SRMNAH WORKFORCE PLANNING AND DEPLOYMENT IN NEPAL WITH FOCUS ON MIDWIVES

A REPORT 2019

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Acknowledgements

It is my pleasure to present this report **SRMNAH Workforce planning and development in Nepal with focus on Midwives 2019**. I owe my huge thanks to all the kind people who have provided information, advice and guidance with the detail contained in this report.

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I believe this report would be instrumental in informing the policy makers, researchers, academia, public health professionals for effective policy formulation regarding production, recruitment, deployment and retention of SRMNAH workforce in Nepal.

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Chief Technical Advisor
GIZ-S2HSP

Contents

Acronyms

ANMs	Auxiliary Nurse Midwives
BEmONC	Basic Emergency Obstetric and Newborn Care
BMid	Bachelor in Midwifery
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
DSE	Dedicated SRMNAH Equivalent (Headcount x % clinical time spent on SRMNAH)
EmONC	Emergency Obstetric and Newborn Care
ICM	International Confederation of Midwives
KAHS	Karnali Academy of Health Sciences
MDGP	MD in General Practice and Emergency Medicine
MIDSON	Midwifery Society of Nepal
MMR	Maternal Mortality Ratio
MoHP	Ministry of Health and Population
MPDSR	Maternal and Perinatal Deaths Surveillance and Response System
MSF	Midwifery Service Framework
NAMS	National Academy of Health Sciences
NMR	Neonatal Mortality Rate
NNC	Nepal Nursing Council
Ob/Gyn	Obstetrician/Gynaecologist
OMBU	Onsite Midwife-led Birthing Unit
PCL	Proficiency Certificate Level
S2HSP	Support to the Health Sector Programme
SBA	Skilled Birth Attendant
SRH	Sexual and Reproductive Health
SRMNAH	Sexual, Reproduction, Maternal, Newborn, Adolescent Health
UHC	Universal Health Coverage
UNFPA	United Nations Population Fund
WHO	World Health Organisation

1. Executive Summary

This report provides guidance, information and recommendations to support the development of the Sexual, Reproductive, Maternal, Newborn and Adolescent Health (SRMNAH) workforce in Nepal.

The Nepal Health Sector Strategy (NHSS) 2015-2020 has identified the importance of developing human resources for health in order to reach better equality in access to quality Sexual and Reproductive Health (SRH) services and to achieve positive health outcomes for the population. The National Health Policy (2014) initiated a crucial step in this process with the introduction of midwifery education and the creation of a cadre of professional midwives for improving SRMNAH services. Further, the National Health Policy (2019), Policy No. 6.8.7 has also emphasized on production of Midwives, including other specialities like Hospital Managers, Health Economists for quality healthcare services.

This study has used needs-based model to estimate the number and mix of health workers required in order to meet the need for all essential SRMNAH services in Nepal. The analysis was then applied to the Provincial level situation and also to all 13 districts within Bagamati Province (Province 3).

The study has shown a significant need for more SRMNAH workers in Nepal. Across the country, in order to meet the need for all essential SRMNAH services, there is a need for 16,000 new professional midwives, plus the equivalent of an extra 2,000 Medical Officers dedicated to SRMNAH and 1,500 MDGPs and 251 Ob/Gyns. In Bagamati Province, there is a need for 3,500 new professional midwives, plus almost 500 Medical Officers (DSE) and 300 MDGPs and 50 Ob/Gyns.

This report aims to provide clear recommendations and principles which should be applied when deploying midwives, including:

- Communicate a clear vision of midwifery, with a precise scope of work.
- Define midwifery as a regulated profession.
- Introduce a monitoring and evaluation system & quality improvement mechanism for midwifery and for the deployment of midwives.
- Teams of Midwives should be deployed at CEmONC facilities as well as BEmONC, including experienced midwives at both levels.
- Reduce overcrowding at CEmONC facilities by developing high quality Onsite Midwife-led Birthing Units (OMBUs) within the premises or close by, and BEmONC facilities with good referral links.
- Create qualified midwifery educators and clinical preceptors to teach new midwives.
- Encourage systemic supportive supervision and mentoring for new midwives.

2. Introduction

This report has been commissioned to support Nepalese workforce planning and deployment plans for Sexual, Reproductive, Maternal, Newborn and Adolescent Health (SRMNAH).

2.1. Background

Despite significant progress since 2000, most low- and middle-income countries failed to meet the 2015 targets set under the Millennium Development Goals relating to maternal and child health[1]. It has been estimated that there were 295,000 maternal deaths in the world in 2017, and nearly all of the preventable deaths occurred in low- and middle-income countries[2]. Similarly, 2.5 million neonatal deaths occurred across the world in 2017[3], and in 2015 there were 2.6 million stillbirths[4] mostly in low- and middle-income countries.

Between 2000 and 2017, there was a reduction of 38% in the global maternal mortality ratio (MMR), with an average annual reduction rate of 2.9%. In Nepal, there was a 66% reduction between 2000 and 2017 (6.4% average annual reduction rate), but despite this substantial progress, both the maternal mortality ratio (MMR, 186/100,000 live births) and the neonatal mortality rate (NMR, 21/1,000 live births) are still among the highest in the Southern Asian Region. This is far from the country's sustainable development goals for 2030 (an MMR of no higher than 70/100,000 and an NMR no higher than 12/1,000) but Nepal is one of only 16 countries in the world which, between 2000 and 2017, demonstrated an annual average MMR reduction of the magnitude necessary to reach the SDG goal of eliminating preventable maternal deaths.

"In terms of UHC service coverage as defined by the SDG target, the WHO South East Asia region has an average of 55% coverage of essential services, with Nepal at 46%, Bangladesh at 46% and India at 56%. In terms of financial protection, Nepal has not performed well as its neighbours: 27.4% of the Nepal population experience catastrophic expenditure at 10% of total household income and 3.3% at 25% of total household income.[5]"

The Nepal Health Sector Strategy (NHSS) 2015-2020 has identified the importance of developing human resources for health in order to reach better equality in access to quality SRH services and to achieve positive health outcomes for the population. The National Health Policy (2014) initiated a crucial step in this process with the introduction of midwifery education and the creation of a cadre of professional midwives for improving SRMNAH services. Further, the National Health Policy (2019), Policy No. 6.8.7 has also emphasized on production of Midwives, including other specialities like Hospital Managers, Health Economist for quality healthcare services within the country.

With support from the Ministry of Health and Population (MoHP) and other agencies including the Nepal Nursing Council (NNC), the Midwifery Society of Nepal (MIDSON) and external development partners, Kathmandu University started Bachelor in Midwifery (BMid) course in 2016 using the curriculum created according to the International Confederation of Midwives (ICM) standards. Similarly, the National Academy of Medical Sciences (NAMS) began the Bachelor of Midwifery Sciences (BMS) course in 2017. Likewise, Karnali Academy of Health Sciences (KAHS) also started three-year BMid course at the end of 2018.

1   Requejo J, Victora C, Bryce J. A decade of tracking progress for maternal, newborn and child survival: The 2015 report. New York: UNICEF & WHO; 2015.
2   WHO, UNICEF, UNFPA, World Bank, UN Population Division. Trends in Maternal Mortality: 2000 to 2017. Geneva: World Health Organization 2019. https://www.who.int/reproductivehealth/publications/maternal-mortality-2000-2017/en/
3   UN Inter-agency group for child mortality estimation. Levels and trends in child mortality report 2018. New York: UNICEF; 2018.
4   Healthy Newborn Network. Numbers [Internet]. 2019 [cited 2019 Oct 29]. Available from: https://www.healthynewbornnetwork.org/numbers/
5   WHO and World Bank, 2017

The MoHP is planning to re-train significant numbers of ANMs as midwives, through the PCL Midwifery course. They are also planning to upgrade a proportion of maternity staff nurses to become midwife equivalents, through accredited one-year bridge courses. The education and deployment of midwives is explored in more detail in Section 5.

Midwifery courses have students enrolled and learning, and ready for their graduation from 2020 onwards. This report aims to inform the development of recruitment, deployment and retention plans of midwives.

2.2. Objectives

The overall objective of the study was to inform the plans for the SRMNAH health workforce in Nepal.

The specific objectives of the study were:

▶   To estimate the number of healthcare professionals that are required to deliver the SRMNAH services and to meet 100% of the population need.

▶   To propose a mix of different cadres of healthcare professionals that would ideally enable the country to meet the need for SRMNAH services, if tasks were to be allocated according to competencies.

▶   To find out the ideal configuration of the SRMNAH team at different stages of the continuum of care (pre-pregnancy, pregnancy, labour/birth and postnatal) and at different levels of the health system (primary, secondary, tertiary).

The study was focused on the districts within Bagamati Province in the expectation that this will provide lessons which can be applied more generally throughout Nepal.

2.3. Operational definition of SRMNAH workforce

The workforce considered in this study included all health workers engaged in providing SRMNAH care for women and adolescents, across the full continuum of care from reproductive health and family planning through pregnancy and the neonatal period. Although there were no dedicated midwives deployed in Nepal, this study considered the cohort which is currently being educated, as well as doctors, nurses and other relevant health professionals.

2.4. Formulation of the study report

GIZ- Support to the Health Sector Programme (S2HSP) team gathered data required for health workforce modelling from the MoHP and other published sources. Initial analysis was presented at a workshop organised by the MoHP in Kathmandu on 20th December 2018. The participants included more than 60 representatives from MoHP, universities, representatives of external development partners, GIZ, Nepal Nursing Council, Midwifery Society of Nepal (MIDSON), midwifery students and other interested parties. During the workshop, there was an opportunity to discuss, review and validate the data and assumptions built into the workforce model.

Following the workshop, the input data and modelling approach were refined, and this report shows the results following this revision.

2.5. Instruction to use the district briefs

The district briefs in Section 6 cover each district within Bagamati Province. They provide a summary of the current SRMNAH workforce in the district, together with a breakdown of the need for SRMNAH services. There is also a needs-based assessment of the SRMNAH workforce required to meet the particular needs of the population in these districts.

All models are sensitive to the quality of data informing them and involve a number of assumptions, including the assumption that tasks are always allocated to the preferred health workers (Annex B). This may or may not reflect the reality at any particular health facility at any given time. The briefs should therefore be used not as fact sheets, but as a focus for discussion to review and improve the quality of data, and to stimulate debate about different policy options.

3. The national context

Nepal is a landlocked country, lying along the southern slopes of the Himalayan mountain range. The territory extends roughly 500 miles from east to west and between 90 and 150 miles from north to south. Nepal has borders with India in the east, south and west and China to the north. The population in 2018 was estimated to be slightly more than 29 million, with almost 8.5 million women of reproductive age. In September 2015, Nepal's new constitution divided the country into 7 Provinces, each of which is sub-divided as follows: (*Table 1.*)

Table 1. **Provincial and Local Governments of Nepal**

Province	Districts	Metropolitan city	Sub-metro-politan city	Municipality	Rural Municipality	Total Local Bodies
Province 1	14	1	2	46	88	**137**
Province 2	8	1	3	73	59	**136**
Bagamati Province	13	3	1	41	74	**119**
Gandaki Province	11	1	0	26	58	**85**
Province 5	12	0	4	32	73	**109**
Karnali Province	10	0	0	25	54	**79**
Sudur-Pashchim Province	9	0	1	33	54	**88**
Total	**77**	**6**	**11**	**276**	**460**	**753**

Source: Ministry of Federal Affairs and General Administration (MoFAGA), Nepal

In terms of health facilities and services, basic health care is the responsibility of Local Government, including the management of infrastructure, human resources, equipment and drugs and health facilities that have fewer than 15 beds. Existing district, zonal, sub-regional and regional hospitals are the responsibility of Provincial Governments and medical colleges and specialised hospitals are the responsibility of the Federal Government.

The geographical terrain varies enormously throughout Nepal, but can be broadly categorised into three types of region: plain (terai), hill and mountain. For a more detailed analysis, we have focused on Bagamati Province, which is home to the country's capital, Kathmandu, and covers an area of 20,300km^2. It is the most populous of the Provinces, accounting for 14% of the population and includes 13 districts across plain, hill and mountainous areas. *(Figure 1.)*
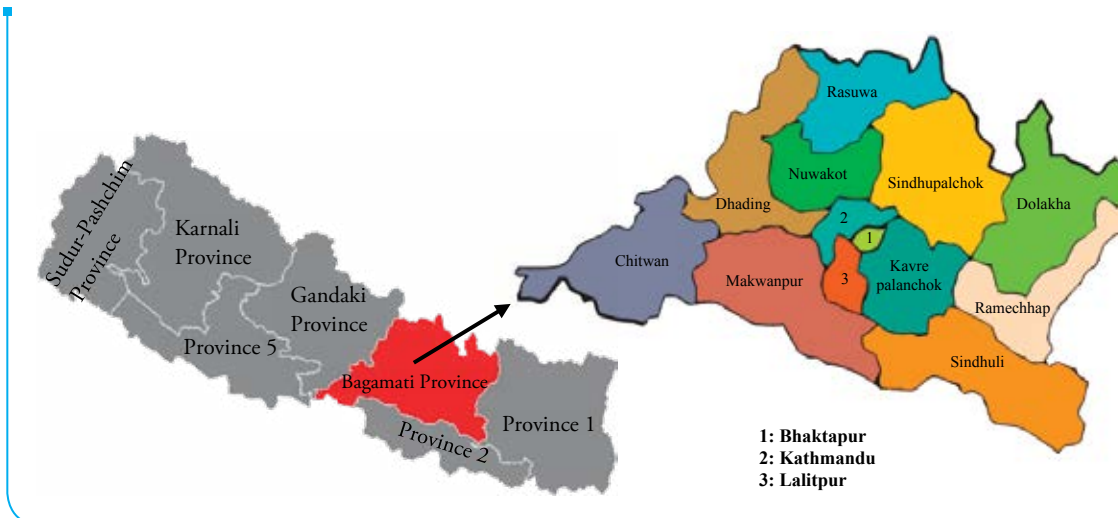
The population estimates for 2018 were taken from the National Population and Housing Census 2011 (Population Projection 2011-2031) high variant. National live birth figures and total pregnancies were obtained from MoHP. These national figures were disaggregated for district level assuming the same number of pregnancies and live births per women of reproductive age as the national figure. *(Table 2.)*

Table 2. *Population estimates for Bagamati Province and its districts, 2018*

Bagamati Province Districts	Terrain	Population	Pregnancies (estimate)	Live births (estimate)
Bhaktapur	Hill	346,042	12,035	8,187
Chitwan	Plain	648,835	22,351	15,205
Dhading	Hill	370,748	11,555	7,860
Dolakha	Mountain	205,790	6,264	4,261
Kathmandu	Hill	1,992,209	69,181	47,062
Kavrepalanchok	Hill	424,312	13,768	9,366
Lalitpur	Hill	532,539	18,406	12,521
Makwanpur	Hill	465,199	14,475	9,847
Nuwakot	Hill	307,371	9,580	6,517
Ramechhap	Hill	222,602	6,815	4,636
Rasuwa	Mountain	47,809	1,358	924
Sindhuli	Hill	322,962	9,651	6,566
Sindhupalchok	Hill	318,268	9,579	6,516
Total		6,204,686	205,018	139,468

Sources:

Population: National Population and Housing Census 2011 High variant projection, CBS, Nepal

Pregnancies: MoHP, Nepal

Live births: MoHP, Nepal

4. The current SRMNAH workforce in Nepal

Nepal contributed to the 2014 State of the World's Midwifery (SoWMy) report[6] and the analysis in this chapter uses a similar methodology. However, in this report, the SoWMy methodology has been developed and tailored to the Nepalese situation, using country-specific data sources which are more up-to-date and more relevant than the sources used for SoWMy.

4.1. Needs of women, newborns and adolescents

The main users of SRMNAH services (women of reproductive age, newborns and adolescents) represent half of the population of Nepal and this population is forecast to grow in size by 15% by 2030. In 2018, older adolescents (aged 15 to 19) represented 11% of the total population, as compared with a global average of 8%.[7]

In 2015, the Global Strategy for Women's, Children's and Adolescents' Health[8] defined a list of the essential interventions for SRMNAH services which should be provided in a "minimum guaranteed benefits package". To provide universal coverage of these essential SRMNAH interventions Nepal must ensure that there are sufficient health workers with the necessary SRMNAH competencies and that they are deployed according to the level of need and supported with the necessary working environment (e.g. correct facility, running water, electricity, equipment, drugs, supplies) and supervision. For the purposes of this report, we have used this Global Strategy list to define the need for SRMNAH care.

The next step in our analysis was to estimate the amount of health worker time that would be required to meet the need for these essential SRMNAH interventions, if everyone who needed an intervention received it. This was achieved by estimating (i) the number of women, newborns or adolescents requiring contact with a health worker for each intervention and (ii) the time required from a skilled health professional to deliver the intervention (i.e. to fulfil the required contact), and then multiplying these two figures. An example is shown in *Table 3*, for the treatment of malpresentation at term by a midwife. It should be noted that this time estimate is for a midwife's time only. There is an additional estimate for the times when an Ob/Gyn or MDGP would also be required to treat complex cases.

Table 3. Management of malpresentation at term by a midwife, Bagamati Province, 2018

Number of deliveries	142,815
Incidence of breech*	14%
Number of breech presentations	14% of 142,815 = 19,994
Midwife time required**	90 minutes
Total time required (midwife)	179,947mins = 29,991 hours

* See *Annex C* for a list of the data sources used to estimate the need for each intervention.
** Time estimates were taken from the OneHealth tool[9] for the vast majority of the interventions. A few were not included in OneHealth, and for these, expert opinion was obtained.

6   UNFPA, WHO, ICM. The state of the world's midwifery 2014: A universal pathway. A woman's right to health. New York: United Nations Population Fund; 2014.
7   United Nations Department of Economic and Social Affairs Population Division. World Population Prospects 2017 custom data acquired via website [Internet]. 2017 [cited 2017 Sep 18]. Available from: https://esa.un.org/unpd/wpp/
8   Every Woman Every Child. The global strategy for women's, children's and adolescents' health (2016-2030). New York: Every Woman Every Child; 2015.
9   WHO OneHealth tool version 5.61 November 2017

This process was repeated for all the interventions and summed to estimate the total amount of time needed to deliver all the interventions to all who need them. This analysis takes into account the country's demography (e.g. number of women of reproductive age, fertility rate) and epidemiology (e.g. prevalence of sexually transmitted infections) plus internationally recognised standards for the expected number of contacts per annum and the average amount of health worker time that a contact should take: see *Annex A* for full details. Variation in demography and epidemiology results in varying amount of need for SRMNAH services.

Figure 2 shows that our estimate of the total need for SRMNAH workers in Nepal in 2018 amounts to 35 million hours of contact time. This time has been disaggregated across the different stages of the continuum of care: sexual & reproductive health, antenatal care, childbirth care, postnatal care for mother and for newborn and finally for adolescent health and development. *Figure 2* highlights that 41% of the need for SRMNAH care is for sexual and reproductive health care and a quarter is for postnatal care (mother and newborn combined).

Figure 2. ▶
Estimated need for SRMNAH worker time in Nepal, 2018 (hrs per annum)

4,727,683 , 14%
3,165,456 , 9%
14,264,415 , 41%
5,426,236 , 15%
5,419,654 , 15%
2,021,809 , 6%

- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need: 35,025,254 hrs per annum
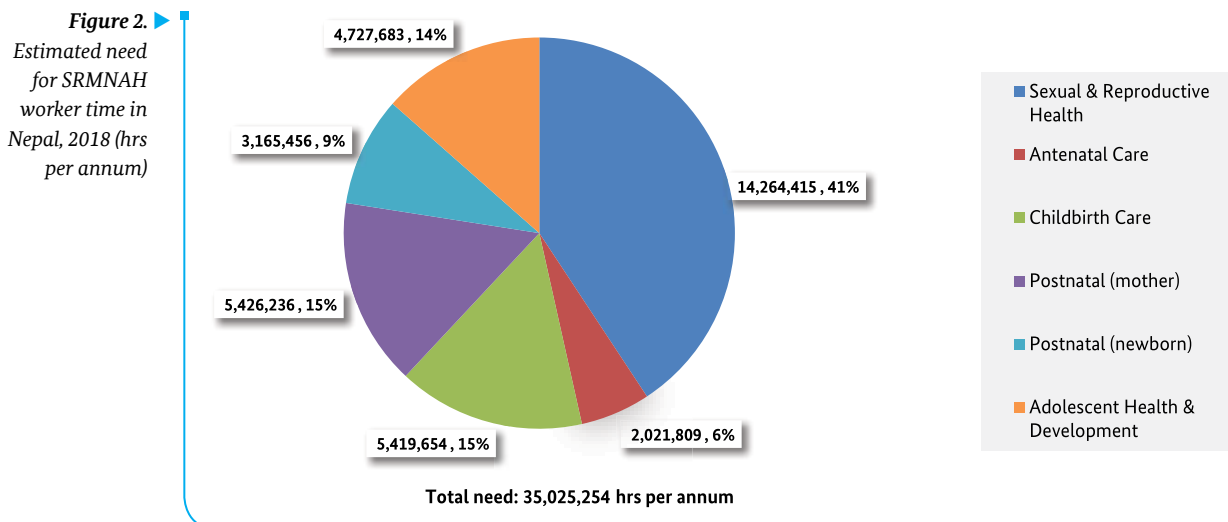
Figure 3 shows a similar picture for Bagamati Province, where there was a total need for more than 7.5 million hours of SRMNAH health worker contact time in 2018.
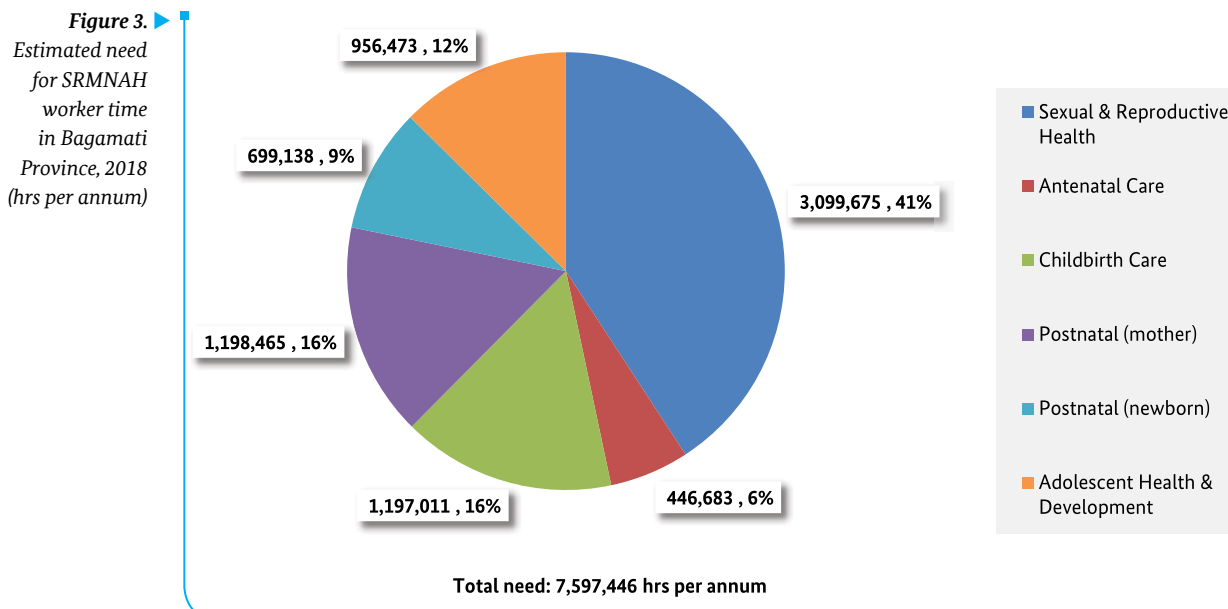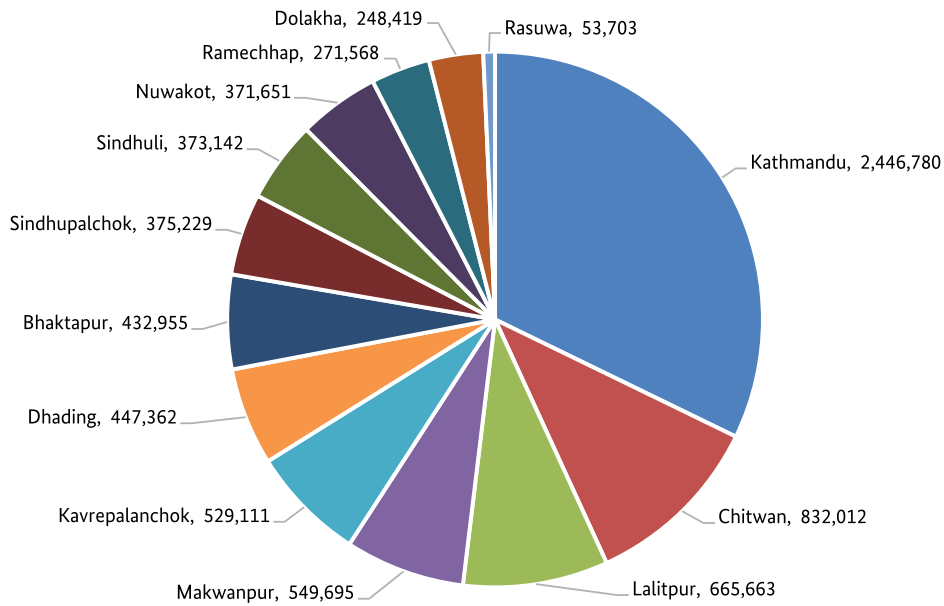
Figure 3. ▶
Estimated need for SRMNAH worker time in Bagamati Province, 2018 (hrs per annum)

956,473 , 12%
699,138 , 9%
3,099,675 , 41%
1,198,465 , 16%
1,197,011 , 16%
446,683 , 6%

- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need: 7,597,446 hrs per annum

Looking in more detail, it is possible to break down this estimate of the need for SRMNAH worker time for each of the 13 districts within Bagamati Province, as illustrated in *Figure 4*. It is clear that Kathmandu dominates the need, accounting for 32% of the total.

Figure 5 shows that the proportions are broadly similar across all the 13 districts within Bagamati Province, but there are some variations. For example, the populous districts Kathmandu, Chitwan and Lalitpur have a higher proportion of need for childbirth care and postnatal care (both mother and newborn), than the mountainous districts Dolakha and Rasuwa. In these mountainous districts, the amount of need for sexual & reproductive health care is relatively high as a proportion of the total SRMNAH need.
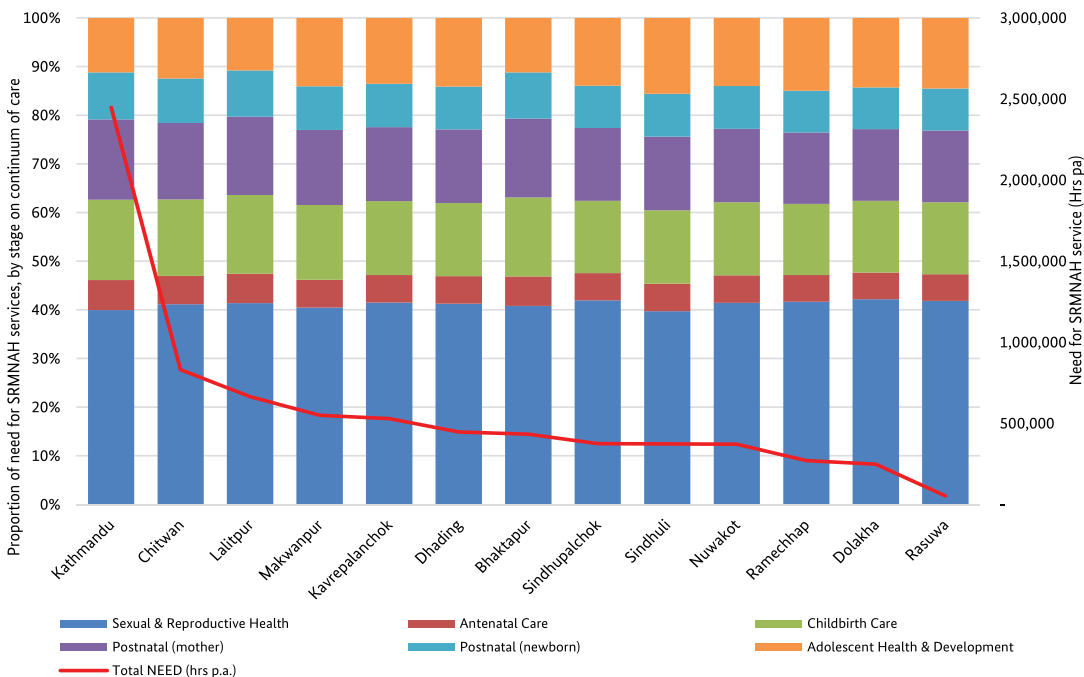
4.2. Primary, Secondary or Tertiary level of care

In consultation with national experts, we reviewed each of the Global Strategy interventions to estimate how much of the need for each should be met at a Primary, Secondary or Tertiary level. We based these estimates on the ideal situation of what should be possible, not necessarily what is currently possible. Some interventions can only be carried out effectively at secondary or tertiary level facilities, where the necessary equipment and medicines are available. Generally, we assumed that secondary and tertiary level workload should be split 90:10, with ten percent of time required at tertiary level facilities for complicated referral cases. Assumptions relating to the proportion of need for each intervention which should be met at Primary, Secondary or Tertiary level are detailed in *Annex D*.

In the Nepalese context, we defined Primary level to include community-based interventions, birthing centres, plus BEmONC Health Posts and Primary Health Care Centres. Three facilities in Bagamati Province were classed as Tertiary level for SRMNAH services: Kanti Children's Hospital and the Paropakar Maternity and Women's Hospital (PMWH), Thapathali (both in Kathmandu) and Bharatpur Hospital in Chitwan. Other CEmONC facilities were classified as Secondary level facilities. It is important to emphasise that there are a number of other tertiary level hospitals in Bagamati Province – notably the National Academy of Medical Sciences, Bir Hospital in Kathmandu which is the largest tertiary hospital in Nepal. However, only three tertiary hospitals routinely carry out SRMNAH services, so these are the only ones classified as tertiary level, for the purposes of this study into the SRMNAH health workforce.

The actual classification of facilities in Nepal is a subject for further discussion and clarification. The data gathered for this study identified all Health Posts within Bagamati Province as BEmONC facilities. Our estimate of the proportion of interventions which could be met at Primary level assumes that these facilities are functioning as BEmONC facilities. However, it has been reported that across Nepal there are only "3% of primary health care centres providing BEmONC and less than half (45%) of health posts offering normal delivery services"[10]. If, in fact, these Health Posts are not able to offer BEmONC services, it might explain why "many women are choosing to by-pass lower level facilities to give birth in hospitals"[11]. Clearly this is an important issue which needs further work to clarify, as primary level BEmONC facilities are essential to ensure that mothers and newborns can receive high quality SRMNAH services.

Figure 6 shows that two-thirds (67.28%) of the need for SRMNAH services in Nepal should be met at a Primary level BEmONC health facility, 29.45% at secondary level and 3.27% at tertiary level. The pattern is very similar for Bagamati Province.

Figure 6.
The proportion of the need for SRMNAH services which should be met at Primary, Secondary and Tertiary level of care, Nepal 2018

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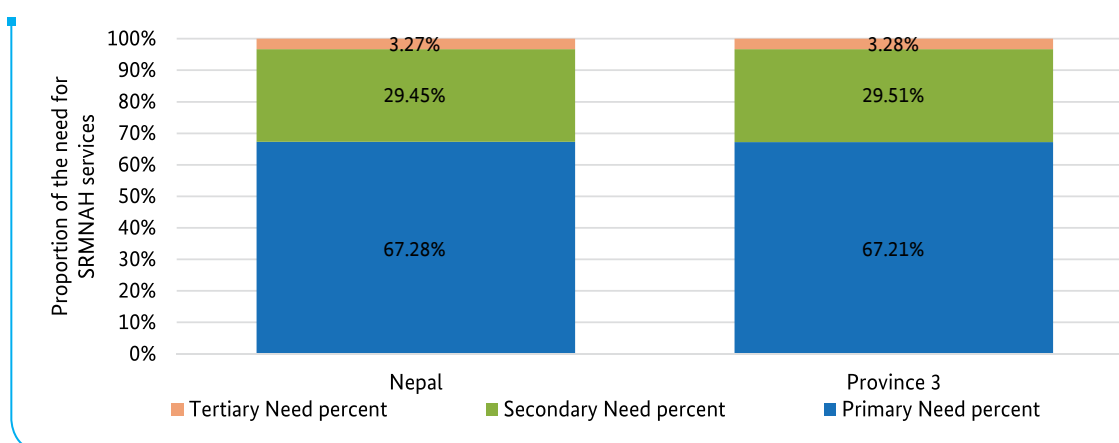
10   Nepal Demographic and Health Survey 2016, and Nepal Health Facility Survey 2015
11   Aryal, KK., Dangol, R. et al (2018) 'Health Services Availability and Readiness in Seven Provinces of Nepal'. DHS Further Analysis Reports No. 115. Rockville, Maryland, USA: ICF
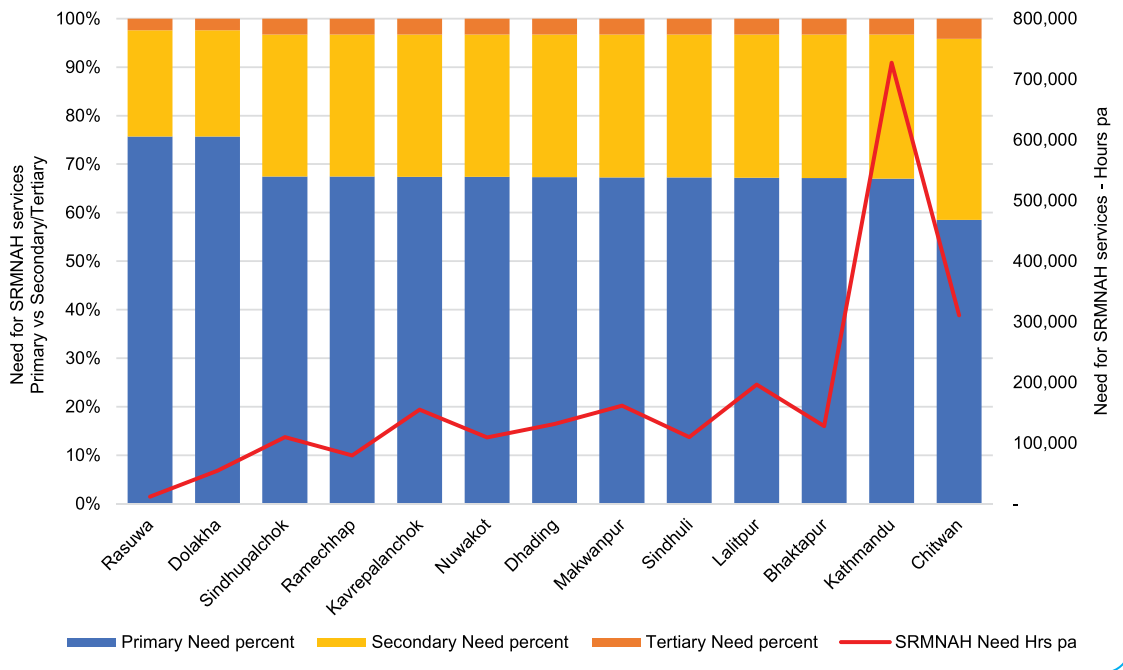
*Figure 7.
The proportion
of the need for
SRMNAH services
which should be
met at Primary,
Secondary &
Tertiary level of
care, Bagamati
Province, by
districts 2018*

However, there is a degree of variation between individual districts, as shown in *Figure 7*.

The Rasuwa and Dolakha districts are mountainous areas and the population and the absolute levels of need for SRMNAH services are lowest (as shown by the red line in *Figure 7*). As there are far fewer secondary facilities in these mountainous areas, the analysis assumes that the model of care is different, with more community-based care. In order to reflect this, the model assumes a different balance between primary and secondary level of care for certain interventions, as detailed in Annex D. For example, for a few interventions we have assumed that the majority of the need for SRMNAH services can be met at a primary level in the mountains, whereas the bulk would be met at a secondary or tertiary level in the plains, where these facilities are available. The estimates were made in consultation with national experts using their experience of working in Nepal. Our model is based on a philosophy of 'what could be' if all health workers were appropriately educated and working in an enabling environment, so the proportions aim to reflect that, rather than reflecting what is actually happening (which will inevitably vary by district and facility).

We know that providing home-based care by Female Community Health Volunteers (FCHVs) or nurses is under discussion in areas where access to health care is difficult, but this is not yet adopted. This increased community-based care in the mountains would require health workers to spend more of their work time travelling to families, so that the proportion of their work time available for clinical contacts would be slightly reduced. As a result, the proportion of the need that should be met at secondary or tertiary level of care in the two mountainous districts (Rasuwa and Dolakha) is estimated at 24% of the total. In contrast, the proportion of need at the secondary tertiary level is higher at 41% in the Terai (Plain) areas such as Chitwan district, where these facilities are situated.

4.3. Selection of SRMNAH workforce

The study team initially examined 15 different SRMNAH health worker occupation groups, but summarised this to ten occupation groups for analysis.

Auxiliary Health Workers (AHWs) and Health Assistants (HAs) were excluded from the analysis because

they do not have the internationally recognised competencies required of a health professional providing care during childbirth. Nursing Administrators (MN and MScN) were excluded because they are almost all engaged in managerial and administrative roles and as such do not usually perform clinical interventions. The two proposed cadres of Midwife, Diploma level (PCL) and Graduate level (BMid) have been grouped together, as the numbers are small and SRMNAH competencies are similar.

Thus, the final groups of SRMNAH workers were agreed as:

1. Midwife (PCL & BMid)
2. Auxiliary Nurse Midwife (ANM)
3. Staff Nurse
4. Nursing Officer
5. Medical Officer
6. MD in General Practice and Emergency Medicine (MDGP)
7. Obstetrician/Gynaecologist (Ob/Gyn)
8. Paediatrician
9. Anaesthesiologist
10. Anaesthetic Assistant

Section 5 examines the possibility of retraining Staff Nurses and ANMs in midwifery competencies. However, this is in the future and for the purposes of this analysis we refer to ANMs and Staff Nurses with their current level of education and competencies.

Numbers were available only for health workers in the public sector. The private sector in Nepal has a number of facilities and provides a significant contribution to SRMNAH services, so it would be beneficial to gather data for this sector and include these numbers in a future analysis.

4.4. Current Public Sector Headcount

The study team obtained the total SRMNAH health workforce in the Public Sector in Nepal as shown in *Table 4*.

Table 4. Public Sector Headcount for SRMNAH health workers in Nepal, 2018

Health Cadres	Total Headcount	Primary	Secondary	Tertiary
Midwives	0	0	0	0
ANMs	8,316	6,861	1,270	185
Staff Nurses	1,545	105	1,070	370
Nursing Officer	115	0	106	9
Medical Officer	686	85	535	66
MDGP	29	0	29	0
Ob/Gyn	51	0	27	24
Paediatrician	50	0	17	33
Anaesthesiologist	29	0	21	8
Anaesthetic Assistant	28	0	28	0
Total	10,849	7,051	3,103	695

Source: MoHP, Nepal

Further, the GIZ–S2HSP has obtained comprehensive details of the SRMNAH health workforce in the Public Sector in Bagamati Province from the MoHP. The summary totals for Bagamati Province are shown in *Table 5*.

Table 5. *Public Sector Headcount for SRMNAH health workers in Bagamati Province, 2018*

Health Cadres	Total Headcount	Primary	Secondary	Tertiary
Midwives	0	0	0	0
ANMs	1,480	1,221	226	33
Staff Nurses	605	41	419	145
Nursing Officer	61	0	56	5
Medical Officer	322	40	251	31
MDGP	13	0	13	0
Ob/Gyn	26	0	14	12
Paediatrician	33	0	11	22
Anaesthesiologist	18	0	13	5
Anaesthetic Assistant	4	0	4	0
Total	2,562	1,302	1,007	253

Source: *MoHP, Nepal*

4.5. Dedicated SRMNAH Equivalents (DSE)

Throughout Bagamati Province, more than 2,500 health professionals were engaged in providing SRMNAH services last year. However, headcount alone is an inadequate measure of the availability of the SRMNAH workforce, because some of the occupation groups provide other health services in addition to SRMNAH services. We have used expert estimates of the proportion of their clinical working time that each occupation group spends, on average, on SRMNAH interventions.

Multiplying this estimate by the headcount, we have calculated the 'dedicated SRMNAH equivalent' (DSE) health worker numbers, as illustrated in *Tables 6* (National) and *7* (Bagamati Province).

Table 6. *Public Sector Dedicated SRMNAH Equivalent (DSE) health workers in Nepal, 2018*

Health Cadres	% of clinical time on SRMNAH	Total DSE	Primary	Secondary	Tertiary
Midwives	100%	0	0	0	0
ANMs	100%	8,316	6,861	1,270	185
Staff Nurses	33%	510	35	353	122
Nursing Officer	100%	115	0	106	9
Medical Officer	10%	69	9	53	7
MDGP	50%	15	0	15	0
Ob/Gyn	100%	51	0	27	24
Paediatrician	100%	50	0	17	33
Anaesthesiologist	30%	9	0	6	2
Anaesthetic Assistant	30%	8	0	8	0
Total		9,143	6,905	1,855	382

Table 7. **Public Sector Dedicated SRMNAH Equivalent (DSE) health workers in Bagamati Province, 2018**

Health Cadres	% of clinical time on SRMNAH	Total DSE	Primary	Secondary	Tertiary
Midwives	100%	0	0	0	0
ANMs	100%	1,480	1,221	226	33
Staff Nurses	33%	200	14	138	48
Nursing Officer	100%	61	0	56	5
Medical Officer	10%	32	4	25	3
MDGP	50%	7	0	7	0
Ob/Gyn	100%	26	0	14	12
Paediatrician	100%	33	0	11	22
Anaesthesiologist	30%	5	0	4	2
Anaesthetic Assistant	30%	1	0	1	0
Total		1,845	1,239	482	125

Figure 8 shows the comparison between headcount and the size of the 'dedicated SRMNAH equivalent' (DSE) workforce in Nepal. ANMs spend all of their time working on SRMNAH, so their number is unchanged, but Medical Officers spend an average of 10% of their clinical time working on SRMNAH, so the DSE figure is much smaller than the headcount. The smaller DSE figure gives a much more accurate estimate of the availability of health workers for the provision of SRMNAH care.

Figure 8.
Public Sector
SRMNAH workers
in Nepal, 2018
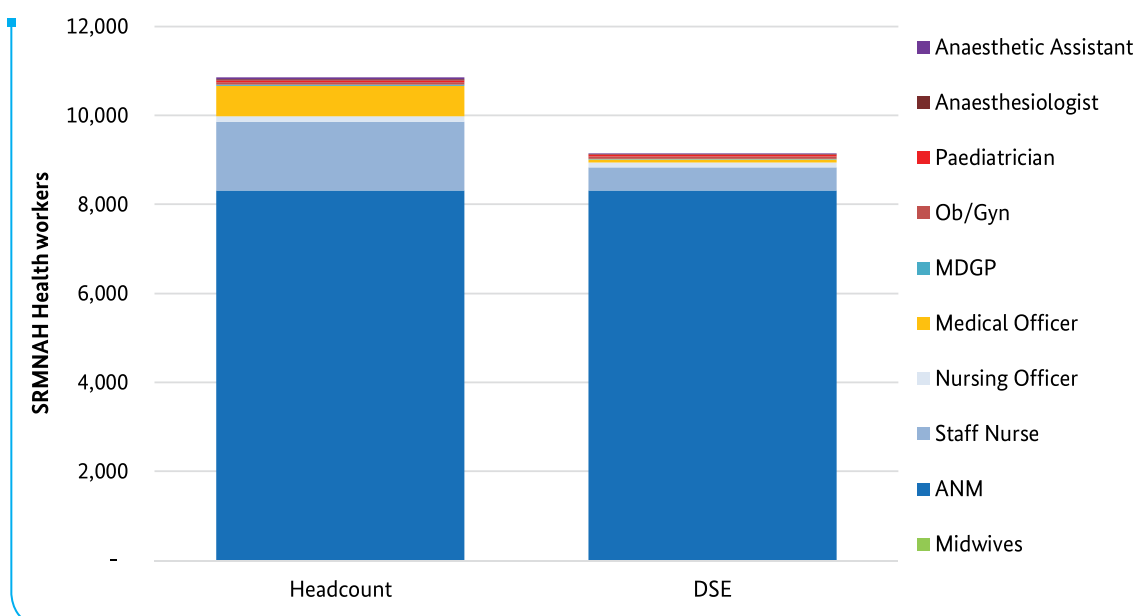
4.6. Distribution of current Public Sector workers

Returning to headcount numbers, we examined the geographical distribution of SRMNAH health
workers, compared with the general population, as shown for Bagamati Province in *Figure 9*.

Figure 9.
Public Sector
SRMNAH
health workers
in Bagamati
Province, 2018
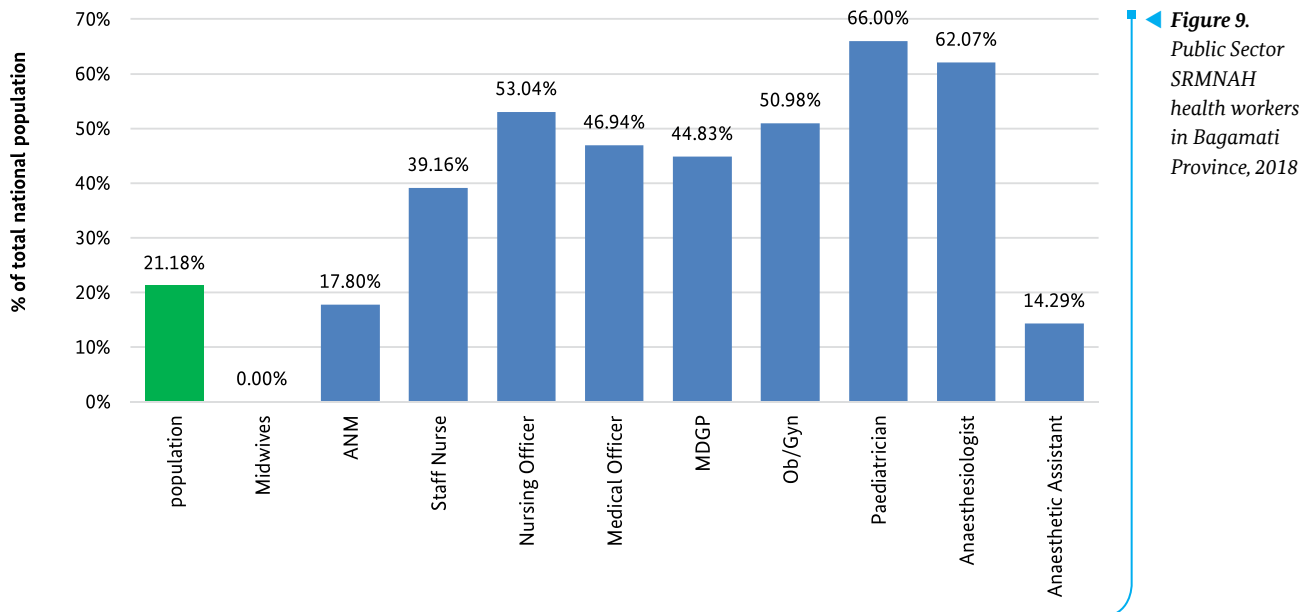
So, Bagamati Province contains 21% of the Nepalese population (6.2 million of 29.2 million total).
However, the total number of ANMs in Bagamati Province is 1,480 which is just 18% of the national total
of 8,316. Similarly, the proportion of Anaesthetic Assistants in Bagamati Province is just 14% (4 of 28).

For all other cadres, there are significantly more health workers in Bagamati Province than would be
expected if they were distributed equitably between districts based purely on population numbers.
Bagamati Province has a total of 605 Staff Nurses working in the public sector, representing 39% of
the national total of 1,545. There are 13 MDGPs and 26 ob/gyns working in the public sector only in
Bagamati Province and together they represent 45% and 51% respectively of the total number of public
sector MDGPs and ob/gyns estimated to be in Nepal. The situation with medical officers is similar: 47%
of the national total are in Bagamati Province (322 of 686). The disparity is most stark for the specialist
cadres, with 66% of Nepal's paediatricians (33 of 50) and 63% of Nepal's anaesthesiologists (18 of 29) in
Bagamati Province. It could be expected that doctors and specialists working in the private sector are
also more numerous in Bagamati Province than in the other provinces, so maldistribution is possibly
even more pronounced than these figures indicate. However, despite this, there is still an important need
for additional SRMNAH health workers in Bagamati Province, as in the country as a whole, as shown
below (Figures 10-13)

The picture presented in Figure 8 is not completely unexpected, as there is usually a far higher
proportion of specialist doctors in the national capital, which in the case of Kathmandu is situated in
Bagamati Province. However, it does present a concern that mothers, newborns and adolescents seeking
SRMNAH services in other Provinces will need to travel far greater distances to access specialist care.

The next phase of our analysis should help to clarify this picture, as we expect to obtain full details of
the SRMNAH health worker numbers in all Provinces. It is possible that many of the specialist doctors
working in other Provinces are employed in the private sector and, as such, they would be addressing the

need for SRMNAH services, but are not included in our national headcount totals. It is also possible that the estimates for national totals of each occupation group are inaccurate.

4.7. Actual and Required SRMNAH workers

This report uses a needs-based approach to assess the level of coverage for SRMNAH services. Initially, we estimated the need for health worker time to provide the essential interventions as described in Section *4.1*. The second step of our analysis looked at SRMNAH worker availability (*Sections 4.4 and 4.5*). The final step was to analyse how many suitably qualified SRMNAH health workers would be required to fully meet the need for SRMNAH care.

This calculation allocates the estimated need to a preferred occupation group with the necessary competency (e.g. family planning to ANMs where appropriate, routine antenatal care to midwives, caesarean section to obstetricians/gynaecologists). The need allocated to each cadre was then converted to the dedicated SRNMAH equivalent (DSE) workforce which would be required to satisfy it, based on standard assumptions of hours worked, efficiency and the percentage time spent on SRMNAH by different occupation groups.

The 'efficiency' estimate recognises that all health workers spend a proportion of their working time on non-clinical duties such as paperwork, meetings and continuing professional development (CPD). Previous global reports have estimated that the time available for clinical work is, on average, 70% of the available working hours.[12] We have used this estimate for Nepal, but have also made an additional allowance in hill and mountainous areas, based on the recognition that workers in these areas are likely to lose more time at work due to travel problems and adverse weather, for example. Consequently, we have assumed that the percentage of work time available for clinical work is 70% in plain areas, 65% in hill areas and 60% in the mountains. These assumptions have been applied equally to all occupation groups.

The analysis for Nepal as a whole is shown in *Figure 10* and the full table of results is in *Section 6*.

Figure 10.
Actual (public sector) & required DSE at Primary, Secondary & Tertiary level, Nepal 2018

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12   UNFPA, WHO, ICM. The state of the world's midwifery 2014: A universal pathway. A woman's right to health. New York: United Nations Population Fund; 2014.
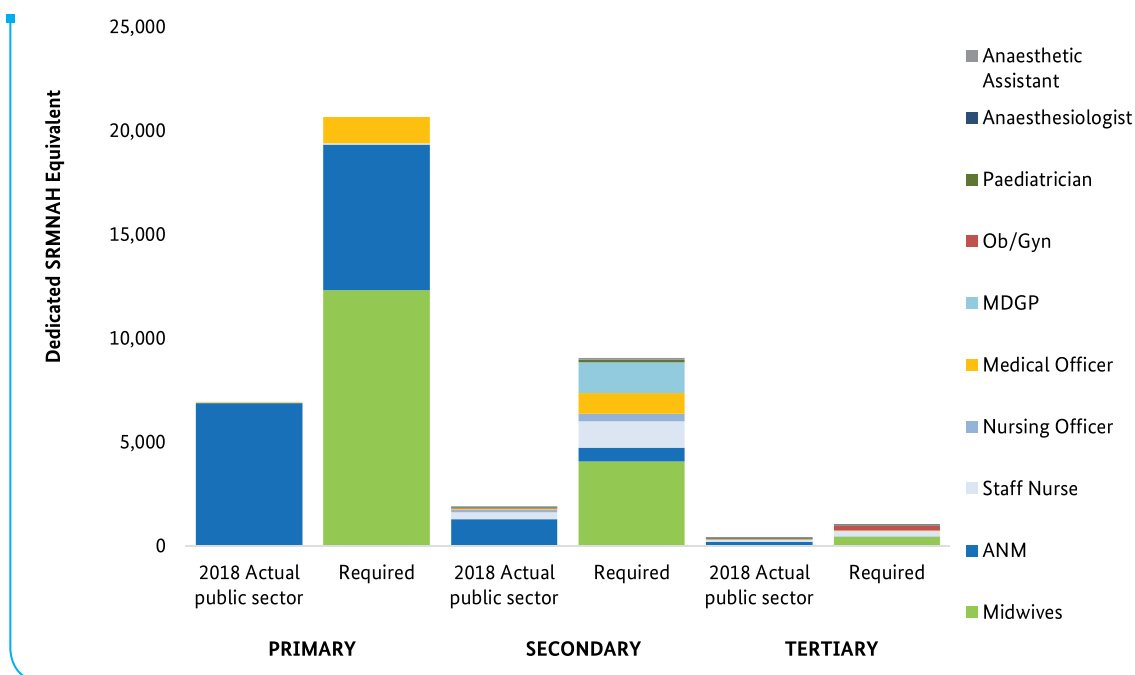
At the primary level of care, there are currently fewer than 7,000 qualified DSEs in the public sector and almost all of these are ANMs (99.4%), with just a very few DSE Staff nurses and Medical Officers. Looking at the need which could be met at a primary level, the required number of ANMs (7,029) is only very slightly more than the current number. However, in addition to this, there needs to be an even greater number of midwives (12,300), plus almost 1,300 Medical Officers (DSE).

More than 2,000 qualified DSEs in the Public Sector are currently stationed at the secondary and tertiary level and the majority (65%) of these are ANMs. The analysis indicates that the total number of DSEs required at the secondary and tertiary levels should be 10,000: more than four times the current level. This total includes more than 4,000 new midwives, 1,000 additional DSE medical officers, 1,000 additional DSE staff nurses, 1,000 additional MDGPs and 2,000 additional DSE MDGP and 600 additional Ob/Gyn.

The picture in Bagamati Province is similar but on a smaller scale, as illustrated in *Figure 11*.
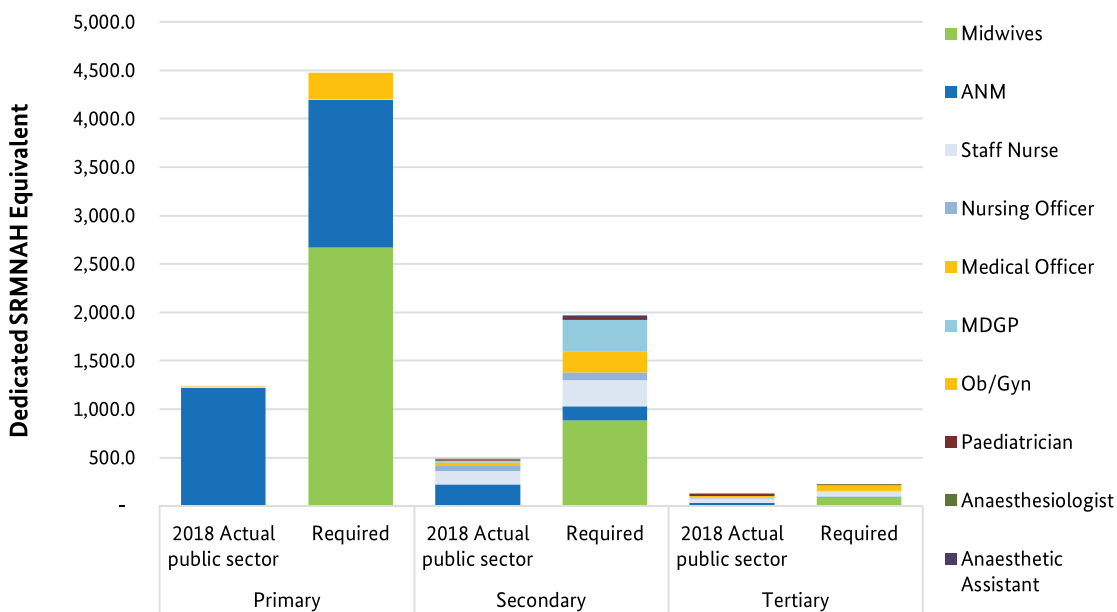
Figure 11.
Actual (public sector) & required DSE: Primary, Secondary &Tertiary level, Bagamati Province 2018

Across the 13 districts in Bagamati Province, 98.5% of the DSE SRMNAH workers at Primary level are ANMs. This is a total of 1,221 ANMs, working with support from just 41 staff nurses who, on average, spend one third of their clinical time on SRMNAH services and 40 medical officers who, on average, spend 10% of their clinical time on SRMNAH services. Our analysis shows that there are almost enough ANMs and Staff Nurses working at a primary level, but in order to meet all the need for SRMNAH services, they should be joined by 2,600 new midwives and an additional 265 DSE medical officers.

Disaggregating this analysis by district, we looked first at the primary level of care in *Figure 12*. It is clear that the greatest need at a primary care level is in Kathmandu, accounting for one-third of the Provincial total (1,437 of 4,420). Although just 11% of the public sector primary level SRMNAH DSE health workers in Bagamati Province are in Kathmandu, this is partly explained by the dominance of secondary and tertiary health facilities in Kathmandu (*Figures 13 and 14*).

All districts require substantially more DSE health workers to meet the need for SRMNAH care in their area. The skill mix requirements indicate that most of these additional workers should be midwives, with some support from medical officers.

Figure 12.
Actual (public sector) & required DSE at a primary level, Bagamati Province by districts 2018
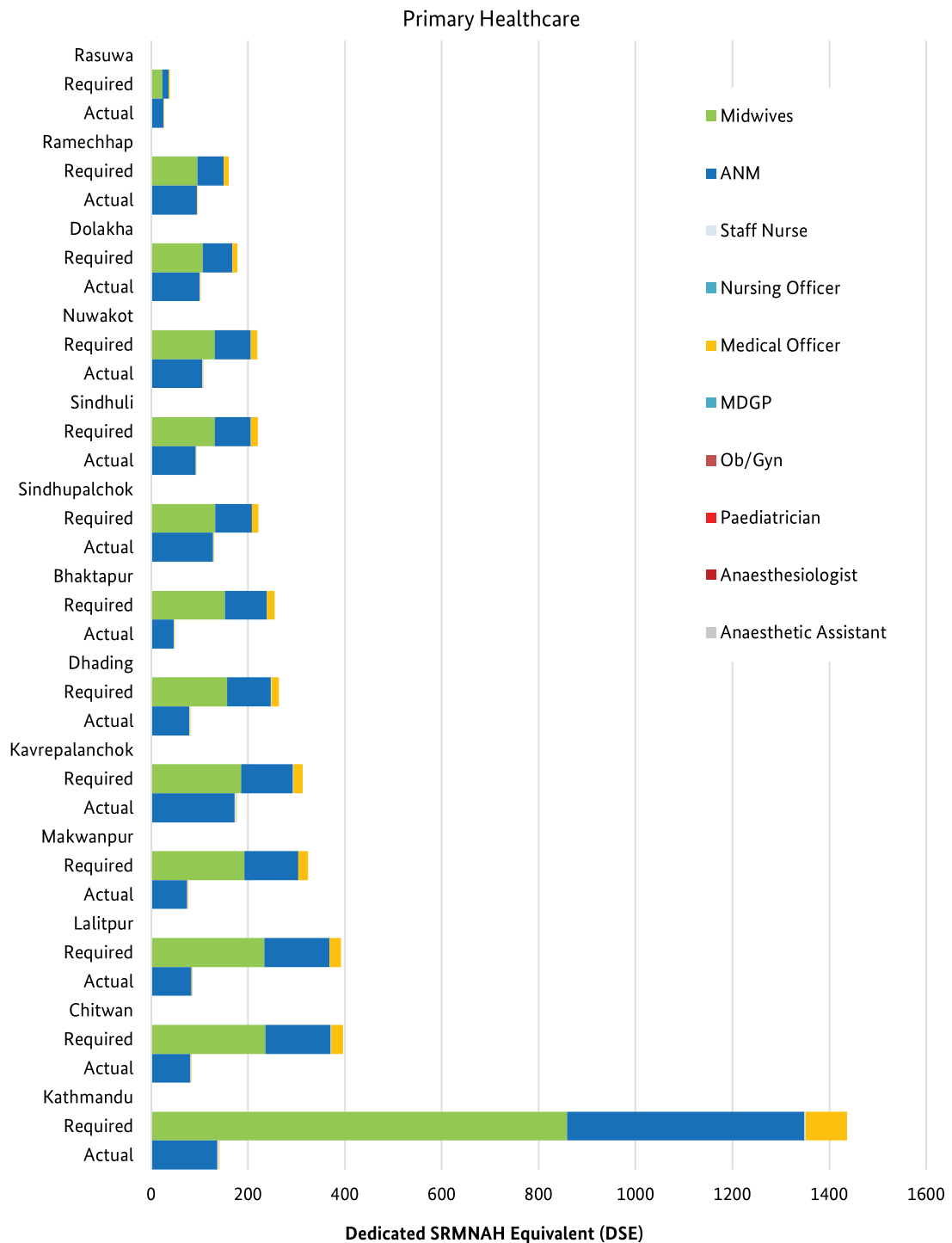
Reviewing the secondary level analysis in Figure 12, Kathmandu again dominates the required DSE SRMNAH workers, with 34% of the total (637 of 1,881). However, almost two-thirds (64%) of all public sector secondary level health workers in the Province are stationed in Kathmandu district. The number of additional SRMNAH health workers required in Kathmandu is still large, with an extra 280 midwives, 50 DSE Medical Officers, 800 DSE MDGP or Ob/Gyns and 3 DSE Anaesthetists needed to meet all the need for SRMNAH services. In the other districts, the absolute numbers are smaller, but the proportional increase required is even greater.

Secondary Healthcare
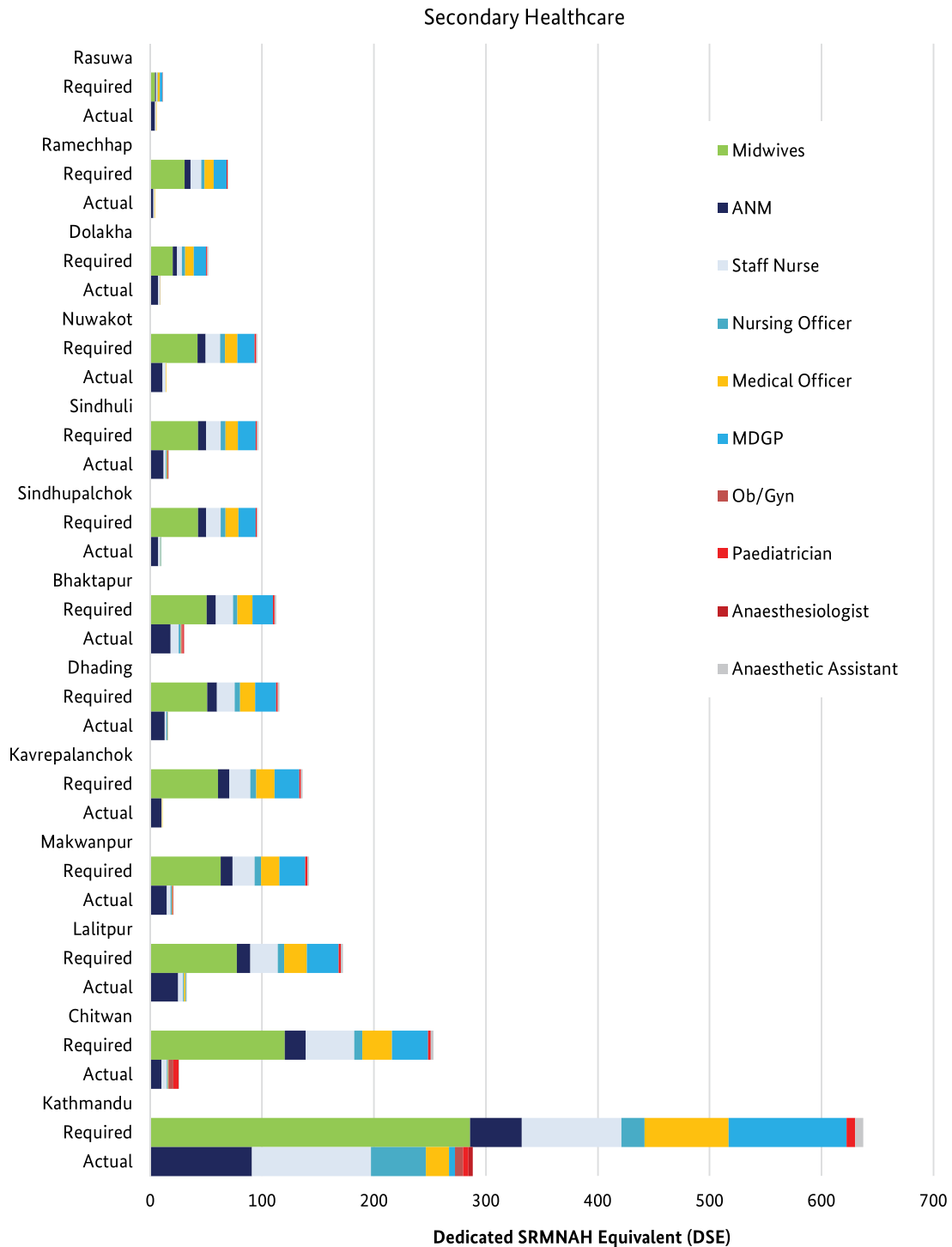
*Figure 13.
Actual (public
sector) &
required DSE
at a secondary
level, Bagamati
Province by
districts 2018*

The only tertiary hospitals in Bagamati Province which routinely offer SRMNAH services are in
Kathmandu and Chitwan and Figure 13 shows that the actual total of DSE health workers in tertiary
facilities is sufficient, although the mix shows that the number of ANMs and staff nurses are hiding a lack
of midwives.

Tertiary Healthcare

Legend:
- Midwives
- ANM
- Staff Nurse
- Nursing Officer
- Medical Officer
- MDGP
- Ob/Gyn
- Paediatrician
- Anaesthesiologist
- Anaesthetic Assistant

Districts (top to bottom): Rasuwa, Ramechhap, Dolakha, Nuwakot, Sindhuli, Sindhupalchok, Bhaktapur, Dhading, Kavrepalanchok, Makwanpur, Lalitpur, Chitwan, Kathmandu — each showing Required and Actual bars.

X-axis: Dedicated SRMNAH Equivalent (DSE), scale 0 to 100.

5. Deployment of Midwives

The Nepal Government recently initiated a Bachelor of Midwifery programme and the first cohort of professional midwives will graduate in early 2020. They will join the health workforce at a time of transition so it is especially important that their introduction is carefully managed. The first cohort of Certificate level Midwives is estimated to be a total of 450 from 15 education institutions. The Government envisages to increase the number of midwife education institutions, but the expected annual production of midwives is unknown.

This section of the report will examine some of the deployment implications and make recommendations to ensure a smooth transition. First, we will explore the costs involved in the two proposed education programmes and then we will propose some principles for the successful deployment of midwives into the health workforce. Finally, we will look at the desired skill mix for staff.

At the time of writing, the MoHP is in the final stages of publishing The National Roadmap to Improve Maternal and Newborn Health in Nepal (2019-2030). The Roadmap will address the three interdependent issues of training, recruitment and deployment and will provide a vision for how SRMNAH teams should work together to deliver services across the continuum of care, in order to ensure consistency and clear roles and responsibilities between occupation groups (MDGPs, Midwives, Staff nurses and ANMs). This report cannot pre-empt what the Roadmap will recommend, but can make a number of suggestions based on the situation analysis and discussions with the national experts during the 2018 Midwifery Planning meeting, in particular when related to issues which will impact on the distribution of midwives as providers and educators as well as supervisors:

▶ develop short-term rotations, for staff working in remote health facilities to alternate with time spent in busier facilities where they can keep up to date with training and practice

▶ expand the number of clinical mentors

▶ increase the number of adequately equipped education sites and monitor education and training through an accreditation mechanism to ensure quality

▶ update the skilled birth attendance (SBA) strategy and include a comprehensive in-service training plan[13]

▶ Ensure more effective outreach services: one ultrasound scan before 24 weeks of gestation for all pregnant women plus a second ultrasound scan before 36 weeks for women in selected remote areas, two home postnatal visits by ANM or midwife as well as family planning household visits in some areas

▶ Scaling up of the Maternal and Perinatal Deaths Surveillance and Response system (MPDSR)

▶ Improving monitoring and evaluation for SRMNAH programmes

▶ Operational research on midwifery. Suggested fields for OR: midwifery training quality; midwifery services (onsite midwife-led birthing units) quality and cost-effectiveness; access to midwifery services; community mobilisation for the use of midwifery services; changes in practices and behaviour related to introduction of midwives

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13 To increase the number of competent health professionals providing care during childbirth, different courses have been established for ANMs, nurses and doctors. It is recommended that the SBA in-service training programme will still be needed to ensure the skills of Doctors, Nurses and ANMs who are working in the Government health system.

The SRMNAH services included in this report encompass sexual & reproductive health (including family planning), antenatal care, childbirth care, postnatal care (mother & newborn), plus adolescent health and development.

Based on the collected information, in 2018 there were approximately 219 CEmONC service sites (149 of which are in the private sector), 158 BEmONC service sites and 1,862 birthing centres. WHO recommends 5 BEmONC (including at least one CEmONC) per 500,000 population. With a population of approximately 28 million, Nepal should have around 57 CEmONC sites and 229 BEmONC sites. This has to be acknowledged as a fundamental structural challenge for the health facilities in Nepal.

In order to address this challenge, the following recommendations are made:

▶   No expansion of CEmONC sites – for the next 5 years, the focus should be on ensuring the functionality and quality of existing CEmONC service sites, and new CEmONC services could only be envisaged in remote areas of the hills and mountains

▶   Set up onsite midwifery led birthing units alongside high caseload CEmONC service sites – to avoid overcrowding and improve the quality of care

▶   Upgrading selected Birthing Centres to BEmONC services – if there is no CEmONC site that can be accessed within two hours

▶   Birthing centres should only be promoted in strategic locations - in remote areas and made capable to provide 24/7 midwifery services

▶   Strengthen referral mechanisms – investment in ambulances & free transport for referral for maternal and newborn complications

▶   Each Province and local government to develop a five-year EmONC development plan (Basic and Comprehensive EmONC services and referral pathways), using when possible geospatial modelling[14].

▶   Develop SBA training and upgrade nursing staff to registered midwives – especially those experienced staff working in hospital maternity wards

The Nepal health system recognises four levels of care:

1.   Community-based care, with community health workers authorised to distribute misoprostol tablets and chlorhexidine for pregnant women who are likely to give birth at home[15], as well as Family Planning education and methods;

2.   Health facility, some of them being Birthing Centres with management of labour, active management of the third stage of labour and provision of First Aid delivery care (before immediate referral), including parenteral anti-convulsant (MgSulf), anti-haemorrhage (Oxytocin), antibiotics and shock management;

3.   Basic Emergency Obstetric and Newborn Care (BEmONC);

4.   Comprehensive Emergency Obstetric and Newborn Care (CEmONC).

In doing this, Nepal effectively defines a "BEmONC minus" level of care, which is designed to be more

14   Neal S, Ruktanonchai CW, Chandra-Mouli V, *et al.* Using geospatial modeling to estimate the prevalence of adolescent first births in Nepal. *BMJ Glob Health* 2019;4:e000763. doi:10.1136/ bmjgh-2018-000763

15   Addressing the constraints/barriers remote population are facing is critical. The Aama programme is part of the solution as well as a functioning referral system (communication and transportation means). In this regard, maternity waiting homes could also be considered, to allow pregnant women to end their pregnancy close to a birthing centre or a BEmONC facility.

appropriate for remote areas. It will, of course, still be important to ensure that these facilities are appropriately staffed and also have access to competent, professional, skilled health personnel (SDG 3.1.2)[16], meaning a trained Nurse, a Midwife or a Doctor with obstetric skills.

The deployment challenges can only be solved through collaborative consultation and dialogue, involving Provincial and Local Governments, health system users and professionals, to develop a joint 5-year plan that outlines: which health posts or health facilities will become strategically located birthing centres; clear referral pathways between strategically located birthing centres and BEmONC and/or CEmONC sites and if needed, where BEmONC sites will be located.

Ideally, the EmONC health facility planning should be done before finalising the deployment plan for new professional midwives: the deployment of health professionals has logically to be based on the EmONC development plan.

Before deploying midwives, it will be important to conduct a national consultation and dialogue on midwifery in order to define the vision, the model and to organise the Midwifery planning. This could be the main objective of a national Midwifery Service Framework (MSF) meeting, as described here:

Midwifery service framework

The goal of the MSF is to lay a foundation of pragmatic steps and supporting tools that can be used by health care decision makers in all countries, whether high, middle or low income, to initiate, develop, strengthen, or monitor and evaluate their midwifery services. It can be used by all parties interested in improving SRMNH, be they health systems and health workforce developers and planners, policy makers, health care professional organisations and unions, educators and regulators, UN agencies, NGOs or CSOs. Countries that have midwives and those that do not (yet) can use the MSF to mainstream equity-based approaches to expand the availability, accessibility, acceptability and quality (AAAQ) of midwifery services and the essential interventions for SRMNH.

The specific objectives of the MSF are to:

- Provide detailed guidance on how to set up or develop midwifery services that fit a country's specific health system, health workforce, and population needs.

- Operationalise the common understanding of the fundamental role that midwifery services play in improving women's and children's health

- Build on the current commitment to reducing maternal, newborn and child mortality and morbidity with a practical approach to making access to midwives available to all families.

This report seeks to provide guidance for the planning and consultation process by:
1. Illustrating the education and training costs
2. Recommending principles to consider when deploying midwives
3. Identifying an appropriate skills-mix for each occupation group at each level of care, based on need.

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16   Definition of skilled health personnel providing care during childbirth: the 2018 joint statement by WHO, UNFPA, UNICEF, ICM, ICN, FIGO and IPA

5.1. Education and Training Costs

As the analysis in Section 4 illustrates, there is an urgent need for significantly greater numbers of SRMNAH workers in Nepal, and especially for midwives. The MoHP has recognised this need and sanctioned three midwifery courses already.

This section of the report examines two alternative options for educating midwives in Nepal: the three-year PCL Midwifery course and a 12 month bridging course.

5.1.1 PCL midwifery course

The Proficiency Certificate Level (PCL) Midwifery course lasts for three years and it is anticipated that 70% of the students who will enrol on this course are currently employed as ANMs. Consequently, it will be necessary to continue to pay their salary while they study, and also to pay another ANM to fill their place. The remaining 30% of students on the PCL course are expected to be new students and, as such, they will be expected to fund themselves through the three-year course. With these assumptions, the anticipated annual cost to the Government of training a full class of 30 PCL midwifery students can be estimated as follows:

Table 8. Cost estimation for PCL Midwifery Course

Course running costs:

		Per student NPR	Per class of 30 NPR
Teaching materials		15,000	450,000
Admission fee	*Assume equivalent to PCL Nursing, CTEVT*	158,333	4,750,000
Exposure visit / clinical placement fee		15,000	450,000
Administration / operational cost			600,000
Total			**6,250,000**

Staff costs:

		Individual cost NPR	Personnel	Per class of 30 NPR
Faculty member / trainer	*Salary + allowances*	650,928.40	8	5,207,427
Administrative personnel – Officer level	*Salary + allowances*	536,448	2	1,072,896
Administrative personnel – assistant level	*Salary + allowances*	361,106	3	1,083,319
Total				**7,363,642**

Payments to students who are ANMs and temporary staff to fill in as replacements:

		Individual cost NPR	Personnel	Per class of 30 NPR
Current ANMs (70% of class)	*Salary + allowances*	405,211.60	21	8,509,444
New students (30% of class)	*Salary + allowances*	0	9	0
Temporary replacement ANMs	*Salary & festive allowance only*	288,210.00	21	6,052,410
Total				**14,561,854**

So, the total annual cost of running a single class of 30 PCL Midwifery students is **NPR 28,175,496**

Assuming there is no inflation, the estimated cost of the full three years of the course will be **NPR 84,526,488**. At current exchange rates, this equates to USD$750,000.

After three years, assuming all students graduate, each new midwife will have cost **NPR 2,817,550** to educate.

The MoHP is currently planning to increase the number of Colleges who offer the PCL Midwifery course and to increase the number of classes at each College. If the number of courses can be increased to 30 per year, this would bring 900 graduates per year and the current need for 16,000 new midwives would be met in 18 years. (By which time the level of need will be different to the present day, due to demographic changes.)

5.1.2 Bridging course

An additional method for producing midwives may be to re-train existing Staff Nurses to give them the specific midwifery competencies required for a specialist midwife. Such a bridging course would take twelve months for a Staff Nurse and the estimated costs to the Government for a class of 20 are as follows:

Table 9. **Cost estimation for Midwifery Bridging Course**

Course running costs:

		Per student NPR	Per class of 20 NPR
Teaching materials		15,000	300,000
Admission fee	Assume no cost as run within the MoHP		
Exposure visit / clinical placement fee		15,000	300,000
Administration / operational cost			600,000
Total			**1,200,000**

Staff costs:

		Individual cost NPR	Personnel	Per class of 20 NPR
Faculty member / trainer	*Salary + allowances*	650,928.40	5	3,254,642
Administrative personnel – Officer level	*Salary + allowances*	536,448	1	536,448
Administrative personnel – assistant level	*Salary + allowances*	361,106	3	1,083,319
Total				**4,874,409**

Payments to students who are Staff Nurses and temporary staff to fill in as replacements

		Individual cost NPR	Personnel	Per class of 20 NPR
Staff Nurse students	*Salary + allowances*	405,211.60	20	8,104,232
Temporary replacement Staff Nurses	*Salary & festive allowance only*	305,500.00	20	6,110,000
Total				14,214,232

So, the total annual cost of running a single midwifery bridging course for 20 Staff Nurses is **NPR 20,288,641** and each new midwife will have cost **NPR 1,014,432.** This is just 36% of the cost of educating a midwife on the three-year PCL course.

In Nepal, there are currently 1,545 Staff Nurses working in public sector, although they spend only a third of their time working on SRMNAH interventions, on average. If 10 one-year bridging courses were established, all these Staff Nurses could be fully trained in SRMNAH midwifery competencies within 8 years.

Of course, our analysis of the health workforce required to meet the need for SRMNAH services indicates that more nurses are required, in addition to the newly trained midwives. This means that education of new nurses will need to continue alongside the midwifery PCL courses and the bridging courses. This will bring a general upskilling of health workers and expected consequent improvements in maternity care, as demonstrated in the Global report on the State of the World's Midwifery in 2015[17].

5.2. Principles for deploying midwives

The deployment plan for midwives must be incremental and include transitional measures, recognising the challenge to provide access to skilled health personnel for every pregnant woman and newborn, especially in remote and underserved settings.

The deployment of newly qualified midwives in a country with no previous experience of midwifery requires a clear vision. It is important to communicate exactly what midwifery means in terms of philosophy and competencies. Midwifery must be defined as an independent and regulated profession, with a nominated regulatory body which has the associated rights and responsibilities. Their precise scope of work must be detailed and communicated, so that the new midwives can join the existing health workforce team seamlessly and efficiently. This is necessary to ensure that they will be respected and supported and allowed to play their full role. A monitoring and evaluation system (data collection, analysis, MPDSR) and quality improvement mechanism (supportive supervision, mentoring) should be established and implemented to allow the profession to grow and develop.

No BEmONC service can exist without midwives or trained ANMs, as midwifery is precisely defined to deliver quality essential basic MNH care (7 EmONC basic signal functions). However, midwifery is also key at the CEmONC referral level, where normality, pregnancy and birth physiology should be respected to avoid unnecessary interventions.

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17   UNFPA, WHO, ICM. The state of the world's midwifery 2014: A universal pathway. A woman's right to health. New York: United Nations Population Fund; 2014.

As far as possible, experienced midwives should be part of the deployment at BEmONC level, not only newly qualified midwives. The responsibilities midwives will have to face at this level can be important, especially managing initial severe pre-eclampsia/eclampsia and haemorrhage treatments, performing vacuum extraction and neonatal resuscitation, as well as deciding on and organising timely referral to a CEmONC level facility when needed.

The overload at CEmONC facilities impacts on the quality of the care provided, but this can be addressed through different strategies, including:

▶ improving the quality of care delivered at rural/semi-urban BEmONC level facilities, which are as close as possible to their communities and efficiently linked with CEmONC referral facilities through good communication and free of charge transportation (Aama programme)

▶ developing quality urban BEmONC services, ideally midwife-led maternities, close to CEmONC hospitals, where all uncomplicated labour/childbirth should take place

On the other hand, WHO recommends a level of 175 deliveries per midwife, per year, in order to maintain their competencies and to be cost effective. This norm has to be approached, knowing that it could be difficult in places where the population is remote and disseminated, but where midwives and ANMs are necessary. Here, the recommendation is to have short-term rotations of health personnel, which allow staff working in remote health facilities to spend time in busier facilities where they can keep up to date with training and practice.

Evidence is growing which shows that "women who received midwife-led continuity models of care were less likely to experience intervention and more likely to be satisfied with their care with at least comparable adverse outcomes for women or their infants than women who received other models of care."[18] This will help to ensure easy referrals and will also improve women and families' confidence which will, in turn, help to increase the use of basic services for uncomplicated pregnancies.

CEmONC implies an efficient and quality emergency triage service to ensure all emergencies are managed in a timely manner. The relationship between basic and comprehensive EmONC services, between midwives, medical officers, MDGPs and Ob/Gyns, is important: it must be based on confidence and respect. This enables efficient communication with reference and counter-reference tools. Teamwork is critical, as MPDSRs show a high frequency of errors and delays are related to poor organisation of care and disruption of the continuum of care.

It is critical that midwifery is taught by midwives and the government is planning to open new education institutions. A number of midwifery professor positions (perhaps as many as 50 at Masters level) could be created, to offer midwives the opportunity to choose to educate others, rather than to practice themselves. In addition, midwives positioned at training hospitals or BEmONC services level should be trained as mentors, although this will reduce their ability to provide clinical care.

Supervision of all maternity services and the mentoring of midwives and nurses represent critical activities necessary to maintain and improve the quality of SRMNAH care. Experienced midwives and trained nurses should be able to become supervisors and mentors. MPDSR is part of this supervisory activity.

18   Sandall J, Soltani H, Gates S, Shennan A, Devane D.Midwife-led continuity models versus other models of care for childbearing women.Cochrane Database of Systematic Reviews 2016, Issue 4. Art. No.: CD004667.DOI: 10.1002/14651858.CD004667.pub5. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004667.pub5/epdf/full

5.3. Skill mix

BEmONC facilities should be situated where women would otherwise have to travel more than two hours to reach a facility to obtain care and support during pregnancy and in particular during childbirth. When access to facilities is challenging due to geographical and transportation related difficulties, birthing centres can contribute to assist the pregnant women and to facilitate their transfer to BEmONC or CEmONC if needed. The WHO population norms suggest that Nepal should have at least 57 CEmONC facilities and 229 BEmONC sites, although the challenging topography may justify more than this. In addition, the need for strategically located midwife-led Birthing Centres, firstly alongside overcrowded maternity units at CEmONC facilities (defined as more than 300 deliveries per month) and secondly in especially remote, mountainous areas appears to be critical.

The development and upgrading of midwife-led Birthing Centres and the expansion of BEmONC facilities will require significant extra SRMNAH workers. While these are being produced, the current workforce will be overstretched, and this will bring significant deployment challenges. It is, therefore, essential that staffing levels are established based on the estimated volume of need for current and future care. The District Briefs in Section 6 of this report provide a detailed estimate of the need for SRMNAH services across the continuum of care in each district within Bagamati Province. This need has been converted to a required number of health workers in each occupation group.

It is important to remember that the ANMs referred to in the District Briefs are as currently qualified. If many are retrained to become midwives, this will complement the direct-entry midwifery training and certainly help to accelerate progress. However, the District Briefs also indicate that there will be a continuing role for ANMs to provide support alongside professional midwives.

The specific staffing levels at each facility should keep in mind the fact that a team of staff will be required to operate a full 24/7 service, allowing for holidays, sickness cover and non-clinical activities. The modelling analysis in this report uses the following assumptions:

Assumptions:

Working days in a week	6
Average working hours per day	6.5
Working weeks per year	52
Average days holiday per year	30
Average days sick per year	12
Average working time available for clinical work (hill)	65%
Average hours available per year per person	1,140 hours
24/7 operating hours in a full year (24*365)	8,760 hours
Number of staff required to operate 24/7	8

We understand that the norm in Nepal is for staff to work for six days per week, although the working day is relatively short, partly to minimise travelling at night. 6 days per week and 6.5 hours per day equates to 39 hours per week. In other parts of the world, the typical pattern is 5 days per week for 8 hours per day, which is a total of 40 hours per week. This does not represent a major difference; however, it should be noted that the number of staff required to operate a full 24/7 shift pattern is quite sensitive to these assumptions. So, for example, if the average day was increased to 8 hours, this would equate to 48 hours per week and the number of staff required to operate 24/7 would reduce from 8 to 6.

6. Bagamati Province and District Briefs

6.1 Nepal	Terrain	*Various*	Tertiary Hospitals	*3*
	Population	*28,291,745*	Secondary Hospitals	*112*
	Pregnancies (est.)	*928,246 per year*	Primary Healthcare Centres	*200*
	Live births (est.)	*631,460 per year*	Health Posts	*3,808*
2018			Birthing centres	*1,881*

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	12,302.7	-	4,059.6	-	422.4
ANM	6,861	7,029.4	1,270	676.3	185	19.8
Staff Nurse	105	135.2	1,070	3,779.0	370	796.1
Nursing Officer	-	-	106	361.5	9	-
Medical Officer	85	12,794.2	535	10,090.5	66	254.4
MDGP	-	-	29	2,959.4	-	-
Ob/Gyn	-	-	27	-	24	251.1
Paediatrician	-	-	17	107.6	33	12.0
Anaesthesiologist	-	-	21	-	8	37.8
Anaesthetic Assistant	-	-	28	340.1	-	-
Total SRMNAH health workers	7,051	32,262	3,102	22,374	696	1,794

Dedicated SRMNAH Equivalent (DSE)

	% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	100%	-	12,302.7	-	4,059.6	-	422.4
ANM	100%	6,860.7	7,029.4	1,269.9	676.3	185.4	19.8
Staff Nurse	33%	34.6	44.6	353.1	1,247.1	122.2	262.7
Nursing Officer	100%	-	-	105.6	361.5	9.4	-
Medical Officer	10%	8.5	1,279.4	53.5	1,009.1	6.6	25.4
MDGP	50%	-	-	14.5	1,479.7	-	-
Ob/Gyn	100%	-	-	27.5	-	23.5	251.1
Paediatrician	100%	-	-	16.7	107.6	33.3	12.0
Anaesthesiologist	30%	-	-	6.3	-	2.4	11.3
Anaesthetic Assistant	30%	-	-	8.4	102.0	-	-
		6,904	20,656	1,855	9,043	383	1,005

Breakdown of NEED by stage on the continuum of care

- 4,727,683 , 14%
- 3,165,456 , 9%
- 14,264,415 , 41%
- 5,426,236 , 15%
- 5,419,654 , 15%
- 2,021,809 , 6%

- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need = 35,025,254 hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives
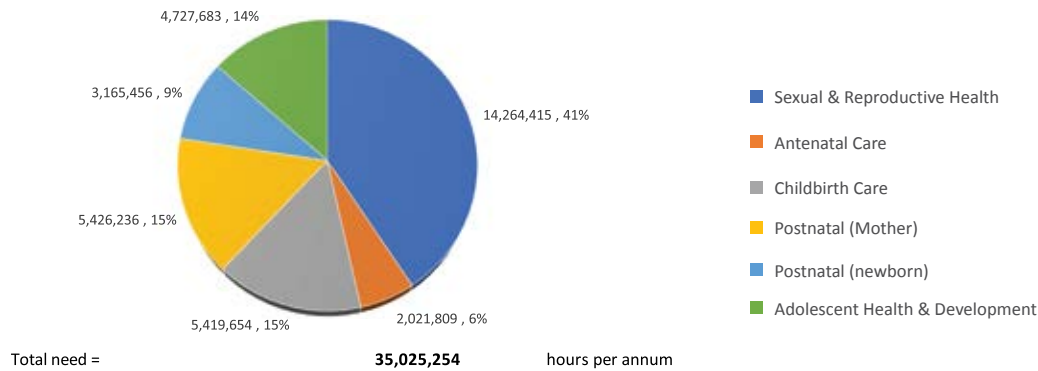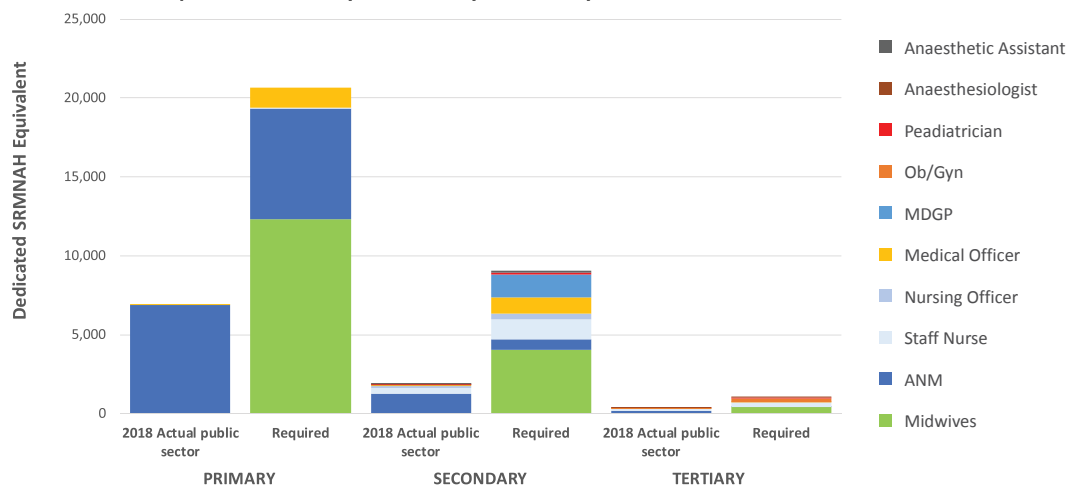
6.2 Bagamati Province	Terrain:	*Various*	Tertiary Hospitals:	*3*
	Population:	*6,204,686*	Secondary Hospitals:	*18*
	Pregnancies (est.):	*205,017 per year*	Primary Healthcare Centres:	*43*
	Live births (est.):	*139,467 per year*	Health Posts:	*643*
2018			Birthing centres:	*309*

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	2,671.7	-	886.1	-	92.0
ANM	1,221	1,524.4	226	145.0	33	4.4
Staff Nurse	41	27.4	419	827.2	145	171.6
Nursing Officer	-	-	56	73.3	5	-
Medical Officer	40	2,707.6	251	2,210.4	31	54.9
MDGP	-	-	13	642.8	-	-
Ob/Gyn	-	-	14	-	12	54.8
Paediatrician	-	-	11	23.4	22	2.6
Anaesthesiologist	-	-	13	-	5	8.3
Anaesthetic Assistant	-	-	4	75.1	-	-
Total SRMNAH health workers	1,302	6,931	1,007	4,883	253	389

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	2,671.7	-	886.1	-	92.0
100%	1,221.0	1,524.4	226.0	145.0	33.0	4.4
33%	13.5	9.1	138.3	273.0	47.9	56.6
100%	-	-	56.0	73.3	5.0	-
10%	4.0	270.8	25.1	221.0	3.1	5.5
50%	-	-	6.5	321.4	-	-
100%	-	-	14.0	-	12.0	54.8
100%	-	-	11.0	23.4	22.0	2.6
30%	-	-	3.9	-	1.5	2.5
30%	-	-	1.2	22.5	-	-
	1,239	4,476	482	1,966	124	218

Breakdown of NEED by stage on the continuum of care

- 956,473 , 12%
- 699,138 , 9%
- 1,198,465 , 16%
- 1,197,011 , 16%
- 446,683 , 6%
- 3,099,675 , 41%

Legend:
- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need =   7,597,446   hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend:
- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives
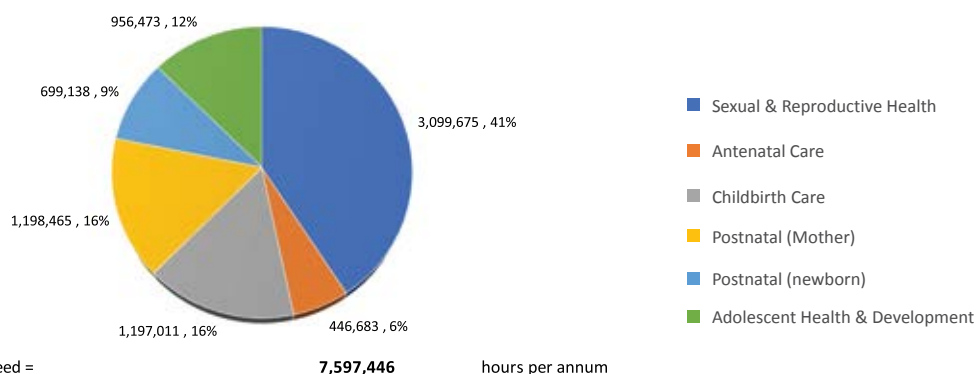
PRIMARY | SECONDARY | TERTIARY
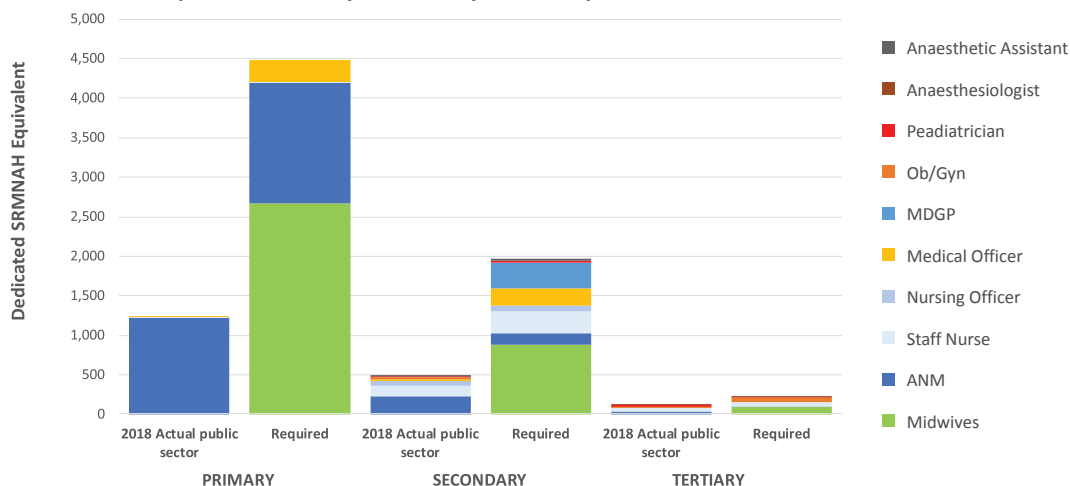
6.3 Bhaktapur	Terrain	Hill	Tertiary Hospitals	-
	Population	346,042	Secondary Hospitals	2
	Pregnancies (est.)	12,035 per year	Primary Healthcare Centres	2
2018	Live births (est.)	8,187 per year	Health Posts	29
			Birthing centres	-

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	152.6	-	51.0	-	5.3
ANM	47	86.6	18	8.1	-	0.3
Staff Nurse	2	1.4	22	47.7	-	9.6
Nursing Officer	-	-	2	3.7	-	-
Medical Officer	2	151.1	7	127.1	-	3.2
MDGP	-	-	-	36.7	-	-
Ob/Gyn	-	-	1	-	-	3.1
Paediatrician	-	-	1	1.3	-	0.1
Anaesthesiologist	-	-	1	-	-	0.5
Anaesthetic Assistant	-	-	-	4.4	-	-
Total SRMNAH health workers	51	392	52	280	-	22

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	152.6	-	51.0	-	5.3
100%	47.0	86.6	18.0	8.1	-	0.3
33%	0.7	0.5	7.3	15.7	-	3.2
100%	-	-	2.0	3.7	-	-
10%	0.2	15.1	0.7	12.7	-	0.3
50%	-	-	-	18.4	-	-
100%	-	-	1.0	-	-	3.1
100%	-	-	1.0	1.3	-	0.1
30%	-	-	0.3	-	-	0.1
30%	-	-	-	1.3	-	-
	48	255	30	112	-	12

Breakdown of NEED by stage on the continuum of care

- 176,703 , 41%
- 26,231 , 6%
- 70,266 , 16%
- 70,351 , 16%
- 41,040 , 10%
- 48,362 , 11%

Legend:
- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need = **432,955** hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend:
- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives
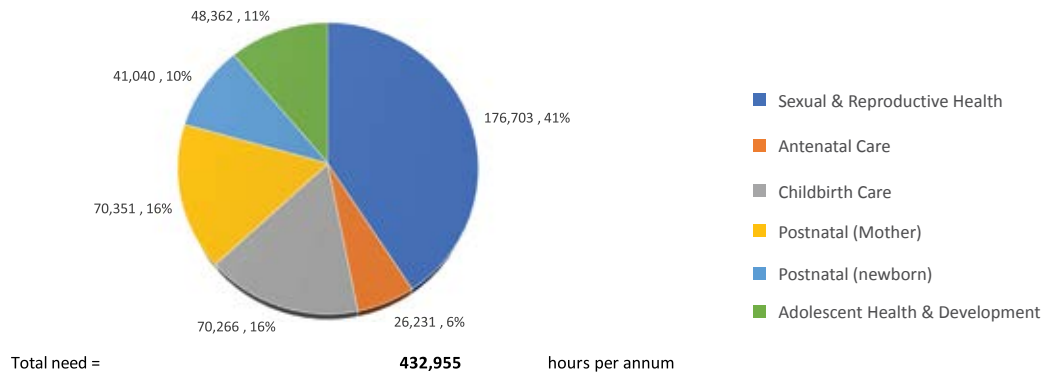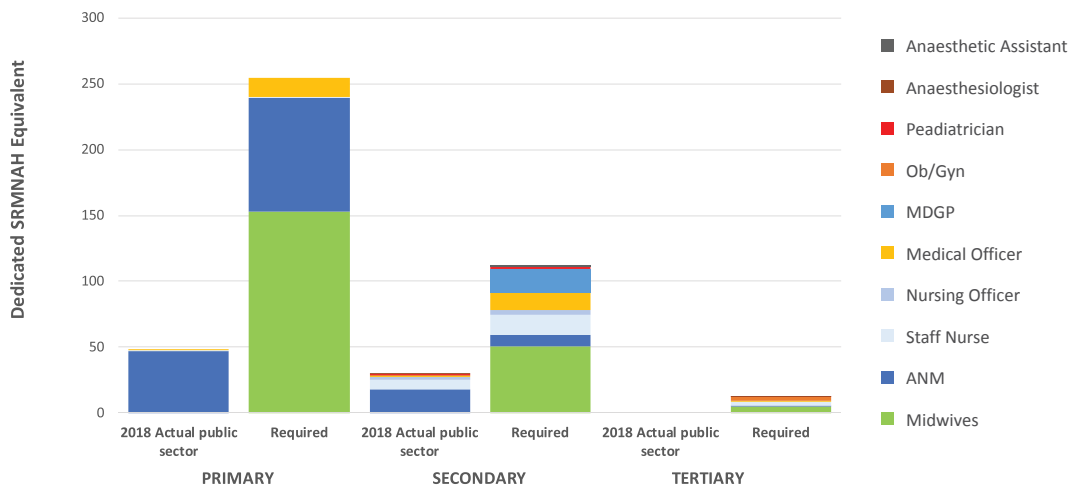
6.4 Chitwan	Terrain	*Plain*	Tertiary Hospitals	*1*
	Population	*648,835*	Secondary Hospitals	*2*
	Pregnancies (est.)	*22,351 per year*	Primary Healthcare Centres	*3*
2018	Live births (est.)	*15,205 per year*	Health Posts	*36*
			Birthing centres	*–*

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	235.8	-	121.3	-	12.4
ANM	81	135.1	10	18.5	14	0.4
Staff Nurse	4	2.8	15	131.4	44	25.3
Nursing Officer	-	-	1	7.4	2	-
Medical Officer	4	243.5	5	251.9	8	8.7
MDGP	-	-	-	65.0	-	-
Ob/Gyn	-	-	4	-	-	5.5
Paediatrician	-	-	5	2.4	-	0.3
Anaesthesiologist	-	-	-	-	1	0.8
Anaesthetic Assistant	-	-	1	7.6	-	-
Total SRMNAH health workers	89	617	41	605	69	53

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	235.8	-	121.3	-	12.4
100%	81.0	135.1	10.0	18.5	14.0	0.4
33%	1.3	0.9	5.0	43.4	14.5	8.3
100%	-	-	1.0	7.4	2.0	-
10%	0.4	24.4	0.5	25.2	0.8	0.9
50%	-	-	-	32.5	-	-
100%	-	-	4.0	-	-	5.5
100%	-	-	5.0	2.4	-	0.3
30%	-	-	-	-	0.3	0.3
30%	-	-	0.3	2.3	-	-
	83	396	26	253	32	28

Breakdown of NEED by stage on the continuum of care

- 342,341 , 41% — Sexual & Reproductive Health
- 48,713 , 6% — Antenatal Care
- 130,499 , 16% — Childbirth Care
- 130,657 , 16% — Postnatal (Mother)
- 76,220 , 9% — Postnatal (newborn)
- 103,582 , 12% — Adolescent Health & Development

Total need = **832,012** hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level
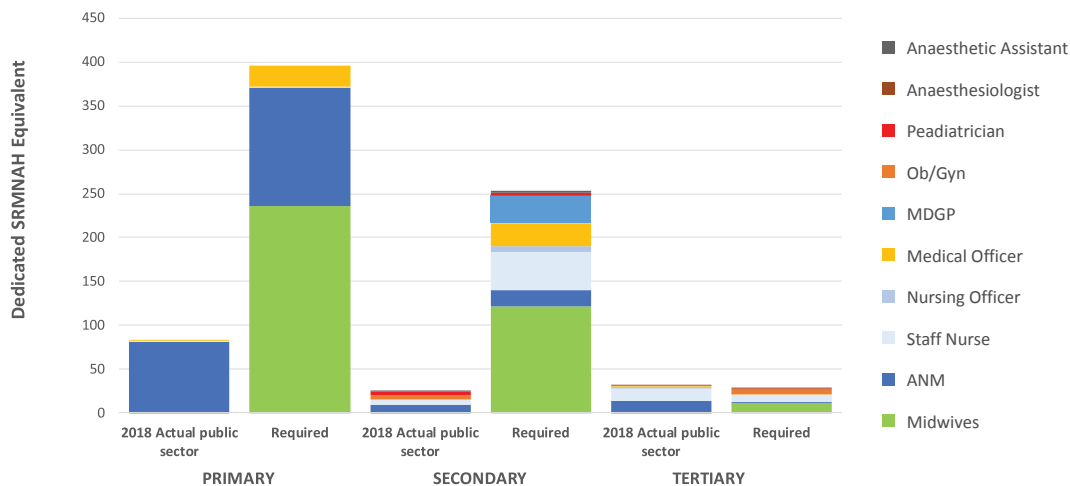
6.5 Dhading 2018	Terrain	Hill	Tertiary Hospitals	-
	Population	370,748	Secondary Hospitals	1
	Pregnancies (est.)	11,555 per year	Primary Healthcare Centres	2
	Live births (est.)	7,860 per year	Health Posts	49
			Birthing centres	67

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	157.4	-	51.5	-	5.4
ANM	79	89.7	13	8.6	-	0.2
Staff Nurse	2	1.8	4	48.0	-	10.2
Nursing Officer	-	-	1	4.8	-	-
Medical Officer	1	164.0	2	131.0	-	3.1
MDGP	-	-	-	37.4	-	-
Ob/Gyn	-	-	-	-	-	3.2
Paediatrician	-	-	-	1.4	-	0.2
Anaesthesiologist	-	-	-	-	-	0.5
Anaesthetic Assistant	-	-	1	4.2	-	-
Total SRMNAH health workers	82	413	21	287	-	23

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	157.4	-	51.5	-	5.4
100%	79.0	89.7	13.0	8.6	-	0.2
33%	0.7	0.6	1.3	15.8	-	3.4
100%	-	-	1.0	4.8	-	-
10%	0.1	16.4	0.2	13.1	-	0.3
50%	-	-	-	18.7	-	-
100%	-	-	-	-	-	3.2
100%	-	-	-	1.4	-	0.2
30%	-	-	-	-	-	0.1
30%	-	-	0.3	1.3	-	-
	80	264	16	115	-	13

Breakdown of NEED by stage on the continuum of care

- 184,663 , 41% — Sexual & Reproductive Health
- 25,165 , 6% — Antenatal Care
- 67,464 , 15% — Childbirth Care
- 67,546 , 15% — Postnatal (Mother)
- 39,404 , 9% — Postnatal (newborn)
- 63,121 , 14% — Adolescent Health & Development

Total need = **447,362** hours per annum
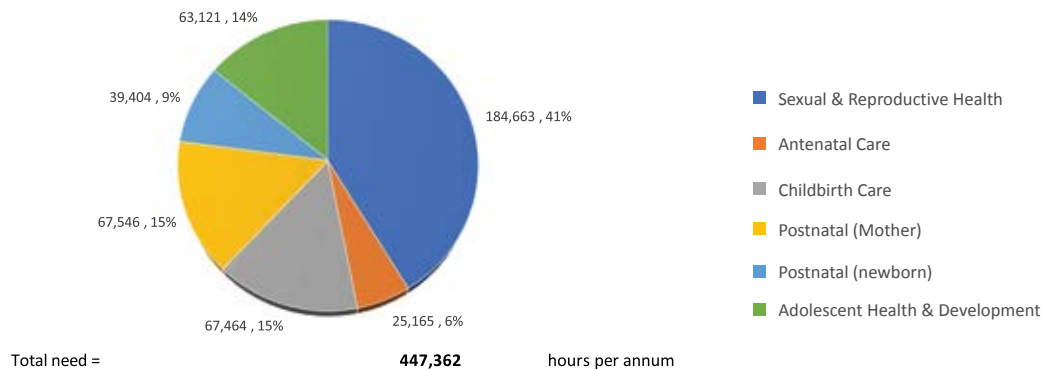
DSE, Actual & Required at Primary, Secondary & Tertiary level

6.6 Dolakha 2018	Terrain	Hill	Tertiary Hospitals	-
	Population	370,748	Secondary Hospitals	1
	Pregnancies (est.)	11,555 per year	Primary Healthcare Centres	2
	Live births (est.)	7,860 per year	Health Posts	52
			Birthing centres	-

Headcount - Public Sector only

	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
Midwives	-	106.9	-	20.4	-	2.2
ANM	100	60.7	7	3.7	-	0.1
Staff Nurse	2	1.1	4	14.0	-	3.6
Nursing Officer	-	-	-	2.9	-	-
Medical Officer	3	105.9	3	73.4	-	1.1
MDGP	-	-	-	22.1	-	-
Ob/Gyn	-	-	-	-	-	1.9
Paediatrician	-	-	-	0.8	-	0.1
Anaesthesiologist	-	-	-	-	-	0.3
Anaesthetic Assistant	-	-	1	2.5	-	-
Total SRMNAH health workers	105	275	15	140	-	9

Dedicated SRMNAH Equivalent (DSE)

	% clinical time on SRMNAH	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
Midwives	100%	-	106.9	-	20.4	-	2.2
ANM	100%	100.0	60.7	7.0	3.7	-	0.1
Staff Nurse	33%	0.7	0.4	1.3	4.6	-	1.2
Nursing Officer	100%	-	-	-	2.9	-	-
Medical Officer	10%	0.3	10.6	0.3	7.3	-	0.1
MDGP	50%	-	-	-	11.1	-	-
Ob/Gyn	100%	-	-	-	-	-	1.9
Paediatrician	100%	-	-	-	0.8	-	0.1
Anaesthesiologist	30%	-	-	-	-	-	0.1
Anaesthetic Assistant	30%	-	-	0.3	0.7	-	-
Total		101	179	9	52	-	6

Breakdown of NEED by stage on the continuum of care

- Sexual & Reproductive Health — 104,771 , 42%
- Antenatal Care — 13,639 , 5%
- Childbirth Care — 36,571 , 15%
- Postnatal (Mother) — 36,615 , 15%
- Postnatal (newborn) — 21,360 , 9%
- Adolescent Health & Development — 35,463 , 14%

Total need = 248,419 hours per annum
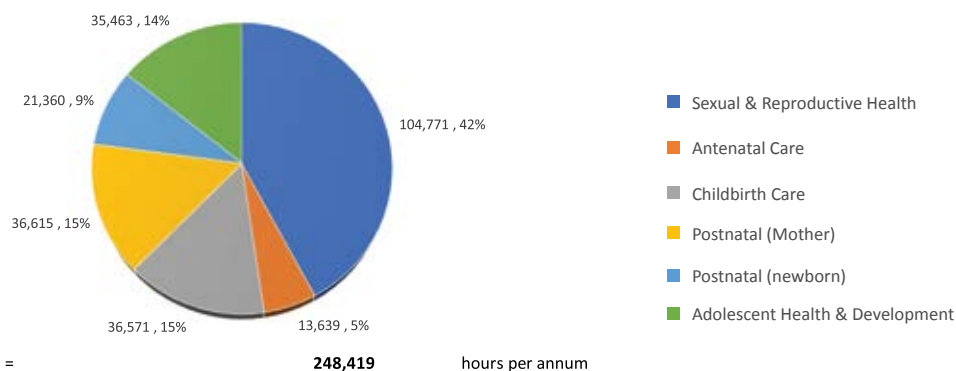
DSE, Actual & Required at Primary, Secondary & Tertiary level
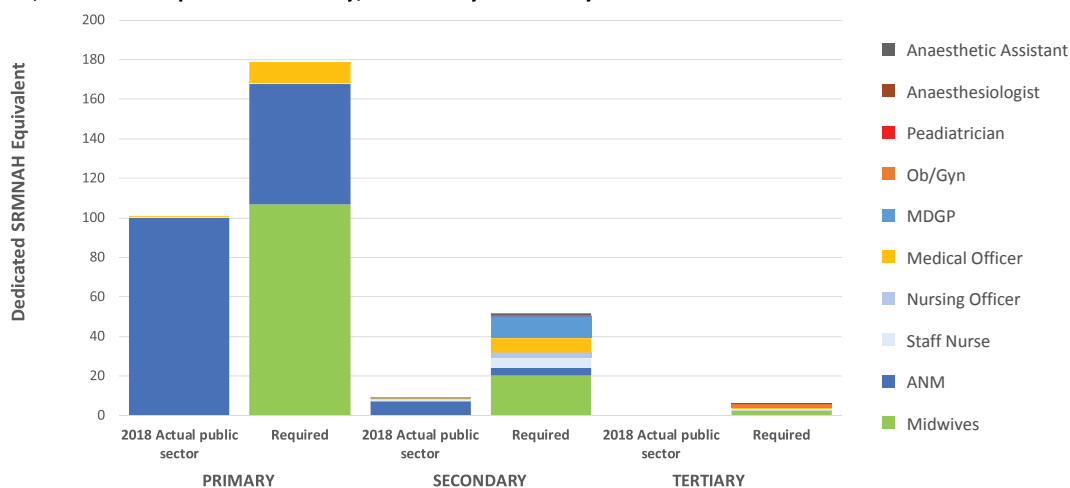
6.7 Kathmandu	Terrain	Hill	Tertiary Hospitals	2
	Population	1,992,209	Secondary Hospitals	3
	Pregnancies (est.)	69,181 per year	Primary Healthcare Centres	8
2018	Live births (est.)	47,062 per year	Health Posts	58
			Birthing centres	-

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	858.9	-	289.2	-	30.0
ANM	137	489.9	91	46.5	19	1.5
Staff Nurse	9	7.9	322	268.9	101	54.7
Nursing Officer	-	-	49	21.1	3	-
Medical Officer	5	852.5	208	711.9	23	18.5
MDGP	-	-	11	210.8	-	-
Ob/Gyn	-	-	7	-	12	17.8
Paediatrician	-	-	5	7.7	22	0.9
Anaesthesiologist	-	-	12	-	4	2.8
Anaesthetic Assistant	-	-	-	25.3	-	-
Total SRMNAH health workers	151	2,209	705	1,581	184	126

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	858.9	-	289.2	-	30.0
100%	137.0	489.9	91.0	46.5	19.0	1.5
33%	3.0	2.6	106.3	88.7	33.5	18.0
100%	-	-	49.0	21.1	3.0	-
10%	0.5	85.3	20.8	71.2	2.3	1.8
50%	-	-	5.5	105.4	-	-
100%	-	-	7.0	-	12.0	17.8
100%	-	-	5.0	7.7	22.0	0.9
30%	-	-	3.6	-	1.2	0.8
30%	-	-	-	7.6	-	-
	140	1,437	288	637	93	71

Breakdown of NEED by stage on the continuum of care

274,025 , 11%
235,918 , 10%
404,411 , 17%
403,920 , 16%
150,787 , 6%
977,719 , 40%

- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need = 2,446,780 hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives

PRIMARY · SECONDARY · TERTIARY

6.8 Kavrepalanchok	Terrain	Hill	Tertiary Hospitals	-
	Population	424,312	Secondary Hospitals	1
	Pregnancies (est.)	13,768 per year	Primary Healthcare Centres	4
2018	Live births (est.)	9,366 per year	Health Posts	91
			Birthing centres	-

Headcount - Public Sector only

	Primary		Secondary		Tertiary	
	2018 Actual public sector	Required	2018 Actual public sector	Required	2018 Actual public sector	Required
Midwives	-	186.0	-	61.0	-	6.3
ANM	173	106.7	10	10.1	-	0.3
Staff Nurse	7	2.1	2	57.5	-	12.1
Nursing Officer	-	-	-	5.5	-	-
Medical Officer	6	191.7	2	153.5	-	3.7
MDGP	-	-	-	44.1	-	-
Ob/Gyn	-	-	-	-	-	3.8
Paediatrician	-	-	-	1.6	-	0.2
Anaesthesiologist	-	-	-	-	-	0.6
Anaesthetic Assistant	-	-	-	5.0	-	-
Total SRMNAH health workers	186	486	14	338	-	27

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary		Secondary		Tertiary	
	2018 Actual public sector	Required	2018 Actual public sector	Required	2018 Actual public sector	Required
100%	-	186.0	-	61.0	-	6.3
100%	173.0	106.7	10.0	10.1	-	0.3
33%	2.3	0.7	0.7	19.0	-	4.0
100%	-	-	-	5.5	-	-
10%	0.6	19.2	0.2	15.4	-	0.4
50%	-	-	-	22.1	-	-
100%	-	-	-	-	-	3.8
100%	-	-	-	1.6	-	0.2
30%	-	-	-	-	-	0.2
30%	-	-	-	1.5	-	-
	176	313	11	136	-	15

Breakdown of NEED by stage on the continuum of care

- 219,544 , 41%
- 29,992 , 6%
- 80,383 , 15%
- 80,481 , 15%
- 46,949 , 9%
- 71,761 , 14%

- ■ Sexual & Reproductive Health
- ■ Antenatal Care
- ■ Childbirth Care
- ■ Postnatal (Mother)
- ■ Postnatal (newborn)
- ■ Adolescent Health & Development

Total need =   529,111   hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

- ■ Anaesthetic Assistant
- ■ Anaesthesiologist
- ■ Peadiatrician
- ■ Ob/Gyn
- ■ MDGP
- ■ Medical Officer
- ■ Nursing Officer
- ■ Staff Nurse
- ■ ANM
- ■ Midwives
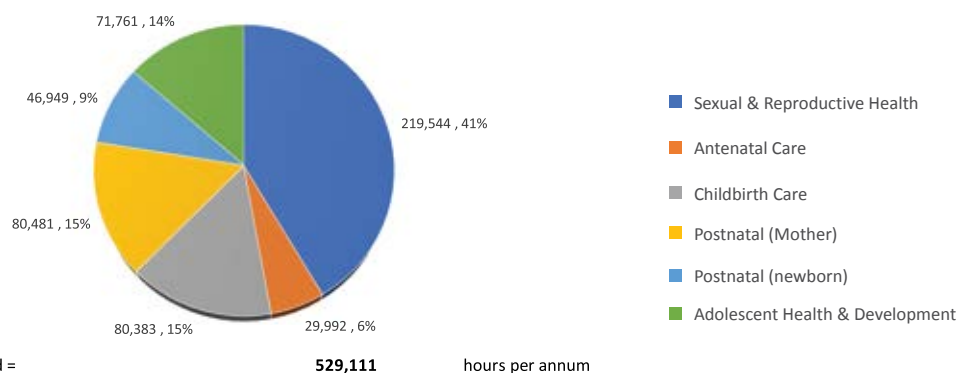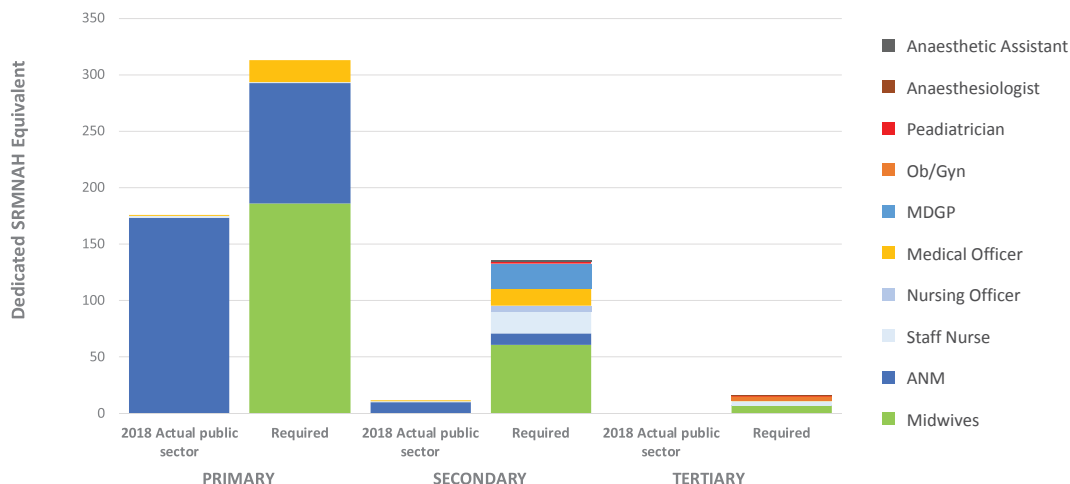
6.9 Lalitpur	Terrain	Hill	Tertiary Hospitals	-
	Population	532,539	Secondary Hospitals	2
	Pregnancies (est.)	18,406 per year	Primary Healthcare Centres	4
2018	Live births (est.)	12,521 per year	Health Posts	37
			Birthing centres	-

Headcount - Public Sector only

	Primary		Secondary		Tertiary	
	2018 Actual public sector	Required	2018 Actual public sector	Required	2018 Actual public sector	Required
Midwives	-	234.1	-	78.2	-	8.1
ANM	83	134.2	25	12.3	-	0.4
Staff Nurse	3	2.1	13	74.3	-	14.8
Nursing Officer	-	-	1	5.5	-	-
Medical Officer	2	231.3	12	195.8	-	4.9
MDGP	-	-	1	56.0	-	-
Ob/Gyn	-	-	-	-	-	4.8
Paediatrician	-	-	-	2.0	-	0.2
Anaesthesiologist	-	-	-	-	-	0.7
Anaesthetic Assistant	-	-	1	6.7	-	-
Total SRMNAH health workers	88	602	53	431	-	34

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary		Secondary		Tertiary	
	2018 Actual public sector	Required	2018 Actual public sector	Required	2018 Actual public sector	Required
100%	-	234.1	-	78.2	-	8.1
100%	83.0	134.2	25.0	12.3	-	0.4
33%	1.0	0.7	4.3	24.5	-	4.9
100%	-	-	1.0	5.5	-	-
10%	0.2	23.1	1.2	19.6	-	0.5
50%	-	-	0.5	28.0	-	-
100%	-	-	-	-	-	4.8
100%	-	-	-	2.0	-	0.2
30%	-	-	-	-	-	0.2
30%	-	-	0.3	2.0	-	-
	84	392	32	172	-	19

Breakdown of NEED by stage on the continuum of care

- Sexual & Reproductive Health — 275,696 , 41%
- Antenatal Care — 40,116 , 6%
- Childbirth Care — 107,465 , 16%
- Postnatal (Mother) — 107,595 , 16%
- Postnatal (newborn) — 62,767 , 10%
- Adolescent Health & Development — 72,025 , 11%

Total need =   665,663   hours per annum
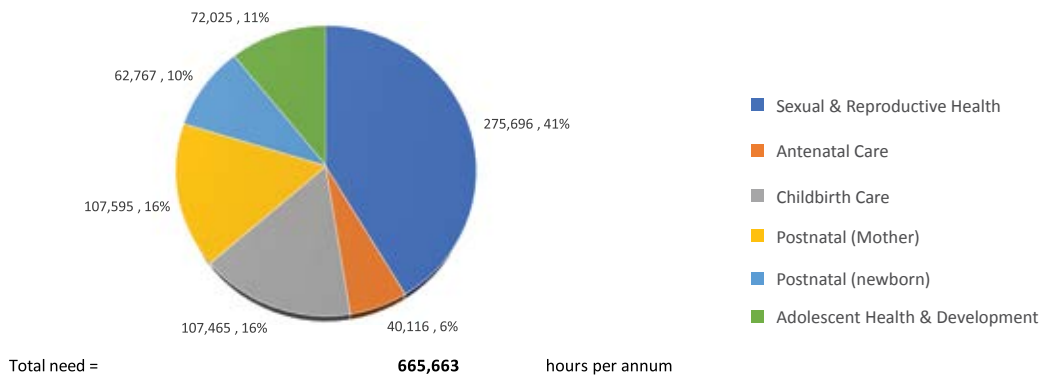
DSE, Actual & Required at Primary, Secondary & Tertiary level
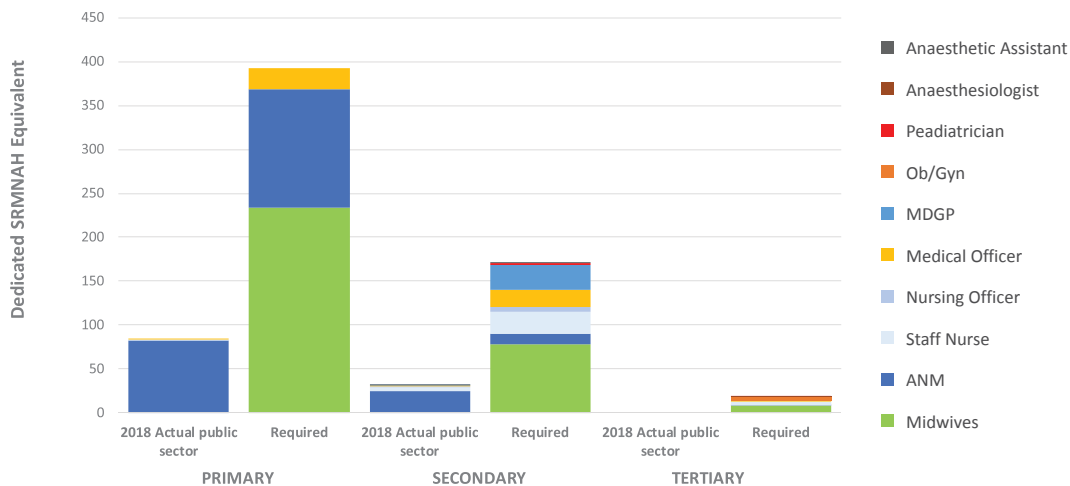
6.10 Makwanpur	Terrain	Hill	Tertiary Hospitals	-
	Population	465,199	Secondary Hospitals	1
	Pregnancies (est.)	14,475 per year	Primary Healthcare Centres	4
2018	Live births (est.)	9,847 per year	Health Posts	42
			Birthing centres	41

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	192.9	-	63.5	-	6.6
ANM	74	110.7	15	10.7	-	0.3
Staff Nurse	4	2.2	10	59.2	-	12.6
Nursing Officer	-	-	1	5.9	-	-
Medical Officer	5	198.8	1	156.7	-	3.9
MDGP	-	-	-	46.6	-	-
Ob/Gyn	-	-	1	-	-	3.9
Paediatrician	-	-	-	1.7	-	0.2
Anaesthesiologist	-	-	-	-	-	0.6
Anaesthetic Assistant	-	-	-	5.3	-	-
Total SRMNAH health workers	83	505	28	350	-	28

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	192.9	-	63.5	-	6.6
100%	74.0	110.7	15.0	10.7	-	0.3
33%	1.3	0.7	3.3	19.5	-	4.2
100%	-	-	1.0	5.9	-	-
10%	0.5	19.9	0.1	15.7	-	0.4
50%	-	-	-	23.3	-	-
100%	-	-	1.0	-	-	3.9
100%	-	-	-	1.7	-	0.2
30%	-	-	-	-	-	0.2
30%	-	-	-	1.6	-	-
	76	324	20	142	-	16

Breakdown of NEED by stage on the continuum of care

- 222,460 , 41% — Sexual & Reproductive Health
- 31,524 , 6% — Antenatal Care
- 84,514 , 15% — Childbirth Care
- 84,617 , 15% — Postnatal (Mother)
- 49,362 , 9% — Postnatal (newborn)
- 77,218 , 14% — Adolescent Health & Development

Total need =   549,695   hours per annum
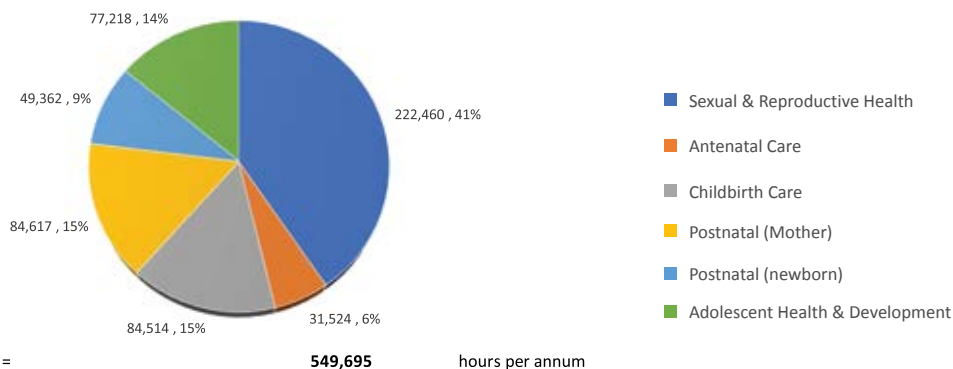
DSE, Actual & Required at Primary, Secondary & Tertiary level
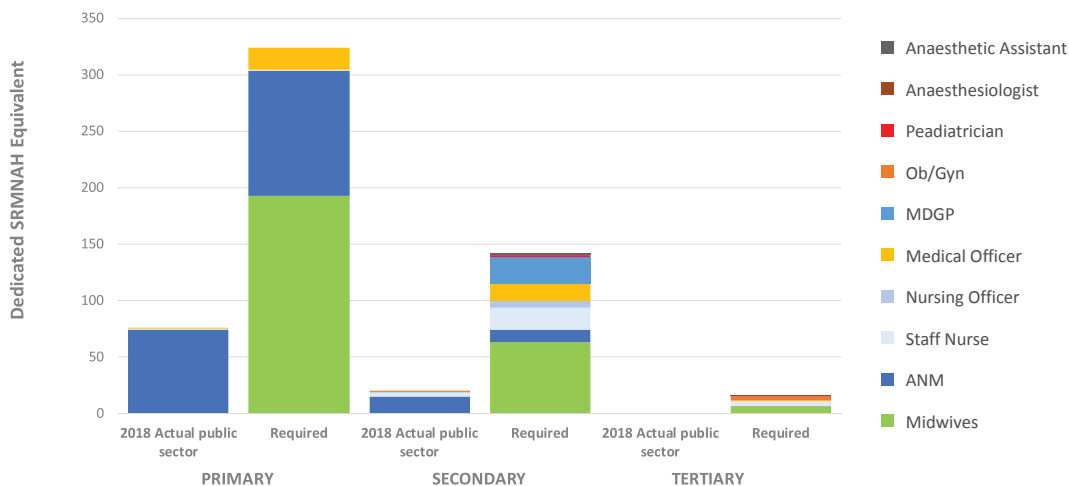
6.11 Nuwakot 2018	Terrain	Hill	Tertiary Hospitals	-
	Population	307,371	Secondary Hospitals	1
	Pregnancies (est.)	9,580 per year	Primary Healthcare Centres	3
	Live births (est.)	6,517 per year	Health Posts	64
			Birthing centres	28

Headcount - Public Sector only

	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
Midwives	-	131.0	-	42.8	-	4.5
ANM	106	74.4	11	7.2	-	0.2
Staff Nurse	1	1.5	9	39.8	-	8.5
Nursing Officer	-	-	-	4.0	-	-
Medical Officer	3	136.1	1	108.9	-	2.6
MDGP	-	-	-	31.0	-	-
Ob/Gyn	-	-	-	-	-	2.7
Paediatrician	-	-	-	1.1	-	0.1
Anaesthesiologist	-	-	-	-	-	0.4
Anaesthetic Assistant	-	-	-	3.5	-	-
Total SRMNAH health workers	110	343	21	238	-	19

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
100%	-	131.0	-	42.8	-	4.5
100%	106.0	74.4	11.0	7.2	-	0.2
33%	0.3	0.5	3.0	13.1	-	2.8
100%	-	-	-	4.0	-	-
10%	0.3	13.6	0.1	10.9	-	0.3
50%	-	-	-	15.5	-	-
100%	-	-	-	-	-	2.7
100%	-	-	-	1.1	-	0.1
30%	-	-	-	-	-	0.1
30%	-	-	-	1.1	-	-
	107	220	14	96	-	11

Breakdown of NEED by stage on the continuum of care

- 52,064 , 14%
- 32,669 , 9%
- 154,118 , 41%
- 56,002 , 15%
- 55,934 , 15%
- 20,864 , 6%

Legend:
- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need = 371,651 hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend:
- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives
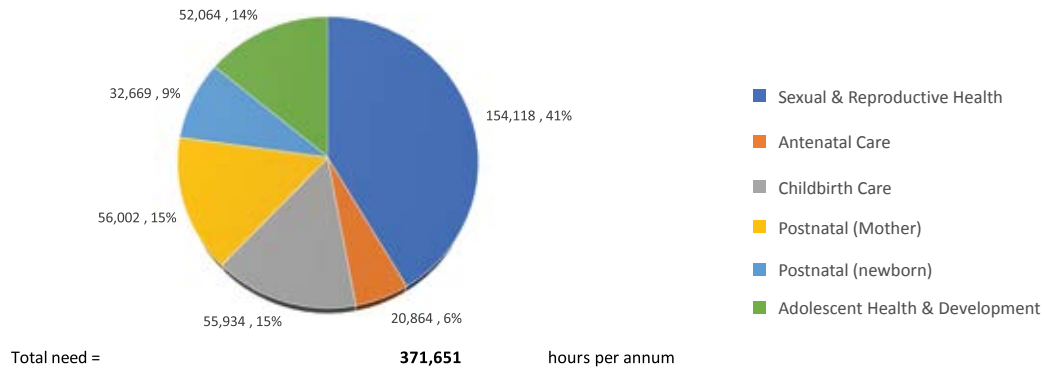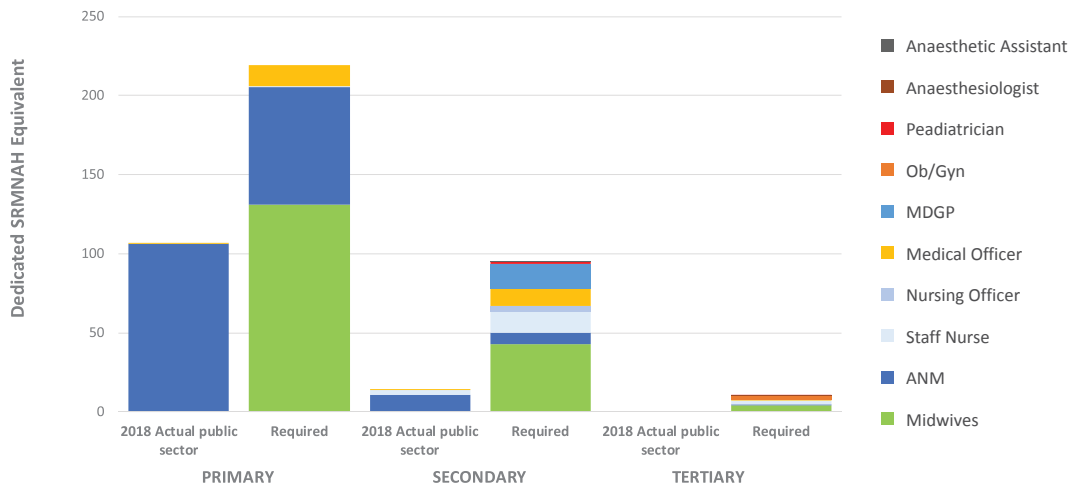
6.12 Ramechhap	Terrain	Hill	Tertiary Hospitals	-
	Population	222,602	Secondary Hospitals	1
	Pregnancies (est.)	6,815 per year	Primary Healthcare Centres	3
2018	Live births (est.)	4,636 per year	Health Posts	52
			Birthing centres	29

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	95.9	-	31.1	-	3.2
ANM	95	54.1	3	5.3	-	0.1
Staff Nurse	3	1.2	2	28.7	-	6.2
Nursing Officer	-	-	-	3.1	-	-
Medical Officer	3	101.1	1	79.9	-	1.8
MDGP	-	-	-	22.5	-	-
Ob/Gyn	-	-	-	-	-	2.0
Paediatrician	-	-	-	0.8	-	0.1
Anaesthesiologist	-	-	-	-	-	0.3
Anaesthetic Assistant	-	-	-	2.5	-	-
Total SRMNAH health workers	101	252	6	174	-	14

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	95.9	-	31.1	-	3.2
100%	95.0	54.1	3.0	5.3	-	0.1
33%	1.0	0.4	0.7	9.5	-	2.0
100%	-	-	-	3.1	-	-
10%	0.3	10.1	0.1	8.0	-	0.2
50%	-	-	-	11.2	-	-
100%	-	-	-	-	-	2.0
100%	-	-	-	0.8	-	0.1
30%	-	-	-	-	-	0.1
30%	-	-	-	0.7	-	-
	96	161	4	70	-	8

Breakdown of NEED by stage on the continuum of care

- 113,164 , 42%
- 14,840 , 5%
- 39,789 , 15%
- 39,838 , 15%
- 23,240 , 8%
- 40,697 , 15%

Legend:
- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need =   271,568   hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend:
- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives
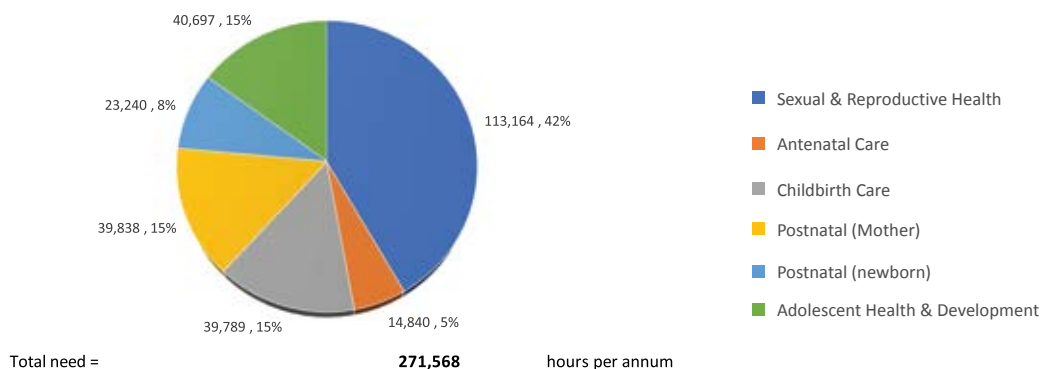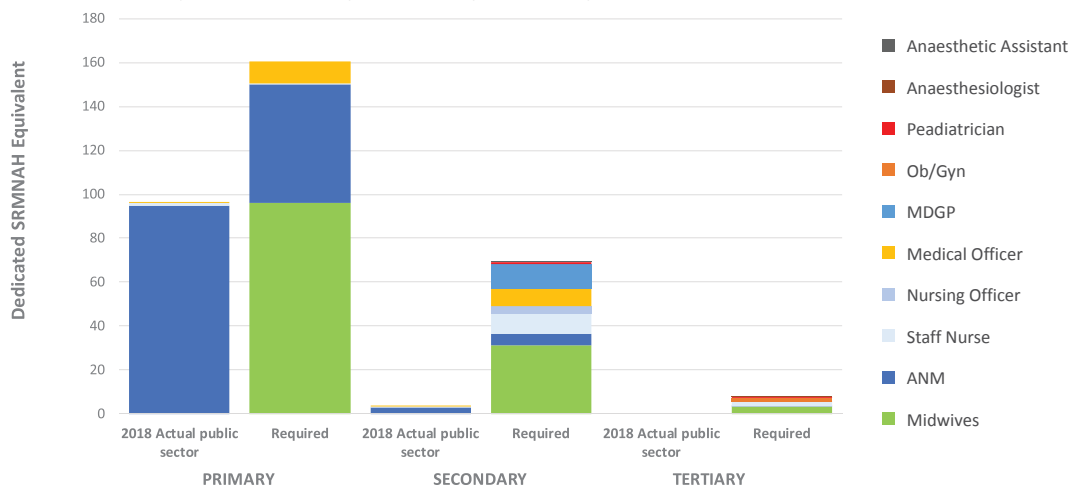
6.13 Rasuwa	Terrain	*Hill*	Tertiary Hospitals	*-*
	Population	*47,809*	Secondary Hospitals	*1*
	Pregnancies (est.)	*1,358 per year*	Primary Healthcare Centres	*1*
2018	Live births (est.)	*924 per year*	Health Posts	*17*
			Birthing centres	*14*

Headcount - Public Sector only

	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
Midwives	-	23.1	-	4.4	-	0.5
ANM	26	13.2	4	0.8	-	0.0
Staff Nurse	-	0.2	4	3.0	-	0.8
Nursing Officer	-	-	-	0.6	-	-
Medical Officer	1	22.7	3	15.5	-	0.2
MDGP	-	-	-	4.8	-	-
Ob/Gyn	-	-	-	-	-	0.4
Paediatrician	-	-	-	0.2	-	0.0
Anaesthesiologist	-	-	-	-	-	0.1
Anaesthetic Assistant	-	-	-	0.5	-	-
Total SRMNAH health workers	27	59	11	30	-	2

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Primary Required	Secondary 2018 Actual public sector	Secondary Required	Tertiary 2018 Actual public sector	Tertiary Required
100%	-	23.1	-	4.4	-	0.5
100%	26.0	13.2	4.0	0.8	-	0.0
33%	-	0.1	1.3	1.0	-	0.3
100%	-	-	-	0.6	-	-
10%	0.1	2.3	0.3	1.6	-	0.0
50%	-	-	-	2.4	-	-
100%	-	-	-	-	-	0.4
100%	-	-	-	0.2	-	0.0
30%	-	-	-	-	-	0.0
30%	-	-	-	0.2	-	-
	26	39	6	11	-	1

Breakdown of NEED by stage on the continuum of care

- 22,469 , 42% — Sexual & Reproductive Health
- 2,956 , 5% — Antenatal Care
- 7,928 , 15% — Childbirth Care
- 7,938 , 15% — Postnatal (Mother)
- 4,631 , 9% — Postnatal (newborn)
- 7,781 , 14% — Adolescent Health & Development

Total need = **53,703** hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend: Anaesthetic Assistant, Anaesthesiologist, Peadiatrician, Ob/Gyn, MDGP, Medical Officer, Nursing Officer, Staff Nurse, ANM, Midwives
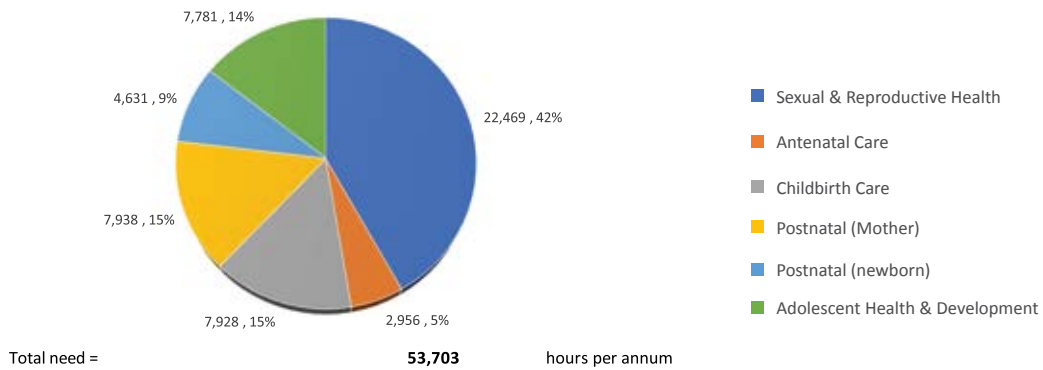
PRIMARY — SECONDARY — TERTIARY
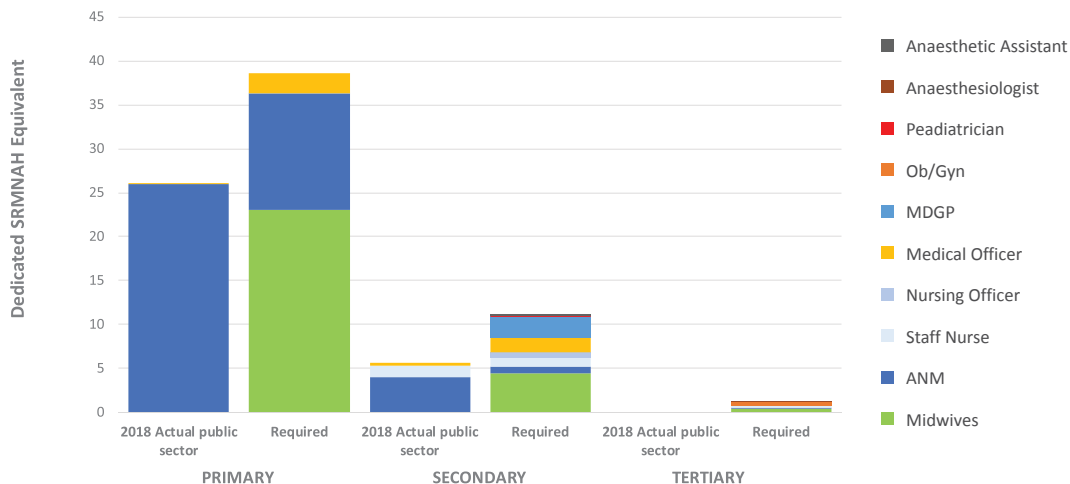
6.14 Sindhuli	Terrain	Hill	Tertiary Hospitals	–
	Population	322,962	Secondary Hospitals	1
	Pregnancies (est.)	9,651 per year	Primary Healthcare Centres	4
2018	Live births (est.)	6,566 per year	Health Posts	51
			Birthing centres	26

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	131.3	-	43.0	-	4.5
ANM	92	74.3	12	7.5	-	0.2
Staff Nurse	2	1.7	6	39.0	-	8.6
Nursing Officer	-	-	1	4.4	-	-
Medical Officer	2	137.5	4	105.5	-	2.6
MDGP	-	-	-	31.9	-	-
Ob/Gyn	-	-	1	-	-	2.7
Paediatrician	-	-	-	1.2	-	0.1
Anaesthesiologist	-	-	-	-	-	0.4
Anaesthetic Assistant	-	-	-	3.5	-	-
Total SRMNAH health workers	96	345	24	236	-	19

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	131.3	-	43.0	-	4.5
100%	92.0	74.3	12.0	7.5	-	0.2
33%	0.7	0.5	2.0	12.9	-	2.8
100%	-	-	1.0	4.4	-	-
10%	0.2	13.8	0.4	10.5	-	0.3
50%	-	-	-	15.9	-	-
100%	-	-	1.0	-	-	2.7
100%	-	-	-	1.2	-	0.1
30%	-	-	-	-	-	0.1
30%	-	-	-	1.1	-	-
	93	220	16	96	-	11

Breakdown of NEED by stage on the continuum of care

58,092 , 15%
32,913 , 9%
148,352 , 40%
56,420 , 15%
56,351 , 15%
21,013 , 6%

- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need =   373,142   hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Dedicated SRMNAH Equivalent

- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives

2018 Actual public sector	Required	2018 Actual public sector	Required	2018 Actual public sector	Required
PRIMARY		SECONDARY		TERTIARY	

6.15 Sindhupalchok 2018	Terrain	Hill	Tertiary Hospitals	-
	Population	318,268	Secondary Hospitals	1
	Pregnancies (est.)	9,579 per year	Primary Healthcare Centres	3
	Live births (est.)	6,516 per year	Health Posts	75
			Birthing centres	22

Headcount - Public Sector only

	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
Midwives	-	132.9	-	43.2	-	4.5
ANM	128	74.8	7	7.2	-	0.2
Staff Nurse	2	1.5	6	40.1	-	8.5
Nursing Officer	-	-	-	4.0	-	-
Medical Officer	3	137.1	2	110.4	-	2.6
MDGP	-	-	1	31.0	-	-
Ob/Gyn	-	-	-	-	-	2.7
Paediatrician	-	-	-	1.1	-	0.1
Anaesthesiologist	-	-	-	-	-	0.4
Anaesthetic Assistant	-	-	-	3.5	-	-
Total SRMNAH health workers	133	346	16	241	-	19

Dedicated SRMNAH Equivalent (DSE)

% clinical time on SRMNAH	Primary 2018 Actual public sector	Required	Secondary 2018 Actual public sector	Required	Tertiary 2018 Actual public sector	Required
100%	-	132.9	-	43.2	-	4.5
100%	128.0	74.8	7.0	7.2	-	0.2
33%	0.7	0.5	2.0	13.2	-	2.8
100%	-	-	-	4.0	-	-
10%	0.3	13.7	0.2	11.0	-	0.3
50%	-	-	0.5	15.5	-	-
100%	-	-	-	-	-	2.7
100%	-	-	-	1.1	-	0.1
30%	-	-	-	-	-	0.1
30%	-	-	-	1.1	-	-
	129	222	10	96	-	11

## Breakdown of NEED by stage on the continuum of care

- 52,281 , 14%
- 32,665 , 9%
- 55,995 , 15%
- 55,927 , 15%
- 20,856 , 5%
- 157,505 , 42%

Legend:
- Sexual & Reproductive Health
- Antenatal Care
- Childbirth Care
- Postnatal (Mother)
- Postnatal (newborn)
- Adolescent Health & Development

Total need = 375,229 hours per annum

DSE, Actual & Required at Primary, Secondary & Tertiary level

Legend:
- Anaesthetic Assistant
- Anaesthesiologist
- Peadiatrician
- Ob/Gyn
- MDGP
- Medical Officer
- Nursing Officer
- Staff Nurse
- ANM
- Midwives

PRIMARY	SECONDARY	TERTIARY
2018 Actual public sector / Required	2018 Actual public sector / Required	2018 Actual public sector / Required

7. Recommendations

This report provides guidance and information on the required SRMNAH health workforce for Nepal, focusing particularly on the districts within Bagamati Province. It is intended to support the development of a deployment plan for midwives at strategic CEmONC, BEmONC and Birthing Centres, to improve maternal and newborn health in Nepal.

We recommend:

- Expanding training capacity for PCL Midwifery courses – existing ANMs and direct-entry students to become fully qualified midwives

- Developing one-year bridging courses to train Staff Nurses to become fully trained midwives

- Formalise and implement a plan for the accelerated production and deployment of professional midwives

- No expansion of CEmONC sites – for the next 5 years, the focus should be to ensure the functionality and quality of existing CEmONC service sites

- Establishing Onsite Midwife-led Birthing Units alongside high-case load CEmONC service sites – to avoid overcrowding and improve the quality of care

- Upgrading selected Birthing Centres to BEmONC services – if there is no CEmONC site that can be accessed in two hours

- Promoting additional Birthing Centres only in strategic locations - in remote areas, where they should be made capable to provide 24/7 services

- Strengthening referral mechanisms – investment in ambulances & free transport for referral for obstetric and newborn complications

Our needs-based analysis identified that there is a need for significantly more SRMNAH workers in Nepal. Across the country, in order to meet all essential SRMNAH services, there is a need for 16,000 new professional midwives, plus the equivalent of an extra 2,000 Medical Officers dedicated to SRMNAH and 1,500 MDGPs and 251 Ob/Gyns. In Bagamati Province, there is a need for 3,500 new professional midwives, plus almost 500 Medical Officers (DSE) and 300 MDGPs and 50 Ob/Gyns.

We recommend a number of principles to consider when deploying midwives, including:

- Communicate a clear vision of midwifery, with a precise scope of work

- Define midwifery as a regulated profession

- Introduce a monitoring and evaluation system & quality improvement mechanism

- Teams of Midwives should be deployed at CEmONC facilities as well as BEmONC, including experienced midwives at both levels

- Reduce overcrowding at CEmONC facilities by developing high quality OMBUs and BEmONC facilities with good referral links

- Create Masters level midwifery professors to teach new midwives

- Encourage supervision and mentoring for new midwives

In order to provide comprehensive guidance, this report needs to be expanded beyond Bagamati
Province to include all Provinces and districts in Nepal. In addition, the report should also be expanded
to include future projections for the need for SRMNAH services and for the mix of health care
professionals required to meet this need.

The report should inform the development of the Nepal Safe Motherhood and Newborn Health Road
Map 2030 and also a national consultation and dialogue on midwifery in order to define the vision for
midwifery in Nepal and to organise midwifery planning and deployment. This would form the primary
objectives of a national Midwifery Service Framework (MSF) meeting.

Annex A: Methodology

Data collection

A self-completion questionnaire was used to collect quantitative data on selected indicators. The questionnaire was based on the one used for the 2014 State of the World's Midwifery (SoWMy) report, but adjusted for the Nepal context (e.g. reflecting the SRMNAH cadres that exist in the country), and to ensure that adolescent health interventions were included as well as reproductive, maternal and newborn interventions. The original SoWMy questionnaire was developed in 2013 through an interative feedback process involving the core SoWMy team and representatives of WHO, UNFPA, ICM, the International Council of Nurses (ICN), the International Federation of Gynaecology and Obstetrics (FIGO) and Jhpiego. Reference was made to international policy documents and agreed research and analysis frameworks. The questionnaire included a request to indicate the numbers and cadres of SRMNAH workers deployed in each facility.

GIZ-S2HSP commissioned national consultants to support the process of data collection. They obtained data primarily from MoHP sources and the international experts visited Kathmandu to assist data clarification. The Nepal MoHP sponsored a workshop with GIZ in Kathmandu on December 20th 2018. Other stakeholders, including representatives from Universities, the Nepal Nursing Council and midwifery students attended to see sample results from 3 Rural Municipalities and to validate the data.

Following the workshop, GIZ national consultants provided full details on demography and health facility details for Bagamati Province.

Secondary data on epidemiology were obtained from published sources to inform the analysis and modelling (see below and Annex C for details).

Data analysis and modelling

Most of the information on 'estimated need' and 'required DSE' in Section 4 of this report is the result of a modelling analysis of the data provided in the questionnaire. The modelling is developed from the methodology used to estimate 'potential met need' in the SoWMy 2014 report and subsequent regional reports, and it aims to estimate the size and composition of the SRMNAH workforce required to meet the need for SRMNAH services. This is compared with the actual size and composition of the current SRMNAH workforce.

Before commencing the modelling, we defined the key interventions representing need for SRMNAH care. For this we used the list of essential SRMNAH interventions from Annex 2 of the Global Strategy for Women's, Children's and Adolescents' Health[19].

The model itself was run separately for each district within Bagamati Province, according to the following method:

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19   A number of interventions that are considered to be essential in the Global Strategy for Women's, Children's and Adolescents' Health were not included in the modelling because they are not SRMNAH interventions and therefore require interventions to be performed by members of the health workforce that were not included in this assessment. These excluded interventions include: detection and treatment of non-communicable diseases (NCDs) such as tuberculosis and cancer; pre-pregnancy detection and management of risk factors such as obesity, alcohol abuse, mental health, genetic conditions; management of hepatitis B and genetic conditions; assessment and management of unintentional injury in adolescents. Interventions related to child health and development were excluded as they were not part of this study. Interventions related to female genital mutilation were also excluded as this is not generally practised in the region. It should, however, be noted that every SRMNAH worker has a responsibility to understand and take appropriate action in relation to NCD risk factors.

1. Estimate how much health worker time would be needed to deliver each of the 121 essential SRMNAH interventions to everyone who needed it in the baseline year (2018), by:

   a. estimating the number of women, adolescents and newborns requiring each intervention using demographic and epidemiological data from secondary sources (see Annex C for details).

   b. estimating the average contact time required to deliver each intervention to one individual, using time estimates from the OneHealth tool where available, otherwise expert estimates (see Annex C for details),

   c. based on the previous two quantities, estimating the total annual contact time required to deliver each intervention to all the individuals who need it,

   d. disaggregating the total annual contact time required for each intervention into need that should only be delivered at a tertiary or at a secondary level of care and need that could be delivered at a primary level (see Annex D for details).

2. Estimate the amount of health worker time that is required to meet the need. This step starts with the need for each SRMNAH intervention, as calculated in step 1, and allocating it to the most appropriate cadre:

   a. a preferred occupation group was established for each of the essential SRMNAH interventions, to identify who should be responsible for providing this service, based on expert opinion from the country. In some cases, a different preferred occupation group was identified for primary care and for secondary and / or tertiary care. The details of the preferred occupation groups for each intervention are shown in Annex B.

   b. the need is divided between primary, secondary and tertiary levels of care, (see Annex D).

   c. the total time required for each occupation group, at each level of care, was then calculated by summing the need for each intervention where the cadre was preferred

   d. this total time required for each occupation group was then converted into DSE (Dedicated SRMNAH Equivalent). A single DSE is assumed to work 1,755 hours per year (6.5 hrs per day, 6 days per week, less 30 days holiday and 12 days sickness). The proportion of time available for clinical work and the proportion of this clinical time which is dedicated to SRMNAH is estimated for each occupation group separately.

Although the methodology for this national study was based on that used in SoWMy 2014, some aspects are quite different, which affects the extent to which the results shown in this report can be compared with those shown in the SoWMy report. The main change is the expansion of the list of essential interventions to include a wider range of SRMNAH interventions. To reflect the inclusion of adolescent health interventions, a new cadre (paediatricians) was added to the model. Anaesthesiologists and Anaesthetist Assistants were also added to reflect their importance in surgical intervention. Additionally, in this national report, ANMs were assumed to have a wider range of competencies than was the case in the SoWMy report, so can meet more of the need than was assumed in SoWMy. Comparability is also affected by: (1) the updating of time estimates for delivery of essential interventions in line with updates in the OneHealth tool since 2014, (2) the updating of incidence data for many of the essential interventions due to the publication of more recent estimates (see Annex C), (3) a reduction in the assumed hours worked per year, from 1880 in SoWMy to 1755 in this national report: SoWMy assumed 8 hours per day for 5 days a week, whereas this national report assumes 6.5 hours per day for 6 days per week; in SoWMy the holiday entitlement was 20 days per year, but in this national report, holiday is assumed to average 30 days per year; and average sickness for health workers has increased from 5 days in SoWMy to 12 days on average for this national report. All of the above changes can be considered as improvements or refinements to the methodology, but they do mean that it is not appropriate to make a direct comparison between the modelling results from SoWMy 2014 and those shown in this report.

Annex B: Interventions and preferred occupation groups

The following table sets out the assumptions made about which occupation groups are competent, authorised and preferred to deliver each of the SRMNAH interventions included in this analysis. This does not necessarily reflect what SRMNAH workers actually do in practice; it shows what they are theoretically capable of doing if they are educated and regulated according to regional standards[20] , and operate within an enabling environment. **A 'P' indicates that the occupation group should be competent to deliver all aspects of the intervention with no supervision and is the preferred cadre for this intervention at the Primary level of care. An 'S' indicates that the occupation group is the preferred option at the secondary level of care. A 'T' indicates that the occupation group is the preferred option at the tertiary level of care.** This assessment is used to estimate the number of each occupation group required to meet the need for SRMNAH services (see Annex A). More than one occupation group is indicated if the intervention requires more than one health worker, or if severe cases require care from a different occupation group than mild cases.

Intervention	Midwife	ANM	Staff Nurse	Nursing Officer	Medical Officer	MDGP	Ob/Gyn	Paediatrician	Anaesthesiologist	Anaesthetic Assistant
Information and counselling for sexual and reproductive health including contraception		P	ST							
Delivery of condoms		P	ST							
Delivery of contraceptive pills and injectables		P	ST							
Delivery of contraceptive implants		P	ST							
IUD insertion	PS		T							
Female sterilisation					PST					
Prevention of communicable and non-communicable disease and sexually transmitted and reproductive tract infections including HIV and syphilis		P	ST							
Detection of HIV		P	ST							
Detection of other STIs		P	ST							
Treatment of HIV					PST					
Treatment of syphilis		P	ST							

20   As advised by the National Consultants for this study

Intervention	Midwife	ANM	Staff Nurse	Nursing Officer	Medical Officer	MDGP	Ob/Gyn	Paediatrician	Anaesthesiologist	Anaesthetic Assistant
Treatment of gonorrhoea		P	ST							
Treatment of chlamydia		P	ST							
Treatment of trichomoniasis		P	ST							
Pre-conception iron and folic acid supplementation	PS		T							
Screening for cervical cancer	PST									
Screening for breast cancer	PST									
Safe abortion	PS		T		PST					
Post-abortion care	PST	P	ST		PST					
Prevention of sexual and other forms of gender-based violence		P	ST							
Response to sexual and other forms of gender-based violence					PS		T			
Early and appropriate antenatal care	PS		T							
Screening for maternal illness, e.g, heart disease	PS		T							
Iron and folic acid supplementation	PS		T							
Tetanus immunisation	PS		T							
Prevention of mother-to-child transmission of HIV (PMTCT)	PS		T							
Prevention of malaria including insecticide-treated nets and intermittent preventive treatment	P				ST					
Treatment of malaria in pregnancy					P	S	T			
Smoking cessation		P	ST							
Management of syphilis					PST					
Dietary counselling for healthy weight gain and adequate nutrition	PS		T							
Prevention of and screening for gestational diabetes	PS		T							

Intervention	Midwife	ANM	Staff Nurse	Nursing Officer	Medical Officer	MDGP	Ob/Gyn	Paediatrician	Anaesthesiologist	Anaesthetic Assistant
Treatment of gestational diabetes	P					S	T			
Treatment of eclampsia	PST					PS	T			
Treatment of pre-eclampsia	PST					PS	T			
Management of obstetric complications (pre-term premature rupture of membranes, macrosomia, etc)	PST					PS	T			
Antenatal corticosteroids for women at risk of birth from 24–34 weeks of gestation when appropriate conditions are met	PST				PST					
Management of malpresentation at term	PST					PS	T			
Facility-based childbirth with a skilled birth attendant	PST					PS	T			
Active management of third stage of labour	PS		T							
Management of prolonged or obstructed labour	PST					PS	T			
Instrumental delivery for maternal/foetal indications	PST					PS	T			
Caesarean section for maternal/foetal indications	PST	PST				PS	T		T	PS
Induction of labour with appropriate medical indications	PST				P	S	T			
Management of intrapartum haemorrhage	PST				P	S	T			
Prevention and management of eclampsia (including with magnesium sulphate)	PST					PS	T			
Management of women with or at risk of infections (including prophylactic use of antibiotics for caesarean section)	P					S	T			
Care in the facility for mother and baby for at least 24 hours after an uncomplicated vaginal birth	PST	PS	T							
Promotion, protection and support of exclusive breastfeeding for 6 months	PST	PS	T							

Intervention	Midwife	ANM	Staff Nurse	Nursing Officer	Medical Officer	MDGP	Ob/ Gyn	Paediatri- cian	Anaesthesi- ologist	Anaesthetic Assistant
Management of postpartum haemorrhage (PPH)	PST	PS	T		P	S	T			
Management of eclampsia	PST					PS	T			
Treatment of maternal anaemia	PST				P	S	T			
Management of postpartum sepsis	PST	PS	T		P	S	T			
Routine postpartum examination	PST									
Initiation or continuation of antiretroviral therapy					P	S	T			
Response to intimate partner violence					P	S	T			
Screening for postpartum depression		PS	T		P	S	T			
Management of postpartum depression	PST				P	S	T			
Postnatal contact with an appropriately skilled healthcare provider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	PST									
Neonatal resuscitation with bag and mask	PST									
Hygienic cord and skin care	PST									
Initiation of prophylactic antiretroviral therapy for babies exposed to HIV					P			ST		
Kangaroo mother care for small babies	PST									
Extra support for feeding small and preterm babies with breast milk	PST									
Continuous positive airway pressure to manage babies with respiratory distress syndrome	PST				P			ST		
Case management of possible severe bacterial infection	PST				P			ST		
Management of newborns with jaundice					P			ST		
Management of genetic conditions					P	S	T			
Postnatal contact with a skilled healthcare pro- vider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	PST									

Intervention	Midwife	ANM	Staff Nurse	Nursing Officer	Medical Officer	MDGP	Ob/Gyn	Paediatrician	Anaesthesiologist	Anaesthetic Assistant
Routine vaccination (DPT, hepatitis B, BCG, HPV)		PS	T							
Promotion of healthy behaviour (e.g. nutrition, physical activity, no tobacco, alcohol, drugs)		PS	T							
Prevention and detection of anaemia		PS	T							
Management of anaemia					P	S	T			
Comprehensive sexuality education, information and counselling for sexual and reproductive health, including contraception	PST									
Services for comprehensive sexual and reproductive health including contraception	PST									
Psychosocial support and related services for adolescent mental health and wellbeing					P			ST		
Prevention of sexual and other forms of GBV	PST									
Response to sexual and other forms of GBV	PST	PS	T							
Prevention and detection of communicable and non-communicable diseases and STIs, including HIV	PST									
Treatment of HIV					P			ST		
Treatment of syphilis					P			ST		
Treatment of gonorrhoea					P	S	T			
Treatment of chlamydia					P	S	T			
Treatment of trichomoniasis					P	S	T			
Detection of hazardous and harmful substance use			PT	S						
Management of hazardous and harmful substance use					P			ST		
Prevention of suicide		PS	T					PST		
Management of self-harm/suicide risks		PS	T					PST		

Note: P=Primary; S=Secondary; T=Tertiary

Annex C: Estimating need for essential SRMNAH interventions

For each of the essential SRMNAH interventions, the following table explains how the amount of health worker time needed to deliver the intervention was estimated, and the data sources. Note that epidemiological data were not generally available for the individual districts, so for most indicators it was assumed that national incidence estimates applied equally in each district.

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
WOMEN'S SEXUAL AND REPRODUCTIVE HEALTH		
Information and counselling for sexual and reproductive health including contraception	One 20-minute contact per woman of reproductive age (WRA) per year	**Indicator**: Number of WRA (2018). **Source**: Projected Population by 5 Years Age Group (as of National Population and Housing Census 2011, Central Bureau of Statistics)
Delivery of condoms	Three contacts per year totalling 35 minutes per WRA using condoms, estimated as follows: WRA x (CPR + unmet need) x % of female contraceptive users who use male or female condoms	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: Contraceptive prevalence rate (any method). **Source**: 2016 DHS **Indicator**: Unmet need for contraception (%). **Source**: 2016 DHS **Indicator**: % of female contraceptive users (aged 15-49) who use each type. **Source**: DoHS, Annual Report 2016/17
Delivery of contraceptive pills and injectables	Three contacts per year totalling 40 minutes per WRA using pills or injectables, estimated as follows: WRA x (CPR + unmet need) x % of female contraceptive users who use pills or injectables	
Delivery of contraceptive implants	One 60-minute contact every 3 years per WRA using implants, estimated as follows: WRA x (CPR + unmet need) x % of female contraceptive users who use implants	
IUD insertion	One 55-minute contact every 5 years per WRA using IUD, estimated as follows: WRA x (CPR + unmet need) x % of female contraceptive users who use IUDs	
Female sterilisation	One 100-minute contact per unsterilised WRA requesting sterilisation, estimated as follows: (20% of the WRA cohort in 2018) x (CPR + unmet need) x % of female contraceptive users who use female sterilisation	

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Prevention of communicable and non-communicable disease and sexually transmitted and reproductive tract infections including HIV and syphilis	One 10-minute contact per woman aged 15+ per year	**Indicator**: Number of women aged 15+ (2018). **Source**: Projected Population by 5 Years Age Group (as of National Population and Housing Census 2011, Central Bureau of Statistics)
Detection of HIV	One 10-minute contact per WRA reporting risky behaviours such as intravenous drug use, estimated as follows: WRA x prevalence of intravenous drug use among women)	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: Prevalence of intravenous drug use among women. **Source**: Degenhardt et al (2017) Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: A multistage systematic review (http://www.sciencedirect.com/science/article/pii/S2214109X17303753).
Detection of other STIs	One 10-minute contact per WRA reporting STI symptoms, estimated as follows: WRA x % of WRA reporting STI symptoms in last year	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: % of WRA reporting STI symptoms in last year. **Source**: 2016 DHS
Treatment of HIV	Four contacts per year totalling 240 minutes per WRA with HIV per year, estimated as follows: WRA x HIV prevalence in adult women	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: HIV prevalence in adult women (%). **Source**: UNAIDS 2017 (http://aidsinfo.unaids.org/)
Treatment of syphilis	One 15- minute contact per WRA with syphilis, estimated as follows: WRA x incidence of syphilis in WRA	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: Incidence of syphilis in WRA. **Source**: Global Burden of Disease (GBD) 2017
Treatment of gonorrhoea	One 15- minute contact per WRA with gonorrhoea, estimated as follows: WRA x incidence of gonorrhoea in WRA	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: Incidence of gonorrhoea in WRA. **Source**: Global Burden of Disease (GBD) 2017
Treatment of chlamydia	One 15- minute contact per WRA with chlamydia, estimated as follows: WRA x incidence of chlamydia in WRA	**Indicator**: Number of WRA (2018). **Source**: As above.. **Indicator**: Incidence of chlamydia in WRA **Source**: Global Burden of Disease (GBD) 2017
Treatment of trichomoniasis	One 15- minute contact per WRA with trichomoniasis, estimated as follows: WRA x incidence of trichomoniasis in WRA	**Indicator**: Number of WRA (2018). **Source**: As above. **Indicator**: Incidence of trichomoniasis in WRA. **Source**: Global Burden of Disease (GBD) 2017
Pre-conception iron and folic acid supplementation	One 10-minute contact per woman trying to conceive, estimated as follows: Pregnancies x 0.6 (assuming that 60% of pregnancies are intended – see Sedgh et al 2014 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4727534/))	**Indicator**: Pregnancies (2018). **Source**:

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Screening for cervical cancer	One 10-minute contact every three years per WRA	**Indicator**: WRA (2018). **Source**: As above.
Screening for breast cancer	One 50-minute contact every year per woman aged 40-69 (assuming clinical breast exam rather than mammogram)	**Indicator**: Women aged 40-69 (2018). **Source**: As above.
Safe abortion (wherever legal)	One 27-minute contact* per legal abortion (assuming surgical rather than medical procedure used), estimated as follows: WRA/1,000 x legal abortions per 1,000 WRA * 15 minutes for a midwife/nurse + 12 minutes for a doctor (on average)	**Indicator**: WRA. **Source**: As above. **Indicator**: Legal abortions per 1,000 WRA. **Source**: Guttmacher Institute 2014 (https://www.guttmacher.org/fact-sheet/induced-abortion-worldwide)
Post-abortion care	Contact totalling 165-minutes* per spontaneous or induced abortion, estimated as follows: (Births x 0.2) + (WRA/1,000 x abortions per 1,000 WRA) * 66 minutes for a nurse aide + 66 minutes for a midwife/nurse + 33 minutes for an obstetrician/gynacologist (on average)	**Indicator:** Births (2018). **Source:** **Indicator**: WRA. **Source**: As above. **Indicator**: Abortions per 1,000 WRA **Source**: As above
Prevention of sexual and other forms of gender-based violence	One 10-minute contact per adult woman per year	**Indicator:** Women aged 15+ (2018). **Source:** As above.
Response to sexual and other forms of gender-based violence	Contact totalling 35 minutes per woman experiencing sexual or GBV, estimated as follows: Women aged 15+ * prevalence of recent IPV among WRA	**Indicator:** Women aged 15+ (2018). **Source:** As above. **Indicator**: Prevalence of recent IPV among WRA. **Source:** 2016 DHS
PREGNANCY (ANTENATAL CARE)		
Early and appropriate antenatal care (four visits), including: identification of GBV; accurate determination of gestational age; screening for hypertensive disorders; counselling on family planning, birth and emergency preparedness, screening for and prevention of STIs, detection of risk factors for genetic conditions	Eight 10-minute contacts per pregnancy of >12 weeks gestation, estimated as follows: Births + (stillbirth rate/1,000 * live births)	**Indicator**: Births (2018). **Source:** As above. **Indicator**: Stillbirth rate. **Source**: Healthy Newborn Network 2017 (https://www.healthynewbornnetwork.org/numbers/)
Screening for maternal illness, e.g. heart disease	One 5-minute contact per pregnancy	**Indicator**: Pregnancies (2018). **Source:** As above.
Iron and folic acid supplementation	One 8-minute contact per pregnancy	**Indicator**: Pregnancies (2018). **Source:** As above.
Tetanus immunisation	Contacts totalling 5 minutes per pregnancy	**Indicator**: Pregnancies (2018). **Source:** As above.

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Prevention of mother-to-child transmission of HIV (PMTCT)	Contacts totalling 360 minutes per pregnant woman with HIV, estimated as follows: Pregnancies x HIV prevalence in WRA	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: HIV prevalence in WRA. **Source**: UNAIDS 2017 (http://aidsinfo.unaids.org/)
Prevention of malaria including insecticide-treated nets and intermittent preventive treatment	One 6-minute contact per pregnant woman living in areas of high malaria transmission, estimated as follows: Pregnancies x % of population living in areas of high malaria transmission	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: % of population living in areas of high malaria transmission. **Source**: Malaria Micro-stratification report, 2018
Treatment of malaria in pregnancy	One 4-minute contact per pregnant woman with malaria, estimated as follows: Pregnancies x incidence of presumed and confirmed malaria cases	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of presumed and confirmed malaria cases (%). **Source**: World Bank, 2015
Smoking cessation	One 16-minute contact per pregnant woman who smokes, estimated as follows: Pregnancies x % of women aged >=15 who smoke any tobacco product	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: % of women aged >=15 who smoke any tobacco product (2015). **Source**: 2016 DHS
Management of syphilis	Contacts totalling 17 minutes per pregnant woman with syphilis, estimated as follows: Pregnancies x incidence of syphilis in WRA	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of syphilis in WRA. **Source**: GBD (2017) as above.
Dietary counselling for healthy weight gain and adequate nutrition	Contacts totalling 10 minutes per pregnant woman	**Indicator**: Pregnancies (2018). **Source**: As above.
Prevention of and screening for gestational diabetes	Contacts totalling 10 minutes per pregnant woman	**Indicator**: Pregnancies (2018). **Source**: As above.
Treatment of gestational diabetes	Contacts totalling 70 minutes per pregnant woman with gestational diabetes, estimated as follows: Pregnancies x prevalence of gestational diabetes	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Prevalence of gestational diabetes. **Source**: IDF Diabetes Atlas 2015 (http://www.diabetesatlas.org/).
Treatment of eclampsia	Contacts totalling 360 minutes* per pregnant woman with eclampsia, estimated as follows: Pregnancies x incidence of eclampsia x % of eclampsia cases occurring antenatally * 240 minutes for midwife + 120 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of eclampsia (% of pregnancies). **Source**: Dolea et al (2003) Global burden of hypertensive disorders of pregnancy in the year 2000 (http://www.who.int/healthinfo/statistics/bod_hypertensivedisordersofpregnancy.pdf) **Indicator**: % of eclampsia cases occurring antenatally. **Source**: Thornton et al (2013) (http://www.ajog.org/article/S0002-9378(13)00237-8/abstract).

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Treatment of pre-eclampsia	Contacts totalling 1,500 minutes* per pregnant woman with pre-eclampsia, estimated as follows: Pregnancies x incidence of pre-eclampsia * 1,440 minutes for midwife + 60 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of pre-eclampsia (% of pregnancies). **Source**: Dolea et al (2003) Global burden of hypertensive disorders of pregnancy in the year 2000 (http://www.who.int/healthinfo/statistics/bod_hypertensivedisordersofpregnancy.pdf)
Management of obstetric complications (preterm premature rupture of membranes, macrosomia, etc)	One 30-minute contact per pregnant woman with obstetric complications, estimated as follows: (Live births + stillbirths) x incidence of pPROM	**Indicator**: Live births (2018). **Source**: As above. **Indicator:** Stillbirths (2018). **Source:** As above. **Indicator**: Incidence of pPROM (%). **Source**: WHO global survey on maternal and perinatal health 2005, Table 4.1 (http://www.who.int/reproductivehealth/topics/best_practices/GS_Tabulation.pdf?ua=1).
Antenatal corticosteroids for women at risk of birth from 24-34 weeks of gestation when appropriate conditions are met	One 70-minute* contact per preterm birth, estimated as follows: (Live births + still births) x preterm birth rate (<38 weeks) * 40 minutes for midwife + 30 minutes for doctor (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Still births (2018). **Source**: As above. **Indicator**: Preterm birth rate (<38 weeks). **Source**: Healthy Newborn Network 2017
Management of malpresentation at term	One 107-minute contact per case of malpresentation at term, estimated as follows: (Live births + still births) x incidence of breech presentation	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Still births (2018). **Source**: As above. **Indicator**: Incidence of breech presentation (%). **Source**: Vogel et al (2015) (available at http://www.thelancet.com/pdfs/journals/langlo/PIIS2214-109X(15)70094-X.pdf)
CHILDBIRTH		
Facility-based childbirth with a skilled birth attendant, including: routine monitoring with partograph, detection of infections, and hygienic management of the cord at birth	One 390-minute* contact per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births) * 360 minutes for midwife + 30 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.
Active management of third stage of labour	One 10-minute contact per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Management of prolonged or obstructed labour	Contacts totalling 480 minutes* per case of prolonged or obstructed labour, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x incidence of prolonged or obstructed labour * 360 minutes for midwife + 120 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Incidence of prolonged or obstructed labour (% of live births). **Source**: Dolea & AbouZahr 2003: Global burden of obstructed labour in the year 2000 (http://www.who.int/healthinfo/statistics/bod_obstructedlabour.pdf).
Instrumental delivery for maternal/foetal indications	One 90-minute* contact per birth requiring instrumental delivery, estimated as follows: Live births + (stillbirth rate/1,000 * live births)) x % of maternal deaths that are secondary to prolonged or obstructed labour * 60 minutes for midwife + 30 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: % of maternal deaths that are secondary to prolonged or obstructed labour. **Source**: WHO (https://stratog.rcog.org.uk/tutorial/easi-resource/importance-of-instrumental-delivery-4862
Caesarean section for maternal/foetal indications	One 390-minute* contact per birth requiring caesarean section, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x recommended c-section rate * 210 minutes for nurse aide + 90 minutes for midwife + 90 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Recommended c-section rate. **Source**: WHO 2015 statement on c-section rates (available at http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/cs-statement/en/)
Induction of labour with appropriate medical indications	One 60-minute* contact per birth occurring after 41 completed weeks of gestation**, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x % of pregnancies which go beyond 41 completed weeks * 40 minutes for midwife/nurse + 20 minutes for doctor (on average) ** Other common indications for induction include pre-eclampsia, gestational diabetes and pPROM, but the time estimates for these conditions are included elsewhere so are not counted again here	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: % of pregnancies which go beyond 41 completed weeks. **Source**: OneHealth tool version 4.61 (Aug 2017)
Management of intrapartum haemorrhage	One 195-minute* contact per case of intrapartum haemorrhage, estimated as follows: Live births + (stillbirth rate/1,000 * live births)) x incidence of intrapartum haemorrhage * 80 minutes for midwife or nurse + 115 minutes for doctor (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Incidence of intrapartum haemorrhage (%). **Source**: OneHealth tool version 4.61 (Aug 2017)

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Prevention and management of eclampsia (including with magnesium sulphate)	Contacts totalling 360 minutes* per case of intrapartum eclampsia, estimated as follows: Pregnancies x incidence of eclampsia x % of eclampsia cases occurring during childbirth * 240 minutes for midwife + 120 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of eclampsia (% of births). **Source**: Dolea et al (2003) as above. **Indicator**: % of eclampsia cases occurring during childbirth. **Source**: Thornton et al (2013) as above.
Management of women with or at risk of infections (including prophylactic use of antibiotics for caesarean section)	One 30-minute contact per woman with or at risk of infections, estimated as follows: Live births + (stillbirth rate/1,000 * live births)) x recommended c-section rate	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Recommended c-section rate. **Source**: WHO 2015 as above.
POSTNATAL (MOTHER)		
Care in the facility for mother and baby for at least 24 hours after an uncomplicated vaginal birth, including (for the mother): eclampsia prevention, anaemia prevention, detection of postpartum sepsis, family planning advice, contraceptives, identification of IPV, nutrition and lifestyle counselling; and (for the newborn: immediate drying and thermal care; early initiation of breastfeeding; hygienic cord and skin care; detection of bacterial infections	Contacts totalling 240 minutes* per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births) * 120 minutes for nurse-aide + 120 minutes for midwife (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.
Promotion, protection and support of exclusive breastfeeding for 6 months	Contacts totalling 70 minutes* per live birth * 20 minutes for nurse aide and 50 minutes for midwife (on average)	**Indicator**: Live births (2018). **Source**: As above.
Management of postpartum haemorrhage (PPH)	One 345-minute* contact per birth resulting in PPH, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x incidence of severe PPH per 100 live births * 80 minutes for nurse aide + 150 minutes for midwife/nurse + 115 minutes for doctor (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Incidence of severe PPH per 100 live births. **Source**: Dolea et al (2003) Global burden of maternal haemorrhage in the year 2000 (http://www.who.int/healthinfo/statistics/bod_maternalhaemorrhage.pdf)

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Management of eclampsia	Contacts totalling 360 minutes* per case of postpartum eclampsia, estimated as follows: Pregnancies x incidence of eclampsia x % of eclampsia cases occurring postpartum * 240 minutes for midwife + 120 minutes for obstetrician/gynaecologist (on average)	**Indicator**: Pregnancies (2018). **Source**: As above. **Indicator**: Incidence of eclampsia (% of births). **Source**: As above. **Indicator**: % of eclampsia cases occurring postpartum. **Source**: Thornton et al (2013) as above.
Treatment of maternal anaemia	One 30-minute* contact per case of maternal anaemia, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x prevalence of anaemia in pregnant women * 20 minutes for midwife + 10 minutes for doctor (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Prevalence of anaemia in pregnant women (%). **Source**: World Bank 2016 (https://data.worldbank.org/indicator/SH.PRG.ANEM)
Management of postpartum sepsis	Contacts totalling 240-minutes* per birth resulting in postpartum sepsis, estimated as follows: WRA x (incidence of postpartum sepsis per 1,000 WRA/10) * 70 minutes for nurse aide + 140 minutes for midwife/nurse + 30 minutes for doctor (on average)	**Indicator**: WRA (2018). **Source**: As above. **Indicator**: Incidence of postpartum sepsis per 1,000 live births. **Source**: Dolea & Stein (2003) Global burden of maternal sepsis in the year 2000 (http://www.who.int/healthinfo/statistics/bod_maternalsepsis.pdf).
Routine postpartum examination	One 10-minute contact per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.
Initiation or continuation of antiretroviral therapy	Contacts totalling 240 minutes per postpartum women with HIV, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x HIV prevalence in adult women	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: HIV prevalence in adult women (%) **Source**: UNAIDS 2017, as above
Response to intimate partner violence	Contacts totalling 35 minutes per new mother experiencing IPV, estimated as follows: (Live births + (stillbirth rate/1,000 * live births)) x incidence of IPV in WRA	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above. **Indicator**: Incidence of IPV in WRA. **Source**: As above.
Screening for postpartum depression	One 10-minute contact per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.
Management of postpartum depression	One 30-minute contact per birth, estimated as follows: (Live births + (stillbirth rate/1,000 * live births))	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Postnatal contact with an appropriately skilled healthcare provider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	Three contacts totalling 180 minutes per birth, estimated as follows: Live births + (stillbirth rate/1,000 * live births)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Stillbirth rate. **Source**: As above.
POSTNATAL (NEWBORN)		
Neonatal resuscitation with bag and mask	One 23-minute contact per newborn requiring resuscitation, estimated as follows: Live births x % of newborns requiring resuscitation	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: % of newborns requiring resuscitation. **Source**: OneHealth tool version 4.61 (Aug 2017)
Hygienic cord and skin care	One 20-minute contact per live birth	**Indicator**: Live births (2018). **Source**: As above.
Initiation of prophylactic antiretroviral therapy for babies exposed to HIV	Contacts totalling 135 minutes per newborn exposed to HIV, estimated as follows: Live births x prevalence of HIV in WRA	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Prevalence of HIV in WRA. **Source**: As above.
Kangaroo mother care for small babies	One 30-minute contact per newborn with low birth weight, estimated as follows: Live births x % of newborns with birth weight <2500g	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: % of newborns with birth weight <2500g. **Source**: Healthy Newborn Network (as above)
Extra support for feeding small and preterm babies with breast milk	One 90-minute contact per small or preterm newborn, estimated as follows: Live births x preterm birth rate (<38 weeks)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Preterm birth rate (<38 weeks). **Source**: As above.
Continuous positive airway pressure to manage babies with respiratory distress syndrome	One 120-minute contact per newborn with respiratory distress syndrome, estimated as follows: Live births x % of births delivered at <32 weeks' gestation* * (WHO estimates that most babies born at <32 weeks develop RDS – see http://www.who.int/pmnch/media/news/2012/201204_borntoosoon-report.pdf)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: % of births delivered at <32 weeks' gestation. **Source**: Blencowe et al (2012) National, regional, and worldwide estimates of preterm birth rates (http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(12)60820-4.pdf) – estimated that 16% of preterm births occurred at <32 weeks, so this global percentage was applied to the country preterm birth estimates (see above).
Case management of possible severe bacterial infection	Contacts totalling 570 minutes* per newborn with possible severe bacterial infection (pSBI), estimated as follows: Live births x incidence of pSBI in newborns (%) * 480 minutes midwife or nurse + 90 minutes doctor (on average)	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Incidence of pSBI in newborns (%). **Source**: Seale et al (2014) Estimates of pSBI in neonates in sub-Saharan Africa, south Asia and Latin America for 2012 (http://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099(14)70804-7.pdf).

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Management of newborns with jaundice	One 150-minute contact per newborn with severe jaundice, estimated as follows: Live births x % of newborns with jaundice requiring phototherapy	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: % of newborns with severe jaundice. **Source**: Teune et al (2011) A systematic review of severe morbidity in infants born late preterm (http://www.ajog.org/article/S0002-9378(11)00916-1/pdf). Estimated at 1.9% for all countries (sum of incidence in late preterm infants and full-term infants).
Management of genetic conditions	Contacts totalling 360 minutes per newborn with genetic conditions, estimated as follows: Live births x prevalence of monogenic diseases at birth	**Indicator**: Live births (2018). **Source**: As above. **Indicator**: Prevalence of monogenic diseases at birth (%). **Source**: WHO 2017: Monogenic diseases (http://www.who.int/genomics/public/geneticdiseases/en/index2.html).
Postnatal contact with a skilled healthcare provider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	Contacts totalling 60 minutes per live birth (Note: this is for neonatal assessments in addition to checks on the newborn that would normally take place at the same time as the mother's postnatal checks)	**Indicator**: Live births (2018). **Source**: As above.
ADOLESCENT HEALTH AND DEVELOPMENT		
Routine vaccination (DPT, hepatitis B, BCG, HPV)	Contacts totalling 32 minutes* per adolescent, estimated on an annual basis as follows: Adolescents/10 * 6 minutes x 2 for DPT + 6 minutes x 2 for Hep B, 2 minutes for BCG + 6 minutes for HPV	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Promotion of healthy behaviour (e.g. nutrition, physical activity, no tobacco, alcohol, drugs)	Contacts totalling 5 minutes per adolescent per year (on the assumption that this intervention will be delivered in groups of 30, each lasting 2.5 hours)	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Prevention and detection of anaemia	One 5-minute contact per adolescent per year	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Management of anaemia	Three 10-minute contacts per adolescent with anaemia, estimated as follows: Adolescents * prevalence of anaemia in school-age children	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above. **Indicator**: prevalence of anaemia in school-age children (%). **Source**: WHO (2008): Worldwide prevalence of anaemia 1993-2005 (http://apps.who.int/iris/bitstream/10665/43894/1/9789241596657_eng.pdf). Global estimate of 25.4% applied.

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Comprehensive sexuality education, information and counselling for sexual and reproductive health, including contraception	Contacts totalling 5 minutes per adolescent per year (on the assumption that this intervention will be delivered in groups of 30, each lasting 2.5 hours)	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Services for comprehensive sexual and reproductive health including contraception	Contacts totalling 10 minutes per adolescent per year, estimated as follows: (10-14 year-old females* + 10-19 year-old males) * 15-19 year-old females are included under WRA above	**Indicator**: 10-14 year-old females + 10-19 year-old males (2018). **Source**: As above.
Psychosocial support and related services for adolescent mental health and wellbeing	Contacts totalling 30 minutes per adolescent with mild depression or anxiety, estimated as follows: Adolescents x Prevalence of anxiety disorders among adolescents	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above. **Indicator**: Prevalence of anxiety disorders among adolescents. **Source**: Global burden of disease study 2017 (http://ghdx.healthdata.org/gbd-2016)
Prevention of sexual and other forms of GBV	Contacts totalling 5 minutes per adolescent per year (on the assumption that this intervention will be delivered in groups of 30, each lasting 2.5 hours)	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Response to sexual and other forms of GBV	Contacts totalling 35 minutes* per adolescent experiencing sexual or other form of GBV, estimated as follows: (10-14 year-old females** + 10-19 year-old males) x incidence of sexual violence in adolescents * 20 minutes for nurse aide + 15 minutes for nurse (on average) ** 15-19 year-old females are included under WRA above	**Indicator**: 10-14 year-old females + 10-19 year-old males (2018). **Source**: As above. **Indicator**: Incidence of sexual violence in adolescents. **Source**: Global burden of disease study 2017 (http://ghdx.healthdata.org/gbd-2016)
Prevention and detection of communicable and non-communicable diseases and STIs, including HIV	One 5-minute contact per adolescent per year	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Treatment of HIV	Four 60-minute contacts per year per adolescent with HIV, estimated as follows: (10-14 year-old females* + 10-19 year-old males) x HIV prevalence in adolescents * 15-19 year-old females are included under WRA above	**Indicator**: 10-14 year-old females + 10-19 year-old males (2018). **Source**: As above. **Indicator**: HIV prevalence in adolescents. **Source**: Global burden of disease study 2017 (as above)
Treatment of syphilis	One 15-minute contact per adolescent male with syphilis, estimated as follows: Males aged 15-19 x incidence of syphilis in adolescent males	**Indicator**: 15-19 year-old males (2018). **Source**: As above. **Indicator:** Incidence of syphilis in males aged 15-19. **Source:** Global burden of disease study 2017 (as above)

Intervention	Number and average duration of contacts needed with an SRMNAH worker	Data requirements and sources
Treatment of gonorrhoea	One 15-minute contact per adolescent male with gonorrhoea, estimated as follows: Males aged 15-19 x incidence of gonococcal infection in adolescent males	**Indicator**: 15-19 year-old males (2018). **Source**: As above. **Indicator:** Incidence of gonococcal infection in males aged 15-19. **Source:** Global burden of disease study 2017 (as above)
Treatment of chlamydia	One 15-minute contact per adolescent male with chlamydia, estimated as follows: Males aged 15-19 x incidence of chlamydial infection in adolescent males	**Indicator**: 15-19 year-old males (2018). **Source**: As above. **Indicator:** Incidence of chlamydial infection in males aged 15-19. **Source:** Global burden of disease study 2017 (as above)
Treatment of trichomoniasis	One 15-minute contact per adolescent male with trichomoniasis, estimated as follows: Males aged 15-19 x incidence of trichomoniasis in adolescent males	**Indicator**: 15-19 year-old males (2018). **Source**: As above. **Indicator:** Incidence of trichomoniasis in males aged 15-19. **Source:** Global burden of disease study 2017 (as above)
Detection of hazardous and harmful substance use	One 5-minute contact per adolescent per year	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above.
Management of hazardous and harmful substance use	Contacts totalling 60 minutes* per adolescent using hazardous or harmful substance, estimated as follows: Adolescents x % of 15-19 year-olds who are heavy episodic drinkers * To cover brief interventions and referral to specialist cadres	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above. **Indicator**: % of 15-19 year-olds who are heavy episodic drinkers. **Source**: Global burden of disease study 2017 (as above)
Prevention of suicide	Contacts totalling 50 minutes* per adolescent at risk of suicide (to cover brief interventions and referral to specialist mental health cadres), estimated as follows: Adolescents x % of adolescents with major depressive disorder * 30 minutes for nurse + 20 minutes for paediatrician (on average)	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above. **Indicator**: % of adolescents with major depressive disorder. **Source**: Global burden of disease study 2017 (as above)
Management of self-harm/ suicide risks	Contacts totalling 50 minutes* per adolescent performing self-harm (to cover brief interventions and referral to specialist mental health cadres), estimated as follows: Adolescents x prevalence of deliberate self-harm among adolescents * 30 minutes for nurse + 20 minutes for paediatrician (on average)	**Indicator**: Adolescents aged 10-19 (2018). **Source**: As above. **Indicator**: Prevalence of deliberate self-harm among adolescents (%). **Source**: Global burden of disease study 2017 (as above)

CPR = contraceptive prevalence rate; DPT = diphtheria, pertussis and tetanus; FGM = female genital mutilation; GBD = Global Burden of Disease; GBV = gender-based violence; HIV = human immunodeficiency virus; HPV = human papilloma virus; IPV = intimate partner violence; IUD = intrauterine device; PMTCT = prevention of mother-to-child transmission of HIV; PPH = postpartum haemorrhage; pPROM = preterm premature rupture of membranes; RTI = reproductive tract infection; STI =-sexually transmitted infection; WHO = World Health Organisation; WRA = women of reproductive age (15-49 years)

* Contact durations were taken from the OneHealth tool version 5.61 (November 2017), available from http://www.avenirhealth.org/software-onehealth) where available, otherwise expert opinion was used. Note that, for interventions that can be delivered at the community level, the time estimate in OneHealth is higher if the intervention is delivered via an outreach model of care. In such cases, the lower time estimate was used in cases where the duration depends on model of care. For countries which make use of outreach services for SRMNAH, therefore, the assumed time requirement will be an underestimate.

Annex D: Organisation of Care

The table below sets out estimates of the proportion of health worker time needed for each of the essential SRMNAH interventions that should be provided at secondary or tertiary levels of care. The remaining proportion could be met at any level of care, from community level upwards. The estimates are made separately for plain, hill and mountain terrains, as these reflect different realities. Most mountainous areas are quite remote and only have primary health facilities, which means that the need for interventions that can only be delivered at higher levels of care can be met only with extensive travel. Our estimates of required health worker numbers attempt to take this into account. The estimates were made in consultation with national experts. Our model is based on a philosophy of 'what could be' if all health workers were appropriately educated and working in an enabling environment, so the proportions aim to reflect that, rather than reflecting what is actually happening (which anyway will vary by province, district and facility).

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
WOMEN'S SEXUAL AND REPRODUCTIVE HEALTH									
Information and counselling for sexual and reproductive health including contraception	70	27	3	80	19	2	90	9	1
Delivery of condoms	70	27	3	80	19	2	90	9	1
Delivery of contraceptive pills and injectables	70	27	3	80	19	2	90	9	1
Delivery of contraceptive implants	70	27	3	80	19	2	90	9	1
IUD insertion	70	27	3	80	19	2	90	9	1
Female sterilisation	70	27	3	80	19	2	90	9	1
Prevention of communicable and non-communicable disease and sexually transmitted and reproductive tract infections including HIV and syphilis	70	27	3	80	19	2	90	9	1
Detection of HIV	0	90	10	0	90	10	0	90	10
Detection of other STIs	70	27	3	80	19	2	90	9	1
Treatment of HIV	0	90	10	0	90	10	0	90	10
Treatment of syphilis	70	27	3	80	19	2	90	9	1
Treatment of gonorrhoea	70	27	3	80	19	2	90	9	1
Treatment of chlamydia	70	27	3	80	19	2	90	9	1

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
Treatment of trichomoniasis	70	27	3	80	19	2	90	9	1
Pre-conception iron and folic acid supplementation	70	27	3	80	19	2	90	9	1
Screening for cervical cancer	70	27	3	80	19	2	90	9	1
Screening for breast cancer (clinical exam not mammogram)	70	27	3	80	19	2	90	9	1
Safe abortion (wherever legal)	40	54	6	70	27	3	90	9	1
Post-abortion care (including care after miscarriage and ectopic pregnancy)	40	54	6	70	27	3	90	9	1
Prevention of sexual and other forms of gender-based violence	70	27	3	80	19	2	90	9	1
Response to sexual and other forms of gender-based violence	40	54	6	70	27	3	90	9	1
PREGNANCY (ANTENATAL CARE)									
Early and appropriate antenatal care [provided at hospital if this is the nearest facility]	70	27	3	80	19	2	90	9	1
Screening for maternal illness, e.g. heart disease	70	27	3	80	19	2	90	9	1
Iron and folic acid supplementation	70	27	3	80	19	2	90	9	1
Tetanus immunisation	70	27	3	80	19	2	90	9	1
Prevention of mother-to-child transmission of HIV (PMTCT)	70	27	3	80	19	2	90	9	1
Prevention of malaria including insecticide-treated nets and intermittent preventive treatment	10	81	9	10	81	9	10	81	9
Treatment of malaria in pregnancy	30	63	7	30	63	7	30	63	7
Smoking cessation	70	27	3	80	19	2	90	9	1
Management of syphilis	70	27	3	80	19	2	90	9	1
Dietary counselling for healthy weight gain and adequate nutrition	70	27	3	80	19	2	90	9	1

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
Prevention of and screening for gestational diabetes	70	27	3	80	19	2	90	9	1
Treatment of gestational diabetes	20	72	8	20	72	8	20	72	8
Treatment of eclampsia	10	81	9	10	81	9	10	81	9
Treatment of pre-eclampsia	10	81	9	10	81	9	10	81	9
Management of obstetric complications (preterm premature rupture of membranes, macrosomia, etc)	10	81	9	10	81	9	10	81	9
Antenatal corticosteroids for women at risk of birth from 24–34 weeks of gestation when appropriate conditions are met	0	90	10	0	90	10	0	90	10
Management of malpresentation at term	0	90	10	0	90	10	0	90	10
CHILDBIRTH									
Facility–based childbirth with a skilled birth attendant	70	27	3	80	19	2	90	9	1
Active management of third stage of labour	70	27	3	80	19	2	90	9	1
Management of prolonged or obstructed labour	70	27	3	80	19	2	90	9	1
Instrumental delivery for maternal/foetal indications	80	18	2	80	18	2	80	18	2
Caesarean section for maternal/foetal indications	0	90	10	0	90	10	0	90	10
Induction of labour with appropriate medical indications	0	90	10	0	90	10	0	90	10
Management of intrapartum haemorrhage	10	81	9	10	81	9	10	81	9
Prevention and management of eclampsia (including with magnesium sulphate)	10	81	9	10	81	9	10	81	9
Management of women with or at risk of infections (including prophylactic use of antibiotics for caesarean section)	10	81	9	10	81	9	10	81	9

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
POSTNATAL (MOTHER)									
Care in the facility for mother and baby for at least 24 hours after an uncomplicated vaginal birth	70	27	3	80	19	2	90	9	1
Promotion, protection and support of exclusive breastfeeding for 6 months	70	27	3	80	19	2	90	9	1
Management of postpartum haemorrhage (PPH)	10	81	9	10	81	9	10	81	9
Management of eclampsia	10	81	9	10	81	9	10	81	9
Treatment of maternal anaemia	0	90	10	0	90	10	0	90	10
Management of postpartum sepsis	10	81	9	10	81	9	10	81	9
Routine postpartum examination	70	27	3	80	19	2	90	9	1
Initiation or continuation of antiretroviral therapy)	5	85.5	9.5	5	85.5	9.5	5	85.5	9.5
Response to intimate partner violence	10	81	9	10	81	9	10	81	9
Screening for postpartum depression	70	27	3	80	19	2	90	9	1
Management of postpartum depression	50	45	5	50	45	5	50	45	5
Postnatal contact with an appropriately skilled healthcare provider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	80	18	2	80	18	2	80	18	2
POSTNATAL (NEWBORN)									
Care in the facility for mother and baby for at least 24 hours after an uncomplicated vaginal birth	70	27	3	80	19	2	90	9	1
Immediate drying and thermal care	70	27	3	80	19	2	90	9	1
Neonatal resuscitation with bag and mask	70	27	3	80	19	2	90	9	1
Hygienic cord and skin care	70	27	3	80	19	2	90	9	1
Initiation of prophylactic antiretroviral therapy for babies exposed to HIV	0	90	10	0	90	10	0	90	10

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
Kangaroo mother care for small babies	70	27	3	80	19	2	90	9	1
Extra support for feeding small and preterm babies with breast milk	40	54	6	70	27	3	80	18	2
Continuous positive airway pressure to manage babies with respiratory distress syndrome examination [requires equipment not available at primary level, but care would start at primary level if that's where the delivery occurred]	0	90	10	0	90	10	0	90	10
Case management of possible severe bacterial infection	5	85.5	9.5	5	85.5	9.5	5	85.5	9.5
Management of newborns with severe jaundice	0	90	10	0	90	10	0	90	10
Management of genetic conditions	0	90	10	0	90	10	0	90	10
Postnatal contact with a skilled healthcare provider, at home or in the health facility, around day 3, day 7 and at 6 weeks after birth	70	27	3	80	19	2	90	9	1
ADOLESCENT HEALTH AND DEVELOPMENT									
Routine vaccination (DPT, hepatitis B, BCG, HPV)	70	27	3	80	19	2	90	9	1
Promotion of healthy behaviour (e.g. nutrition, physical activity, no tobacco, alcohol, drugs)	70	27	3	80	19	2	90	9	1
Prevention and detection of anaemia	70	27	3	80	19	2	90	9	1
Management of anaemia	50	45	5	50	45	5	50	45	5
Comprehensive sexuality education, information and counselling for sexual and reproductive health, including contraception	70	27	3	80	19	2	90	9	1
Services for comprehensive sexual and reproductive health including contraception	70	27	3	80	19	2	90	9	1

Intervention	PLAIN			HILL			MOUNTAIN		
	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary	% primary	% secondary	% tertiary
Psychosocial support and related services for adolescent mental health and wellbeing	0	90	10	0	90	10	0	90	10
Prevention of sexual and other forms of GBV	70	27	3	80	19	2	90	9	1
Response to sexual and other forms of GBV	10	81	9	10	81	9	10	81	9
Prevention and detection of communicable and non-communicable diseases and STIs, including HIV	70	27	3	80	19	2	90	9	1
Treatment of HIV	0	90	10	0	90	10	0	90	10
Treatment of syphilis	70	27	3	80	19	2	90	9	1
Treatment of gonorrhoea	70	27	3	80	19	2	90	9	1
Treatment of chlamydia	70	27	3	80	19	2	90	9	1
Treatment of trichomoniasis	70	27	3	80	19	2	90	9	1
Detection of hazardous and harmful substance use	10	81	9	10	81	9	10	81	9
Management of hazardous and harmful substance use	0	90	10	0	90	10	0	90	10
Prevention of suicide	10	81	9	10	81	9	10	81	9
Management of self-harm/suicide risks	5	85.5	9.5	5	85.5	9.5	5	85.5	9.5