Health workforce supply, needs and financial feasibility in Lesotho: a labour market analysis

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ABSTRACT

Background The Government of Lesotho has prioritised health investment that aims to improve the health and socioeconomic development of the country, including the scaling up of the health workforce (HWF) training and improving their working conditions. Following a health labour market analysis, the paper highlights the available stock of health workers in Lesotho’s health labour market, 10-year projected supply versus needs and the financial implications.

Methods Multiple complementary approaches were used to collect data and analyse the HWF situation and labour market dynamics. These included a scooping assessment, desk review, triangulation of different data sources for descriptive analysis and modelling of the HWF supply, need and financial space.

Findings Lesotho had about 20 942 active health workers across 18 health occupations in 2020, mostly community health workers (69%), nurses and midwives (17.9%), while medical practitioners were 2%. Almost one out of three professional nurses and midwives (28.43%) were unemployed, and nearly 20% of associate nurse professionals, 13.26% of pharmacy technicians and 24.91% of laboratory technicians were also unemployed. There were 20.73 doctors, nurses and midwives per 10 000 population in Lesotho, and this could potentially increase to a density of 31.49 doctors, nurses and midwives per 10 000 population by 2030 compared with a need of 46.72 per 10 000 population deemed necessary to make the density of doctors, nurses and midwives to 70% of the WHO Sustainable Development Goal threshold.

Conclusion Lesotho’s HWF stock falls short of its population health need by 53%. The unemployment of some cadres is, however, apparent. Addressing the need requires increasing the HWF budget by at least 12.3% annually up to 2030 or prioritising at least 33% of its recurrent health expenditure to the HWF.

INTRODUCTION

In the pre-COVID-19 context, the world faced a looming shortage of 18 million health
workers by 2030,\textsuperscript{1,2} which required >50% of all investments needed to attain the Sustainable Development Goal (SDG)\textsuperscript{3,4} However, the global health workforce (HWF) crisis is escalated by the direct and indirect effects of the protracted COVID-19 pandemic, requiring greater investments in the HWF in countries. The African region faces a potential shortage of 6.1 million health workers by 2030 and rising levels of trained but unemployed health workers due to fiscal constraints.\textsuperscript{2,4}

The Government of Lesotho has, over the years, prioritised education and health as key areas of investment, the two sectors jointly consuming at least 25% (25.4%–26.6%) of government budgets from 2018 to 2020.\textsuperscript{5,6} The health sector allocation as a share of general government expenditure is estimated to be 12.8% in 2019/20,\textsuperscript{6} which was 2.2% short of the 15% target of the Abuja declaration.\textsuperscript{7} Part of the government’s investments in the health sector includes several initiatives to address HWF challenges, including the scaling up of the HWF production (using six in-country institutions and foreign training), advancing the role of community health workers and improving the wages and working conditions of health workers.

Nevertheless, Lesotho still faces critical HWF issues, including (but not limited to) shortages, maldistribution, migration and unemployment, as well as suboptimal productivity and performance.\textsuperscript{8,9} These lingering challenges have impacted the health system’s capacity to deliver adequate and quality health services to address the population’s health needs.\textsuperscript{8–10} As part of efforts to generate context-appropriate evidence for evidence-informed HWF policies and strategies, the Ministry of Health (MoH) conducted a health labour market analysis using a recently published guidebook for such analysis by World Health Organization (WHO).\textsuperscript{11} Health labour market analysis is an approach of using an economic framework for systematically generating evidence to gain insights into the interaction and mismatches between the supply of health workers (those available and employed at current wages levels); the demand for health workers (the number of funded positions available to employ health workers from the combined ability and willingness to pay from both public and private sectors), viz-a-viz the population health needs and the feasibility and impact of different policy
options.12 13 This paper highlights the available stock of health workers in Lesotho, projected supply versus needs and the financial implications over the next decade.

METHODS

Using a multmethod approach, data were triangulated from multiple and diverse sources. The process included a desk review, Technical Working Group (TWG) discussions on the HWF needs and challenges, descriptive analysis and a group modelling exercise to project the future needs and supply of the HWF.

Desk review

Several policy documents, reports and academic papers were obtained through the MoH, Lesotho Nursing Council (LNC), The National Health Training College (NHTC), Christian Health Association of Lesotho (CHAL), Ministry of Public Services and Ministry of Finance. In addition, a non-systematic general search of published and grey literature was conducted on google scholar and PubMed using the following keywords: Lesotho “AND” health workforce OR human resources for health OR health workers OR doctors OR nurses OR midwives OR wage bill OR unemployment OR training. In all, 20 relevant government policy/strategic documents, reports and 7 published papers were reviewed (see online supplemental file 1 for the list of documents reviewed). These documents were reviewed purposely to ascertain (a) data on HWF stock and densities, (b) wage bill, (c) training capacity and (d) unemployment in Lesotho. The desk review was primarily aimed to extract the needed secondary data for the descriptive analysis to inform the predictive modelling. No qualitative synthesis of different reports and papers is being reported in this piece.

Shaping the policy issues through stakeholder engagement

Broad stakeholder engagements were undertaken through a series of meetings with directors, policymakers and implementers of the MoH to gain their perspectives to clarify the scope and potential utility of the HLMA. Several bilateral engagements were held with the LNC, Medical and Dental Council of Lesotho, CHAL, NHTC, Ministry of Public Services, Ministry of Labour, Ministry of Development Planning and some development partners and independent private practitioners to elicit their expectations and policy questions for the health labour market analysis and to obtain available data and reports relevant for the exercise. At each stage of the conceptualisation and analysis, teleconferences were held to provide updates, discuss the progress of data acquisition, issues of data quality and completeness and receive inputs to shape the subsequent steps.

Methodology workshop

A workshop was held for 30 policy actors and stakeholders drawn from the various institutions and ministries mentioned above. The methodology workshop was used to harmonise the understanding of the TWG that conducted the analysis on the methods for Health Labour Market Analysis (HLMA); build consensus on the priority labour market issues for the analysis; agree on key methodological assumptions and assess the extent of data available for analysis to address the identified priority issues and develop a roadmap for data collection, analysis and validation.

### Box 1 Stock and flow formulae for HWF supply projection

\[
S_{n,t} = [T_{n,t-1} \times (1 - a_n)] + I_n \times P \ldots \text{ equation (1)}
\]

Where:
- \( S_n \) is the supply of health worker of category \( n \) at time \( t \).
- \( T_n \) is the aggregate stock of health worker of category \( n \) at time \( t \).
- \( a_n \) represents the attrition rate (a proportion of the stock, \( T_n \), that died, retired, could not work due to ill-health or migrated out).
- \( I_n \) is the inflow of health workers of category \( n \) trained domestically or immigrating from another country.
- \( P \) is the labour participation rate or the proportion of the health workers willing to engage in professional practice.

#### Source: adapted from Asamani et al.15

### Box 2 Need-based health workforce requirements

\[
N_{HST} = \sum P_{i,j,g,t} \times [H_i] \times [h, i, j, t - 1 \times (1 + R_p)] \times L_{y,j,i,j,g,t} \ldots \text{equation (2)}
\]

Where:
- \( N_{HST} \) represents the ‘needed health services’ by a given population under a given service delivery model, \( i,j,g,t \) over a period of time \( t \).
- \( P_{i,j,g,t} \) represents the size of the given population of age cohort \( i, gender \) in location (rural or urban) at time \( t \) in a given jurisdiction (this represents the population and its demographic characteristics).
- \( H_i \) represents the proportion of the given population with health status \( h \), of age cohort \( i \), gender \( j \) in location \( g \) at time \( t \) (this represents the level of health of the population).
- \( L_{y,j,i,j,g,t} \) represents the frequency of health services of type \( y \) planned or otherwise required, under a specified service model, to address the needs of individuals of health status \( h \) among age cohort \( i \), gender \( j \) in location \( g \) at time \( t \) (this represents the level of service required by the population).
- \( R_p \) is the instantaneous rate of change of the health status, \( h \).

\[
SW_{n,y} = \frac{A_{WT}}{N_{HST} \times P_{i,j,g,t}} \ldots \text{equation (3)}
\]

Where:
- \( SW_{n,y} \) is the standard workload for health professionals of category \( n \) when performing health service activity \( y \).
- \( A_{WT} \) is the annual available working time of the health professional of category \( n \).
- \( N_{HST} \) is the service standard or the time it takes a well-trained health professional of category \( n \) to deliver the service activity, \( y \).

\[
\text{Needs - based HWF requirements}_{n,y} = \frac{N_{HST}}{SW_{n,y}} \ldots \text{equation (4)}
\]

Where:
- \( N_{HST} \) represents the number of needed health service activity \( y \), to be delivered by a health professional of category \( n \) at time \( t \).
- \( SW_{n,y} \) is the standard workload for health professionals of category \( n \) when performing health service activity \( y \).

#### Source: adapted from Asamani et al.14 15
Descriptive analysis of the health labour market
Lesotho’s HWF’s size, composition and distribution were analysed using descriptive statistics and contextually interpreted with the qualitative insights obtained from stakeholders to ensure consistency. The analysis and interpretation of data were undertaken jointly by WHO technical experts and MoH technical team. In the context of travel and meeting restrictions occasioned by the COVID-19 pandemic, a series of virtual working sessions were held between June and September 2020 and then from 30 November 2020 to 11 December 2020, two data analysis workshops (1 week each for descriptive analysis and group modelling exercise) were held. The workshops had active participation from clinicians, public health experts, policymakers, epidemiologists, health economists and human resource for health practitioners to thoroughly analyse and interpret the available data.

Modelling the future supply and need-based requirements for health workers
We adopted an empirical framework for integrated analysis of HWF supply, needs and economic feasibility (figure 1). A simulation tool in Microsoft Excel that was recently published to operationalise the empirical framework, which has been applied in modelling the HWF as part of health labour market analysis in different contexts, was fitted with the country-specific data from Lesotho. As HWF supply and need modelling is complex and requires multidimensional skills, a group modelling approach was used whereby a multidisciplinary team of clinicians, public health professionals, human resource practitioners and policy actors worked together to review relevant documents, Lesotho’s model of care and clinical guidelines as well as routine service data and previous surveys, to identify priority health needs of the population for the projections. Using the adopted framework (figure 1), three distinct but inter-related estimations were made: (1) supply of HWF, (2) need-based requirements for HWF and (3) financial space for HWF in Lesotho. These have been extensively described in the literature, hence are briefly highlighted in this section.

Health workforce supply forecast
Building on the stock and distribution of the HWF, the future supply of health workers was modelled using a stock-and-flow approach, as illustrated in box 1 (equation 1). This comprised determining the inflow or entry in the current workforce on the one hand and the outflow or attrition from the current workforce on the other hand. The inflow depended on the training capacity and immigration, while the outflow/attrition was influenced by retirements, emigration, deaths, resignations and dismissals.

Modelling the need-based requirements for health workers
There are several methods for determining the ‘needed’ HWF in a country. The health need-based or epidemiology approach was adopted following the assumption that the need for health workers flows directly from the ‘need for health services’.

Estimating the population’s ‘need for health services’
First, the ‘need for health service’ covering at least 98% of the disease burden in Lesotho was estimated. A desk review of the prevalence rates of diseases and their risk factors and coverage rates of priority public health interventions was conducted. For each of the diseases and risk factors, a team of clinicians worked together to identify the planned or otherwise necessary health intervention to address them and the health worker occupational group that has the competency to do so. The appropriate population cohorts (demographic groups, gender and location) that will benefit from the interventions (services) were identified and matched to generate the need-based service requirements for each given year (equation 2).

Translating the need for health service into need-based staffing requirements
The second stage of the model translated the aggregated need for the different health services into ‘need-based staffing requirements’ using a measure of standard workload (using equation 3)—defined as the volume of work within one health service activity that one health worker can accomplish within a year to acceptable professional standards (see online supplemental file 2). The standard workload determined by a multidisciplinary clinician team constituted and trained for that purpose was then used to translate the need-based service requirements (estimated in equation 2) into need-based HWF requirements using equation 4.
Asamani JA, et al. BMJ Global Health 2022;7:e008420. doi:10.1136/bmjgh-2021-008420

| ISCO-08 code | Staff category (ISCO-08 classification) | Estimated active stock | Employment sector | Density per 10000 population | % of those employed who are in the public sector | % of those employed who are in private not for profit | % of those employed who are in private for profit |
|--------------|------------------------------------------|------------------------|-------------------|-----------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| 2211         | Community health workers                 | 14 508                 | Public            | 5312                        | 0.72                                          | 63.39                                         | 36.61                                         | 0.00                                         |
| 2212         | Dental assistants and therapists         | 66                     | Public            | 25                          | 0.33                                          | 30.30                                         | 37.88                                         | 31.82                                        |
| 222          | Dentists                                 | 25                     | Public            | 5                           | 0.12                                          | 52.00                                         | 20.00                                         | 28.00                                        |
| 3221         | Dietitians and nutritionists             | 29                     | Public            | 10                          | 0.14                                          | 65.52                                         | 34.48                                         | 0.00                                         |
| 2261         | Environmental and occupational health and hygiene workers | 144                 | Public            | n.d.                        | 0.72                                          | 100.00                                        | 0.00                                          | 0.00                                         |
| 3251         | Generalist medical practitioners         | 380                    | Public            | 67                          | 1.89                                          | 69.21                                         | 13.16                                         | 17.63                                        |
| 2263         | Healthcare assistants and other personal care workers in health services | 849                 | Public            | 6                           | 4.23                                          | 45.23                                         | 54.06                                         | 0.71                                         |
| 2264/3255    | Medical and dental prosthetic technicians | 13                   | Public            | n.d.                        | 0.06                                          | 100.00                                        | 0.00                                          | 0.00                                         |
| 2267         | Medical and pathology laboratory technicians | 273                 | Public            | 4                           | 1.36                                          | 65.85                                         | 32.20                                         | 1.95                                         |
| 3211         | Medical imaging and therapeutic equipment operators | 41                   | Public            | 6                           | 0.2                                           | 68.29                                         | 17.07                                         | 14.63                                        |
| 3212         | Medical records and health information technicians | 349                 | Public            | 9                           | 1.74                                          | 45.27                                         | 52.15                                         | 2.58                                         |
| 3214         | Nursing and midwifery professionals      | 2779                   | Public            | 50                          | 13.83                                         | 49.44                                         | 46.85                                         | 3.71                                         |
| 3253         | Nursing associate professionals          | 967                    | Public            | 33                          | 4.81                                          | 66.67                                         | 27.94                                         | 5.39                                         |
| 2265         | Optometrists and opticians               | 13                     | Public            | 5                           | 0.06                                          | 23.08                                         | 38.46                                         | 38.46                                        |

Continued
Forecasting financial space for the health workforce

The economic demand for health workers is reflected in a country’s ability and willingness to pay for health workers in its efforts to meet the health need of the population. Thus, aggregate demand is an estimate of the collective financial capacity of the government, development partners and the private sector in purchasing healthcare services, of which the cost of health workers’ wages represents a substantial proportion. This approach assumes that countries (governments and partners) will not necessarily spend on healthcare more than they can afford, even if their health or level of health utilisation is suboptimal relative to an internationally established metric.

Therefore, demand for health workers can be gauged using the financial space for health workers, which we define as the public sector budget space for HWF employment and the private sector’s contribution. As illustrated in box 3, we used the public sector budget space for the wage bill as a proxy and adjusted for the private sector contribution to HWF employment (equation 6). Analysis of the health sector budget was undertaken to gauge the level of prioritisation of the HWF within the successive budgets. Between 2015 and 2021, Lesotho has been spending 17.5%–20.5% of its overall public health expenditure on the HWF remuneration. Assuming this level of prioritisation, a potential budget space was simulated using equations 5 and 6, the projected gross domestic product (GDP) growth rate estimated by the World Bank and the general government health expenditure as a share of GDP.

FINDINGS

Health workforce stock, densities and distribution

Triangulating from the various data sources, it was estimated that there were about 20,942 active HWF across 18 health occupations in Lesotho in 2020 (table 1). Of this, the large majority (69%) were community health workers, followed by nurses and midwives (professionals and associate professionals) who constitute 17.9% (n=3746). Medical practitioners and specialists make up a smaller proportion of 2% (n=420) of the health workforce stock.

The density of doctors, nurses and midwives in Lesotho was estimated to be 20.73 per 10,000 population, representing 47% of the WHO SDG indicative threshold of 44.5 per 10,000 needed to make progress towards universal health coverage (UHC). However, the density of 72.2 community health workers per 10,000 population is higher than Africa’s average of 5 per 10,000 population.

Unemployed health workers

Triangulating data from regulatory bodies and the MoH job seekers database showed that nearly one out of three professional nurses and midwives (28.43%, n=1349) were unemployed—about four percentage points higher than the country’s unemployment rate of 24%. Almost 20% of associate nurse professionals (192 out of 967), 13.26%
of pharmacy technicians (46 out of 347) and 24.91% of laboratory technicians (68 out of 273) were also unemployed (figure 2).

Supply projections for selected categories of the health workforce, 2020–2030
A stock-and-flow method of workforce supply was adopted to estimate the anticipated supply of health workers up to 2030 (equation 1). Twenty-three occupations were prioritised by the MoH for supply and need modelling. The annual enrolments, dropouts and outputs (graduation) from training institutions were obtained from the health training institutions and triangulated with data from the professional regulatory bodies (for regulated professions), while attrition was estimated from routine administrative records of the MoH.

The results show that across 23 categories of health workers, Lesotho’s aggregate HWF stock is expected to progressively increase at an average rate of 1.01% annually. By 2030, the supply of these 23 categories of health workers is expected to reach a total of 22610 from 19934 in 2020 if the current trend of production and attrition continues without interventions on either side (table 2). The most considerable proportional growth in the HWF stock is expected among nutritionists and dietitians, who may increase by almost sevenfolds from 29 in 2020 to 199 by 2030. The environmental health officers who are trained locally are also expected to increase by at least 3.5-folds from 144 within the public sector alone in 2020 to >500 by 2030.

For general medical practitioners, the prevailing rate of foreign production, if continued, will likely yield an increase of 53.4% from the baseline stock of 380 in 2020 to 583 within 10 years. This expansion could have a knock-on effect on specialist training that could boost the stock of medical specialists (of all fields) from 40 in 2020 to about 70 within 10 years. The production of nursing and midwifery professionals is also anticipated to lead to a net increase of 61.6% above the baseline stock of 2779 in 2020 to roughly 4490, barring any unprecedented outmigration and/or declining enrolments resulting from negative feedback of the large (28%) unemployment among professional nurses/midwives. Holding the same assumptions, nursing associate professionals (nurse assistants) are likely to increase from 967 in 2020 to 1560 within 10 years if no interventions target inflows or outflows.

The density of doctors, nurses and midwives, estimated to be 21 per 10 000 population in 2020, is likely to improve by 27% to 26.73 per 10 000 population by 2025 and then 31.49 per 10 000 population by 2030. This will represent almost 70% of the WHO SDG threshold of 44.5 physicians, nurses and midwives per 10 000 population. Thus, even when future population growth is accounted for, the increases in the density of doctors, nurses, and midwives per 10 000 population are likely to be close to 50% within 10 years if the current production rate is sustained.

Need-based requirements for health workforce, 2020–2030
The need-based modelling revealed that, across both public and private sectors, the population’s health needs of Lesotho required at least 17681 health workers across 23 occupational groups in 2020, which could increase by 35.3% to 23922 by 2025 and escalate by a further 48.4% to 35506 by 2030 in line with expanding health needs of the population, mainly due to ageing, resulting from increasing life expectancy and the changing disease patterns. If all the estimated need-based requirements are translated into positions and filled, it would have translated into a workforce (doctors, nurses and midwives) density of 36.55 per 10000 population in 2020 and 46.72
per 10,000 population by the year 2030 (compared with the WHO SDG threshold of 44.5 per 10,000 population). Table 3 shows the estimated population health need-based requirements for the various health occupational groups included in the analysis.

Health workforce need versus supply gaps, 2020–2030
The status of the HWF in Lesotho as per the analysis demonstrates that the country required 17,681 health workers across various occupational categories in both public and private sectors in 2020 (including community health workers), which will likely increase to 23,922 in 2025 and then 35,506 in 2030 if the current trends of production and underlying factors of need remain relatively constant. If community health workers are not included, the additional health workers needed was 5,915 in 2020, likely reaching 6418 by 2030. The increasing gap suggests that the country’s rate of health workforce production is at a relatively slower pace than the rate of growth in the actual need for health workers.

Comparing the supply and need-based requirements estimates, the supply of health workers in 2020 (both employed and unemployed) represented only 47% of the aggregate requirement. This is, however, expected to gradually improve to 53% in 2025 and 55% in 2030. In contrast, the supply of community health workers was 131% more than the estimated need-based requirements in 2020, but as the population health need evolves, the need-based excess of community health workers will decline to 30% in 2025 and reach undersupply of 32% by 2030 if additional community health workers are not trained and engaged.

The baseline need-based shortage of general practitioners was estimated to be 264 (59% of the need is met by the supply); shortage of 240 pharmacists (only 22% of the need is met by the supply) and 475 need-based shortage of professional nurses (15% need-based shortfall). However, the shortage of nursing associate professionals at baseline was estimated to be 2084, representing

Table 2
Projected supply of health workers, 2020–2030

| No. | Health professionals                                      | Estimated aggregate supply |
|-----|-----------------------------------------------------------|----------------------------|
|     |                                                           | 2020 | 2022 | 2024 | 2026 | 2028 | 2030 |
| 1.  | Biomedical scientist                                       | 60   | 66   | 72   | 78   | 85   | 91   |
| 2.  | Community health workers                                   | 14,508 | 14,288 | 14,072 | 13,859 | 13,651 | 13,446 |
| 3.  | Dental assistants and therapists                            | 66   | 81   | 96   | 110  | 123  | 136  |
| 4.  | Dental specialists                                          | 1    | 1    | 1    | 1    | 1    | 1    |
| 5.  | Dentists                                                   | 25   | 25   | 26   | 26   | 27   | 27   |
| 6.  | Dietitians and nutritionists                               | 29   | 64   | 99   | 133  | 167  | 199  |
| 7.  | Environmental and occupational health and hygiene workers  | 144  | 223  | 299  | 372  | 442  | 509  |
| 8.  | Epidemiologist                                             | 5    | 6    | 7    | 8    | 9    | 9    |
| 9.  | Generalist medical practitioners                           | 380  | 422  | 463  | 504  | 544  | 583  |
| 10. | Health educators                                           | 58   | 63   | 69   | 74   | 79   | 84   |
| 11. | Medical and pathology laboratory technicians                | 273  | 290  | 306  | 321  | 336  | 351  |
| 12. | Medical imaging and therapeutic equipment operators        | 41   | 44   | 48   | 51   | 54   | 58   |
| 13. | Nursing and midwifery professionals                        | 2779 | 3150 | 3505 | 3847 | 4175 | 4490 |
| 14. | Nursing associate professionals                            | 967  | 1090 | 1211 | 1330 | 1446 | 1560 |
| 15. | Occupational therapist                                     | 380  | 422  | 463  | 504  | 544  | 583  |
| 16. | Optometrists and opticians                                 | 13   | 15   | 16   | 18   | 20   | 21   |
| 17. | Pharmaceutical technicians and assistants                  | 347  | 375  | 401  | 428  | 453  | 478  |
| 18. | Pharmacists                                                | 97   | 131  | 164  | 197  | 229  | 260  |
| 19. | Physiotherapists and physiotherapy assistants              | 22   | 23   | 24   | 25   | 26   | 27   |
| 20. | Psychiatric social worker                                  | 273  | 290  | 306  | 321  | 336  | 351  |
| 21. | Psychologists                                              | 29   | 37   | 45   | 53   | 60   | 68   |
| 22. | Specialised nursing professional                           | 50   | 68   | 87   | 105  | 123  | 140  |
| 23. | Specialist medical practitioners                           | 40   | 46   | 52   | 58   | 64   | 70   |
|     | Lesotho                                                    | 19,934 | 20,509 | 21,064 | 21,598 | 22,113 | 22,610 |

Source: authors’ analysis using triangulated data curated from various sources.
There were no data on the current stock and training of occupational therapists and psychiatric social workers. Hence, their anticipated supply could not be estimated. However, they were considered high priority areas for urgent training; hence, their need estimation was conducted, as shown in tables 3 and 4.
| No. | Health professionals | Need-based requirements |
|-----|----------------------|-------------------------|
|     |                      | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
| 1   | Biomedical scientist  | 175  | 179  | 182  | 186  | 190  | 196  | 200  | 205  | 210  | 216  | 223  |
| 2   | Community health workers | 6271 | 6933 | 7693 | 8566 | 9571 | 10739 | 12074 | 13615 | 15394 | 17450 | 19848 |
| 3   | Dental assistants and therapists | 369  | 372  | 375  | 378  | 381  | 391  | 394  | 397  | 400  | 403  | 412  |
| 4   | Dentists              | 126  | 127  | 128  | 129  | 130  | 133  | 134  | 135  | 137  | 138  | 141  |
| 5   | Dental specialists     | 11   | 11   | 11   | 11   | 11   | 11   | 11   | 11   | 12   | 12   | 12   |
| 6   | Dietitians and nutritionists | 122  | 126  | 132  | 137  | 143  | 153  | 160  | 168  | 177  | 187  | 200  |
| 7   | Environmental and occupational health and hygiene workers | 360  | 363  | 366  | 369  | 372  | 375  | 378  | 381  | 384  | 387  | 390  |
| 8   | Epidemiologist        | 8    | 8    | 9    | 9    | 9    | 9    | 9    | 9    | 10   | 10   | 10   |
| 9   | Generalist medical practitioners | 644  | 664  | 684  | 706  | 730  | 758  | 786  | 817  | 851  | 889  | 932  |
| 10  | Health educators      | 62   | 63   | 63   | 64   | 64   | 65   | 65   | 66   | 66   | 67   | 67   |
| 11  | Medical and pathology laboratory technicians | 595  | 614  | 634  | 656  | 680  | 709  | 737  | 767  | 799  | 834  | 877  |
| 12  | Medical imaging and therapeutic equipment operators | 53   | 54   | 55   | 55   | 56   | 57   | 58   | 59   | 60   | 61   | 61   |
| 13  | Nursing and midwifery professionals | 3254 | 3355 | 3460 | 3571 | 3686 | 3826 | 3954 | 4089 | 4230 | 4379 | 4549 |
| 14  | Nursing associate professionals | 3051 | 3127 | 3208 | 3294 | 3386 | 3492 | 3597 | 3710 | 3832 | 3965 | 4117 |
| 15  | Occupational therapist | 22   | 22   | 22   | 22   | 22   | 23   | 23   | 23   | 23   | 23   | 24   |
| 16  | Optometrists and opticians | 29   | 30   | 30   | 31   | 31   | 33   | 33   | 34   | 34   | 35   | 36   |
| 17  | Pharmaceutical technicians and assistants | 729  | 746  | 764  | 783  | 804  | 837  | 863  | 891  | 921  | 956  | 1000 |
| 18  | Pharmacists           | 437  | 449  | 461  | 474  | 488  | 502  | 518  | 535  | 553  | 573  | 594  |
| 19  | Physiotherapists and physiotherapy assistants | 40   | 40   | 40   | 41   | 41   | 41   | 42   | 42   | 42   | 42   | 43   |
| 20  | Psychiatric social worker | 47   | 47   | 48   | 48   | 48   | 49   | 49   | 50   | 50   | 50   | 51   |
| 21  | Psychologists         | 888  | 914  | 943  | 975  | 1009 | 1065 | 1109 | 1158 | 1212 | 1274 | 1361 |
| 22  | Specialised nursing professional | 327  | 338  | 349  | 360  | 372  | 385  | 399  | 413  | 429  | 446  | 464  |
| 23  | Specialist medical practitioners | 60   | 62   | 65   | 67   | 70   | 73   | 77   | 80   | 85   | 90   | 95   |
| **Total** | **17681** | **18644** | **19722** | **20932** | **22296** | **23922** | **25670** | **27655** | **29912** | **32486** | **35506** |

Source: authors’ analysis using triangulated data curated from various sources.
| No. | Health professionals                              | 2020 | 2025 | 2030 |
|-----|--------------------------------------------------|------|------|------|
|     | Need (a) | Supply (b) | Gap (b-a) | SAR (b/a) | Need (a) | Supply (b) | Gap (b-a) | SAR (b/a) | Need (a) | Supply (b) | Gap (b-a) | SAR (b/a) |
| 1   | Biomedical scientist                            | 175  | 60   | 115  | 34.2% | 196  | 75   | 120  | 38.5% | 223  | 91   | 132  | 40.7% |
| 2   | Community health workers                        | 6271 | 14508| 8237 | 231.3% | 10739 | 13965| 3226 | 130.0% | 19848| 13446| 6402 | 67.7% |
| 3   | Dental assistants and therapists                | 369  | 66   | 303  | 17.9% | 391  | 103  | 288  | 26.3% | 412  | 136  | 275  | 33.1% |
| 4   | Dental specialists                              | 11   | 1    | 10   | 9.4% | 11   | 1    | 10   | 8.5% | 12   | 1    | 11   | 7.7% |
| 5   | Dentists                                        | 126  | 25   | 101  | 17.8% | 133  | 26   | 107  | 19.7% | 141  | 27   | 113  | 19.5% |
| 6   | Dietitians and nutritionists                    | 122  | 29   | 93   | 23.9% | 153  | 116  | 37   | 75.9% | 200  | 199  | 0    | 99.8% |
| 7   | Environmental and occupational health and hygiene workers | 360  | 144  | 216  | 40.0% | 375  | 336  | 39   | 89.5% | 390  | 509  | 119  | 130.4% |
| 8   | Epidemiologists                                 | 8    | 5    | 3    | 60.9% | 9    | 7    | 2    | 79.1% | 10   | 9    | 1    | 91.9% |
| 9   | Generalist medical practitioners                | 644  | 380  | 264  | 59.0% | 758  | 484  | 274  | 63.8% | 932  | 583  | 349  | 62.6% |
| 10  | Health educators                                | 62   | 58   | 4    | 93.2% | 65   | 71   | 6    | 109.8% | 67   | 84   | 16   | 124.3% |
| 11  | Medical and pathology laboratory technicians    | 595  | 273  | 322  | 45.9% | 709  | 313  | 396  | 44.2% | 877  | 351  | 525  | 40.1% |
| 12  | Medical imaging and therapeutic equipment operators | 53  | 41   | 12   | 77.2% | 57   | 50   | 8    | 86.7% | 61   | 58   | 4    | 93.7% |
| 13  | Nursing and midwifery professionals             | 3254 | 2779 | 475  | 85.4% | 3826 | 3678 | 149  | 96.1% | 4549 | 4490 | 58   | 98.7% |
| 14  | Nursing associate professionals                 | 3051 | 967  | 2084 | 31.7% | 3492 | 1271 | 2221 | 36.4% | 4117 | 1560 | 2557 | 37.9% |
| 15  | Occupational therapist                          | 22   | –    | 22   | 0.0% | 23   | –    | 23   | 0.0% | 24   | –    | 24   | 0.0% |
| 16  | Optometrists and opticians                      | 29   | 13   | 16   | 44.8% | 33   | 17   | 15   | 53.2% | 36   | 21   | 14   | 59.7% |
| 17  | Pharmaceutical technicians and assistants       | 729  | 347  | 382  | 47.6% | 837  | 415  | 423  | 49.5% | 1000 | 478  | 522  | 47.8% |
| 18  | Pharmacists                                     | 437  | 97   | 340  | 22.2% | 502  | 181  | 322  | 36.0% | 594  | 260  | 333  | 43.8% |
| 19  | Physiotherapists and physiotherapy assistants   | 40   | 22   | 18   | 55.2% | 41   | 25   | 16   | 60.5% | 43   | 27   | 15   | 64.0% |

Continued
an almost 68% shortfall in supply compared with the need. Similarly, of 327 specialised nurses needed, the supply was only 50 in 2020, representing a paltry 15% of the need. Thus, there was a massive shortage of 85% of specialised nurses needed in 2020, which may reduce by 15 percentage points to 70% by 2030. In comparison, the need-based shortage general practitioners by 2030 will likely be 62% (n=349); 74% (n=25) for medical specialists; 41% (n=132) for biomedical scientists and 44% (n=333) for pharmacist. Table 4 compares the projected needs with supply to establish the potential need versus supply mismatches for all the occupational categories considered in the analysis.

### Financial feasibility analysis: estimates of financial space versus the cost of supply and needs, 2020–2030

Using the trend of public sector expenditure prioritisation for the health sector and the level of prioritisation of the health workforce spending within the health budget (17%–21% of the recurrent expenditure), the fiscal space for the health workforce was estimated to be US$34.2 million in 2020 which would likely grow to US$55.57 million by 2030. Additionally, the private sector’s contribution to health workforce employment (estimated at 20%) translates into US$6.8 million in 2020, which may reach US$11.11 million by 2030. Thus, the composite financial space for the HWF was US$40.94 million in 2020, which on the back of a weak medium-term economic outlook, only could only increase by 6.3% annually, up to US$66.69 million by 2030 across public and private sectors, representing 1.7%–2.2% of GDP over the 10 years (table 5).

In comparison, the cost of employing all health workers in the supply pipeline (in addition to the currently employed ones) is estimated to be US$61.48 million in 2020 (2.5% of GDP), expanding considerably to US$104.24 million by 2030. Thus, a 33% deficit is apparent between the financial space and what is required to guarantee employment for all health workers in the supply pipeline in 2020. Against a backdrop of a sluggish medium-term economic outlook with fiscal pressures, this financial deficit is likely to worsen to 36% by 2030 if the health workforce is not better prioritised beyond the current 17%–20% of recurrent health expenditure. Addressing the gap requires increasing the HWF budget by at least 12.3% annually up to 2030 or spending at least 33% of the recurrent health budget on the HWF employment and remuneration. With the prevailing level of HWF prioritisation within public health spending, the investment can only meet 32%–37% of the requirements needed to address the country’s disease burden and changing demographic dynamics of the population (tables 5 and 6).

As shown in figure 3, up to 67% of the HWF could potentially be employed within the estimated financial space, but it would marginally decline to 64% by 2030 if there is no expansion in the budgetary allocation or prioritisation of the health investments. If this continues, there would...
possibly be HWF unemployment of 33%–37% between 2020 and 2030, given an unmitigated health workforce production pipeline. These estimates are quite similar to the estimated 22% (range: 13%–28%) unemployment rate among nurses, pharmacy technicians and laboratory technicians based on the job seekers’ register kept by the MoH.

**DISCUSSION**

We found that Lesotho had a density of 20.72 doctors, nurses and midwives per 10,000 population from 6.7 per 10,000 in 2005, which represents a 209% improvement over 15 years. However, previously the nursing and midwifery professionals in Lesotho were pegged at about 6000 compared with 2779 found in this analysis. The current analysis uncovered that the previous estimates used the overall number of those who ever registered as nurses and midwives in Lesotho since the establishment of the Lesotho Nursing Council, some of whom have since died, migrated or retired from active service.

It was found that the density of 72.2 community health workers per 10,000 population is higher than in most countries in Africa, where the average is 5 per 10,000 population. This seeming reliance on community health workers is attributed to a shortage of highly qualified health professionals and the emphasis on task-shifting in the health system. However, the potential risk of labour substitution is becoming apparent whereby community health workers are taking up roles originally carried out by other health professionals, but there is no robust mechanism to evaluate the long-term impact on individual health outcomes. Thus, closer monitoring is imperative to address the quality and safety of the services provided.

The financial space analysis suggests there may be insufficient funding to employ all the HWF that may be produced from the education pipeline by 2030 if the production of health workers and budgetary prioritisation of HWF remains the same over time. However, this phenomenon is widespread in Africa and not peculiar

| Table 5 | Financial feasibility analysis: supply and needs compared with estimated financial space |
|---|---|
| **Cost implications and financial sustainability estimates** | 2020 | 2022 | 2024 | 2026 | 2028 | 2030 |
| Public sector budget space, US$ (A) | 34,116,487 | 37,613,427 | 41,468,804 | 45,719,356 | 50,405,590 | 55,572,163 |
| Estimated private sector demand, US$ (B) | 6,823,297 | 7,522,685 | 8,293,761 | 9,143,871 | 10,081,118 | 11,114,433 |
| Cumulative financial space, US$ (C) | 40,939,785 | 45,136,113 | 49,762,564 | 54,863,227 | 60,486,708 | 66,686,595 |
| Cost of employing projected supply, US$ (D) | 61,479,612 | 70,554,451 | 79,359,175 | 87,902,920 | 96,194,489 | 104,242,360 |
| Cost of filling need-based requirements, US$ (E) | 128,963,555 | 136,000,689 | 143,979,466 | 154,092,996 | 164,830,152 | 178,247,628 |
| Cost of training to fill need-based gaps, US$ (F) | 221,198,068 | 216,518,785 | 216,867,854 | 226,459,999 | 240,790,255 | 267,017,553 |
| Overall investment requirement (need-based employment+cost of training), US$ (E+F) | 350,161,622 | 352,519,475 | 360,847,320 | 380,552,995 | 405,620,407 | 445,265,181 |
| The proportion of the supply-side wage bill that could be absorbed by the estimated financial space (D/C) | 66.59% | 63.97% | 62.71% | 62.41% | 62.88% | 63.97% |
| The proportion of need-based wage bill that could be absorbed by economic capacity (E/C) | 31.75% | 33.19% | 34.56% | 35.60% | 36.70% | 37.41% |
| Per cent of public health sector wage required to absorb ‘unemployed’ health workers | 60.20% | 67.58% | 71.37% | 72.27% | 70.84% | 67.58% |
| Proportional increase required in HWF allocation to meet need-based requirements | 182.41% | 169.26% | 157.76% | 149.63% | 141.61% | 136.60% |

Source: authors’ analysis using triangulated data curated from various sources.
| No. | Health professional                                      | 2020             | 2025             | 2030             |
|-----|---------------------------------------------------------|------------------|------------------|------------------|
|     | Estimated wage bill in US$                             | Need | Supply | Need | Supply | Need | Supply |
| 1   | Biomedical scientist                                   | 2 135 413.79    | 731 306          | 2 387 066.48    | 919 553          | 2 713 121.03    | 1 103 141          |
| 2   | Dental assistants and therapists                        | 4 500 716.08    | 804 436          | 4 759 974.44    | 1 254 121         | 5 018 431.15    | 1 660 601          |
| 3   | Dental specialists                                      | 360 569.62      | 33 929           | 381 339.80      | 32 429            | 402 045.76      | 30 996             |
| 4   | Dentists                                                | 3 615 982.98    | 717 339          | 3 824 277.34    | 752 496           | 4 031 827.65    | 785 930            |
| 5   | Dietitians and nutritionists                            | 1 481 777.76    | 353 464          | 1 865 321.87    | 1 415 232         | 2 435 956.79    | 2 430 073          |
| 6   | Environmental and occupational health and hygiene workers| 4 390 779.78    | 1 755 134        | 4 569 557.57    | 4 090 187         | 4 755 398.09    | 6 200 890          |
| 7   | Epidemiologist                                          | 183 065.54      | 111 482          | 204 017.60      | 161 302           | 227 367.65      | 208 919            |
| 8   | Generalist medical practitioners                        | 18 487 264.77   | 10 903 558       | 21 739 482.27   | 13 875 472        | 26 732 934.81   | 16 723 209         |
| 9   | Health educators                                        | 758 733.02      | 706 929          | 789 571.83      | 866 620           | 821 664.09      | 1 021 577          |
| 10  | Medical and pathology laboratory technicians            | 7 249 063.45    | 332 441          | 8 642 662.97    | 3 820 954         | 10 683 527.62   | 4 280 874          |
| 11  | Medical imaging and therapeutic equipment operators     | 647 024.65      | 499 726          | 696 068.37      | 603 335           | 749 432.42      | 702 364            |
| 12  | Nursing and midwifery professionals                     | 32 065 319.19   | 27 385 674       | 37 708 109.69   | 36 244 200        | 44 826 193.00   | 44 251 605         |
| 13  | Nursing associate professionals                         | 15 973 606.50   | 5 063 395        | 18 282 301.57   | 6 654 909         | 21 558 207.41   | 8 168 422          |
| 14  | Optometrists and opticians                              | 646 983.08      | 290 084          | 726 506.62      | 386 843           | 802 864.05      | 479 326            |
| 15  | Pharmaceutical technicians and assistants               | 8 890 641.31    | 4 229 384        | 10 207 436.45   | 5 052 584         | 12 180 477.42   | 5 827 564          |
| 16  | Pharmacists                                             | 7 851 300.69    | 1 742 115        | 9 022 264.72    | 3 245 524         | 10 662 457.63   | 4 675 251          |
| 17  | Physiotherapists and physiotherapy assistants           | 485 445.34      | 268 145          | 502 858.14      | 304 150           | 521 070.25      | 335 508            |
| 18  | Psychologists                                           | 13 201 937.97   | 431 042          | 15 832 165.15   | 724 031           | 20 230 207.04   | 1 004 071          |
| 19  | Specialised nursing professional                        | 3 990 493.09    | 609 421          | 4 691 984.98    | 1 167 527         | 5 649 803.27    | 1 711 819          |
| 20  | Specialist medical practitioners                        | 2 047 435.38    | 1 357 159        | 2 481 428.77    | 1 880 342         | 3 235 540.48    | 2 380 401          |
|    | Lesotho                                                 | 128 963 554.48  | 61 321 162.77    | 149 314 397     | 83 451 811        | 178 247 628     | 103 980 542        |

Only cadres with both supply and need estimates are included in this cost estimate. Community health workers were removed from this estimate because they are largely remunerated by development partners, and there is no standardised salary scale.
to Lesotho. For instance, reports from Ghana, Ethiopia, Namibia, Sierra Leone and Rwanda suggest that between 25% and 30% of some health workers may fail to find jobs and start practice within 1 year after graduation.\textsuperscript{16–35}

Addressing the HWF unemployment and filling the need-based gaps for health workers in Lesotho require an accelerated investment in the HWF (about a 12.3% annual increase in the budget), but Lesotho’s public sector wage bill, which already is nearly 24% of the GDP, coupled with weakened growth prospects imposed by the COVID-19 pandemic,\textsuperscript{30} could constrain the prospects of massive investments in the HWF. The government can leverage its moderate level of debt sustainability\textsuperscript{36} in addition to exploring innovative health financing mechanisms by increasing taxes on alcoholic and tobacco products, accelerating growth in tourism and mining and tackling inefficiencies in public spending, including poor budget execution and rationalising the public sector wage bill.\textsuperscript{5,28}

CONCLUSION

Lessons from Lesotho’s case demonstrates great value in conducting a health labour market analysis to feed into national HWF strategic plan development. Lesotho’s HWF density of 20.72 doctors, nurses and midwives per 10 000 population are lower than previously thought, and the overall stock of health workers covers just 48% of the need arising from the country’s disease burden. Addressing the health labour market mismatches would require bold intersectoral and multistakeholder policy actions to sustainably expand investments in the HWF education, recruitment, equitable distribution and retention. These are crucial to avert the growing HWF unemployment, progressively inching towards UHC targets and accelerating socioeconomic growth. In this regard, expanding public sector budget space for HWF by a sustained increase in the HWF by 12.3% annually (or at least 32% of the recurrent health sector budget) is necessary to recruit health workers being trained and ensure their retention.

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Figure 3  Economic feasibility analysis under different projection scenarios. Source: authors’ construction.
planning process and was not conceived as primary research. The MoH, therefore, determined that no primary data collection was necessary and that ethical review was not required. As such, the stakeholders were engaged in their respective roles as policy actors within a constituted Technical Working Group or Steering Committee as part of a policy development process rather than research subjects.

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