HEALTH LABOUR MARKET ANALYSIS IN BANGLADESH 2021

Health Labour Market Analysis in Bangladesh 2021

Human Resources Branch
Health Services Division
Ministry of Health and Family Welfare

In collaboration with
World Health Organization Bangladesh

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- Members of the Technical Expert Group (TEG) and Technical Support Group (TSG) for advising guidance and monitoring of the assessment (attached in the Annex).

Secretary
Health Services Division
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Government of the People's Republic of Bangladesh

Foreword

It is a great pleasure to publish the report of the Health Labour Market Analysis in Bangladesh 2021. The report is a product of a long and earnest effort of the health workforce team in the Ministry of Health and Family Welfare and WHO Bangladesh.

A capable and responsive health system is a prerequisite for any healthy and wealthy nation and performance of the health system greatly depends on a competent and motivated health workforce. This has been observed during the management of COVID-19 pandemic. Therefore, supply and distribution of a competent and well motivated health workforce in adequate number for ensuring quality healthcare to all is a priority.

WHO's framework for health labour market analysis (HLMA) was used for the first time in Bangladesh to assess the dynamics between demand and supply of various categories of health workforces. It provides need-based estimates of the health workforce including doctors, nurses, midwives, medical assistants and technologists-how many health workforce we have and how many we could produce by 2030.

The report shows that Bangladesh has made significant progress between 2014 and 2021 by increasing the density of doctors, nurses, and midwives per 10,000 population from 5.4 to 11.7. However, the country is still far behind the global median of 48.6.

Bangladesh is committed to achieve the Sustainable Development Goals (SDGs) along with Universal Health Coverage (UHC) by 2030. The country is also committed to combat the COVID-19 pandemic through nation-wide vaccination programme and public awareness campaigns against the disease. We need more and more qualified health workers to fight not only against the virus but also other diseases including the diseases caused by the adverse effects of climate change. We need to keep tracking our progress on demand and supply of various categories of health workforce as well as to create a labour market where every health worker will have a job and inspired to serve the people with full commitment.

I am sure the report will add value to the knowledgebase of health workforce in Bangladesh. I thank WHO for their technical support throughout this activity. I also extend my sincere thanks to all who directly or indirectly involved in development and publication of the report. Now it is time to act on the recommendations. All actors and agencies need to come forward and work together in this regard.

Wish you all the best!

………………………………
Dr. Md. Anwar Hossain Howlader

WHO Representative to Bangladesh

World Health
Organization
Bangladesh

Message

While looking for an innovative approach to address health workforce issues and challenges, especially in low-and middle-income countries, WHO introduced a health labour market analysis (HLMA) framework in the Global Strategy on Human Resources for Health: Workforce 2030. Its importance was highlighted by the UN High-Level Commission's report on Health Employment and Economic Growth (2016). It has been an honor for WHO to have supported the Ministry of Health and Family Welfare (MOHFW) of Bangladesh in developing and publishing the "Health Labour Market Analysis in Bangladesh 2021" report.

I congratulate the MOHFW for taking this initiative and I believe this report provides a comprehensive overview of the health workforce in Bangladesh. It examines the variation in supply of the doctors, nurses, midwives, technologists, and other priority categories of the health workforce and its implication on advancing Universal Health Coverage (UHC) in Bangladesh. By doing so, it demonstrates the projection of doctors, nurses, and other priority categories of health workforce in Bangladesh by 2030.

The findings insist the government and relevant stakeholders to strengthen its planning and management processes and design a health workforce strategy to enhance the health workforce's availability, accessibility, and quality to respond to population's health need, and to meet the global median of 48.6 doctors, nurses, and midwives per 10,000 population.

While appreciating various initiatives by MOHFW in addressing the HRH related challenges in the country, WHO would aspire to see periodic initiatives to monitor the trends in supply and demand of health workforce in the market. The HLMA effort has already offered a platform for policymakers, researchers, and other stakeholders to debate HRH issues and propose cost- effective HRH policy reforms in Bangladesh.

I must thank all the contributors to the report. I sincerely acknowledge the Foreign, Commonwealth, and Development Office (FCDO) of the Government of the United Kingdom for its financial support and the Human Resources Development Unit at the MOHFW for undertaking this study.

WHO is committed to working closely with the Government of Bangladesh and all the public and private partners to strengthen the quantity and quality of health workforce towards advancing Sustainable Development Goals and UHC by 2030 in Bangladesh.

Dr Bardan Jung Rana

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Acknowledgements

I am pleased to acknowledge the contribution of the concerned stakeholders for their contribution to the report "Health Labour Market Analysis in Bangladesh 2021". This report is the result of a collaborative effort between the Health Services Division (HSD) of the Ministry of Health and Family Welfare (MOHFW) and the World Health Organization (WHO) Bangladesh.

The production of health workforce is time-consuming, technical, and highly expensive, which demands the best utilization of them in order to ensure maximum use of limited resources of the country. Therefore, it is important to take informed policy decisions regarding the production and utilization of country's health workforce.

This report critically analyzes the need, demand and supply of the priority categories of health workforce in the context of Universal Health Coverage (UHC) in light of health labour market analysis approach. It investigates the dynamic relationship between the stock, supply, demand and need of health workers and makes several pragmatic policy recommendations based on this analysis. I believe the report will significantly contribute to take pragmatic and informed policy decisions regarding the production and employment of health workforce, particularly doctors, nurses and other priority categories of health workforces in Bangladesh.

Many institutions and individuals were involved in conceiving this project and preparing the report. I acknowledge their contributions with deep appreciation. Specifically, I would like to express my sincere gratitude to the Honorable Minister, MOHFW Mr. Zahid Maleque, MP for his inspiration and thoughtful guidance. I would also like to express my gratitude to Dr. Md. Anwar Hossain Howlader, Secretary, HSD and Mr. Lokman Hossain Miah, former Senior Secretary, HSD for their continuous support and advice. My sincere gratitude goes to the members of the Technical Expert Group and Technical Support Group as well as to the authors and contributors of the report. Without their contributions the report might never come into fruition.

I thank Dr. Bardan J. Rana, WHO Representative to Bangladesh and the entire HSD HRD team and WHO HRH team who worked hard in supporting us to make this report final. I acknowledge with appreciation the financial contribution of FCDO extended to the project. I thank all Director Generals and head of agencies under MOHFW for extending their wholehearted support in bringing the report at this stage. Finally, I like to express my deep sense of appreciation to my colleagues, fieldworkers, and everyone related to this project for their dedication and hard work. I hope this report will be beneficial for all users.

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Md. Saidur Rahman

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Acronyms

AFPI	Assistant Family Planning Inspector
AHI	Assistant Health Inspector
APR	Annual Program Review
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BMDC	Bangladesh Medical and Dental Council
BNMC	Bangladesh Nursing and Midwifery Council
BSCO	Bangladesh Standard Classification of Occupation
CHCP	Community Healthcare Provider
CI	Confidence Interval
CME	Centre for Medical Education
DGDA	Directorate General of Drug Administration
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DGME	Directorate General of Medical Education
DGNM	Directorate General of Nursing and Midwifery
ESP	Essential Service Package
FCDO	Foreign, Commonwealth & Development Office
FPI	Family Planning Inspector
FWA	Family Welfare Assistant
FWV	Family Welfare Visitors
GAC	Global Affairs Canada
GOB	Government of Bangladesh
HA	Health Assistant
HI	Health Inspector
HLMA	Health Labour Market Analysis
HR	Human Resources
HRD	Human Resources Development
HRH	Human Resources for Health
HRIS	Human Resource Information System
HRM	Human Resources Management
HSD	Health Services Division
HTR	Hard to Reach
HWF	Health Workforce
ILO	International Labour Organization
MEFWD	Medical Education And Family Welfare Division
MOHFW	Ministry of Health and Family Welfare
NHWA	National Health Workforce Account
PHC	Primary Healthcare
PSU	Primary Sampling Unit
SACMO	Sub Assistant Community Medical Officer
SDG	Sustainable Development Goals
TBA	Traditional Birth Attendants
TEG	Technical Expert Group
TOR	Terms of Reference
TSG	Technical Support Group
UHC	Universal Health Coverage
USAID	United States Agency for International Development
WHO	World Health Organization

Executive Summary

The aim of this report is to respond to two critical policy questions raised in the "Conducting Health Labour Market Analysis" concept note prepared by the Ministry of Health and Family Welfare in collaboration with the WHO[1]:

1. Is there an oversupply or undersupply of the priority categories of health workforce in the context of Universal Health Coverage (UHC) in Bangladesh?

2. How many doctors, nurses and other priority categories of health workers should Bangladesh produce in the next 10 years?

The report adopts a labour market analysis approach to inform these policy questions. It investigates the dynamic relationship between the stock, supply, demand and need of health workers and makes several pragmatic policy recommendations based on this analysis.

Concerning supply, there is an estimated total density is 49.01 health workers per 10,000 population, including a high proportion of unrecognized providers. For the density of recognized workers is 33.17 per 10,000 population and the others are unrecognized providers. There are important geographical variations in densities; for recognized health workers, it is 73.72 in urban areas and 11.48 in rural areas. The total supply of doctors was 76,867 in 2018; for nurses it was 73,119, and for B Pharm and Diploma pharmacists 14,454. The nurse per doctor ratio is inferior to one, which raises the issue of low efficiency in the composition of the workforce. A majority of health workers work in the private sector.

A high proportion of unfilled sanctioned positions in the public sector indicates an important undersupply of doctors, Sub-Assistant Community Medical Officers (SACMOs), dentists, medical technologists and midwives. Available data do not permit to conclude to the existence or the absence of shortages in the private sector. In 2020, WHO published a *Health Workforce Support and Safeguards List* of 47 countries that had health workforce densities below the global median (i.e. 48.6 per 10,000 population); this list includes Bangladesh[2], indicating an important needs-based shortage, e.g., a numerical gap between the available workforce and that required to deliver the services corresponding to the needs of Bangladeshis.

As to the second policy question on production, the report considers four scenarios to project the number of health workers available in 2030:

- **Scenario 1:** Maintain the production as it is, both quantitatively and qualitatively, the projections assume a 80% proportion of graduates entering the register, and 4% of leavers (retirees and others).

- **Scenario 2:** Augment the production of graduates by 10% or 20%, making the same assumptions to those of scenario 1.

- **Scenario 3:** Maintain the current production at its current level and bring the proportion of graduates (all categories) who enter the domestic health labour market to 95%. To achieve this objective, the education authorities need to implement interventions informed by rigorous analysis of the causes of the low rates of registration of new graduates.

- **Scenario 4**: In addition to measures proposed in scenarios 2 and 3, adopt objectives and strategies to reduce attrition, to improve productivity and to improve access to health workers of rural, hard-to-reach and urban poor populations.

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[1] MOHFW & WHO, 2018, Concept Note: Conducting Health Labour Market Analysis in Bangladesh, Dhaka, Ministry of Health and Family Welfare (Bangladesh), World Health Organization-Bangladesh

[2] https://cdn.who.int/media/docs/default-source/health-workforce/hwf-support-and-safeguards-list8jan.pdf?sfvrsn=1a16bc6f_5

Under all scenarios, Bangladesh would remain a country with a qualified workforce not quantitatively sufficient to meet the needs of its population. The report insists that assessing future health workers requirements is not only projecting numbers: it is also estimating needs in terms of skills-mix, competencies, working conditions, productivity and expected quality, hence the importance of defining explicit objectives. The formulation of realistic objectives for "the next 10 years" therefore requires a careful assessment of the feasibility of changes (social/political acceptability, affordability –how services and education will be financed, capacity).

Recommendations

The report makes several recommendations based on the analyses and findings. The report recommends the use of standard indicators to collect data from all available sources regardless of sector. National Health Workforce Accounts (NHWA) provide a framework for this; the strengthening of the capacity of professional councils, as data collectors, and of analysts would make this database a powerful tool for planning purposes. The vision for a Digital Bangladesh by 2021 offers an opportunity to develop a robust and inter-operable HRIS in the MOHFW and its departments.

Regulation: Although regulations safeguarding professional standard and quality and protection of people's healthcare rights exist in Bangladesh, there is no systematic data collection on their implementation, nor on the nearly one-third of the active health workforce that is unqualified and informal. The report suggests the development of strategies to track and monitor these workers and bring them under a regulatory and capacity development framework that mitigates the risks associated to the utilization of their services.

Planning: the report suggests that the Government put in place a planning process and design a bundle of evidence-informed short-term, medium- term and long- term interventions to improve the availability, accessibility and quality of the health workforce and the effective functioning of the health labour market. Such planning can be the responsibility of the MOHFW in collaboration with other relevant government bodies.

Supply of health workers: the report suggests a gradual increase of the total supply of all categories of qualified health workers, by increasing the capacity of production of training institutions and by augmenting the proportion of graduates who enter the health labour market. Improving productivity would increase the capacity of the health workforce to deliver a higher volume of services, as well as prioritizing the deployment of the workforce at primary health care level, as a strategy to meet the majority of health needs.

Demand of health workers: the report suggests the adoption of measures to reduce vacancy rates in the public health sector, for example from about 32% on average to below 15%, and evidence-informed policies to improve health workforce development, attraction, recruitment and retention in areas with unmet needs (MOHFW & WHO 2021).

Introduction

This report intends to respond to two critical policy questions raised in the "Conducting Health Labour Market Analysis" Concept Note prepared by the Ministry of Health and Family Welfare, in collaboration with the WHO (2018). These questions are :

1. Is there an oversupply or undersupply of the priority categories of health workforce in the context of Universal Health Coverage (UHC) in Bangladesh?

2. How many doctors, nurses and other priority categories of health workers should Bangladesh produce in the next 10 years?

The report adopts a labour market analysis approach; it consists in investigating the dynamic relationship between the supply, demand and need of health workers. Supply refers to individuals employed by a provider organization or are self-employed in the health sector, plus those not employed, but willing to work; together they constitute the total number of health workers available in a country. Demand is the number of jobs available, and need is the number of workers required to attain a country's health objectives, which in the case of Bangladesh is universal health coverage (UHC). In response to the first question, the report documents and analyzes the health workforce situation in the public sector[3] at national and sub-national levels and then estimates in the private sector, including its informal part, e.g. unqualified and unrecognized workers[4]. The response to the second question depends on how the supply (volume and composition of the workforce, i.e. the stock of health workers) and demand (objectives and priorities of the government and of the private sector employers) will evolve. The report presents different scenarios of such possible evolution, with a view to help health workforce planning.

Method of work, data collection and sources

Methods of work included the analysis of health workforce data and information, including education and employment statistics a rapid search of the published literature, and interviews of key-informants. For the public sector, the main source is the Health Services Division (HSD) of the Ministry of Health and Family Welfare (MOHFW). For the private sector, the information comes mainly from a National Survey in 2019 as part of a health labour market analysis (HLMA), with the purpose of estimating the composition and characteristics of the health workforce, covering the public, private, and informal sectors (MOHFW & WHO 2021). Available data present limitations that the report took into consideration in its assessment of health labour market in order to present as accurate as possible a portrait of the health workforce in Bangladesh. Interviewees included the State Minister of Health and Family Welfare, Secretary of Medical Education and Family Welfare Division, Additional Secretary (Admin) of the Health Services Division, Director (Medical Education and Health Manpower Development) of the Directorate General of Medical Education, Secretary, Ministry of Public Administration, Vice-chair BRAC, Registrars of the Bangladesh Medical and Dental Council, and Nursing and Midwifery Council.

A MOHFW Expert Group (Steering Committee) oversaw the HLMA process. It included representatives from Ministry of Health and Family Welfare (MOHFW), Ministry of Expatriate's Welfare and Overseas Employment, Ministry of Public Administration, Foreign Commonwealth Development Office of the UK, Global Affairs Canada, USAID and WHO Bangladesh (formation of advisory committee is attached in the annex). The MOHFW created a technical working group to supervise the 2019 survey (Attached in the annex). A national consultant prepared a background paper on the key elements of the health labour market in Bangladesh.

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[3] The "public" sector includes all government components; "private" includes the private for-profit, the private not-for-profit and the informal sectors.
[4] 'Unqualified' refers to workers who have no relevant education and training and are not included in any classification of ISCO. They are labeled 'unrecognized' because they do not have the recognition of government. (MOHFW & WHO 2021, p.5).

Structure of the report

Section 1 addresses the first question about the current supply of health workers. Section 2 is an attempt to assess future demand and needs for health workers. Section 3 is an analysis and discussion of the observations made in the previous two sections and the formulation of policy recommendations.

Two policy questions

Question 1: Is there an oversupply or undersupply of the priority categories of health workforce in the context of universal health coverage (UHC) in Bangladesh?

An oversupply or surplus exists when the number of health workers willing to work is superior to jobs available. The result is unemployment or underemployment, e.g. when workers only find part-time work, when they would be willing to work full-time. There is undersupply, or shortage when demand for health workers is not met and funded positions remain unfilled. Unemployment can occur concurrently with shortages, when workers are not willing to accept the conditions of unfilled jobs and prefer to remain unemployed.

The reference to the context of UHC in Question 1 implies that the analysis of supply should consider the health workforce requirements to ensure that the whole population has access to a competent and motivated health workers. If the current supply does not meet such requirements, there is a deficit or a needs-based shortage of health workers.

Question 1 is about "the priority categories of health workforce" but does not define them. The report assumes that this refers to qualified health workers and tries to cover all categories. However, given that in Bangladesh unqualified and informal workers deliver a significant proportion of health services, the analysis includes them.

The supply of health workers in the formal sector comes from two main sources: graduates from domestic education institutions (the education pipeline), and foreign-trained workers. The latter include foreigners immigrating to Bangladesh and Bangladeshis trained abroad and returning. The supply is a sub-component of the stock of health workers, which is the total number of health workers potentially available in a country. It includes the active health workforce, i.e. workers participating in the health labour market (supply), plus those who are trained as health workers, but do not participate for some reason, such as having opted for work in another labour market (education, industry), working in a management position in government or in a provider organization, or early retirement.

This section is divided in four parts: an overview of the "sources" of health workers (education institutions and foreign-trained), a description of supply in the public sector, followed by one of the supply in the private sector and an overview of the total supply.

Education pipeline and foreign-trained workers

Typically, the production of education institutions and inflows of foreign-trained workers determine the various dimensions of the health workforce: its size and composition (availability), its distribution by levels of care, type of facility and geographical zones (accessibility) and the competencies they acquire, their alignment with population needs and how workers apply them (acceptability, quality coverage). Data to 2016 for health worker education institutions are from a mapping study conducted by the MOHFW and WHO (2018) and more recent ones are from the MOHFW statistics. The review of these data led to the following observations:

Educational institutions

- There has been a major increase of the number of health worker education institutions after 2010, (mainly in the area of nursing and midwifery) (**Table 1**).

Table 1: Total number of health worker education institutions (public including armed forces, and private), 2010, 2016, 2020			
Type of Institution	**2010**	**2016**	**2020**
Medical Colleges	62	105	113
Dental Colleges	17	35	35
Nursing Colleges	30	64	174
Nursing Institutes (Nursing & Midwifery)	57	157	223
Medical Assistant Training Schools (MATS)	47	208	209
Institutes of Health Technology (offering DMT in pharmacy[5])	61 (35)	105 (51)	110 (54)
No. of Universities offering B Pharm[4]	32	36	41
Total	**306**	**710**	**905**

Sources : (1) Mapping of Health Professional Education Institutions in Bangladesh, DGHS & WHO Bangladesh 2018
    (2) Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

- This expansion translated in increased numbers of seats and of graduates. In public medical colleges, the number of seats available went from 2920 before 2010 to 4475 in 2020 (+53%); in private colleges, the figures are 3669 before 2010 and 6597 in 2020 (80%). Public dental colleges offered 216 seats before 2010 and 532 (+146%) in 2020 and private ones 740 before 2010 and 1405 (+90%) in 2020.

- In 2020, private education institutions offer more seats in total, from 59% of seats for MBBS studies to 89% for BSc Nursing and 94% for MATS (**Table 2**). Between 2008 and 2018 (last year available), private colleges produced 52% of the 55,442 medical graduates in the country. This proportion is likely to keep increasing as students from colleges created since 2015 are starting to graduate.

Table 2: Number of public and private sector health worker education institutions and seats available, 2020							
Institutions/ Sector	**Medical colleges (seats #)**	**Dental colleges (seats #)**	**Nursing colleges/BSc (seats #)**	**Nursing Institutes/ Diploma (seats #)**	**Midwifery Institutes (seats #)**	**Medical Assistant Training Schools (seats #)**	**Technology Institutes (seats #)**
Public	38 (34%), 4475 (41%)	9 (26%), 532 (27%)	32 (18%), 1935 (11%)	44 (20%), 3380 (28%)	41 (37%), 1050 (28%)	9 (4%), 816 (6%)	13 (12%), 2526 (20%)
Private	75 (66%), 6594 (59%)	26 (74%), 1405 (73%)	142 (82%), 15145 (89%)	179 (80%), 8705 (72%)	71 (63%), 2690 (72%)	200 (96%), 13185 (94%)	97 (88%), 8865 (80%)
Total	**113 (11069)**	**35 (1937)**	**174 (17080)**	**223 (12085)**	**112 (3740)**	**209 (14001)**	**110 (11391)**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

- There is no alignment between the geographical distribution by division of education institutions and of seats available with the distribution of the population, (**Table 3**). There is a concentration of seats in Dhaka for all occupational categories; the Division has 18% of the population of the country, but 65% of seats in dental colleges, 52% in health technology institutes, 49% in medical colleges, 46% in nursing colleges, 41% in MATS, and 31% in nursing institutes. Only Mymensingh has a number of seats corresponding to its proportion of the total population.

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[5] Source: Pharmacy Council of Bangladesh, 2021.

- Private MATS offer 93.8% of total seats, nursing colleges 88.6%, health technology institutes 78%, dental colleges 72.5%, nursing institutes 72%, and medical colleges 59.3%.

Table 3: Number of public and private health worker education institutions, number and percentage of seats, by division, 2020

Division (% of population)	N. medical colleges, seats and % of total seats			N. nursing colleges, seats and % of total seats			N. nursing institutes, seats and % of total seats			N. Midwifery institutes, seats and % of total seats		
	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private
Rajshahi (22.12%)	12 (1110, 10.38%)	4 (545, 12.5%)	8 (565, 8.9%)	28 (2585, 15.13%)	5 (175, 9%)	23 (2410, 15.9%)	42 (2215, 18.33%)	6 (510, 15.1%)	36 (1705, 19.6%)	16 (465, 12.4%)	7 (175, 16.7%)	9 (290, 10.8%)
Dhaka (17.82%)	55 (5142, 48.6%)	10 (1257, 28.9%)	45 (3885, 61.2%)	77 (7785, 45.58%)	10 (560, 28.9%)	67 (7225, 47.7%)	69 (3745, 30.99%)	10 (810, 24%)	59 (2935, 33.7%)	40 (1425, 38.1%)	10 (275, 26.2%)	30 (1150, 42.8%)
Chattogram (14.06%)	17 (1391, 12.54%)	6 (651, 15%)	11 (740, 11.7%)	20 (1345, 7.87%)	5 (350, 18.1%)	15 (995, 6.6%)	16 (1110, 9.18%)	5 (465, 13.8%)	11 (645, 7.4%)	12 (345, 9.2%)	7 (175, 16.7%)	5 (170, 6.3%)
Rangpur (13.92%)	7 (800, 7.48%)	3 (460, 10.6%)	4 (340, 5.4%)	14 (1460, 8.55%)	4 (425, 22%)	10 (1035, 6.8%)	35 (1855, 5.54%)	5 (305, 9%)	30 (1550, 17.8%)	13 (430, 11.5%)	4 (100, 9.5%)	9 (330, 12.3%)
Sylhet (11.21%)	6 (743, 6.95%)	3 (331, 7.6%)	3 (412, 6.5%)	10 (1300, 7.61%)	1 (125, 6.5%)	9 (1175, 7.8%)	10 (475, 3.93%)	2 (150, 4.4%)	8 (325, 3.7%)	8 (285, 7.6%)	3 (75, 7.1%)	5 (210, 7.8%)
Khulna (9.71%)	10 (755, 7.06%)	6 (480, 11%)	4 (272, 4.3%)	8 (530, 3.1%)	4 (50, 2.6%)	4 (480, 3.2%)	26 (1400, 11.58%)	8 (635, 18.8%)	18 (765, 8.8%)	8 (250, 6.7%)	5 (125, 11.9%)	3 (125, 4.6%)
Barishal (6.83%)	2 (331, 3.09%)	2 (281, 6.5%)	0	10 (1125, 6.59%)	2 (125, 6.5%)	8 (1000, 6.6%)	12 (670, 5.54%)	5 (355, 10.5%)	7 (315, 3.6%)	8 (275, 7.4%)	4 (100, 9.5%)	4 (175, 6.5%)
Mymensingh (4.32%)	4 (475, 4.44%)	3 (345, 7.9%)	1 (130, 2%)	7 (950, 5.56%)	1 (125, 6.5%)	6 (825, 5.4%)	13 (615, 5.09%)	3 (150, 4.4%)	10 (465, 5.3%)	7 (265, 7.1%)	1 (25, 2.4%)	6 (240, 8.9%)
BANGLADESH	**113 (10694)**	**38 (4350)**	**75 (6344)**	**174 (17080)**	**32 (1935)**	**142 (15145)**	**223 (12085)**	**44 (3380)**	**179 (8705)**	**112 (3740)**	**41 (1050)**	**71 (2690)**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Table 3 (ctd): Number of public and private health worker education institutions, number and percentage of seats, by division.

Division (% of population)	N. dental colleges, seats and % of total seats			N. MATS seats and % of total seats			N. health technology institutes, seats and % of total seats		
	Total	Public	Private	Total	Public	Private	Total	Public	Private
Rajshahi (22.12%)	4 (149, 7.69%)	1 (59, 11.1%)	3 (90, 6.4%)	45 (2932, 20.94%)	1 (102, 12.5%)	44 (2830, 1.5%)	22 (2028, 17.8%)	2 (357, 14.1%)	20 (1671, 18.8%)
Dhaka (17.82%)	21 (1260, 65%)	3 (205, 38.5%)	18 (1055, 75.1%)	78 (5714, 41%)	2 (204, 25%)	76 (5510, 41.8%)	55(5888, 51.69%)	4 (604, 23.9%)	51 (5284, 59.6%)
Chattogram (14.06%)	2 (125, 6.45%)	1 (60, 11.3%)	1 (65, 4.6%)	13 (819, 5.9%)	2 (154, 18.9%)	11 (665, 5%)	8 (727, 6.38%)	1 (277, 11%)	7 (450, 5.1%)
Rangpur (13.92%)	2 (152, 7.84%)	1 (52, 9.8%)	1 (100, 7.1%)	22 (1410, 10%)	0	22 (1410, 0.7%)	5 (697, 6.12%)	1 (277, 11%)	4 (420, 4.7%)
Sylhet (11.21%)	3 (117, 6.04%)	1 (52, 9.8%)	2 (65, 4.6%)	7 (500, 3.5%)	0	7 (500, 3.8%)	3 (357, 3.13%)	1 (257, 10.2%)	2 (100, 1.1%)
Khulna (9.71%)	0	0	0	25 (1581, 11.29%)	4 (356, 43.6%)	21 (1225, 9.3%)	6 (707, 6.21%)	2 (377, 14.9%)	4 (330, 3.7%)
Barishal (6.83%)	1 (52, 2.68%)	1 (52, 9.8%)	0	6 (375, 2.67%)	0	7 (375, 2.8%)	5 (527, 4.63%)	1 (277, 11%)	4 (250, 2.8%)
Mymensingh (4.32%)	2 (82, 4.23%)	1 (52, 9.8%)	1 (30, 2.1%)	12 (670, 4.7%)	0	12 (670, 5.1%)	6 (460, 4.04%)	1 (100, 4%)	5 (360, 4.1%)
BANGLA-DESH	**35 (1937)**	**9 (532)**	**26 (1405)**	**209 (14001)**	**9 (816)**	**200 (13185)**	**110 (11391)**	**13 (2526)**	**97 (8865)**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Students

- The pool of candidates seeking admission (demand) for health worker education is very large and the further expansion of the "production" would be possible; for example, there are 9 applicants per seat for admission to MBBS studies. Such expansion is possible only if the capacity of education institutions permits, in terms of availability of infrastructures equipment clinical training settings, educators and trainers, which is a major challenge. Any expansion needs to ensure that quality of education is maintained.

- The "production" of medical doctors and other professionals, namely nurses and midwives, has increased nationally in the last decade thanks to the growth of the education private sector **(Table 2).**

- In public institutions, in 2020, there were more seats for nurses than for doctors (4475 vs 5315, of which 1935 for BSc nursing). When public and private seats for BSc nursing are added, their number is still superior to that of total medical seats, 17080 vs 11069 (**Table 2**).

- Between 2008 and 2018, 55% of all medical graduates were women (52% in 2008 and 59% in 2018). During that period, an equal number of men and women graduated from public colleges; the proportion of women graduates was 59% in private colleges (**Table 4**). The trend is similar for dentists. Between 2007 and 2016, 66% of BDS graduates were women; the proportion from public dental colleges was 56% and of 79% from private ones.

Table 4: Number of graduates, by sex, public and private medical colleges, 2008-2018			
Sector	**Male**	**Female**	**Total**
Public	13,120 (50%)	13,034 (50%)	26,154 (100%)
Private	12,030 (41%)	17,238 (59%)	29,268 (100%)
Total	**25,150 (45%)**	**30,272 (55%)**	**55,422 (100%)**

Sources: (1)   Mapping of Health Professional Education Institutions in Bangladesh, DGHS & WHO Bangladesh 2018
(2)   Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

- Between 2007 and 2016, there have been 3516 DMT graduates in pharmacy, 1048 in public IHT and 2468 in private ones; 36% were women. Admissions in 2016 were 268 in public IHT, and 72% in private ones. Data for 2020 are not available.

- For the years 2009-2018, only 8 out 10 MBBS and 3 out 4 BDS graduates were registered. Part of the explanation is that foreign students returned to their country of origin and did not need to register in Bangladesh (**Table 5**). However, they represent less than 2% of graduates. For MBBS graduates, another 18% of not registered remains to be explained. Reasons for the gap may be a slow registration process, which would account for the non-registration of graduates of the last 1-2 years. Other explanations would be that some graduates go abroad to specialize and end up not returning[6], or that others simply do not enter the labour market, like has been reported for female medical students who never enter into the profession after graduation (Hossain et al 2019). It can be reasonably assumed that the same trend exists in other occupations, for example in nursing and dentistry.

Table 5: Total number of graduated and registered/licensed in 2009-2018 (10 years)		
Degree	**Graduated**	**Registered**
MBBS	53036	42470 (80%)
BDS	7529	5901 (78%)
BSc Nursing	5578	4742 (85%)

Sources: (1) Mapping of Health Professional Education Institutions in Bangladesh, DGHS & WHO Bangladesh 2018
(2) Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW
(3) HRH Data Sheet 2019, HR Branch, HSD, MOHFW

- Important additional data needed to complete this assessment include:

  ✔ average duration of studies or proportion of students who complete their studies in the prescribed number of years

  ✔ attrition rates (number of graduates/admissions) and causes by program (average over the last 10 years available)

Faculty

- Faculty data are available only for public institutions (medical colleges, MATS, institutes of health technology, colleges and institutes of nursing and midwifery). In medical colleges, only 56% of the 4478 sanctioned posts are filled; there are 34% unfilled positions of professor and 46% of associate professor. In dental colleges, 115 of 217 sanctioned posts are filled (53%), 76% in medical assistant schools, 74 % in institutes of health technology, and 35% in colleges and institutes of nursing and midwifery.

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[6] Graduates who plan to emigrate need to register first, as this will be a condition for the recognition of their qualifications by another country, such as USA, Canada, England, Australia and New Zealand that are preferred destinations.

- In government medical colleges the number of students per faculty member is about 9, assuming that all faculty members work full-time (denominator = 2515) and that the total number of students (numerator= 21750) is the number of seats available at entry multiplied by five years of studies (Table 3 & 6). In public nursing and midwifery institutes numbers are much higher because of the very low proportion of filled posts (Table 7).

- In order to enable an assessment of the capacity of production of education institutions, additional data are needed:

  - Number of faculty by education program, by occupational category, by age and sex, by full-time/part-time, and by last diploma obtained public/private sector (if possible, for-profit, not-for-profit)

  - Faculty/student ratios, by education program, by occupational category, public/private sector (if possible, for-profit, not-for-profit)

  - Information on faculty working in the public and the private sector.

Table 6: Total number of faculty members in 36 GOB medical colleges, 2021			
Category	Sanctioned posts	Filled posts (%)	Student/Faculty
Professor	599	205 (34%)	109
Associate Professor	1004	464 (46%)	48
Assistant Professor	1656	939 (57%)	24
Curator	44	31 (70%)	722
Lecturer	1175	879 (74%)	25
Total	**4478**	**2515 (53%)**	**9**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Table 7: Number of faculty members in public sector nursing and midwifery colleges and institutes, 2021			
Category	Sanctioned posts	Filled posts (%)	Student/Faculty
Principal	17	12 (82%)	1290
Vice Principal	5	1 (20%)	15,481
Professor	15	0	-
Associate Professor	23	2 (8%)	7441
Assistant Professor	39	1 (2,5%)	15481
Lecturer	89	48 (54%)	323
Total	**187**	**64 (35%)**	**241**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Comments from key informants included the following: "the country has potential to produce sufficient numbers of health professionals, but the quality of the institutions both public and private, is undermined by insufficient and poorly skilled faculties, especially in the basic science, outdated teaching methodologies and curricula selection. Regulatory authorities such as the Directorate General of Medical Education (DGME), Bangladesh Medical and Dental Council (BMDC), Bangladesh Nursing and Midwifery Council (BNMC), State Medical Faculty (SMF), respective public universities capacities have not grown with equal pace of fast expansion of education institutions. Compliance of regulatory requirements is seriously compromised, affecting the effective medical education."

Data and information on accreditation of programs and institutions and a more detailed analysis of the health worker education market would help validate this observation. The WHO *Health Labour Market Analysis Guidebook* includes a chapter that can guide such an analysis.

Foreign-trained health workers

The contribution of foreign-trained health worker to the supply, including Bangladeshi who trained abroad, appears negligible in the public sector and is unknown in the private sector. A labour force survey can help:

- quantify the number of foreign-trained workers by occupational category
- describe their demographic profile
- identify their country of training
- describe their professional profile (years in Bangladesh, work location, type of contract etc.)

Supply of health workers and demand in the public sector

The main public employer of health workers is the MOHFW. This section uses data from the MOHFW to characterize the state of the supply and demand of health workers in the public sector. The data do not include workers from other ministries (Home, Social Welfare, Local Government, Civil Aviation, and Defense); for example, these employ approximately 2300 doctors about 8% of all government employed doctors.

Composition of health workforce

- In 2019, the MOHFW employed 151532 individuals: 74985 in the Directorate General of Health Services (DGHS), 41282 in the Directorate General of Family Planning (DGFP) and 35265 in the Directorate General of Nursing and Midwifery (DGNM). DGHS, DGFP and DGNM collectively employed more than 95% of the total workforce under the MOHFW. In total, 58.6% were women; this proportion was 36.4% for doctors and 90 % for nurses. The number of nurses, including BSc and diploma, per doctor is 1.35; it is 1.04 if medical Sub-Assistant Community Medical Officers are added to doctors.[7]

Table 8: Health workers employed by the Ministry of Health and Family Welfare (in DGHS, DGFP and DGNM), by sex and occupational category (2021)			
Health worker category	**Total**	**Male**	**Female**
Doctors	26,619	16919 (64%)	9700 (36%)
Dentists	829	467 (56%)	362 (44%)
Nurses (BSc and Diploma)	35,828	3582 (10%)	32246 (90%)
Sub-Assistant Community Medical Officers	7,927	5459 (69%)	2468 (31%)
Midwifery	1,145	0 (0%)	1145 (100%)
Medical Technologists	6,248	5276 (84%)	972 (16%)
Domiciliary Staff[8]	57,451	22071 (38%)	35380 (62%)
Alternative medicine	1,053	705 (67%)	348 (33%)
Pharmacists[9] (Category B)	1,744	1411 (81%)	333 (19%)
Total	**138,844**	**55890 (40%)**	**82954 (60%)**

Source : (1) Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW
        (2) Assessment of Healthcare Providers in Bangladesh 2021, HR Branch, HSD, MOHFW & WHO Bangladesh

- The major expansion of education institutions in the last decade contributes to building a young health workforce; 57.3% of doctors, 61% of dentists, 70% of nurses and 78% of midwives are less than 40 years old Notably, only 9.2 % of the doctors and 0.02% of the nurses are over 59 years old (**Table 9**).

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[7] HRH Data Sheet 2019

[8] Includes health inspector, assistant health inspector and health assistant

[9] The MOHFW recruits Category B (DMT) in Pharmacy. Category A is pharmacists with a bachelor's degree and Category C are Certified pharmacists. The latter run drug shops/pharmacies throughout the country. They receive around three-month training. The Pharmacy Council calls for application and conduct exams.

Table 9: Age distribution of health workers working under the Ministry of Health and Family Welfare by occupational category (%), 2021						
Category	**<25-29 (%)**	**30-39 (%)**	**40-49 (%)**	**50-59 (%)**	**>59 (%)**	**Total (N)**
Doctors	15.50	41.81	21.11	12.39	9.20	26695
Dentists	18.98	42.09	21.17	12.17	5.60	822
Nurses	30.85	30.60	22.95	15.58	0.02	30375
Midwives	74.12	8.98	13.37	3.42	0.11	935
Medical Technologists	4.60	32.40	31.22	31.73	0.05	3892
Sub-Assistant Community Medical Officer	13.90	51.46	17.24	16.74	0.66	3661
Pharmacists (Category B)	8.2	41.51	27.47	21.9	0.92	1744

Source : Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Availability and accessibility

- Nationally, the total density of health workers working under the MOHFW is approximately 5.48 per 10000 population. Data on densities by occupational category show that nurses (BSc and diploma) have the highest at 2.13, followed by doctors at 1.72, composed of 1.45 for generalists and 0.27 for specialists **(Table 10)**.

- Data on densities by administrative division (**Table 10**) indicates the highest concentration of doctors in the Dhaka Division (**Table 10**).

- This is in spite of various government measures to reduce imbalances in the geographical access to health workers, an issue discussed in the last part of the report.

- With the exception of SACMOs who all work in rural and hard-to-reach zones, between 50% and 75% of the other occupational categories work in urban zones, where 38% of the population live. Most importantly, 75.3% of the doctors and 75% of the nurses work in urban areas (**Table 11**).

- Between 50% and 75% of all occupational categories work in tertiary services, except for SACMOs who all work at primary care level (**Table 12**)

Table 10: Density by 10000 population of main categories of health workers employed by the Ministry of Health and Family Welfare (DGHS and DGNM), by administrative division (2021)						
Density/ Division	**Doctors (generalists/specialists)**	**Dentists**	**Nurses (BSc and Diploma)**	**Sub-Assistant Community Medical Officers**	**Medical tech-nologists**	**Pharmacist (DMT)**
Rajshahi	1.05 (0.85/0.23)	0.05	2.41	0.12	0.33	1.11
Dhaka	3.4 (3.0/0.4)	0.07	2.72	0.14	0.28	1.83
Chattogram	1 (0.78/0.22)	0.04	1.38	0.20	0.20	0.98
Rangpur	0.79 (0.71/0.2)	0.04	1.92	0.10	0.22	0.80
Sylhet	0.96 (0.76/0.2)	0.04	1.64	0.35	0.17	0.19
Khulna	0.99 (0.79/0.20)	0.04	2.04	0.22	0.24	1.12
Barishal	0.99 (0.79/0.19)	0.05	2.66	0.92	0.26	0.72
Mymensingh	0.98 (0.82/0.16)	0.05	1.62	0.49	0.22	2.05
Bangladesh	**1.72 (1.45/0.27)**	**0.05**	**2.13**	**0.24**	**0.25**	**1.09**

Source : Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Table 11: Distribution of main categories of health workers employed by the Ministry of Health and Family Welfare (DGHS and DGNM), in % by urban- rural-hard-to-reach geographical zones, 2021

Health worker category (% pop.)	Doctors	Dentists	Nurses (BSc and Diploma)	Midwives	Sub-Assistant Communi-ty Medical Officers	Medical tech-nologists	Pharmacists (Category B)
Urban (38%)	75.3%	57.8%	75.0%	0%	0%	51.1 %	68.89%
Rural and hard-to-reach (62%)	24.8%	42.2%	25.0%	100%	100%	48.9%	31.11%
Total	100% (25,926)	100% (870)	100% (35,828)	100% (2,549)	100% (3,661)	100% (3,892)	100% (1,744)

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Table 12: Distribution by level of services, main categories of health workers employed by the Ministry of Health and Family Welfare (DGHS and DGNM), in % (2021)

Level of services	Doctors	Dentists	Nurses (BSc and Diploma)	Midwives	Sub-Assistant Community Medical Officers	Medical tech-nologists	Pharmacists (Category B)
Primary	10.7%	28.4%	8.2%	100%	100%	30.6%	31.11%
Secondary	14.1%	13.8%	16.8%	0%	0%	18.3%	19.56%
Tertiary	75.3%	57.8%	75.0%	0%	0%	51.1%	49.33%
Total	100 % (25,926)	100% (870)	100% (33,616)	100% (2,549)	100% (3,661)	100% (3,892)	100% (1,744)

Source: Health Labour Market Analysis Data 2020-21, HR Branch, HSD, MOHFW

Demand

Demand for health workers in the public sector corresponds to the number of sanctioned posts offered by public employers. Data are available only for the MOHFW; these show important gaps between supply and demand for most categories of workers.

- **Table 13** shows unmet demand of more than one third of available positions for doctors, dentists, midwives and medical technologists. The gap is lower for nursing staff and the Directorate General of Nursing and Midwifery is the Directorate with less unfilled posts (**Table 14**). In total, clinical staff represent 61.3% of all unfilled posts; domestic staff and Alternative medicine account for the remainder. Among medical technologists, the highest percentage of unfilled posts is for physiotherapists (62.6%), followed by radiotherapists (58.1%) and pharmacists (50.5%) (Health Bulletin 2019). Data going back to 1997 show that similar shortages have been a constant feature in the Directorate General of Health Services (El-Saharty et al 2015, p.16).

Table 13: Health workers employed by the Ministry of Health and Family Welfare (DGHS and DGNM), by occupational category (2021)

Health worker category	Sanctioned posts	Filled posts	% Vacant posts
Doctors	40,162[10]	26,619[11]	33.7%[12]
Dentists	1,361	829	39.1%
Nurses	40,015	35,828	10.5%
Sub-Assistant Community Medical Officers	5,397	3,661	32.5%
Midwives	2,996	1,145	61.7%
Medical Technologists	6,406	3,892	39.2%
Domiciliary Staff	75,009	59,183	21.1%
Alternative medicine	1,906	1,053	44.7%
Pharmacists (Category B)	2,982	1,744	41.5%
Total	**176,234**	**133,210**	**24.0%**

Source : Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Table 14: Health workers employed by the three Directorates of the Ministry of Health and Family Welfare (MOHFW), 2019

Directorate	Sanctioned posts	Filled posts	Vacant posts (%)
Health Services (DGHS)	103743	74985	27.7%
Family Planning (DGFP)	52435	41282	21.3%
Nursing and Midwifery (DGNM)	37509	35265	6%

Source: HRH Data Sheet 2019, HR Branch, HSD, MOHFW

- As regards the geographical distribution of sanctioned and filled posts, data for the DGHS workforce show that the most advantaged division is Dhaka and the most disadvantaged are Rajshahi, Sylhet and Rangpur in that order. The other divisions are attributed a number of posts corresponding to their proportion of the total population (**Table 15**). Vacancy rates vary from 26% to 35% with a national average of 30.8%.

Table 15: Distribution of all workers employed by the DGHS (Ministry of Health and Family Welfare), by division (2021)

Division (% of total population in Bangladesh)	Sanctioned posts (% of total)	Filled posts (% of total)	Vacant posts	Vacancy Rate (%)
Rajshahi (22.12%)	21389 (11.56)	15729 (8.5)	5660	26.46 %
Dhaka (17.82%)	67369 (36.4)	46210 (24.97)	21159	31.41 %
Chattogram (14.06%)	27580 (14.9)	18191 (9.83)	9389	34.04 %
Rangpur (13.92%)	16926 (9.15)	11796 (6.37)	5130	30.31 %
Sylhet (11.21%)	10657 (5.76)	6622 (3.58)	4035	37.86 %
Khulna (9.71%)	17898 (9.67)	11805 (6.38)	6093	34.04 %
Barishal (6.83%)	11912 (6.44)	8141 (4.4)	3771	31.66 %
Mymensingh (4.32%)	11341 (6.13)	8337 (4.5)	3004	26.49 %
Total	**185072 (100)**	**126831 (68.53)**	**58241**	**31.47 %**

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

- A World Bank report suggested that among the factors that contribute to high vacancy rates is the complexity of the process of filling a vacancy and the time required to do so, due the number of government bodies involved. This implies that the MOHFW does not have full authority to hire, which implies that it does not fully control the process of filling vacant posts (El-Saharty 2015, pp. 16-17).

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[10] Generalists: 30214, Specialists: 9898
[11] Generalists: 22623, Specialists: 4164
[12] Generalists: 25%, Specialists: -58%

Supply of health workers and demand in the private sector

There is no systematic collection of detailed data on the health workforce in the private sector by professional councils. The most recent labour force survey (2016-2017) (BBS) aggregates all health workers in the category "Human health activities", which is too broad to characterize this component of the health labour market. In 2019, this paucity of data led the MOHFW, in collaboration with WHO, to conduct a survey of the health workforce, including the private sector supply of health workers (Ministry of Health, WHO, 2021). It used a sample of 133 geographical units, representative of the whole country. This section draws on this survey to present an estimation of the composition, availability and accessibility of the formal and informal private sector health workforce.

Availability, composition and accessibility of the non-government (private) health workforce [13]

- Table 11 of the 2019 survey estimates a density of 40.4 per 10000 population of non-government workers, of which 15.2 corresponds to non-qualified and non-recognized workers. (pp.15, 16).

- Non-government physicians represent 73.5% of all physicians in the country, an increase from the 62% estimation in 2013 (WHO 2015). For dentists, the proportion is 80%, and for nurses (BSc and diploma) it is 50%.

- The informal sector includes the following providers: Physiotherapist untrained (with no academic degree), Drug/Medicine Seller, Unani care provider (with no formal education/ training), Ayurveda care provider (with no formal education/training), Kaviraj, Traditional Birth Attendant, Palli Chikitshok (Village doctor) – Untrained Totka, Dental Technicians (Without formal education or training), Lab Technicians (without formal education or training).

- Survey data describe the supply of non-qualified and non-recognized health workers as follows:

  - Their density per 10,000 population is 15.21, representing 31% of the total supply of health workers (p.14). In a 2008 health workforce study by BRAC informal providers were about 66% of the total (BRAC 2008).

  - They represent 37% of workers in the private sector.

  - Four divisions have a density superior to the national one, more than twice in the case of Dhaka (**Table 16**)

  - The most numerous informal workers are drug sellers, village doctors and traditional birth attendants in that order.

  - 31% are women (p.23)

  - 18% are less than 35 years old, 38% are between 36 and 55 and 44% are above 56. (p.24).

  - 79% did not reach the diploma level and 73% declare no training (pp. 28-29)

  - On average, they have been active for 15.8 years (p.31)

  - 84 % are self-employed (p.34), serving 26 patients per day on average (p. 38), and earning 8875 per month (p.40)

  - No data is available on demand for recognized health workers in the private sector.

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[13] All data are from MOHFW & WHO 2021

Table 16: Distribution of informal (non-qualified and non-recognized) health workers by Division, estimated number and density				
Division (% of total population in Bangladesh)	Number of informal workers (% of total)	Density per 10000 pop.	Density per 10000 pop. urban	Density per 10000 pop. rural
Barishal (6.83%)	17,813 (7.3%)	16.28	48.03	15.1
Chattogram (14.06%)	21,914 (9%)	9.73	15.87	6.73
Dhaka (17.82%)	106, 408 (43.6%)	37.27	52.47	9.46
Khulna (9.71%)	28,594 (11.7%)	18.38	17.76	18.74
Mymensingh (4.32%)	14,180 (5.8%)	20.46	11.58	26.6
Rajshahi (22.12%)	25,547 (10.5%)	7.21	11.48	6.09
Rangpur (13.92%)	20,157 (8.3%)	9.04	10.33	7.26
Sylhet (11.21%)	9,141 (3.8%)	5.21	3.99	5.51
Total	**243,754**	**15.21**	**24.64**	**10.17**

Source: Assessment of Healthcare Providers in Bangladesh 2021, HR Branch, HSD, MOHFW & WHO Bangladesh

Total supply of health workers

The combination of MOHFW data (HRH Data Sheet 2019) and findings of the 2019 MOHFW-WHO study makes it possible to estimate of the total supply of health workers. In the absence of a national database covering the government and non-government health workforce, this is the best available picture of the current supply of health workers. However, caution is necessary in interpreting the findings for at least three reasons. First, figures of the non-government workforce are estimates; these are nationally representative but not sub-regionally. Secondly, data on the supply only includes employed workers; there is no information on the unemployed willing to work. Thirdly, there might be some double counting, as a number of workers may be active in both the government and the non-government sectors. Nonetheless, the following observations help provide a credible answer the first policy question:

- The 2019 MOHFW-WHO study estimates the total supply of doctors (government and non-government) at 74,415 and the MOHFW *HRH Sheet 2019* at 76,867 in 2018. For nurses and midwives, the corresponding figures are respectively 71,837 and 73,119, giving nurse per doctor ratios inferior to one (0.96 and 0.95).

- For pharmacists, only the *HRH Sheet 2019* provides national estimates, as the private sector study results aggregate "medical and pharmaceutical technicians". Estimates for 2018 are: B Pharm 14,673 and Diploma 14,454, Certified 105,700.

- 18% of employed health workers are in the government sector and 82% in the non-government one. (p.8). The MOHFW employs about 35% of doctors in the country and other ministries 3%.

- Nationally, the health workforce is composed of men at 75%, with the exception of nursing and midwifery personnel who are women at 90%. This is different from the global average of almost 70% of health workers being women (WHO 2019).

- The age distribution is as follows: 34% are less than 35 years old, 45% between 36 and 55 and 21% 56 and above. Nurses (BSc and diploma) are the youngest group with 82% below 35; for doctors, the proportion is 43%.

- The estimated total density is 49 health workers per 10,000 population; for government workers, density is 8.6 and 40.4 for non-government ones. For qualified and recognized workers it is 33.17, 0.62 for the non-qualified but recognized, and 15.21 for non-qualified and non-recognized (p.13).

- Density of recognized health workers (government and non-government) is 73.72 in urban areas and 11.48 in rural areas; for non-qualified and non-recognized it is 23.8 in urban areas and 10.17 per 10000, population in rural areas (p.14).

- In the public sector, generalists represent 58 % of the medical workforce whereas this proportion is 69 % in the non-government sector.

- Non-government doctors report the highest average monthly income (BDT 63,646); this is 4.5 times more than nurses (BSc and Diploma), p.39. Entry salary of government doctors is BDT 22000.

- 42% of doctors report working in more than one place (not specifying public/ private). For the other categories of workers, this is a marginal practice. p.31

The response to the first policy question is multifaceted. In the public sector, the high proportion of unfilled sanctioned positions indicates an important unmet demand of doctors, SACMOs, dentists, medical technologists and midwives; this proportion is 10.5% for nurses (**Table 13**). All divisions experience this problem at more or less the same degree (**Table 15**). DGHS MIS data (2020-2021) reports that vacancy rates of medical doctors in Upazila Health Complexes range between 40-50 % and are about 80% at Union Sub-Centers. There is therefore an undersupply of all categories of qualified health workers in the public sector. Available data do not inform on the existence or the absence of shortages in the private sector. A survey of facilities would provide this information. Overall, there are no data on unemployed health workers.

Progress towards universal health coverage is function of the availability and accessibility of qualified health workers. The assessment of the current situation should therefore consider only the density of 33.17 workers per 10,000 population (government and non-government). The WHO *Global Strategy on Human Resources for Health: Workforce 2030* identified an indicative threshold of 44.5 doctors, nurses and midwives needed to meet the targets of UHC and SDGs. The *Strategy* clearly states that it is not a benchmark and that each country must define its own health workforce requirements in function of its specific context (WHO 2016). In 2020, WHO published a *Health Workforce Support and Safeguards List* of 47 countries that did not reach a threshold of 50; the list included Bangladesh[14]. It is safe to say that in view of the low density of health workers, there is a needs-based shortage, e.g., that there is an important numerical gap between the available workforce and that required to deliver the services corresponding to the needs of Bangladesh.

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[14] https://cdn.who.int/media/docs/default-source/health-workforce/hwf-support-and-safeguards-list8jan.pdf?sfvrsn=1a16bc6f_5

Question 2: How many doctors, nurses and other priority categories of health workers should Bangladesh produce in the next 10 years?

Policymakers everywhere face the question of how many health workers to train to meet their country's health objectives. The response would be easy if there were international benchmarks, but no such thing exists and cannot exist (BOX 1). Countries use a variety of methods to inform decisions on health workforce requirements, ranging from simple projections to meet replacement needs of workers who reach retirement age to more complex techniques based on the assessment of future service needs (WHO 2021). The interval between the decision to educate more health workers and the moment they enter the labour market can be years. The challenge that decision-makers face is to decide now in function of what they expect future needs to be. This requires clarity about what the country wants to achieve and what the service needs will be in 10 years.

Box 1: Why international workforce benchmarks are inappropriate

Numerator level: Physicians are not equal from a country to another and even within the same country. Competencies vary according to training, to access to continuing education; definitions of specialties vary; and productivity varies according to sex and age, to access to equipment, to the organization of work, to incentives.

The definition of "nurse" ranges from an auxiliary who provides basic bedside services and assistance to a physician, to an autonomous professional who can prescribe medicines and exams and works independently. There are similar variations for all other professional categories.

Denominator level: The burden of disease can vary significantly from one country to another in function of differences in the age structure, ethnic composition and geographical distribution of the population, in the environment and climatic conditions, in the economic situation and in the organization and functioning of the health care system.

For example. Portugal and Tunisia have approximately the same population: teamwork is dominant in primary care in Portugal, but not in Tunisia. The productivity of a physician is higher in Portugal.

Portugal has one of the oldest populations in the world (19.4% over 65); Tunisia has a young one (8% over 65); this implies that these countries have a different burden of chronic diseases. It is therefore inappropriate to use the same numerator and denominator to estimate HRH requirements in these two countries (Gedik & Dussault 2021)

The formulation of an informed answer to the question on future training requirements in the coming 10 years starts by addressing "sub-questions" like the following:

- What will be the impact of current demographic (population growth and mobility, ageing) and epidemiological trends (simultaneous prevalence of infectious and non-communicable diseases, high disability rates) on the evolution of needs and demand for health services?

- How does the government plan to respond to these needs? What are the government's objectives and strategies for progressing towards UHC? What does universal coverage mean? Access to primary care, to all specialized care, including rehabilitation, long-term, palliative care or only a basic package of services?

- Are there plans to change the organization of the delivery of services, like prioritizing primary health care, developing home care services, telemedicine, ehealth, mhealth? What will be the respective roles of the public and the private sector providers?

- Who will deliver what services? What will the division of labour? Will scopes of practice change? Will there be an expansion of the functions of workers like nurses, pharmacists, nutritionists, and others (task-sharing, task-shifting)? Which competencies will be required to meet future health needs?

- How will the behavior and expectations of current workers and future graduates evolve? Will they demand a better work-life balance? Will they be more mobile?

- Will there be measures to scale-up effectiveness and efficiency of delivery, such as more integration of services, new modalities of financing?

- How will the behavior and expectations of users evolve? Will health literacy improve? Will there be acceptance of new types of services, such as tele-consultations?

These questions indicate that health workforce development is not only a matter of defining quantitative targets. It also requires assessing whether future workers, also existing ones, need to acquire different/additional competencies to ensure a better alignment with service needs. Informed decisions help avoid future mismatches between the supply, demand and needs of health workers, such as shortages or surpluses, an inefficient mix of occupations, or a misalignment of competencies with service needs.

The formulation of scenarios (what will happen if …) of the possible evolution of the health sector and health workforce needs and demand can provide policymakers with credible alternative visions of what will be the dynamics of the labour health market in the next 10 years. Scenarios can help define better policy objectives and give planners clearer mandates. Projections use 2018 data as the baseline year (HRH Data Sheet 2019).

- **Scenario 1:** Maintain the production as it currently is, both quantitatively and qualitatively. The projections assume an 80% proportion of graduates entering the register, and 4% of leavers (retirees and others).

- **Box 2** gives the example of the projections for doctors. It takes into account that 14 medical colleges created after 2015 will start producing graduates 5 years after the first cohort of admissions. Table 17 presents the results. Projections for the other professional categories follow the same pattern.

Box 2: Calculation of the increase of the supply of doctors if the current production is constant
Total supply 2019= New registrations 2019 (N. Graduates 2019 x 80%) + supply of 2018 -4%
Total supply 2020= New registrations 2020 (N. Graduates 2020 x 80%) + supply of 2019 -4%
Total supply 2021= New registrations 2021 (N. Graduates 2021+ graduates of colleges created in 2015 x 80%) + supply of 2020 -4%
Total supply 2022= New registrations 2022 (N. Graduates 2022+ graduates of colleges created in 2016 x 80% + supply of 2021 -4%
Total supply 2023= New registrations 2023 (N. Graduates 2023x 80% + supply of 2022 -4%
Total supply 2024= New registrations 2024 (N. Graduates 2024) x 80% + supply of 2023 -4%
Total supply 2025 »New registrations 2025 (N. Graduates 2025+ graduates of colleges created in 2019 x 80% + supply of 2024 -4%
Total supply 2026= New registrations 2026 (N. Graduates 2026 x 80%) + supply of 2025 -4%
Total supply 2027= New registrations 2027 (N. Graduates 2027 x 80%) + supply of 2026 -4%
Total supply 2028= New registrations 2028 (N. Graduates 2028 x 80%) + supply of 2027 -4%
Total supply 2029= New registrations 2029 (N. Graduates 2029 x 80%) + supply of 2028 -4%
Total supply 2030= New registrations 2030 (N. Graduates 2030 x 80%)+ supply of 2029 -4%

Table 17 shows the calculation of the projection of the supply of doctors according to scenario All other calculations followed the same model and are available in a separate **Statistical Annex**.

Table 17: Projection of the supply of doctors according to scenario 1						
Year	**New registrations**			**Supply of previous year**	**Attrition rate 4%**	**Total Supply**
	Graduate	**Increase**	**80%**			
2018						76867
2019	9390		7512	76867	3075	81304
2020	8782		7026	81304	3252	85078
2021	9310		7448	85078	3403	89123
2022	9256		7405	89123	3565	92963
2023	9311		7449	92963	3719	96693
2024	9354		7483	96693	3868	100308
2025	9354		7483	100308	4012	103779
2026	9354		7483	103779	4151	107111
2027	9354		7483	107111	4284	110310
2028	9354		7483	110310	4412	113381
2029	9354		7483	113381	4535	116329
2030	9354		7483	116329	4653	119159

Scenario 2: Augment the production of graduates by 10% or 20%, makinh the same assumptions to those of scenario 1. The effects of these increases will be produced when the additional admitted in 2021 will graduate, i.e. five years later for doctors and dentists (as shown in Box 3), and three years later for the other categories.

Box 3: Calculation of the growth of the supply of doctors if the current production is increased

- Total supply 2027= New registrations 2026 (N. Graduates 2026 + 10% (20%) x 80%) + supply of 2026 -4%

- Total supply 2028= New registrations 2027 (N. Graduates 2026 + 10% (20%) x 80%) x 80%) + supply of 2019 -4%

- Total supply 2029= New registrations 2028 = (N. Graduates 2026 + 10% (20%) x 80%) x 80%) + supply of 2019 -4%

- Total supply 2030= New registrations 2029 (N. Graduates 2026 + 10% (20%) x 80%) x 80%) + supply of 2019 -4%

Scenario 3: Maintain the current production at its current level and bring the proportion of graduates (all categories) who enter the domestic health labour market to 95%. To achieve this objective, the education authorities need to implement interventions informed by rigorous analysis of the causes of the low rates of registration of new graduates.

 Scenario 4: in addition to measures proposed in scenarios 2 and 3, adopt objectives and strategies to reduce attrition, to improve productivity and to improve access to health workers of rural, hard-to-reach and urban poor populations. Examples of such measures are:

- Legislate to expand the functions (scopes of practice) of certain cadres, principally nurses, pharmacists and SACMOs

- Make the mix of occupations more efficient (increase the nurse/doctor ratio, for example doubling it in the next 10 years)

- Review curricula to improve technical and social competencies (use of digital tools, sensitivity to cultural differences, communication to improve health literacy)

- Promote teamwork and integration of services

- Reward performance (pay-for-performance, better career prospects)

- Strengthen management and regulation (reduce absenteeism, improve recruitment procedures, regulate dual practice)

These legal and managerial measures can help increased the availability, accessibility and quality of services.

Results

Tables 18-18a and **19-19a** summarize the results of the projections of number of workers for all occupational categories.

Table 18: Projection of the increase of the supply of health workers (2018-2030) according to scenarios 1 and 2			
Occupational category (N. 2018)	**Scenario 1 (N 2030/%)**	**Scenario 2 +10% (N 2030/%)**	**Scenario 2 +20% (N 2030/%)**
Doctors (76867)	+42292 (+0.55 %)	+46940 (+0.61 %)	+51592 (+0.67 %)
BSc nurses (4064)	+37003 (+9.11 %)	+38717 (+9.53 %)	+41917 (+10.31 %)
Diploma nurses (50539)	+67826 (+1.34 %)	+75505 (+1.49 %)	+83183 (+1.65 %)
Midwives (2131)	+21986 (+10.32 %)	+21287 (+9.99 %)	+23108 (+10.84 %)
Dentists (9608)	+4625 (+0.48 %)	+5182 +(0.54 %)	+5734 (+0.6%)
SACMOs (14081)	+20394 (+1.45 %)	+22417 (+1.59 %)	+24441 (+1.74 %)

Table 18 (a): Projection of the increase of the supply of medical technologists (2018-2030) according to scenarios 1 and 2

Occupational category (N. 2018)	Scenario 1 (N 2030/%)	Scenario 2 +10% (N 2030/%)	Scenario 2 +20% (N 2030/%)
Medical Technologist- Laboratory (12744)	+1418 (+11%)	+1842 (+14%)	+2266 (+18%)
Medical Technologist-Radiotherapy (576)	+408 (+71%)	+450 (+78%)	+492 (+85%)
Medical Technologist-Radiography & Imaging (3435)	+1723 (+50%)	+1922 (+56%)	+2120 (+62%)
Medical Technologist-Physiotherapy (2376)	+1586 (+67%)	+1749 (+74%)	+1911 (+80%)
Medical Technologist-Dentistry (4118)	+967 (+23%)	+1132 (+27%)	+1297 (+32%)
Medical Technologist-Operation Theater (OT) Assistance (165)	+847 (+513%)	+907 (+550%)	+967 (+586%)
Medical Technologist-Intensive Care (IC) Assistance (60)	+561 (+935%)	+596 (+993%)	+631 (+1051%)
Medical Technologist-Prosthetics and Orthotics (23)	+54 (+236%)	+58 (+253%)	+62 (+270%)
Medical Technologist - Pharmacy (B-Category) (14454)	+1185 (+8%)	+1354 (+9%)	+1523 (+11%)

Table 19: Projection of the increase of the supply of health workers (2018-2030) according to scenarios 3 and 4

Occupational category (N. 2018)	Scenarios 3-4 (N 2030/%)	Scenarios 3-4 +10% (N 2030/%)	Scenarios 3-4 +20% (N 2030/%)
Doctors (76867)	+55803 (+0.73 %)	+61323 (+0.8 %)	+66848 (+0.87 %)
BSc nurses (4064)	+44236 (+10.88 %)	+46271 (+11.39 %)	+50071 (+12.32 %)
Diploma nurses (50539)	+84213 (+1.67 %)	+93332 (+1.85 %)	+102450 (+2.03 %)
Midwives (2131)	+26263 (+12.32 %)	+25433 (+11.93 %)	+27595 (12.95 %)
Dentists (9608)	+6190 (+0.64 %)	+6851 (+0.71 %)	+7507 (+0.78 %)
SACMOs (14081)	+25241 (+1.79 %)	+27643 (+1.96 %)	+30046 (+2.13 %)

Table-19a: Projection of the increase of the supply of medical technologists (2018-2030) according to scenarios 3 and 4

Occupational category (N. 2018)	Scenario 1 (N 2030/%)	Scenario 2 +10% (N 2030/%)	Scenario 2 +20% (N 2030/%)
Medical Technologist-Laboratory (12744)	+2609 (+20%)	+3113 (+24%)	+3616 (+28%)
Medical Technologist-Radiotherapy (576)	+527 (+91%)	+576 (+100%)	+626 (+109%)
Medical Technologist-Radiography & Imaging (3435)	+2296 (+67%)	+2532 (+74%)	+2767 (+81%)
Medical Technologist-Physiotherapy (2376)	+2056 (+87%)	+2249 (+95%)	+2442 (+103%)
Medical Technologist-Dentistry (4118)	+1448 (+35%)	+1644 (+40%)	+1840 (+45%)
Medical Technologist-Operation Theater (OT) Assistance (165)	+1017 (+617%)	+1089 (+660%)	+1160 (+703%)
Medical Technologist-Intensive Care (IC) Assistance (60)	+670 (+1117%)	+712 (+1186%)	+753 (+1255%)
Medical Technologist-Prosthetics and Orthotics (23)	+66 (+287%)	+71 (+307%)	+75 (+328%)
Medical Technologist - Pharmacy (B-Category) (14454)	+1715 (+12%)	+1915 (+13%)	+2116 (+15%)

Increases in the number of health workers by occupational category

Between 2018 and 2030, under all scenarios, the highest increases would be for midwives and for BSc nurses, thanks to the increase of the number of schools. As their numbers are low at the start, these remain low in spite of having multiplied by 10 or more. This is also the case for the categories of medical technologists with the smallest number of individuals (intensive care, operating theater assistance) Doctors and dentists numbers would increase at a slower pace; as the impact on increasing admissions will be felt later in the period. The number of diploma nurses and SACMOs would slightly more than double.

Densities (Tables 20-20a and 21-21a)

Densities increase under all scenarios, because the growth rate of all categories of workers is higher than that of the population of Bangladesh (15.8% between 2018 and 2030[15]). For doctors, the increase is higher after 2024 when graduates from the new schools start registering. Under scenario 1 (maintaining the current production and rate of registration), the increase would be of 33.9% (4.67 to 6.25). Under the "best" scenario (+20% of graduates with a registration rate of 95%), the density of doctors per 10000 population would increase by 61% (4.67 to 7.54) to 2030.

Figure1 shows the projected evolution of the combined density of doctors, nurses and midwives, from 8.12 in 2018 under scenario 1 to 20.15 under scenarios 3-4 +20% in 2030. The total density, i.e. considering all categories of qualified health workers would increase from 10.97 under scenario 1 to 25.28 under scenarios 3-4 +20%.

Table 20: Projection of the density of health workers per 10000 (2018-2030) according to scenarios 1, 2 and 3						
Occupational category (Density/2018)	**Density/2024**			**Density/2030**		
	Scenario 1	**Scenario 2 (+10%)**	**Scenario 2 (+20%)**	**Scenario 1**	**Scenario 2 (+10%)**	**Scenario 2 (+20%)**
Doctors (4.67)	5.74	5.79	5.83	6.25	6.49	6.74
BSc nurses (0.25)	1.08	1.12	1.17	2.15	2.24	2.41
Diploma nurses (3.07)	4.69	4.86	5.02	6.21	6.61	7.01
Midwives (0.13)	0.68	0.72	0.77	1.26	1.37	1.48
Dentists (0.58)	0.69	0.69	0.70	0.75	0.78	0.80
SACMOs (0.86)	1.48	1.52	1.56	1.81	1.91	2.02

Table 20a: Projection of the density of medical technologists per 10000 (2018-2030) according to scenarios 1 and 2						
Occupational category (Density/2018)	**Density/2024**			**Density/2030**		
	Scenario 1	**Scenario 2 (+10%)**	**Scenario 2 (+20%)**	**Scenario 1**	**Scenario 2 (+10%)**	**Scenario 2 (+20%)**
Medical Technologist-Laboratory (0.77)	0.76	0.77	0.77	0.74	0.76	0.79
Medical Technologist-Radiotherapy (0.03)	0.05	0.05	0.05	0.05	0.05	0.06
Medical Technologist-Radiography & Imaging (0.21)	0.25	0.25	0.25	0.27	0.28	0.29
Medical Technologist-Physiotherapy (0.14)	0.19	0.19	0.19	0.21	0.22	0.22

[15] Population 2018= 164600000; Population 2024= 174612904; Population 2030= 190686952 (Source: : BBS Pop Projection 2011-2061)

Table 20a: Projection of the density of medical technologists per 10000 (2018-2030) according to scenarios 1 and 2

| Occupational category (Density/2018)	Density/2024			Density/2030		
	Scenario 1	Scenario 2 (+10%)	Scenario 2 (+20%)	Scenario 1	Scenario 2 (+10%)	Scenario 2 (+20%)
Medical Technologist-Dentistry (0.25)	0.27	0.27	0.27	0.27	0.28	0.28
Medical Technologist-Operation Theater (OT) Assistance (0.01)	0.04	0.04	0.04	0.05	0.06	0.06
Medical Technologist-Intensive Care (IC) Assistance (0)	0.02	0.02	0.02	0.03	0.03	0.04
Medical Technologist-Prosthetics and Orthotics (0.001)	0.003	0.003	0.003	0.004	0.004	0.004
Medical Technologist - Pharmacy (B-Category) (0.88)	0.86	0.86	0.87	0.82	0.83	0.84

Table 21: Projection of the density of health workers per 10000 (2018-2030) according to scenarios 3 and 4

Occupational category (Density/2018)	Density/2024			Density/2030		
	Scenarios 3-4	Scenarios 3-4 (+10%)	Scenarios 3-4 (+20%)	Scenarios 3-4	Scenarios 3-4 (+10%)	Scenarios 3-4 (+20%)
Doctors (4.67)	6.18	6.23	6.28	6.96	7.25	7.54
BSc nurses (0.25)	1.25	1.30	1.36	2.53	2.64	2.84
Diploma nurses (3.07)	5.15	5.34	5.54	7.07	7.54	8.02
Midwives (0.13)	0.79	0.84	0.89	1.49	1.62	1.75
Dentists (0.58)	0.73	0.74	0.75	0.83	0.86	0.90
SACMOs (0.86)	1.64	1.69	1.74	2.06	2.19	2.31

Table 21a: Projection of the density of medical technologists per 10000 (2018-2030) according to scenarios 3 and 4

Occupational category (Density/2018)	Density/2024			Density/2030		
	Scenarios 3- 4 (+10%)	Scenarios 3- 4 (+20%)	Scenarios 3- 4 (+10%)	Scenarios 3- 4 (+20%)	Scenarios 3- 4 (+10%)	Scenarios 3- 4 (+20%)
Medical Technologist-Laboratory (0.77)	0.88	0.81	0.81	0.81	0.83	0.86
Medical Technologist-Radiotherapy (0.03)	0.05	0.05	0.05	0.06	0.06	0.06
Medical Technologist-Radiography & Imaging (0.21)	0.27	0.27	0.27	0.3	0.31	0.33
Medical Technologist-Physiotherapy (0.14)	0.2	0.2	0.2	0.23	0.24	0.25
Medical Technologist-Dentistry (0.25)	0.28	0.28	0.29	0.29	0.3	0.31
Medical Technologist-Operation Theater (OT) Assistance (0.01)	0.04	0.04	0.04	0.06	0.07	0.07
Medical Technologist-Intensive Care (IC) Assistance (0)	0.03	0.03	0.03	0.04	0.04	0.04
Medical Technologist-Prosthetics and Orthotics (0.001)	0.003	0.004	0.004	0.005	0.005	0.005
Medical Technologist - Pharmacy (B-Category) (0.88)	0.88	0.88	0.88	0.85	0.86	0.87

Figure 1: Combined density of doctor, nurses and midwives in 2018, 2024 and 2030

Figure 1: Combined density of doctor, nurses and midwives in 2018, 2024 and 2030
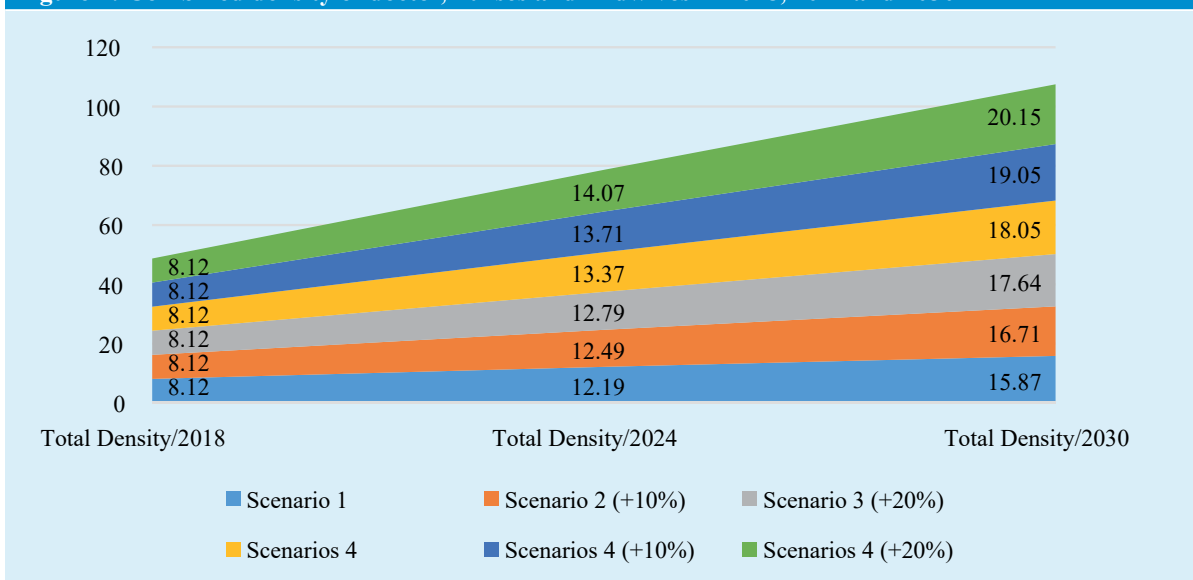
- Nurse/doctor ratios (Table 22 and Figure 2)

The nurse (BSc and diploma)-doctor ratio, frequently used as an indicator of efficient skills-mix, would grow from 0.71 to 1.44 under scenarios 3-4 (+20%), without

Table 22: Nurse (BSc and diploma)-doctor ratio 2018-2024-2030

Projection	2018	2024	2030
Scenario 1	0.71	1.01	1.34
Scenario 2 (+10%)	0.71	1.03	1.36
Scenario 2 (+20%)	0.71	1.06	1.40
Scenarios 3-4	0.71	1.04	1.38
Scenarios 3-4 (+10%)	0.71	1.07	1.40
Scenarios 3-4 (+20%)	0.71	1.10	1.44

Figure 2: Nurse (BSc and diploma)-doctor ratio 2018-2024-2030

Figure 2: Nurse (BSc and diploma)-doctor ratio 2018-2024-2030
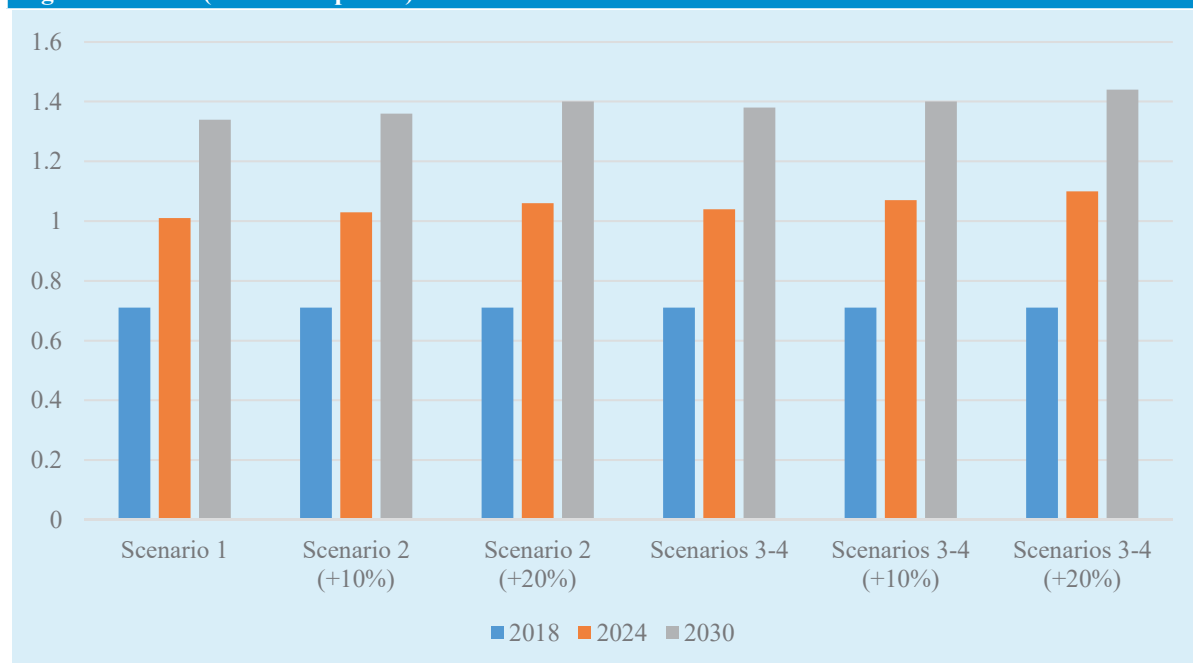
- Scenario assessment

Under scenario 1, there will be positive changes in densities, but no efficiency gains, as the composition of the workforce and the tasks and competencies of workers remain the same.

Under scenario 2, densities start increasing when additional graduates enter the health labour market, after 3 years in the case of nurses, midwives, SAMCOs, and 5 years in that of doctors and dentists. Scenario 2 implies investing in the capacity of production of health worker education institutions, i.e. in the recruitment of additional faculty and trainers, in scaling-up infrastructures and equipment, and in clinical settings. Recruitment of students would not be a problem, at least for doctors, as demand for admission in health professional schools is high.

Under scenario 3, there would be short-term increases in the number of workers entering the health labour market and consequently a higher volume of services available. That scenario implies additional investments in to educate the extra number of students.

Scenario 4 is by far the more demanding in terms of additional financial resources and of planning and management capacities. It requires the definition of priorities and of objectives that have a good degree of feasibility, and of strategies that can realistically achieve them. On the other hand, it is the one more likely to produce progress towards UHC.

Bangladesh was included in the WHO *Health Workforce Support and Safeguards List 2020* as one of 47 countries with "the most pressing health workforce challenges related to UHC (…) that have a density of doctors, nurses and midwives that is below the global median (i.e. 48.6 per 10,000 population)"[16]. Under all scenarios, Bangladesh would remain a country with a qualified workforce that is not quantitatively sufficient to meet the needs of its population, but under scenario 4, it would augment significantly its capacity to progress towards UHC.

Assessing future health workers requirements is not only projecting numbers: it is also estimating needs in terms of skills-mix, competencies, working conditions, productivity and expected quality, hence the importance of defining explicit objectives. Each of the four scenarios presents challenges in terms of human, physical and financial resources mobilization and of getting stakeholders to agree on objectives and on strategies to achieve them. This means that the process is not just technical, but also a political one. The formulation of realistic objectives for "the next 10 years" therefore requires a careful assessment of the feasibility of changes (social/political acceptability, affordability –how services and education will be financed, capacity).

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16 https://cdn.who.int/media/docs/default-source/health-workforce/hwf-support-and-safeguards-list8jan.pdf?sfvrsn=1a16bc6f_5

Conclusion and recommendations

There are two types of shortages of health workers in Bangladesh. The first one corresponds to the formal definition of shortage, e.g. the existence of funded positions that remain unfilled. The information of such shortages is available for government sector but remain unknown for the private sector. Then there are needs-based shortages, also called deficits, corresponding to the insufficient number of qualified workers to meet the needs of the population. Shortages affect all occupational categories of workers, though at different levels. At MOHFW level, the number of unfilled sanctioned posts is higher for doctors than for nurses. Shortages are not distributed equally among districts and presumably within districts.

Informed responses to the two policy questions addressed in this report would ideally entail much more quantitative and qualitative information than was available for this report. The expansion and improvement of the database (NHWA) in terms of validity and reliability of data and information, and coverage of both public and private sectors, are imperative. This will take time, but this report already offers recommendations to support policy decisions in the short-term. They are based on the analysis of available data on the current situation of the health workforce and on a preference for Scenario 4, e.g. for a planning approach to health workforce development, the only one that can make UHC possible.

Recommendations

Governance

- **Health workforce data**: Although data from the public sector is available and reliable, this covers only an estimated 1/5 of the health labour market. There is a clear need to ensure reliable and timely collection of data on all health workers in both the government and non-government sectors. The report recommends the use of standard indicators to collect data from all available sources regardless of sector. NHWA provide a framework for this; the strengthening of the capacity of professional councils, as data collectors, and of analysts would make this database a powerful tool for planning purposes.

  This is crucial, as the quality of estimates of future needs cannot be better than the quality of data and information available. The creation of an independent HRH Observatory mandated to collate and analyze all health workforce data in order to feed the NHWA, and to provide policy advice the government should be considered. An observatory could also develop tools to track the career path of graduates and use the collected information to assess the dynamics of the health labour market.

- **Health workforce information system**: The vision for a Digital Bangladesh by 2021 offers an opportunity to develop a robust and inter-operable HRIS in the MOHFW and its departments.

Regulation

The regulations safeguarding professional standards and quality and protection of people's healthcare rights exist, but there is no systematic data collection on their implementation. For example, a survey showed that more than 43% of the medical doctors' respondents were not able to show their license or registration certificate during their private practice, which is against the rules of the Bangladesh Medical and Dental Council [17]. Areas in need of stricter regulation are private sector practice and education programs, dual practice by government workers, mainly doctors, and unqualified and unrecognized workers. To be effective, the regulation of private practice is by professional councils requires that these

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[17] https://www.bmdc.org.bd/ [Accessed on 27 July 2021 (BMDC Act 2010 in Bangla)]

have the resources to proactively monitor the quality of the work of their members and that they account for their activities. As regards the education of health workers, robust accreditation processes are how many countries ensure quality; an independent and accountable agency can assume this role. The government should consider applying the recommendations of the Asia Pacific Observatory on Health Systems and Policies on the regulation of dual practice (Hipgrave, Nachtnebel & Hort 2013). Nearly one-third of the active health workforce in Bangladesh is unqualified and informal, a proportion that has gradually diminished as the number of qualified workers increased. Strategies should be developed to track and monitor of these workers and bring them under a regulatory and capacity development framework that mitigates the risks associated to the utilization of their services. In the mid-term, this problem will only be resolved by ensuring the universal access to qualified workers (for example ensuring access to pharmacists for all would reduce the utilization of drug sellers), in combination with a scaling-up of health literacy.

Planning and management

The Government should seek to strengthen its planning and management processes and design a health workforce strategy including a bundle of evidence-informed short-term, medium- term and long- term interventions to improve the availability, accessibility and quality of the health workforce and the functioning of the health labour market. The government has already developed multiple policies to improve retention of health workers in rural areas. These include the allocation of 20% of seats in public medical schools to district students and of 5% of seats in private medical schools to poor students, clinical rotations in rural health facilities, rural service for public medical schools graduates, financial incentives and accommodation, but their effects seem limited. An evaluation of the relevance, acceptability, feasibility, affordability, effectiveness and impact of these strategies, of their implementation and of their results would provide information to plan the workforce coverage more effectively (WHO 2021). Planning can be the responsibility the MOHFW in collaboration with other relevant government ministries (such as Finance Labour, Education, and others), communities, health workers, education institutions, parastatal institutions, patient organizations, regulatory bodies, development partners, professional and occupations associations, and civil society (WHO 2021).

Supply of health workers

Gradually increase the total supply of all categories of qualified health workers, by:

- Increasing the capacity of training institutions to produce more graduates. This supposes an increase of the number of educators and trainers in both the public and private sectors, especially in nursing and midwifery colleges and institutes and in MATS and IHTs where there is a major understaffing.

- Increasing the proportion of graduates who enter the health labour market (or reducing the number of graduates who do not enter the health labour market).

- Adopting measures to prevent the early exit of the health labour market by offering flexibility for temporary leave (for maternity, for example) and facilitating re-entry.

- Changing the retirement age.

- Addressing the drivers of emigration.

Improve productivity in order to increase the capacity of the health workforce to deliver a higher volume pf service by:

- Gradually making the skills-mix more effective, by expanding the scope of practice of nurses, pharmacists and other providers and scaling-up the nurse-doctor ratio.

- Strengthening management capacity to fight absenteeism, to promote multi-professional teamwork, to ensure that workers have the equipment and supplies they need, and to exploit the potentialities of digitalization and of communication technologies.

- Introducing incentives to improve performance.

- And most importantly, prioritize the deployment of the workforce at primary health care level as a strategy to meet the majority of health needs.

Demand of health workers

- Adopt measures to reduce vacancy rates in the public health sector from about 32% on average to below 15%.

- Adopt evidence-informed policies to improve health workforce development, attraction, recruitment and retention in areas with unmet needs (WHO 2021).

- Scale-up the public health workforce: The Government of Bangladesh has a constitutional obligation to ensure basic medical care for all. In order to meet its goal of universal coverage, it has to increase significantly the contribution of the public sector workforce to health care. This implies the gradual increase of the budget allocation to healthcare and the creation of new jobs for qualified health workers.

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Annexes

Annex I: Databases

Source	Data available	Comment
MOHFW: Central HRIS	Yes	Up to November 2021
MOHFW: DGHS	Yes	Up to November 2021
MOHFW: DGFP	Yes	HR data 2020/2021
MOHFW: DGNM	Yes	HR data 2020/2021
Bangladesh Medical and Dental Council (BMDC)	Yes	HR data 2021
Bangladesh Nursing and Midwifery Council (BNMC)	Yes	HR data 2021
State Medical Faculty of Bangladesh (SMF)	Yes	HR data 2021
Pharmacy Council of Bangladesh (PCB)	Yes	HR data 2021
World Health Organization (WHO)	Yes	
Others : Medical Colleges, Dental Colleges, Postgraduate Health Professionals Educaitonal Institutions including Medical University, Specialized Institutions	Yes	HR data 2020-21

Source: Health Labour Market Analysis Database 2020-21, HR Branch, HSD, MOHFW

Annex II: Composition of the Technical Expert Group (TEG) & Technical Support Group (TSG)

Technical Expert Group (TEG)

Additional Secretary (Admin) and Line Director (HRD), Health Services Division	Chairperson
Additional Secretary (Medical Education), Medical Education & Family Welfare Division	Member
Joint Secretary (Hospital), Health Services Division	Member
Joint Secretary (Admin), Ministry of Public Administration	Member
Joint Secretary (Admin), Ministry of Expatriate's Welfare and Overseas Employment	Member
Joint Secretary (Planning), Medical Education & Family Welfare Division	Member
Director (Admin), Directorate General of Health Services (DGHS)	Member
Director (Admin), Directorate General of Family Planning (DGFP)	Member
Director (Medical Education & Health Manpower Development) DGME	Member
Director (Admin), Directorate General of Nursing & Midwifery (DGNM)	Member
Director (Admin), Directorate General of Drug Administration (DGDA)	Member
Director (Admin), Health Economics Unit	Member
Vice President, Bangladesh Medical & Dental Council (BMDC) & Principal, Shaheed Suhrawardi Medical College	Member
Secretary General, Bangladesh Private Medical Practitioners Association (BPMPA) and Executive Committee Member, Bangladesh Medical Association (BMA)	Member
First Secretary (Development), Global Affairs Canada, High Commission of Canada to Bangladesh	Member
Team Leader – Health Systems, World Health Organization Bangladesh	Member
Deputy Director, HSS Pillar, USAID, Bangladesh	Member
Health Advisor, DFID, British High Commission Bangladesh	Member
Deputy Secretary (GNSP), Health Services Division	Member
Additional/Joint Secretary, (HR) & Programme Manager (HRD), Health Services Division	Member Secretary

Technical Support Group (TSG)

Additional/Joint Secretary, (HR) & Programme Manager (HRD), Health Services Division	Chairperson
Joint Secretary (Planning), Medical Education and Family Welfare Division	Member
Professor (Curriculum Development & Evaluation), Centre for Medical Education	Member
Deputy Programme Manager (HRD), Directorate General of Health Services (DGHS)	Member
Deputy/Assistant Director (Medical Education), Directorate General of Medical Education (DGME)	Member
Deputy Programme Manager, Directorate General of Family Planning (DGFP)	Member
Deputy Programme Manager, Directorate General of Nursing & Midwifery (DGNM)	Member
National Professional Officer – HRH, World Health Organization Bangladesh	Member
Deputy Secretary (GNSP) & Deputy Programme Manager (HRD), Health Services Division	Member Secretary

Annex III: Statistical Analysis

This document presents the calculations of the projections of the supply of all occupational categories according to the following scenarios:

Scenario 1: Maintain the current production as is, assuming that 80% of new graduates register and an attrition rate of 4%

Scenario 2: Assuming an increase of the production of Graduates by 10% or 20%

Scenarios 3-4: Replicate scenarios 1 and 2, bringing the proportion of Graduates who register at 95%.

Table 1: Projection of the supply of doctors according to scenario 1								Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year 4%	Attrition rate		Total Supply		
	Gradu-ates	Increase	80%						
2018							76867	164600000	4.67
2019	9390		7512	76867	3075		81304		
2020	8782		7026	81304	3252		85078		
2021	9310		7448	85078	3403		89123		
2022	9256		7405	89123	3565		92963		
2023	9311		7449	92963	3719		96693		
2024	9354		7483	96693	3868		100308	174612904	5.74
2025	9354		7483	100308	4012		103779		
2026	9354		7483	103779	4151		107111		
2027	9354		7483	107111	4284		110310		
2028	9354		7483	110310	4412		113381		
2029	9354		7483	113381	4535		116329		
2030	9354		7483	116329	4653		119159	190686952	6.25

Source: BBS Pop Projection 2011-2061

Table 2: Projection of the supply of doctors according to scenario 2 (+10%)							Total popu-lation in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	Increase	80%					
2018						76867	164600000	4.67
2019	9390		7512	76867	3075	81304		
2020	8782		7026	81304	3252	85078		
2021	9310		7448	85078	3403	89123		
2022	9256		7405	89123	3565	92963		
2023	9311		7449	92963	3719	96693		
2024	10289	10%	8232	96693	3868	101057	174612904	5.79
2025	10289		8231	101057	4042	105246		
2026	10289		8231	105246	4210	109267		
2027	10289		8231	109267	4371	113127		
2028	10289		8231	113127	4525	116834		
2029	10289		8231	116834	4673	120391		
2030	10289		8231	120391	4816	123807	190686952	6.49

Source: BBS Pop Projection 2011-2061

Table 3: Projection of the supply of doctors according to scenarios 2 (+20%)

| Year | New registrations | | | Supply of previous year | Attrition rate 4% | Total Supply | Total population in BD (2018, 2024 & 2030) | Density per 10000 |
	Graduates	Increase	80%					
2018						76867	164600000	4.67
2019	9390		7512	76867	3075	81304		
2020	8782		7026	81304	3252	85078		
2021	9310		7448	85078	3403	89123		
2022	9256		7405	89123	3565	92963		
2023	9311		7449	92963	3719	96693		
2024	11225	20%	8980	96693	3868	101805	174612904	5.83
2025	11225		8980	101805	4072	106713		
2026	11225		8980	106713	4269	111424		
2027	11225		8980	111424	4457	115947		
2028	11225		8980	115947	4638	120289		
2029	11225		8980	120289	4812	124458		
2030	11225		8980	124458	4978	128459	190686952	6.74

Source: BBS Pop Projection 2011-2061

Table 4: Projection of the supply of doctors according to scenarios 3-4

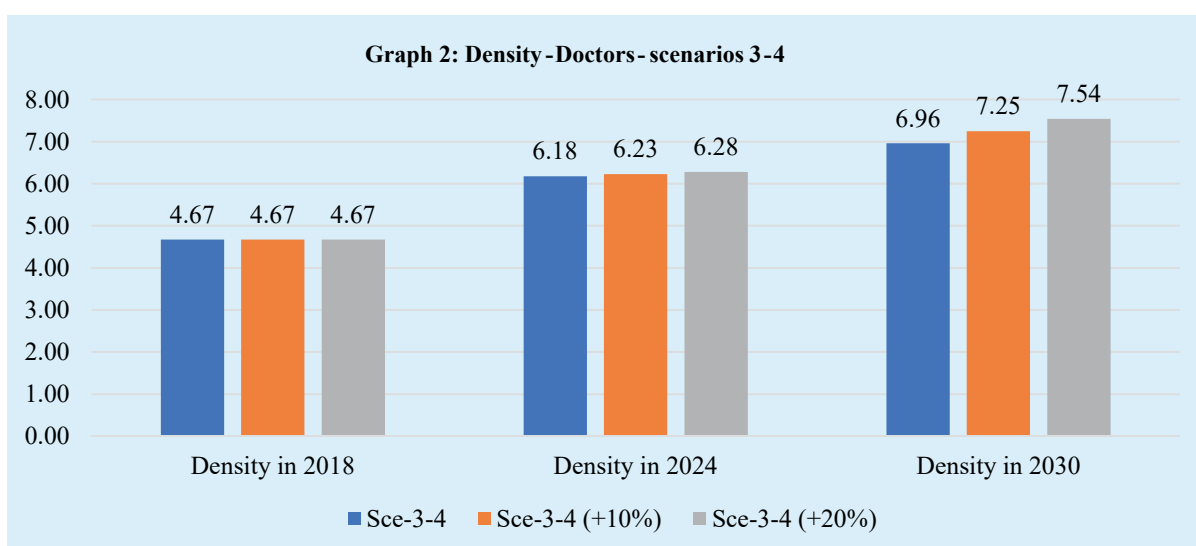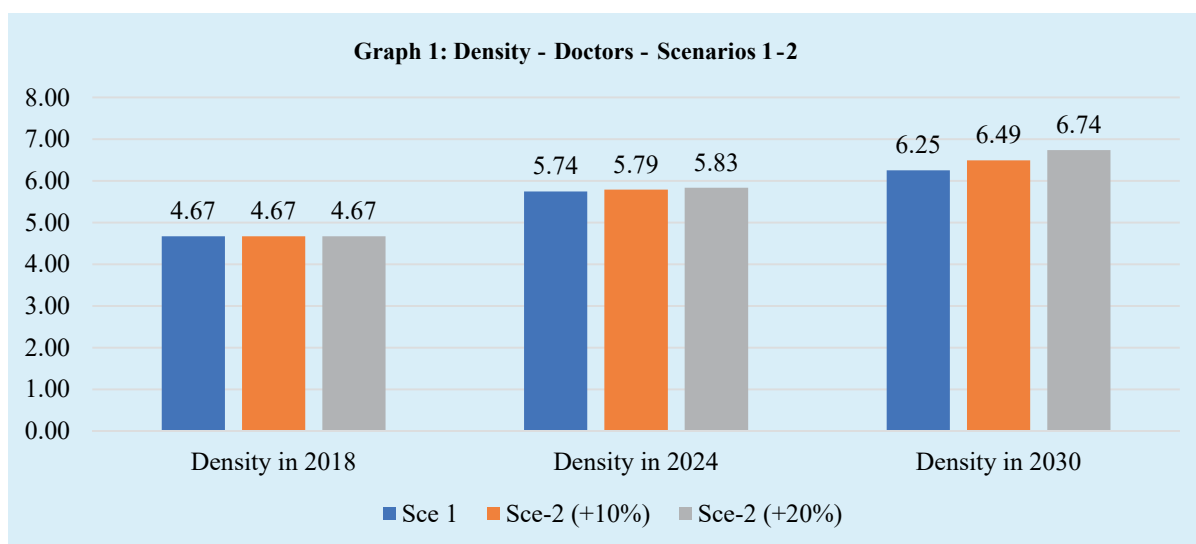| Year | New registrations | | | Supply of previous year | Attrition rate 4% | Total Supply | Total population in BD (2018, 2024 & 2030) | Density per 10000 |
	Graduates	Increase	95%					
2018						76867	164600000	4.67
2019	9390		8921	76867	3075	82713		
2020	8782		8343	82713	3309	87747		
2021	9310		8845	87747	3510	93082		
2022	9256		8793	93082	3723	98152		
2023	9311		8845	98152	3926	103071		
2024	9354		8886	103071	4123	107835	174612904	6.18
2025	9354		8886	107835	4313	112407		
2026	9354		8886	112407	4496	116797		
2027	9354		8886	116797	4672	121012		
2028	9354		8886	121012	4840	125058		
2029	9354		8886	125058	5002	128942		
2030	9354		8886	128942	5158	132670	190686952	6.96

Source: BBS Pop Projection 2011-2061

Table 5: Projection of the supply of doctors according to scenarios 3 -4 (+10%)

| Year | New registrations | | | Supply of previous year | Attrition rate 4% | Total Supply | Total population in BD (2018, 2024 & 2030) | Density per 10000 |
	Graduates	Increase	95%					
2018						**76867**	164600000	4.67
2019	9390		8921	76867	3075	82713		
2020	8782		8343	82713	3309	87747		
2021	9310		8845	87747	3510	93082		
2022	9256		8793	93082	3723	98152		
2023	9311		8845	98152	3926	103071		
2024	10289	10%	9775	103071	4123	108723	174612904	6.23
2025	10289		9775	108723	4349	114149		
2026	10289		9775	114149	4566	119357		
2027	10289		9775	119357	4774	124358		
2028	10289		9775	124358	4974	129158		
2029	10289		9775	129158	5166	133766		
2030	10289		9775	133766	5351	138190	190686952	7.25

Source: BBS Pop Projection 2011-2061

Table 6: Projection of the supply of doctors according to scenarios 3-4 (+20%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						**76867**	164600000	4.67
2019	9390		8921	76867	3075	82713		
2020	8782		8343	82713	3309	87747		
2021	9310		8845	87747	3510	93082		
2022	9256		8793	93082	3723	98152		
2023	9311		8845	98152	3926	103071		
2024	11225	20%	10664	103071	4123	109612	174612904	6.28
2025	11225		10664	109612	4384	115891		
2026	11225		10664	115891	4636	121919		
2027	11225		10664	121919	4877	127706		
2028	11225		10664	127706	5108	133262		
2029	11225		10664	133262	5330	138595		
2030	11225		10664	138595	5544	143715	190686952	7.54

Source: BBS Pop Projection 2011-2061

Graph 1: Density - Doctors - Scenarios 1-2

	Density in 2018	Density in 2024	Density in 2030
Sce 1	4.67	5.74	6.25
Sce-2 (+10%)	4.67	5.79	6.49
Sce-2 (+20%)	4.67	5.83	6.74

Graph 2: Density - Doctors - scenarios 3-4

	Density in 2018	Density in 2024	Density in 2030
Sce-3-4	4.67	6.18	6.96
Sce-3-4 (+10%)	4.67	6.23	7.25
Sce-3-4 (+20%)	4.67	6.28	7.54

Table 7: Projection of the supply of dentists according to scenario 1						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						9608	164600000	0.58
2019	924		739	9608	384	9963		
2020	963		770	9963	399	10335		
2021	1195		956	10335	413	10877		
2022	908		726	10877	435	11169		
2023	1046		837	11169	447	11559		
2024	1116		893	11559	462	11989	174612904	0.69
2025	1116		893	11989	480	12402		
2026	1116		893	12402	496	12799		
2027	1116		893	12799	512	13180		
2028	1116		893	13180	527	13546		
2029	1116		893	13546	542	13897		
2030	1116		893	13897	556	14233	190686952	0.75

Source: BBS Pop Projection 2011 - 2061

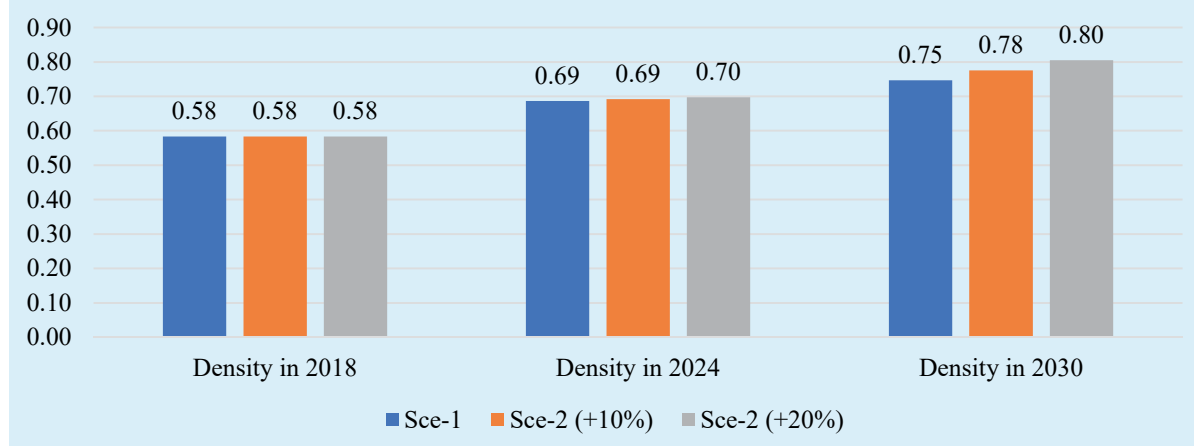| Table 8: Projection of the supply of dentists according to scenario 2 (+10%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						9608	164600000	0.58
2019	924		739	9608	384	9963		
2020	963		770	9963	399	10335		
2021	1195		956	10335	413	10877		
2022	908		7 26	10877	435	11169		
2023	1046		837	11169	447	11559		
2024	1228	10%	982	11559	462	12078	174612904	0.69
2025	1228		982	12078	483	12578		
2026	1228		982	12578	503	13057		
2027	1228		982	13057	522	13517		
2028	1228		982	13517	541	13959		
2029	1228		982	13959	558	14383		
2030	1228		982	14383	575	14790	190686952	0.78

Source: BBS Pop Projection 2011 - 2061

Table 9: Projection of the supply of dentists according to scenario 2 (+20%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						9608	164600000	0.58
2019	924		739	9608	384	9963		
2020	963		770	9963	399	10335		
2021	1195		956	10335	413	10877		
2022	908		726	10877	435	11169		
2023	1046		837	11169	447	11559		
2024	1339	20%	1071	11559	462	12168	174612904	0.70
2025	1339		1071	12168	487	12752		
2026	1339		1071	12752	510	13313		
2027	1339		1071	13313	533	13852		
2028	1339		1071	13852	554	14369		
2029	1339		1071	14369	575	14866		
2030	1339		1071	14866	595	15342	190686952	0.80

Source: BBS Pop Projection 2011-2061

Table 10: Projection of the supply of dentists according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						9608	164600000	0.58
2019	924		878	9608	384	10101		
2020	963		915	10101	404	10612		
2021	1195		1135	10612	424	11323		
2022	908		863	11323	453	11733		
2023	1046		994	11733	469	12257		
2024	1116		1060	12257	490	12827	174612904	0.73
2025	1116		1060	12827	513	13374		
2026	1116		1060	13374	535	13899		
2027	1116		1060	13899	556	14404		
2028	1116		1060	14404	576	14888		
2029	1116		1060	14888	596	15352		
2030	1116		1060	15352	614	15798	190686952	0.83

Source: BBS Pop Projection 2011-2061

Table 11: Projection of the supply of dentists according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						**9608**	164600000	0.58
2019	924		878	9608	384	10101		
2020	963		915	10101	404	10612		
2021	1195		1135	10612	424	11323		
2022	908		863	11323	453	11733		
2023	1046		994	11733	469	12257		
2024	1228	10%	1166	12257	490	12933	174612904	0.74
2025	1228		1167	12933	517	13582		
2026	1228		1167	13582	543	14206		
2027	1228		1167	14206	568	14804		
2028	1228		1167	14804	592	15378		
2029	1228		1167	15378	615	15930		
2030	1228		1167	15930	637	16459	190686952	0.86

Source: BBS Pop Projection 2011-2061

Table 12: Projection of the supply of dentists according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						**9608**	164600000	0.58
2019	924		878	9608	384	10101		
2020	963		915	10101	404	10612		
2021	1195		1135	10612	424	11323		
2022	908		863	11323	453	11733		
2023	1046		994	11733	469	12257		
2024	1339	20%	1272	12257	490	13039	174612904	0.75
2025	1339		1272	13039	522	13790		
2026	1339		1272	13790	552	14510		
2027	1339		1272	14510	580	15202		
2028	1339		1272	15202	608	15866		
2029	1339		1272	15866	635	16503		
2030	1339		1272	16503	660	17115	190686952	0.90

Source: BBS Pop Projection 2011 - 2061

Graph 3:Density - Dentists - scenarios - 1 - 2

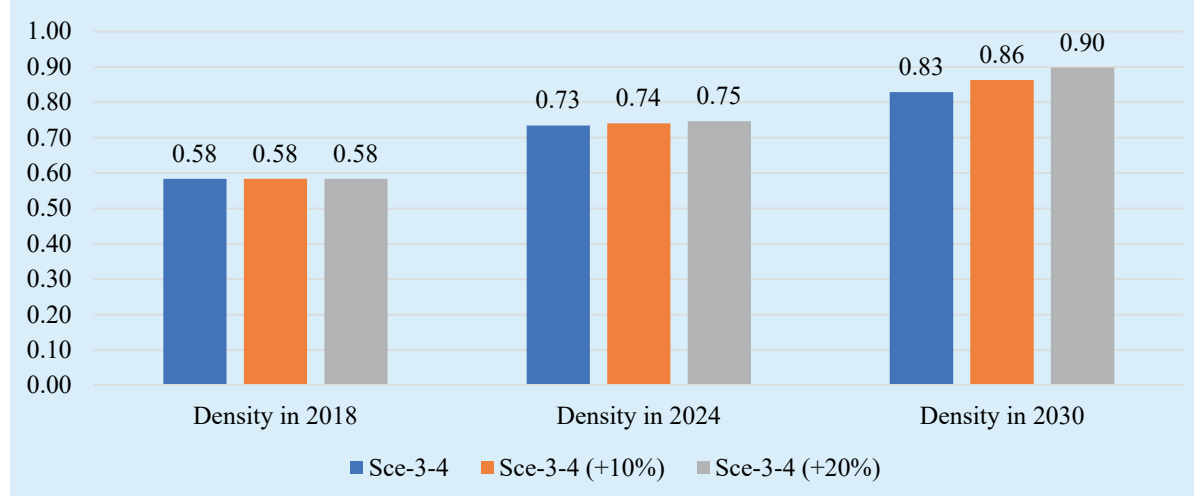**Graph 4:Density - Dentists - scenarios 3 - 4**

Table 13: Projection of the supply of SACMOs according to scenario 1							Total popula-tion in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previ-ous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						14081	164600000	0.86
2019	3787		3030	14081	563	16547		
2020	3251		2601	16547	662	18486		
2021	3549		2839	18486	739	20586		
2022	3288		2630	20586	823	22393		
2023	3288		2630	22393	896	24128		
2024	3288		2630	24128	965	25793	174612904	1.48
2025	3288		2630	25793	1032	27392		
2026	3288		2630	27392	1096	28926		
2027	3288		2630	28926	1157	30400		
2028	3288		2630	30400	1216	31814		
2029	3288		2630	31814	1273	33172		
2030	3288		2630	33172	1327	34475	190686952	1.81

Source: BBS Pop Projection 2011-2061

Table 14: Projection of the supply of SACMOs according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						**14081**	164600000	0.86
2019	3787		3030	14081	563	16547		
2020	3251		2601	16547	662	18486		
2021	3549		2839	18486	739	20586		
2022	3617	10%	2893	20586	823	22656		
2023	3617		2894	22656	906	24643		
2024	3617		2894	24643	986	26551	174612904	1.52
2025	3617		2894	26551	1062	28383		
2026	3617		2894	28383	1135	30141		
2027	3617		2894	30141	1206	31829		
2028	3617		2894	31829	1273	33449		
2029	3617		2894	33449	1338	35005		
2030	3617		2894	35005	1400	36498	190686952	1.91

Source: BBS Pop Projection 2011 - 2061

Table 15: Projection of the supply of SACMOs according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						**14081**	164600000	0.86
2019	3787		3030	14081	563	16547		
2020	3251		2601	16547	662	18486		
2021	3549		2839	18486	739	20586		
2022	3946	20%	3156	20586	823	22919		
2023	3946		3157	22919	917	25159		
2024	3946		3157	25159	1006	27310	174612904	1.56
2025	3946		3157	27310	1092	29374		
2026	3946		3157	29374	1175	31356		
2027	3946		3157	31356	1254	33258		
2028	3946		3157	33258	1330	35085		
2029	3946		3157	35085	1403	36838		
2030	3946		3157	36838	1474	38522	190686952	2.02

Source: BBS Pop Projection 2011-2061

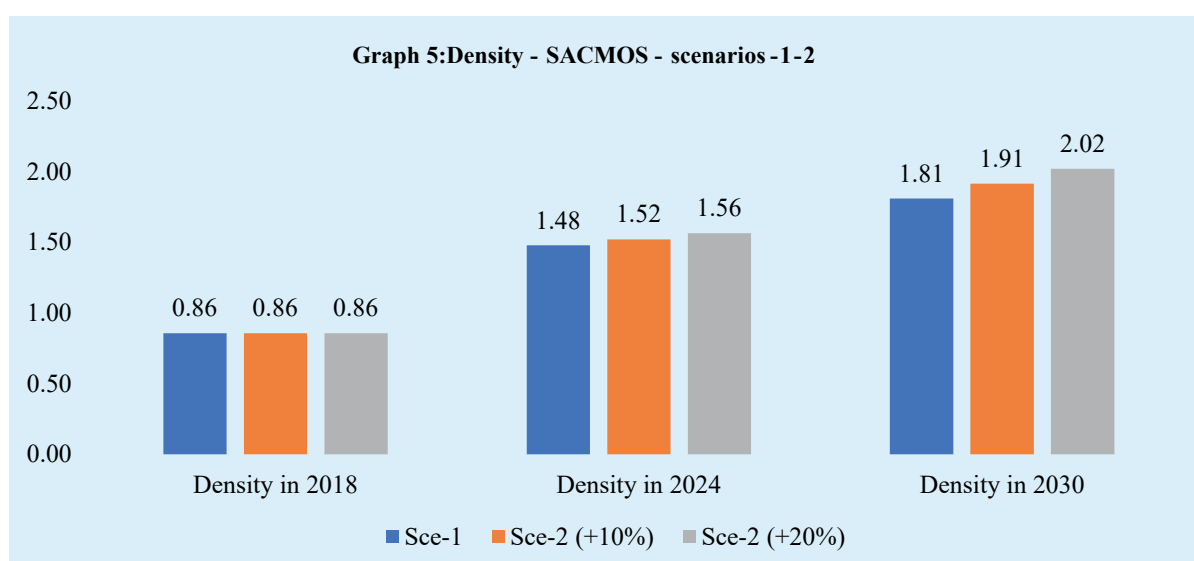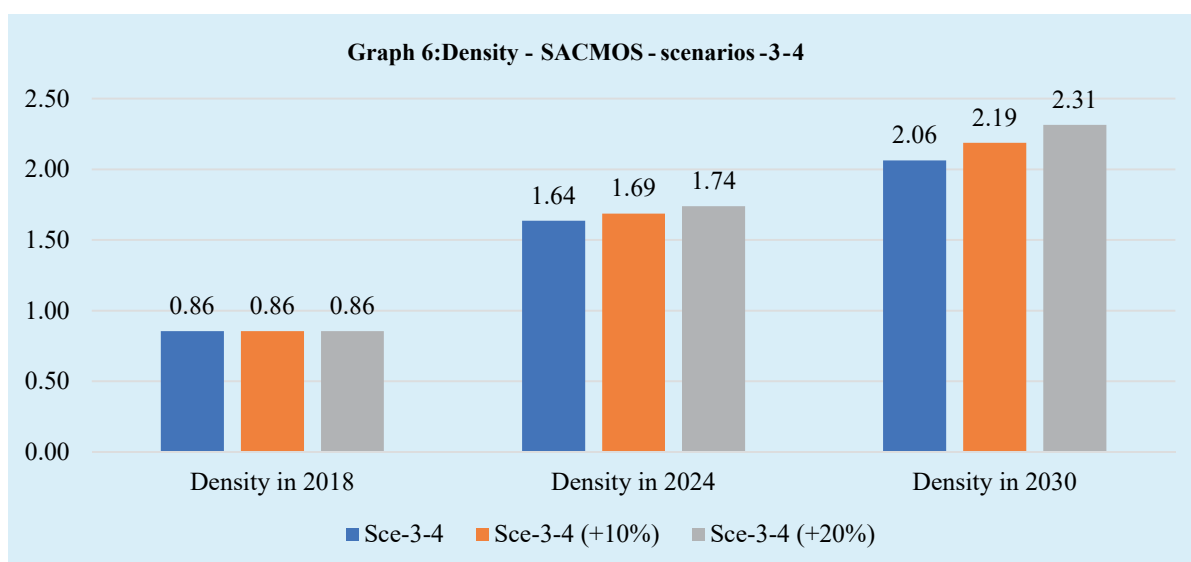| Table 16: Projection of the supply of SACMOs according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						**14081**	164600000	0.86
2019	3787		3598	14081	563	17115		
2020	3251		3088	17115	685	19519		
2021	3549		3372	19519	781	22110		
2022	3288		3124	22110	884	24349		
2023	3288		3124	24349	974	26499		
2024	3288		3124	26499	1060	28562	174612904	1.64
2025	3288		3124	28562	1142	30544		
2026	3288		3124	30544	1222	32445		
2027	3288		3124	32445	1298	34271		
2028	3288		3124	34271	1371	36024		
2029	3288		3124	36024	1441	37707		
2030	3288		3124	37707	1508	39322	190686952	2.06

Source: BBS Pop Projection 2011-2061

Table 17: Projection of the supply of SACMOs according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	**New registrations**			**Supply of previous year**	**Attrition rate 4%**	**Total Supply**		
	Graduates	**Increase**	**95%**					
2018						**14081**	164600000	0.86
2019	3787		3598	14081	563	17115		
2020	3251		3088	17115	685	19519		
2021	3549		3372	19519	781	22110		
2022	3617	10%	3436	22110	884	24662		
2023	3617		3436	24662	986	27111		
2024	3617		3436	27111	1084	29463	174612904	1.69
2025	3617		3436	29463	1179	31721		
2026	3617		3436	31721	1269	33888		
2027	3617		3436	33888	1356	35969		
2028	3617		3436	35969	1439	37966		
2029	3617		3436	37966	1519	39883		
2030	3617		3436	39883	1595	41724	190686952	2.19

Source: BBS Pop Projection 2011 - 2061

Table 18: Projection of the supply of SACMOs according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	**New registrations**			**Supply of previous year**	**Attrition rate 4%**	**Total Supply**		
	Graduates	**Increase**	**95%**					
2018						**14081**	164600000	0.86
2019	3787		3598	14081	563	17115		
2020	3251		3088	17115	685	19519		
2021	3549		3372	19519	781	22110		
2022	3946	20%	3748	22110	884	24974		
2023	3946		3749	24974	999	27724		
2024	3946		3749	27724	1109	30363	174612904	1.74
2025	3946		3749	30363	1215	32898		
2026	3946		3749	32898	1316	35330		
2027	3946		3749	35330	1413	37666		
2028	3946		3749	37666	1507	39908		
2029	3946		3749	39908	1596	42060		
2030	3946		3749	42060	1682	44127	190686952	2.31

Source: BBS Pop Projection 2011-2061

Graph 5:Density - SACMOS - scenarios -1-2

Graph 6:Density - SACMOS - scenarios -3-4

	Density in 2018	Density in 2024	Density in 2030
Sce-3-4	0.86	1.64	2.06
Sce-3-4 (+10%)	0.86	1.69	2.19
Sce-3-4 (+20%)	0.86	1.74	2.31

Table 19: Projection of the supply of BSc nurses according to scenario 1							Total popula-tion in BD (2018, 2024 & 2030)	Densi-ty per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	Increase	80%					
2018						4064	164600000	0.25
2019	1345		1076	4064	163	4977		
2020	1909		1527	4977	199	6306		
2021	2773		2218	6306	252	8272		
2022	3207		2566	8272	331	10506		
2023	5743		4594	10506	420	14681		
2024	6042		4834	14681	587	18927	174612904	1.08
2025	6042		4834	18927	757	23003		
2026	6042		4834	23003	920	26917		
2027	6042		4834	26917	1077	30674		
2028	6042		4834	30674	1227	34281		
2029	6042		4834	34281	1371	37743		
2030	6042		4834	37743	1510	41067	190686952	2.15

Source: BBS Pop Projection 2011-2061

Table 20: Projection of the supply of BSc nurses according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						4064	164600000	0.25
2019	1345		1076	4064	163	4977		
2020	1909		1527	4977	199	6306		
2021	2773		2218	6306	252	8272		
2022	3207		2566	8272	331	10506		
2023	6317	10%	5054	10506	420	15140		
2024	6317		5054	15140	606	19588	174612904	1.12
2025	6317		5054	19588	784	23859		
2026	6317		5054	23859	954	27958		
2027	6317		5054	27958	1118	31894		
2028	6317		5054	31894	1276	35672		
2029	6317		5054	35672	1427	39299		
2030	6317		5054	39299	1572	42781	190686952	2.24

Source: BBS Pop Projection 2011-2061

Table 21: Projection of the supply of BSc nurses according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						4064	164600000	0.25
2019	1345		1076	4064	163	4977		
2020	1909		1527	4977	199	6306		
2021	2773		2218	6306	252	8272		
2022	3207		2566	8272	331	10506		
2023	6892	20%	5513	10506	420	15599		
2024	6892		5513	15599	624	20489	174612904	1.17
2025	6892		5513	20489	820	25183		
2026	6892		5513	25183	1007	29688		
2027	6892		5513	29688	1188	34014		
2028	6892		5513	34014	1361	38167		
2029	6892		5513	38167	1527	42154		
2030	6892		5513	42154	1686	45981	190686952	2.41

Source: BBS Pop Projection 2011-2061

Table 22: Projection of the supply of BSc nurses according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						4064	164600000	0.25
2019	1345		1278	4064	163	5179		
2020	1909		1814	5179	207	6786		
2021	2773		2634	6786	271	9148		
2022	3207		3047	9148	366	11829		
2023	5743		5456	11829	473	16812		
2024	6042		5740	16812	672	21879	174612904	1.25
2025	6042		5740	21879	875	26744		
2026	6042		5740	26744	1070	31414		
2027	6042		5740	31414	1257	35898		
2028	6042		5740	35898	1436	40202		
2029	6042		5740	40202	1608	44333		
2030	6042		5740	44333	1773	48300	190686952	2.53

Source: BBS Pop Projection 2011-2061

Table 23: Projection of the supply of BSc nurses according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						4064	164600000	0.25
2019	1345		1278	4064	163	5179		
2020	1909		1814	5179	207	6786		
2021	2773		2634	6786	271	9148		
2022	3207		3047	9148	366	11829		
2023	6317	10%	6001	11829	473	17357		
2024	6317		6001	17357	694	22665	174612904	1.30
2025	6317		6001	22665	907	27759		
2026	6317		6001	27759	1110	32651		
2027	6317		6001	32651	1306	37346		
2028	6317		6001	37346	1494	41854		
2029	6317		6001	41854	1674	46181		
2030	6317		6001	46181	1847	50335	190686952	2.64

Source: BBS Pop Projection 2011-2061

	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	Total popula-tion in BD (2018, 2024 & 2030)	Density per 10000
Year	Graduates	Increase	95%					
2018						4064	164600000	0.25
2019	1345		1278	4064	163	5179		
2020	1909		1814	5179	207	6786		
2021	2773		2634	6786	271	9148		
2022	3207		3047	9148	366	11829		
2023	6892	20%	6547	11829	473	17903		
2024	6892		6547	17903	716	23734	174612904	1.36
2025	6892		6547	23734	949	29332		
2026	6892		6547	29332	1173	34705		
2027	6892		6547	34705	1388	39864		
2028	6892		6547	39864	1595	44817		
2029	6892		6547	44817	1793	49571		
2030	6892		6547	49571	1983	54135	190686952	2.84

Table 24: Projection of the supply of BSc nurses according to scenarios 3-4 (+20%)

Source: BBS Pop Projection 2011-2061

Graph 7: Density-Nurses (BSc)- scenarios-1-2

Density in 2018: Sce-1 0.25, Sce-2 (+10%) 0.25, Sce-2 (+20%) 0.25
Density in 2024: Sce-1 1.08, Sce-2 (+10%) 1.12, Sce-2 (+20%) 1.17
Density in 2030: Sce-1 2.15, Sce-2 (+10%) 2.24, Sce-2 (+20%) 2.41

Graph 8:Density- Nurses (BSc)- scenarios 3-4

Density in 2018: Sce-3-4 0.25, Sce-3-4 (+10%) 0.25, Sce-3-4 (+20%) 0.25
Density in 2024: Sce-3-4 1.25, Sce-3-4 (+10%) 1.30, Sce-3-4 (+20%) 1.36
Density in 2030: Sce-3-4 2.53, Sce-3-4 (+10%) 2.64, Sce-3-4 (+20%) 2.84

Table 25: Projection of the supply of Diploma nurses according to scenario 1						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	In-crease	80%					
2018						50539	164600000	3.07
2019	5394		4315	50539	2022	52833		
2020	6711		5369	52833	2113	56088		
2021	7742		6194	56088	2244	60038		
2022	12487		9990	60038	2402	67626		
2023	12487		9990	67626	2705	74911		
2024	12487		9990	74911	2996	81904	174612904	4.69
2025	12487		9990	81904	3276	88617		
2026	12487		9990	88617	3545	95062		
2027	12487		9990	95062	3802	101249		
2028	12487		9990	101249	4050	107189		
2029	12487		9990	107189	4288	112891		
2030	12487		9990	112891	4516	118365	190686952	6.21

Source: BBS Pop Projection 2011-2061

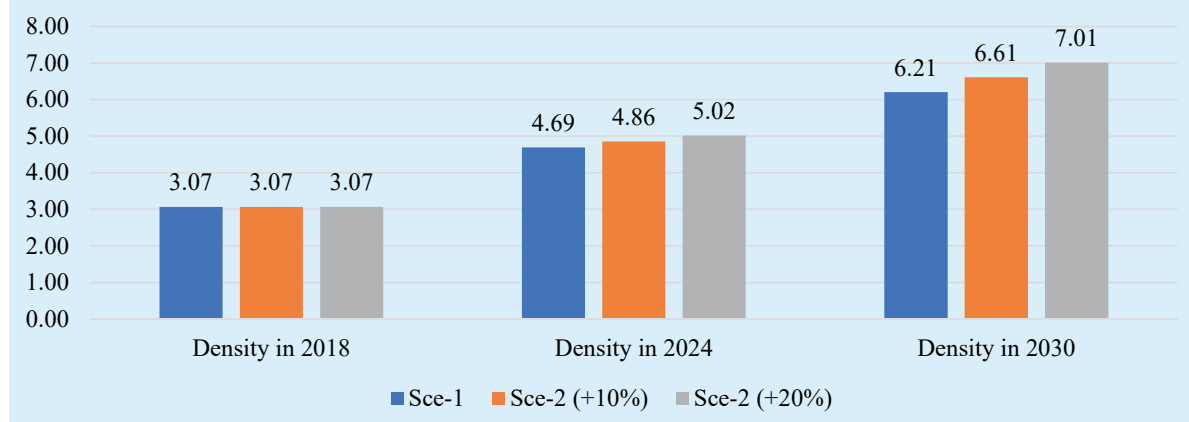| Table 26: Projection of the supply of Diploma nurses according to scenario 2 (+10%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	In-crease	80%					
2018						50539	164600000	3.07
2019	5394		4315	50539	2022	52833		
2020	6711		5369	52833	2113	56088		
2021	7742		6194	56088	2244	60038		
2022	13736	10%	10989	60038	2402	68625		
2023	13736		10989	68625	2745	76869		
2024	13736		10989	76869	3075	84783	174612904	4.86
2025	13736		10989	84783	3391	92380		
2026	13736		10989	92380	3695	99673		
2027	13736		10989	99673	3987	106675		
2028	13736		10989	106675	4267	113396		
2029	13736		10989	113396	4536	119849		
2030	13736		10989	119849	4794	126044	190686952	6.61

Source: BBS Pop Projection 2011-2061

Table 27: Projection of the supply of Diploma nurses according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						50539	164600000	3.07
2019	5394		4315	50539	2022	52833		
2020	6711		5369	52833	2113	56088		
2021	7742		6194	56088	2244	60038		
2022	14984	20%	11988	60038	2402	69624		
2023	14984		11988	69624	2785	78827		
2024	14984		11988	78827	3153	87661	174612904	5.02
2025	14984		11988	87661	3506	96142		
2026	14984		11988	96142	3846	104284		
2027	14984		11988	104284	4171	112100		
2028	14984		11988	112100	4484	119604		
2029	14984		11988	119604	4784	126807		
2030	14984		11988	126807	5072	133722	190686952	7.01

Source: BBS Pop Projection 2011-2061

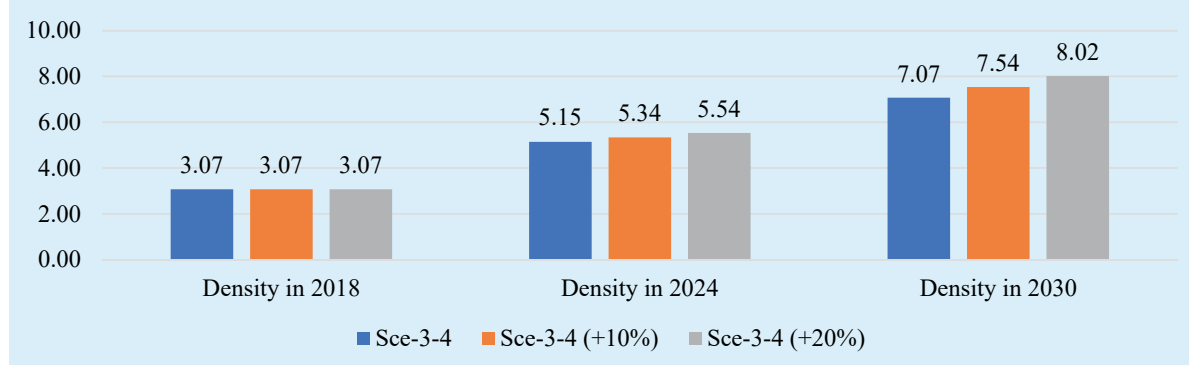| Table28: Projection of the supply of Diploma nurses according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						50539	164600000	3.07
2019	5394		5124	50539	2022	53642		
2020	6711		6375	53642	2146	57872		
2021	7742		7355	57872	2315	62912		
2022	12487		11863	62912	2516	72258		
2023	12487		11863	72258	2890	81230		
2024	12487		11863	81230	3249	89844	174612904	5.15
2025	12487		11863	89844	3594	98112		
2026	12487		11863	98112	3924	106051		
2027	12487		11863	106051	4242	113671		
2028	12487		11863	113671	4547	120987		
2029	12487		11863	120987	4839	128010		
2030	12487		11863	128010	5120	134752	190686952	7.07

Source: BBS Pop Projection 2011-2061

Table 29: Projection of the supply of Diploma nurses according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	Increase	95%					
2018						50539	164600000	3.07
2019	5394		5124	50539	2022	53642		
2020	6711		6375	53642	2146	57872		
2021	7742		7355	57872	2315	62912		
2022	13736	10%	13049	62912	2516	73444		
2023	13736		13049	73444	2938	83555		
2024	13736		13049	83555	3342	93262	174612904	5.34
2025	13736		13049	93262	3730	102580		
2026	13736		13049	102580	4103	111526		
2027	13736		13049	111526	4461	120114		
2028	13736		13049	120114	4805	128358		
2029	13736		13049	128358	5134	136273		
2030	13736		13049	136273	5451	143871	190686952	7.54

Source: BBS Pop Projection 2011-2061

Table 30: Projection of the supply of Diploma nurses according to scenarios (210%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	Increase	95%					
2018						50539	164600000	3.07
2019	5394		5124	50539	2022	53642		
2020	6711		6375	53642	2146	57872		
2021	7742		7355	57872	2315	62912		
2022	14984	20%	14235	62912	2516	74630		
2023	14984		14235	74630	2985	85880		
2024	14984		14235	85880	3435	96680	174612904	5.54
2025	14984		14235	96680	3867	107048		
2026	14984		14235	107048	4282	117001		
2027	14984		14235	117001	4680	126557		
2028	14984		14235	126557	5062	135729		
2029	14984		14235	135729	5429	144535		
2030	14984		14235	144535	5781	152989	190686952	8.02

Source: BBS Pop Projection 2011-2061

Graph 9: Density-Nurses (Diploma)- scenarios 1 -2

Legend: Sce-1 | Sce-2 (+10%) | Sce-2 (+20%)

Graph 10: Density-Nurses (Diploma)- scenarios 3-4

Legend: Sce-3-4 | Sce-3-4 (+10%) | Sce-3-4 (+20%)

Table 31: Projection of the supply of midwifes according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						2131	164600000	0.13
2019	1068		854	2131	85	2900		
2020	1416		1133	2900	116	3917		
2021	1441		1153	3917	157	4913		
2022	2959		2367	4913	197	7084		
2023	3411		2729	7084	283	9529		
2024	3411		2729	9529	381	11877	174612904	0.68
2025	3411		2729	11877	475	14131		
2026	3411		2729	14131	565	16294		
2027	3411		2729	16294	652	18371		
2028	3411		2729	18371	735	20365		
2029	3411		2729	20365	815	22279		
2030	3411		2729	22279	891	24117	190686952	1.26

Source: BBS Pop Projection 2011-2061

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Table 32: Projection of the supply of midwifes according to scenario 2 (+10%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	
	Graduates	Increase	80%				
2018						2131	164600000	0.13
2019	1068		854	2131	85	2900		
2020	1416		1133	2900	116	3917		
2021	1441		1153	3917	157	4913		
2022	3255	10%	2604	4913	197	7320		
2023	3255		2604	7320	293	9632		
2024	3255		2604	9632	385	11850	174612904	0.68
2025	3255		2604	11850	474	13980		
2026	3255		2604	13980	559	16025		
2027	3255		2604	16025	641	17988		
2028	3255		2604	17988	720	19872		
2029	3255		2604	19872	795	21681		
2030	3255		2604	21681	867	23418	190686952	1.23

Source: BBS Pop Projection 2011 - 2061

Table 33: Projection of the supply of midwifes according to scenario 2 (+20%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	
	Graduates	Increase	80%				
2018						2131	164600000	0.13
2019	1068		854	2131	85	2900		
2020	1416		1133	2900	116	3917		
2021	1441		1153	3917	157	4913		
2022	3551	20%	2841	4913	197	7557		
2023	3551		2841	7557	302	10096		
2024	3551		2841	10096	404	12533	174612904	0.72
2025	3551		2841	12533	501	14872		
2026	3551		2841	14872	595	17118		
2027	3551		2841	17118	685	19274		
2028	3551		2841	19274	771	21344		
2029	3551		2841	21344	854	23331		
2030	3551		2841	23331	933	25239	190686952	1.32

Source: BBS Pop Projection 2011-2061

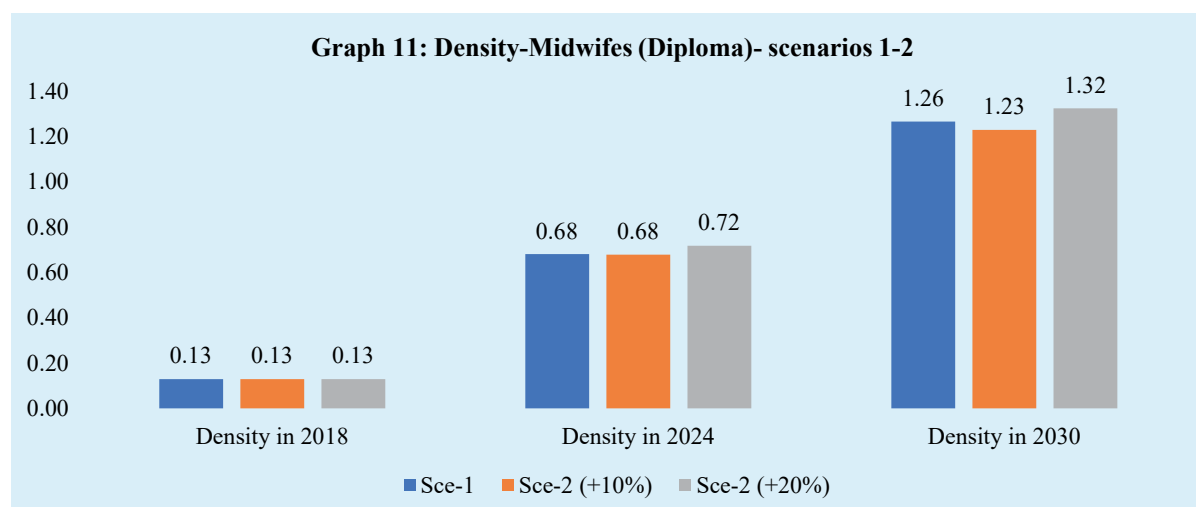| Table 34: Projection of the supply of midwifes according to scenarios 3-4						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	
	Graduates	Increase	95%				
2018						2131	164600000	0.13
2019	1068		1015	2131	85	3060		
2020	1416		1345	3060	122	4283		
2021	1441		1369	4283	171	5481		
2022	2959		2811	5481	219	8073		
2023	3411		3240	8073	323	10990		
2024	3411		3240	10990	440	13791	174612904	0.79
2025	3411		3240	13791	552	16480		
2026	3411		3240	16480	659	19061		
2027	3411		3240	19061	762	21539		
2028	3411		3240	21539	862	23918		
2029	3411		3240	23918	957	26202		
2030	3411		3240	26202	1048	28394	190686952	1.49

Source: BBS Pop Projection 2011 - 2061

Table 35: Projection of the supply of midwifes according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						2131	164600000	0.13
2019	1068		1015	2131	85	3060		
2020	1416		1345	3060	122	4283		
2021	1441		1369	4283	171	5481		
2022	3255	10%	3092	5481	219	8354		
2023	3255		3092	8354	334	11112		
2024	3255		3092	11112	444	13759	174612904	0.79
2025	3255		3092	13759	550	16301		
2026	3255		3092	16301	652	18741		
2027	3255		3092	18741	750	21084		
2028	3255		3092	21084	843	23333		
2029	3255		3092	23333	933	25491		
2030	3255		3092	25491	1020	27564	190686952	1.45

Source: BBS Pop Projection 2011 -2061

Table 36: Projection of the supply of midwifes according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						2131	164600000	0.13
2019	1068		1015	2131	85	3060		
2020	1416		1345	3060	122	4283		
2021	1441		1369	4283	171	5481		
2022	3551	20%	3373	5481	219	8635		
2023	3551		3373	8635	345	11663		
2024	3551		3373	11663	467	14570	174612904	0.83
2025	3551		3373	14570	583	17360		
2026	3551		3373	17360	694	20039		
2027	3551		3373	20039	802	22611		
2028	3551		3373	22611	904	25080		
2029	3551		3373	25080	1003	27451		
2030	3551		3373	27451	1098	29726	190686952	1.56

Source: BBS Pop Projection 2011-2061

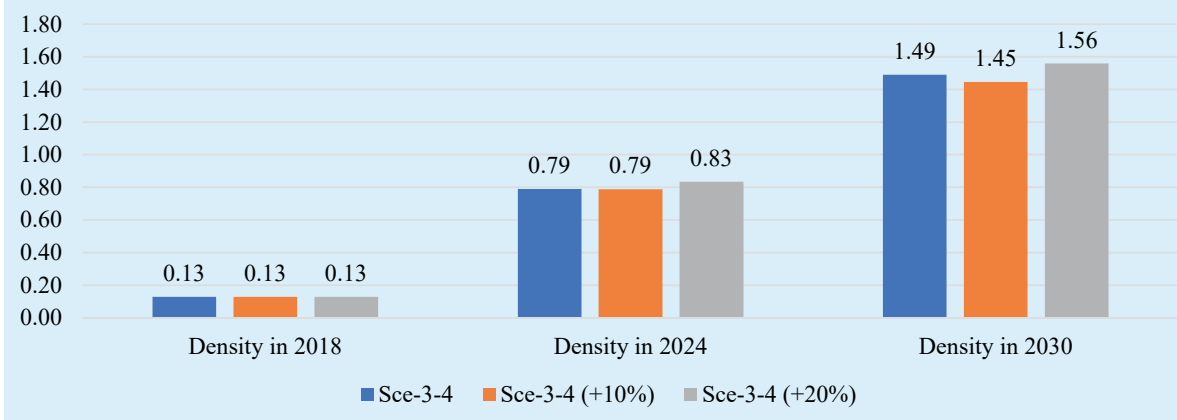**Graph 11: Density-Midwifes (Diploma)- scenarios 1-2**

Density	2018	2024	2030
Sce-1	0.13	0.68	1.26
Sce-2 (+10%)	0.13	0.68	1.23
Sce-2 (+20%)	0.13	0.72	1.32

Graph 12: Density-Midwifes (Diploma) scenarios 3-4

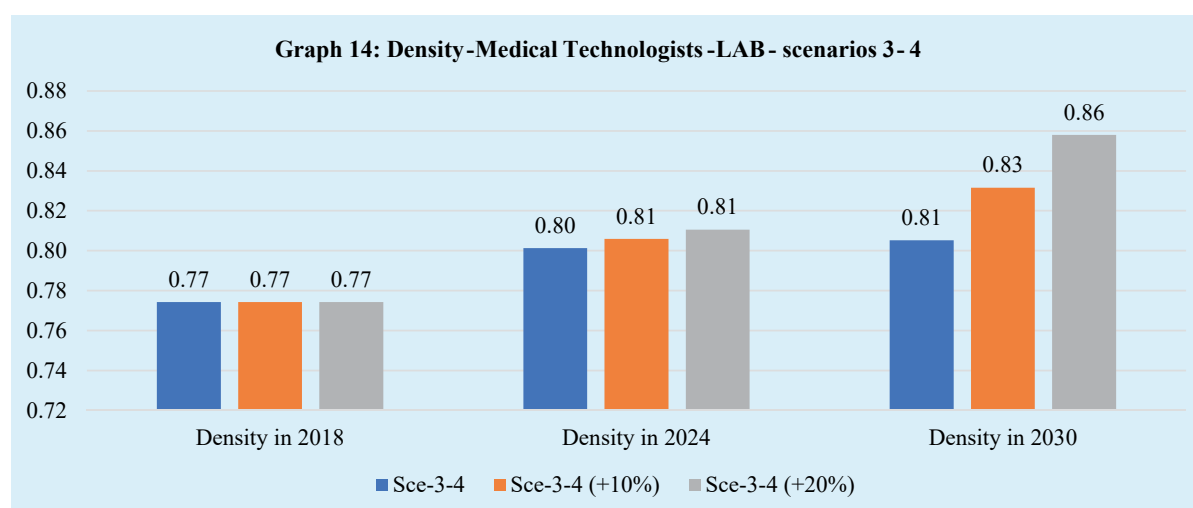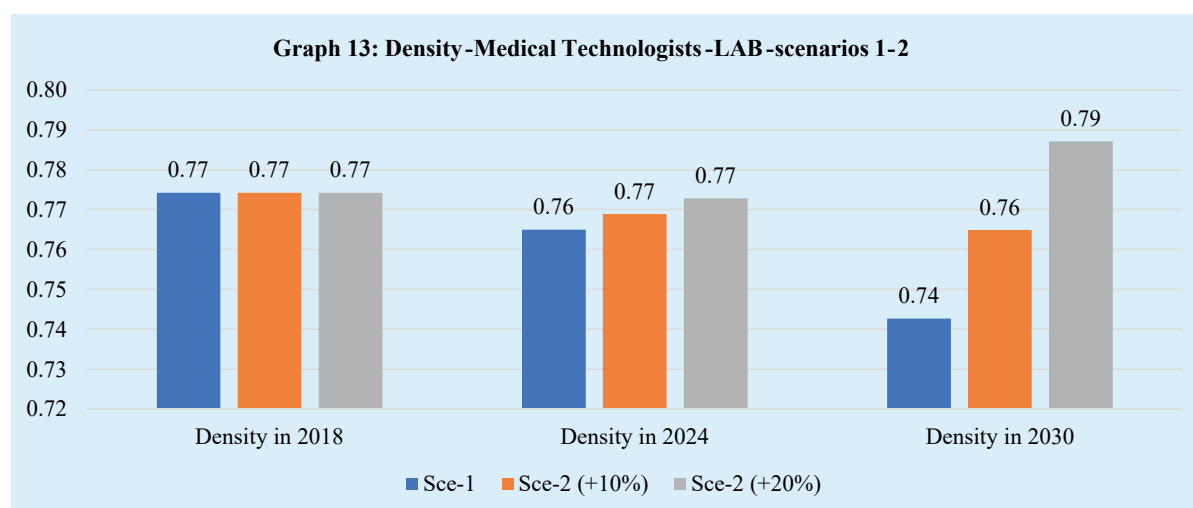| Table 37: Projection of the supply of Medical Technologists-LAB according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	**New registrations**			**Supply of previous year**	**Attrition rate 4%**	**Total Supply**		
	Graduates	**Increase**	**80%**					
2018						12744	164600000	0.77
2019	671		537	12744	510	12771		
2020	770		616	12771	511	12876		
2021	795		636	12876	515	12997		
2022	707		566	12997	520	13043		
2023	853		682	13043	522	13204		
2024	853		682	13204	528	13358	174612904	0.76
2025	853		682	13358	534	13506		
2026	853		682	13506	540	13648		
2027	853		682	13648	546	13785		
2028	853		682	13785	551	13916		
2029	853		682	13916	557	14041		
2030	853		682	14041	562	14162	190686952	0.74

Source: BBS Pop Projection 2011-2061

Table 38: Projection of the supply of Medical Technologists-LAB according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						12744	164600000	0.77
2019	671		537	12744	510	12771		
2020	770		616	12771	511	12876		
2021	795		636	12876	515	12997		
2022	707		566	12997	520	13043		
2023	853		682	13043	522	13204		
2024	938	10%	751	13204	528	13426	174612904	0.77
2025	938		751	13426	537	13640		
2026	938		751	13640	546	13845		
2027	938		751	13845	554	14042		
2028	938		751	14042	562	14231		
2029	938		751	14231	569	14412		
2030	938		751	14412	576	14586	190686952	0.76

Source: BBS Pop Projection 2011-2061

Table 39: of the supply of Medical Technologists-LAB according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						12744	164600000	0.77
2019	671		537	12744	510	12771		
2020	770		616	12771	511	12876		
2021	795		636	12876	515	12997		
2022	707		566	12997	520	13043		
2023	853		682	13043	522	13204		
2024	1024	20%	819	13204	528	13494	174612904	0.77
2025	1024		819	13494	540	13773		
2026	1024		819	13773	551	14041		
2027	1024		819	14041	562	14299		
2028	1024		819	14299	572	14546		
2029	1024		819	14546	582	14783		
2030	1024		819	14783	591	15010	190686952	0.79

Source: BBS Pop Projection 2011-2061

Table 40: Projection of the supply of Medical Technologists-LAB according to scenarios 3-4

Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	Total population in BD (2018, 2024 & 2030)	Density per 10000
	Graduates	Increase	95%					
2018						12744	164600000	0.77
2019	671		637	12744	510	12872		
2020	770		732	12872	515	13088		
2021	795		755	13088	524	13320		
2022	707		672	13320	533	13459		
2023	853		810	13459	538	13731		
2024	853		810	13731	549	13992	174612904	0.80
2025	853		810	13992	560	14243		
2026	853		810	14243	570	14483		
2027	853		810	14483	579	14714		
2028	853		810	14714	589	14936		
2029	853		810	14936	597	15149		
2030	853		810	15149	606	15353	190686952	0.81

Source: BBS Pop Projection 2011-2061

Table 41 : Projection of the supply of Medical Technologists-LAB according to scenarios 3-4 (+10%)

Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	Total population in BD (2018, 2024 & 2030)	Density per 10000
	Graduates	Increase	95%					
2018						12744	164600000	0.77
2019	671		637	12744	510	12872		
2020	770		732	12872	515	13088		
2021	795		755	13088	524	13320		
2022	707		672	13320	533	13459		
2023	853		810	13459	538	13731		
2024	938	10%	891	13731	549	14073	174612904	0.81
2025	938		891	14073	563	14401		
2026	938		891	14401	576	14717		
2027	938		891	14717	589	15020		
2028	938		891	15020	601	15310		
2029	938		891	15310	612	15589		
2030	938		891	15589	624	15857	190686952	0.83

Source: BBS Pop Projection 2011-2061

Table 42: Projection of the supply of Medical Technologists-LAB according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	In-crease	95%					
2018						12744	164600000	0.77
2019	671		637	12744	510	12872		
2020	770		732	12872	515	13088		
2021	795		755	13088	524	13320		
2022	707		672	13320	533	13459		
2023	853		810	13459	538	13731		
2024	1024	20%	972	13731	549	14154	174612904	0.81
2025	1024		972	14154	566	14560		
2026	1024		972	14560	582	14950		
2027	1024		972	14950	598	15325		
2028	1024		972	15325	613	15684		
2029	1024		972	15684	627	16029		
2030	1024		972	16029	641	16360	190686952	0.86

Source: BBS Pop Projection 2011-2061

Graph 13: Density-Medical Technologists-LAB-scenarios 1-2

Graph 14: Density-Medical Technologists-LAB- scenarios 3- 4

Table 43: Projection of the supply of Medical Technologists-Radiotherapy according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						576	164600000	0.03
2019	75		60	576	23	613		
2020	77		62	613	25	650		
2021	64		51	650	26	675		
2022	84		67	675	27	715		
2023	84		67	715	29	754		
2024	84		67	754	30	791	174612904	0.05
2025	84		67	791	32	827		
2026	84		67	827	33	861		
2027	84		67	861	34	894		
2028	84		67	894	36	925		
2029	84		67	925	37	955		
2030	84		67	955	38	984	190686952	0.05

Source: BBS Pop Projection 2011-2061

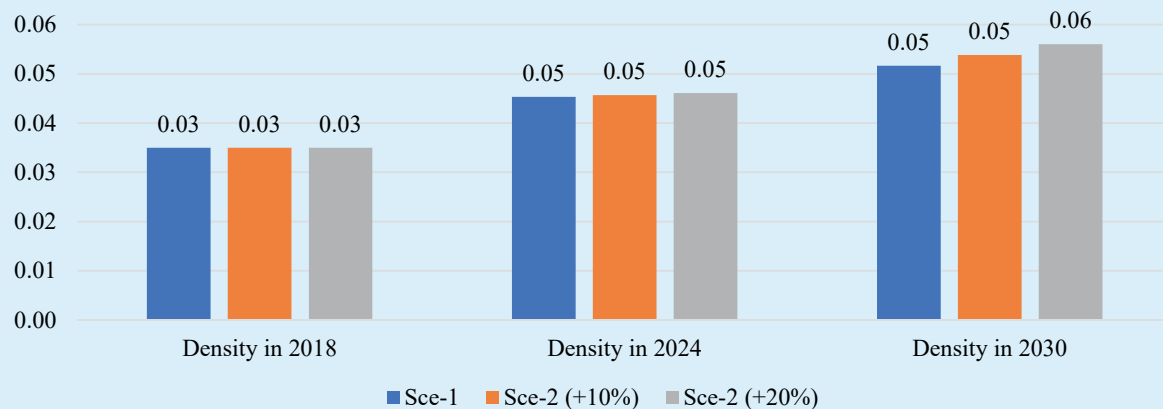| Table 44: Projection of the supply of Medical Technologists-Radiotherapy according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						576	164600000	0.03
2019	75		60	576	23	613		
2020	77		62	613	25	650		
2021	64		51	650	26	675		
2022	84		67	675	27	715		
2023	84		67	715	29	754		
2024	92	10%	74	754	30	798	174612904	0.05
2025	92		74	798	32	840		
2026	92		74	840	34	880		
2027	92		74	880	35	919		
2028	92		74	919	37	956		
2029	92		74	956	38	992		
2030	92		74	992	40	1026	190686952	0.05

Source: BBS Pop Projection 2011-2061

Table 45: Projection of the supply of Medical Technologists-Radiotherapy according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						576	164600000	0.03
2019	75		60	576	23	613		
2020	77		62	613	25	650		
2021	64		51	650	26	675		
2022	84		67	675	27	715		
2023	84		67	715	29	754		
2024	101	20%	81	754	30	804	174612904	0.05
2025	101		81	804	32	853		
2026	101		81	853	34	899		
2027	101		81	899	36	944		
2028	101		81	944	38	987		
2029	101		81	987	39	1028		
2030	101		81	1028	41	1068	190686952	0.06

Source: BBS Pop Projection 2011-2061

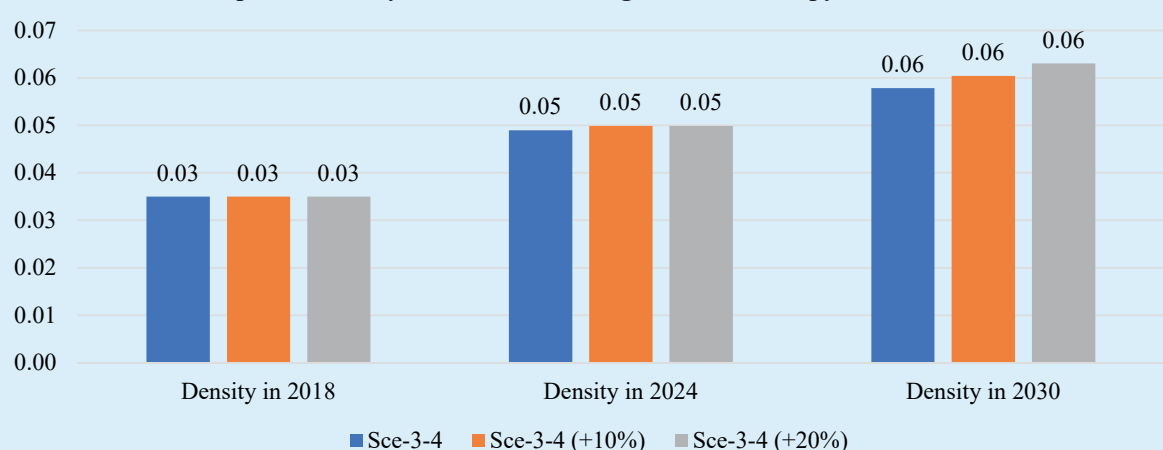| Table 46: Projection of the supply of Medical Technologists-Radiotherapy according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						576	164600000	0.03
2019	75		71	576	23	624		
2020	77		73	624	25	672		
2021	64		61	672	27	706		
2022	84		80	706	28	758		
2023	84		80	758	30	807		
2024	84		80	807	32	855	174612904	0.05
2025	84		80	855	34	900		
2026	84		80	900	36	944		
2027	84		80	944	38	986		
2028	84		80	986	39	1027		
2029	84		80	1027	41	1065		
2030	84		80	1065	43	1103	190686952	0.06

Source: BBS Pop Projection 2011-2061

Table 47: Projection of the supply of Medical Technologists-Radiotherapy according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						576	164600000	0.03
2019	75		71	576	23	624		
2020	77		73	624	25	672		
2021	64		61	672	27	706		
2022	84		80	706	28	758		
2023	84		80	758	30	807		
2024	92	10%	88	807	32	863	174612904	0.05
2025	92		88	863	35	916		
2026	92		88	916	37	967		
2027	92		88	967	39	1016		
2028	92		88	1016	41	1063		
2029	92		88	1063	43	1109		
2030	92		88	1109	44	1152	190686952	0.06

Source: BBS Pop Projection 2011-2061

Table 48: Projection of the supply of Medical Technologists-Radiotherapy according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						576	164600000	0.03
2019	75		71	576	23	624		
2020	77		73	624	25	672		
2021	64		61	672	27	706		
2022	84		80	706	28	758		
2023	84		80	758	30	807		
2024	101	20%	96	807	32	871	174612904	0.05
2025	101		96	871	35	932		
2026	101		96	932	37	990		
2027	101		96	990	40	1046		
2028	101		96	1046	42	1100		
2029	101		96	1100	44	1152		
2030	101		96	1152	46	1202	190686952	0.06

Source: BBS Pop Projection 2011-2061

Graph 15: Density-Medical Technologists-Radiotherapy - scenarios-1-2

Legend: ■ Sce-1 ■ Sce-2 (+10%) ■ Sce-2 (+20%)

Graph 16: Density- Medical Technologists-Radiotherapy- scenarios 3-4

Legend: ■ Sce-3-4 ■ Sce-3-4 (+10%) ■ Sce-3-4 (+20%)

Table 49: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						3435	164600000	0.21
2019	354	283			137	3581		
2020	373	298			143	3736		
2021	399	319			149	3906		
2022	399	319			156	4069		
2023	399	319			163	4225		
2024	399	319			169	4375	174612904	0.25
2025	399	319			175	4520		
2026	399	319			181	4658		
2027	399	319			186	4791		
2028	399	319			192	4918		
2029	399	319			197	5041		
2030	399	319			202	5158	190686952	0.27

Source: BBS Pop Projection 2011-2061

Table 50: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate	Total Supply		
	Graduates	Increase	80%		4%			
2018						**3435**	**164600000**	**0.21**
2019	354		283	3435	137	3581		
2020	373		298	3581	143	3736		
2021	399		319	3736	149	3906		
2022	399		319	3906	156	4069		
2023	399		319	4069	163	4225		
2024	439	10%	351	4225	169	4407	174612904	0.25
2025	439		351	4407	176	4582		
2026	439		351	4582	183	4750		
2027	439		351	4750	190	4911		
2028	439		351	4911	196	5066		
2029	439		351	5066	203	5214		
2030	439		351	5214	209	5357	190686952	0.28

Source: BBS Pop Projection 2011-2061

Table 51: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate	Total Supply		
	Graduates	Increase	80%		4%			
2018						3435	164600000	0.21
2019	354		283	3435	137	3581		
2020	373		298	3581	143	3736		
2021	399		319	3736	149	3906		
2022	399		319	3906	156	4069		
2023	399		319	4069	163	4225		
2024	479	20%	383	4225	169	4439	174612904	0.25
2025	479		383	4439	178	4645		
2026	479		383	4645	186	4842		
2027	479		383	4842	194	5031		
2028	479		383	5031	201	5213		
2029	479		383	5213	209	5388		
2030	479		383	5388	216	5555	190686952	0.29

Source: BBS Pop Projection 2011-2061

Table 52: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenarios 3-4							Total popu-lation in BD (2018, 2024 & 2030)	Densi-ty per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Sup-ply		
	Gradu-ates	Increase	95%					
2018						3435	164600000	0.21
2019	354		336		137	3634		
2020	373		354		145	3843		
2021	399		379		154	4068		
2022	399		379		163	4285		
2023	399		379		171	4492		
2024	399		379		180	4692	174612904	0.27
2025	399		379		188	4883		
2026	399		379		195	5067		
2027	399		379		203	5243		
2028	399		379		210	5412		
2029	399		379		216	5575		
2030	399		379		223	5731	190686952	0.30

Source: BBS Pop Projection 2011-2061

Table 53: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	Increase	95%					
2018						3435	164600000	0.21
2019	354		336	3435	137	3634		
2020	373		354	3634	145	3843		
2021	399		379	3843	154	4068		
2022	399		379	4068	163	4285		
2023	399		379	4285	171	4492		
2024	439	10%	417	4492	180	4729	174612904	0.27
2025	439		417	4729	189	4957		
2026	439		417	4957	198	5176		
2027	439		417	5176	207	5386		
2028	439		417	5386	215	5587		
2029	439		417	5587	223	5781		
2030	439		417	5781	231	5967	190686952	0.31

Source: BBS Pop Projection 2011-2061

Table 54: Projection of the supply of Medical Technologists- Radiography & Imaging according to scenarios 3-4 (+20%)								Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate		Total Supply		
	Graduates	Increase	95%		4%				
2018							3435	164600000	0.21
2019	354		336	3435	137		3634		
2020	373		354	3634	145		3843		
2021	399		379	3843	154		4068		
2022	399		379	4068	163		4285		
2023	399		379	4285	171		4492		
2024	479	20%	455	4492	180		4767	174612904	0.27
2025	479		455	4767	191		5032		
2026	479		455	5032	201		5285		
2027	479		455	5285	211		5529		
2028	479		455	5529	221		5762		
2029	479		455	5762	230		5987		
2030	479		455	5987	239		6202	190686952	0.33

Source: BBS Pop Projection 2011-2061

Graph 17: Density- Medical Technologists-Radiography & Imaging-scenarios-1-2

Graph 18: Density-Medical Technologists-Radiography & Imaging- scenarios 3-4

Table 55: Projection of the supply of Medical Technologists- Physiotherapy according to scenario 1	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	Grad-uates	Increase	80%					
2018						2376	164600000	0.14
2019	319		255	2376		2536		
2020	303		242	2536		2677		
2021	341		273	2677		2843		
2022	297		238	2843		2967		
2023	327		262	2967		3110		
2024	327		262	3110		3247	174612904	0.19
2025	327		262	3247		3379		
2026	327		262	3379		3505		
2027	327		262	3505		3626		
2028	327		262	3626		3743		
2029	327		262	3743		3855		
2030	327		262	3855		3962	190686952	0.21

Source: BBS Pop Projection 2011-2061

Table 56: Projection of the supply of Medical Technologists- Physiotherapy according to scenario 2 (+10%)	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	Gradu-ates	Increase	80%					
2018						2376	164600000	0.14
2019	319		255	2376	95	2536		
2020	303		242	2536	101	2677		
2021	341		273	2677	107	2843		
2022	297		238	2843	114	2967		
2023	327		262	2967	119	3110		
2024	360	10%	288	3110	124	3273	174612904	0.19
2025	360		288	3273	131	3430		
2026	360		288	3430	137	3580		
2027	360		288	3580	143	3725		
2028	360		288	3725	149	3864		
2029	360		288	3864	155	3997		
2030	360		288	3997	160	4125	190686952	0.22

Source: BBS Pop Projection 2011-2061

Table 57: Projection of the supply of Medical Technologists- Physiotherapy according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Gradu-ates	In-crease	80%					
2018						2376	164600000	0.14
2019	319		255	2376	95	2536		
2020	303		242	2536	101	2677		
2021	341		273	2677	107	2843		
2022	297		238	2843	114	2967		
2023	327		262	2967	119	3110		
2024	392	20%	314	3110	124	3299	174612904	0.19
2025	392		314	3299	132	3481		
2026	392		314	3481	139	3656		
2027	392		314	3656	146	3823		
2028	392		314	3823	153	3984		
2029	392		314	3984	159	4139		
2030	392		314	4139	166	4287	190686952	0.22

Source: BBS Pop Projection 2011-2061

Table 58: Projection of the supply of Medical Technologists- Physiotherapy according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of pre-vious year	Attrition rate 4%	Total Sup-ply		
	Gradu-ates	In-crease	95%					
2018						2376	164600000	0.14
2019	319		303	2376	95	2584		
2020	303		288	2584	103	2768		
2021	341		324	2768	111	2982		
2022	297		282	2982	119	3145		
2023	327		311	3145	126	3329		
2024	327		311	3329	133	3507	174612904	0.20
2025	327		311	3507	140	3677		
2026	327		311	3677	147	3841		
2027	327		311	3841	154	3998		
2028	327		311	3998	160	4149		
2029	327		311	4149	166	4293		
2030	327		311	4293	172	4432	190686952	0.23

Source: BBS Pop Projection 2011-2061

Table 59: Projection of the supply of Medical Technologists- Physiotherapy according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						2376	164600000	0.14
2019	319		303	2376	95	2584		
2020	303		288	2584	103	2768		
2021	341		324	2768	111	2982		
2022	297		282	2982	119	3145		
2023	327		311	3145	126	3329		
2024	360	10%	342	3329	133	3538	174612904	0.20
2025	360		342	3538	142	3738		
2026	360		342	3738	150	3930		
2027	360		342	3930	157	4115		
2028	360		342	4115	165	4292		
2029	360		342	4292	172	4462		
2030	360		342	4462	178	4625	190686952	0.24

Source: BBS Pop Projection 2011-2061

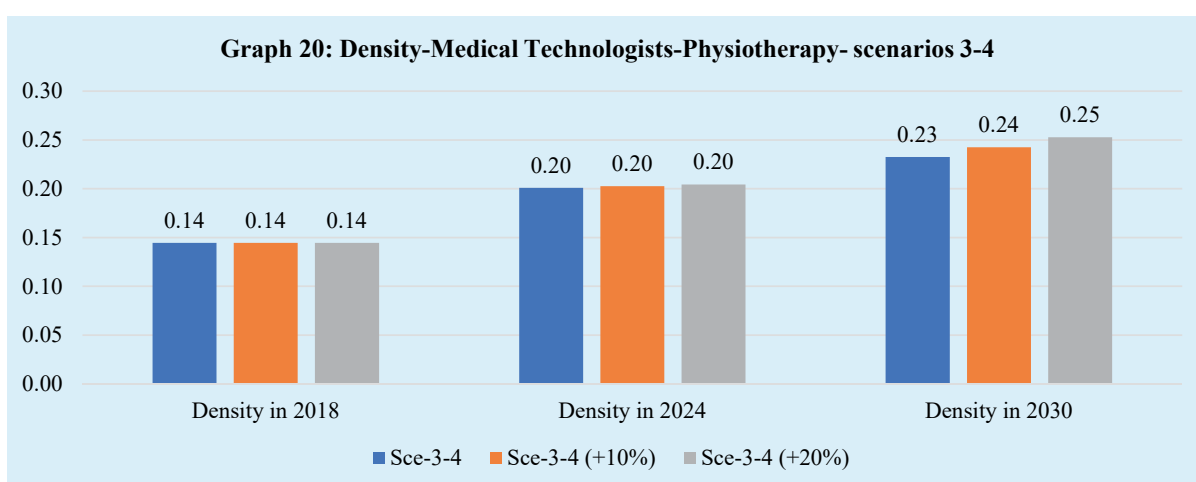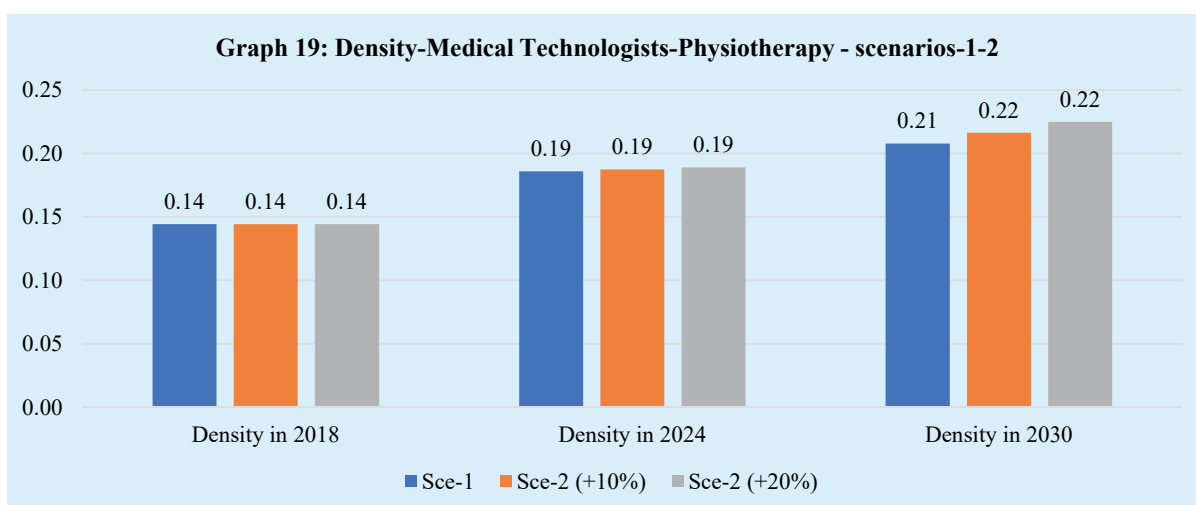| Table 60: Projection of the supply of Medical Technologists- Physiotherapy according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						2376	164600000	0.14
2019	319		303	2376	95	2584		
2020	303		288	2584	103	2768		
2021	341		324	2768	111	2982		
2022	297		282	2982	119	3145		
2023	327		311	3145	126	3329		
2024	392	20%	373	3329	133	3569	174612904	0.20
2025	392		373	3569	143	3799		
2026	392		373	3799	152	4020		
2027	392		373	4020	161	4232		
2028	392		373	4232	169	4435		
2029	392		373	4435	177	4631		
2030	392		373	4631	185	4818	190686952	0.25

Source: BBS Pop Projection 2011-2061

Graph 19: Density-Medical Technologists-Physiotherapy - scenarios-1-2

Graph 20: Density-Medical Technologists-Physiotherapy- scenarios 3-4

Table 61: Projection of the supply of Medical Technologists- Dentistry according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						4118	164600000	0.25
2019	287		230	4118	165	4183		
2020	336		269	4183	167	4284		
2021	344		275	4284	171	4388		
2022	340		272	4388	176	4485		
2023	332		266	4485	179	4571		
2024	332		266	4571	183	4654	174612904	0.27
2025	332		266	4654	186	4733		
2026	332		266	4733	189	4809		
2027	332		266	4809	192	4883		
2028	332		266	4883	195	4953		
2029	332		266	4953	198	5020		
2030	332		266	5020	201	5085	190686952	0.27

Source: BBS Pop Projection 2011-2061

Table 62: Projection of the supply of Medical Technologists- Dentistry according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						4118	164600000	0.25
2019	287		230	4118	165	4183		
2020	336		269	4183	167	4284		
2021	344		275	4284	171	4388		
2022	340		272	4388	176	4485		
2023	332		266	4485	179	4571		
2024	365	10%	292	4571	183	4680	174612904	0.27
2025	365		292	4680	187	4785		
2026	365		292	4785	191	4886		
2027	365		292	4886	195	4983		
2028	365		292	4983	199	5075		
2029	365		292	5075	203	5165		
2030	365		292	5165	207	5250	190686952	0.28

Source: BBS Pop Projection 2011-2061

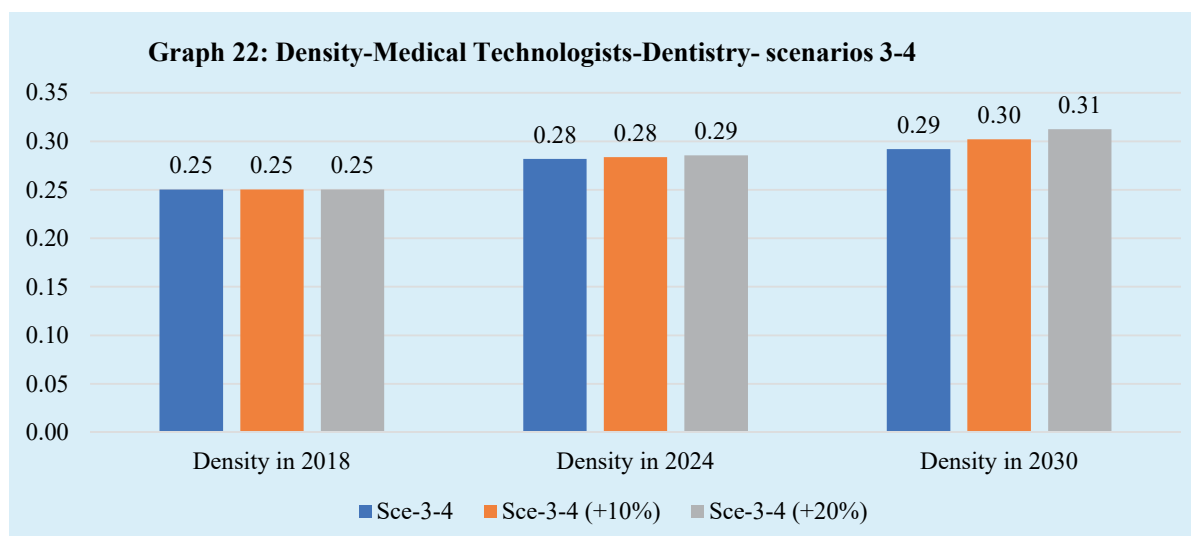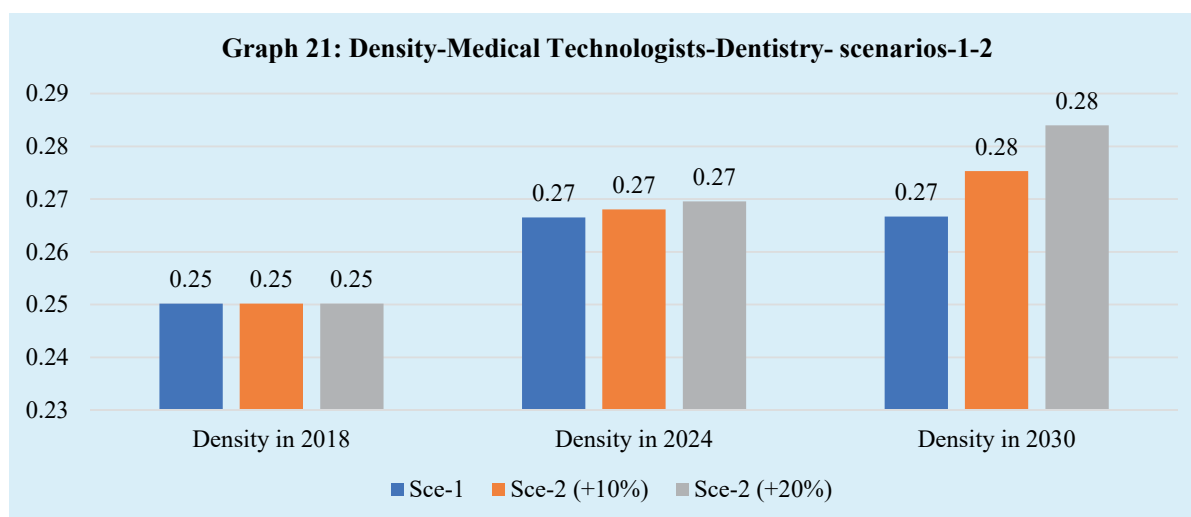| Table 63: Projection of the supply of Medical Technologists- Dentistry according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						4118	164600000	0.25
2019	287		230	4118	165	4183		
2020	336		269	4183	167	4284		
2021	344		275	4284	171	4388		
2022	340		272	4388	176	4485		
2023	332		266	4485	179	4571		
2024	398	20%	319	4571	183	4707	174612904	0.27
2025	398		319	4707	188	4837		
2026	398		319	4837	193	4962		
2027	398		319	4962	198	5083		
2028	398		319	5083	203	5198		
2029	398		319	5198	208	5309		
2030	398		319	5309	212	5415	190686952	0.28

Source: BBS Pop Projection 2011-2061

Table 64: Projection of the supply of Medical Technologists- Dentistry according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						4118	164600000	0.25
2019	287		273	4118	165	4226		
2020	336		319	4226	169	4376		
2021	344		327	4376	175	4528		
2022	340		323	4528	181	4670		
2023	332		315	4670	187	4798		
2024	332		315	4798	192	4922	174612904	0.28
2025	332		315	4922	197	5040		
2026	332		315	5040	202	5154		
2027	332		315	5154	206	5263		
2028	332		315	5263	211	5368		
2029	332		315	5368	215	5469		
2030	332		315	5469	219	5566	190686952	0.29

Source: BBS Pop Projection 2011-2061

Table 65: Projection of the supply of Medical Technologists- Dentistry according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						4118	164600000	0.25
2019	287		273	4118	165	4226		
2020	336		319	4226	169	4376		
2021	344		327	4376	175	4528		
2022	340		323	4528	181	4670		
2023	332		315	4670	187	4798		
2024	365	10%	347	4798	192	4953	174612904	0.28
2025	365		347	4953	198	5102		
2026	365		347	5102	204	5245		
2027	365		347	5245	210	5382		
2028	365		347	5382	215	5514		
2029	365		347	5514	221	5640		
2030	365		347	5640	226	5762	190686952	0.30

Table 66: Projection of the supply of Medical Technologists- Dentistry according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						4118	164600000	0.25
2019	287		273	4118	165	4226		
2020	336		319	4226	169	4376		
2021	344		327	4376	175	4528		
2022	340		323	4528	181	4670		
2023	332		315	4670	187	4798		
2024	398	20%	378	4798	192	4985	174612904	0.29
2025	398		378	4985	199	5164		
2026	398		378	5164	207	5336		
2027	398		378	5336	213	5501		
2028	398		378	5501	220	5659		
2029	398		378	5659	226	5811		
2030	398		378	5811	232	5958	190686952	0.31

Source: BBS Pop Projection 2011-2061

Graph 21: Density-Medical Technologists-Dentistry- scenarios-1-2

Graph 22: Density-Medical Technologists-Dentistry- scenarios 3-4

Table 67: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						165	164600000	0.01
2019	51		41	165	7	199		
2020	65		52	199	8	243		
2021	191		153	243	10	386		
2022	121		97	386	15	468		
2023	121		97	468	19	546		
2024	121		97	546	22	621	174612904	0.04
2025	121		97	621	25	693		
2026	121		97	693	28	762		
2027	121		97	762	30	828		
2028	121		97	828	33	892		
2029	121		97	892	36	953		
2030	121		97	953	38	1012	190686952	0.05

Source: BBS Pop Projection 2011-2061

Table 68: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						165	164600000	0.01
2019	51		41	165	7	199		
2020	65		52	199	8	243		
2021	191		153	243	10	386		
2022	121		97	386	15	468		
2023	121		97	468	19	546		
2024	133	10%	106	546	22	630	174612904	0.04
2025	133		106	630	25	712		
2026	133		106	712	28	790		
2027	133		106	790	32	865		
2028	133		106	865	35	936		
2029	133		106	936	37	1005		
2030	133		106	1005	40	1072	190686952	0.06

Source: BBS Pop Projection 2011-2061

Table 69: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						165	164600000	0.01
2019	51		41	165	7	199		
2020	65		52	199	8	243		
2021	191		153	243	10	386		
2022	121		97	386	15	468		
2023	121		97	468	19	546		
2024	145	20%	116	546	22	640	174612904	0.04
2025	145		116	640	26	731		
2026	145		116	731	29	818		
2027	145		116	818	33	901		
2028	145		116	901	36	981		
2029	145		116	981	39	1058		
2030	145		116	1058	42	1132	190686952	0.06

Source: BBS Pop Projection 2011-2061

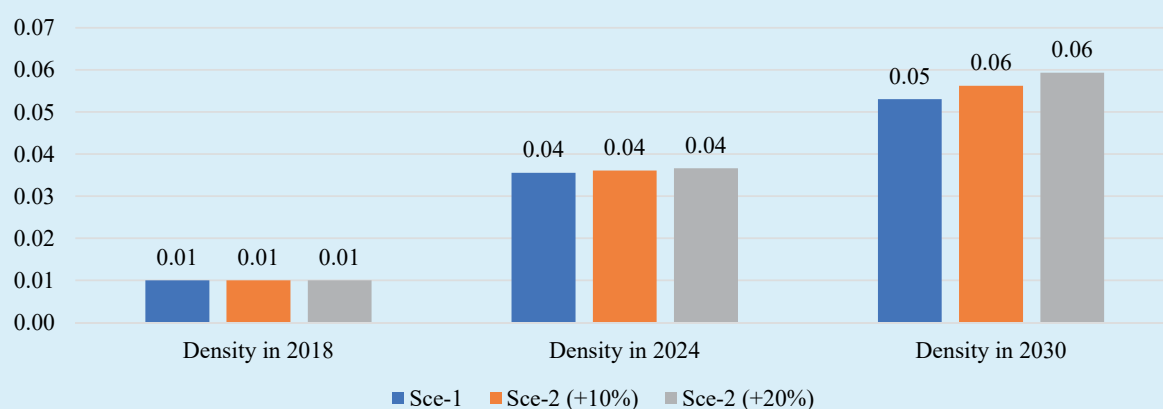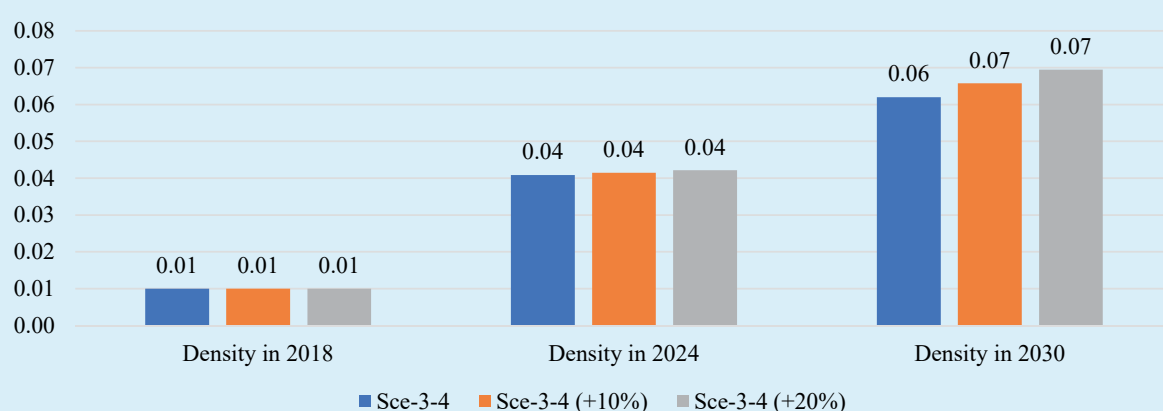| Table 70: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						165	164600000	0.01
2019	51		48	165	7	207		
2020	65		62	207	8	260		
2021	191		181	260	10	431		
2022	121		115	431	17	529		
2023	121		115	529	21	623		
2024	121		115	623	25	713	174612904	0.04
2025	121		115	713	29	799		
2026	121		115	799	32	882		
2027	121		115	882	35	962		
2028	121		115	962	38	1038		
2029	121		115	1038	42	1112		
2030	121		115	1112	44	1182	190686952	0.06

Source: BBS Pop Projection 2011-2061

Table 71: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						165	164600000	0.01
2019	51		48	165	7	207		
2020	65		62	207	8	260		
2021	191		181	260	10	431		
2022	121		115	431	17	529		
2023	121		115	529	21	623		
2024	133	10%	126	623	25	724	174612904	0.04
2025	133		126	724	29	822		
2026	133		126	822	33	915		
2027	133		126	915	37	1005		
2028	133		126	1005	40	1091		
2029	133		126	1091	44	1174		
2030	133		126	1174	47	1254	190686952	0.07

Source: BBS Pop Projection 2011-2061

Table 72: Projection of the supply of Medical Technologists- Operation Theater (OT) Assistance according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						165	164600000	0.01
2019	51		48	165	7	207		
2020	65		62	207	8	260		
2021	191		181	260	10	431		
2022	121		115	431	17	529		
2023	121		115	529	21	623		
2024	145	20%	138	623	25	736	174612904	0.04
2025	145		138	736	29	844		
2026	145		138	844	34	949		
2027	145		138	949	38	1049		
2028	145		138	1049	42	1145		
2029	145		138	1145	46	1237		
2030	145		138	1237	49	1325	190686952	0.07

Source: BBS Pop Projection 2011-2061

Graph 23: Density-Medical Technologists-Operation Theater (OT) Assistance - scenarios 1-2

Legend: ■ Sce-1 ■ Sce-2 (+10%) ■ Sce-2 (+20%)

Graph 24: Density-Medical Technologists-Operation Theater (OT) Assistance- scenarios 3-4

Legend: ■ Sce-3-4 ■ Sce-3-4 (+10%) ■ Sce-3-4 (+20%)

Table 73: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						60	164600000	0.00
2019	32		26	60	2	83		
2020	125		100	83	3	180		
2021	128		102	180	7	275		
2022	70		56	275	11	320		
2023	70		56	320	13	363		
2024	70		56	363	15	405	174612904	0.02
2025	70		56	405	16	445		
2026	70		56	445	18	483		
2027	70		56	483	19	519		
2028	70		56	519	21	555		
2029	70		56	555	22	588		
2030	70		56	588	24	621	190686952	0.03

Source: BBS Pop Projection 2011-2061

Table 74: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						60	164600000	0.00
2019	32		26	60	2	83		
2020	125		100	83	3	180		
2021	128		102	180	7	275		
2022	70		56	275	11	320		
2023	70		56	320	13	363		
2024	77	10%	62	363	15	410	174612904	0.02
2025	77		62	410	16	456		
2026	77		62	456	18	499		
2027	77		62	499	20	541		
2028	77		62	541	22	581		
2029	77		62	581	23	619		
2030	77		62	619	25	656	190686952	0.03

Source: BBS Pop Projection 2011-2061

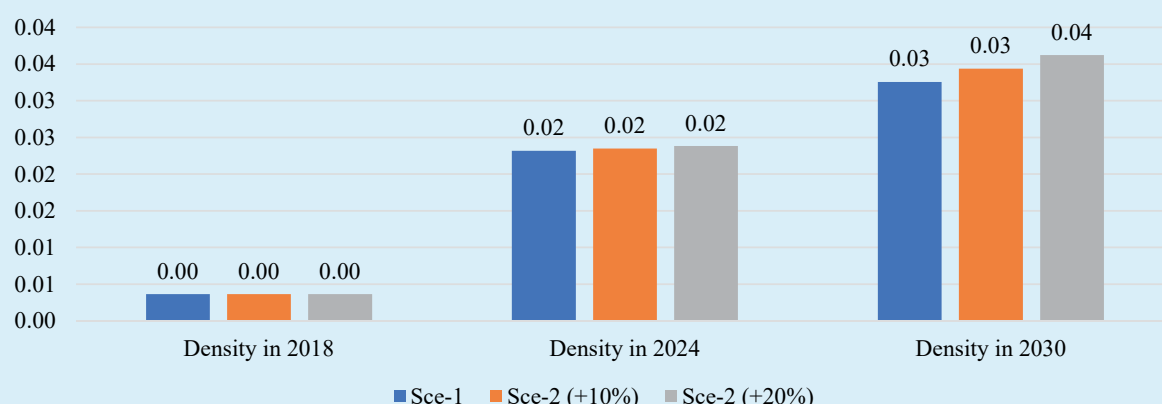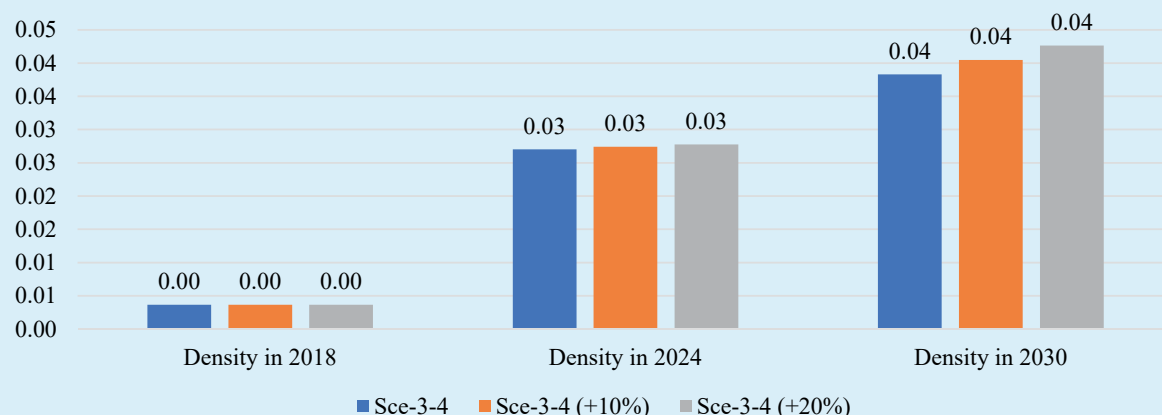| Table 75: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenario 2 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						60	164600000	0.00
2019	32		26	60	2	83		
2020	125		100	83	3	180		
2021	128		102	180	7	275		
2022	70		56	275	11	320		
2023	70		56	320	13	363		
2024	84	20%	67	363	15	416	174612904	0.02
2025	84		67	416	17	467		
2026	84		67	467	19	515		
2027	84		67	515	21	562		
2028	84		67	562	22	606		
2029	84		67	606	24	649		
2030	84		67	649	26	691	190686952	0.04

Source: BBS Pop Projection 2011-2061

Table 76: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenarios 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						60	164600000	0.00
2019	32		30	60	2	88		
2020	125		119	88	4	203		
2021	128		122	203	8	317		
2022	70		67	317	13	371		
2023	70		67	371	15	422		
2024	70		67	422	17	472	174612904	0.03
2025	70		67	472	19	519		
2026	70		67	519	21	565		
2027	70		67	565	23	609		
2028	70		67	609	24	651		
2029	70		67	651	26	692		
2030	70		67	692	28	730	190686952	0.04

Source: BBS Pop Projection 2011-2061

Table 77: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate	Total Supply		
	Graduates	Increase	95%		4%			
2018						60	164600000	0.00
2019	32		30	60	2	88		
2020	125		119	88	4	203		
2021	128		122	203	8	317		
2022	70		67	317	13	371		
2023	70		67	371	15	422		
2024	77	10%	73	422	17	478	174612904	0.03
2025	77		73	478	19	532		
2026	77		73	532	21	584		
2027	77		73	584	23	634		
2028	77		73	634	25	682		
2029	77		73	682	27	728		
2030	77		73	728	29	772	190686952	0.04

Source: BBS Pop Projection 2011-2061

Graph 25: Density-Medical Technologists-Intensive Care (IC) Assistance - scenarios-1-2

Legend: Sce-1 ■ Sce-2 (+10%) ■ Sce-2 (+20%)

Graph 26: Density-Medical Technologists-Intensive Care (IC) Assistance- scenarios 3-4

Legend: Sce-3-4 ■ Sce-3-4 (+10%) ■ Sce-3-4 (+20%)

Table 78: Projection of the supply of Medical Technologists- Intensive Care (IC) Assistance according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate	Total Supply		
	Graduates	Increase	95%		4%			
2018						60	164600000	0.00
2019	32		30	60	2	88		
2020	125		119	88	4	203		
2021	128		122	203	8	317		
2022	70		67	317	13	371		
2023	70		67	371	15	422		
2024	84	20%	80	422	17	485	174612904	0.03
2025	84		80	485	19	546		
2026	84		80	546	22	603		
2027	84		80	603	24	659		
2028	84		80	659	26	713		
2029	84		80	713	29	764		
2030	84		80	764	31	813	190686952	0.04

Source: BBS Pop Projection 2011-2061

Table 79: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						23	164600000	0.001
2019	9		7	23	1	29		
2020	7		6	29	1	34		
2021	9		7	34	1	40		
2022	9		7	40	2	45		
2023	8		6	45	2	50		
2024	8		6	50	2	54	174612904	0.003
2025	8		6	54	2	58		
2026	8		6	58	2	62		
2027	8		6	62	2	66		
2028	8		6	66	3	70		
2029	8		6	70	3	74		
2030	8		6	74	3	77	190686952	0.004

Source: BBS Pop Projection 2011-2061

Table 80: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	80%					
2018						23	164600000	0.001
2019	9		7	23	1	29		
2020	7		6	29	1	34		
2021	9		7	34	1	40		
2022	9		7	40	2	45		
2023	8		6	45	2	50		
2024	9	10%	7	50	2	55	174612904	0.003
2025	9		7	55	2	60		
2026	9		7	60	2	64		
2027	9		7	64	3	69		
2028	9		7	69	3	73		
2029	9		7	73	3	77		
2030	9		7	77	3	81	190686952	0.004

Source: BBS Pop Projection 2011-2061

Table 81: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenario 2 (+20%)						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	
	Graduates	Increase	80%				
2018						23	164600000	0.001
2019	9		7	23	1	29		
2020	7		6	29	1	34		
2021	9		7	34	1	40		
2022	9		7	40	2	45		
2023	8		6	45	2	50		
2024	10	20%	8	50	2	55	174612904	0.003
2025	10		8	55	2	61		
2026	10		8	61	2	66		
2027	10		8	66	3	71		
2028	10		8	71	3	76		
2029	10		8	76	3	81		
2030	10		8	81	3	85	190686952	0.004

Source: BBS Pop Projection 2011-2061

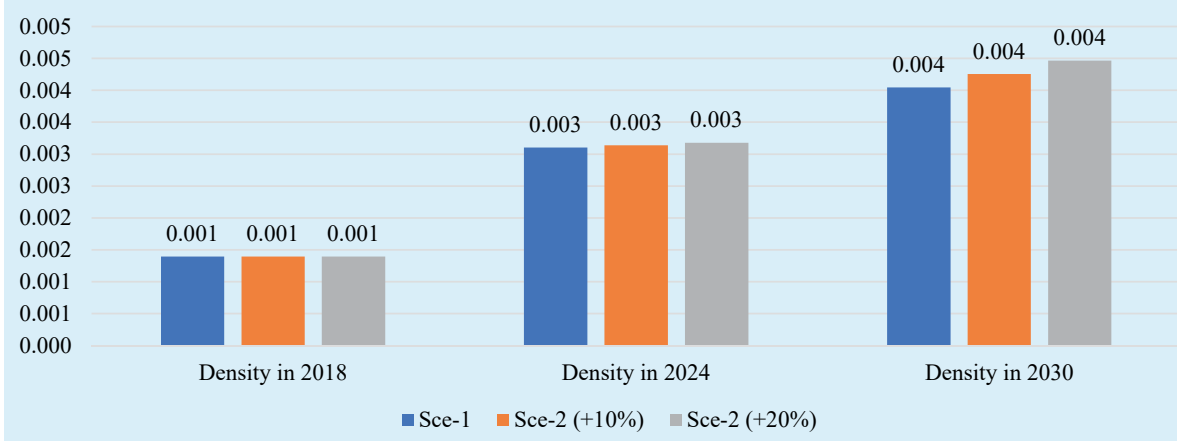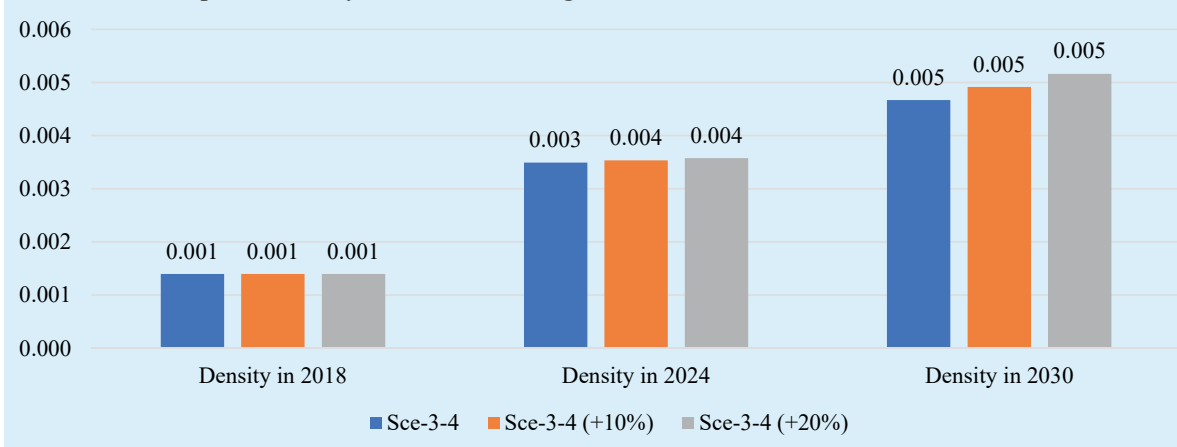| Table 82: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenarios 3-4						Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply	
	Graduates	Increase	95%				
2018						23	164600000	0.001
2019	9		9	23	1	31		
2020	7		7	31	1	36		
2021	9		9	36	1	43		
2022	9		9	43	2	50		
2023	8		8	50	2	56		
2024	8		8	56	2	61	174612904	0.003
2025	8		8	61	2	66		
2026	8		8	66	3	71		
2027	8		8	71	3	76		
2028	8		8	76	3	80		
2029	8		8	80	3	85		
2030	8		8	85	3	89	190686952	0.005

Source: BBS Pop Projection 2011-2061

Table 83: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenarios 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						23	164600000	0.001
2019	9		9	23	1	31		
2020	7		7	31	1	36		
2021	9		9	36	1	43		
2022	9		9	43	2	50		
2023	8		8	50	2	56		
2024	9	10%	8	56	2	62	174612904	0.004
2025	9		8	62	2	68		
2026	9		8	68	3	73		
2027	9		8	73	3	79		
2028	9		8	79	3	84		
2029	9		8	84	3	89		
2030	9		8	89	4	94	190686952	0.005

Source: BBS Pop Projection 2011-2061

Table 84: Projection of the supply of Medical Technologist - Prosthetics and Orthotics according to scenarios 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 4%	Total Supply		
	Graduates	Increase	95%					
2018						23	164600000	0.001
2019	9		9	23	1	31		
2020	7		7	31	1	36		
2021	9		9	36	1	43		
2022	9		9	43	2	50		
2023	8		8	50	2	56		
2024	10	20%	9	56	2	62	174612904	0.004
2025	10		9	62	2	69		
2026	10		9	69	3	75		
2027	10		9	75	3	82		
2028	10		9	82	3	87		
2029	10		9	87	3	93		
2030	10		9	93	4	98	190686952	0.005

Source: BBS Pop Projection 2011-2061

Graph 27: Density-Medical Technologists-Prosthetics and Orthotics- scenarios 1-2

Graph 28: Density-Medical Technologists-Prosthetics and Orthotics- scenarios 3-4

Table 85: Projection of the supply of Medical Technologist - Pharmacist (Category B) according to scenario 1							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 1%	Total Supply		
	Graduates	Increase	80%					
2018						14454	164600000	0.88
2019	311		249	14454	145	14558		
2020	311		249	14558	146	14661		
2021	311		249	14661	147	14764		
2022	311		249	14764	148	14865		
2023	311		249	14865	149	14965		
2024	311		249	14965	150	15064	174612904	0.86
2025	311		249	15064	151	15162		
2026	311		249	15162	152	15259		
2027	311		249	15259	153	15356		
2028	311		249	15356	154	15451		
2029	311		249	15451	155	15545		
2030	311		249	15545	155	15639	190686952	0.82

Source: BBS Pop Projection 2011-2061

Table 86: Projection of the supply of Medical Technologists - Pharmacists (Category B) according to scenario 2 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 1%	Total Supply		
	Gradu-ates	In-crease	80%					
2018						14454	164600000	0.88
2019	311		249	14454	145	14558		
2020	311		249	14558	146	14661		
2021	311		249	14661	147	14764		
2022	311		249	14764	148	14865		
2023	311		249	14865	149	14965		
2024	342	10%	274	14965	150	15089	174612904	0.86
2025	342		274	15089	151	15212		
2026	342		274	15212	152	15333		
2027	342		274	15333	153	15454		
2028	342		274	15454	155	15573		
2029	342		274	15573	156	15691		
2030	342		274	15691	157	15808	190686952	0.83

Source: BBS Pop Projection 2011-2061

Table 87: Projection of the supply of Medical Technologists - Pharmacists (Category B) according to scenario 2 (+20%)							Total popula-tion in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attri-tion rate 1%	Total Sup-ply		
	Gradu-ates	Increase	80%					
2018						14454	164600000	0.88
2019	311		249	14454	145	14558		
2020	311		249	14558	146	14661		
2021	311		249	14661	147	14764		
2022	311		249	14764	148	14865		
2023	311		249	14865	149	14965		
2024	373	20%	299	14965	150	15114	174612904	0.87
2025	373		299	15114	151	15261		
2026	373		299	15261	153	15407		
2027	373		299	15407	154	15552		
2028	373		299	15552	156	15695		
2029	373		299	15695	157	15836		
2030	373		299	15836	158	15977	190686952	0.84

Source: BBS Pop Projection 2011-2061

Table 88: Projection of the supply of Medical Technologists - Pharmacists (Category B) according to scenario 3-4							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	**New registrations**			**Supply of previous year**	**Attrition rate 1%**	**Total Supply**		
	Graduates	**Increase**	**95%**					
2018						14454	164600000	0.88
2019	311		295	14454	145	14605		
2020	311		295	14605	146	14754		
2021	311		295	14754	148	14902		
2022	311		295	14902	149	15049		
2023	311		295	15049	150	15194		
2024	311		295	15194	152	15337	174612904	0.88
2025	311		295	15337	153	15479		
2026	311		295	15479	155	15620		
2027	311		295	15620	156	15759		
2028	311		295	15759	158	15897		
2029	311		295	15897	159	16033		
2030	311		295	16033	160	16169	190686952	0.85

Source: BBS Pop Projection 2011-2061

| Table 89: Projection of the supply of Medical Technologists - Pharmacists (Category B) according to scenario 3-4 (+10%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	**New registrations**			**Supply of previous year**	**Attrition rate 1%**	**Total Supply**		
	Graduates	**Increase**	**95%**					
2018						14454	164600000	0.88
2019	311		295	14454	145	14605		
2020	311		295	14605	146	14754		
2021	311		295	14754	148	14902		
2022	311		295	14902	149	15049		
2023	311		295	15049	150	15194		
2024	342	10%	325	15194	152	15367	174612904	0.88
2025	342		325	15367	154	15538		
2026	342		325	15538	155	15708		
2027	342		325	15708	157	15876		
2028	342		325	15876	159	16042		
2029	342		325	16042	160	16206		
2030	342		325	16206	162	16369	190686952	0.86

Source: BBS Pop Projection 2011-2061

Table 90: Projection of the supply of Medical Technologists - Pharmacists (Category B) according to scenario 3-4 (+20%)							Total population in BD (2018, 2024 & 2030)	Density per 10000
Year	New registrations			Supply of previous year	Attrition rate 1%	Total Supply		
	Graduates	Increase	95%					
2018						14454	164600000	0.88
2019	311		295	14454	145	14605		
2020	311		295	14605	146	14754		
2021	311		295	14754	148	14902		
2022	311		295	14902	149	15049		
2023	311		295	15049	150	15194		
2024	373	20%	355	15194	152	15396	174612904	0.88
2025	373		355	15396	154	15597		
2026	373		355	15597	156	15795		
2027	373		355	15795	158	15992		
2028	373		355	15992	160	16187		
2029	373		355	16187	162	16379		
2030	373		355	16379	164	16570	190686952	0.87

Source: BBS Pop Projection 2011-2061

Graph 29: Density-Medical Technologists-Pharmacists (B-Category) scenarios 1-2
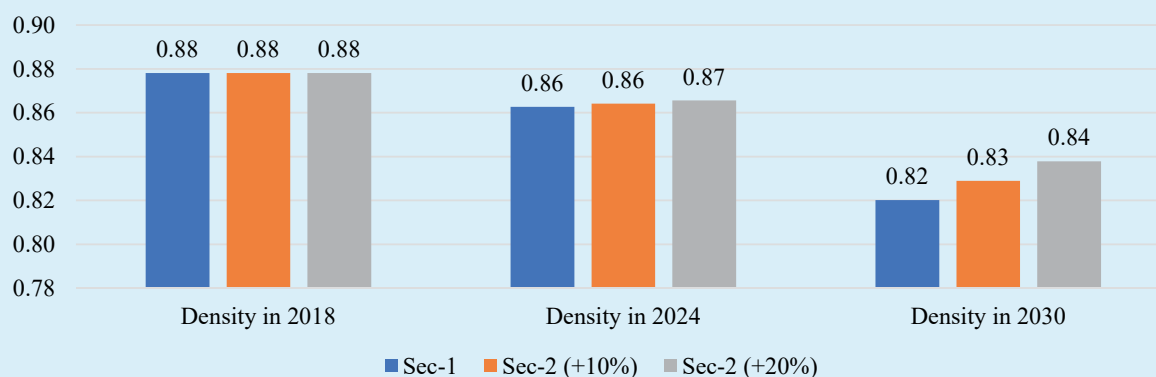
Graph 30: Density-Medical Technologists-Pharmacists (B-Category) scenarios 3-4
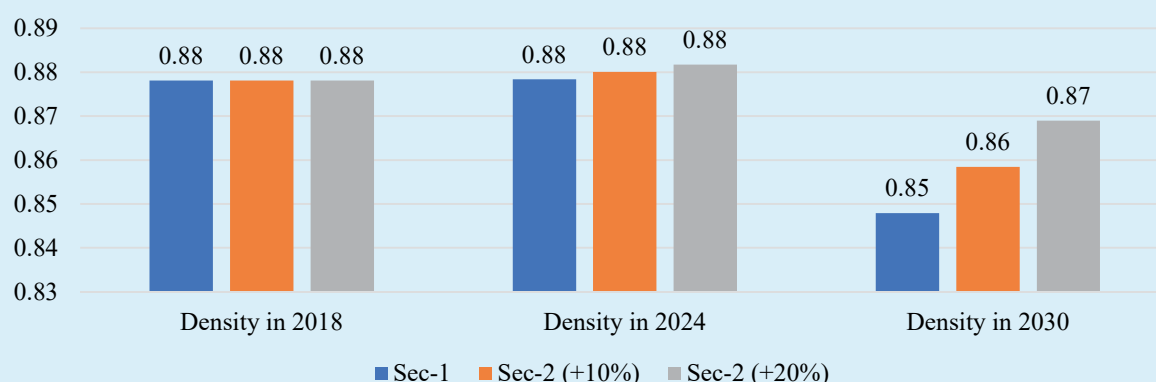
Annex IV: Selected Photographs

Dissemination seminar of key findings of the HLMA held on 01 December 2021

TEG Meeting held on 27 September 2018

TSG Meeting held on 04 March 2020

Workshop on finalization of HLMA Report held on 18 October 2021

Photo Credit: Md. Almamun