental Unit	8	Based on the demand for dental services
Echograph, general purpose	6	Average crude birth rate in Europe is approximately 1,000 per 100,000 population. Assuming per pregnancy an average of 2 ultrasounds is conducted, that entails 2,000 pregnancy-related ultrasounds per 100,000 population. Double that to include the non-OB ultrasounds and one expects 4,000 ultrasounds per 100,000 population. One ultrasound machine can comfortably handle 6,000+ ultrasounds per year. To stimulate proper antenatal care coverage can be expanded to 6 ultrasounds. Sources used to determine crude birth rate: http://www.census.gov/population/international/data/idb/informationGateway.php
Echograph, Mammography	1	Approx 15 % of population are women aged 50 - 74. That's 15,000 per 100,000 pop, and 7,500 examinations annually with one examination every 2 years. Sources used: http://www.census.gov/
Electrocardiograph	16	In 100,000 population one can expect 100,000 to 150,000 outpatient visits. In UK 34.7 ECG per 1,000 primary care patient, corresponds to 5,205 tests per 100,000 population(150,000 outpatient visits). With 50% of inpatient getting ECG as well, that would total approximately 8,200 ECG per 100,000 population. These numbers would not suggest a need for 16 ECGs, but as ECG is frequently conducted by primary care phycisians a spread of machinery (without any machine coming close to 100% utilization rate) is justifiied. https://bjcardio.co.uk/2012/03/the-gap-between-training-and-provision-a-primary-care-based-ecg-survey-in-north-east-england/
Electroencephalograph	3	Estimated 570 TBI per 1,000,000 population (US rates 2006: https://www.cdc.gov/traumaticbraininjury/pdf/bluebook_factsheet-a.pdf). Due to severity of condition extra coverage is required (3 instead of 1)
Electromyograph	1	Based on the expected number of skeletal muscle activity examinations
Endoscopic Unit	3	Endoscopy examination estimated at 2,700 per 100,000 population (UK data). Source: https://www.researchgate.net/publication/255179460_A_survey_of_endoscopy_workload_in_Northern_England_lower_gastrointestinal_endoscopy_workload_exceeds_British_Society_of_Gastroenterology_projections
Gamma Camera	1	Based on the expected scans per 100k from OECD/EU statistics and capacity of machine.

Device	Proposed Standard per 100,000	Explanation of the Standard Calculation
Hematology Analyser	1	Hematology analyzer can do 60 tests per hour = 124,800 per year. One machine would suffice to handle the required tests in population.
Hemodialysis Unit	20	Based on expected ESRD patients, estimation of 3 sessions per week per patient and the capacity of the dialysis machines
Incubator, Infant	5	Based on the estimated birth rate and need for approximately 20 percent of all births require incubator
Incubators, Infant, Intensive Care	5	Share of all live births requiring NICU incubator
Laparoscopy Unit	1	Based on expected ambulatory surgical rate of 1,000 per 100k (25%), production of 4 uses per day for 260 days per year
Linear Accelerator	1	Estimated that 50% of cancer cases require radiotherapy. Average of 22 fractions per patient and estimated cancer cases per year
Lithotripter, Extracorporeal	1	Based on the projected cases for gall stones
Mammography Unit	1	Based on the recommendation that all women 40-69 have a mammogram every 2 years. Machine capacity of 4 per hour considered to determine volume. Also OECD/EU stats on scans.
Microscope, Electronic	1	Expected laboratory examinations per 100,000 population is approx 270,000. Based on number of tests conducted larger laboratories will have multiple microscopes, but will also serve more than 100,000 population.
MRI - Magnetic Resonance Imaging	1	In 2013 France, Belgium and the Netherlands had respectively .94, 1.08 and 1.15 MRI scanners per 100,000 population. France conducted close to 9,100 MRI examinations per 100,000 population, which implies that 1 MRI machine can handle close to 10,000 examinations per year. Netherlands conducted 5,000 scans per 100,000 population in 2011. Source: http://www.oecd.org/els/health-systems/oecd-health-statistics-2014-frequently-requested-data.htm
Operating Table	8	OECD stats show 8.5 per 100k which is also derived based on the volume of surgeries and OR throughput expected
Patient Monitor	26	Assumes patiento monitors required for Critical Care Units and A&E beds
PET scanners	0	Based on the expected scans per 100k from OECD/EU statistics and capacity of machine.
Refrigerator, Blood Bank	3	Based on the distribution of major labs in hospital equipment standards
Slit Lamp	3	Based on hospital standards
Sterilizer, Ethylene Oxyde	1	Based on hospital standards
Sterilizer, Plasma	1	Based on hospital standards
Sterilizer, Steam	3	Based on hospital standards
Surgical Lamp, ceiling	8	Based on hospital standards
Tonometer, Electronic	3	Based on hospital standards
Ventilator, Adult	16	Based on hospital standards
Ventilator, Neonatal	4	Based on hospital standards
Ventilator, Pediatric	5	Based on hospital standards
Water Purification System	3	Likely all dialysis units and other high specialised care units will require. Estimated based on distribution by region

Device	Proposed Standard per 100,000	Explanation of the Standard Calculation
X-Ray Fluoroscopic Unit, Image Intense	1	Fluoroscopy in Europe estimated at 1,020 per 100,000 population (Finland) up to 4,670 per 100,000 (Austria). Most European countries sit between 2,000 and 3,000 fluo exams per 100,000 population. Source: https://ec.europa.eu/energy/sites/ener/files/documents/RP180web.pdf
X-Ray Unit	4	X-ray taken together: European data suggest approx. 100,000 x-rays per 100,000 inhabitants (all x-ray categories). With conservative operational hours an x-ray machine can do +- 17,500 scans per year on working days + additional emergency x-rays outside of normal working hours. Four standard x-ray units will be able handle to handle the bulk of the required x-rays (70,000+), while the hemodynamic unit and 4 mobile x-ray unit will account for the remaining required x-ray examinations. Sources: https://ec.europa.eu/energy/sites/ener/files/documents/RP180web.pdf (see table 5.1)

Source: Based on Bibliography

Annex 10. Hospital Performance Ranking

Level of Care	Hospital	Catchment Population	Current	Projected- Bed Model	Mortality Rate	OCC %	Concentration Index	Consolidated Index
	Percent of Population by Region	**% Projected**	**# Beds**	**# Beds**	**%**	**%**		
IV Level	University Children's Hospital	483,034	370	163.84	0.2%	73%		
	Riga Maternity Hospital	565,785	122	316.84	0.0%	49%		
	Traumatology and Orthopedics Hospital	461,867	210	190.94	0.3%	66%		
	Riga East Clinical University Hospital	508,928	1,669	1,135.19	3.1%	72%		
	Pauls Stradiņš Clinical University Hospital	481,452	820	1,073.90	3.3%	77%		
	Total Beds		**3,191**	**2,880.71**	**1.4%**	**67%**		
III Level	Liepaja Regional Hospital- Kurzeme	137,694.38	296	307	3.9%	57%	1.00	1.54
	Jēkabpils Regional Central Hospital – Zemgale	137,356.23	231	306	3.0%	70%	3.00	3.47
	Vidzeme Hospital- (Valka) Vidzeme	125,916.03	224	279	4.2%	78%	3.00	3.33
	Total Beds		**751**	**892**	**3.7%**	**68%**		
II Level	Madona Hospital	45,321.42	79	78	2.9%	95%	6.00	6.28
	Balvi and Gulbene Hospital Association	52,160.10	78	90	4.9%	80%	3.00	3.30
	Daugavpils Regional Hospitals	61,416.47	639	106	2.8%	67%	3.00	3.54
	Rēzeknes Hospital	61,988.74	295	107	4.9%	57%	3.00	3.51
	Jelgavas City Hospital	52,922.57	255	91	4.5%	62%	6.00	6.48
	Hospital Jurmala	86,511.64	96	149	3.7%	59%	6.00	6.55
	Ziemeļkurzemes Regional Hospital	55,854.03	281	95	5.2%	42%	-	0.62
	Total Beds		**1,723**	**716**	**4.1%**	**66%**		
I Level	Cēsu Clinic	30,804.91	87	87.0	3.8%	71%	7.00	7.42
	Dobele Hospital	35,308.06	80	80.0	4.3%	69%	4.00	4.40
	Riga 2nd Hospital	69,844.12	69	98.97	2.2%	119%	7.00	7.08
	Tukums Hospital	45,917.08	89	89.0	4.5%	76%	7.00	7.33
	Ogre District Hospital	47,963.13	90	90.0	3.4%	71%	7.00	7.44
	Total Beds		**415**	**445.0**	**3.6%**	**81%**		
Community Day Care	Krāslava Hospital	39,985.15	59		6.7%	47%	4.00	4.55
	Kuldīga Hospital	36,415.49	90		5.5%	60%	4.00	4.50
	Prielukes Hospital	35,164.74	13		5.7%	6%	2.00	2.97
	Aizkraukle Hospital	34,309.57	62		2.6%	60%	7.00	7.67
	Bauska hospital	33,757.42	40		7.9%	84%	7.00	7.16
	Līvāni Hospital	38,557.53	60		6.3%	46%	3.00	3.58
	Ludza Medical Center	39,985.15	47		2.8%	92%	3.00	3.38
	Preiļi Hospital	40,348.78	30		3.3%	68%	7.00	7.56

Level of Care	Hospital	Catchment Population	Current	Projected- Bed Model	Mortality Rate	OCC %	Concentration Index	Consolidated Index
	Percent of Population by Region	**% Projected**	**# Beds**	**# Beds**	**%**	**%**		
	Saldus Medical Center	36,284.27	23		3.3%	74%	-	0.50
	Sigulda Hospital	54,458.18	70		1.4%	47%	4.00	4.85
	Smiltene Red Cross Hospital	27,470.17	14		18.0%	35%	4.00	4.03
	Alūksne Hospital	29,138.57	60		4.3%	68%	4.00	4.50
	Limbaži Hospital	45,444.14	-		0.0%		4.00	4.00
	Total Beds Community Day Care		**568**	**0**	**5.2%**	**57%**		
	Total Beds		**6,648**	**4,934**				

Annex 11. Inpatient admissions current and projection

	Total 2014 (current)	2020	2025
Medical Specialities	**96.986**	**92.662**	**89.308**
General Medicine	15.975	15.263	14.710
Accident and Emergency	-	-	-
Anaesthetics (including Intensive Care)	16.020	15.306	14.752
Cardiology	21.287	20.338	19.602
Dermatology	452	432	416
Endocrinology and Diabetes Mellitus	1.476	1.410	1.359
Gastroenterology	3.159	3.018	2.909
Geriatric Medicine	1.631	1.558	1.502
Infectious Diseases	-	-	-
Medical Oncology	13.558	12.954	12.485
Neurology	22.976	21.952	21.157
Pulmonology	-	-	-
Nuclear Medicine	-	-	-
Renal Medicine	-	-	-
Rheumatology	452	432	416
Mental Illness and Disabilities	**17.560**	**16.777**	**16.170**
Child and Adolescent Psychiatry		-	-
Forensic Psychiatry		-	-
General Psychiatry	17.560	16.777	16.170
Psychotherapy		-	-
Pediatric	**43.972**	**42.012**	**40.491**
Paediatrics	40.989	39.162	37.744
Infectious Ped	-	-	-
Neonatology	1.592	1.521	1.466
Paediatric Surgery	1.391	1.329	1.281
Obstetrics and Gynaecology	**28.794**	**27.510**	**26.515**
Pathology and Radiology	**17.240**	**16.471**	**15.875**
Chemical Pathology		-	-
Clinical Genetics		-	-
Clinical Neurophysiology		-	-
Clinical Pharmacology & Therapeutics		-	-
Clinical Radiology	1.973	1.885	1.817
Haematology	4.092	3.910	3.768
Histopathology		-	-
Immunology		-	-
Medical Microbiology & Virology	11.175	10.677	10.290
Surgical Specialties	**111.322**	**106.359**	**102.509**
General Surgery	32.506	31.057	29.933
Trauma and Orthopaedic Surgery	48.227	46.077	44.409
Cardiothoracic Surgery	7.947	7.593	7.318
Neurosurgery	4.355	4.161	4.010
Ophthalmology	5.788	5.530	5.330
Oral and Maxillo Facial Surgery	-	-	-
ENT	2.590	2.475	2.385
Plastic Surgery	1.945	1.858	1.791
Urology	7.964	7.609	7.334
Long-term care	**48.305**	**46.152**	**44.481**
TB	6.801	6.498	6.263

	Total 2014 (current)	2020	2025
Substance abuse	14.712	14.056	13.547
Others	26.792	25.598	24.671
Overall	**364.179**	**347.944**	**335.350**

Annex 12 Specialist codes and Sanigest classification

Code	Database Profile	Sanigest Name	Category
A251	Orthodontist	Dentistry	Dentistry
A252	Paradontology	Dentistry	Dentistry
A253	Children'S Dentist	Dentistry	Dentistry
A254	Dental Prosthetist	Dentistry	Dentistry
A255	Endodontics	Dentistry	Dentistry
n10	Dental Dresser	Dentistry	Dentistry
n102	Denture Master (Technician)	Dentistry	Dentistry
n11	Dental Hygienist	Dentistry	Dentistry
n12	Dental Technician	Dentistry	Dentistry
P25	Dentist	Dentistry	Dentistry
A371	Physical Rehabilitation Doctor	Health Related Staff	Health Related Staff
n01	Biologist	Health Related Staff	Health Related Staff
n02	Biochemist	Health Related Staff	Health Related Staff
n04	Speech Therapy Specialist	Health Related Staff	Health Related Staff
n108	Laboratory Specialist	Health Related Staff	Health Related Staff
n20	Epidemiologist	Health Related Staff	Health Related Staff
n29	Masseur	Health Related Staff	Health Related Staff
n30	Baby Massage	Health Related Staff	Health Related Staff
n31	Solarium Employee	Health Related Staff	Health Related Staff
n72	Beautician	Health Related Staff	Health Related Staff
n75	Laboratory Assistant	Assistant	Assistant
n76	Biomedical Laboratory Assistant	Assistant	Assistant
n77	Dresser Laboratory	Assistant	Assistant
n78	Laboratory Dresser - Histologist	Assistant	Assistant
n82	Epidemiologist Assistant	Assistant	Assistant
n83	Hygienist Assistant	Assistant	Assistant
n86	Outpatient Care Medical Assistant	Assistant	Assistant
n91	Art Therapist	Health Related Staff	Health Related Staff
n93	Nutrition Specialist	Health Related Staff	Health Related Staff
n94	Radiogrāfers	Health Related Staff	Health Related Staff
n96	Beauty Specialist In Cosmetology	Health Related Staff	Health Related Staff
n97	Biomechanics	Health Related Staff	Health Related Staff
n98	Bionic Prosthetics Engineer	Health Related Staff	Health Related Staff
n99	Another list of specialty	Health Related Staff	Health Related Staff
P29	Laboratory Doctor	Health Related Staff	Health Related Staff
P30	Sanitarians	Health Related Staff	Health Related Staff
P34	Forensic Expert	Health Related Staff	Health Related Staff
P37	Rehabilitation	Health Related Staff	Health Related Staff
P38	Physical Medicine Doctor	Occupational Medicine	Medical Specialties
P45	Transfusiologist	Health Related Staff	Health Related Staff
P46	Health Care Manager	Health Related Staff	Health Related Staff
P49	Public Health Doctor	Health Related Staff	Health Related Staff
P51	Clinical Physiologist	Health Related Staff	Health Related Staff
P54	Physical & Rehabilitation Medicine Doctor	Health Related Staff	Health Related Staff

Code	Database Profile	Sanigest Name	Category
PP01	Allergologist	Dermatology	Medical Specialties
PP02	Hepatologist	Gastroenterology	Medical Specialties
PP04	Homeopath	Health Related Staff	Health Related Staff
PP05	Cosmetologist	Health Related Staff	Health Related Staff
PP06	Dietician	Health Related Staff	Health Related Staff
PP07	Acupunture Doctor	Health Related Staff	Health Related Staff
PP10	Prosthetic	Health Related Staff	Health Related Staff
PP11	Sexologist, Sexpathologist	Health Related Staff	Health Related Staff
PP13	Other Expert	Health Related Staff	Health Related Staff
PP16	Algologie	Health Related Staff	Health Related Staff
PP17	Osteopath	Health Related Staff	Health Related Staff
PP18	Phlebologist	Health Related Staff	Health Related Staff
PP19	Transplantologist	Health Related Staff	Health Related Staff
PP29	Chiropractor	Health Related Staff	Health Related Staff
PP33	Reflexology	Health Related Staff	Health Related Staff
PP22	healthcaremanagementdoctor	Health Related Staff	Health Related Staff
T01	Physiotherapist	Health Related Staff	Health Related Staff
T02	Occupational Therapy	Health Related Staff	Health Related Staff
T03	Hippotherapy	Health Related Staff	Health Related Staff
T04	Physiotherapist'S Assistant	Assistant	Assistant
T05	Speech Therapy	Health Related Staff	Health Related Staff
T06	Technical Orthopedist	Health Related Staff	Health Related Staff
T07	Occupational Therapist Assistant	Assistant	Assistant
M02	electroacunpuruediagnosticsbyFollmethod	Health Related Staff	Health Related Staff
M04	aurikuloakupunkt?ra	Health Related Staff	Health Related Staff
M05	l?zerakupunkt?ra	Health Related Staff	Health Related Staff
M08	HealingCi-gun(Qi-Gong)	Health Related Staff	Health Related Staff
M09	Su-Jok	Health Related Staff	Health Related Staff
M16	LaserTherapy	Health Related Staff	Health Related Staff
M18	medicalhlamidiolo?ija	Health Related Staff	Health Related Staff
M20	exerciseECG	Health Related Staff	Health Related Staff
M22	manualdiagnosticsandmanualtherapy	Health Related Staff	Health Related Staff
M23	electroencephalography	Health Related Staff	Health Related Staff
M33	superficiallyplacedabdominalorgansandbloodvesselsUS	Health Related Staff	Health Related Staff
M57	endoscopicmethodinnursingpractice	Health Related Staff	Health Related Staff
P10	Transplantologyst	Health Related Staff	Health Related Staff
M52	bronchoscopy	Internist	Medical Specialties
n32	Pharmacist	Health Related Staff	Health Related Staff
M51	osteoreflex	Health Related Staff	Health Related Staff
M35	elektrokardiostimul?cijaandinvasiverhythmdisorderscorrection	Health Related Staff	Health Related Staff
M37	electrophysiologicaldiagnostics	Health Related Staff	Health Related Staff
M39	vascularpathologydiagnosticsultrasonodoplerogr?fisk?	Health Related Staff	Health Related Staff
M40	peripheralvascularangioplasty	Cardiology	Medical Specialties
M45	fungalslim.untheirresultingkomplik.profilakses,dgandtreatmentmethod	Health Related Staff	Health Related Staff

Code	Database Profile	Sanigest Name	Category
M46	alcohol,drugsandpsychotropicsubstancesimpacttestmethod	Health Related Staff	Health Related Staff
M54	Neurosonographynewbornandinfantchildren	Neurology	Medical Specialties
M48	therapeuticpercutaneouscoronaryangioplasty,includingtiltimplantation	Health Related Staff	Health Related Staff
M49	diagnosticheartcatheterizationandlargebloodvessels,includingcoronaryangiography.	Cardiology	Medical Specialties
M53	electromyography	Health Related Staff	Health Related Staff
A011	Cardiologist	Cardiology	Medical Specialties
A012	Rheumatologist	Rheumatology	Medical Specialties
A013	Pneumonologist	Pneumonology	Medical Specialties
A014	Endocrinologist	Endocrinology & Diabetes Mellitus	Medical Specialties
A015	Nephrologist	Renal Medicine	Medical Specialties
A016	Gastroenterologist	Gastroenterology	Medical Specialties
A161	oncologychemotherapist	Medical Oncology	Medical Specialties
A162	Oncology Surgeon	Medical Oncology	Medical Specialties
P01	Internist	Internist	Medical Specialties
P02	Family (General Practice) Doctor	General Medicine	Medical Specialties
P16	Oncologist Chemotherapist	Medical Oncology	Medical Specialties
P18	Anesthetist, Reanimatologist	Anaesthetics (including Intensive Care)	Medical Specialties
P20	Neurologist	Neurology	Medical Specialties
P24	Infectologist	Infectious Diseases	Medical Specialties
P27	Dermatologist, Venereologist	Dermatology	Medical Specialties
P36	Sports Doctor	Sports Medicine	Medical Specialties
P39	Emergency Medicine Physician	Accident and Emergency	Medical Specialties
P41	Health Doctor	General Medicine	Medical Specialties
PP24	transfusiologyst	Health Related Staff	Health Related Staff
P40	disastermedicaldoctor	Accident and Emergency	Medical Specialties
P48	geriatrie	Internist	Medical Specialties
PP15	hypnotherapist	General Psychiatry	Mental Illness and Disabilities
P52	Cardiologist	Cardiology	Medical Specialties
P53	Occupational Health and Occupational Physician	Occupational Medicine	Medical Specialties
P55	Oncologist	Medical Oncology	Medical Specialties
P35	occupationalphysician	Occupational Medicine	Medical Specialties
P44	geneticist	Internist	Medical Specialties
PP28	Gastrointestinal Endoscopy	Gastroenterology	Medical Specialties
M17	gastrointestinalendoscopy	Gastroenterology	Medical Specialties
M19	electrocardiography	Health Related Staff	Health Related Staff
M24	neirosonolo?isk?investigation	Neurology	Medical Specialties
M21	echocardiography	Cardiology	Medical Specialties
A163	oncologygynecologist	Medical Oncology	Medical Specialties
N05	psychologist	Psychoterapy	Mental Illness and Disabilities
n101	Professionalhealthcarechaplain	Health Related Staff	Health Related Staff

Code	Database Profile	Sanigest Name	Category
A191	Child Psychiatrist	Child and Adolescent Psychiatry	Mental Illness and Disabilities
A192	Forensic Psychiatry Expert	Forensic Psychiatry	Mental Illness and Disabilities
P19	Psychiatrist	General Psychiatry	Mental Illness and Disabilities
P42	Psychotherapist	Psychoterapy	Mental Illness and Disabilities
P28	Narcologist	Narcology	Narcology
n00	voidspecialty	Health Related Staff	Health Related Staff
N15	Microbiologist	Medical Microbiology & Virology	Pathology and Radiology
n26	Public Health Nurse	Nurse	Nurse
n27	Medical Assistant (Dresser)	Assistant	Assistant
n28	Midwife	Health Related Staff	Health Related Staff
n39	Nurse	Nurse	Nurse
n40	Ambulatory Care Nurse	Nurse	Nurse
n41	Children'S Nurse	Nurse	Nurse
n43	Diabetes Nurse	Nurse	Nurse
n44	Nurse Dietitian	Nurse	Nurse
n45	Endoscopy Nurse	Nurse	Nurse
n46	Physical Therapy Nurse	Nurse	Nurse
n47	Phthisio-Pneumonology Sister	Nurse	Nurse
n48	Functional Diagnostics Sister	Nurse	Nurse
n51	Infectology Nurse	Nurse	Nurse
n52	Anesthesia, Intensive And Emergency Care Nurse	Nurse	Nurse
n53	Surgical Nurse	Nurse	Nurse
n54	Addiction Sister	Nurse	Nurse
n55	Emergency Nurse	Nurse	Nurse
n56	Neurosurgery Nurse	Nurse	Nurse
n57	Neuroscience Nurse	Nurse	Nurse
n58	Ophthalmic Nurse	Nurse	Nurse
n59	Oncology Nurse	Nurse	Nurse
n60	Theater Sister	Nurse	Nurse
n61	Pre-School And School Nurse	Nurse	Nurse
n62	Mental Health Nurse	Nurse	Nurse
n63	Radiography And Radiology Nurse	Nurse	Nurse
n64	Therapy Nurse	Nurse	Nurse
n65	Transfusiology Sister	Health Related Staff	Health Related Staff
n66	Traumatology And Orthopedics Sister	Nurse	Nurse
n67	Podiatry Sister	Nurse	Nurse
n68	Dental Nurse	Nurse	Nurse
n70	Sisters Assistant	Assistant	Assistant
n73	Hemodialysis And Renal Transplantation Nurse	Nurse	Nurse
n74	Emergency Medicine Physician Assistant (Dresser)	Assistant	Assistant
n80	Peritoneal Dialysis Nurse	Nurse	Nurse
n81	Urology Nurse	Nurse	Nurse

Code	Database Profile	Sanigest Name	Category
n89	Physical And Rehabilitation Nurse	Nurse	Nurse
n90	Transfusiology Sister	Nurse	Nurse
n95	Internal Nurse	Nurse	Nurse
M60	functionaldiagnosticmethodinnursingpractice	Health Related Staff	Health Related Staff
M58	physicaltherapymethodinnursingpractice	Health Related Staff	Health Related Staff
A142	Gynecologist Oncology	Obstetrics and Gynaecology	Obstetrics and Gynaecology
P14	Gynecologist, Obstetrician	Obstetrics and Gynaecology	Obstetrics and Gynaecology
M34	ultrasoundinobstetricsandgynecology	Obstetrics and Gynaecology	Obstetrics and Gynaecology
A151	Neonatologist	Neonatology	Paediatric
A1510	Children'S Allergist	Paediatrics	Paediatric
A152	Children Infectologist	Paediatrics	Paediatric
A153	Pediatric Cardiologist	Paediatrics	Paediatric
A154	Pediatric Rheumatology	Paediatrics	Paediatric
A155	Pediatric Pneumonologist	Paediatrics	Paediatric
A156	children'sendocrinologist	Paediatrics	Paediatric
A157	childnephrologist	Paediatrics	Paediatric
A158	Pediatric Gastroenterologist	Paediatrics	Paediatric
PP21	childneurologist	Paediatrics	Paediatric
A159	Pediatric Haematooncologist	Paediatrics	Paediatric
P12	Children'S Surgeon	Paediatric Surgery	Paediatric
P15	Pediatrician	Paediatrics	Paediatric
P21	Children Neurologist	Paediatrics	Paediatric
A292	Microbiologist	Medical Microbiology & Virology	Pathology and Radiology
n23	Immunologist	Immunology	Pathology and Radiology
n24	Geneticist	Clinical Genetics	Medical Specialties
n33	Pharmacist	Clinical Pharmacology and Therapeutics	Pathology and Radiology
n79	Microbiology Dresser L- Aborants	Assistant	Assistant
n85	Radiology Assistant	Assistant	Assistant
P17	Hematologist	Haematology	Medical Specialties
P31	Radiologist Therapist	Clinical Radiology	Pathology and Radiology
P32	Radiologist	Clinical Radiology	Pathology and Radiology
P33	Pathologist	Chemical Pathology	Pathology and Radiology
P43	Geneticist	Clinical Genetics	Pathology and Radiology
P47	Clinical Microbiologist	Medical Microbiology & Virology	Pathology and Radiology
PP03	Immunologist	Immunology	Pathology and Radiology
P03	Surgeon	General Surgery	Surgical Specialties
P04	Neurosurgeon	Neurosurgery	Surgical Specialties
P05	Thoracic Surgeon	Cardiothoracic Surgery	Surgical Specialties

Code	Database Profile	Sanigest Name	Category
P06	Heart Surgeon	General Surgery	Surgical Specialties
P07	Vascular Surgeon	General Surgery	Surgical Specialties
P08	Urologist	Urology	Surgical Specialties
P09	Plastic Surgeon	Plastic Surgery	Surgical Specialties
P11	Outpatient Surgeon	General Surgery	Surgical Specialties
P13	Traumatologist, Orthopaedist	Trauma and Orthopaedic Surgery	Surgical Specialties
P22	Ophthalmologist	Ophtalmology	Surgical Specialties
P23	Otolaryngologist	ENT	Medical Specialties
P26	Oral And Maxifacial Surgeon	Oral and Maxilla Facial Surgery	Surgical Specialties
PP31	Hand Surgeon	General Surgery	Surgical Specialties

Annex 13. Projection method, benchmark and occupancy factor by service type, summary table

Clinical Service	Projection Method	Benchmark	Occupancy	Comments
All Medical and Surgical acute beds	Population projection	Bed days/365	85%	All based on the projected discharges to 2020 and 2025 and changes in ambulatory surgery rate and hospitalization rate as outlined in the assumptions.
Renal Dialysis	3 sessions per patient per week	2 shifts per day, 312 days per annum	n/a	eurostat population standards revised
Day beds	Population projection	420 day pateints per annum	n/a	
Linacs	Incidence of cancer	1.6 linacs per 1000 new cases	n/a	Estimated 50% of new cáncer cases need radiotherapy. Also eurostat population standards revised
Palliative Care	Population based ratio	6.7 beds (public & private) per 100,000 population	n/a	90% of beds are considered public
Obstetric and gynecology inpatients (overnight)	Projected births Projected population	Bed days/365	75%	Increase in total fertility and ALOS 3 days. For Gynaecology ALOS 4 days and roughly 30% of all bed days estimated from projected discharges and population adjustments
Neonatal Intensive Care Cots	Population based ratio	1.5 NICU cots per 1000 live births for level 2 and 0.5 level 3 NICU	70%	Projected increase in live births to 2025 and standards based on US and Australian neonatal standards. Indian standards reviewed at 3 per 100,000
Special Care Nursery Cots	Population based ratio	5.6 SCN cots per 1000 live births	70%	
Intensive Care Unit	% of inpatient beds	9 bed per 100,000 roughly 4.5% of acute adult overnight medical and surgical beds for distribution	70%	Planning standard Australia and UK as % of beds. Also estimated based on http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3551445/
Pediatric ICU	Population and discharge	2 beds per 100,000 people	70%	Derived from utilization rate for children converted to per 100k standard
Acute Observation Unit	% of inpatient beds	2.5% of acute adult overnight medical and surgical beds	n/a	These are not located on ICU ward but distributed throughout the wards
Coronary Care Unit	% of inpatient beds	2.5% of acute adult overnight medical and surgical beds	n/a	Concentrated in level 2 facilities
Rehabilitation	Population based	30 beds per 100,000 population	85%	Propose to shift many to day cases
Stroke Unit	Access time based	Access to stroke unit within 90 minutes	85%	90% of the population should have access in <90 minutes to a stroke unit. Basically located in Level 3 and 4 hospitals and includes stroke ICU bed
Geriatric Medicine	Population based	2.5 beds per 1000 population aged over 70 years	85%	listed in long term other

Clinical Service	Projection Method	Benchmark	Occupancy	Comments
		converted to per 100,000		
Acute Mental Health	Population based	4 beds per 100,000	n/a	Based on projected acute mental health discharges in acute hospitals
Paediatric (overnight) beds	Population Projection	Bed days/365	75%	Projected increase in number children from increasesd fertility but declining admission rate
Ambulatory Surgery Centers	n/a	1 center in each major National Development Center	day	
Primary Health Centers	Population	1 center in each major National Development Center	day	Based on expected population and size estimated with 2,000 people per physician and size of town.

Annex 14 Contracted facility listing and regional codes

Hospital_ID	Hospital name	Contracted hospitals	Region	Municipality Code	Municupality name
2e5cf835e0c38d447c38678392ae6b02d40dc34b	Riga East Clinical University Hospital	Contracted	Riga	1000	Riga
0cb28f51b0abe44abeba33590e25325de9b8b360	Traumatology and Orthopedics Hospital	Contracted	Riga	1000	Riga
30bcfdb92a70b2f7dc03c17c71e51d5b0151e2e9	Pauls Stradiņš Clinical University Hospital	Contracted	Riga	1000	Riga
8f3878a69ba8e2fcc3f4d570a89910e5fd79faea	University Children's Hospital	Contracted	Riga	1000	Riga
67039f80e06c00ef536ba783ec6da21c74247131	Riga Psychiatry and Addiction Centre	Contracted	Riga	1000	Riga
90ce17cd383f9c9565a48359e76f7c7ac51e4b8d	Riga 2nd Hospital	Contracted	Riga	1000	Riga
db1bbe4ac2eef5b2e633a85d70acd6cb57c80028	Riga Maternity Hospital	Contracted	Riga	1000	Riga
ec4acf60138c42ff76b95b0dbc309285927a8a66	Daugavpils Neuropsychiatric Hospital	Contracted	Latgale	5000	Daugavpils
72efce28982904fcbe8b583e71944b002dcec335	Daugavpils Regional Hospital	Contracted	Latgale	5000	Daugavpils
ce47653557b90ab2dac0d16077f63cafec60081d	Hospital Ģintermuiža	Contracted	Zemgale	9000	Jelgava
2bb8ca33b4288676963ac6a28048794731a5759d	Jelgavas City Hospital	Contracted	Zemgale	9000	Jelgava
a7c2db9281d0710be757baddfb9a977fd0bcb7c5	Jēkabpils Regional Central Hospital	Contracted	Zemgale	9000	Jelgava
63dcb85272fd2d71dee412b17f1cde54bccbbba3	National Rehabilitation Centre "Vaivari "	Contracted	Periga	1300	Jurmala
1f3c0fa31e1fb477ac5ee7ecc6df9b8972950551	Hospital Jurmala	Contracted	Periga	1300	Jurmala
9c196433de5a1ec9600ac16618e6895616046be7	Piejūras Hospital	Contracted	Kurzeme	1700	Liepaja
0e17e13db134bf1b7822133c6d1534e7402933e0	Liepaja Regional Hospital	Contracted	Kurzeme	1700	Liepaja
b94a75d4f308f793b6b5b2e8da3b8f5f049d80f5	Rēzeknes Hospital	Contracted	Latgale	5000	Daugavpils
150fbb30d1c787e39d35c51b2655c63543b50c52	Vidzeme Hospital	Contracted	Vidzeme	2500	Valmiera
dcd76020bf14e8d42bca3f24f85942bca1c42828	Ziemeļkurzemes Regional Hospital	Contracted	Kurzeme	1700	Liepaja
3226a2efdd5dfd4ccbfd4236d7eeed9ab228d8cd	Aizkraukle Hospital	Contracted	Zemgale	9000	Jelgava
9d31ca6f9482259c386d40bc77ac7540abc281c1	Alūksne Hospital	Contracted	Vidzeme	2500	Valmiera
be49ef96898ba087161c104c960573dc5fe6e99d	Bauska hospital	Contracted	Zemgale	9000	Jelgava
9c25680fcdeeb28fddcb4abe823408e43151afca	Cēsu Clinic	Contracted	Vidzeme	2500	Valmiera
bab6c6fc854740bc6dc09c28318fd0ec1162cbb4	Straupe Addiction Hospital	Contracted	Vidzeme	2500	Valmiera
f916c14dc7b847a389942d5f2d1491440bf0d270	Dobele Hospital	Contracted	Zemgale	9000	Jelgava
0c4b24a4ff95522170066f0615496cd63c417a55	Balvi and Gulbene Hospital Association	Contracted	Vidzeme	2500	Valmiera
19df58adc56403e033e19e76946a9e9df811a5f3	Aknīstes Mental Hospital	Contracted	Zemgale	9000	Jelgava
23aa05b6f9dbc33aa92c03ba820ee576a323841c	Krāslava Hospital	Contracted	Latgale	5000	Daugavpils
727d6d64b120df598ae39cc066a23407dd94e6da	Kuldīga Hospital	Contracted	Kurzeme	1700	Liepaja

Hospital_ID	Hospital name	Contracted hospitals	Region	Municipality Code	Municupality name
146c9e047acebcc182cbe6fc280bcff64fdd57ad	Prielukes Hospital	Contracted	Kurzeme	1700	Liepaja
c5e495a0f3c8fbcf4d37494edd62fbde5487ccdf	Child Neuropsychiatric Hospital "Ainaži"	Contracted	Periga	1300	Jurmala
5380196e9b5074021c23c7077303d0482336548d	Ludza Medical Center	Contracted	Latgale	5000	Daugavpils
9254b8e22c7b9664efb74188b8cc5af63b878a27	Madona Hospital	Contracted	Vidzeme	2500	Valmiera
5498f18ef616c907c3dc12d85c7cd3e977a5b80d	Ogre District Hospital	Contracted	Periga	1300	Jurmala
f9a08526344115b00e251315718f0b1e50d72578	Preiļi Hospital	Contracted	Latgale	5000	Daugavpils
3ec586fd945a0e47047e96a407128e6c656d1d2f	Līvāni Hospital	Contracted	Latgale	5000	Daugavpils
4eee47c94dc33a77917bcb5f99a82f31d96ab7bb	Sigulda Hospital	Contracted	Periga	1300	Jurmala
187d402b1a5f9e4f924f9b4a6a152f3e08298dad	Saldus Medical Center	Contracted	Kurzeme	1700	Liepaja
9f230a3479eb2be92e9c6d8314c04d0f74bb78f2	Tukums Hospital	Contracted	Periga	1300	Jurmala
3795048a635cabe92b1a5b78b2f21f77e4915857	Smiltene Red Cross Hospital	Contracted	Vidzeme	2500	Valmiera
b6771ac35d31caa1a0ae11190b03baa07d175bc8	Strenču Neuropsychiatric Hospital	Contracted	Vidzeme	2500	Valmiera

Annex 15 Contracted facility listing and regional codes

Region/ Hospital	% refurbished (2006-2016)	% refurbished (2011-2016)
Kurzeme		
Liepaja Regional Hospital	43%	43%
Northern Regional Hospital	64%	34%
Seaside Hospital	59%	59%
Letgale		
Daugavpils Neuropsychiatric Hospital	0%	0%
Daugavpils Regional Hospital	0%	0%
Kraslava Hospital	37%	37%
Livani Hospital	198%	100%
Ludza medical center	66%	3%
Preili Hospital	29%	29%
Rezeknes Hospital	51%	24%
Riga		
Child Mental hospital "Ainaži"	6%	0%
Eastern Clinical University Hospital of Riga	21%	16%
Jurmala Hospital	73%	39%
National Rehabilitation Centre of "Vaivari"	452%	79%
Ogre District Hospital	63%	63%
Pauls Stradinš Clinical University Hospital	42%	6%
Psychiatry and Addiction Center of Riga	50%	50%
Riga Maternity Hospital	18%	15%
Sigulda Hospital	139%	100%
Traumatology and Orthopedics Hospital	22%	21%
Tukums hospital	56%	6%
University Children's Hospital	87%	34%
Vidzeme		
Aluksne hospital	67%	59%
Balvi and Gulbene hospital association	158%	100%
Madona Hospital	35%	18%
Straupe Addiction Hospital	7%	0%
Strenci Mental Hospital	0%	0%
Vidzeme Hospital	62%	29%
Zemgale		
Aizkraukle hospital	116%	100%
Akniste hospital	150%	77%
Bauska hospital	261%	100%
Dobele Hospital	22%	14%
Gintermuiža Hospital	72%	50%
Jelgava City Hospital	118%	59%

Annex 16. Proposed Medical Staff FTE per 100,000 population and Projected Needed Populations for 2020 and for 2025 based on Proposed Standards

	2014							2020							2025						
Specialty / Region	K	L	P	R	V	Z	All	K	L	P	R	V	Z	All	K	L	P	R	V	Z	All
Medical Specialties	**371**	**409**	**416**	**2193**	**306**	**330**	**4025**	**297**	**322**	**461**	**1378**	**230**	**285**	**2974**	**278**	**297**	**465**	**1,343**	**214**	**269**	**2,866**
Accident and Emergency	2	1	3	124	7	1	138	19	21	30	88	15	18	191	18	19	30	86	14	17	184
Critical Care (including Anaesthesia)	33	31	20	321	27	19	450	29	32	45	135	23	28	292	27	29	46	132	21	26	281
Cardiology	14	20	17	173	7	15	245	8	9	13	39	6	8	84	8	8	13	38	6	8	81
Dermatology	9	12	13	147	9	8	198	4	4	6	17	3	3	36	3	4	6	16	3	3	35
Endocrinology/ Diabetes Mellitus	7	4	7	54	6	7	84	3	3	4	13	2	3	29	3	3	4	13	2	3	28
Gastroenterology	6	8	4	70	4	4	95	5	5	8	23	4	5	50	5	5	8	22	4	4	48
General Medicine (GP)	203	216	236	527	156	201	1539	114	124	178	531	89	110	1,145	107	114	179	517	82	104	1,104
Geriatric Medicine							0	2	2	4	11	2	2	23	2	2	4	10	2	2	22
Infectious Diseases	5	5	0	38	5	3	55	6	6	9	27	4	5	57	5	6	9	26	4	5	55
Internist	38	48	53	279	35	33	486	48	52	74	221	37	46	477	45	48	75	215	34	43	460
Medical Oncology	6	7	2	60	4	4	82	4	4	6	18	3	4	38	4	4	6	17	3	3	37
Neurology	25	34	23	196	26	18	322	13	14	21	62	10	13	134	13	13	21	60	10	12	129
Nuclear Medicine							0	2	2	3	9	1	2	19	2	2	3	9	1	2	18
Occupational Medicine	14	7	23	86	10	9	148	25	27	38	115	19	24	248	23	25	39	112	18	22	239
Pneumonology	8	13	13	65	11	6	115	11	12	18	53	9	11	115	11	11	18	52	8	10	110
Renal Medicine	2	3	0	34	2	3	44	2	2	3	10	2	2	21	2	2	3	9	2	2	20
Rheumatology	1	1	1	19	0	0	23	2	2	2	7	1	1	15	1	2	2	7	1	1	15
Mental Illness and Disabilities	**34**	**39**	**20**	**206**	**26**	**50**	**375**	**32**	**35**	**50**	**150**	**25**	**31**	**324**	**30**	**32**	**51**	**146**	**23**	**29**	**312**
Child and Adolescent Psychiatry	2	3	3	9	1	2	20	3	4	5	16	3	3	34	3	3	5	15	2	3	33
Forensic Psychiatry	1	6	0	5	0	3	14	3	3	5	14	2	3	30	3	3	5	14	2	3	29
General Psychiatry	29	30	16	149	25	41	290	22	24	34	101	17	21	218	20	22	34	98	16	20	210
Psychotherapy	3	1	1	43	1	4	52	4	5	7	19	3	4	42	4	4	7	19	3	4	40
Obstetrics and Gynaecology	**60**	**56**	**60**	**319**	**43**	**47**	**584**	**38**	**41**	**59**	**177**	**30**	**37**	**382**	**36**	**38**	**60**	**172**	**27**	**35**	**368**
Obstetrics and Gynaecology	60	56	60	319	43	47	584								36	38	60	172	27	35	368
Paediatric	**47**	**58**	**47**	**330**	**44**	**44**	**570**	**37**	**40**	**58**	**173**	**29**	**36**	**372**	**35**	**37**	**58**	**168**	**27**	**34**	**359**
Paediatrics	37	47	38	241	36	35	434	29	31	44	133	22	27	286	27	29	45	129	21	26	276
Neonatology	7	5	7	47	7	7	80	6	6	9	27	4	5	57	5	6	9	26	4	5	55

	2014							2020							2025						
Specialty / Region	K	L	P	R	V	Z	All	K	L	P	R	V	Z	All	K	L	P	R	V	Z	All
Paediatric Surgery	3	6	3	42	1	2	56	3	3	4	13	2	3	29	3	3	4	13	2	3	28
Pathology and Radiology	**38**	**44**	**25**	**334**	**26**	**28**	**495**	**30**	**32**	**46**	**138**	**23**	**29**	**298**	**28**	**30**	**47**	**134**	**21**	**27**	**287**
Chemical Pathology	4	7	1	42	1	1	55	6	6	9	27	5	6	59	6	6	9	27	4	5	57
Clinical Genetics	0	0	0	14	0	0	14	1	1	1	4	1	1	8	1	1	1	3	1	1	7
Clinical Neurophysiology							0	0	0	1	2	0	0	4	0	0	1	2	0	0	4
Clinical Pharmacology and Therapeutics	0	0	1	0	0	0	1	1	1	1	4	1	1	8	1	1	1	3	1	1	7
Clinical Radiology	31	33	23	210	24	24	344	15	16	23	69	12	14	149	14	15	23	67	11	13	143
Haematology	1	1	1	20	0	0	24	2	2	4	11	2	2	23	2	2	4	10	2	2	22
Histopathology							0	3	3	4	13	2	3	29	3	3	4	13	2	3	28
Immunology	0	0	0	15	0	0	15	1	1	2	5	1	1	11	1	1	2	5	1	1	11
Medical Microbiology & Virology	2	2	0	34	1	3	42	1	1	1	4	1	1	8	1	1	1	3	1	1	7
Surgical Specialties	**96**	**105**	**112**	**832**	**81**	**91**	**1318**	**61**	**66**	**95**	**284**	**47**	**59**	**613**	**57**	**61**	**96**	**277**	**44**	**55**	**591**
General Surgery	41	40	40	225	26	38	410	21	23	33	97	16	20	210	20	21	33	95	15	19	202
Trauma and Orthopaedic Surgery	20	13	21	141	21	12	228	11	12	18	53	9	11	115	11	11	18	52	8	10	110
Cardiothoracic Surgery	0	0	0	14	0	0	14	2	2	3	9	1	2	19	2	2	3	9	1	2	18
Neurosurgery	0	6	1	50	0	1	58	3	3	4	13	2	3	29	3	3	4	13	2	3	28
Ophtalmology	15	24	24	187	15	22	288	10	10	15	44	7	9	95	9	10	15	43	7	9	92
Oral and Maxilla Facial Surgery	0	1	0	29	0	1	31	2	2	2	7	1	1	15	1	2	2	7	1	1	15
ENT	13	14	20	113	12	15	186	6	6	9	27	4	5	57	5	6	9	26	4	5	55
Plastic Surgery	0	0	4	19	1	0	26	2	3	4	12	2	2	25	2	2	4	11	2	2	24
Urology	6	6	2	54	7	3	79	5	5	7	22	4	5	48	4	5	7	22	3	4	46
Overall	**647**	**710**	**680**	**4214**	**526**	**590**	**7367**	**495**	**538**	**770**	**2300**	**384**	**475**	**4962**	**464**	**495**	**776**	**2,240**	**357**	**449**	**4,782**

Annex 17. Medical Staff by specialty: Current vs. Proposed

Primary Method: Using maximum of 1.5 FTE per provider (proposed FTE based on standards):

Medical Staff per specialty	FTE	Proposed FTE	Proposed FTE	Proposed Deficit-Surplus	
	Current	2020	2025	2020	2025
Medical Specialties	**4025.0**	**2973.7**	**2866.1**	**1051.3**	**1158.9**
Accident and Emergency	138.1	190.9	184.0	-52.7	-45.8

Critical Care (including Anaesthesia)	449.7	292.0	281.5	157.7	168.2
Cardiology	244.7	84.0	80.9	160.7	163.8
Dermatology	197.8	36.3	35.0	161.5	162.8
Endocrinology/ Diabetes Mellitus	83.7	28.6	27.6	55.0	56.1
Gastroenterology	95.5	49.6	47.8	45.8	47.6
General Medicine (GP)	1539.0	1145.2	1103.8	393.8	435.3
Geriatric Medicine		22.9	22.1	-22.9	-22.1
Infectious Diseases	54.8	57.3	55.2	-2.4	-0.3
Internist	486.4	477.2	459.9	9.2	26.5
Medical Oncology	82.2	38.2	36.8	44.1	45.4
Neurology	322.3	133.6	128.8	188.7	193.5
Nuclear Medicine		19.1	18.4	-19.1	-18.4
Occupational Medicine	148.5	248.1	239.1	-99.7	-90.7
Pneumonology	115.5	114.5	110.4	1.0	5.1
Renal Medicine	44.0	21.0	20.2	23.0	23.8
Rheumatology	22.8	15.3	14.7	7.5	8.0
Mental Illness and Disabilities	**374.9**	**324.0**	**312.3**	50.9	62.7
Child and Adolescent Psychiatry	19.8	34.0	32.8	-14.2	-13.0
Forensic Psychiatry	13.6	30.0	28.9	-16.4	-15.3
General Psychiatry	289.8	218.0	210.1	71.8	79.7
Psychotherapy	51.7	42.0	40.5	9.7	11.2
Obstetrics and Gynaecology	**584.0**	**381.7**	**367.9**	202.2	216.0
Obstetrics and Gynaecology	584.0	381.7	367.9	202.2	216.0
Paediatric	**570.1**	**372.2**	**358.7**	197.9	211.4
Paediatrics	434.1	286.3	275.9	147.8	158.2
Neonatology	80.4	57.3	55.2	23.1	25.2
Paediatric Surgery	55.6	28.6	27.6	27.0	28.0
Pathology and Radiology	**495.2**	**297.8**	**287.0**	197.4	208.2
Chemical Pathology	55.0	59.2	57.0	-4.2	-2.0
Clinical Genetics	14.0	7.6	7.4	6.4	6.6
Clinical Neurophysiology		3.8	3.7	-3.8	-3.7

Clinical Pharmacology & Therapeutics	1.0	7.6	7.4	-6.6	-6.4
Clinical Radiology	344.5	148.9	143.5	195.6	201.0
Haematology	23.7	22.9	22.1	0.8	1.6
Histopathology		28.6	27.6	-28.6	-27.6
Immunology	15.2	11.5	11.0	3.8	4.2
Medical Microbiology & Virology	41.8	7.6	7.4	34.1	34.4
Surgical Specialties	**1317.6**	**612.7**	**590.5**	704.9	727.1
General Surgery	410.0	210.0	202.4	200.1	207.7
Trauma and Orthopaedic Surgery	227.8	114.5	110.4	113.3	117.4
Cardiothoracic Surgery	13.7	19.1	18.4	-5.4	-4.7
Neurosurgery	57.8	28.6	27.6	29.1	30.2
Ophtalmology	287.5	95.4	92.0	192.1	195.6
Oral and Maxilla Facial Surgery	30.5	15.3	14.7	15.3	15.8
ENT	186.1	57.3	55.2	128.9	130.9
Plastic Surgery	25.6	24.8	23.9	0.7	1.6
Urology	78.6	47.7	46.0	30.9	32.6
Overall	**7366.8**	**4962.1**	**4782.5**	2404.6	2584.3

Comparative Method: Using maximum of 1.0 FTE per provider (proposed FTE based on standards):

Medical Staff per specialty	FTE	Proposed FTE	Proposed FTE	Proposed Deficit-Surplus	
	Current	2020	2025	2020	2025
Medical Specialties	**3247.2**	**2973.7**	**2866.1**	**273.5**	**381.1**
Accident and Emergency	123.6	190.9	184.0	-67.2	-60.3
Critical Care (including Anaesthesia)	358.5	292.0	281.5	66.5	77.0
Cardiology	170.1	84.0	80.9	86.1	89.1
Dermatology	152.7	36.3	35.0	116.5	117.8
Endocrinology/ Diabetes Mellitus	60.9	28.6	27.6	32.2	33.3
Gastroenterology	63.2	49.6	47.8	13.6	15.4
General Medicine (GP)	1359.4	1145.2	1103.8	214.2	255.7
Geriatric Medicine		22.9	22.1	-22.9	-22.1
Infectious Diseases	43.9	57.3	55.2	-13.3	-11.3
Internist	378.6	477.2	459.9	-98.6	-81.3
Medical Oncology	61.1	38.2	36.8	22.9	24.3
Neurology	235.9	133.6	128.8	102.3	107.1
Nuclear Medicine		19.1	18.4	-19.1	-18.4
Occupational Medicine	100.2	248.1	239.1	-147.9	-139.0
Pneumonology	89.8	114.5	110.4	-24.7	-20.6
Renal Medicine	33.4	21.0	20.2	12.4	13.2
Rheumatology	15.9	15.3	14.7	0.6	1.2
Mental Illness and Disabilities	**292.8**	**324.0**	**312.3**	-31.2	-19.5
Child and Adolescent Psychiatry	12.9	34.0	32.8	-21.1	-19.8
Forensic Psychiatry	6.6	30.0	28.9	-23.4	-22.3
General Psychiatry	229.3	218.0	210.1	11.3	19.2

Psychotherapy	43.9	42.0	40.5	1.9	3.4
Obstetrics and Gynaecology	**420.2**	**381.7**	**367.9**	38.4	52.3
Obstetrics and Gynaecology	420.2	381.7	367.9	38.4	52.3
Paediatric	**417.8**	**372.2**	**358.7**	45.7	59.1
Paediatrics	316.2	286.3	275.9	29.9	40.3
Neonatology	59.6	57.3	55.2	2.3	4.4
Paediatric Surgery	42.1	28.6	27.6	13.4	14.5
Pathology and Radiology	**385.3**	**297.8**	**287.0**	87.5	98.3
Chemical Pathology	43.6	59.2	57.0	-15.6	-13.4
Clinical Genetics	13.6	7.6	7.4	6.0	6.2
Clinical Neurophysiology		3.8	3.7	-3.8	-3.7
Clinical Pharmacology & Therapeutics	1.0	7.6	7.4	-6.6	-6.4
Clinical Radiology	259.0	148.9	143.5	110.1	115.5
Haematology	18.5	22.9	22.1	-4.4	-3.6
Histopathology		28.6	27.6	-28.6	-27.6
Immunology	11.3	11.5	11.0	-0.2	0.3
Medical Microbiology & Virology	38.3	7.6	7.4	30.7	30.9
Surgical Specialties	**995.8**	**612.7**	**590.5**	383.1	405.3
General Surgery	313.6	210.0	202.4	103.7	111.3
Trauma and Orthopaedic Surgery	164.3	114.5	110.4	49.8	53.9
Cardiothoracic Surgery	10.1	19.1	18.4	-9.0	-8.3
Neurosurgery	45.9	28.6	27.6	17.3	18.3
Ophtalmology	222.0	95.4	92.0	126.6	130.0
Oral and Maxilla Facial Surgery	21.4	15.3	14.7	6.1	6.7
ENT	145.3	57.3	55.2	88.0	90.1
Plastic Surgery	18.8	24.8	23.9	-6.0	-5.1
Urology	54.4	47.7	46.0	6.7	8.4
Overall	**5759.1**	**4962.1**	**4782.5**	797.0	976.6

Annex 18. Medical Staff by Region: Current vs Proposed

The following tables all provide the FTE (based on maximum 1.5 methodology) per region:

RIGA: Medical Staff per specialty	FTE 2014	Proposed FTE 2020	Proposed FTE 2025	Proposed Deficit-Surplus 2020	Proposed Deficit-Surplus 2025
Medical Specialties	**2192.9**	**1378.5**	**1342.7**	**814.5**	**850.3**
Accident and Emergency	124.3	88.5	86.2	35.8	38.1
Critical Care (including Anaesthesia)	320.5	135.4	131.9	185.2	188.7
Cardiology	172.7	38.9	37.9	133.7	134.7
Dermatology	147.0	16.8	16.4	130.2	130.6
Endocrinology/ Diabetes Mellitus	53.8	13.3	12.9	40.5	40.9
Gastroenterology	69.7	23.0	22.4	46.7	47.3
General Medicine (GP)	526.7	530.9	517.1	-4.2	9.6
Geriatric Medicine	0.0	10.6	10.3	-10.6	-10.3
Infectious Diseases	38.4	26.5	25.9	11.8	12.5
Internist	278.9	221.2	215.4	57.7	63.5
Medical Oncology	59.7	17.7	17.2	42.0	42.5
Neurology	196.4	61.9	60.3	134.5	136.1
Nuclear Medicine	0.0	8.8	8.6	-8.8	-8.6
Occupational Medicine	86.0	115.0	112.0	-29.1	-26.1
Pneumonology	65.0	53.1	51.7	11.9	13.3
Renal Medicine	34.4	9.7	9.5	24.7	24.9
Rheumatology	19.5	7.1	6.9	12.4	12.6
Mental Illness and Disabilities	**206.0**	**150.2**	**146.3**	**55.9**	**59.8**
Child and Adolescent Psychiatry	9.4	15.8	15.4	-6.4	-5.9
Forensic Psychiatry	4.7	13.9	13.5	-9.2	-8.9
General Psychiatry	149.4	101.1	98.4	48.4	51.0

Psychotherapy	42.5	19.5	19.0	23.1	23.6
Obstetrics and Gynaecology	**318.6**	**177.0**	**172.4**	**141.6**	**146.2**
Obstetrics and Gynaecology	318.6	0.0	172.4	318.6	146.2
Paediatric	**329.5**	**172.5**	**168.0**	**157.0**	**161.5**
Paediatrics	241.3	132.7	129.3	108.5	112.0
Neonatology	46.6	26.5	25.9	20.1	20.8
Paediatric Surgery	41.7	13.3	12.9	28.4	28.7
Pathology and Radiology	**334.3**	**138.0**	**134.4**	**196.3**	**199.9**
Chemical Pathology	41.8	27.4	26.7	14.3	15.0
Clinical Genetics	14.0	3.5	3.4	10.5	10.6
Clinical Neurophysiology	0.0	1.8	1.7	-1.8	-1.7
Clinical Pharmacology and Therapeutics	0.0	3.5	3.4	-3.5	-3.4
Clinical Radiology	209.6	69.0	67.2	140.6	142.4
Haematology	20.1	10.6	10.3	9.5	9.8
Histopathology	0.0	13.3	12.9	-13.3	-12.9
Immunology	14.9	5.3	5.2	9.6	9.7
Medical Microbiology & Virology	34.0	3.5	3.4	30.5	30.6
Surgical Specialties	**832.2**	**284.0**	**276.6**	**548.2**	**555.6**
General Surgery	225.2	97.3	94.8	127.9	130.5
Trauma and Orthopaedic Surgery	141.0	53.1	51.7	87.9	89.3
Cardiothoracic Surgery	13.7	8.8	8.6	4.8	5.1
Neurosurgery	50.0	13.3	12.9	36.7	37.0
Ophtalmology	187.2	44.2	43.1	143.0	144.1
Oral and Maxilla Facial Surgery	28.6	7.1	6.9	21.5	21.7
ENT	112.9	26.5	25.9	86.4	87.0
Plastic Surgery	19.4	11.5	11.2	7.9	8.2
Urology	54.1	22.1	21.5	32.0	32.6
Overall	**4213.6**	**2300.2**	**2240.4**	**1913.5**	**1973.2**

PIERIGA: Medical Staff per specialty	**FTE** 2014	**Proposed FTE** 2020	**Proposed FTE** 2025	**Proposed Deficit-Surplus** 2020	2025
Medical Specialties	**415.7**	**461.3**	**464.9**	**-45.6**	**-49.2**

Accident and Emergency	3.2	29.6	29.8	-26.4	-26.7
Critical Care (including Anaesthesia)	19.8	45.3	45.7	-25.5	-25.8
Cardiology	16.7	13.0	13.1	3.7	3.6
Dermatology	12.5	5.6	5.7	6.9	6.8
Endocrinology/ Diabetes Mellitus	6.7	4.4	4.5	2.3	2.2
Gastroenterology	4.3	7.7	7.8	-3.4	-3.4
General Medicine (GP)	236.4	177.6	179.0	58.8	57.4
Geriatric Medicine	0.0	3.6	3.6	-3.6	-3.6
Infectious Diseases	0.0	8.9	9.0	-8.9	-9.0
Internist	53.5	74.0	74.6	-20.6	-21.1
Medical Oncology	2.4	5.9	6.0	-3.6	-3.6
Neurology	23.1	20.7	20.9	2.4	2.2
Nuclear Medicine	0.0	3.0	3.0	-3.0	-3.0
Occupational Medicine	22.8	38.5	38.8	-15.7	-16.0
Pneumonology	13.4	17.8	17.9	-4.3	-4.5
Renal Medicine	0.2	3.3	3.3	-3.1	-3.1
Rheumatology	0.8	2.4	2.4	-1.6	-1.6
Mental Illness and Disabilities	**20.1**	**50.3**	**50.7**	-30.2	-30.6
Child and Adolescent Psychiatry	3.4	5.3	5.3	-1.8	-1.9
Forensic Psychiatry	0.0	4.7	4.7	-4.7	-4.7
General Psychiatry	15.6	33.8	34.1	-18.2	-18.5
Psychotherapy	1.0	6.5	6.6	-5.5	-5.6
Obstetrics and Gynaecology	**59.7**	**59.2**	**59.7**	0.5	0.0
Obstetrics and Gynaecology	59.7	0.0	59.7	59.7	0.0
Paediatric	**47.3**	**57.7**	**58.2**	-10.5	-10.9
Paediatrics	38.1	44.4	44.8	-6.3	-6.7
Neonatology	6.6	8.9	9.0	-2.3	-2.4
Paediatric Surgery	2.6	4.4	4.5	-1.9	-1.9
Pathology and Radiology	**25.2**	**46.2**	**46.5**	-21.0	-21.3
Chemical Pathology	0.5	9.2	9.3	-8.7	-8.8
Clinical Genetics	0.0	1.2	1.2	-1.2	-1.2
Clinical Neurophysiology	0.0	0.6	0.6	-0.6	-0.6
Clinical Pharmacology and Therapeutics	1.0	1.2	1.2	-0.2	-0.2
Clinical Radiology	22.7	23.1	23.3	-0.4	-0.6
Haematology	1.0	3.6	3.6	-2.6	-2.6
Histopathology	0.0	4.4	4.5	-4.4	-4.5
Immunology	0.0	1.8	1.8	-1.8	-1.8
Medical Microbiology & Virology	0.0	1.2	1.2	-1.2	-1.2
Surgical Specialties	**112.4**	**95.0**	**95.8**	17.4	16.7
General Surgery	39.8	32.6	32.8	7.3	7.0
Trauma and Orthopaedic Surgery	20.7	17.8	17.9	2.9	2.8
Cardiothoracic Surgery	0.0	3.0	3.0	-3.0	-3.0
Neurosurgery	1.3	4.4	4.5	-3.2	-3.2
Ophtalmology	24.2	14.8	14.9	9.4	9.3
Oral and Maxilla Facial Surgery	0.2	2.4	2.4	-2.2	-2.2
ENT	19.8	8.9	9.0	10.9	10.8
Plastic Surgery	4.3	3.8	3.9	0.4	0.4
Urology	2.3	7.4	7.5	-5.1	-5.2
Overall	**680.4**	**769.7**	**775.7**	-89.4	-95.4

VIDZEME: Medical Staff per specialty	**FTE** 2014	**Proposed FTE** 2020	**Proposed FTE** 2025	**Proposed Deficit-Surplus** 2020	2025
Medical Specialties	**306.3**	**230.1**	**214.1**	**76.2**	**92.2**

Accident and Emergency	7.1	14.8	13.7	-7.7	-6.6
Critical Care (including Anaesthesia)	26.6	22.6	21.0	4.0	5.6
Cardiology	6.5	6.5	6.0	0.0	0.5
Dermatology	8.9	2.8	2.6	6.1	6.3
Endocrinology/ Diabetes Mellitus	5.5	2.2	2.1	3.3	3.5
Gastroenterology	3.8	3.8	3.6	0.0	0.2
General Medicine (GP)	156.2	88.6	82.4	67.6	73.7
Geriatric Medicine	0.0	1.8	1.6	-1.8	-1.6
Infectious Diseases	4.5	4.4	4.1	0.1	0.4
Internist	34.5	36.9	34.4	-2.4	0.2
Medical Oncology	3.7	3.0	2.7	0.8	1.0
Neurology	26.0	10.3	9.6	15.7	16.4
Nuclear Medicine	0.0	1.5	1.4	-1.5	-1.4
Occupational Medicine	10.1	19.2	17.9	-9.1	-7.8
Pneumonology	10.7	8.9	8.2	1.8	2.4
Renal Medicine	1.8	1.6	1.5	0.2	0.3
Rheumatology	0.3	1.2	1.1	-0.9	-0.8
Mental Illness and Disabilities	**26.2**	**25.1**	**23.3**	1.1	2.9
Child and Adolescent Psychiatry	0.7	2.6	2.4	-2.0	-1.8
Forensic Psychiatry	0.0	2.3	2.2	-2.3	-2.2
General Psychiatry	24.5	16.9	15.7	7.7	8.8
Psychotherapy	1.0	3.2	3.0	-2.2	-2.0
Obstetrics and Gynaecology	**43.2**	**29.5**	**27.5**	13.6	15.7
Obstetrics and Gynaecology	43.2	0.0	27.5	43.2	15.7
Paediatric	**43.7**	**28.8**	**26.8**	14.9	16.9
Paediatrics	35.7	22.2	20.6	13.6	15.1
Neonatology	7.4	4.4	4.1	3.0	3.3
Paediatric Surgery	0.6	2.2	2.1	-1.7	-1.5
Pathology and Radiology	**26.0**	**23.0**	**21.4**	3.0	4.6
Chemical Pathology	1.3	4.6	4.3	-3.3	-3.0
Clinical Genetics	0.0	0.6	0.5	-0.6	-0.5
Clinical Neurophysiology	0.0	0.3	0.3	-0.3	-0.3
Clinical Pharmacology and Therapeutics	0.0	0.6	0.5	-0.6	-0.5
Clinical Radiology	23.7	11.5	10.7	12.1	12.9
Haematology	0.0	1.8	1.6	-1.8	-1.6
Histopathology	0.0	2.2	2.1	-2.2	-2.1
Immunology	0.1	0.9	0.8	-0.8	-0.7
Medical Microbiology & Virology	1.0	0.6	0.5	0.4	0.5
Surgical Specialties	**81.0**	**47.4**	**44.1**	33.6	36.9
General Surgery	25.7	16.2	15.1	9.4	10.5
Trauma and Orthopaedic Surgery	20.5	8.9	8.2	11.6	12.3
Cardiothoracic Surgery	0.0	1.5	1.4	-1.5	-1.4
Neurosurgery	0.0	2.2	2.1	-2.2	-2.1
Ophtalmology	14.7	7.4	6.9	7.3	7.9
Oral and Maxilla Facial Surgery	0.3	1.2	1.1	-0.9	-0.8
ENT	11.8	4.4	4.1	7.4	7.7
Plastic Surgery	1.4	1.9	1.8	-0.5	-0.4
Urology	6.7	3.7	3.4	3.0	3.3
Overall	**526.4**	**383.9**	**357.2**	142.5	169.1

KURZEME: Medical Staff per specialty	FTE 2014	Proposed FTE 2020	Proposed FTE 2025	Proposed Deficit-Surplus 2020	Proposed Deficit-Surplus 2025
Medical Specialties	**371.1**	**296.9**	**278.3**	**74.2**	**92.8**
Accident and Emergency	1.5	19.1	17.9	-17.6	-16.4
Critical Care (including Anaesthesia)	32.8	29.2	27.3	3.6	5.5
Cardiology	14.3	8.4	7.9	5.9	6.4
Dermatology	9.0	3.6	3.4	5.4	5.6
Endocrinology/ Diabetes Mellitus	6.7	2.9	2.7	3.8	4.0
Gastroenterology	5.8	5.0	4.6	0.8	1.1
General Medicine (GP)	202.9	114.3	107.2	88.6	95.7
Geriatric Medicine	0.0	2.3	2.1	-2.3	-2.1
Infectious Diseases	4.5	5.7	5.4	-1.2	-0.9
Internist	38.0	47.6	44.7	-9.7	-6.7
Medical Oncology	6.2	3.8	3.6	2.4	2.6
Neurology	24.6	13.3	12.5	11.2	12.1
Nuclear Medicine	0.0	1.9	1.8	-1.9	-1.8
Occupational Medicine	14.0	24.8	23.2	-10.8	-9.2
Pneumonology	7.7	11.4	10.7	-3.7	-3.0
Renal Medicine	2.3	2.1	2.0	0.2	0.4
Rheumatology	1.0	1.5	1.4	-0.5	-0.4
Mental Illness and Disabilities	**34.2**	**32.4**	**30.3**	1.8	3.8
Child and Adolescent Psychiatry	1.8	3.4	3.2	-1.6	-1.4
Forensic Psychiatry	0.5	3.0	2.8	-2.5	-2.3
General Psychiatry	29.2	21.8	20.4	7.5	8.8
Psychotherapy	2.7	4.2	3.9	-1.5	-1.3
Obstetrics and Gynaecology	**59.6**	**38.1**	**35.7**	21.5	23.9
Obstetrics and Gynaecology	59.6	0.0	35.7	59.6	23.9
Paediatric	**47.0**	**37.2**	**34.8**	9.8	12.1
Paediatrics	37.2	28.6	26.8	8.6	10.4
Neonatology	7.3	5.7	5.4	1.5	1.9
Paediatric Surgery	2.5	2.9	2.7	-0.4	-0.2
Pathology and Radiology	**38.3**	**29.7**	**27.9**	8.6	10.4
Chemical Pathology	3.9	5.9	5.5	-2.0	-1.6
Clinical Genetics	0.0	0.8	0.7	-0.8	-0.7
Clinical Neurophysiology	0.0	0.4	0.4	-0.4	-0.4
Clinical Pharmacology and Therapeutics	0.0	0.8	0.7	-0.8	-0.7
Clinical Radiology	30.9	14.9	13.9	16.0	17.0
Haematology	1.3	2.3	2.1	-1.0	-0.9
Histopathology	0.0	2.9	2.7	-2.9	-2.7
Immunology	0.3	1.1	1.1	-0.9	-0.8
Medical Microbiology & Virology	2.0	0.8	0.7	1.2	1.3
Surgical Specialties	**96.4**	**61.2**	**57.3**	35.2	39.0
General Surgery	41.3	21.0	19.7	20.3	21.6
Trauma and Orthopaedic Surgery	19.9	11.4	10.7	8.4	9.2
Cardiothoracic Surgery	0.0	1.9	1.8	-1.9	-1.8
Neurosurgery	0.4	2.9	2.7	-2.5	-2.3
Ophtalmology	15.4	9.5	8.9	5.8	6.4
Oral and Maxilla Facial Surgery	0.0	1.5	1.4	-1.5	-1.4
ENT	12.8	5.7	5.4	7.1	7.4
Plastic Surgery	0.4	2.5	2.3	-2.1	-1.9
Urology	6.3	4.8	4.5	1.5	1.8
Overall	**646.5**	**495.5**	**464.5**	151.1	182.0

ZEMGALE: Medical Staff per specialty	FTE 2014	Proposed FTE 2020	Proposed FTE 2025	Proposed Deficit-Surplus 2020	Proposed Deficit-Surplus 2025
Medical Specialties	**330.2**	**284.7**	**296.9**	**45.5**	**33.3**
Accident and Emergency	1.2	18.3	19.1	-17.0	-17.8
Critical Care (including Anaesthesia)	19.2	28.0	29.2	-8.8	-10.0
Cardiology	14.6	8.0	8.4	6.5	6.2
Dermatology	7.9	3.5	3.6	4.4	4.3
Endocrinology/ Diabetes Mellitus	6.9	2.7	2.9	4.2	4.1
Gastroenterology	4.0	4.8	5.0	-0.8	-1.0
General Medicine (GP)	201.0	109.6	114.4	91.3	86.6
Geriatric Medicine	0.0	2.2	2.3	-2.2	-2.3
Infectious Diseases	2.8	5.5	5.7	-2.6	-2.9
Internist	33.4	45.7	47.6	-12.2	-14.2
Medical Oncology	3.5	3.7	3.8	-0.2	-0.3
Neurology	18.4	12.8	13.3	5.6	5.0
Nuclear Medicine	0.0	1.8	1.9	-1.8	-1.9
Occupational Medicine	9.0	23.8	24.8	-14.8	-15.8
Pneumonology	5.5	11.0	11.4	-5.5	-5.9
Renal Medicine	2.7	2.0	2.1	0.7	0.6
Rheumatology	0.1	1.5	1.5	-1.3	-1.4
Mental Illness and Disabilities	**49.7**	**31.0**	**32.4**	18.7	17.3
Child and Adolescent Psychiatry	2.0	3.3	3.4	-1.3	-1.4
Forensic Psychiatry	2.8	2.9	3.0	-0.1	-0.2
General Psychiatry	41.0	20.9	21.8	20.1	19.2
Psychotherapy	4.0	4.0	4.2	0.0	-0.2
Obstetrics and Gynaecology	**46.9**	**36.5**	**38.1**	10.3	8.8
Obstetrics and Gynaecology	46.9	0.0	38.1	46.9	8.8
Paediatric	**44.3**	**35.6**	**37.2**	8.6	7.1
Paediatrics	35.2	27.4	28.6	7.8	6.6
Neonatology	7.1	5.5	5.7	1.6	1.4
Paediatric Surgery	2.0	2.7	2.9	-0.7	-0.9
Pathology and Radiology	**27.6**	**28.5**	**29.7**	-0.9	-2.1
Chemical Pathology	0.8	5.7	5.9	-4.8	-5.1
Clinical Genetics	0.0	0.7	0.8	-0.7	-0.8
Clinical Neurophysiology	0.0	0.4	0.4	-0.4	-0.4
Clinical Pharmacology and Therapeutics	0.0	0.7	0.8	-0.7	-0.8
Clinical Radiology	24.3	14.3	14.9	10.1	9.4
Haematology	0.0	2.2	2.3	-2.2	-2.3
Histopathology	0.0	2.7	2.9	-2.7	-2.9
Immunology	0.0	1.1	1.1	-1.1	-1.1
Medical Microbiology & Virology	2.5	0.7	0.8	1.8	1.7
Surgical Specialties	**90.9**	**58.7**	**61.2**	32.2	29.7
General Surgery	38.3	20.1	21.0	18.2	17.3
Trauma and Orthopaedic Surgery	12.3	11.0	11.4	1.4	0.9
Cardiothoracic Surgery	0.0	1.8	1.9	-1.8	-1.9
Neurosurgery	0.5	2.7	2.9	-2.2	-2.4
Ophtalmology	21.8	9.1	9.5	12.7	12.3
Oral and Maxilla Facial Surgery	0.5	1.5	1.5	-1.0	-1.0
ENT	14.5	5.5	5.7	9.0	8.8
Plastic Surgery	0.0	2.4	2.5	-2.4	-2.5
Urology	3.0	4.6	4.8	-1.6	-1.8
Overall	**589.5**	**475.0**	**495.5**	114.5	94.0

LATGALE: Medical Staff per specialty	FTE 2014	Proposed FTE 2020	Proposed FTE 2025	Proposed Deficit-Surplus 2020	Proposed Deficit-Surplus 2025
Medical Specialties	**408.7**	**322.3**	**296.9**	**86.4**	**111.8**
Accident and Emergency	0.8	20.7	19.1	-19.9	-18.2
Critical Care (including Anaesthesia)	30.8	31.7	29.2	-0.9	1.6
Cardiology	20.0	9.1	8.4	10.9	11.6
Dermatology	12.4	3.9	3.6	8.5	8.8
Endocrinology/ Diabetes Mellitus	4.1	3.1	2.9	1.0	1.2
Gastroenterology	7.9	5.4	5.0	2.5	3.0
General Medicine (GP)	215.9	124.1	114.4	91.8	101.6
Geriatric Medicine	0.0	2.5	2.3	-2.5	-2.3
Infectious Diseases	4.6	6.2	5.7	-1.6	-1.1
Internist	48.1	51.7	47.6	-3.6	0.5
Medical Oncology	6.8	4.1	3.8	2.6	2.9
Neurology	33.8	14.5	13.3	19.3	20.4
Nuclear Medicine	0.0	2.1	1.9	-2.1	-1.9
Occupational Medicine	6.7	26.9	24.8	-20.2	-18.1
Pneumonology	13.2	12.4	11.4	0.8	1.7
Renal Medicine	2.6	2.3	2.1	0.3	0.5
Rheumatology	1.1	1.7	1.5	-0.5	-0.4
Mental Illness and Disabilities	**38.8**	**35.1**	**32.4**	3.7	6.5
Child and Adolescent Psychiatry	2.6	3.7	3.4	-1.1	-0.8
Forensic Psychiatry	5.7	3.3	3.0	2.4	2.7
General Psychiatry	30.1	23.6	21.8	6.4	8.3
Psychotherapy	0.5	4.6	4.2	-4.1	-3.7
Obstetrics and Gynaecology	**56.0**	**41.4**	**38.1**	14.7	17.9
Obstetrics and Gynaecology	56.0	0.0	38.1	56.0	17.9
Paediatric	**58.4**	**40.3**	**37.2**	18.0	21.2
Paediatrics	46.6	31.0	28.6	15.6	18.0
Neonatology	5.4	6.2	5.7	-0.8	-0.3
Paediatric Surgery	6.3	3.1	2.9	3.2	3.5
Pathology and Radiology	**43.6**	**32.3**	**29.7**	11.4	13.9
Chemical Pathology	6.8	6.4	5.9	0.3	0.8
Clinical Genetics	0.0	0.8	0.8	-0.8	-0.8
Clinical Neurophysiology	0.0	0.4	0.4	-0.4	-0.4
Clinical Pharmacology and Therapeutics	0.0	0.8	0.8	-0.8	-0.8
Clinical Radiology	33.3	16.1	14.9	17.2	18.4
Haematology	1.3	2.5	2.3	-1.1	-1.0
Histopathology	0.0	3.1	2.9	-3.1	-2.9
Immunology	0.0	1.2	1.1	-1.2	-1.1
Medical Microbiology & Virology	2.3	0.8	0.8	1.4	1.5
Surgical Specialties	**104.7**	**66.4**	**61.2**	38.3	43.5
General Surgery	39.8	22.8	21.0	17.0	18.8
Trauma and Orthopaedic Surgery	13.4	12.4	11.4	1.0	2.0
Cardiothoracic Surgery	0.0	2.1	1.9	-2.1	-1.9
Neurosurgery	5.7	3.1	2.9	2.6	2.8
Ophtalmology	24.3	10.3	9.5	13.9	14.7
Oral and Maxilla Facial Surgery	1.0	1.7	1.5	-0.7	-0.5
ENT	14.4	6.2	5.7	8.1	8.6
Plastic Surgery	0.1	2.7	2.5	-2.6	-2.4
Urology	6.2	5.2	4.8	1.1	1.5
Overall	**710.3**	**537.8**	**495.5**	172.5	214.8

Annex 19: Nurses and Nursing Professionals

	Nursing professionals		Midwives		Nursing associate professionals		Health care assistants	
	(number)	(per 100 000 inhabitants)	(number)	(per 100 000 inhabitants)	(number)	(per 100 000 inhabitants)	(number)	(per 100 000 inhabitants)
Average		**648.49**		**37.95**		**172.18**		**596.16**
Belgium	:	:	10,101	90	:	:	94,641	846
Bulgaria	32,455	447	3,276	45	0	0	:	:
Czech Republic	:	:	4,380	42	:	:	24,261	231
Denmark (²)	55,037	984	1,710	31	36,087	645	52,192	933
Germany	884,000	1,086	19,000	23	161,000	198	:	:
Estonia	8,134	617	412	31	0	0	3,446	261
Ireland (³)	*56,800*	*1,235*	2,085	46	0	0	22,851	497
Greece (⁴)	21,029	186	2,632	23	19,124	169	6,167	55
Spain (⁵)	239,767	514	8,297	18	0	0	442,367	949
France	616,796	939	20,970	32	0	0	416,300	634
Croatia	4,839	114	1,610	38	21,574	507	484	11
Italy	369,706	614	12,290	20	0	0	590,812	981
Cyprus	4,065	472	243	28	157	18	:	:
Latvia	9,831	488	395	20	0	0	2,051	102
Lithuania	22,324	755	902	30	0	0	6,843	231
Luxembourg	6,481	1,193	203	37	0	0	3,144	579
Hungary	48,304	488	1,671	17	15,285	155	26,818	271
Malta	2,974	702	177	42	0	0	2,878	680
Netherlands (⁶)	:	:	2,852	17	:	:	267,000	1,589
Austria (⁷)	56,747	669	1,379	16	9,954	117	4,694	55
Poland	200,587	527	22,833	60	0	0	:	:
Portugal (⁸)	63,318	605	2,491	24	0	0	*28,819*	*276*
Romania	10,270	51	3,458	17	109,792	549	59,548	298
Slovenia	4,797	233	124	6	12,240	594	4,189	203
Slovakia (⁹)	31,128	575	1,775	33	0	0	4,465	82
Finland (²)	51,772	956	2,283	42	24,673	456	111,704	2,063
Sweden (⁴)	106,176	1,115	7,161	75	:	:	:	:
United Kingdom (¹⁰)	*425,330*	*663*	31,907	50	99,342	155	*950,000*	*1,482*
Iceland	3,025	934	264	82	1,978	611	:	:
Liechtenstein (¹¹)	*70*	*191*	*17*	*46*	3	8	:	:
Norway	84,664	1,667	2,762	54	0	0	73,904	1,455
Switzerland	89,139	1,102	2,500	31	51,308	634	58,154	719
FYR of Macedonia	7,587	368	1,141	55	0	0	345	17
Serbia (²)	5,458	76	2,604	36	37,450	520	:	:
Turkey	139,544	183	53,427	70	0	0	:	:

(¹) Belgium (health care assistants only), Ireland (except health care assistants), Greece, France (except midwives), Italy, Portugal (except health care assistants), Slovakia (except health care assistants), the former Yugoslav Republic of Macedonia, Serbia and Turkey: professionally active nursing and caring professionals. Belgium and Spain (both, midwives only): professionals licensed to practise.

(²) 2012.

(³) Midwives: 2011; data refer to full-time equivalents.

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(⁴) 2011.

(⁵) Nursing professionals: includes also midwives.

(⁶) Midwives: 2012.

(⁷) Excluding the self-employed and those employed by institutions other than hospitals.

(⁸) Nurses who hold a post / job under which nursing education is not required are not excluded.

(⁹) Nursing associate professionals: 2012.

(¹⁰) Midwives: includes underestimated values for Scotland, as some midwives with low level qualifications may be excluded.

(¹¹) Nursing professionals and nursing associate professionals: 2012.

Source: Eurostat (online data code: hlth_rs_prsns)

Annex 20: Physician Standards

Staff per 100,000 Standard approach	
	Sanigest Standard
Medical Specialities	**155**
Accident and Emergency	**10**
Critical Care (including Anaesthesia)	**15**
Cardiology	**4**
Dermatology	**2**
Endocrinology and Diabetes Mellitus	**2**
Gastroenterology	**3**
General Medicine (GP)	**60**
Geriatric Medicine	**1**
Infectious Diseases	**3**
Internist	**25**
Medical Oncology	**2**
Neurology	**7**
Nuclear Medicine	**1**
Occupational Medicine	**13**
Pulmonalogy	**6**
Renal Medicine	**1**
Rheumatology	**1**
Mental Illness and Disabilities	**17**
Child and Adolescent Psychiatry	**2**
Forensic Psychiatry	**2**
General Psychiatry	**11**
Psychotherapy	**2**
Obstetrics and Gynaecology	**20**
Pediatric	**20**
Paediatrics	**15**
Neonatology	**3**
Paediatric Surgery	**2**
Pathology and Radiology	**16**
Chemical Pathology	**3**
Clinical Genetics	**0**
Clinical Neurophysiology	**0**
Clinical Pharmacology and Therapeutics	**0**
Clinical Radiology	**8**
Haematology	**1**
Histopathology	**2**
Immunology	**1**
Medical Microbiology & Virology	**0**
Surgical Specialties	**32**
General Surgery	**11**
Trauma and Orthopaedic Surgery	**6**
Cardiothoracic Surgery	**1**
Neurosurgery	**2**
Ophthalmology	**5**
Oral and Maxillo Facial Surgery	**1**
ENT	**3**
Plastic Surgery	**1**
Urology	**3**
Overall	259

Annex 21: Retirement rates and impact on staffing needs

2020 Specialist Analysis	Kurzeme			Latgale			Periga			Riga			Vidzeme			Zemgale		
	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap
Obstetrics & Gynae	48	59	11	52	50	(2)	74	67	(7)	126	205	**79**	37	55	**18**	46	38	(8)
Medical Oncology	4	4	0	4	7	**3**	6	1	(5)	18	30	**12**	3	4	**1**	4	2	(2)
Cardiology	8	15	**7**	9	19	**10**	13	17	**4**	39	97	**58**	6	3	(3)	8	19	**11**
Cardiothoracic Surgery	2	1	(1)	2	3	**1**	2	0	(2)	7	10	**3**	1	0	(1)	1	0	(1)
Mental Health:																		
Child/Adolescent Psych	3	2	(1)	4	4	**0**	3	3	**0**	16	11	(5)	3	0	(3)	7	7	**0**
Forensic Psychiatry	0	0	**0**	12	0	(12)	0	0	**0**	12	0	(12)	0	0	**0**	7	0	(7)
General Psychiatry	19	16	(3)	21	11	(10)	30	5	(25)	88	70	(18)	15	7	(8)	18	13	(5)

2025 Specialist Analysis	Kurzeme			Latgale			Periga			Riga			Vidzeme			Zemgale		
	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap	Need	Estimated	Gap
Obstetrics & Gynae	45	32	(13)	48	23	(25)	75	44	(31)	123	158	**35**	34	35	**1**	43	22	(21)
Medical Oncology	4	0	(4)	4	6	**2**	6	1	(5)	17	29	**12**	3	3	**0**	3	2	(1)
Cardiology	8	6	(2)	8	9	**1**	13	8	(5)	38	80	**42**	6	3	(3)	8	13	**5**
Cardiothoracic Surgery	1	1	**0**	2	2	**0**	2	0	(2)	7	6	(1)	1	0	(1)	1	0	(1)
Mental Health:																		
Child/Adolescent Psych	3	0	(3)	3	4	**1**	3	0	(3)	15	8	(7)	3	0	(3)	6	7	**1**
Forensic Psychiatry	0	0	**0**	11	0	(11)	0	0	**0**	11	0	(11)	0	0	**0**	6	0	(6)
General Psychiatry	18	16	(2)	19	9	(10)	30	4	(26)	86	56	(30)	14	4	(10)	17	7	(10)

Annex 22: Detailed Services by Different Level Hospitals

Type of Hospital	Services	Explanation
	Minimum	
	Optimum	
Level I	• Anesthetics • General Medicine • General Surgery • Obstetrics and Gynecology • Pediatrics • A&E • X-Rays and ultrasound • Clinical Laboratory • Acute psychiatry • Physiotherapy	The first level of hospital provides inpatient and outpatient services, such as general surgery, paediatrics, OBGYN, and internal medicine. These facilities also provide level III emergency services. The proposed distribution aims to give equal geographical access to all population within an hour distance.
Level II	• Anesthetics (including intensive care) • General Medicine • General Surgery • Obstetrics and Gynecology • Pediatrics • A & E • Cardiology • Physiotherapy • X-Rays • Ultrasound • CT scan • Clinical laboratory • Trauma and orthopedic surgery • Acute psychiatry • Gastroenterology • Infectious disease • Urology • Nephrology (Dialysis) • Neurology • Neonatology • MRI	When health needs are greater than those that can be solved at Level 1, Level 2 hospitals in addition to the services offered by Level 1, increase the portfolio and complexity of services involving specialties such as cardiology and physiotherapy. Besides, emergency care corresponds to level II. As in the previous level, access to hospitals this level is less than one hour
Level III	• Anesthetics (including intensive care)	

Type of Hospital	Services	Explanation
	• General Medicine • General Surgery • Obstetrics and Gynecology • Pediatrics • Trauma and orthopedic surgery • A & E • Acute psychiatry • Cardiology • Infectious diseases • Neurology • Endocrinology • Pulmunology • Physiatrist • Physiotherapy • X-Rays • Ultrasound • CT scan • MRI • Clinical Laboratory • Pathology laboratory • Gastroenterology • Hematology • Urology • Nephrology (Dialysis) • Geriatrics • Rheumatology • Dermatology • Ophthalmology • ENT • Cardiovascular surgery • Maxillofacial surgery • Pediatric surgery • Thoracic surgery • Burn Unit • Reconstructive surgery • Neurosurgery • PET (Only for one center of excellence)	The third level of hospital care includes the first and second levels plus a level I emergency service endocrinology, pulmonology, pathology, radiation therapy, and angiography. Due to location there are Level 2 hospitals that can provide some of third level services and gives access in less than an hour to the population.

Annex 23 List of Hospitals that participated in the investment and equipment needs survey.

Facility Name	Received/Not received
Liepaja Regional Hospital	Received
Regional Hospital Of Northern	Received
Kuldiga hospital	Not received
Saldus Medical Center	Not received
Seaside Hospital	Received
Daugavpils Regional Hospital	Received
Rezeknes Hospital	Received
Preili Hospital	Received
Kraslava Hospital	Received
Livani Hospital	Received
Ludza medical center	Received
Daugavpils Neuropsychiatric Hospital	Received
Jurmala Hospital	Received
Ogre District Hospital	Received
Tukums hospital	Received

Sigulda Hospital	Received
University Children's Hospital	Received
Pauls Stradinš Clinical University Hospital	Received
Eastern Clinical University Hospital of Riga	Received
Child Mental hospital "Ainaži"	Received
National Rehabilitation Centre of "Vaivari"	Received
Riga Maternity Hospital	Received
Psychiatry and Addiction Center of Riga	Received
Riga Hospital Nr. 2.	Not received
Traumatology and Orthopedics Hospital	Received
Vidzeme Hospital	Received
Madona Hospital	Received
Balvi and Gulbene hospital association	Received
CESU Clinic	Not received
Aluksne hospital	Received
Priekuli Hospital	Not received
Smiltene Red Cross hospital	Not received
Straupe Addiction Hospital	Received
Strenci Mental Hospital	Received
Jelgava City Hospital	Received
Jekabpils Regional Hospital	Partialy
Dobele Hospital	Received
Aizkraukle hospital	Received
Bauska hospital	Received
Akniste hospital	Received
Gintermuiža Hospital	Received