MYANMAR SRMNAH WORKFORCE ASSESSMENT

3MDG

MINISTRY OF HEALTH AND SPORTS

UNFPA

MYANMAR SRMNAH WORKFORCE ASSESSMENT

Foreword

The theme for International Day of the Midwife 2016 was *Women and Newborns: The Heart of Midwifery*. On this day, Myanmar's Ministry of Health and Sports, and development partners working in the field of midwifery around the world celebrated the successes of midwives. Though progress has been made in reducing preventable maternal mortality, it remains a significant challenge in Myanmar, and four prevailing causes are responsible for 70% of maternal deaths: post-partum bleeding, high blood pressure, infection and complications of unsafe abortions. Thousands of women, adolescents and newborns could be saved by having access to skilled care at birth and access to medicines and health supplies. Evidence shows that midwives who are educated and regulated to international standards can provide 87 per cent of the essential care needed by women of reproductive age and newborns.

Myanmar participated in the *State of the World's Midwifery* report 2014: the second time this country has participated in this initiative. Participation required a review of the situation of midwifery in Myanmar, so brought together midwives, faculty of midwifery training schools, practising midwives, UN agencies, the national midwifery association and council and other stakeholders. The analysis that followed resulted in recommendations and a call for strengthening of midwifery in Myanmar. The Ministry of Health and Sports, and UNFPA Myanmar organized a meeting in June 2015 to develop draft national midwifery standards as per the ASEAN *Regional Guideline for Minimum Requirements for Training and Accreditation of Skilled Birth Attendants*, and to discuss the way forward for strengthening midwifery education.

UNFPA Myanmar, with the leadership of the Ministry of Health and Sports, and with expertise provided by the Spanish research institute, ICS Integrare (an expert group of researchers in workforce assessment) coordinated this assessment with a national team of consultants, as part of the Joint UN Health System Strengthening Initiative supported by the 3MDG Fund. The assessment looks in detail at four key areas which are at the core of the concept of effective coverage of sexual, reproductive, maternal, newborn and adolescent health (SRMNAH) services: availability, accessibility, acceptability and quality. It is heartening to see that, based on this detailed analysis, three strategies are laid out as potential ways to increase the extent to which Myanmar's health workforce can better meet the SRMNAH needs of our population. All three strategies focus primarily on midwives, as they are the backbone of Myanmar's SRMNAH system and uniquely able to provide services across the full continuum of SRMNAH care.

I am confident that the findings and recommendations will form the basis for the development of evidence-based midwifery workforce policy and planning as well as for improving the health system with a view to providing high quality services centered on women and newborns.

I would like to take this opportunity to thank UNFPA Myanmar for its partnership and continuous support. I am certain that with our political will, increased investments in midwifery workforce policy and planning, women will no longer die giving life.

Prof. Dr. Myint Han
Director General-DHPRDM
Ministry of Health and Sports

Acknowledgements

Workforce planning is an integral part of the health system strengthening and its strategic management. Within this, midwives are the backbone of Sexual, Reproductive, Maternal, Newborn and Adolescent Health (SRMNAH) care. They are often the ones who are on the frontline of health care and the only point of contact with the local population. This is especially the case in Myanmar, where 70% of the population live in rural areas.

Recent evidence has shown that data driven health workforce planning and programming for improved access to skilled midwifery care, has led to significant reductions in maternal and infant mortality rates. Based on this fact, an SRMNAH workforce assessment was undertaken for Myanmar in order to obtain a basis for the development of the midwifery workforce policy and planning. UNFPA acknowledges the leadership and foresight of the Ministry of Health and Sports in this undertaking and recognizes especially the drive of the Department of Health Professional Resource Development and Management (DHPRDM) in this endeavor. UNFPA has provided its technical support and co-ordination to the process.

I thank the national assessment team for the workforce assessment, consisting of representatives from the Department of Health Professional Resource Development and Management, Department of Public Health, Department of Medical Services, Ob-Gyn Society of the Myanmar Medical Association, Myanmar Nurse and Midwife Association, Myanmar Nurse and Midwife Council, WHO, UNICEF, UNOPS, Jhpiego, Marie Stopes International, Myanmar Maternal and Child Welfare Association and the UNFPA Myanmar Country Office.

Added to those mentioned above, were numerous other colleagues, partners and stakeholders who joined in providing further valuable contributions and at the review stage, including: Nursing Officers/ Assistant Directors from State and Regional Health Departments, Principals/Tutors of all Midwifery Training Schools, Professors of Ob-Gyn at the Institute of Medicine I, Pact Myanmar and Ipas.

My heartfelt gratitude goes especially to the analysis and drafting team which consisted of: Dr. Phone Myint and Dr. Ohnmar Kyi (independent consultants), and Dr. Andrea Nove and Dr. Francisco Pozo Martin (ICS Integare), and the editing team of Joanne McManus and Anna Rayne.

Last but not the least, I wish to acknowledge that this work of high importance for health system strengthening was made possible by the generous funding support of the donors of the 3MDG Fund. This assessment formed part of a larger joint initiative by the UN in Health System Strengthening in Myanmar.

Janet E. Jackson
UNFPA Representative for Myanmar

Contents

Foreword I
Acknowledgements II
Executive summary V

1 Background and methods 1
2 Context 4

2.1 General country context 4
2.2 Myanmar's health system 4
2.2.1 General 4
2.2.2 Sexual, reproductive, maternal, newborn and adolescent health 6
2.3 Population health status 8
2.4 Sexual, reproductive, maternal, newborn and adolescent health status 8
2.5 Policy context 12
2.6 Health financing 14

3 The need for SRMNAH workers 16

3.1 Defining 'need' 16
3.2 Demography 16
3.3 Epidemiologic Information relevant to sexual, reproductive, maternal, newborn and adolescent health 19

4 The current SRMNAH workforce in Myanmar 20

4.1 Health worker cadres counted as part of the SRMNAH workforce 20
4.2 The four dimensions of effective coverage of SRMNAH workers 20
4.2.1 Availability 20
4.2.2 Accessibility 22
4.2.3 Acceptability 27
4.2.4 Quality of care 28
4.3 Modelling met need and effective coverage of SRMNAH workers 31
4.3.1 Time spent by health workers on providing SRMNAH care 31
4.3.2 SRMNAH worker competencies 33
4.3.3 'Met need' for SRMNAH workers: baseline model 33
4.3.4 Adjusting baseline met need estimates to produce effective coverage estimates 36
4.3.5 Met need and effective coverage: future projections 38

5 The future SRMNAH workforce in Myanmar 41

5.1 Options for future development of the SRMNAH workforce 41
5.1.1 Option 1: Task shifting 41
5.1.2 Option 2: Improve SRMNAH workers' performance 42
5.1.3 Option 3: More graduates with more competencies, and increase absorption and retention 42
5.2 Impact of each option 45
5.2.1 Impact on met need for essential SRMNAH services 45
5.2.2 Costs 49
5.2.3 Lives saved 52

Contents

Abbreviations and acronyms 55

References 56

Annex A: SRMNAH worker competencies 60

Annex B: Estimating need for SRMNAH interventions 63

Annex C: SRMNAH worker education institutions 66

Annex D: Methodology for lives saved estimates 68

D.1 Quantifying the relationship between met need and coverage of SRMNAH interventions 68
D.2 Estimating the number of lives saved due to the increase in coverage 73
D.2.1 Baseline projection 74
D.2.2 Projection for option 1: Task shifting 76
D.2.3 Projection for option 2: Improve performance 78
D.2.4 Projection for option 3: More graduates with more competencies 80

Annex E: The national assessment team for SRMNAH workforce assessment 82

Executive summary

Myanmar has made commitments to achieve targets under the Millennium Development Goals (MDGs), the Sustainable Development Goals (SDGs) and the Family Planning 2020 initiative. There is increasing recognition at global, regional and national levels that health workers form the backbone of effective and resilient health systems, but there is a lack of accurate, up-to-date information about the health workforce. This hampers efficient planning and programming, which in turn is a barrier to achieving national targets.

There have been great improvements in sexual, reproductive, maternal, newborn and adolescent health (SRMNAH) in Myanmar, but the country did not achieve its MDG targets for maternal and child mortality, and there is evidence of inequality of access to essential SRMNAH care. Myanmar recognizes SRMNAH as a priority, and is committed to scaling up and strengthening midwifery as a key part of the strategy to improve SRMNAH. UNFPA Myanmar commissioned this workforce assessment to contribute to improvements in SRMNAH workforce planning and management. The assessment set out to answer the following question:

> *What is the appropriate SRMNAH workforce for Myanmar, and how is it best deployed, to equitably deliver essential SRMNAH interventions at scale and quality, and what (including costs) needs to be put in place to achieve universal access?*

The SRMNAH workforce in Myanmar was defined as: auxiliary midwives (AMWs), midwives, nurses, lady health visitors (LHVs), generalist doctors, obstetricians/gynaecologists and paediatricians/neonatologists. Most midwives and LHVs are deployed in health centres and in the community, whereas nurses and doctors tend to be deployed in hospitals. AMWs are volunteers who work within their own communities.

The framework for this assessment is based on four critical dimensions of human resources for health: availability, accessibility, acceptability and quality. These can be considered as the four components of effective coverage, which reinforce the universal health coverage agenda. This assessment takes a needs-based approach to assessing the level of effective coverage, which involves the following stages:

1. Decide which SRMNAH services should be provided.
2. Estimate how much health worker time would be necessary to deliver all of these services to all those who need them.
3. Estimate the proportion of needed SRMNAH worker time that is available to spend on SRMNAH care, taking into account the varying skills and competencies of different cadres of SRMNAH workers.
4. Adjust the availability estimates to take into account accessibility, acceptability and quality and thus estimate levels of effective coverage.

Midwives, LHVs and AMWs account for over half of the SRMNAH workforce of Myanmar as a whole, but less than half of the SRMNAH workforce in Kachin, Yangon and Nay Pyi Taw, where doctors and nurses dominate. Because SRMNAH workers spend some of their time on non-SRMNAH duties, it is inappropriate to use headcount as a measure of SRMNAH workforce size. Taking into account the amount of time that SRMNAH workers spend on non-SRMNAH work reduces the size of the workforce by 70% (i.e. the full-time equivalent SRMNAH workforce is just 30% of the headcount).

Midwives are acknowledged as the backbone of the SRMNAH care system, but currently they receive a lower level of education than nurses and have relatively restricted options for career progression. Plans to introduce a new bachelor's degree in midwifery are well advanced, which will help to address this issue and bring the competencies of Myanmar's midwives up to international standards. However, midwives' scope of practice will continue to be somewhat limited due to legal restrictions on the number of essential SRMNAH interventions they are authorized to perform. Also, they are relatively poorly paid, given their level of education.

The full-time-equivalent SRMNAH workforce in Myanmar is large enough to meet almost three quarters (73%) of the need for essential SRMNAH interventions, assuming tasks are allocated to health workers in an economically efficient way (i.e. allocated to the least expensive cadre that is competent to perform the task). This 'met need' estimate varies by state/region, standing at 97% in Chin and Kayah but just 48% in Mandalay. Most of the need for SRMNAH care—and therefore most of the unmet need—is for pre-pregnancy sexual and reproductive health services, such as family planning services, screening and management of HIV and other sexually transmitted infections.

If Myanmar continues on its current trajectory, it is projected that the SRMNAH workforce will be sufficiently large, and will have the appropriate skill-mix, to meet almost 100% of the need by 2027, and that this level of met need will be sustained until 2030. However, because of the way SRMNAH services are configured (tasks cannot always be allocated according to the principle of economic efficiency), it is highly unlikely that the workforce actually meets three quarters of the need at present, nor is it likely to meet all of the need by 2027.

Likewise, the 'met need' estimates above take into account only the availability dimension of effective coverage. The considerable challenges to accessibility, acceptability and quality in Myanmar mean that effective coverage of SRMNAH services could be as low as 24% nationally (ranging from 48% in Kayah to just 9% in Chin) and is not projected to increase substantially over the next 15 years unless additional efforts are made to address all four dimensions of effective coverage.

In this assessment, the three following strategies are considered as potential ways to increase the level of met need and/or effective coverage. All three focus primarily on midwives, as they are the backbone of the SRMNAH system and uniquely able to provide services across the full continuum of SRMNAH care. The three strategies are:

1. Task shifting: all tasks relating to disease control and environmental sanitation would be removed from the job description for midwives and would become the responsibility of public health supervisors (PHS-IIs). Thus, midwives would be able to spend more of their available working time on the SRMNAH duties for which they are specifically trained.
2. Improve SRMNAH workers' performance by: (a) providing in-service training to all midwives in the four BEmONC signal functions that they are authorized to perform and in the most modern methods of post-abortion care, and (b) improving the infrastructure and working conditions of midwives, especially those deployed in hard-to-reach areas.
3. Produce more graduates with more competencies by: (a) increasing the number of graduate midwives, (b) introducing a bachelor's degree course in midwifery with a curriculum that meets global standards for midwifery education and the country's need, (c) increasing midwives' salaries to reflect their level of education, (d) improving recruitment and retention of midwives in hard-to-reach areas, and (e) improving absorption of newly qualified midwives into the public health system.

It is estimated that implementing either strategy 1 or strategy 3 would result in Myanmar achieving close to 100% met need 3-5 years earlier than would occur under the current trajectory. Both of these strategies would also result in quicker progress towards the levels of effective coverage currently expected by 2030.

The second strategy would not have much impact on met need until after 2030, because it would take until 2030 to implement it fully. Option 2 would, however, have an immediate and sustained impact on effective coverage due to the improvements to quality of care, but would also involve considerably higher costs than the other two options.

In terms of lives saved, the most effective option of the three would be to produce more graduates with more competencies. It is projected that this option would save approximately 80,000 lives by 2030 (the deaths of about 2,000 mothers, 59,000 newborns and 19,000 stillbirths would be averted). The first strategy (task shifting) would save about 25,000 lives over the same period (500 mothers, 18,300 newborns and 5,800 stillbirths). The second strategy (improving performance) is projected to save relatively few lives by 2030 (500 mothers, 2,300 newborns and 700 stillbirths) because it is a longer-term strategy and therefore its effects would not be fully observable until after 2030. Since policy options are based on certain assumptions and different parameters, when considering one option or a combination of options, targets should be set and fulfilled.

1 Background and methods

The United Nations Secretary-General's Global Strategy for Women's and Children's Health[1] and the H4+ High Burden Countries Initiative[2] reaffirmed the consensus among health ministers, United Nations agencies, health professionals and civil society organizations (CSOs) that health workers form the backbone of effective and resilient health systems. The practical implications of the need to develop the health workforce have been set out by the World Health Organization (WHO) in its global strategy for health workforce development[3]. Lack of critical information on the health workforce hampers efficient planning and programming, preventing access to skilled care and leading to the deaths of women, adolescents and newborns, and to high stillbirth rates. The State of the World's Midwifery (SoWMy) reports of 2011 and 2014[4, 5], among other global reports, stressed the need for better data on the availability, accessibility, acceptability and quality of the sexual, reproductive, maternal, newborn and adolescent health (SRMNAH) workforce.

Myanmar, as a signatory to the Programme of Action of the International Conference on Population and Development, is committed to achieving the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) as well as improving family planning as envisaged under the FP2020 initiative[6]. Myanmar also recognizes maternal and newborn health (MNH) as a priority and a central component of reproductive health (RH), together with the other core elements of the WHO Global Reproductive Health Strategy[7]. As outlined in the Five-Year Strategic Plan for Reproductive Health (2014–2018)[8], priority is placed on scaling up and strengthening midwifery to reduce maternal, newborn and child deaths in Myanmar.

Midwives play a critical role in ensuring that women, adolescents and newborns survive and thrive. When well educated and regulated to international standards, midwives can provide 87% of the essential care for women and newborns[5]. Recent evidence indicates that improving access to midwifery care can lead to significant reductions in mortality rates[9]. Evidence also suggests that, in order to achieve their potential in improving SRMNAH, midwives should form part of a multi-disciplinary team which is appropriately planned and managed to ensure that it functions effectively and allows each team member to practise to the full scope of his or her professional competencies[10]. Therefore, while midwives are a key SRMNAH cadre with considerable potential to influence SRMNAH, it is appropriate to assess the entire SRMNAH workforce in order to gauge the extent to which a multi-disciplinary team is in place, and the place of midwives within it.

With this in mind, the United Nations Population Fund (UNFPA) Myanmar commissioned this assessment to enable improvements to SRMNAH workforce planning and management in Myanmar. It was undertaken in accordance with the SRMNAH workforce assessment tool developed jointly by UNFPA, WHO and ICS Integrare[11]. The objective of the assessment is to answer the following question:

> *What is the appropriate SRMNAH workforce for Myanmar, and how is it best deployed, to equitably deliver essential SRMNAH interventions at scale and quality, and what (including costs) needs to be put into place to achieve universal access?*

The national assessment involves assessing and discussing policy on SRMNAH workforce issues, and reveals who does what, and where. It also provides future projections and options to support workforce planning for a resilient health system. The assessment is designed to:

- Describe existing policies, guidelines and regulations regarding the SRMNAH workforce
- Describe the current performance of the SRMNAH workforce as well as factors influencing this (education, working environment, management, policies and financing)
- Identify gaps in and opportunities to improve universal access to a qualified SRMNAH workforce
- Identify practices that can improve the performance of the SRMNAH workforce
- Formulate scenarios and costed options to improve equitable access to, and the quality, efficiency and utilization of SRMNAH services
- Develop strategies to engage stakeholders, inform policy dialogue and influence decision-making at the national level

The theoretical framework for the assessment is based on the Tanahashi framework[12], which considers four critical dimensions of human resources for health: availability, accessibility, acceptability and quality (AAAQ). The AAAQ dimensions are at the core of the concept of *effective coverage*, the right to health[13], and the social protection floors agreed by the International Labour Organization's member states[14]; collectively, they reinforce the universal health coverage (UHC) agenda. The assessment and this report are structured around them.

The assessment was undertaken in three phases, each building on the work conducted in the previous phase:

Phase 1: Preparation. The start-up process included: (a) the identification of partners and members of the national assessment team, and (b) a desk review to gather available data and identify gaps in these data. Following the desk review, a national expert workshop was convened in Nay Pyi Taw in September 2015, during which the start-up process was reviewed, data gaps identified and additional sources of data suggested.

Phase 2: Population of the core data set. Information gaps identified in Phase 1 were filled by collecting new information and data in the field. This involved (a) locating and collating data that are not available from published reports, and (b) filling remaining gaps via primary data collection:

- State/region data on health workforce and health facilities were obtained from the Health Management Information System (HMIS) yearly report Form 3[15] for all 330 townships.
- Data on health facility readiness to perform emergency obstetric and neonatal care (EmONC) were derived from hospital statistics[16].
- Data on caesarean section rates were obtained from hospital statistics, including data from private hospitals from 2013 onwards[17].
- Estimates of the number of women of reproductive age for 2015 to 2030 were based on the 2014 number and projected forward using the population growth rate (linear regression from 1973 census), sex ratio, total fertility rate and contraceptive prevalence rate[18,19].
- To obtain state/region-level estimates of the number of deliveries, the data for 2004-2014 from yearly report form 3[15] by region/state were used, and verified by reference to the number of live births recorded in the 2014 population census. The trend line for abortion was estimated using a series of annual hospital statistics reports starting from 2004[20].

- Primary data collection was done to supplement information on: roles of each SRMNAH cadre, skill mix available at different levels of service provision, what motivated secondary school pupils to choose a midwifery career, and further information on pipelines into the SRMNAH workforce. It was difficult to obtain estimates of the percentage of working time spent on SRMNAH, so the estimates obtained during Phase 2 were verified and adjusted during Phase 3 (see below).

Phase 3: Data analysis and synthesis. Data were analysed and synthesized, and disparities between the state of the midwifery workforce and country need were identified. A number of options were identified for future development of the SRMNAH workforce, then further developed during stakeholder workshops in Nay Pyi Taw and Yangon in January 2016. At these workshops, key data and assumptions were shared with stakeholders (e.g. the percentage of working time each cadre spends on SRMNAH), and adjusted according to the recommendations of the national experts.

Under the overall direction of the UNFPA Myanmar Country Office, and with the cooperation of the Ministry of Health (MoH), phases 1 and 2 were conducted by two national consultants (Dr. Phone Myint and Dr. Ohnmar Kyi) and phase 3 was conducted by two international consultants (Dr. Andrea Nove and Dr. Francisco Pozo Martin of ICS Integrare), in partnership with the national consultants.

2 Context

2.1 General country context

Myanmar lies between latitudes 09°32´ and 28°31´N and longitudes 92°10´ and 101°11´E, and has an area of approximately 676,578 square kilometres. It shares borders with China to the north and east, the Lao People's Democratic Republic and Thailand to the east, and India and Bangladesh to the west. Administratively, Myanmar consists of seven regions (Ayeyarwady, Bago, Magway, Mandalay, Sagaing, Taninthayi and Yangon), seven states (Chin, Kachin, Kayah, Kayin, Mon, Shan and Rakhine) and the Union Territory. Nay Pyi Taw, the capital, designated as the Union Territory, is under the direct administration of the President. The regions and states are subdivided into districts, townships, sub-townships and towns. The urban parts of each township are divided into wards and the rural parts into tracts made up of villages. In accordance with the current Constitution[21], five self-administered zones and one self-administered division for six minority ethnic groups have been established.

The population of Myanmar includes over 130 ethnic groups. The eight major groups are: the majority Bamar (60%) followed by the Shan (8.5%), the Kayin (6.2%), the Rakhine (4.5%), the Mon (2.4%), the Chin (2.2%), the Kachin (1.4%) and the Kayah (0.4%). Over 100 languages and dialects are spoken across the country, with Myanmar as the official language[22]. With a population of around 51.4 million[23], Myanmar has both the lowest gross domestic product (GDP) per capita and one of the highest poverty rates in Southeast Asia [22]. The latest Integrated Household Living Conditions Survey indicates that one in every four citizens of Myanmar is considered poor[24]; using the same data set but a different methodology, the World Bank estimated its poverty rate at 37.5%[25].

After three decades without a population and housing census, Myanmar conducted its latest census in April 2014. This indicated that almost 40% of the population live in Yangon, Ayeyarwady and Mandalay, and that the newly formed capital Nay Pyi Taw, together with Chin and Kayah States make up 3.5% of the total population. Urbanization is also noted, with a national rate of 30%; Yangon is the most urbanized region at 70%, while Magway and Ayeyarwady regions remain rural with around 85% of the population residing in villages[23].

2.2 Myanmar's health system

2.2.1 General

Myanmar's health system follows the country's administrative structure, with health departments at regional/state, district and township levels[26]. At township level there are township hospitals, station hospitals, and rural and sub-rural health centres (RHC and sub-RHC). Primary care infrastructure starts with sub-RHCs at the grassroots level, In RHCs ambulatory care and outreach services, including delivery care, are provided. Curative services in rural areas are provided in 16-bed station hospitals. These are headed by station medical officers, and provide emergency care as well as general medical care. Most townships have a 25-bed (in some cases, a 50-bed) township hospital providing emergency care and treatment, primary care for prevalent diseases, clinical care such as general medicine, surgery, obstetrics and gynaecology, paediatric care, and general administrative and auxiliary services. Some townships have urban health centres providing ambulatory care and dental care, and Maternal and Child Health (MCH) Centres for pregnant mothers and children under five.

Township health departments serve a population of approximately 100,000-300,000. Each department is headed by a township medical officer. Urban areas are served by township hospitals, urban health centres, MCH centres and school health teams. In rural areas, township health departments oversee

1-3 station hospitals and 4-9 RHCs. Each RHC has 4-7 sub-RHCs. Each sub-RHC is staffed by a midwife and a public health supervisor grade 2 (PHS-II), while outreach services are provided by midwives supported by volunteer auxiliary midwives (AMWs) and community health workers (CHWs).

Most districts comprise 2-6 townships and have a 100-bed (in some cases, a 200-bed) district hospital providing the same secondary-level care services as the township hospitals and also specialized services in general medicine, surgery, obstetrics and gynaecology, paediatrics, anaesthesia, orthopaedics, ophthalmology, dentistry and pathology.

The regional/state-level hospitals offer a wider range of secondary-level specialities (medicine, surgery, obstetrics and gynaecology, paediatrics, anaesthesia, orthopaedics, ophthalmology, ear-nose-throat, radiology, pathology, psychiatry, dentistry, forensic medicine, microbiology, physiotherapy, neuro-medicine and neuro-surgery). Supportive radiology and clinical laboratories are also provided at this level.

Tertiary-level care hospitals exist in Yangon, Mandalay and Nay Pyi Taw with over 20 specialist disciplines, fully equipped for tertiary-level care services including intensive care. Some of these also function as teaching and training hospitals for both undergraduate and postgraduate medical students. Specialist hospitals, such as women's hospitals, children's hospitals, orthopaedic hospitals, eye/ear, nose and throat hospitals and psychiatric hospitals are situated in the cities of Yangon, Mandalay and Taunggyi (Shan state).

In the public sector RHCs, sub-RHCs, MCH centres and urban health centres provide ambulatory care and are patients' first point of contact with the health system. Health promotion activities (concerning e.g. nutrition for mothers and children, exclusive breastfeeding and safe motherhood measures) are also carried out, particularly in the course of antenatal care (ANC).

In 2014, there were 16.4 doctors, nurses and midwives per 10,000 population in Myanmar, an increase from 14.9 in 2010–11. However, the 2006 World Health Report stated that countries with fewer than 22.8 doctors, nurses, and midwives per 10,000 population were unlikely to be able to provide even the most basic health services.

The MoH is responsible for coordinating the health workforce at the national level, and for coordinating mechanisms at the national, subnational and district levels, according to the guidelines provided by central government. External partners (e.g. UN organizations, non-governmental organizations (NGOs), international organizations, donor organizations, international academic organizations and civil society organizations (CSOs) are involved in workforce planning and activities. The nature of their involvement varies and may include financial support, service provision and/or education and training. External (non-MoH) groups such as CSOs and NGOs coordinate workforce activities between community and facility, or facility and district levels. They work mostly on community-based MNH programmes, and help to build capacity by training basic health staff and health volunteers. They also support the MoH through coordination and partnership activities, and support first-level and referral-level health facilities by providing training, drugs, equipment and supplies, and with aspects of service provision. Many of their projects are focused on training midwives and volunteers for community-based projects designed to update knowledge and awareness of maternal and child health and nutrition[27].

All categories of public-sector health workers are government-salaried employees. The salary is set by the Ministry of Finance as stipulated in the rules and regulations relating to the civil service. Gender has no effect on the level of salary. Salaries are adjusted every 2 years for the first 10 years in a given post.

In addition, financial incentives are available: health workers in hard-to-reach areas are entitled to an additional hardship allowance (see Section 5.1.3). Since salary is standardized across ranks, salaries across different professions within the health sector and across ministries are similar for the same rank. Health workers in underserved areas are given special consideration in terms of postgraduate studies, promotion and/or studying overseas[22].

Although a health management information system (HMIS) is in place, it needs leadership and further strengthening. This is also true of workforce information. In addition, coordination between MoH departments needs to be improved. The MoH is currently in the process of developing a computerized human resources for health database.

The private health sector is a major source of service provision. Private sector services are mostly confined to urban settings and were initially limited to primary and ambulatory care. More intensive and institutional care is now available in big cities. Most people are inclined to seek private health care on becoming aware of their illness, but most of those with severe cases requiring specialized care rely on the public facilities. The private sector has expanded rapidly and is currently estimated to provide 75–80% of ambulatory care [22], but it relies on the medical professionals working in public facilities, who are allowed to practise privately outside of office hours.

2.2.2 Sexual, reproductive, maternal, newborn and adolescent health

The full continuum of SRMNAH care is available, from the primary level where standard care, basic emergency care and outreach services are provided, to the secondary and tertiary levels which also serve as referral centres for comprehensive care. Table 1 summarizes the staffing pattern and midwifery care provided at each level.

Table 1: SRMNAH care provided at different types of health facility

Care / Facility/ workforce	Ambulatory care		Hospital care			
	Rural	Urban	Primary		Secondary	Tertiary
Facility type	RHC and sub-RHC	Urban health centre and maternal and child health centre	Station hospital (16 beds)	Township hospital (25-50 beds)	District hospital, regional/state hospital (100, 150, 200 and 300 beds)	Specialist and teaching hospital (500 and 1,000 beds)
SRMNAH workers employed	Midwife;* Lady health visitor	Midwife; Lady health visitor; Medical Officer	Nurse; Station Medical Officer	Nurse; Medical Officer; Township Medical Officer	Nurse; Medical Officer; Ob/Gyn Consultant; Paediatrics Consultant	Midwife; Nurse; General Medical Officer; Medical Officer (Ob/Gyn); Medical Officer (Paediatrics); Ob/Gyn Consultant; Paediatrics Consultant
Designated to carry out deliveries	Domiciliary and (some) Institutional	Domiciliary and (some) Institutional	Institutional	Institutional	Institutional	Institutional
Emergency obstetric and neonatal care	Basic	Basic	Compre-hensive	Compre-hensive	Comprehensive	Comprehensive

Ob/gyn = obstetrician/gynaecologist, RHC = rural health centre, SRMNAH = sexual, reproductive, maternal, newborn and adolescent health.

Source: Unpublished information, Ministry of Health, 2013

* At sub-RHCs the midwife works alone.

The Myanmar Health Sector Coordinating Committee (MHSCC) is multi-sectoral in nature, with participation by representatives of government ministries, United Nations agencies, international organizations, donors, international and local NGOs and the private sector. It provides a mechanism for coordinating SRMNAH activities. Under the auspices of the RH-MCH technical and strategy group, the Lead RH Working Group and the Lead Birth Spacing/Family Planning Working Group coordinate the activities of NGOs and other stakeholders engaged in projects delivering RH information and services, in order to avoid duplication of activities and to reduce the administrative burden on the Department of Public Health. Subnational level coordination is effected through the state/region, district and township level coordination mechanisms. Local authorities and committees are responsible for implementing strategic plans for RH and newborn and child health development to ensure complementarity and harmonization.

Midwives are the backbone of basic health services for families at the community level. The midwifery curriculum will be reviewed and updated to ensure that midwives meet the expected standards with regard to service delivery, particularly for the new tasks and responsibilities in RH care [DHPRDM, unpublished information, 2016]. Competency-based education and training, both pre- and in-service, will employ evidence-based standards. However, while the midwifery curriculum has been revised and the duration of training increased from 18 months to 24 months, competency-based training and ensuring an enabling environment for carrying out their responsibilities still need to be strongly emphasized.

The training of nurses in Myanmar commenced in the late 19th century and the first Myanmar nurse qualified in 1888. During the early years only the basic diploma course in general nursing was taught; nurses had to attend a course on midwifery to become a nurse midwife. A nursing and midwifery course was started in 1990 whose graduates hold both a nursing diploma and a midwifery certificate[28]. The first Nurses' Training Centre was opened in 1986 and was upgraded to become the Institute of Nursing (forerunner of the current University of Nursing, Yangon) in 1991 when the Bachelor of Nursing Science (BNSc) degree programme was established. Thus nursing education became highly academic after 1986[29]. Midwifery training was introduced in 1901 at the Dufferin Hospital in Rangoon (Yangon). Suitable women who had attained 7th standard education (middle school) were selected by the municipal and district councils. For the registration and better training of midwives and nurses in the country, an 18-month midwifery course was started in 1929[30]. Currently, those who apply for nursing or midwifery training must pass matriculation. Applicants with higher marks in the matriculation are selected for the nursing university and the remaining applicants are allocated to nursing training school or midwifery training school, those with higher scores allotted to nursing training schools[28].

Volunteers such as AMWs have been trained and deployed since 1980 to assist midwives. They provide services in their own community and form a bridge between the midwife and the community. Initially, WHO, UNICEF and USAID provided support for their training and equipment; now, the Myanmar Maternal and Child Welfare Association, regional government and development partners are jointly sustaining this training and deployment[22]. Some development partners are also helping village health committees, providing seed funds and building capacity to manage these funds in order to establish revolving funds to provide financial support for emergency referrals and transport to hospitals in towns. This is particularly so in the Ayeyarwady region, following Cyclone Nargis in 2008.

Different service delivery modes are in place, including public, private, social marketing and community-based interventions. It is planned to engage NGO partners and the private sector through public-private partnerships to provide information and services in hard-to-reach areas. But these endeavours need to be made more practicable and more effective because, despite the growing involvement and

importance of private providers in the field of SRMNAH care, mechanisms for regulation, communication and information sharing are still lacking.

2.3 Population health status

In Myanmar, life expectancy at birth increased for both males and females between 1980 and 2011. The estimated life expectancy at birth for both sexes in 1980 was 55.0 years (56.5 for females and 53.7 for males). The values for 2000 were 61.9 years for both sexes (63.3 for females and 60.5 for males) showing an increase from 1980[22]. According to the 2014 Myanmar Population and Housing Census, life expectancy for both sexes is 66.8 years (69.0 for females and 63.9 for males)[23]. Improvement of the adult mortality rate among females outpaced that among males between 1999 and 2014.

Myanmar's disease-specific vertical programmes on HIV/AIDS, malaria and TB have also been viewed as effective in achieving progress towards the MDG 6 (HIV/AIDS, malaria and other diseases) targets. However, in spite of overall advances in health status, disparities remain between regions and groups in both access to, and quality of health services, especially among ethnic minorities, the poor and those living in remote areas[31].

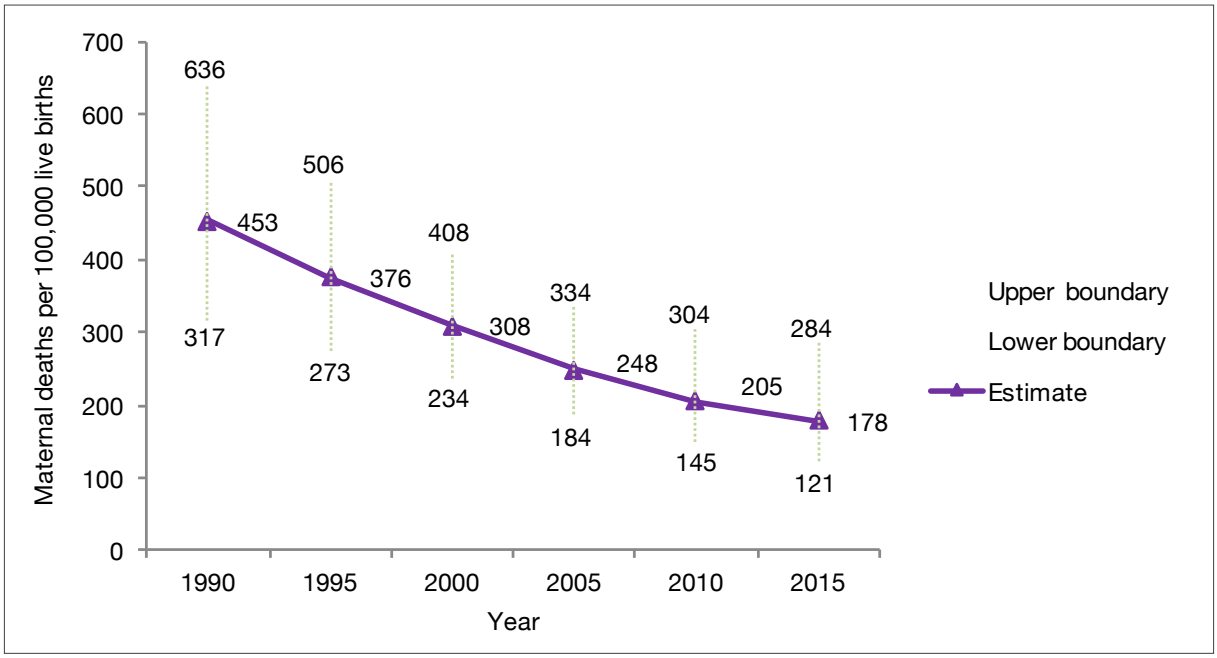
Myanmar's public health care system is critically under-resourced, with major gaps in access and coverage. In many rural areas, the system is constrained by factors such as poor health knowledge, lack of public awareness about utilization of health services, misconceptions, traditional beliefs, unreliable electricity supply, limited transport and shortage of adequately skilled health personnel[32]. According to the 1999 National Mortality Survey, differences were observed in the maternal mortality ratio (MMR) between urban and rural areas, and the values varied widely between regions.

2.4 Sexual, reproductive, maternal, newborn and adolescent health status

Myanmar was traditionally a pro-natalist country, due to its geographical position between the two enormously populous nations of India and China, and family planning was not favoured. However, fertility in Myanmar is now found to be declining. One estimate puts the total fertility rate (TFR) at 2.0, which is below the replacement rate of 2.1[22]. Yet the 2014 census estimated that TFR is 2.3 for all women and 4.03 for ever-married women with the peak age-specific fertility rate between 25 and 29 years. Fertility rates for all women aged 15-49 are higher in rural areas: 2.5 for rural women and 1.8 for urbanites[23]. There has been a gradual increase in Myanmar's contraceptive prevalence rate (CPR), which reached 37% in 2001 (32.8% using modern methods and 4.2% using traditional methods), 41% in 2007 (38.4% for modern methods) [33] and 46% in 2010 (45.7% for modern methods)[34]. Relevant factors may have been improved education and employment of women, an increase in age at first marriage, and an increase in the proportion of women who never marry[35]. Myanmar's decline in fertility, together with its decline in mortality (as indicated by crude death rates) result in the country being categorized as in the late transitional stage.

Improvements in Myanmar's MMR are shown by its gradual decline between 1990 and 2015, illustrated in Figure 1.

Figure 1: Trends in maternal mortality ratio, Myanmar, 1990–2015



Source: Maternal Mortality Estimation Inter-Agency Group[36]

MMR estimates are highly sensitive to the methodology used to calculate them. As in many other countries, differing estimates exist for Myanmar. The national mortality survey conducted by the Central Statistical Organization in 1999 estimated the MMR as 250 per 100,000 live births and data from its vital registration system published in the Statistical Year Book indicated that MMR declined from 148 in 2008 to 141 in 2011 per 100,000 live births[37]. The 2014 census estimated the MMR at 282 per 100,000 live births[38]. The main causes of maternal mortality (post-partum haemorrhage and hypertensive disorders) are preventable through effective and simple interventions.

Despite recent improvements, with an infant mortality rate of 62 per 1,000 live births and an under-5 mortality rate of 72 per 1,000 live births (among the highest rates in the Association of South East Asian Nations (ASEAN) member countries[39]) Myanmar has still not achieved the MDG 4 targets[31,40]. Each year 53,000 children aged under 5 die, of whom 43,000 are younger than 1 month. Estimates from the 2014 census show a neonatal mortality rate of 43 deaths within 28 days per 1,000 live births. Neonatal mortality accounted for 47% of all under-5 deaths in 2011. The principal causes of neonatal mortality are prematurity, birth asphyxia and sepsis, including pneumonia. Deaths are more common among babies delivered at home in rural areas[27].

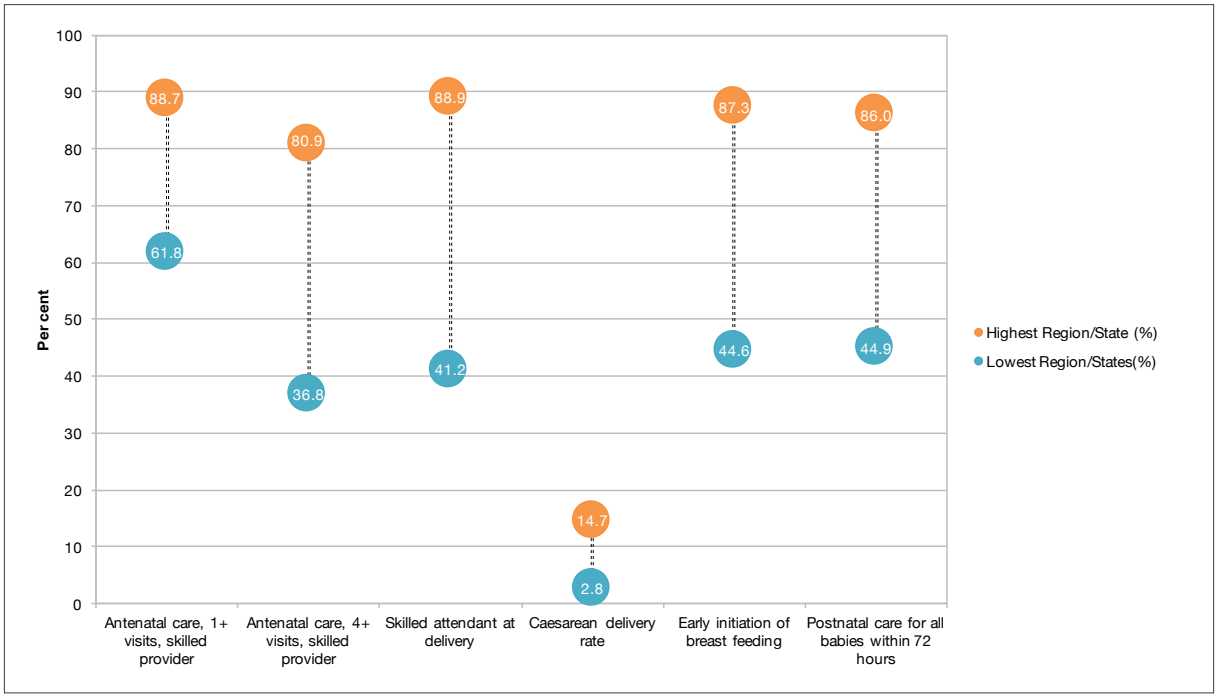
Over 90% of women receive ANC at least once during their pregnancy from any kind of provider, but the tendency is for the first appointment to take place after the first trimester of pregnancy, which is later than WHO recommends[41]. Coverage of ANC is higher in urban than in rural areas, and women with secondary or higher education and those from the richest quintile are more likely to seek ANC. More women from urban settings and those with secondary or higher education or in the richest quintile seek ANC from skilled providers[24]. Figure 2a indicates that there is wide variation in access to ANC according to region/state, with women in Mandalay and Nay Pyi Taw being most likely to attend the recommended four or more ANC appointments, and those living in Rakhine and Bago being least likely to access this level of ANC.

Figure 2a: Percentage of pregnant women accessing at least four antenatal care appointments, by region/state, 2013

Source: Annual Public Health Statistics[42]

As with ANC, births attended by skilled attendants are higher among urban dwellers, the more educated and the rich. Likewise institutional deliveries are more prevalent among those in big cities and those with more education[24]. Figure 2b illustrates the extent of the differences between regions/states on a number of measures of SRMNH service coverage. On most measures, rates in the best-served regions/states are double those in the least well-served regions/states.

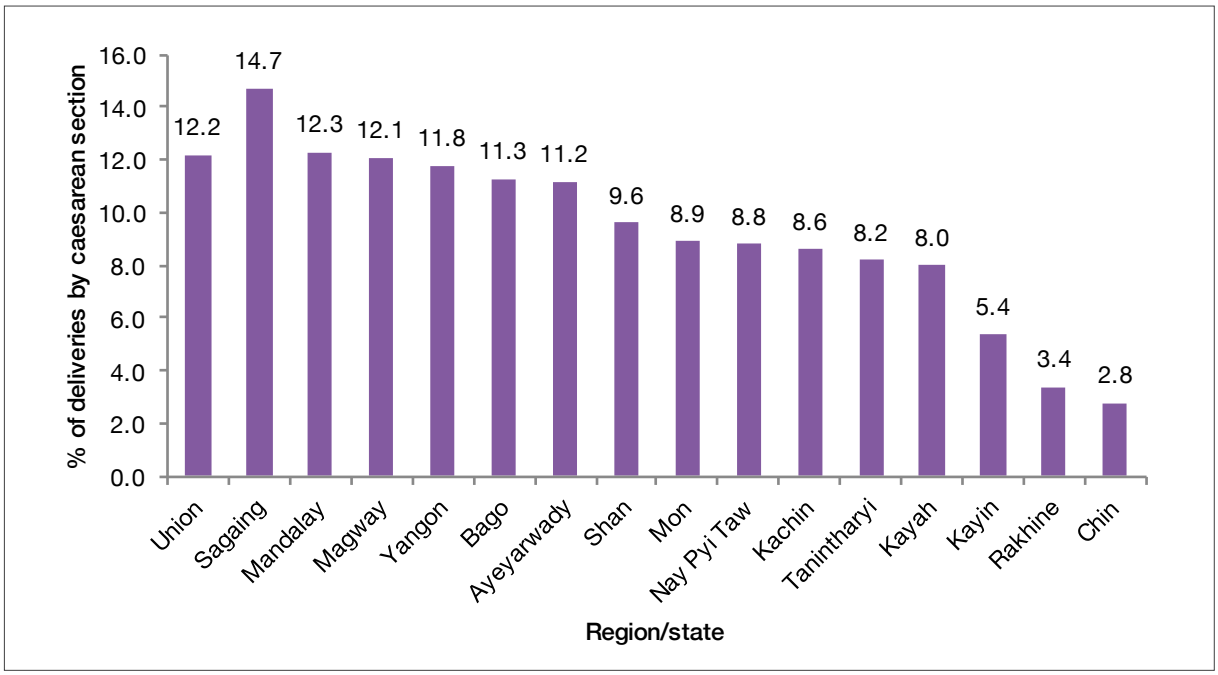
Figure 2b: Service coverage variation between regions/states, 2013



Source: Annual Public Health Statistics[42] and Annual Hospital statistics[16]

WHO stated in the past that the 'ideal' caesarean section rate should be 10–15%, with rates below 10% indicating poor access to emergency care and rates above 15% indicating possible over-medicalization. However, in 2015 WHO issued new advice[43] that, at population level, rates above 10% are not associated with mortality reduction. Figure 3 shows that the overall caesarean section rate in Myanmar in 2013 was 12%, but that this varied significantly by region/state, with nine states and regions (including the union territory of Nay Pyi Taw) recording a rate below 10% and Sagaing recording a relatively high rate of 14.7%.

Figure 3: Caesarean section rate, by region/state, 2013



Source: Derived from both public and private hospital data[17]

UNFPA is the main agency providing support on RH to the MoH and it also supports the Health Education Bureau for Behaviour Change Communication programme, targeting community support groups to aid referral of at-risk pregnant women to midwives, and also targeting youth centres for prevention of HIV/AIDS among out-of-school youths by peer education[22]. Despite these efforts, there remain significant gaps in coverage of maternal health care in Myanmar: the proportion of deliveries with a skilled birth attendant was 68% in 2012, a gradual improvement from 50% in 2001[44]. Women in rural areas still prefer home delivery (80%) and the unmet need for family planning is 18%[35].

A recent report[45] collated the evidence from all countries in the Asia and the Pacific region about adolescent sexual and reproductive health (SRH), and reported several indications that, in Myanmar, this group requires specific attention and services tailored to their needs:

- About 10% of young people aged 15-24 in Myanmar reported engaging in premarital sex, with higher rates among young men than young women[46]
- Only about half of sexually active youths in Myanmar report using a condom consistently[47]
- 74% of ever-married adolescent girls had heard of sexually transmitted infections (STIs) but most referred only to HIV, with fewer than 50% reporting knowledge of other STIs. Friends and family were cited as the most common source of information[48]
- It is estimated that 8,900 adolescents aged 10-19 in Myanmar are living with HIV: one of the highest numbers in the region[49]

- There is limited evidence about adolescents' understanding of SRH, but a qualitative study of young people in Myanmar found that few could correctly name reproductive organs or their functions, most could not explain where or how pregnancy took place, and none could explain menstruation[50]
- A small study found that pregnant adolescents in Myanmar present later for ANC and receive less adequate maternal care than older women[51]

In recognition of the importance of understanding the specific needs of adolescents, Myanmar actively engaged young people and other key stakeholders in the development of national guidelines. Myanmar's National Service Standards and Guidelines on Adolescent and Youth Health Care [52] were developed following consultation with a range of agencies including government stakeholders, United Nations agencies, NGOs and youth groups[45].

2.5 Policy context

MCH, including newborn care, has been identified as a priority issue in the National Health Plan (NHP) which aims to reduce maternal, newborn, infant and child morbidity and mortality. There are strategic plans for RH, adolescent health, and newborn and child health development. The successive RH strategic plans (2009–2013 and 2014–2018) were developed by the Department of Health's RH programme with the support of all implementing partners as a continuation of first 5-year RH strategic plan (2004–2008). These plans set core strategies for improving antenatal, delivery, post-partum and newborn care, providing quality services for birth spacing and prevention and management of unsafe abortions, preventing and reducing reproductive tract infection, STIs (including HIV), cervical cancer and other gynaecological morbidities, and promoting sexual health, including adolescent RH for both females and males.

In the last two RH strategic plans, the list of SRMNAH interventions to be delivered has included all 46 of the Partnership for Maternal, Newborn & Child Health (PMNCH) essential interventions[32], most of which are guaranteed in the country's minimum benefit package. Since 2012 all emergency, maternal and childhood illness care has been available free of charge in all public hospitals, helped by the 8.7-fold increase in government expenditure on health in the year 2014–15. Policies are in place to make the coverage universal. The RH strategic plan[8] maintains a focus on vulnerable groups in order to address inequalities and disparities in access, through facility and outreach services and in partnership with civil society. However, staff shortages and difficulty in staff retention in hard-to-reach areas, low investment in health, and areas unreached due to conflict are persisting barriers to universal coverage.

The RH strategic plan aims to ensure that facilities, goods and services are within safe physical reach for all sections of the population, especially marginalized groups such as those living in poverty, disadvantaged adolescents and young people, out-of-school youths, minorities and indigenous peoples, women survivors of violence and abuse, women living with HIV, women engaged in sex work, women living with disabilities, refugees and internally displaced persons. In the same vein, the strategy aims to ensure that RH facilities, goods and services are affordable for all, including socially disadvantaged groups. However, it is still necessary to overcome the constraints relating to low levels of investment, health worker shortages, and providing services in areas that are hard to reach because of difficult terrain or armed conflict.

Mechanisms to monitor and evaluate implementation are detailed in the RH strategic plan. Data for monitoring its implementation are obtained from several sources, requiring close coordination with the respective responsible entities. These include the HMIS, hospital statistics, central and regional government reports and township implementation reports. National surveys and special studies (e.g. HIV and STI surveillance surveys by the National AIDS Programme) are carried out periodically and also yield information on impact and outcome indicators. Currently, the MoH is conducting Myanmar's first Demographic and Health Survey.

A committee of the upper house of parliament oversees MCH affairs. A broad multisectoral approach is adopted in implementing the RH strategic plan. The RH programme is developed in line with other MoH programmes such as the National AIDS Programme, National Malaria Control Programme, Women and Child Health Development Section, School Health Programme, National Nutrition Centre and Central Health Education Bureau. The Department of Public Health partners with other ministries (Ministry of Education, Ministry of Social Welfare), professional associations, academics, United Nations agencies, bilateral donors and CSOs including NGOs.

Policies relating to health workforce availability, accessibility and acceptability are to be based on national health workforce strategies and plans for workforce development. The RH strategic plan takes into consideration the range, skill-mix and gender balance of health workers (health service providers and management and support workers) needed to deliver the essential package of services. Allowance is made for a rational redistribution of tasks among health workforce teams (task shifting/sharing) as one method of strengthening and expanding the health workforce to rapidly increase access to health services. The plan also reviews the distribution of community health volunteers across villages and townships to ensure that this distribution is rational, cost-effective and sustainable.

The RH strategic plan includes measures to address health workforce education, recruitment, retention and performance, as well as regulatory options to improve quality of practice, such as licensing and accreditation, and to build managerial capacity of township health managers. The plan reviews pre-service midwifery and medical curricula and training programmes (content and training approaches) with a view to delivering standardized, high-quality RH care. Provision is also made for reviewing and improving the in-service training curricula of RH service providers in order to improve their skills in both clinical care and service management, and for conducting competency-based training and skill assessments.

Myanmar has prioritized efforts to strengthen midwifery, and areas of focus include pre-service education, in-service education needs, and optimizing continuing professional development. The strategies adopted to fill these gaps are: building the capacity of midwives, requesting an increased health budget (SRMNAH) and setting national standard for midwives (core competencies and education). These strategies are now in the early phases of implementation.

2.6 Health financing

Total health expenditure (THE) in Myanmar was 2.0–2.4% of its GDP between 2001 and 2011[22]. This is the lowest THE of all countries in the WHO South-East Asia and Western Pacific Regions. General government health expenditure (GGHE) as a percentage of general government expenditure (GGE) is low, at 1% between 2003 and 2011. GGHE as percentage of GDP amounted to 0.2–0.3% over the same period. GGHE as a percentage of GDP and of GGE in 2012–2013 increased significantly, to 0.76% and 3.14%, respectively; however, this level of health investment is still low compared to the demand for health care[22].

Inadequate GGHE over the past decade resulted in high out-of-pocket payments by households, which became the dominant source of financing for health care, accounting for 79% of THE. Anecdotal evidence suggests that informal payments are commonly being made in government health-care facilities. However, it is difficult to ascertain whether these are gestures of gratitude (common among patients) or coerced payments on which services rendered are conditional[22]. There is evidence that some households cannot afford health-care expenses and instead adopt alternative coping mechanisms[53]. Various studies in Myanmar have indicated that 12–18% of households faced catastrophic health expenditure[54].

Official development assistance (ODA) gradually increased from 1% of THE in 2001, peaking at 9% in 2009–10 with the humanitarian assistance in response to Cyclone Nargis. ODA dropped slightly to 7% in 2011, but it was still significant at half of the level of government investment in health (14% of THE in 2011[22]). The country received a very low level of international financial assistance considering its development profile. Compared to nearby South-East Asian countries, Myanmar received the lowest level of ODA (US$ 339 million) in 2010, and ODA for health per capita was lower than in Cambodia and Lao PDR. Moreover, ODA expended for health-related purposes in Myanmar went mainly towards MDG 6-related programmes (67.5%), with only 8.6% going towards RH and family planning in 2009[55].

By pooling the contributions of seven bilateral donors (Australia, Denmark, the European Union, Sweden, Switzerland, the United Kingdom and the United States of America), the Three Millennium Development Goal (3MDG) Fund promotes the efficient and effective use of development funds. With commitments totalling more than US$ 270 million for the period 2012–2017, it is a major development fund in Myanmar. It is managed by the United Nations Office for Project Services. By the end of June 2015, the 3MDG Fund had awarded a total of 85 grants to 56 partners. This support is ensuring access to essential maternal, newborn and child health (MNCH) services for a population of 4.4 million who live in remote and hard-to-access areas. The 3MDG Fund and the MoH have identified six priority areas to advance progress towards UHC: scaling up services in conflict affected areas, supporting health care in special regions, strengthening service delivery in both the public and private sectors, supporting the MoH in its health workforce strategy, improving service quality for MNCH, and improving the evidence base for national MNCH strategies. Supporting the MoH in its health workforce strategy includes training AMWs, improving midwifery training and increasing the midwifery workforce[56].

Myanmar's national health accounts do not include estimates for SRMNAH interventions, for which there is no separate budget line. At national level, a budget is allocated to the Department of Public Health and allied work plans of the MoH, while at township level funds for RH activities are incorporated and earmarked in budgets for delivering the total health package. RH interventions by thematic area are costed to assist in scaling up the package of essential RH interventions throughout the country.

The activity based budgeting method was applied to estimate the cost of the operational activities of the RH strategic plan 2014–2018. The costing was based on plenary and group discussions at the workshop on the plan's development. This process concluded that US$ 321 million is required to adequately implement all the operational activities for the 5-year period, increasing from US$ 37 million in 2014 to US$ 96 million in 2018. The MoH, in partnership with development partners, will fund the RH strategic plan and adequate resources are to be mobilized from state/regional governments.

A number of government policy documents indicate that the health sector is still under-funded, but modest improvements in budgetary allocations have been made in recent years. There was a significant funding gap during the implementation of the 2009–2013 RH strategic plan. Government expenditure on health has since increased, and a proportional increase will be required at both central and regional/state levels to meet the national targets set by the MoH and the international targets on reproductive, maternal and child health. In view of the resource gap, substantial financial and non-financial resources are required to support the implementation of RH interventions. New activities on RH are being introduced in phases. The RH strategic plan includes increasing advocacy to obtain commitments and resources from development partners and other agencies to enable the thematic components of the strategic plan.

3 The need for SRMNAH workers

3.1 Defining 'need'

This workforce assessment takes a needs-based approach to assessing the level of effective coverage of SRMNAH workers. The first stage of this process involved deciding which SRMNAH services should be provided. For the purposes of this assessment, the 46 PMNCH essential interventions[57] were taken as the SRMNAH services to be provided by the workforce, with the addition of a number of services included in the ASEAN guidelines on skilled birth attendants[58] (see Annex A for a full list of the services included in this assessment). This is the minimum set of services that should be provided to all who need them in order to minimize mortality and morbidity related to SRMNAH.

Having decided on the services to be provided, the next step was to decide how much time it would take to deliver each of these services if everyone who needed an intervention received it. This was achieved by estimating (i) the number of women or babies requiring each intervention (see Annex B for an explanation of how this was estimated for each intervention) and (ii) the time required to perform the intervention once[a] , and then multiplying these two figures. An example is shown in Table 2, for malaria prevention with insecticide treated nets (ITNs) and antimalarial medication.

Table 2: Method used to estimate time required to deliver malaria prevention with ITNs and anti-malarial medication

Number of pregnancies in 2016	979,478
% of population living in malaria endemic areas	63
Pregnant women living in malaria-endemic areas	979,478*0.63 = 617,071
Time required for malaria prevention with ITNs and antimalarial medication	5 minutes
Total time required	617,071 * 5 minutes = 51,422 hours

This process was repeated for all the PMNCH and ASEAN interventions, with time allocated to different cadres according to their competence to deliver each intervention (see Section 4.3.2). This revealed the total amount of time needed to deliver all the interventions to all who need them.

Demography and epidemiology are the two main drivers of the need for SRMNAH services as defined in this assessment. These are discussed in the following two sections.

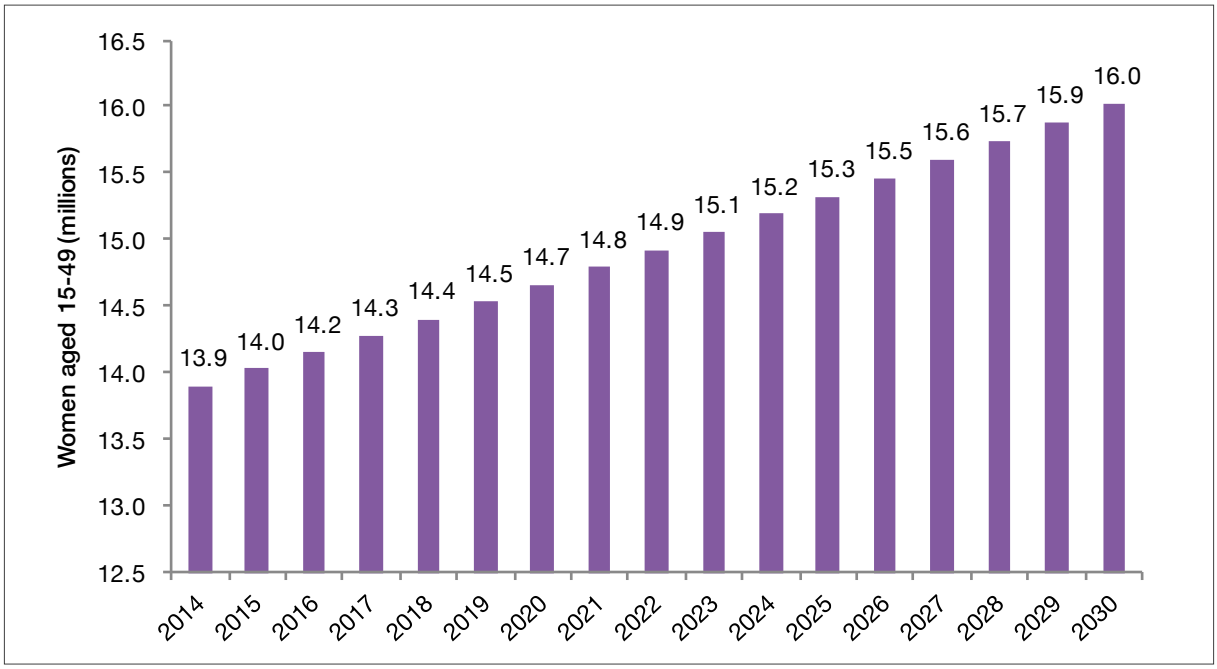
3.2 Demography

Relevant demographic indicators for SRMNAH include: the number of women of reproductive age, the number of pregnancies and the number of live births. High numbers of women of reproductive age imply a high level of need for SRH services; high numbers of pregnancies imply a high level of need for ANC; and high numbers of births imply a high level of need for skilled birth attendance and postnatal care.

Figure 4 shows the projected growth in numbers of women of reproductive age to the year 2030, with the 2014 census as a baseline. It shows that, by 2030, there are expected to be almost 2 million more women of reproductive age in Myanmar than there are at present.

[a] Time estimates were taken from the OneHealth tool[77] for the vast majority of the interventions. A few were not included in OneHealth, and for these expert opinion was obtained.

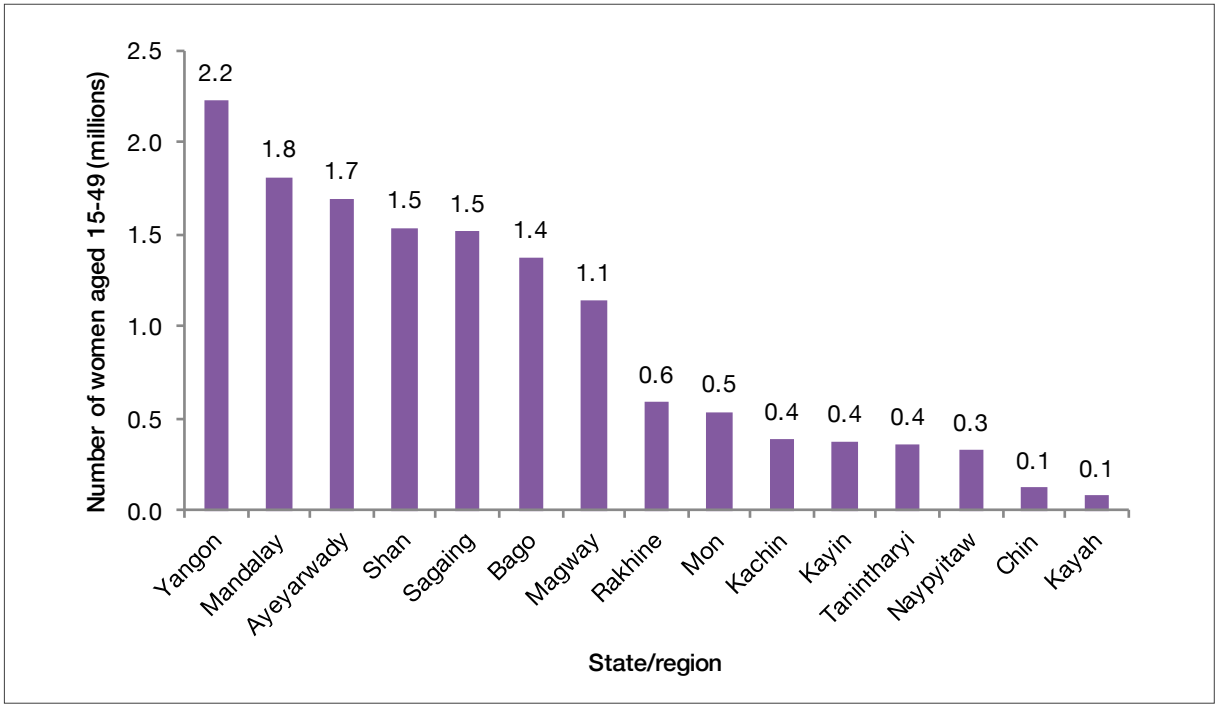
Figure 4: Projected growth in number of women of reproductive age, 2015–2030



Sources: 2014: population census. 2015-2030: projections based on population growth rate, total fertility rate, contraceptive prevalence rate and sex ratio.

Figure 5 shows how women of reproductive age are currently distributed by state/region, illustrating that the highest need for SRMNAH services is in Yangon, Mandalay and Ayeyarwady, with relatively little need in Chin and Kayah. This distribution is not expected to change much over the next 15 years (although the absolute numbers will increase).

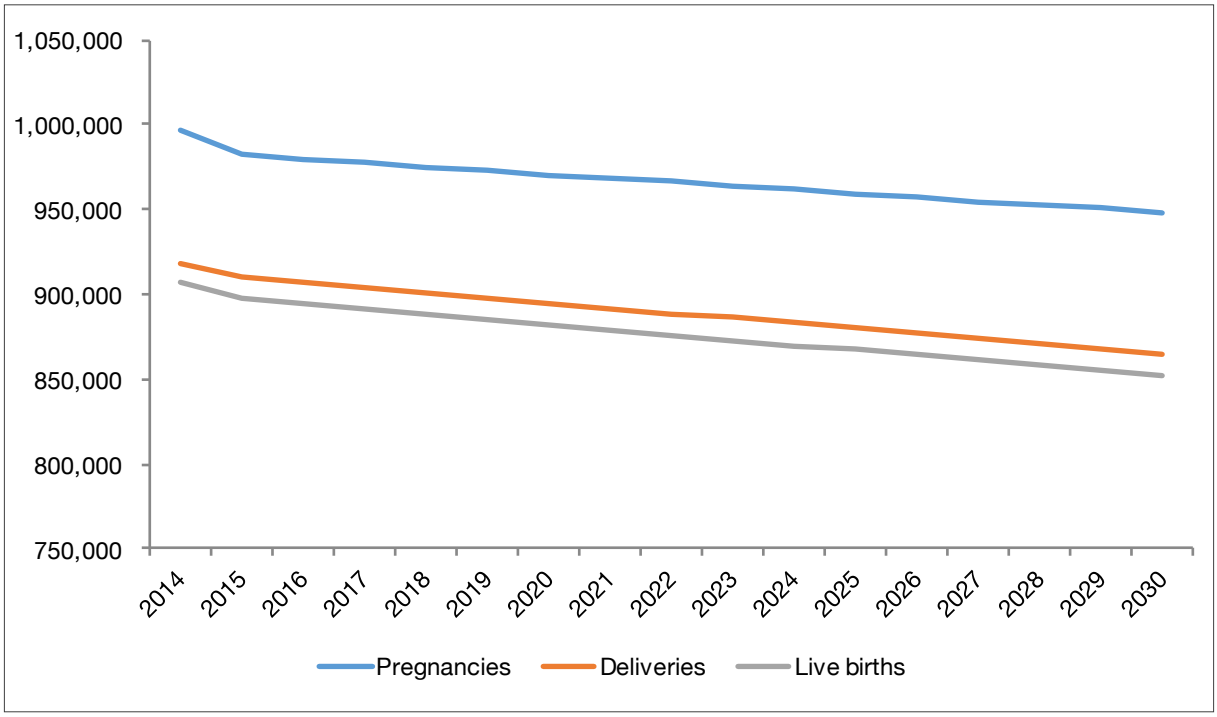
Figure 5: Estimated numbers of women of reproductive age, by state/region, 2014



Source: 2014 census[18]

Fertility levels are relatively low and are projected to fall further over the next 15 years so, despite the projected growth in the number of women of reproductive age, numbers of pregnancies, deliveries and live births are projected to decrease, as illustrated by Figure 6. This same pattern is projected to occur in all regions/states.

Figure 6: Projected decrease in numbers of pregnancies, deliveries and live births, 2015–2030



Source: Projection based on 2014 census and Health Management Information System (2004-2014)

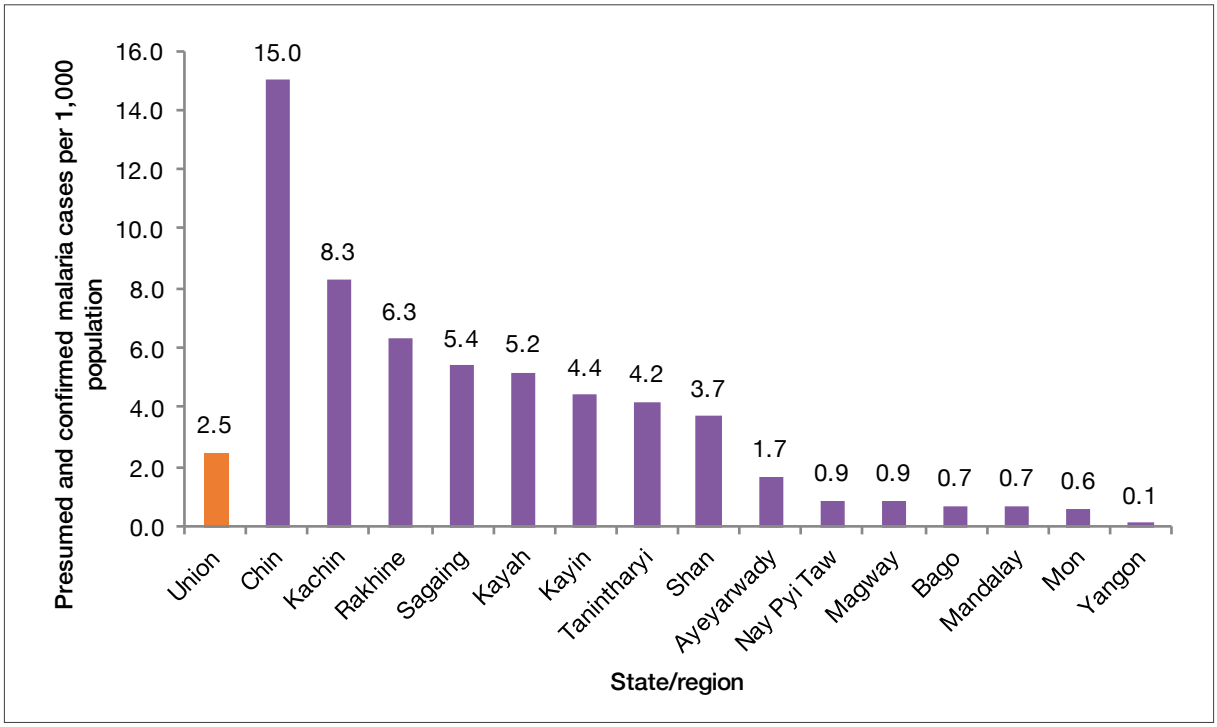
The projected rise in the number of women of reproductive age means that the need for SRH services for women and adolescents will increase over the next 15 years, whereas the projected decrease in the number of pregnancies means that the need for MNH services will decrease. This has important implications for the future skill-mix of the SRMNAH workforce, and also for the way in which SRMNAH services are configured, because a large proportion of SRH care is provided at primary level.

3.3 Epidemiologic Information relevant to sexual, reproductive, maternal, newborn and adolescent health

Relevant epidemiological indicators include: incidence of diseases relevant to SRMNAH, such as HIV, other STIs and malaria; incidence of pregnancy complications, such as hypertension and diabetes; incidence of newborn complications, such as jaundice and respiratory distress. The higher the incidence of these diseases and complications, the greater the need for SRMNAH services.

Annex B gives full details of all epidemiological indicators considered for this assessment. Of particular note is the risk of malaria in large parts of the country (two thirds of the population lives in malaria-endemic areas)[37] resulting in rates of infection ranging from almost zero in Yangon to 15.0 presumed or confirmed cases per 1,000 population in Chin, as illustrated in Figure 7.

Figure 7: Presumed and confirmed malaria cases per 1,000 population, by region/state, 2014



Source: Annual Public Health Statistics 2014

4 The current SRMNAH workforce in Myanmar

4.1 Health worker cadres counted as part of the SRMNAH workforce

Having defined need for SRMNAH care and estimated the level of need, the next stage of the process was to identify which health worker cadres are engaged in the provision of SRMNAH services. After consultation with key stakeholders including the MoH, it was decided to include the following: auxiliary midwives (AMWs), midwives, nurses, lady health visitors (LHVs), generalist doctors, obstetricians/ gynaecologists (ob/gyns), and paediatricians/neonatologists.

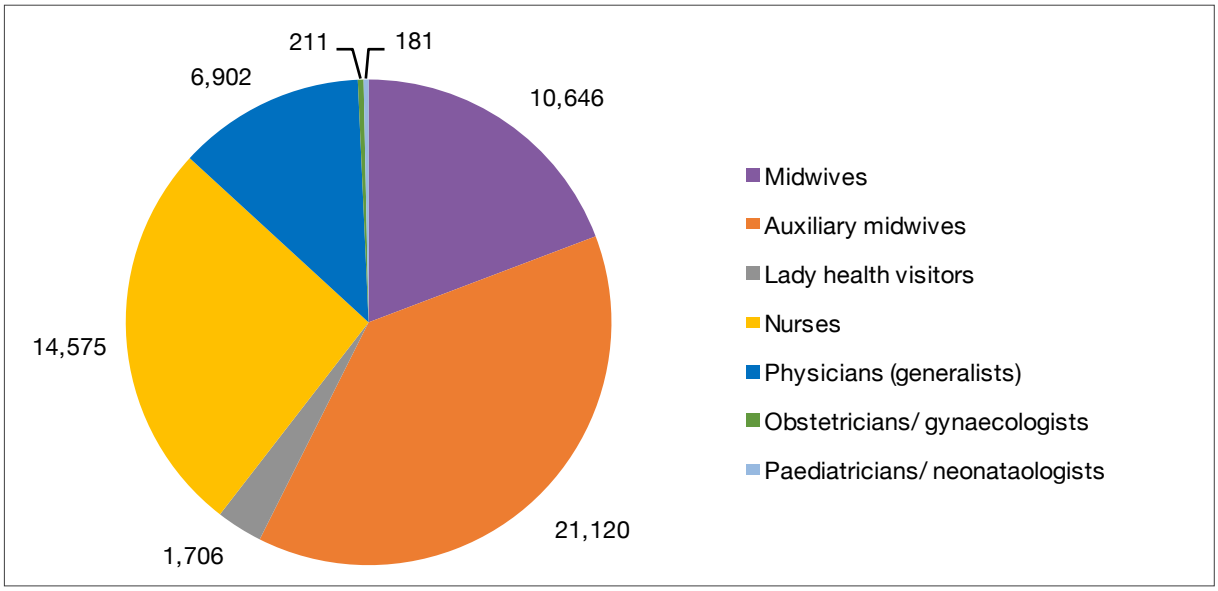
It should be noted that this assessment focuses on SRMNAH services, and therefore does not include cadres that specialize in child health or other aspects of women's health. The inclusion of AMWs was controversial: some stakeholders thought they should not be counted as part of the SRMNAH workforce, either because they are volunteers, or because their level of education is not sufficiently high. AMWs are trained and deployed to perform specific SRMNAH tasks: providing ANC, attending home deliveries, taking care of newborns, making referrals if necessary, and educating women about maternal and child health and nutrition. They are not classed as skilled birth attendants. However, within the context of primary health care they play an important role in reducing maternal deaths through collaboration with midwives[59]. As they are trained and authorized to perform some SRMNAH interventions (see Annex A) it was considered appropriate to include them.

4.2 The four dimensions of effective coverage of SRMNAH workers

4.2.1 Availability

Across all the cadres listed in Section 4.1, 55,341 SRMNAH workers were employed at public sector service delivery points in 2014. Figure 8 shows that about one quarter of these were midwives and LHVs, and over one third were AMWs.

Figure 8: Composition of the public sector SRMNAH workforce by headcount, 2014



Sources: Obstetricians/gynaecologists: estimates based on Myanmar's figures from the 2014 State of the World's Midwifery report[60]. Other cadres: Health Management Information System, 2014.

Of course, not all of these health workers work full time, and not all spend all their working time on SRMNAH care. The official duties of midwives in Myanmar are very broad and non-SRMNAH care duties absorb significant amounts of time, leaving less than optimal time for midwives' core duties[61]. The analysis below explains how the composition of the SRMNAH workforce changes when these factors are taken into account (see Section 4.3.1).

It should also be noted that the above numbers include the public sector workforce employed through the MoH. Government health services are still to reach the conflict-affected and post-conflict areas in the eastern part of the country.

Future availability of SRMNAH workers in Myanmar depends heavily on the numbers being trained. Table 3 sets out the numbers trained in each cadre for the years 2012–2016, and shows an overall increase in all cadres, but a relatively small increase since 2013 in the number of graduate midwives.

Table 3: Graduate numbers by cadre, 2012–2016

Year	Cadre					
	Mid wives	Nurses	Lady health visitors	Doctors (generalists)	Obstetricians/ gynaecologists	Paediatricians/ neonatologists
2012	929	1,489	78	1,642	26	21
2013	1,206	1,630	104	1,755	32	30
2014	947	1,741	131	1,710	36	43
2015	1,145	1,549	137	2,438	40	40
2016 (projected)	1,283	1,943	140	2,368	46	48
% change 2013–2016	+6%	+19%	+35%	+35%	+44%	+60%

Source: DHPRDM unpublished information, 2016

In addition to the numbers being trained and attrition rates, the future availability of SRMNAH workers depends on the number of graduates absorbed into the workforce. Newly trained doctors have to sit an examination set by the Union Civil Service Board; 500 doctors were recruited in 2011 and 1,500 in 2012[22]. Recruitment of nurses and midwives is based on availability of sanctioned posts and on budget. Regional deployment by sanctioned posts of doctors and nurses (per 1,000 population) is high in Yangon and Mandalay regions, where most tertiary and teaching hospitals are located. As noted in Section 2.2.2, most midwives and LHVs are deployed to communities rather than to hospitals.

There can be a delay between graduation and absorption into the public sector health workforce because not all graduates can be absorbed straight away (as health facility and workforce expansion could not be accomplished as planned). As a result, some new graduates enter the private sector and some face difficulty in retaining their midwifery skills. Recently, however, this situation has improved and a higher proportion of graduates have been absorbed into the public sector workforce[8].

Future availability also depends on the rate at which SRMNAH workers leave the workforce due to death, retirement or voluntary attrition. Death and retirement rates can be estimated on the basis of Myanmar's age-specific death rates and statutory retirement ages, but there are no official estimates of the level of voluntary attrition among SRMNAH workers. During the stakeholder workshops held in January 2016, it was estimated that the annual voluntary attrition rates shown in Table 4 apply.

Table 4: Estimated annual voluntary attrition rates for SRMNAH workers

Cadre	Annual voluntary attrition rate
Auxiliary midwives	20%
Midwives	1%
Nurses	2%
Lady health visitors	0.1%
Doctors (generalists)	4%
Obstetricians/gynaecologists	1%
Paediatricians/neonatologists	1%

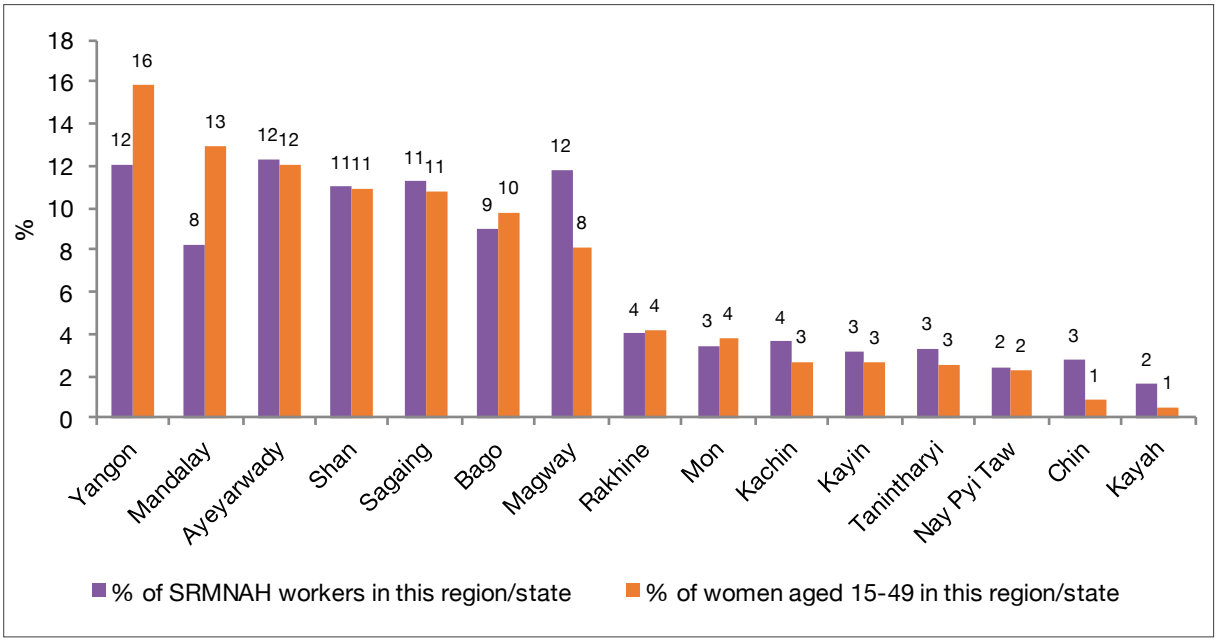
Source: Stakeholders' workshop, 2016 (see Section 1)

4.2.2 Accessibility

Geographical accessibility

Even if there are enough SRMNAH workers with the competencies to provide the essential interventions, women and adolescents may still not be able to access their services. For example, they may be physically unable to reach a SRMNAH worker because they live in a remote area, or they may be unable to pay for SRMNAH care. Equality of access to health care is a central tenet of the UHC and SDG agendas, so it is important to understand and address the current barriers to access in Myanmar. At regional/state level, the distribution of the SRMNAH workforce broadly reflects the distribution of women of reproductive age. Figure 9 shows, however, that most of the less populous states/regions have a relatively large share of the SRMNAH workforce, probably reflecting the need for higher staff-to-population ratios in less densely populated areas. Correspondingly, the main population centres of Yangon and Mandalay have a relatively small share of the SRMNAH workforce.

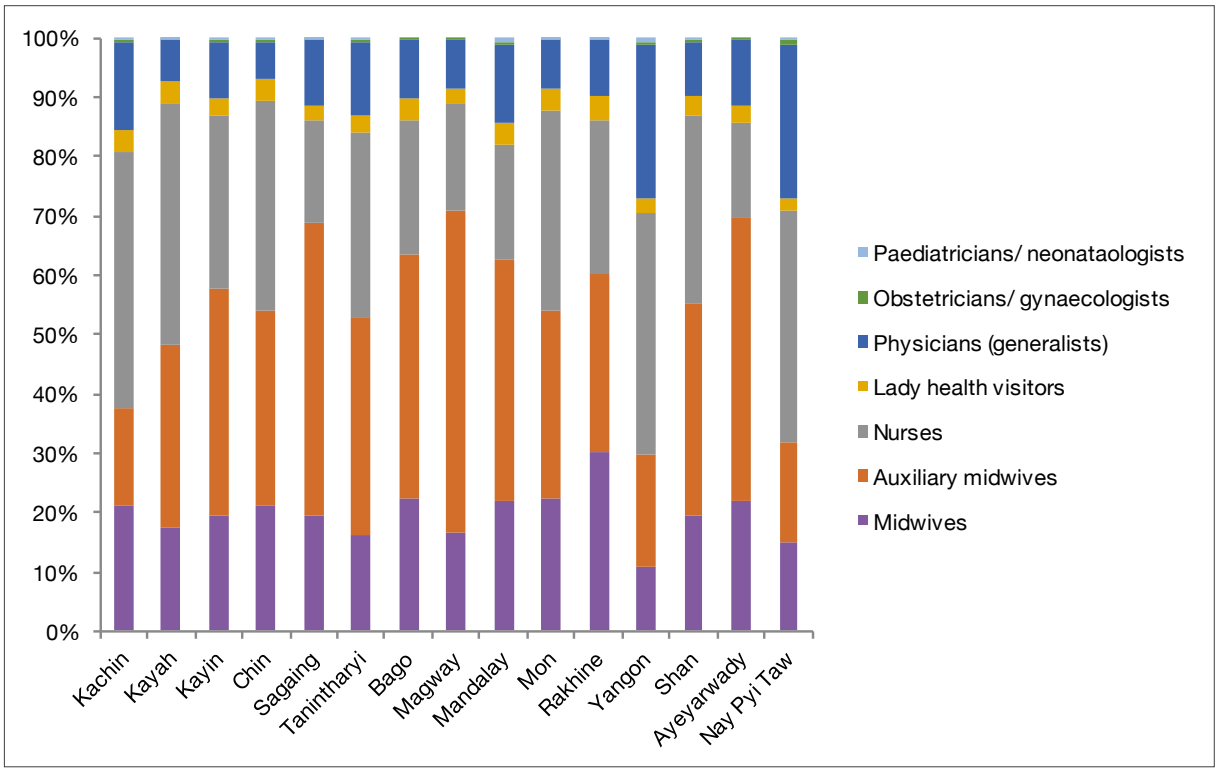
Figure 9: Distribution of the SRMNAH workforce compared with distribution of women of reproductive age, by region/state, 2014



Sources: Workforce data: Health Management Information System, 2014. Demographic data: projections based on 2014 census.

Although Figure 9 shows that the total SRMNAH workforce is reasonably equitably distributed by region/state, Figure 10 shows that the distribution of individual cadres varies considerably by region/state. For example, midwives make up a relatively large proportion of the total headcount in Rakhine, as do AMWs in Sagaing, Magway and Ayeyarwady, nurses in Kachin and Kayah, and doctors in Yangon and Nay Pyi Taw. This indicates that the skill-mix varies considerably by region/state, which has implications for accessibility to an appropriate health worker cadre for those requiring more specialized care.

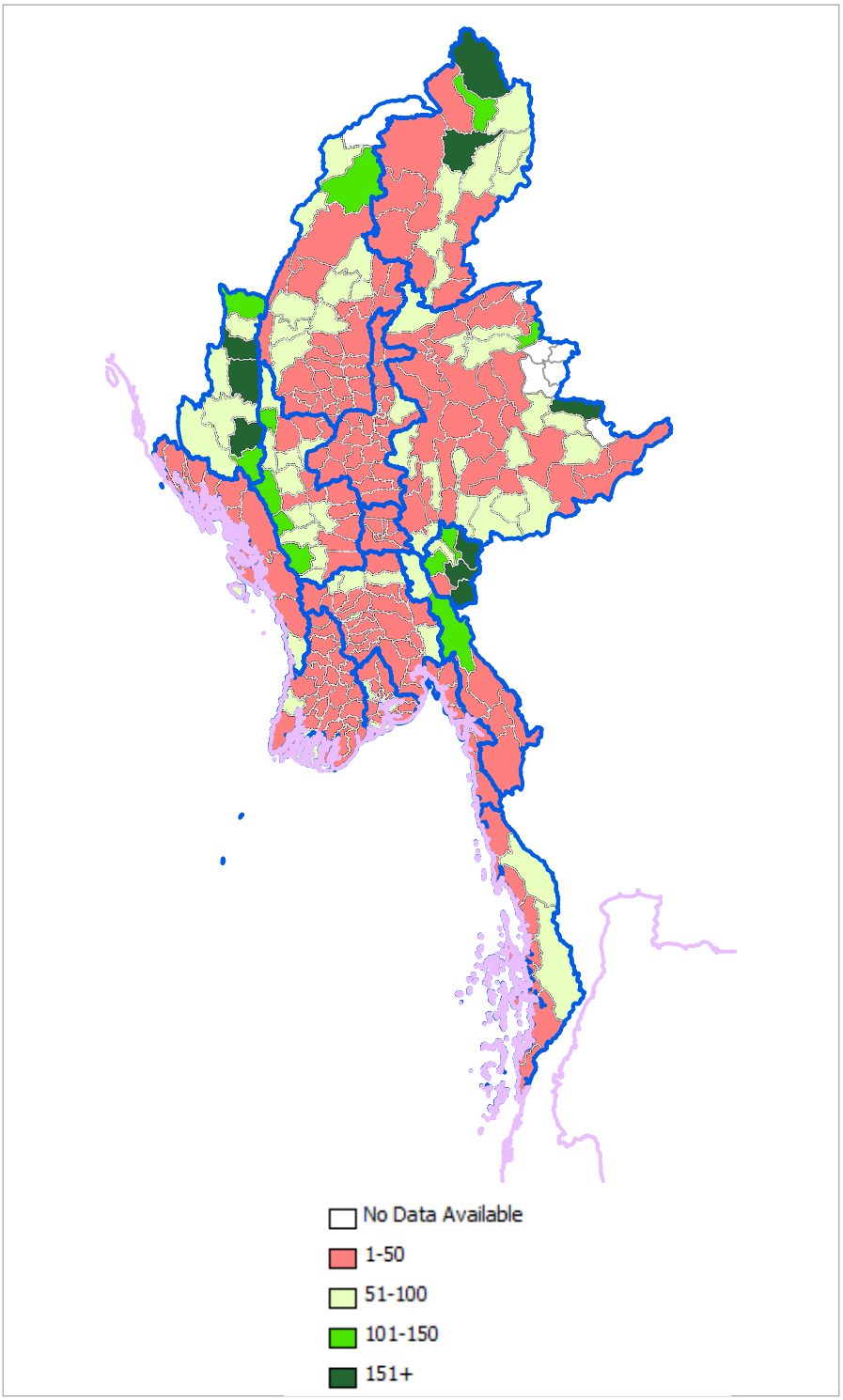
Figure 10: Composition of the SRMNAH workforce, by region/state, 2015



Source: Health Management Information System, 2014

Map 1 shows that most townships in Myanmar have fewer than 50 SRMNAH workers per 10,000 women of reproductive age, but that some of the more remote areas have much higher workforce density, reflecting the relative sparseness of the population in these areas.

Map 1: Doctors, midwives, lady health visitors, nurses and auxiliary midwives per 10,000 women of reproductive age, by township, 2014

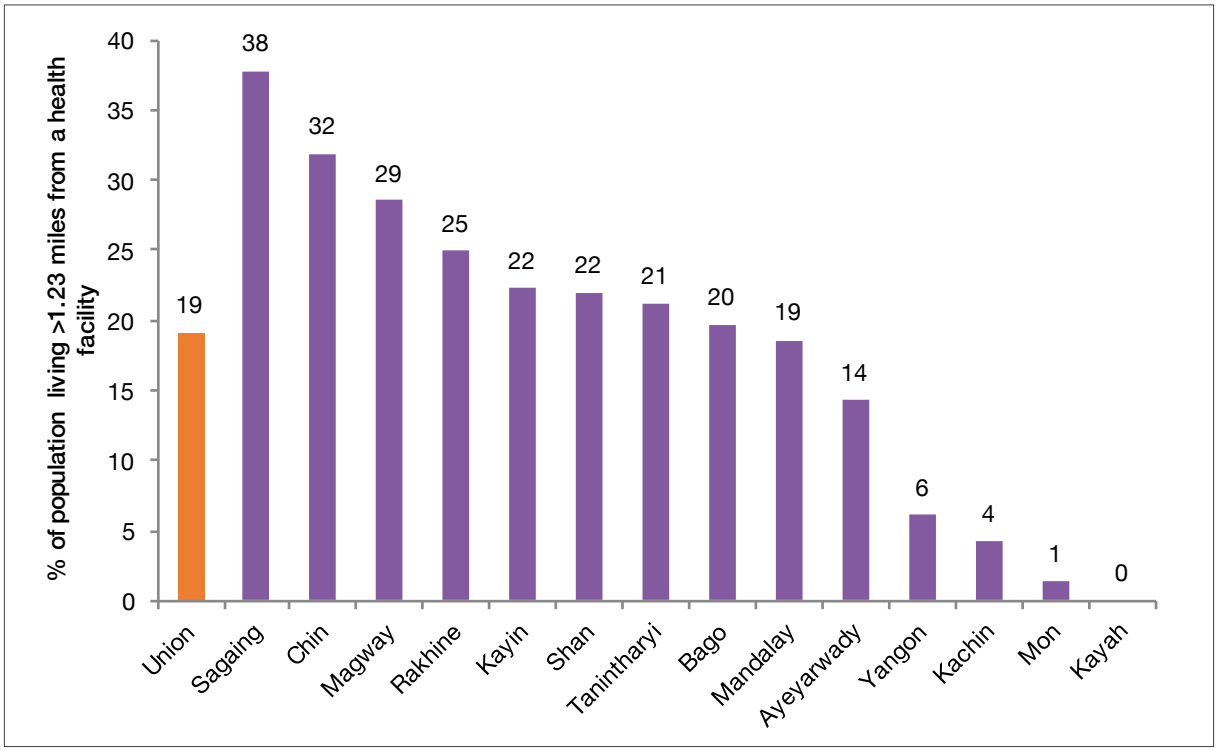


Source: Shape file from Myanmar Information Management Unit[63] and workforce data from Health Management Information System[15]

Despite the higher workforce densities in some remote townships, as shown in Map 1, evidence suggests that women and adolescents living in remote and rural areas generally experience relatively low levels of accessibility. As noted in Section 2.2.1, hardship allowances are paid to health workers deployed in hard-to-reach areas, and non-financial measures such as special consideration in promotion and postgraduate training are in place. However, retention in hard-to-reach places remains a challenge. Competitive salaries are not offered as an incentive to work in the public sector, nor are loans standardly offered. However, compared to their counterparts in the private sector, doctors working in the public sector have better opportunities for continuing education[22].

One indicator of geographical accessibility to health workers is the proportion of the population living within 1.23 miles (approximately one hour's walk) of a health facility. This indicator helps to pinpoint geographical areas which are likely to have greater problems with geographical accessibility, but it should be borne in mind that the time taken depends partly on the terrain and weather conditions, and these data should be interpreted accordingly. Figure 11 shows that in 2010, 19% of the population of Myanmar lived more than 1.23 miles from the nearest health facility, but that this figure was much higher in some states/regions, notably Sagaing (38%) and Chin (32%), than in the relatively well served states/regions of Kayah, Mon, Kachin and Yangon.

Figure 11: % of population living more than 1.23 miles from a health facility, by region/state, 2010



Source: Integrated Household Living Conditions Survey 2010[24]

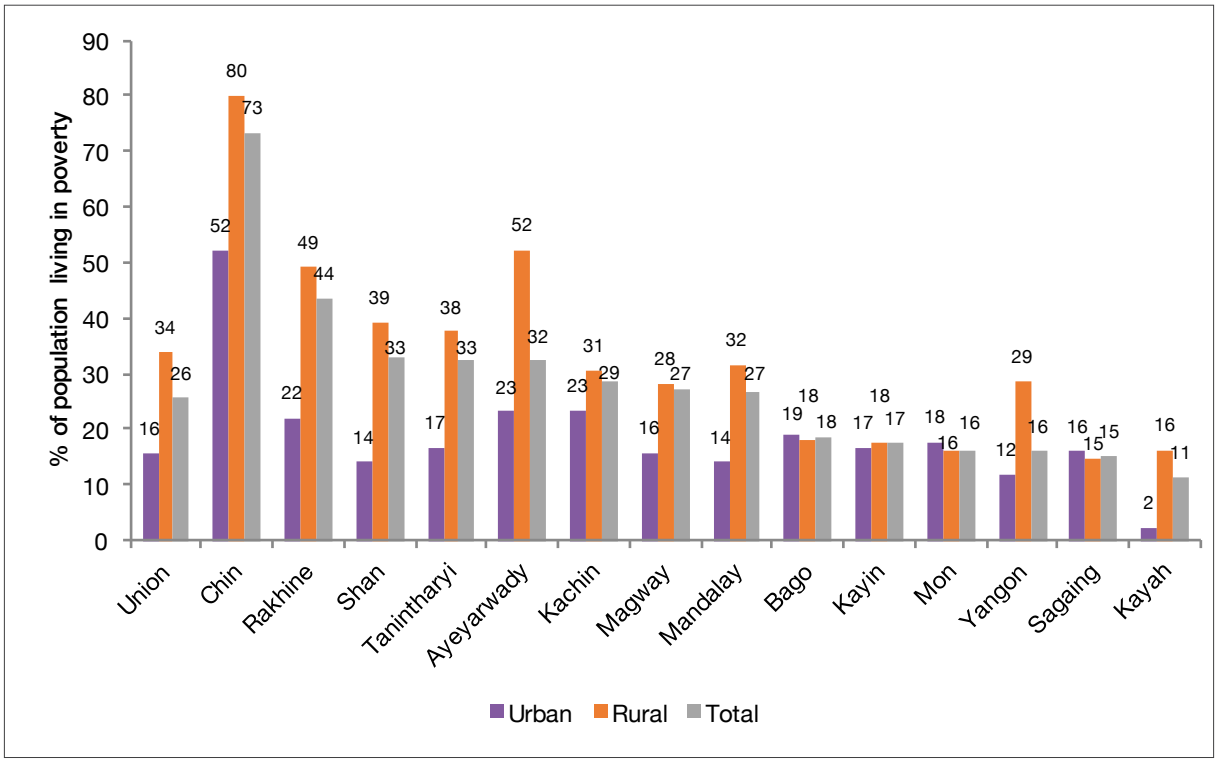
Maintaining accessibility to SRMNAH workers is particularly challenging in areas experiencing conflict[64]. Conflicts are ongoing in some states in Myanmar, resulting in high numbers of refugees and internally displaced persons, and specific challenges relating to health workforce planning. This assessment did not look specifically at these parts of the country, but it should be noted that SRH needs and risks may be particularly high in humanitarian settings because women, adolescents and children are especially vulnerable to the effects of conflict and may lack the knowledge or means to access care. For example, a study of young refugees (15-24 years) from Myanmar in Thailand found that more than half had

engaged in premarital sex, but few had the knowledge or access to services needed to avoid STIs and unintended pregnancy[65].

Financial accessibility

Although Myanmar has an essential benefits package for SRMNAH, it does not include all the essential interventions used in this assessment to define need for SRMNAH services[5]. There is evidence that service users are expected to pay for elements of SRMNAH care (see Section 2.6) and that the private sector is an important provider of SRMNAH services (see Section 2.2.1), which indicates that financial accessibility may be a barrier to effective coverage of SRMNAH services for at least some sections of the population. High out-of-pocket spending on health, as seen in Myanmar (see Section 2.6) is another indicator of lack of equality of access[66]. Figure 12 shows that poverty levels in 2010 varied significantly by region/state, with particularly high levels of poverty in Chin and Rakhine and in rural areas of most states/regions. It is therefore likely that financial accessibility to SRMNAH care is relatively low in these parts of Myanmar.

Figure 12: Incidence of poverty in urban and rural areas, by region/state, 2010



Source: Integrated Household Living Conditions Survey 2010[24]

Two recent studies in Myanmar indicated that 12–18% of households encountered catastrophic health expenditure, defined as costs so high that they were forced to cut down on necessities such as food[54,53], but there are no published data about how much women and their families pay for SRMNAH care specifically, which makes it difficult to estimate exactly how many people find that SRMNAH care is not accessible to them due to inability to pay. An unpublished study by the Shalom (Nyein) Foundation looked at the cost of different types of delivery among rural communities in six states (Kachin, Kayin, Chin, Shan, Mon and Rakine). This study found that the median cost was 35,000 kyats, but that there was a very wide interquartile range (16,000 to 82,500 kyats) which reflected: (a) the considerably higher costs for hospital deliveries, especially if a caesarean section was performed, and (b) variation in costs both between and within states (e.g. there was a sliding scale of costs in Kachin

state because midwives charged a higher fee for wealthier clients). The study authors speculated that high costs of public sector midwives were a barrier to women accessing a skilled birth attendant. They also noted that about 8% of women who were referred to hospital for delivery did not go to hospital because they could not afford to do so.

4.2.3 Acceptability

Even where SRMNAH care is available and accessible, effective coverage of services will be reduced if the workforce or the services they offer are not acceptable to the public, because in those circumstances women and adolescents are likely either to choose alternative health providers (e.g. traditional birth attendants (TBAs) or not to access care at all.

There is a lack of empirical research into public perceptions of SRMNAH workers in Myanmar, but discussion with key stakeholders during this assessment suggests that midwives are regarded as key persons within the local communities where they are deployed. Living close to the community that they serve, they tend to the wider health care needs of families of expectant mothers, mothers and newborns. However, there is evidence that significant numbers of women, especially in rural areas, choose TBAs as their care provider, rather than midwives or AMWs (see Table 5). The reasons for these choices are not known, but it is reasonable to suppose that at least some women choose TBAs because their services are perceived to be more acceptable than those offered by midwives. TBAs also provide many services, including help with domestic chores. Also, because midwives' workloads tend to be heavy (see Section 4.2.1), in some areas midwives delegate tasks such as postnatal care to TBAs and AMWs because of time constraints[67].

Table 5: % of ever-married women aged 15-49 who gave birth in the preceding 2 years receiving care from different cadres of SRMNAH worker, 2009–10

Health worker providing care	Antenatal care		Delivery care	
	Urban	Rural	Urban	Rural
	%	%	%	%
Midwife	35	61	25	41
Medical doctor	47	9	56	17
Lady health visitor/nurse	13	8	8	5
Auxiliary midwife	1	6	2	10
Traditional birth attendant	2	6	7	22
Community health worker	*	*	*	*
Relative/friend	*	*	1	1
Other	1	1	1	1
No one	2	9	*	2
Any skilled health worker (midwife, doctor, lady health visitor, nurse)	95	78	90	63

*less than 0.5% but greater than 0
Source: Multiple Indicator Cluster Survey 2009–2010[68]

The wide variety of ethnic groups and languages spoken in Myanmar (see Section 2.1) presents a challenge in terms of providing a socioculturally acceptable SRMNAH workforce. For example, a midwife working in one area may be unacceptable to some women because she does not speak the local language or dialect fluently. Until 2012, although there was at least one midwifery and/or nursing school in every state/region (see Annex C), recruitment into midwifery courses was carried out centrally and based on high school scores, with the result that women from ethnic minority groups

(whose Myanmar language skills were relatively poor and educational attainment relatively low[b]) were under-represented among the midwifery workforce. Since 2012 the recruitment process has been decentralized to regional/state level and there are indications that this has increased participation by women from ethnic minority groups, but it remains to be seen what impact this will have on the ethnic profile of the midwifery workforce in the longer term.

4.2.4 Quality of care

Even where the SRMNAH workforce is available, accessible and acceptable, if the care provided is of poor quality then SRMNAH outcomes will be poor. It is notoriously difficult to measure and monitor quality of care in a reliable and meaningful way, and Myanmar does not currently have a quality assurance system for SRMNAH, but there are indicators for some aspects of quality. One such indicator is the years of study required to qualify as a SRMNAH worker (see Table 6). The duration of study for midwives currently falls short of the ICM recommendation of a minimum of 3 years of study for direct-entry midwifery courses or 18 months for post-nursing courses[69]. In recognition of this, a new Bachelor of Midwifery qualification will be developed which meets ICM global standards (as announced by the Director General of the DHPRDM at the stakeholder workshop for this assessment in Nay Pyi Taw in January 2016). The first student intake for this new degree is due in 2019-2020, which means its first graduates will join the workforce in 2023-2024. Additionally, there will be a bridging course to enable existing midwives to upgrade their qualification to a Bachelor degree, with the first student intake expected in 2018-2019.

Table 6: Years of study required to qualify as a SRMNAH worker

Cadre	Years of study required
Medical doctor	6 years plus 1 year of internship
Ob/gyn and paediatrician	Medical doctor + 3 years
Midwife	2 years
Lady health visitor	Midwife + 9 months
Nurse-midwife (diploma)	3 years
Nurse-midwife (BNSc)	4 years
Auxiliary midwife	6 months

Sources: Auxiliary midwives: Department of Public Health. Other cadres: Department of Health Professional Resource Development.

Another indicator of quality is the recent Service Availability and Readiness Assessment (SARA) survey, which measured the extent to which different types of health facility have the necessary equipment and resources (including human resources) to provide various health services. Table 7 shows the results for services relevant to SRMNAH in the form of summary scores, indicating that there are gaps in readiness at all types of facility, which inevitably affect the quality of care that SRMNAH workers are able to provide. Scores are generally highest at specialized and general/state/district hospitals, and scores are reasonably high for basic emergency obstetric care in hospitals. Primary health centres tended to record lower scores (except for malaria) and overall scores were low for blood transfusion and prevention of mother-to-child transmission of HIV.

[b] Eligibility for midwifery training requires the completion of secondary school, and an upper ranking in the matriculation examination (Myanmar, English and mathematics) in their respective region/state; applicants must be under age 25, female, at least 5 feet in height, with no physical deformity, and must have a certificate of good health from their township health department and a crime clearance certificate from their township police officer, and they must be single. The same requirements apply for those wishing to attend nursing school except that both males and females can apply.

Table 7: Health facility readiness scores, 2014

	Type of facility						Summary of readiness scores for all types of facility
	General/ state/ district hospital	Township/ sub-township/ station hospital	Specialized hospital	Private hospital	Health centre (rural and urban)	Sub-rural health centre	
	%	%	%	%	%	%	%
Malaria	69	69	48	53	86	72	74
Basic emergency obstetric care	85	71	95	73	60	57	62
Comprehensive emergency obstetric care	77	53	81	65	NA	NA	57
Family planning services	59	57	79	53	64	57	58
Antenatal care services	71	58	81	61	61	56	57
Sexually transmitted infections	78	64	69	62	47	53	54
Prevention of mother-to-child transmission of HIV	51	35	70	27	49	47	45
Blood transfusion	70	41	80	51	NA	NA	45

Source: Myanmar Service Availability and Readiness Assessment (SARA) 2014[70]

Health facilities' readiness to provide emergency obstetric and newborn care is another indicator of quality of care. Sub-RHCs and RHCs, MCHs and urban health centres are all designated as facilities providing basic emergency obstetric and newborn care (BEmONC). However, because these facilities are generally staffed by midwives (see Section 2.2.2), and midwives are authorized to perform only four of the seven BEmONC signal functions, it is questionable whether any of the designated BEmONC facilities fulfils this designation (see Table 8). Again, this inevitably limits the quality of care that midwives are able to provide in primary-level health facilities.

Table 8: Designated and actual BEmONC facilities, 2014

State/ region	Number of BEmONC designated health facilities **				Population*	Designated BEmONC facilities per 500,000 population	Actual BEmONC facilities per 500,000 population
	Maternal and child health centre	Rural health centre	Sub-rural health centre	Total			
Chin	9	74	298	381	478,801	398	All perform only four BEmONC signal functions because they are staffed by midwives who are not authorized to perform the remaining three
Kayah	6	27	112	145	286,627	253	
Magway	33	184	833	1,050	3,917,055	134	
Sagaing	41	210	1,006	1,257	5,325,347	118	
Ayeyawady	42	225	1,129	1,396	6,184,829	113	
Bago	35	191	815	1,041	4,867,373	107	
Kayin	8	61	265	334	1,574,079	106	
Kachin	19	68	267	354	1,689,441	105	
Rakhine	18	114	523	655	3,188,807	103	
Tanintharyi	12	48	227	287	1,408,401	102	
Shan	52	205	826	1,083	5,824,432	93	
Mon	15	66	298	379	2,054,393	92	
Nay Pyi Taw	3	27	177	207	1,160,242	89	
Mandalay	33	153	724	910	6,165,723	74	
Yangon	22	87	412	521	7,360,703	35	
Total	**348**	**1,740**	**7,912**	**10,000**	**51,486,253**	**97**	

BEmONC=basic emergency obstetric and newborn care
* Source: 2014 census[23]; ** Source: Ministry of Health

All hospitals including station hospitals are designated as facilities providing comprehensive emergency obstetric and newborn care (CEmONC) and the number of such facilities per 500,000 population is more than the five recommended by WHO [71] in all states and regions. While all tertiary hospitals provide CEmONC, only 80% of township hospitals and 34% of station hospitals are actually providing CEmONC [72]. A HMIS report in 2014 found that only 65% of designated CEmONC hospitals were performing caesarean sections in 2013, suggesting that the actual number of CEmONC facilities falls below the recommended number in Rakhine, Yangon and Nay Pyi Taw (see Table 9).

Table 9: Designated and actual CEmONC facilities, 2014

State/region	Number of hospitals designated and performing CEmONC		Population**	Designated CEmONC per 500,000 population ***	Actual CEmONC per 500,000 population ***
	Designated	Actually providing caesarean sections (Jan-Dec 2013)*			
Kayah	17	6	286,627	30	10
Chin	24	9	478,801	25	9
Kachin	49	27	1,689,441	15	8
Tanintharyi	33	22	1,408,401	12	8
Sagaing	109	75	5,325,347	10	7
Bago	96	73	4,867,373	10	7
Magway	82	56	3,917,055	10	7
Shan	151	82	5,824,432	13	7
Ayeyawady	101	87	6,184,829	8	7
Kayin	30	18	1,574,079	10	6
Mon	33	26	2,054,393	8	6
Mandalay	83	60	6,165,723	7	5
Rakhine	49	23	3,188,807	8	4
Yangon	70	41	7,360,703	5	3
Nay Pyi Taw	18	5	1,160,242	8	2
Total	**945**	**610**	**51,486,253**	**9**	**6**

CEmONC=comprehensive emergency obstetric and newborn care
Sources: * Health Management Information System (HMIS); ** 2014 census; *** HMIS hospital statistics

4.3 Modelling met need and effective coverage of SRMNAH workers

'Need' for SRMNAH workers was based on the amount of health worker time required to deliver a set of essential SRMNAH interventions (see Section 3.1). The extent to which this need is currently met in Myanmar was estimated by reference to the amount of SRMNAH worker time available to provide these interventions, taking into account each cadre's competencies.

4.3.1 Time spent by health workers on providing SRMNAH care

Assumptions were made about the amount of health worker time available. It was assumed that all SRMNAH workers except AMWs work 40 hours per week, taking an average of 5 days of sickness leave per year and 20 days of paid annual leave (it was assumed that AMWs work 3 hours per day on average, i.e. 38% of full-time hours). These assumptions may not reflect the actual number of hours worked, e.g. some cadres work a great deal of paid or unpaid overtime, and some do not take their full holiday entitlement. However, workforce models are necessarily a simplification of reality, and the aim at this stage was to estimate the potential adequacy of the overall workforce, rather than to model what actually happens in the workplace.

Not all SRMNAH workers spend all of their time on SRMNAH care: some time is spent on non-clinical activities (e.g. paperwork, meetings) and some on providing clinical care unrelated to SRMNAH; for example, generalist doctors provide a wide range of general health care, of which only some is SRMNAH-related. These other activities were taken into account when estimating the amount of

health worker time available to be spent on SRMNAH services. No official data exist on the amount of health worker time spent on providing clinical SRMNAH care, so expert opinion was obtained at two stakeholder workshops in January 2016, resulting in the estimates shown in Table 10.

Table 10: Expert estimates of % of health worker time spent on providing clinical SRMNAH care

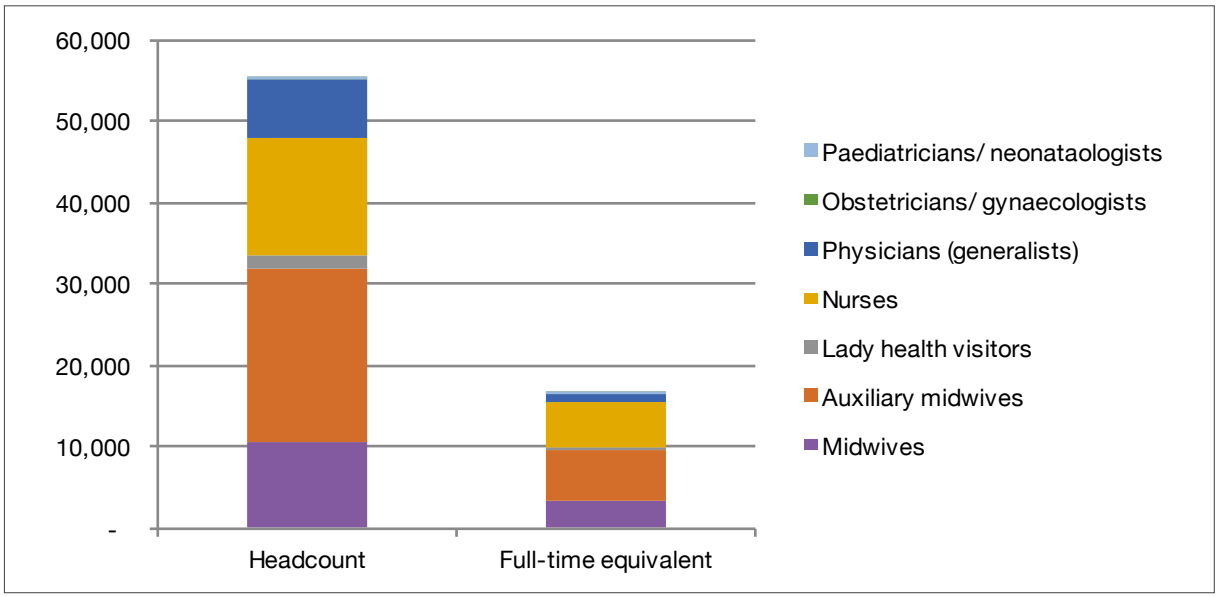
Cadre	% time spent on clinical work*	% of clinical work that is related to SRMNAH
Auxiliary midwife	85	90
Midwife	55	60
Nurse	75	50
Lady health visitor	35	50
Doctor (generalist)	70	20
Obstetrician/gynaecologist	70	80
Paediatrician/neonatologist	70	50

* Clinical work = patient contact time. ** It was assumed that AMWs work on average 3 hours per day (i.e. 38% of full-time hours), so the percentages shown here were applied to these part-time hours.

Applying these percentages to the total amount of working time available resulted in an estimate of the number of full-time-equivalent (FTE) SRMNAH workers in the Myanmar workforce. A FTE worker is not an individual health worker: it is a theoretical concept representing the equivalent of one person working full-time on providing SRMNAH care.

The impact of using FTEs as a measure of availability, rather than a headcount, is illustrated in Figure 13. Taking into account the amount of time available for SRMNAH care reduces the size of the workforce by 70% (it decreases from 55,341 to 16,593), and alters the skill-mix, showing that generalist physicians and LHVs actually account for a smaller proportion of the time spent on SRMNAH care (15.6% by headcount, 7.6% by FTE).

Figure 13: Size and composition of SRMNAH workforce, headcount vs full-time equivalent, 2014



4.3.2 SRMNAH worker competencies

Having estimated the total amount of health worker time available to perform SRMNAH interventions, it was then necessary to allocate the tasks associated with these interventions to different cadres within the workforce with the requisite skills to carry them out. The assumed competencies of each cadre are set out in Annex A.

In the analysis, tasks were allocated to cadres using a marginal time allocation procedure whereby the hours available from each cadre (from the cheapest to the most expensive[c]) were assigned to each intervention that they are competent to perform, one hour at a time. If there were not enough FTEs in that cadre to meet the need for that intervention, the remaining need was allocated to the next cheapest cadre, and so on, until either all the need for that intervention was met or all the available FTEs had been used up. This may not reflect the reality of task allocation, e.g. a remote area may have only one health worker who has to perform tasks for which a less expensive cadre is competent. This is the nature of workforce modelling, which is designed to guide decisions about allocation of resources.

4.3.3 'Met need' for SRMNAH workers: baseline model

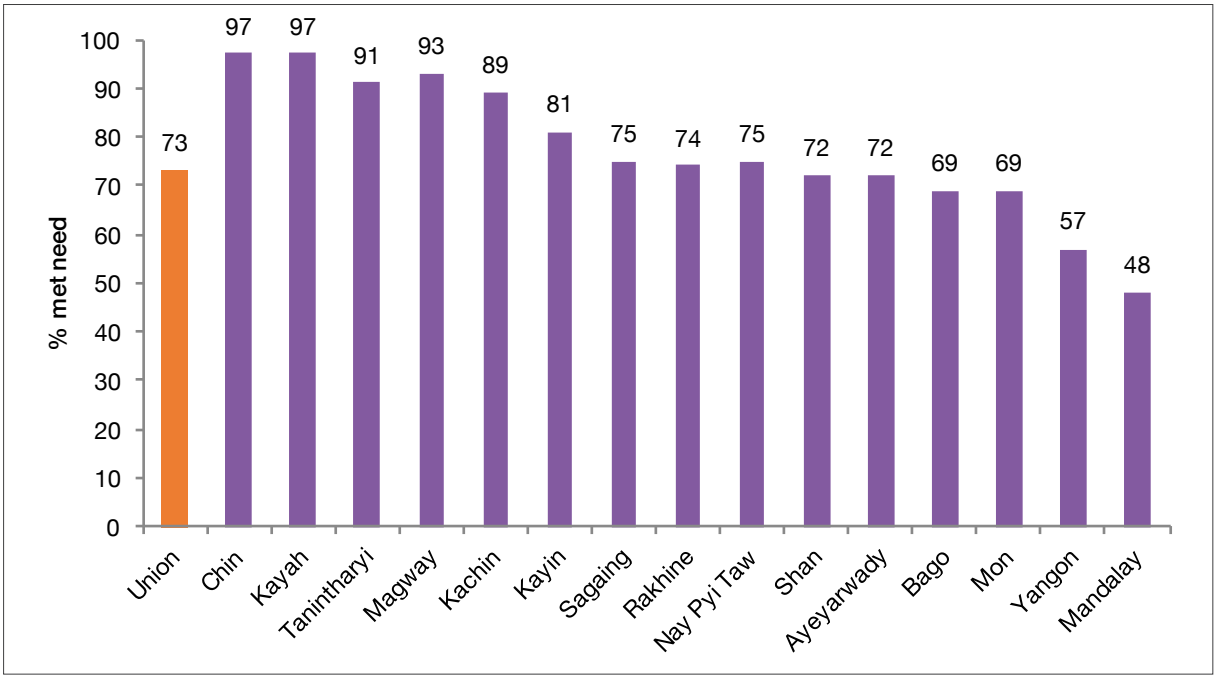
Having estimated the level of need for SRMNAH services (see Section 3) and the amount of SRMNAH worker time available to deliver these services (see Section 4.3.1) and having allocated interventions to competent cadres (see Section 4.3.2) it is possible to estimate the amount of need that the current SRMNAH workforce is able to meet. The difference between the working time required and the working time available was classified as 'unmet need' for SRMNAH services. For example, if 100 million hours of working time are required to meet the need but only 40 million hours are available, this results in 40% met need and 60% unmet need.

It should be noted that the baseline estimate of 'met need' does not indicate the amount of need that is actually being met. It is a measure of the potential of the workforce to meet the need for SRMNAH services: in other words, the percentage of the clinical time required to provide the essential SRMNAH interventions that could be provided by the current health workforce (with its current skill-mix) if the workload were allocated in an economically efficient manner.

Figure 14 shows that across Myanmar as a whole the current SRMNAH workforce is theoretically large enough to meet 73% of the need for SRMNAH services, but the 'met need' estimate varies from 97% in Chin and Kayah to less than 60% in the main population centres of Yangon and Mandalay. These results reflect the analysis reported in Section 4.2.2, which showed that, in relation to the number of women of reproductive age, Yangon and Mandalay had fewer SRMNAH workers than Chin and Kayah.

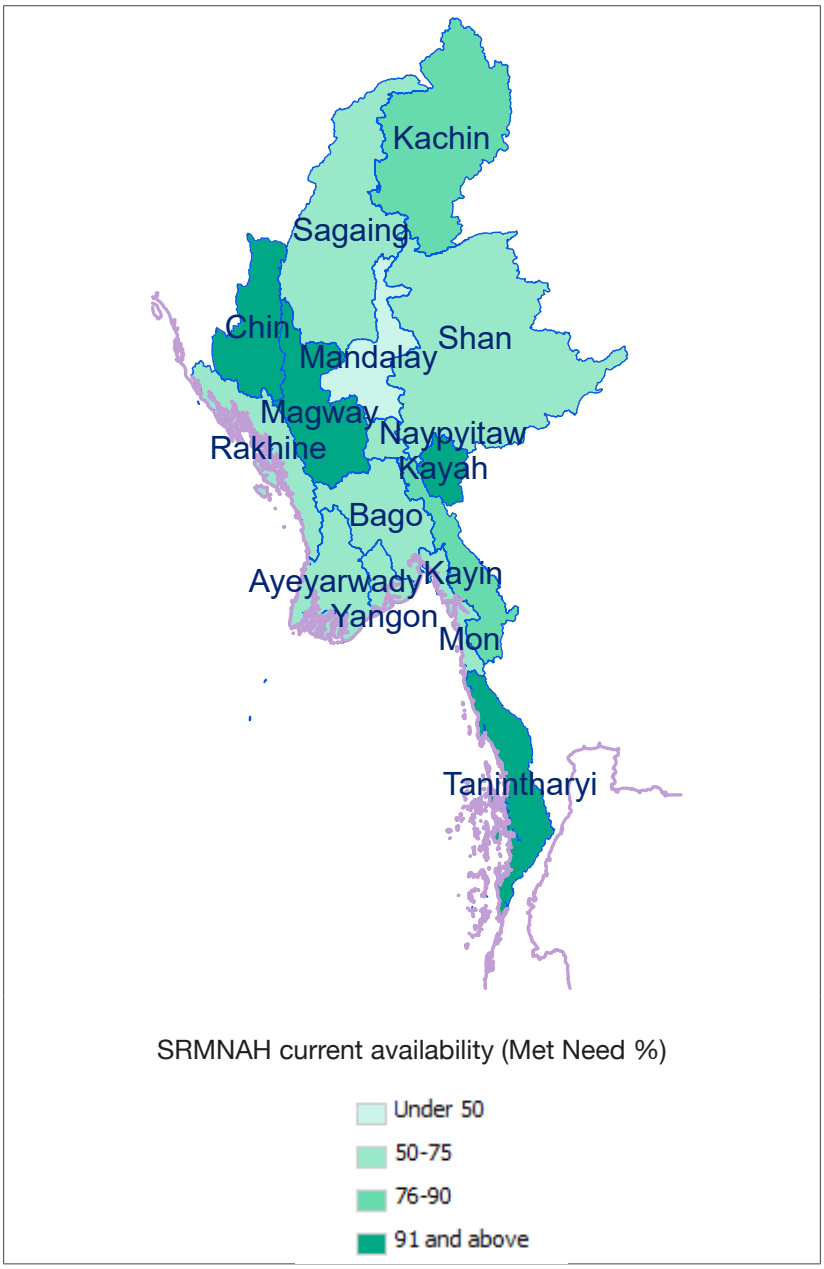
[c] 'Expensive' was defined according to their basic salary.

Figure 14: Baseline met need, by region/state, 2014



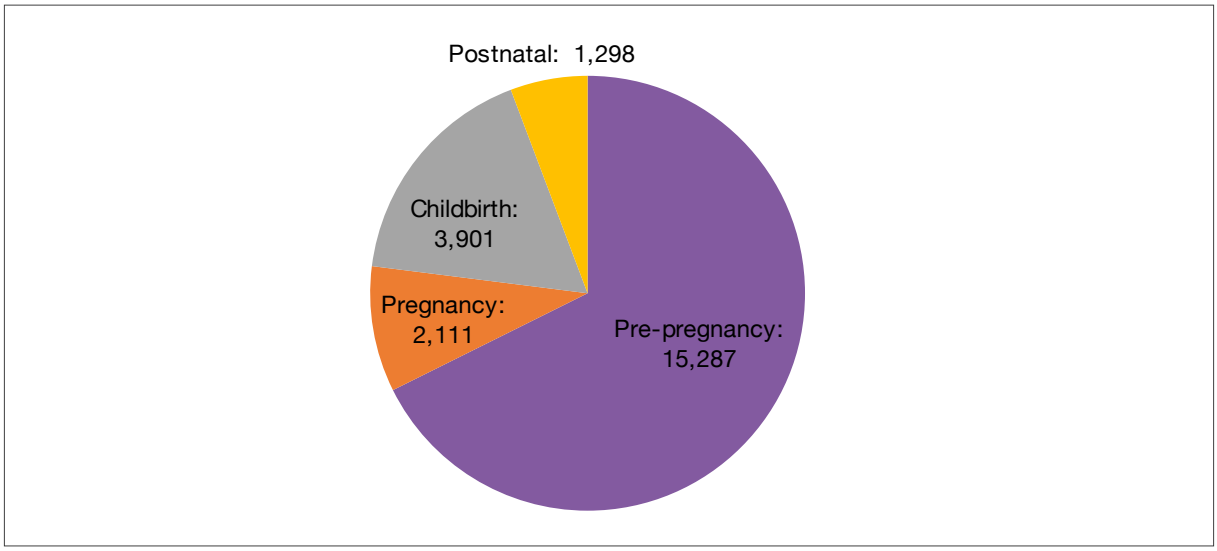
These results are presented graphically in Map 2.

Map 2: SRMNAH current availability (met need)



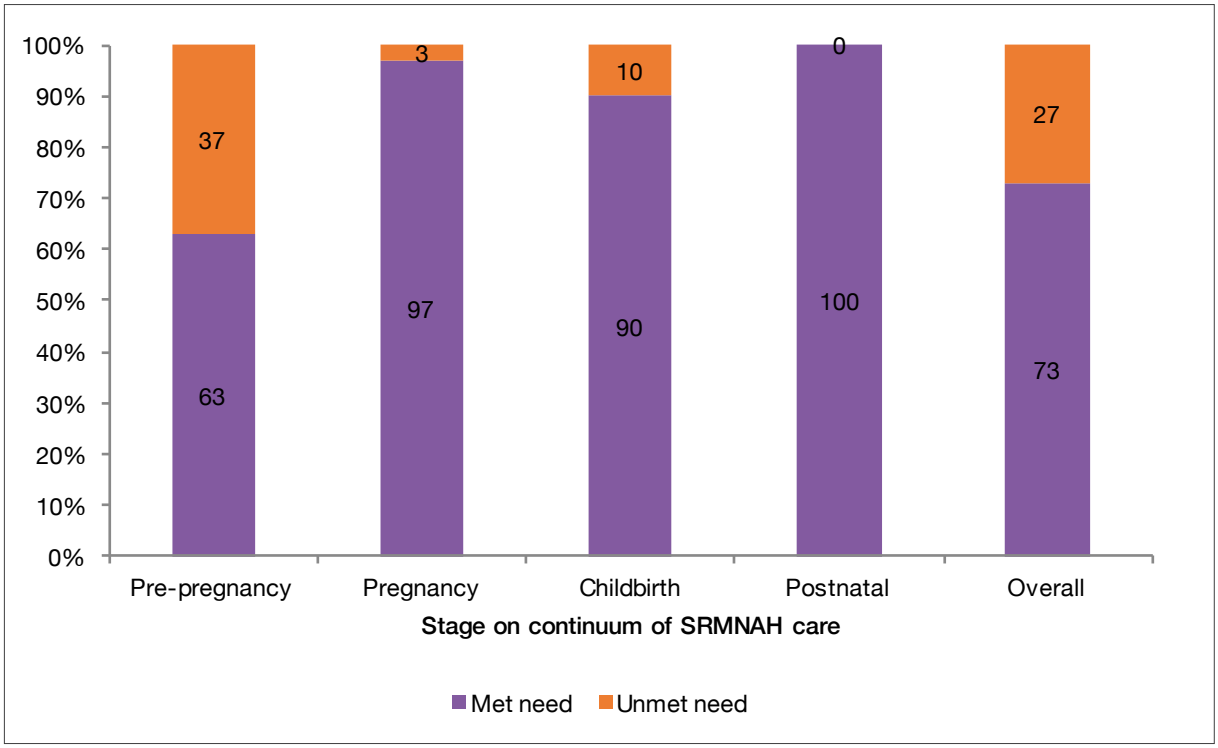
The amount of need and the amount of met need can be disaggregated across the different stages of SRMNAH care: pre-pregnancy, pregnancy, childbirth and postnatal. Figure 15 shows the amount of need for each stage of this continuum (expressed in terms of FTEs) and illustrates clearly that, due to Myanmar's low fertility rate, the majority of the need for SRMNAH worker time occurs during the pre-pregnancy stage, e.g. family planning, screening and management of HIV and other STIs. This has important implications for the way in which SRMNAH services are configured, and the skill-mix of the SRMNAH workforce.

Figure 15: Full-time equivalent workers needed, by stage in continuum of care, 2014



The large need for SRH services is reflected in Figure 16, which shows that met need for pregnancy, childbirth and postnatal care is high (90%+), but for pre-pregnancy (SRH) care it is just 63%.

Figure 16: Met need, by stage in continuum of care, 2014



4.3.4 Adjusting baseline met need estimates to produce effective coverage estimates

Myanmar's baseline estimate of 73% met need indicates that the workforce is theoretically large enough to meet 73% of the need for essential SRMNAH interventions if tasks are allocated in an economically efficient manner. The amount of need actually being met is certainly smaller than this, partly due to the way in which services are configured (e.g. it is not always possible to allocate tasks according to the principle of economic efficiency) and partly due to the baseline model taking into account only the 'availability' dimension of effective coverage (see Section 4.2). In this assessment, the baseline 'met need' estimate was adjusted for the other three dimensions using proxy variables as set out in Table 11.

Table 11: Proxy variables used to adjust met need estimates to reflect accessibility, acceptability and quality

Dimension of effective coverage	Proxy variable used	Source of data for proxy variable
Geographical accessibility	% of population living >1.23 miles from a health facility	Integrated Household Living Conditions Survey 2010
Financial accessibility	% of population living in poverty	Integrated Household Living Conditions Survey 2010
Acceptability	% of ever-married women aged 15-49 who gave birth in the preceding 2 years receiving antenatal care from a traditional birth attendant	Multiple Indicator Cluster Survey 2009–2010
Quality of care	Health facility readiness score (%) for antenatal care services	Service Availability and Readiness Assessment 2014

Data on each of these proxy variables except quality of care were available disaggregated by region/state, so it was possible to provide estimates of effective coverage at regional/state level. There are obvious limitations to this approach because (a) the proxy variables do not capture the full range of barriers to effective coverage and (b) the data on most of the proxy variables are not current. In the absence of more comprehensive and/or recent data, however, they allow us to estimate levels of effective coverage and assess the extent to which this might vary by region/state. Given the relatively high availability of SRMNAH workers in Myanmar, it is important to attempt these adjustments because otherwise the model estimates would significantly over-estimate the extent to which the SRMNAH workforce in Myanmar is meeting the need for SRMNAH care.

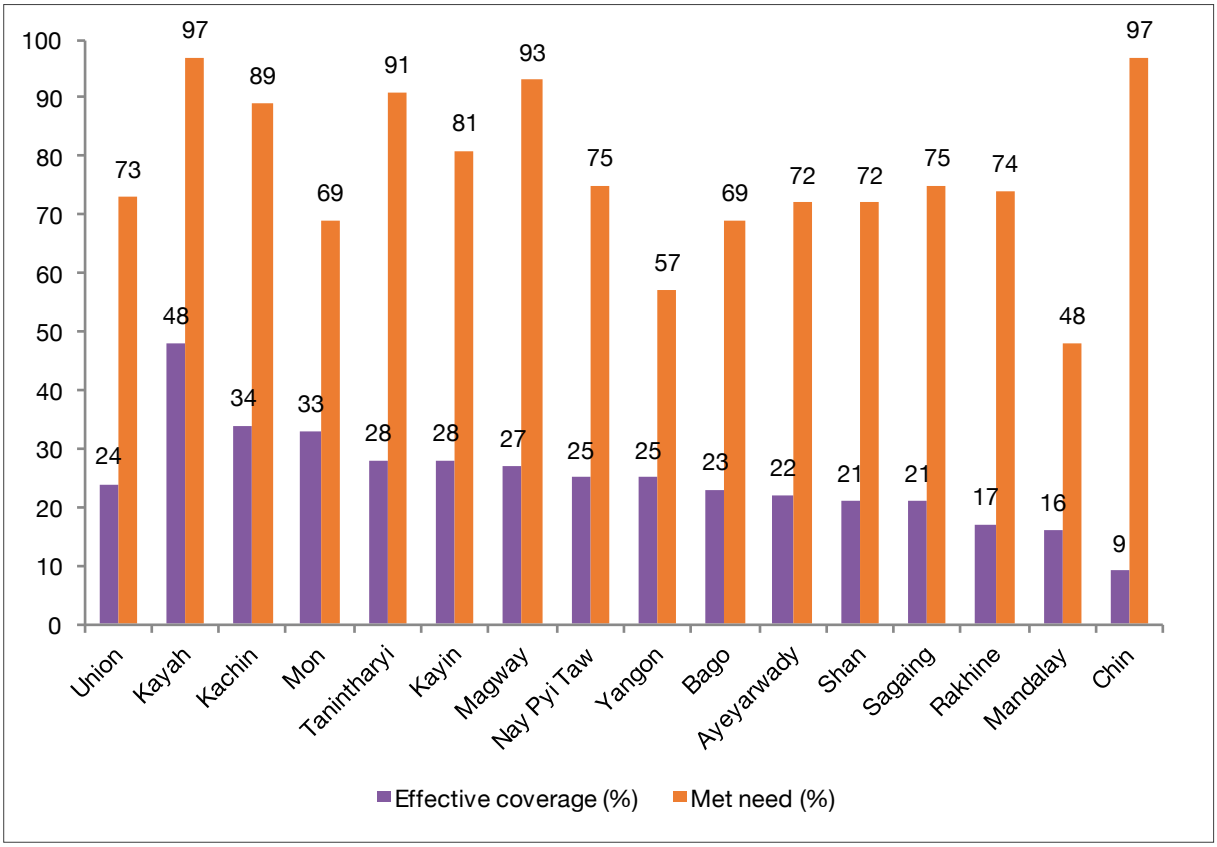
The adjustment was made by applying the percentages for the proxy variables to the 'met need' estimate. The process was as follows:

1. 19% of the population lives more than 1.23 miles from a health facility (see Section 4.2.2), so the 'met need' estimate of 73% was reduced by 19%, giving a 'met need adjusted for geographical accessibility' estimate of 59%
2. 26% of the population lives in poverty (see Section 4.2.2), so the 'met need adjusted by geographical accessibility' estimate of 59% was reduced by 26%, giving a 'met need adjusted by geographical and financial accessibility' estimate of 44%
3. 5% of women receive antenatal care from a TBA (see Section 4.2.3), so the 'met need adjusted by geographical and financial accessibility' estimate of 45% was reduced by 5%, giving a 'met need adjusted by accessibility and acceptability' estimate of 42%
4. A readiness score of 57% for ANC services (see Section 4.2.4) was translated to an 'unreadiness score' of 43%, so the 'met need adjusted by accessibility and acceptability' estimate of 42% was reduced by 43%, giving a final 'effective coverage' estimate of 24%

The above process is somewhat crude, because it assumes that each of the four dimensions has a discrete effect on effective coverage, i.e. that people living in areas with low availability of SRMNAH workers are not the same people who are affected by low accessibility, acceptability and quality. In reality, it is likely that the four dimensions of effective coverage interact, e.g. some areas with low accessibility may also have low acceptability and/or quality. It is theoretically possible to conduct a more sophisticated analysis which takes this into account, but this would require data showing how the four proxy variables interact, and such data are not currently available. In interpreting these 'effective coverage' estimates, therefore, it is important to bear in mind that they are the worst case scenario, and that rates of effective coverage may well be higher than this.

Figure 17 shows that, across Myanmar as a whole, the level of effective coverage could be as low as 24%, with regional/state-level estimates ranging from 48% in Kayah to just 9% in Chin. The difference between the 'met need' estimate and the 'effective coverage' estimate is large in all states/regions, but particularly in Chin, indicating that although Chin is well served in terms of availability of SRMNAH workers, this state faces significant challenges in terms of accessibility, acceptability and quality.

Figure 17: Estimates of effective coverage and met need, by state/region, 2014



4.3.5 Met need and effective coverage: future projections

The above process resulted in estimates of effective coverage for the baseline year (2014). Estimates of workforce availability were then projected forward to the year 2030 using a 'stock and flow' model. The 'stock' is the current workforce; over time the size of the stock is affected by 'flows' both into and out of the workforce. Inflows consist of new graduates, and outflows consist of those leaving the workforce due to death, retirement or voluntary attrition. The size of inflows and outflows were estimated for each year to 2030 based on information (and in some cases assumptions) about the age structure of the workforce, the statutory retirement age, voluntary attrition rate, graduate numbers, and age-specific death rates. Taking both inflows and outflows into account, this section presents estimates of met need and effective coverage up to 2030, assuming a 'baseline' scenario (i.e. assuming no additional efforts are made to change the size of inflows or outflows and that current demographic and epidemiological conditions (including those used to estimate levels of effective coverage continue to apply).

Under this baseline scenario, Figure 18 shows that 'met need' across the country as a whole is projected to rise from 73% in 2014 to 97% by 2027, and to remain at this level until 2030, so that by 2027 the SRMNAH workforce will be large enough to meet nearly all of the need for SRMNAH services *assuming*

that tasks are allocated in an economically efficient manner. On the other hand, effective coverage is projected to rise only slightly (from 24% to 32%). Effective coverage will increase significantly only if more health facilities are built and appropriately staffed in remote areas, poverty rates are reduced, and health facilities are better equipped and resourced.

Figure 18: Met need and effective coverage estimates, baseline scenario, 2014–2030

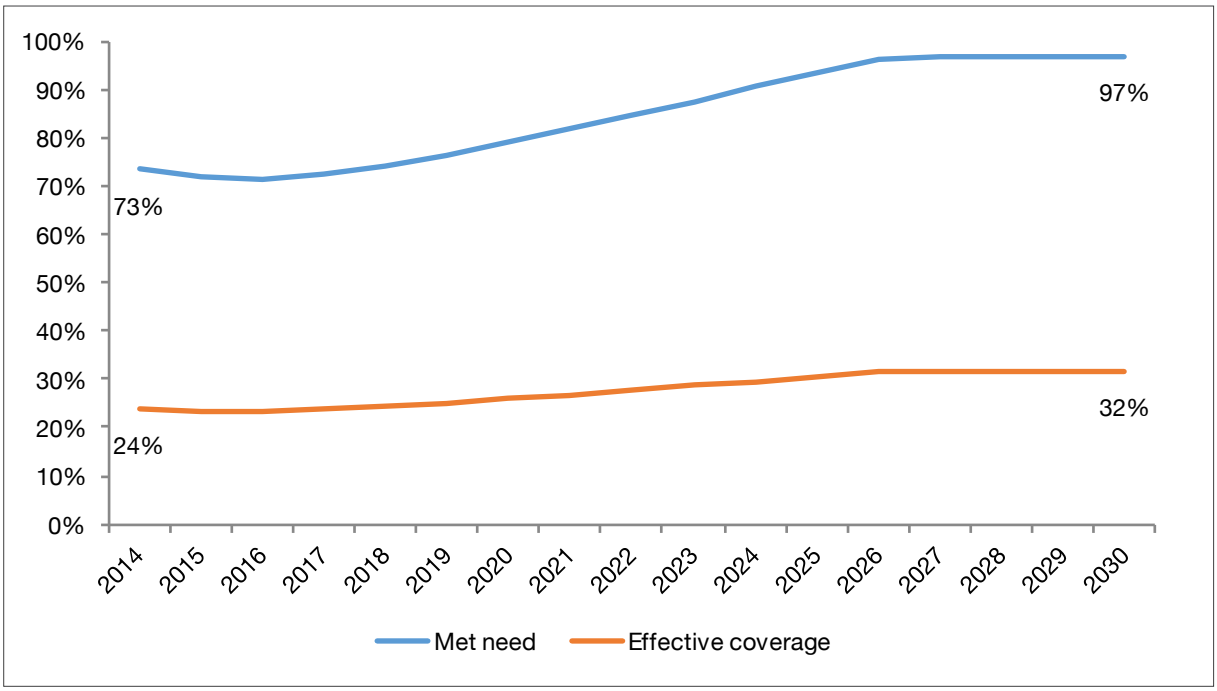


Figure 19a shows the projected increases in met need separately for each region/state. It indicates that in terms of SRMNAH worker availability, all regions and states except Mandalay are projected to have met need of over 90% by 2030, and five states/regions (Chin, Kachin, Kayah, Nay Pyi Taw and Yangon) are projected to have 100% met need. Figure 19b, however, shows that in most states/regions (the exceptions being Mon, Nay Pyi Taw and Yangon), effective coverage is not projected to improve much by 2030. In other words, even though SRMNAH worker availability is set to improve by a large margin over the next 15 years, effective coverage will remain low if there are no accompanying efforts to address shortcomings in accessibility, acceptability and quality.

Figure 19a: Met need estimates, baseline scenario by region/state, 2014–2030

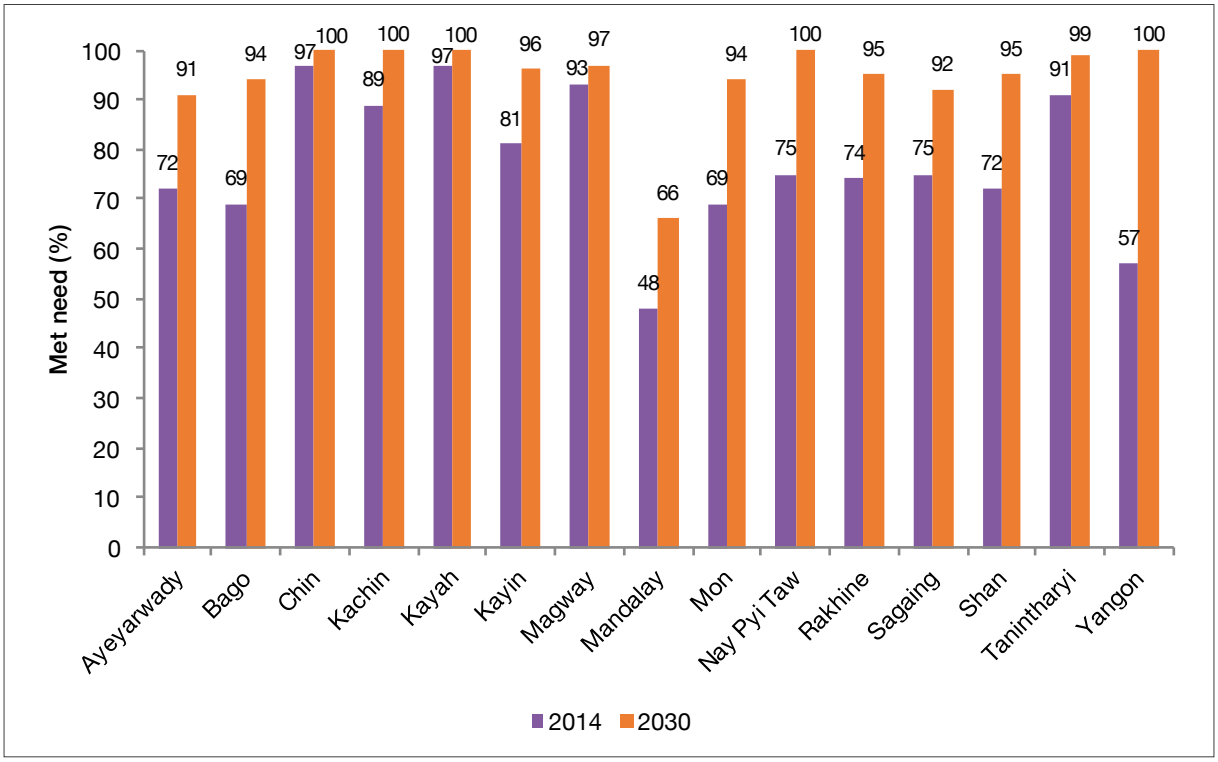
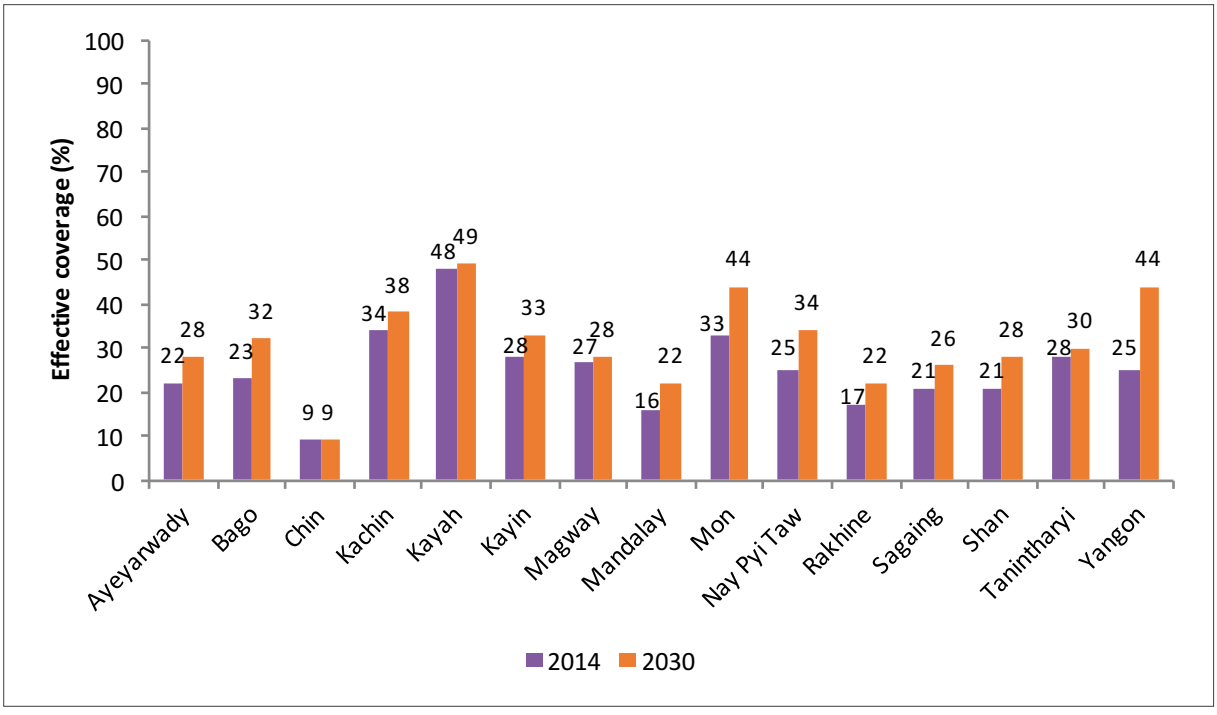


Figure 19b: Effective coverage estimates, baseline scenario by region/state, 2014–2030



5 The future SRMNAH workforce in Myanmar

5.1 Options for future development of the SRMNAH workforce

In order to address the main SRMNAH workforce issues and challenges identified in this assessment, three options are presented below. They include both short-term and longer-term strategies, and could be implemented individually or in combination. Since policy options are based on certain assumptions and different parameters, when considering one option or a combination of options, targets should be set and fulfilled.

The focus of all three options is primarily on midwives, as they are the backbone of the SRMNAH system (see Section 2.2.2) and uniquely placed to provide services across the full continuum of SRMNAH care[73]. Of course, midwives can only be fully effective if they are able to operate as part of a multi-disciplinary team, with effective referral mechanisms between different levels of care[10]. The emphasis on midwives in this section does not imply that other SRMNAH cadres are unimportant or do not require investment; it simply reflects the evidence-based view that investment in midwifery is the most cost-effective way to significantly improve SRMNAH outcomes in Myanmar in the short to medium term.

It is anticipated that the successful implementation of one or more of the three options will be necessary in order for Myanmar to achieve its commitments under the FP2020 initiative (see Section 1). Unless met need and effective coverage are increased, it is unlikely that the SRMNAH workforce will be able to deliver on these commitments.

5.1.1 Option 1: Task shifting

Under this option, all tasks relating to disease control and environmental sanitation would be removed from the job description for midwives and would become the responsibility of public health supervisors II (PHS-IIs).

As described in Section 4.2.1, while being trained as experts in SRMNAH care, midwives currently also fulfil many other public health functions. Since the late 1970s, midwives' duties have been categorized as primary health care/basic health services. Their main activities include: maternal and child health services, reproductive health care, health education, nutrition promotion, immunization, disease control activities, and treatment and referral of common illnesses[74]. A 2003 study found that, while half of the midwives interviewed were fully satisfied with their work situation, some (8%) expressed their desire to quit. However, all of them were happy delivering maternity care and about half of them revealed they would be happier in their work if better rewarded, in kind or in cash. The majority (almost 70%) found it difficult to accomplish their assigned tasks because of time limitations. They felt 'bogged down' with data and statistics and could not complete these tasks in time.

This option recognizes that this situation reduces the time that midwives can spend using their specialized skills, affects the public perception of the midwife as a specialist cadre and limits the extent to which midwives are able to meet the need for SRMNAH services in their communities. On the other hand, the 2003 study mentioned above found that midwives enjoyed helping to tackle existing health problems and control priority diseases, feeling these activities boost up their role in the community[67]. There is, therefore, a risk that this option might be unpopular with midwives in the short term.

5.1.2 Option 2: Improve SRMNAH workers' performance

This option proposes two activities, both of which could be achieved in the short to medium term with appropriate investment:

(a) provide in-service training to all midwives in: (i) the four BEmONC signal functions that they are authorized to perform: parenteral antibiotics, uterotonic drugs, parenteral anticonvulsants and basic neonatal resuscitation, and (ii) manual vacuum aspiration as part of post-abortion care

(b) improve infrastructure and working conditions by: building more health facilities in rural areas, improving the supply of medicines and other commodities, strengthening the supportive supervision of midwives, and improving midwives' quality of life through better housing.

Building more health facilities in rural areas would improve geographical accessibility, and including living quarters for midwives in these new facilities would address the reluctance of some midwives to work in remote areas (due to the current lack, or poor quality, of housing). Strengthening supportive supervision for midwives (especially those deployed in remote areas) would address midwives' experience of professional isolation, another strong disincentive to remain in the profession.

Although midwives are currently authorized to perform four of the seven BEmONC signal functions, some do not perform them very often and therefore require refresher training. Similarly, as abortion is illegal in Myanmar except under specific circumstances, and therefore uncommon, midwives tend not to be well versed in the most up-to-date methods of post-abortion care, which may lead to poor quality of care when they do perform these interventions.

The quality of care that midwives are able to provide is also affected by their living and working environments. Improvements to both health facility infrastructure and the supply of medicines and other commodities would allow midwives to operate to the full scope of their abilities.

5.1.3 Option 3: More graduates with more competencies, and increase absorption and retention

This option proposes five activities:

(a) increase the number of graduate midwives

(b) introduce a bachelor's degree in midwifery and a bridging course to convert a diploma into a degree

(c) increase midwives' basic salary to reflect their higher level of education, relative to that of PHS-IIs

(d) improve the recruitment and retention of midwives in hard-to-reach areas

(e) improve the absorption of newly qualified midwives into the public health system by increasing the number of, and filling, sanctioned midwifery posts

Activities (a) and (b) are already well advanced in the planning stages and should be implemented over the next few years (see Section 4.2.4). The addition of activities (c) to (e) would take longer to implement. Implementation of Option 3 is dependent on many factors, including financing; in particular, introducing a new degree course and increasing the number of graduates will require investment to ensure sufficient numbers of suitably qualified educators to teach the new curriculum to the increased numbers of student midwives.

The introduction of a bachelor's degree in midwifery will help to address the current lack of career progression options in midwifery (by comparison with nursing). Figure 20 shows that diploma midwives are currently quite restricted in terms of how far they can progress along the midwifery pathway. As

a result, many ambitious midwives switch to nursing or other alternative careers, which is a form of wastage. Figure 20 also illustrates how this might change when graduate midwives enter the workforce.

Figure 20: Proposed career pathways for midwives after the introduction of the bachelor's degree

In a similar vein, and as noted in Section 4.2.1, many new graduates are 'lost' to midwifery after graduation because they are not immediately recruited to work as public sector midwives, with the result that some choose to enter nursing or work in the private sector instead. Increasing the number of sanctioned midwife posts would help to prevent this wastage.

Currently, midwives' and PHS-IIs' salaries are the same, even though it takes longer to qualify as a midwife than as a PHS-II. Increasing midwives' pay to reflect their higher level of qualification would be an important recognition of their value and contribution to SRMNAH and should improve retention rates.

The need to improve recruitment and retention in hard-to-reach areas has already been recognized by the MoH. For some time there has been a policy of making hardship payments to health workers in such areas, and a new specification was issued in February 2016. The relevant payments for SRMNAH cadres are shown in Table 12.

Table 12: Basic salaries and monthly hardship allowances for SRMNAH workers in hard-to-reach areas

		Type of area*		
Position	Basic monthly salary (kyats)	Slightly hard to reach	Fairly hard to reach	Very hard to reach
Matron	195,000-205,000	+61,000	+67,000	+73,000
Ward sister	180,000-190,000	+64,000	+70,000	+76,000
Staff nurse	165,000-175,000	+67,000	+73,000	+79,000
Trained nurse	165,000-175,000	+67,000	+73,000	+79,000
Lady health visitor	165,000-175,000	+67,000	+73,000	+79,000
Midwife	150,000-160,000	+70,000	+76,000	+82,000
Medical doctor	250,000-270,000	+76,000	+82,000	+88,000
Pediatrician (junior consultant)	280,000-300,000	+86,000	+92,000	+98,000
Obstetrician/gynaecologist (junior consultant))	280,000-300,000	+86,000	+92,000	+98,000
Senior consultant obstetrician/gynaecologist / paediatrician	310,000-330,000	+96,000	+102,000	+108,000

* Area types are based on General Administrative Department criteria
Source: Announcement by the Ministry of Finance, No. 26/2016, dated 16 February 2016

5.2 Impact of each option

5.2.1 Impact on met need for essential SRMNAH services

Table 13 sets out how each of the three options was operationalized in the 'met need' modelling.

Table 13: How the options were operationalized in the 'met need' model

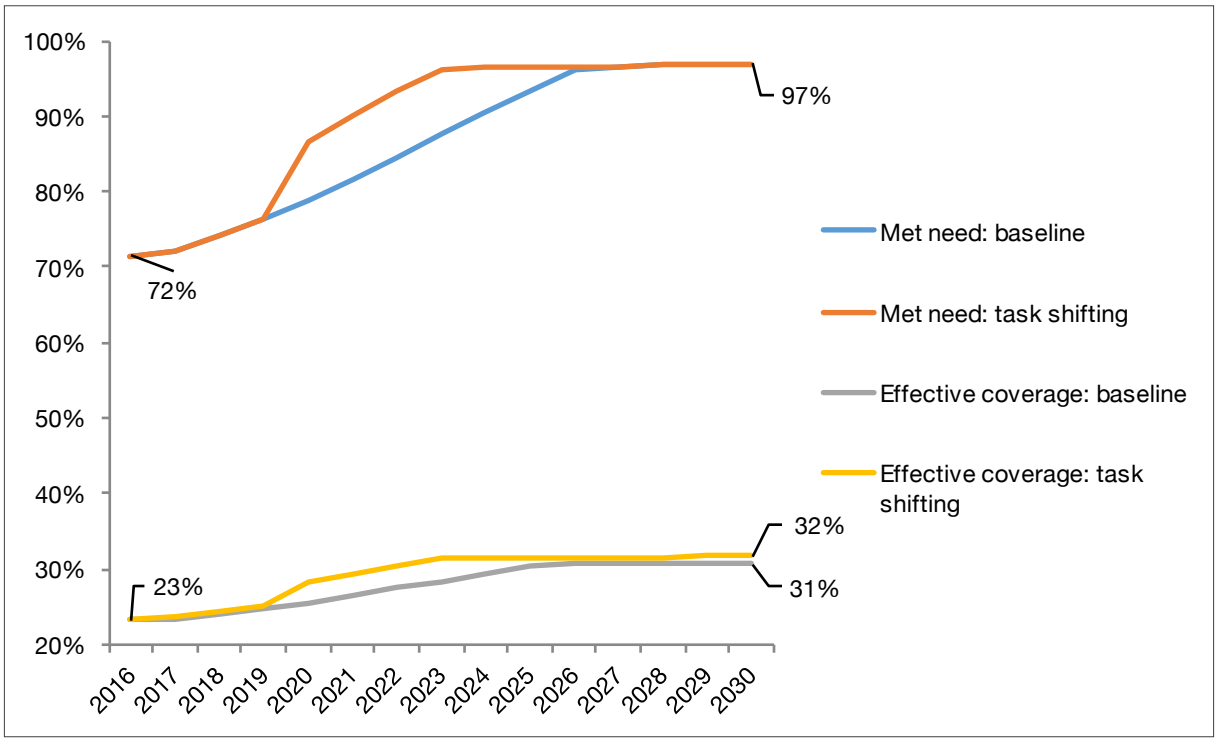
Option	Activity	How modelled
1. Task shifting	Recruitment and training of additional PHS-IIs	% time midwives spend on SRMNAH increases from 60% to 80% from 2020 onwards
2. Improved performance	a) In-service training	Health facility readiness score for antenatal care increases from 57% to 70% by 2020
	b) Improve infrastructure and working conditions	Voluntary attrition rate for midwives decreases from 1% to 0.5% by 2030
3. More graduates with more competencies	a) Increase the number of graduate midwives	1 midwife per village tract achieved by 2030, with a linear increase in the number of midwives between 2023 (when the new graduates would start to enter the workforce) and 2030
	b) Introduce a bachelor's degree for midwives and a bridging course to convert a diploma into a degree	Assume 50 graduates from the bridging course per year from 2021 onwards, and that all graduates from the two courses would have the following additional competencies: delivery of contraceptive implants; management of syphilis, chlamydia and trichomoniasis in all women of reproductive age; management of syphilis, chlamydia and trichomoniasis in pregnancy; treatment of syphilis in pregnancy; delivery of antibiotics to manage premature rupture of membranes; management of HIV during childbirth if not previously diagnosed; presumptive antibiotic therapy for newborns at risk of bacterial infections
	c) Increase basic midwifery salary to reflect their higher level of education relative to PHS-IIs, and d) Improve recruitment and retention of midwives in hard-to-reach areas	Voluntary attrition rate for midwives decreases from 1% to 0.5% from 2017 onwards
	e) Improve absorption of newly qualified midwives into the public health system by increasing the number of, and filling, sanctioned midwife posts	An additional 6,000 sanctioned midwife posts by 2020 (2014 baseline = 12,743) and a further 6,000 by 2025. Assume all sanctioned posts would be filled

Table 13 shows that the modelling assumed that the options would affect the availability and quality dimensions of effective coverage only. It is possible that options 2 and 3 would also affect acceptability, and that option 2b would also affect geographical accessibility (depending on where the new facilities were located). However, it is very difficult to estimate the extent to which accessibility and acceptability would be affected, and this has not been attempted as part of this exercise.

Option 1: Task shifting

If enough PHS-IIs were employed to allow them to take over all disease control and environmental sanitation tasks (see Table 14), midwives would be able to spend more working time on SRMNAH care. Figure 21 shows that, once the new PHS-IIs joined the workforce in 2020, there would be an immediate impact on met need: Myanmar would reach almost 100% met need by 2023, i.e. three years earlier than under the baseline scenario. There would also be an impact on effective coverage, but this would be smaller and the difference between the baseline scenario and the task shifting scenario would almost disappear by 2025.

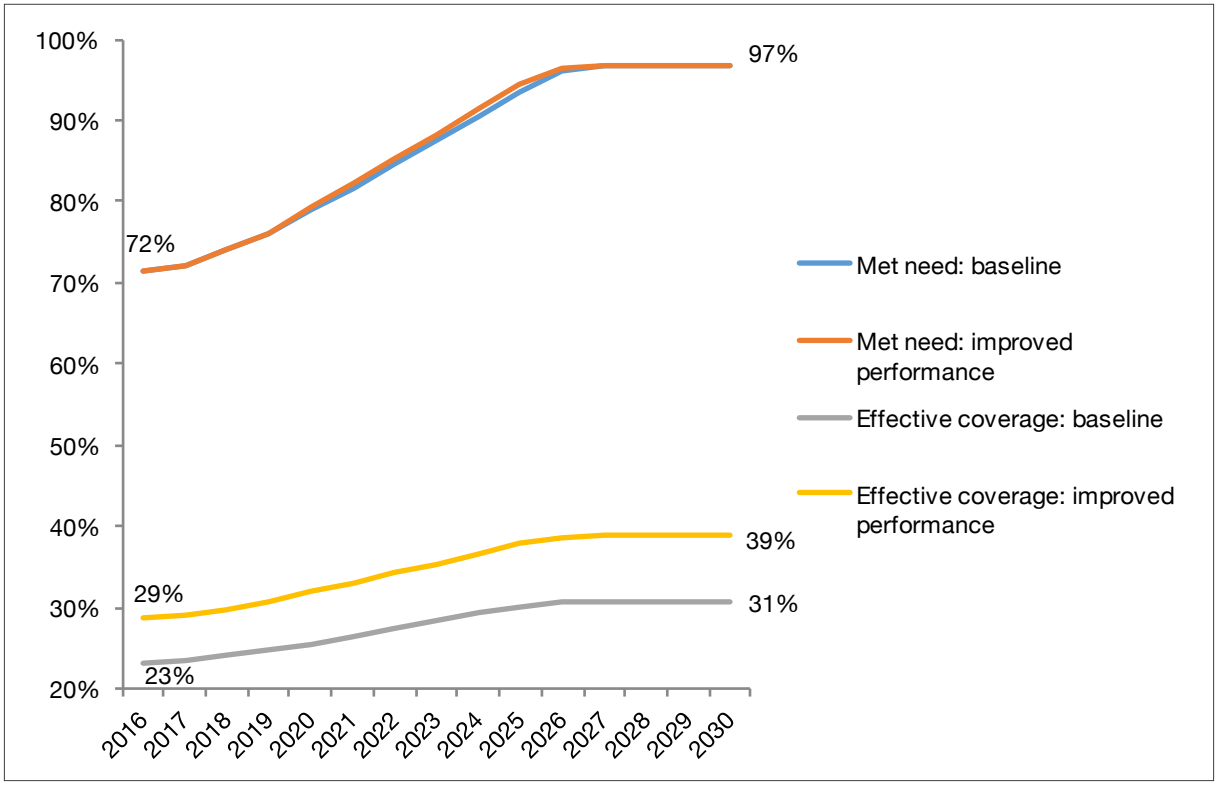
Figure 21: Projected met need 2016–2030: baseline scenario *versus* task shifting scenario



Option 2: Improved performance

If Myanmar were to improve the infrastructure and working conditions of midwives, Figure 22 shows that the projected impact on availability to 2030 would be minimal, because the impact on voluntary attrition rates would be small (see Table 13) and it would take until 2030 to implement fully the programme of improving infrastructure and working conditions. The full benefit of this option in terms of availability would therefore be felt after 2030. The projected impact on quality of care (and therefore effective coverage), on the other hand, would be immediate and sustained, because the programme of in-service training will begin in 2016 and be complete by 2020.

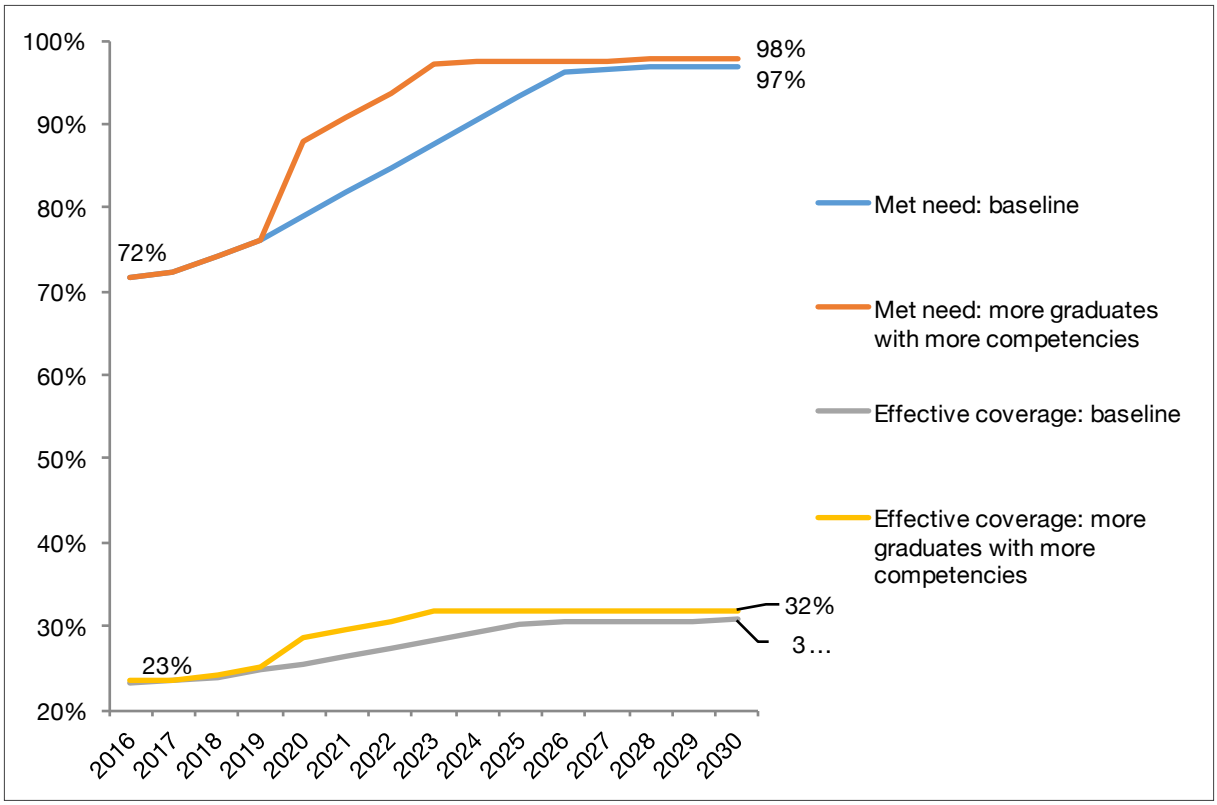
Figure 22: Projected met need and effective coverage 2016–2030: baseline scenario versus improved performance scenario



Option 3: More graduates with more competencies

Figure 23 shows that increasing the number and competencies of graduate midwives would accelerate Myanmar's progress towards 100% met need, such that 97% met need would be achieved in 2023 rather than 2027. The big increase in met need between 2019 and 2020 would be due to the creation of the additional sanctioned posts for midwives. Because met need would be almost 100% by 2023, the addition of the new sanctioned posts in 2025 and the new Bachelor midwives from 2023 onwards would have no significant impact on met need. In terms of effective coverage, this option would result in quicker progress towards the increased level of effective coverage, such that it would reach 31% by 2022 rather than 2026.

Figure 23: Projected met need 2016–2030: baseline scenario versus more graduates with more competencies scenario



5.2.2 Costs

Option 1: Task shifting

At the stakeholder workshops, it was estimated that there would need to be as many PHS-IIs as midwives in order to achieve the task shifting option. On this basis, the numbers needed in each region/state are shown in Table 14.

Table 14: Number of public health supervisors to be hired under the task shifting option

State/region	Number of public health supervisors 2014	Number of midwives 2014	Additional public health supervisors to be hired
Ayeyarwady	410	1,488	1,078
Sagaing	471	1,210	739
Shan	503	1,183	680
Bago	510	1,109	599
Magway	496	1,085	589
Mandalay	436	1,004	568
Yangon	304	728	424
Rakhine	313	669	356
Mon	199	430	231
Kachin	187	418	231
Chin	174	321	147
Kayin	202	339	137
Tanintharyi	167	301	134
Nay Pyi Taw	85	206	121
Kayah	81	155	74
Total	**4,538**	**10,646**	**6,108**

Assuming an average PHS-II salary of 1.8 million kyats per year, the cost of this option would be **11 billion kyats per year** (6,108 x 1.8 million) once all the additional PHS-IIs were recruited.

Option 2: Improved performance

At the stakeholder workshops, it was estimated that there would need to be a minimum of one health facility per village tract in order to fully achieve the improved performance option. On this basis, the numbers of additional health facilities needed in each region/state are shown in Table 15.

Table 15: Number of health facilities to be built under the improved performance option

Region/state	Number of health facilities* 2014	Number of village tracts	Additional health facilities needed
Shan	1,115	1,753	638
Ayeyarwady	1,427	1,924	497
Mandalay	922	1,416	494
Magway	1,067	1,539	472
Sagaing	1,289	1,761	472
Rakhine	669	1,041	372
Bago	1,070	1,429	359
Kachin	363	599	236
Chin	387	470	83
Yangon	526	619	93
Kayin	347	376	29
Kayah	148	74	0
Mon	385	378	0
Nay Pyi Taw	210	189	0
Tanintharyi	296	264	0
Total	**10,221**	**13,832**	**3,745**

* Only health facilities available at village tract level are counted here, i.e. rural health centres, sub-centres and station hospitals.

Assuming a cost of 60 million kyats to build each health facility, the cost of this option would therefore be just under **225 billion kyats** (3,745 x 60,000,000). Note that the costs of providing in-service training are not shown here, because we understand that funds for this activity have already been set aside.

Option 3: More graduates with more competencies

The main costs under this option would be those of training and salaries of the additional midwives. It was assumed that:

1. It costs 700,000 kyats to train each midwife, i.e. 233,333 kyats per year
2. The average midwife salary would increase from 150,000 kyats to 165,000 kyats in 2017 for those in the existing workforce, and the same increase would apply to the new graduates from the year in which they graduate
3. From 2017 onwards, salaries and training costs would increase at a rate of 7.45% per year on average (i.e. assuming the 2014-15 inflation rate[75] continues to apply)

On the basis of these assumptions, the annual and cumulative costs of this option are shown in Table 16. The significant increases in costs in 2020 and 2025 are mainly due to the creation of the additional 6,000 sanctioned midwife posts in each of these years (see Table 13). The total cost is estimated at almost **53 billion kyats.**

Table 16: Annual and cumulative costs for the more graduates with more competencies option

Year	Cost in that year (kyats)	Cumulative cost (kyats)
2016	0	0
2017	76,819,489	76,819,489
2018	89,437,860	166,257,349
2019	103,457,102	269,714,451
2020	2,167,575,858	2,437,290,309
2021	2,481,278,012	4,918,568,321
2022	2,829,615,419	7,748,183,740
2023	2,312,215,945	10,060,399,685
2024	2,592,071,032	12,652,470,716
2025	5,832,121,624	18,484,592,340
2026	6,387,209,671	24,871,802,012
2027	6,991,154,991	31,862,957,003
2028	6,348,096,590	38,211,053,593
2029	6,936,385,770	45,147,439,363
2030	7,575,857,587	52,723,296,951

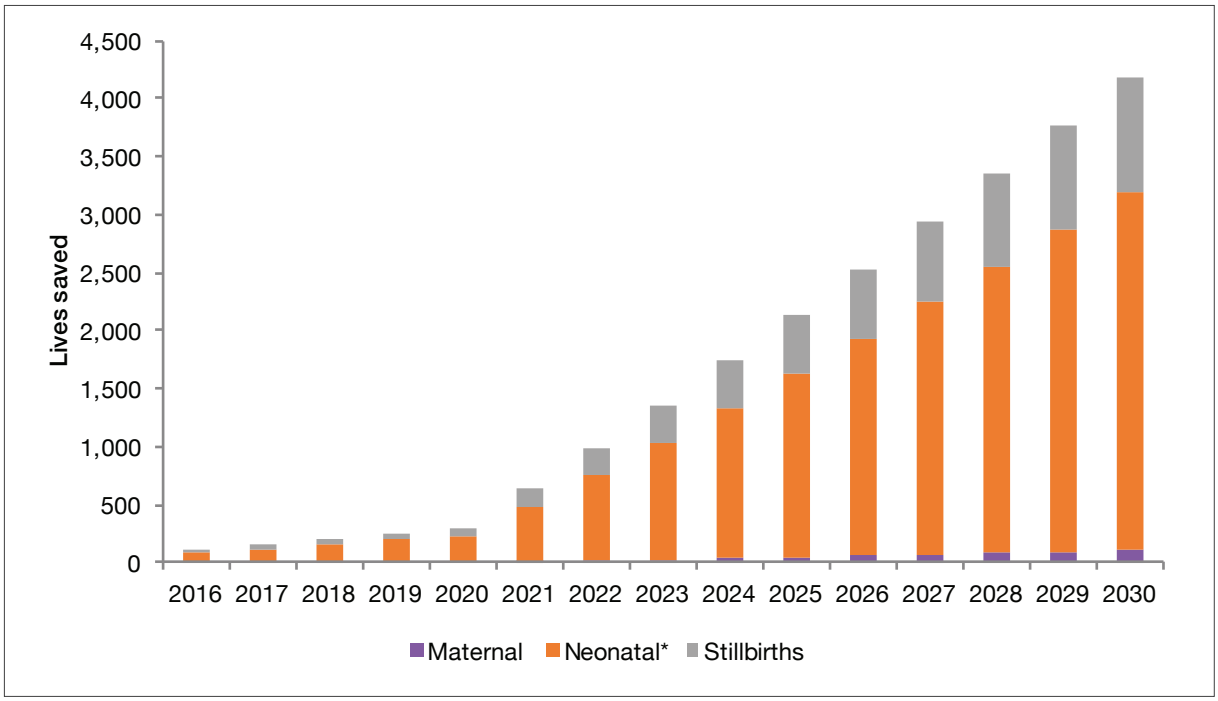
Note: the above costs do not include the monthly hardship allowances shown in Table 12.

5.2.3 Lives saved

The Lives Saved Tool (LiST) was used to model the number of mothers' and newborns' lives that would be saved and the number of stillbirths averted under each of the three options. Full details of the methodology can be found in Annex D.

Over the period 2016 to 2030 inclusive, it is estimated that full implementation of the task shifting option would result in 24,643 fewer deaths (527 maternal deaths, 18,302 neonatal deaths and 5,814 stillbirths). Figure 24 illustrates that the estimated number of lives saved would be relatively small until 2021 (because it would take until 2020 for the new PHS-IIs to be trained and join the workforce), but would rise rapidly from then onwards, reaching over 4,000 per year by 2030.

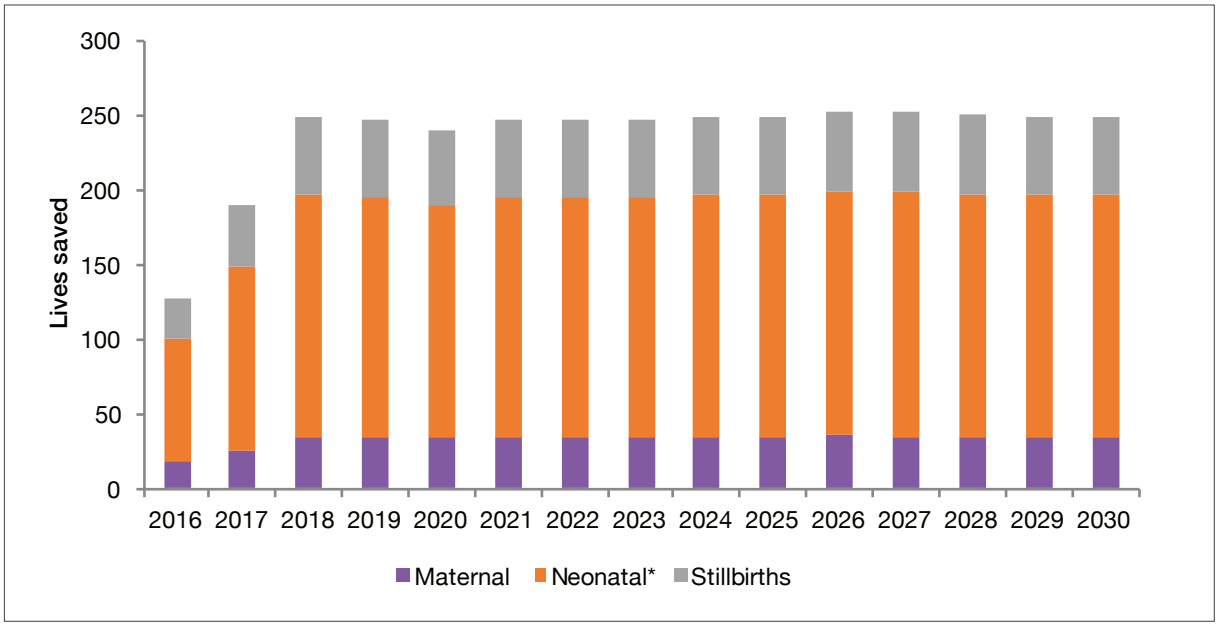
Figure 24: Estimated lives saved under task shifting scenario, 2016–2030



*within 28 days of live birth

Over the period 2016 to 2030 inclusive, it is estimated that full implementation of the improved performance option would result in 3,539 fewer deaths (500 maternal deaths, 2,292 neonatal deaths and 747 stillbirths). Figure 25 illustrates that the estimated number of lives saved rise between 2016 and 2018, then remain fairly static from 2018 to 2030.

Figure 25: Estimated lives saved under improved performance scenario, 2016–2030



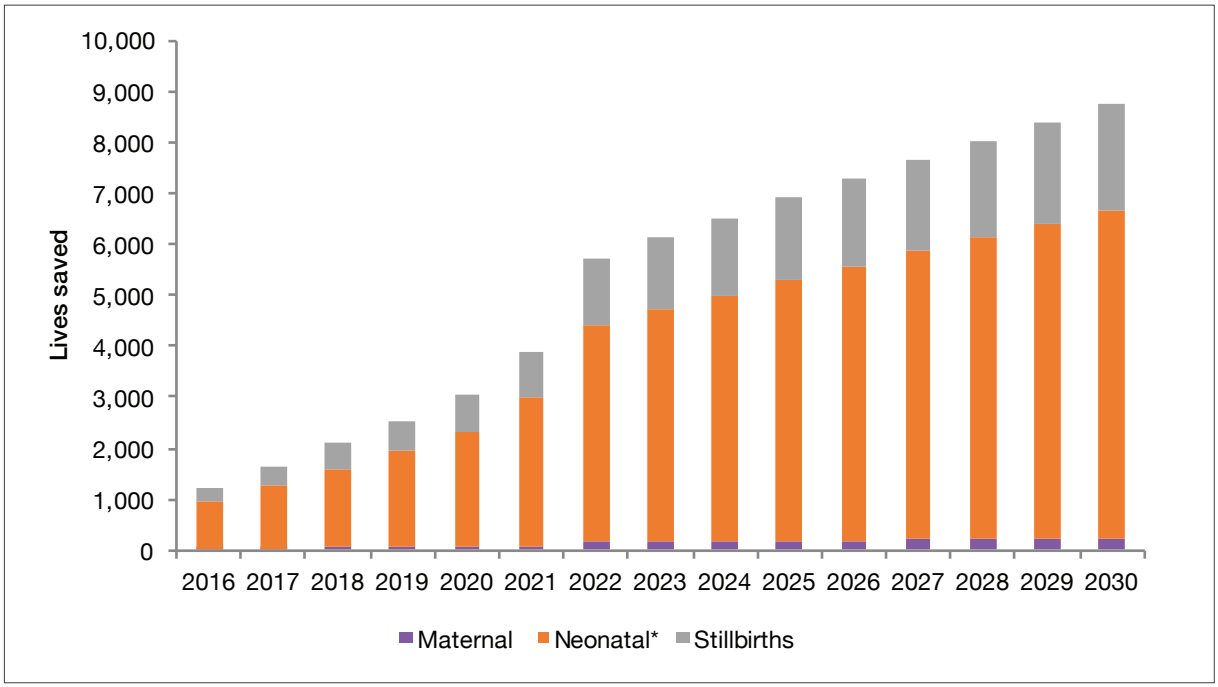
*within 28 days of live birth

Relative to the cost of this option, these are small numbers of lives saved. This is because, as noted in Section 5.2.1, this option would have little impact on the availability of SRMNAH workers during the time frame of this assessment; its real impact would not be felt until after 2030. It is also important to bear in mind that the number of lives saved is only one measure of impact; the improvement in quality of care that would be expected under this option would almost certainly result in lower levels of maternal morbidity and increased levels of satisfaction with and acceptability of antenatal care.

Improvements to quality of care will also theoretically save lives, but LiST assumes that quality of care will be uniformly high under both the baseline and the alternative scenarios, so it is not possible to model the effect of increasing quality of care on mortality.

Over the period 2016 to 2030 inclusive, it is estimated that full implementation of the more graduates with more competencies option would result in 79,786 fewer deaths (2,173 maternal deaths, 58,872 neonatal deaths and 18,741 stillbirths). Figure 26 illustrates that the estimated number of lives saved would rise more rapidly from 2021 onwards, because under this scenario large numbers of additional sanctioned midwife posts would be created.

Figure 26: Estimated lives saved under more graduates with more competencies scenario, 2016–2030



*within 28 days of live birth

It is notable that the largest impact under each of the three scenarios is accounted for by improvements to family planning services. This reflects the fact that the majority of the SRMNAH workload consists of pre-pregnancy interventions, including family planning (see Figure 15) and the fact that met need for pre-pregnancy care is lower than met need for pregnancy, childbirth and postnatal care (see Figure 16). Therefore, improvements to SRMNAH availability will have the largest impact on pre-pregnancy care.

Abbreviations and acronyms

AAAQ:	Availability, Accessibility, Acceptability and Quality
AMW:	Auxiliary Midwife
ANC:	Antenatal Care
ASEAN:	Association of South East Asian Nations
CHW:	Community Health Worker
FTE:	Full-time Equivalent
GDP:	Gross Domestic Product
GGE:	General Government Expenditure
GGHE:	General Government Health Expenditure
HMIS:	Health Management Information System
LiST:	Lives Saved Tool
MCH:	Maternal and Child Health
MDG:	Millennium Development Goal
MNCH:	Maternal, Newborn and Child Health
MNH:	Maternal and Newborn Health
MoH:	Ministry of Health
NGO:	Non-government Organization
NHP:	National Health Plan
Ob/gyn:	Obstetrician/Gynaecologist
ODA:	Official Development Assistance
OOP(S):	Out of Pocket (spending)
PHS:	Public Health Supervisor
PMNCH:	Partnership for Maternal, Newborn & Child Health
RH:	Reproductive Health
RHC:	Rural Health Centre
SARA:	Service Availability and Readiness Assessment
SDG:	Sustainable Development Goal
SoWMy:	State of the World's Midwifery
SRH:	Sexual and Reproductive Health
SRMNAH:	Sexual, Reproductive, Maternal, Newborn and Adolescent Health
STI:	Sexually Transmitted Infection
TBA:	Traditional Birth Attendant
TFR:	Total Fertility Rate
THE:	Total Health Expenditure
UHC:	Universal Health Coverage
UNICEF:	United Nations Children's Fund
UNFPA:	United Nations Population Fund
UNOPS:	United Nations Office for Project Services
WHO:	World Health Organization

References

1. Every Woman Every Child. The Global Strategy for Women's, Children's and Adolescents' Health (2016-2030). New York, 2015 http://www.who.int/life-course/partners/global-strategy/globalstrategyreport2016-2030-lowres.pdf?ua=1.
2. World Health Organization. H4+ High Burden Country Initiative (HBCI). 2016. http://www.who.int/workforcealliance/countries/hbci/en/index.html (accessed Feb 17, 2016).
3. Global Health Workforce Alliance (GHWA), World Health Organisation. Health Workforce 2030: A global strategy on human resources for health. 2016. http://www.who.int/workforcealliance/knowledge/resources/strategy_brochure2014/en/ (accessed Feb 17, 2016).
4. UNFPA. The State of World's Midwifery 2011: Delivering Health, Saving Lives. New York: United Nations Population Fund, 2011 http://www.unfpa.org/sowmy/report/home.html.
5. UNFPA, WHO, ICM. The State of the World's Midwifery 2014: A universal pathway. A woman's right to health. Annex 3. United Nations Population Fund, 2014 http://www.unfpa.org/sites/default/files/pub-pdf/EN_SoWMy2014_complete.pdf.
6. Family Planning 2020. Country Statement for Myanmar's Commitment to Family Planning 2020. 2013. http://www.familyplanning2020.org/resources/358 (accessed Feb 17, 2016).
7. World Health Organisation. Reproductive health strategy to accelerate progress towards the attainment of international development goals and targets. Geneva, 2004 http://www.who.int/reproductivehealth/publications/general/RHR_04_8/en/.
8. Ministry of Health, UNFPA. Five year strategic plan for reproductive health (2014-2018). Nay Pyi Taw, 2014.
9. Homer CSE, Friberg IK, Dias MAB, *et al*. The projected effect of scaling up midwifery. *Lancet* 2014; **384**: 1146–57.
10. Ten Hoope-Bender P, de Bernis L, Campbell J, *et al*. Improvement of maternal and newborn health through midwifery. *Lancet* 2014; **384**: 1226–35.
11. UNFPA, WHO. Conducting a sexual, reproductive, maternal, newborn and adolescent health workforce assessment. A handbook. New York: United Nations Population Fund, 2015.
12. Tanahashi T. Health service coverage and its evaluation. Bull World Health Organ 1978; **56**: 295–303.
13. UN Committee on Economic Social and Cultural Rights. CESCR General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12). 2000. http://www.unhcr.org/refworld/pdfid/4538838d0.pdf.
14. International Labour Organisation. Social Protection Floors Recommendation, 2012 (No. 202). 2012. http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:3065524.
15. Ministry of Health Department of Public Health. Health management information system: Data dictionary for health services indicators. Nay Pyi Taw, 2012.
16. Ministry of Health Department of Public Health. Health management information system: Annual hospital statistics. Nay Pyi Taw, 2016.
17. Ministry of Health Department of Health Planning. Health management information system: Guidelines for data collection from private hospitals. Nay Pyi Taw, 2013.
18. Department of Population. The 2014 Myanmar population and housing census: The Union report, census report vol 2. Nay Pyi Taw, 2015.
19. Ministry of Immigration and Population, Department of Population, UNFPA. Myanmar fertility and reproductive health survey 2001: Preliminary report. Yangon, 2002.

20. Ministry of Health. Ministry of Health publications: Hospital statistics series, 2004-2012. 2016. http://www.moh.gov.mm/ (accessed April 13, 2016).
21. Myanmar Ministry of Information. Constitution of the Republic of the Union of Myanmar. Nay Pyi Taw, 2008 http://www.burmalibrary.org/docs5/Myanmar_Constitution-2008-en.pdf.
22. Asia Pacific Observatory on Health Systems and Policies. The Republic of the Union of Myanmar health system review, Health Systems in Transition Vol. 4, No. 3. Manila, 2014 http://www.wpro.who.int/asia_pacific_observatory/hits/series/myanmar_health_systems_review.pdf.
23. Department of Population. The 2014 Myanmar Population and Housing Census: Highlights of the main results, Census report vol. 2-A. Nay Pyi Taw, 2015.
24. Ministry of National Planning and Economic Development (MNPED), United Nations Development Programme (UNDP). Integrated household living conditions survey in Myanmar: MDG report. Yangon, 2011.
25. World Bank. Myanmar: Ending poverty and boosting shared prosperity in a time of tradition: A systematic country diagnostic. Yangon, 2014.
26. Ministry of Health. Health in Myanmar. Nay Pyi Taw, 2012. http://www.searo.who.int/myanmar/documents/healthinmyanmar2012/en/
27. Ministry of Health, UNICEF. Assessment of newborn health in Myanmar. Nay Pyi Taw, 2013.
28. Khin Ma Ma. Township health nurse/divisional public health nurse. In: Ko Ko, Kyaw Lwin, eds. A report of the working group on township health system in Myanmar, MAMS monograph 2010. Yangon: Myanmar Academy of Medical Science, 2010.
29. Htay Htay Hlaing. Evolution of nursing education in Myanmar 1921-1991. Thesis submitted for successful completion of Master of Nursing Science. 2004.
30. Than Tun Sein, Htay Htay Hlaing, Phyo Maung Thaw. Training and utilization of midwives for rural health services in Myanmar. *Myanmar Heal Sci Res J* 2007; **19**.
31. United Nations Country Team in Myanmar. Thematic analysis 2011: Achieving the Millennium Development Goals in Myanmar. Yangon, 2011 http://reliefweb.int/sites/reliefweb.int/files/resources/PDF_219.pdf.
32. Ministry of Health, UNFPA. Myanmar midwifery situation 2014: Synthesis report. Nay Pyi Taw, 2014.
33. United Nations Population Fund. Report on situation analysis of population and development, reproductive health and gender in Myanmar. Yangon, 2010.
34. World Bank. WDI (World Development Indicators) 2011. 2011. http://data.worldbank.org/data-catalog/world-development-indicators/wdi-2011 (accessed Feb 6, 2013).
35. Department of Population, UNFPA. Country report on 2007 fertility and reproductive health survey. Nay Pyi Taw, 2009.
36. UN Maternal Mortality Estimation Inter-agency Group. Maternal mortality in 1990-2015. 2015. http://www.who.int/gho/maternal_health/countries/mmr.pdf (accessed Feb 11, 2016).
37. Ministry of Health. Health in Myanmar 2014. Nay Pyi Taw, 2014.
38. Ministry of Immigration and Population Department of Population. The 2014 Myanmar population and housing census. Nay Pyi Taw, 2015.
39. UN Inter-agency Group for Child Mortality Estimation. Levels and trends in child mortality 2011. New York, 2011.
40. Yu-Mon-Saw, Khine-Lae-Win, Shiao LW, et al. Taking stock of Myanmar's progress toward the health-related Millennium Development Goals: Current roadblocks, paths ahead. *Int J Equity Heal* 2013; **12**.

41. World Health Organization. Provision of effective antenatal care. 2006. http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/effective_antenatal_care.pdf (accessed April 13, 2016).
42. Ministry of Health Department of Public Health. Health management information system: Annual public health statistics. Nay Pyi Taw, 2016.
43. World Health Organization. WHO statement on caesarean section rates. 2015. http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/cs-statement/en/ (accessed Feb 22, 2016).
44. Ministry of Health, Department of Health Planning, Department of Health. Annual public health statistics 2012. Nay Pyi Taw, 2012.
45. UNFPA, UNESCO, WHO. Sexual and reproductive health of young people in Asia and the Pacific: A review of issues, policies and programmes. Bangkok, 2015.
46. San San Htay, Myo Oo, Yoshida Y, Harun-Or-Rashid M, Sakamoto J. Risk behaviours and associated factors among medical students and community youths in Myanmar. *Nagoya J Med Sci* 2010; **72**: 71–81.
47. Pacheun O, Swe E, Powwattana A. Risk behaviors for HIV/AIDS among youth in rural area of Myanmar. *Asia Pacific J Public Heal* 2008; **20 Suppl**: 215–9.
48. UNICEF. Children, adolescents and AIDS: 2014 statistical update. 2014. http://www.emtct-iatt.org/wp-content/uploads/2014/12/UNICEF-Stats_Update-Summary.pdf (accessed Feb 19, 2016).
49. UNICEF. Adolescents under the radar in the Asia-Pacific AIDS response. Bangkok, 2015.
50. Hla Soe Tint, Phyo Maung Thaw, Yin Thet Nu Oo, Ko Ko Zaw, Than Tun Sein, Thein Tun. Sexual and reproductive health needs of vulnerable youth in Myanmar. *South East Asian J Trop Med Public Health* 2008; **39**: 1126–38.
51. Kyi Kyi Sein. Maternal Health Care Utilization Among Ever Married Youths in Kyimyindaing Township, Myanmar. *Matern Child Health J* 2012; **16**: 1021–30.
52. Department of Health, WHO, UNFPA. National service standards and guidelines on adolescent and youth care. Nay Pyi Taw, 2013 http://countryoffice.unfpa.org/myanmar/drive/NationalServiceStandardsandGuidelinesEnglish.pdf.
53. Ministry of Health, United Nations Children's Fund (UNICEF). Feasibility study on township-based health protection (unpublished report). 2012.
54. Nyein Foundation. Exploring utilization and expenditure on health care services by rural communities of selected townships in six states of Myanmar (unpublished report). 2012.
55. World Bank. Myanmar - interim strategy note for the period FY13-14. Washington D.C., 2012.
56. 3MDG. Progress report: January to June 2015. Yangon, 2015.
57. The Partnership for Maternal, Newborn and Child Health (PMNCH). A global review of the key interventions related to reproductive, maternal, newborn and child health (RMNCH). Geneva: Partnership for Maternal, Newborn and Child Health, 2011.
58. ASEAN, UNFPA. ASEAN regional guideline for minimum requirements for training and accreditation of skilled birth attendants (SBA). Bangkok, 2014.
59. Department of Health, Department of Medical Research. Assessment of auxiliary midwife training package. Nay Pyi Taw, 2011.
60. 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.
61. Jhpiego. Report of the rapid task analysis workshop: Strengthening midwifery education, practice and regulation in Myanmar. Yangon, 2015.

62. Health Information System Working Group. The long road to recovery: Ethnic and community-based organizations leading the way to better health in Eastern Burma. Tak, 2015 http://hiswg.org/wp-content/uploads/2015/02/The-Long-Road-to-Recovery-2015_Eng-1.pdf.
63. Myanmar Information Management Unit (MIMU). GIS resources and agency maps. 2016. http://www.themimu.info/gis-resources (accessed April 13, 2016).
64. UNFPA Arab States Regional Office. Analysis of the midwifery workforce in selected Arab countries. Cairo, 2015.
65. Benner M, Townsend J, Kaloi W, et al. Reproductive health and quality of life of young Burmese refugees in Thailand. *Confl Health* 2010; **4**: doi: 10.1186/1752–1505 – 4–5.
66. ILO. World Social Protection Report 2014/15. Geneva: International Labour Office, 2014.
67. Theingi Myint, Khin Saw Naing, Soe Moe. Perspectives of midwives and clients in the provision of maternal health services (Bago Division 2003). Population leadership program at the University of Washington, 2003.
68. Ministry of National Planning and Economic Development, Ministry of Health. Myanmar multiple indicator cluster survey 2009-2010 final report. Nay Pyi Taw, 2011.
69. International Confederation of Midwives. Global Standards for Midwifery Education (2010): Amended 2013. 2013. http://www.internationalmidwives.org/assets/uploads/documents/CoreDocuments/ICM Standards Guidelines_ammended2013.pdf (accessed Feb 24, 2016).
70. Ministry of Health, Department of Medical Research, Department of Health. Nation-wide service availability and readiness assessment (SARA), Myanmar 2014. Yangon, 2016.
71. UNICEF, UNFPA, WHO. Guidelines for Monitoring the Availability and Use of Obstetric Services. New York: UNICEF, 1997.
72. Ministry of Health, UNICEF. Assessment of emergency obstetric care in Myanmar. Nay Pyi Taw, 2010.
73. Hoope-Bender P ten, Lopes S, Nove A, et al. Midwifery2030, a woman's Pathway to health: What does it mean? *Midwifery* 2015; published online Nov 11. DOI:10.1016/j.midw.2015.10.014.
74. Htay Lwin. Health staff at rural health centre level. In: Ko Ko, Kyaw Lwin, eds. A report of the working group on township health system in Myanmar, MAMS monograph 2010. Yangon: Myanmar Academy of Medical Science, 2010.
75. Myanmar Central Statistical Organization. Consumer price index (union) and rate of inflation. 2016. http://www.csostat.gov.mm/s3.1MA0201.htm (accessed April 19, 2016).
76. The Partnership for Maternal, Newborn & Child Health. Essential Interventions, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Health. Geneva: PMNCH, 2011. http://www.who.int/pmnch/knowledge/publications/201112_essential_interventions/en/.
77. World Health Organization. OneHealth Tool: A Tool to Support the Costing, Budgeting, Financing, and National Strategies Development of the Health Sector in Developing Countries, with a Focus on Integrating Planning and Strengthening Health Systems. Futures Institute, 2012.

A

Annex A: SRMNAH worker competencies

The following table sets out the assumptions made about which cadres in Myanmar are trained and authorized to deliver each of the SRMNAH interventions considered as part of this assessment. It is based on a review of the standard education curricula for each cadre, and adjusted according to consultation with national experts at the two stakeholder workshops held in January 2016.

This does not reflect what SRMNAH workers actually do: it shows what they are theoretically capable of doing, according to current education curricula and legislation. For this reason, the table includes some interventions such as male sterilization and safe abortion even though they are not routinely practised in Myanmar. A few exceptions were noted during the stakeholder workshops, e.g. there are special dispensations for midwives working single-handedly in remote areas to perform certain interventions that midwives are not generally authorized to perform. These exceptions were not taken into account in the modelling.

Intervention	Aux midwife	Mid wife	Nurse	Lady health visitor	Doctor (gen eralist)	Ob/gyn	Paed/ neo
Pre-conception							
Family planning advice		✓	✓	✓	✓	✓	
Delivery of condoms, vaginal barriers, vaginal tablets	✓	✓	✓	✓	✓	✓	
Delivery of contraceptive pills	✓	✓	✓	✓	✓	✓	
Delivery of injectable contraceptives		✓	✓	✓	✓	✓	
Delivery of contraceptive implants					✓	✓	
IUD insertion					✓	✓	
Female and male sterilization					✓	✓	
Prevention of HIV in WRA	✓	✓	✓	✓	✓	✓	
Management of HIV in WRA		✓		✓	✓	✓	
Prevention of other STIs in WRA	✓	✓	✓	✓	✓	✓	
Management of syphilis in WRA					✓	✓	
Management of gonorrhoea in WRA					✓	✓	
Management of chlamydia in WRA					✓	✓	
Management of trichomoniasis in WRA					✓	✓	
Pre-conception folic acid fortification / supplementation					✓	✓	
Antenatal							
Taking a detailed history by asking relevant questions (take an initial and ongoing history at each antenatal visit)	✓	✓		✓	✓	✓	
Iron and folic acid supplementation in pregnancy	✓	✓	✓	✓	✓	✓	
Tetanus toxoid vaccination in pregnancy		✓	✓	✓	✓	✓	
Prevention of malaria in pregnancy with ITNs and antimalarial medication					✓	✓	
Management of malaria in pregnancy with ITNs and antimalarial medication		✓	✓	✓	✓	✓	
Screening for HIV for PMTCT		✓	✓	✓	✓	✓	
Treatment of HIV for PMTCT		✓		✓	✓	✓	
Prevention of STIs (as part of antenatal care)	✓	✓	✓	✓	✓	✓	

Intervention	Aux midwife	Mid wife	Nurse	Lady health visitor	Doctor (gen eralist)	Ob/gyn	Paed/ neo
Management of gonorrhoea					✓	✓	
Management of chlamydia					✓	✓	
Management of trichomoniasis					✓	✓	
Screening for syphilis		✓	✓	✓	✓	✓	
Treatment of syphilis					✓	✓	
Calcium supplementation to prevent hypertension					✓	✓	
Interventions for cessation of smoking	✓	✓	✓	✓	✓	✓	
Antihypertensive drugs to treat high blood pressure (including low-dose aspirin to prevent pre-eclampsia)					✓	✓	
Magnesium sulphate for eclampsia		✓	✓	✓	✓	✓	
Antibiotics for pPROM					✓	✓	
Antenatal corticosteroids to prevent neonatal respiratory distress					✓	✓	
Safe abortion (vacuum aspiration or D&C)					✓	✓	
Post-abortion care		✓	✓	✓	✓	✓	
Reduce malpresentation at term with external cephalic version					✓	✓	

Intervention	Aux midwife	Mid wife	Nurse	Lady health visitor	Doctor (gen eralist)	Ob/gyn	Paed/ neo
Childbirth							
Induction of labour to manage prelabour rupture of membranes at term					✓	✓	
Identification of the onset of labour	✓	✓	✓	✓	✓	✓	
Normal labour and delivery management and social support during childbirth	✓	✓	✓	✓	✓	✓	
Active management of third stage labour (to deliver placenta) to prevent post-partum haemorrhage (including uterine massage, uterotonics and cord traction)		✓	✓	✓	✓	✓	
Screen for HIV during childbirth if not already tested		✓	✓	✓	✓	✓	
Manage HIV during childbirth if not previously diagnosed					✓	✓	
Caesarean section for maternal/foetal indication (including prophylactic antibiotics for caesarean section)					✓	✓	
Induction of labour for prolonged pregnancy					✓	✓	
Management of post-partum haemorrhage (manual removal of placenta and/or surgical procedures and/or oxytocics)		✓		✓	✓	✓	
Postnatal							
Postnatal preventive care	✓	✓	✓	✓	✓	✓	
Detect and treat post-partum sepsis		✓	✓	✓	✓	✓	
Neonatal resuscitation with bag and mask		✓	✓	✓	✓	✓	✓
Kangaroo mother care		✓	✓	✓	✓	✓	✓
Extra support for feeding small and preterm babies					✓	✓	✓
Management of newborns with jaundice			✓		✓	✓	✓
Initiate prophylactic ART for babies exposed to HIV		✓		✓	✓	✓	✓
Presumptive antibiotic therapy for newborns at risk of bacterial infections					✓	✓	✓
Surfactant to prevent respiratory distress syndrome in preterm babies					✓	✓	✓
Continuous positive airway pressure to manage babies with respiratory distress syndrome							✓
Postnatal information and counselling, postnatal care planning and provision of contraceptive methods		✓		✓	✓	✓	

ART=antiretroviral therapy, D&C=dilatation and curettage, ITNs=insecticide-treated bed nets, IUD=intrauterine device, pPROM=preterm premature rupture of membranes, PMTCT=prevention of mother-to-child transmission, STIs=sexually transmitted infections, WRA=women of reproductive age.

Annex B: Estimating need for SRMNAH interventions

The following table explains how the number of SRMNAH worker contacts needed was estimated for each of the essential SRMNAH interventions. The number of contacts was multiplied by an estimate of the average time taken to deliver each intervention (see Section 3.1), to yield an estimate of total SRMNAH worker time required to meet the need. Epidemiological data for many of these interventions (e.g. incidence of complications needing intervention) were provided by the national consultants by reference to national statistics. If no data were available, the same assumptions were made as for the State of the World's Midwifery report[60]. Interventions shown in italics are from the ASEAN guidelines[58]; the rest are from the list of PMNCH essential RMNCH interventions[76].

Intervention	Number of contacts needed with a SRMNAH worker
Pre-conception	
Family planning advice	One contact per woman of reproductive age (WRA) per year
Delivery of condoms, vaginal barriers, vaginal tablets	Three contacts per year per woman of reproductive age using condoms, estimated as follows: WRA x (CPR + unmet need) x condom method mix x 3 contacts per year
Delivery of contraceptive pills	Three contacts per year per woman of reproductive age using pills, estimated as follows: WRA x (CPR + unmet need) x pill method mix x 3 contacts per year
Delivery of injectable contraceptives	Three contacts per year per woman of reproductive age using injectables, estimated as follows: WRA x (CPR + unmet need) x injectable method mix x 3 contacts per year
Delivery of contraceptive implants	Three contacts per year per woman of reproductive age using iimplants, estimated as follows: WRA x (CPR + unmet need) x implant method mix x 3 contacts per year
IUD insertion	One contact every five years per woman of reproductive age using IUD, estimated as follows: (WRA x (CPR + unmet need) x IUD method mix) / 5
Female and male sterilisation	One contact per unsterilised woman of reproductive age requesting sterilisation, estimated as follows: (WRA in 2015 – WRA in 2014*) x (CPR + unmet need) x female sterilisation method mix * for 2015 – same approach for earlier years
Prevention of HIV in WRA	One contact per woman of reproductive age per year
Prevention of other STIs in WRA	
Management of HIV in WRA	One contact per WRA needing ART, estimated as follows: (Number of WRA needing ART / WRA) x WRA
Management of syphilis in WRA	One contact per WRA with syphilis, estimated as follows: WRA x incidence of syphilis
Management of gonorrhoea in WRA	One contact per WRA with gonorrhoea, estimated as follows: WRA x incidence of gonorrhoea
Management of chlamydia in WRA	One contact per WRA with chlamydia, estimated as follows: WRA x incidence of chlamydia
Management of trichomoniasis in WRA	One contact per WRA with trichomoniasis, estimated as follows: WRA x incidence of trichomoniasis
Pre-conception folic acid fortification /supplementation	One contact per woman of reproductive age per year

Intervention	Number of contacts needed with a SRMNAH worker
Antenatal	
Taking a detailed history by asking relevant questions	Four contacts per pregnancy
Iron and folic acid supplementation in pregnancy	Four contacts per pregnancy
Tetanus toxoid vaccination in pregnancy	Two contacts per pregnancy
Prevention of malaria in pregnancy with ITNs and antimalarial medication	One 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
Management of malaria in pregnancy with ITNs and antimalarial medication	One contact per pregnant woman with presumed and confirmed malaria, estimated as follows: Pregnancies x incidence of presumed and confirmed malaria cases
Screening for HIV for PMTCT	One contact per pregnancy
Prevention of other sexually transmitted infections (STIs) (as part of antenatal care)	
Treatment of HIV for PMTCT	One contact per pregnant woman needing ART to avoid mother-to-child transmission, estimated as follows: % (number of pregnant women needing ART for PMTCT / number of pregnancies) x number of pregnancies
Management of gonorrhoea	One contact per pregnant woman with gonorrhoea, estimated as follows: All pregnant women x incidence of gonorrhoea
Management of chlamydia	One contact per pregnant woman with chlamydia, estimated as follows: Pregnancies x incidence of chlamydia
Management of trichomoniasis	One contact per pregnant woman with trichomoniasis, estimated as follows: Pregnancies x incidence of trichomoniasis
Screening for syphilis	One contact per pregnancy
Treatment of syphilis	One contact per pregnant woman with syphilis, estimated as follows: Pregnancies x incidence of syphilis in pregnant women
Calcium supplementation to prevent hypertension	One contact per pregnancy
Interventions for cessation of smoking	One contact per pregnant woman who smokes, estimated as follows: Pregnancies x incidence of smoking in women aged over 15 years
Antihypertensive drugs to treat high blood pressure (including low-dose aspirin to prevent pre-eclampsia)	One contact per pregnant woman with raised blood pressure and per pregnant woman with pre-eclampsia, estimated as follows: (Pregnancies x incidence of pre-eclampsia) + (live births x incidence of pre-eclampsia)
Magnesium sulphate for eclampsia	One contact per pregnant woman with eclampsia and pre-eclampsia, estimated as follows: Pregnancies x (incidence of eclampsia + incidence of pre-eclampsia)
Antibiotics for pPROM	One contact per case of pPROM, estimated as follows: All births including stillbirths x incidence of pPROM
Antenatal corticosteroids to prevent neonatal respiratory distress	One contact per preterm birth (including stillbirths), estimated as follows: All births including stillbirths x preterm birth rate
Safe abortion (vacuum aspiration or D&C)	One contact per safe abortion, estimated as follows: WRA x safe abortion rate
Post-abortion care	One contact per unsafe abortion*, estimated as follows: WRA x unsafe abortion rate * Time estimates for safe abortion included post-abortion care so safe abortions were not included here.
Reduce malpresentation at term with external cephalic version	One contact per breech birth (including stillbirths), estimated as follows: All births including stillbirths x incidence of breech presentation

Intervention	Number of contacts needed with a SRMNAH worker
Childbirth	
Induction of labour to manage prelabour rupture of membranes at term	One contact per case of pPROM, estimated as follows: All births including stillbirths x incidence of pPROM
Identification of the onset of labour	One contact per birth (including stillbirths)
Normal labour and delivery management and social support during childbirth	One contact per birth (including stillbirths)
Active management of third stage labour (to deliver placenta) to prevent postpartum haemorrhage (including uterine massage, uterotonics and cord traction)	One contact per birth (including stillbirths)
Screen for HIV during childbirth if not already tested	One contact per birth (including stillbirths) where the woman had had <4 ANC visits, estimated as follows: All births including stillbirths x (100 - % of pregnant women with 4+ ANC visits)
Manage HIV during childbirth if not previously diagnosed	One contact per birth (including stillbirths) to HIV+ women where the woman had had <4 ANC visits, estimated as follows: All births including stillbirths x (100 - % of HIV+ pregnant women with 4+ ANC visits)
Caesarean section for maternal/foetal indication (including prophylactic antibiotic for caesarean section)	One contact per birth (including stillbirths) which require caesarean section, estimated as follows: All births including stillbirths x 0.05
Induction of labour for prolonged pregnancy	One contact per birth (including stillbirths) occurring after 41 completed weeks of gestation, estimated as follows: Pregnancies x % of pregnancies which go beyond 41 completed weeks
Management of postpartum haemorrhage (manual removal of placenta and/or surgical procedures and/or oxytocics)	One contact per birth (including stillbirths) where there is PPH, estimated as follows: WRA x incidence of PPH per 1,000 women aged 15-49
Postnatal	
Postnatal preventive care	Four contacts per birth (including stillbirths)
Postnatal information and counselling, postnatal care planning + provision of contraceptive methods	Two contacts per live birth
Detect and treat postpartum sepsis	One contact per case of postpartum sepsis, estimated as follows: WRA x incidence of postpartum sepsis
Neonatal resuscitation with bag and mask	One contact per newborn requiring resuscitation, estimated as follows: Live births x 0.01
Kangaroo mother care	One contact per newborn with low birth weight, estimated as follows: Live births x % of newborns with low birth weight
Extra support for feeding small and preterm babies	One contact per preterm live birth, estimated as follows: Live births x preterm birth rate
Management of newborns with jaundice	One contact per newborn with jaundice, estimated as follows: Live births x % of newborns with jaundice requiring phototherapy
Initiate prophylactic ART for babies exposed to HIV	One contact per birth to HIV+ women who have not had 4+ ANC visits, estimated as follows: Live births x (100 - % of HIV+ pregnant women with 4+ ANC visits)
Presumptive antibiotic therapy for newborns at risk of bacterial infections	One contact per newborn at risk of bacterial infection, estimated as follows: Live births x incidence of bacterial infection in newborns
Surfactant to prevent respiratory distress syndrome in preterm babies	One contact per preterm live birth, estimated as follows: Live births x preterm birth rate
Continuous positive airway pressure to manage babies with respiratory distress syndrome	One contact per newborn with respiratory distress syndrome, estimated as follows: Live births x incidence of respiratory distress syndrome in newborns

ANC = antenatal care, ART=antiretroviral therapy, CPR = contraceptive prevalence rate, D&C=dilatation and curettage, HIV = human immunodeficiency virus, ITNs=insecticide-treated bed nets, IUD=intrauterine device, PPH = postpartum haemorrhage, pPROM=preterm premature rupture of membranes, PMTCT=prevention of mother-to-child transmission, STIs=sexually transmitted infections, WRA=women of reproductive age.

C

Annex C: SRMNAH worker education institutions

Region/state	Type of university/training school	Location	Cadre
Kachin	Midwifery Training School	Myitkyina	Midwife
	Nursing Training School		Nurse-midwife
	Nursing Training School	Bamaw	Nurse-midwife
Kayah	Nursing & Midwifery Training School	Loikaw	Midwife
			Nurse-midwife
Kayin	Midwifery Training School	Hpa An	Midwife
	Nursing Training School		Nurse-midwife
Chin	Nursing Training School	Falam	Nurse-midwife
Sagaing	Nursing & Midwifery Training School	Monywa	Midwife
			Nurse-midwife
	Nursing & Midwifery Training School	Kalay	Midwife
			Nurse-midwife
Tanintharyi	Midwifery Training School	Myeik	Midwife
	Nursing Training School	Dawei	Nurse-midwife
Bago	Midwifery Training School	Bago	Midwife
	Midwifery Training School	Taungoo	Midwife
	Nursing Training School		Nurse-midwife
	Nursing & Midwifery Training School	Pyay	Midwife
			Nurse-midwife
Magway	Nursing & Midwifery Training School	Magway	Midwife
			Nurse-midwife
	Medical University		Medical doctor
	Nursing & Midwifery Training School	Pakokku	Midwife
			Nurse-midwife
Mandalay	Midwifery Training School	Mandalay	Midwife
	Nursing Training School		Nurse-midwife
	Nursing University		Nurse-midwife BSc
	Medical University		Medical doctor Ob & gyn Paediatrician
	Midwifery Training School	Pyin Oo Lwin	Midwife
	Nursing Training School	Meikhtila	Nurse-midwife
Mon	Midwifery Training School	Mawlamyaing	Midwife
	Nursing Training School		Nurse-midwife
Rakhine	Nursing & Midwifery Training School	Sittwe	Midwife
			Nurse-midwife

Region/state	Type of university/training school	Location	Cadre
Yangon	Central Midwifery Training School	Dagon	Midwife
	Nursing Training School	Latha	Nurse-midwife
	Nursing University	Yangon	Nurse-midwife BSc
	Medical University		Medical doctor Ob & gyn Paediatrician
	Lady Health Visitor Training School	Bahan	Lady health visitor
	Nursing Training School	East Yangon	Nurse-midwife
	Nursing Training School	North Okkalapa	Nurse-midwife
	Medical University 2		Medical doctor Ob & gyn Paediatrician
	Midwifery Training School	Thanlyin	Midwife
Shan	Nursing & Midwifery Training School	Lashio	Midwife
			Nurse-midwife
	Nursing & Midwifery Training School	Kyaington	Midwife
			Nurse-midwife
	Midwifery Training School	Taunggyi	Midwife
	Nursing Training School		Nurse-midwife
	Medical University		Medical doctor
Ayeyarwady	Nursing & Midwifery Training School	Pathein	Midwife
			Nurse-midwife
	Nursing Training School	Hinthada	Nurse-midwife
Nay Pyi Taw	Midwifery Training School	Nay Pyi Taw	Midwife
	Nursing Training School		Nurse-midwife
			Nurse-midwife

Note: The Nursing Field Training School and the Domiciliary Midwifery Training School do not offer certificates.

D

Annex D: Methodology for lives saved estimates

The theory underlying the modelling of lives saved under each policy option is that an increase in the level of met need for SRMNAH services (achieved by increasing the size and/or skill-mix of the health workforce) will translate into an increase in coverage of essential SRMNAH interventions, which in turn will increase the number of lives saved. The modelling process therefore had two stages:

1. Quantifying the relationship between met need and coverage of SRMNAH interventions
2. Estimating the number of lives that would be saved due to the increase in coverage

D.1 Quantifying the relationship between met need and coverage of SRMNAH interventions

As noted in Section 4.3.3, met need represents the available working time of the SRMNAH workforce as a percentage of the amount of working time it would take to meet the country's need for essential SRMNAH interventions *if tasks were allocated to the workforce in an economically efficient way*. It is therefore a measure of *potential* workforce availability only; it does not take into account the way in which the workforce is actually allocated to tasks, nor does it measure accessibility, acceptability or quality. It is also a national-level estimate; it does not take into account subnational variations in workforce availability. Thus, a country with a high met need estimate may not actually be meeting that amount of the need across the whole country.

As explained below, the Lives Saved Tool (LiST) estimates levels of coverage of key SRMNAH interventions. Because met need is a measure of workforce availability only, it would be inappropriate to assume that, say, a 10% increase in met need would result in a 10% increase in coverage of these key interventions. Many other factors might influence the relationship between the two, e.g. efficiency of resource allocation, affordability of care. A literature search was conducted to establish whether any earlier studies had attempted to quantify the relationship, and only two were found:

1. A 2006 study from Brazil[d] found that a 1% increase in total health worker density was associated with a 0.005% increase in the coverage of antenatal care
2. A 2006 multi-country study[e] found that higher levels of health worker density were associated with higher coverage of vaccinations and skilled birth attendance

These two studies did not answer the question: for each unit increase in met need, what is the size of the increase in coverage at each stage of the care continuum: pre-conception, antenatal, childbirth and postnatal? It was therefore decided to quantify the relationship using the 2014 State of the World's Midwifery (SoWMy) data set. This provided national-level estimates of overall met need, met need at each stage in the care continuum, and health worker density (defined as number of SRMNAH workers per 1,000 women of reproductive age) for each of the 73 SoWMy countries.

The literature search mentioned above identified a number of factors which might influence the relationship at national level, including: degree of urbanization, fertility, gross domestic product (GDP), total health expenditure (THE) per capita, % of THE that is out-of-pocket spending (OOPS), government effectiveness, female education, female representation in parliament, and poverty levels. Where possible

[d] http://www.who.int/hrh/documents/measuring_efficiency_Brazil.pdf (accessed 14 January 2016).
[e] http://www.who.int/hrh/documents/reassessing_relationship.pdf (accessed 14 January 2016).

(i.e. where there were globally comparable sources of data for 2012[f]) these factors were considered for inclusion in the regression model so that the model could control for likely confounders. Exploratory analysis using data from the 73 SoWMy countries found that there were associations between these factors and the outcome variables of interest, but not all were statistically significant.

Four linear regression models were built to quantify the following relationships, as shown in Table D.1.

Table D.1: Models built to quantify relationship between met need and service coverage

Dependent variable	Independent variable
Contraceptive prevalence rate (modern methods)	Met need for pre-conception services
% of pregnant women accessing 1+ antenatal care visits	Met need for antenatal services
% of live births attended by a skilled birth attendant	Met need for delivery care
% of live births receiving the first postnatal check within 48 hours of delivery	Met need for postnatal care

Sources of data for the outcome variables are shown in Table D.2.

Table D.2: Sources of data for outcome variables

Variable	Source	No of countries (/73) with an estimate
Contraceptive prevalence rate (modern methods), 2012	United Nations Population Division http://www.un.org/en/development/desa/population/theme/family-planning/index.shtml (accessed 14 December 2015)	70
% of pregnant women accessing 1+ antenatal care visits, 2012	UNICEF http://www.data.unicef.org/maternal-health/antenatal-care.html (accessed 15 December 2015)	60
% of live births attended by a skilled birth attendant, 2012	World Bank http://data.worldbank.org/indicator/SH.STA.BRTC.ZS/countries?page=5 (accessed 14 December 2015)	73
% of live births receiving the first postnatal check within 48 hours of delivery, 2012	DHS Statcompiler http://www.statcompiler.com/ (accessed 16 December 2015), supplemented by reference to individual country DHS reports where Statcompiler was incomplete	41

[f] 2012 was selected because the SoWMy 2014 met need estimates related to that year.

In all four models, the covariates in Table D.3 were considered for inclusion.

Table D.3: Model covariates

Covariate	Source	No of countries (/73) with an estimate
Met need for pre-conception services, antenatal services, delivery care or postnatal care	Special analysis of SoWMy 2014 data set	73
% of population in urban areas, 2012	World Bank http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS (accessed 17 December 2015)	73
GDP per capita, 2012	World Bank http://data.worldbank.org/indicator/NY.GDP.PCAP.CD (accessed 18 December 2015)	71
THE per capita (current US$), 2012	World Bank http://data.worldbank.org/indicator/SH.XPD.PCAP (accessed 17 December 2015)	70
% of THE that is OOPS, 2012	World Health Organization http://apps.who.int/gho/data/node.main.75 (accessed 17 December 2015)	70
Total fertility rate, 2010–2015	United Nations Population Division http://esa.un.org/unpd/wpp/Download/Standard/Fertility/ (accessed 17 December 2015)	73
Government effectiveness score, 2012	World Bank http://databank.worldbank.org/data/reports.aspx?source=worldwide-governance-indicators (accessed 18 December 2015)	73
Female primary school completion rate, 2012*	World Bank http://data.worldbank.org/indicator/SE.PRM.CMPT.FE.ZS/countries (accessed 18 December 2015)	60
% female parliamentarians (lower or single house), 2012	Inter-parliamentary union http://www.ipu.org/wmn-e/arc/classif311212.htm (accessed 18 December 2015)	71
% population living on <US$1.90 a day, 2012 (2011 PPP)*	World Bank http://data.worldbank.org/indicator/SI.POV.DDAY (accessed 18 December 2015)	51

GDP= gross domestic product, THE=total health expenditure, OOPS=out-of-pocket spending, PPP=purchasing power parity.

* Not all countries had a 2012 estimate for this indicator. In these cases, 2012 estimates were interpolated or extrapolated based on the estimates for the available years between 1990 and 2015. This was only possible for countries with at least two data points over this period. For the others, a missing value was entered.

A different set of countries was included in each of the four models, according to the amount of available data. Countries with no data for the outcome variable or for at least one of the covariates under consideration were excluded. Table D.4 shows the countries included in each model.

Table D.4: Countries included in each model

Pre-conception model	Antenatal model	Childbirth model	Postnatal model
N=44	N= 42	N=45	N=25
Azerbaijan, Bangladesh, Benin, Bolivia, Botswana, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo (Brazzaville), DR Congo, Côte d'Ivoire, Djibouti, Guatemala, India, Indonesia, Kyrgyzstan, Lao PDR, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mexico, Morocco, Mozambique, Niger, Nigeria, Pakistan, Papua New Guinea, Peru, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, South Africa, Swaziland, Tajikistan, Tanzania, Uganda, Viet Nam, Yemen	Azerbaijan, Bangladesh, Benin, Bolivia, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo (Brazzaville), DR Congo, Côte d'Ivoire, Djibouti, Guatemala, India, Indonesia, Kyrgyzstan, Lao PDR, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mexico, Morocco, Mozambique, Niger, Nigeria, Pakistan, Peru, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, South Africa, Swaziland, Tajikistan, Tanzania, Uganda, Viet Nam, Yemen	Angola, Azerbaijan, Bangladesh, Benin, Bolivia, Botswana, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo (Brazzaville), DR Congo, Côte d'Ivoire, Djibouti, Guatemala, India, Indonesia, Kyrgyzstan, Lao PDR, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mexico, Morocco, Mozambique, Niger, Nigeria, Pakistan, Papua New Guinea, Peru, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, South Africa, Swaziland, Tajikistan, Tanzania, Uganda, Viet Nam, Yemen	Azerbaijan, Bangladesh, Benin, Cambodia, Cameroon, Congo (Brazzaville), DR Congo, Côte d'Ivoire, Indonesia, Kyrgyzstan, Lao PDR, Lesotho, Madagascar, Malawi, Mali, Mauritania, Niger, Nigeria, Pakistan, Peru, Senegal, Sierra Leone, Tajikistan, Uganda, Yemen

The models were built using manual forward selection, with 'met need for care' being included as an independent variable from the start, regardless of the strength of association between met need and the outcome variable. For the coefficients of other covariates, a p-value of <0.1 was the cut-off for inclusion in the model. This resulted in the following models.

1. Pre-conception
Dependent variable: contraceptive prevalence rate (CPR).

Covariates: met need (pre-conception), female primary school completion rate, government effectiveness score, % of THE that is OOPS. Total fertility rate (TFR) was also significantly associated with the outcome, but CPR and TFR were assumed to be measuring the same underlying concept, so TFR was not included in the final model to avoid collinearity problems.

The R^2 value for this model was 0.6732, i.e. the covariates in the model explained 67% of the variance in the CPR, i.e. the model fitted the data well. The model equation was as follows:

CPR = 14.63 + 0.01 (met need (pre-conception)) + 0.46 (female primary school completion rate) + 17.7 (government effectiveness score) – 0.15 (% of THE that is OOPS)

The coefficient for met need (pre-conception) was 0.01, i.e. a unit increase in met need (pre-conception) was associated with an increase of 0.01 in the CPR, when the other covariates were held constant.

In the LiST model, therefore, it was assumed that each 1 point increase in pre-conception met need would result in a 0.01 point increase in coverage of all pre-conception interventions.

2. Antenatal

Dependent variable: % of pregnancies with 1 or more antenatal care visits (ANC1+).

Covariates: met need (antenatal), % of THE that is OOPS, % of population living on <US$.90 a day.

The R^2 value for this model was 0.4044, i.e. the covariates in the model explained 40% of the variance in ANC1+, i.e. the model fitted the data moderately well.

The model equation was as follows:

ANC1+ = 104.65 + 0.08 (met need (antenatal)) – 0.45 (% of THE that is OOPS) – 0.15 (% of population living on < US$.90 a day)

The coefficient for met need (antenatal) was 0.08, i.e. a unit increase in met need (antenatal) was associated with an increase of 0.08 in the % of pregnant women accessing at least 1 antenatal care visit, when the other covariates were held constant.

In the LiST model, therefore, it was assumed that each 1 point increase in antenatal met need would result in a 0.08 point increase in coverage of all pregnancy interventions.

3. Childbirth

Dependent variable: % of live births with skilled birth attendant (SBA).

Covariates: met need (delivery), % of THE that is OOPS, % of population living in urban areas, female primary school completion rate.

The R^2 value for this model was 0.5648, i.e. the covariates in the model explained 56% of the variance in SBA, i.e. the model fitted the data moderately well.

The model equation was as follows:

SBA = 42.7 + 0.1 (met need (delivery)) – 0.45 (% of THE that is OOPS) + 0.38 (% of population living in urban areas) + 0.34 (female primary school completion rate)

The coefficient for met need (delivery) was 0.1, i.e. a unit increase in met need (delivery) was associated with an increase of 0.1 in the SBA rate, when the other covariates were held constant.

In the LiST model, therefore, it was assumed that each 1 point increase in met need for delivery care would result in a 0.1 point increase in coverage of all childbirth interventions.

4. Postnatal

Dependent variable: % of live births with postnatal care visit within 2 days of delivery (PNC).

Covariates: met need (postnatal), female primary school completion rate, % of THE that is OOPS.

The R^2 value for this model was 0.4689, i.e. the covariates in the model explained 47% of the variance in PNC, i.e. the model fitted the data moderately well.

The model equation was as follows:

PNC = 18.03 + 0.25 (met need (postnatal)) + 0.54 (female primary school completion rate) – 0.39 (% of THE that is OOPS)

The coefficient for met need (delivery) was 0.25, i.e. a unit increase in met need (postnatal) was associated with an increase of 0.25 in the % of live births receiving at least 1 postnatal care visit within 2 days of delivery, when the other covariates were held constant.

In the LiST model, therefore, it was assumed that each 1 point increase in met need for postnatal care would result in a 0.25 point increase in coverage of all postnatal interventions.

D.2 Estimating the number of lives saved due to the increase in coverage

The Lives Saved Tool (LiST) software[g] was then used to model the impact of higher met need on lives saved. The modelling was carried out using Spectrum version 5, using the following four modules:

1. DemProj (demographic projections)
2. FamPlan (family planning)
3. AIM (HIV/AIDS)
4. LiST (lives saved)

LiST works by comparing the number of deaths expected to occur under a baseline scenario to the number expected to occur under alternative scenarios (in Myanmar's case, the options set out in Section 5.1). LiST estimates lives saved by applying the coverage level of interventions and the effectiveness values of such interventions to underlying demographic data using cause of death distributions. For example, in order to estimate maternal lives saved under scaled-up coverage, the model estimates the number of pregnant women in the target year using demographic projections and then estimates how many are at risk of each cause of death. It then uses the difference between baseline and scaled-up coverage and the effectiveness of each intervention with respect to a specific cause of death to estimate the number of lives saved in each cause of death category. It should be noted that the model follows a life cycle approach, such that lives saved using interventions that impact on 'early' causes of death feed back into the demographic projections to ensure that the number of women or newborns susceptible to dying from 'later' causes increases. In our model, we also used the FamPlan and AIM modules in combination with LiST, in order to use information pertaining to contraceptive prevalence and HIV prevalence and treatment, since family planning and HIV interventions were among the essential interventions included in the workforce modelling.

[g] Developed by a consortium led by the Johns Hopkins Bloomberg School, supported by a grant from the Gates Foundation: http://www.jhsph.edu/dept/ih/IIP/list/

It should be noted that LiST only includes biomedical interventions that have been proven, through a scientific body of evidence (or, in a few cases, through expert Delphi reviews) to be effective in reducing maternal and neonatal mortality. Because of the remaining gaps in the scientific literature regarding the effectiveness of SRMNAH interventions, as well as the biomedical orientation of this tool, this approach constitutes a limited definition of effective coverage of SRMNAH services. However, the corresponding advantage is that the impact of increased effective coverage on lives saved is estimated as rigorously as is allowed by current scientific knowledge.

All LiST interventions were selected for inclusion in the model, except: all child health interventions, all immunizations except tetanus toxoid, all malaria interventions except those specifically for pregnant women, all TB interventions, nutrition interventions not specifically affecting women of reproductive age or newborns up to 28 days, all water, sanitation and hygiene interventions, all non-communicable disease interventions, and all interventions for mental/neurological/substance misuse disorders except perinatal depression.

Four LiST projections were prepared: one baseline projection and one for each of the three options outlined in Section 5.1.

D.2.1 Baseline projection

The baseline year for DemProj, FamPlan and AIM was 1983, because this was the last census in Myanmar prior to 2014 and also shortly preceded the country's first officially recorded case of HIV (which is necessary if the AIM module is being used). The LiST projection baseline year was 2014. All four modules were projected forward to 2030.

LiST contains default estimates for most interventions, but to ensure that the most accurate and up-to-date data were used, national sources of data were sought for all relevant indicators. Table D.5 lists the indicators for which data were available.

Table D.5: Sources of data used for LiST indicators

Module	Indicator	Source of baseline estimates
DemProj	Age/sex distribution of population	1983 census book
	Total fertility rate	For 2015 to 2030: Presentation from Department of Population, Projection from census (draft) (medium scenario). For years prior to 2015: UN Population Division with adjustment proportional to the difference between the UNPop figures and the country figures for 2014–2030
FamPlan	Contraceptive prevalence rate for all women of reproductive age	FP2020 costed implementation plan
	Contraceptive method mix for all women of reproductive age	FP2020 costed implementation plan
AIM	CD4 count threshold for eligibility	HIV estimates and projections, Myanmar 2010–2015
LiST: Configuration	Neonatal mortality rate	2014 census
	Infant mortality rate	2014 census
	Under-5 mortality rate	2014 census
	Stillbirth rate	Myanmar HMIS, 2013
	Causes of neonatal deaths	Annual hospital statistics report 2014
	Causes of maternal deaths	Maternal death review in Myanmar 2013

Module	Indicator	Source of baseline estimates
LiST: Periconceptual	% of abortions receiving post-abortion care	SARA 2014 (D&C kit)
LiST: Pregnancy	% of pregnant women screened for syphilis with the rapid plasma reagent test and treated with 2.4μ benzathine penicillin, if needed	SARA 2014 (rapid plasma reagent test)
	% of pregnant women receiving iron supplementation	Public health statistics 2014
Childbirth	% of births taking place at home with a SBA	Public health statistics 2013
	% of births taking place at home without a SBA	Public health statistics 2013
	% of births taking place in a CEmONC facility	Hospital statistics 2013
	% of births taking place in a BEmONC facility	Public health statistics 2013
	% of births taking place in a non-EmONC facility	Derived from public health statistics 2013
Curative	% of low birth weight infants with access to kangaroo mother care	SARA 2015 (kangaroo mother care)

BEmONC=basic emergency obstetric and newborn care, CEmONC=comprehensive emergency obstetric and newborn care, D&C= dilatation and curettage, SBA=skilled birth attendant.

For all interventions other than those listed in Table D.5, LiST default estimates were used, either because they matched the national sources of data that were obtained, or because no national data source was identified.

Under the baseline scenario, for each year from 2014 to 2030, 'met need' estimates were disaggregated into the four stages of the continuum of care: pre-pregnancy, pregnancy, childbirth and postnatal (see Section 4.3.3). As explained in Section D.1 of this annex, over the LiST projection period (2014–2030):

- each percentage point increase in pre-pregnancy met need was translated to a 0.01 percentage point increase in coverage of pre-pregnancy interventions
- each percentage point increase in pregnancy met need was translated to a 0.08 percentage point increase in pregnancy interventions
- each percentage point increase in childbirth met need was translated to a 0.1 percentage point increase in childbirth interventions
- each percentage point increase in pre-pregnancy met need was translated to a 0.25 percentage point increase in postnatal interventions

The exception to the above rules was the CPR. Projections have already been made by UNFPA Myanmar about how the CPR is expected to evolve between 2014 and 2020, based on commitments made under the FP2020 initiative. As noted in Section 5.1, however, these commitments are unlikely to be met without additional investment in the SRMNAH workforce, so under the baseline scenario it was assumed that the FP2020 target for the CPR (40%) would not be met until 2030.

LiST then calculated the expected number of maternal deaths, neonatal deaths (within 28 days of delivery) and stillbirths expected for each year 2016–2030 (inclusive) under the baseline scenario.

D.2.2 Projection for option 1: Task shifting

The 'option 1' projection was identical to the baseline projection, with the following exceptions:

- The CPR was projected to increase to 35% by 2020 and then linearly to 45% by 2030
- Faster progress would be made towards the levels of coverage projected under the baseline scenario, such that 60% of the improvement expected between 2016 and 2030 will be achieved between 2016 and 2023. This reflects the pattern of results seen in Section 5.2.1, i.e. the levels of met need would be roughly equal in 2030 under both the baseline and the task shifting scenarios, but under the task shifting scenario the rate of increase would be faster.

LiST then calculated the expected number of maternal deaths, neonatal deaths (within 1 month of delivery) and stillbirths expected for each year 2016–2030 (inclusive) under the 'task shifting' scenario, so these could be compared against the baseline scenario. The results are shown in Tables D.6 to D.8.

Table D.6: Estimated maternal lives saved under the 'task shifting' scenario

Year	Number of maternal deaths under baseline scenario	Number of maternal deaths under 'task shifting' scenario	Maternal lives saved
2016	1,478	1,478	0
2017	1,462	1,462	0
2018	1,448	1,448	0
2019	1,439	1,439	0
2020	1,435	1,435	0
2021	1,439	1,434	5
2022	1,443	1,429	14
2023	1,446	1,422	24
2024	1,454	1,419	35
2025	1,465	1,419	46
2026	1,472	1,415	57
2027	1,475	1,407	68
2028	1,476	1,395	81
2029	1,475	1,383	92
2030	1,475	1,370	105
Total	**21,882**	**21,355**	**527**

Table D.7: Estimated newborn* lives saved under the 'task shifting' scenario

Year	Number of neonatal deaths under baseline scenario	Number of neonatal deaths under 'task shifting' scenario	Newborn lives saved
2016	34,402	34,312	90
2017	34,041	33,917	124
2018	33,716	33,557	159
2019	33,499	33,305	194
2020	33,392	33,161	231
2021	33,499	33,014	485
2022	33,593	32,845	748
2023	33,659	32,644	1,015
2024	33,836	32,544	1,292
2025	34,089	32,508	1,581
2026	34,249	32,372	1,877
2027	34,336	32,162	2,174
2028	34,343	31,870	2,473
2029	34,331	31,554	2,777
2030	34,319	31,237	3,082
Total	**509,304**	**491,002**	**18,302**

* up to 28 days after live birth.

Table D.8: Estimated stillbirths averted under the 'task shifting' scenario

Year	Number of stillbirths under baseline scenario	Number of stillbirths under 'task shifting' scenario	Stillbirths averted
2016	11,128	11,103	25
2017	11,014	10,980	34
2018	10,911	10,869	42
2019	10,843	10,792	51
2020	10,811	10,750	61
2021	10,848	10,707	141
2022	10,881	10,653	228
2023	10,905	10,589	316
2024	10,965	10,557	408
2025	11,050	10,546	504
2026	11,105	10,503	602
2027	11,136	10,435	701
2028	11,141	10,341	800
2029	11,139	10,239	900
2030	11,138	10,137	1,001
Total	**165,015**	**159,201**	**5,814**

D.2.3 Projection for option 2: Improve performance

The 'option 2' projection was identical to the baseline projection, with the following exception:

- For interventions relating to the BEmONC signal functions and post-abortion care (i.e. post-abortion case management, all antenatal care interventions, and the % of deliveries taking place in BEmONC facilities) coverage would be increased by 23% by 2020 and remain at that level until 2030. This reflects the assumption that the health facility readiness index would increase by 23%[h] by 2020 (see Section 5.2.1)

LiST then calculated the expected number of maternal deaths, neonatal deaths (within 1 month of delivery) and stillbirths expected for each year 2016–2030 (inclusive) under the 'improve performance' scenario, so these could be compared against the baseline scenario. The results are shown in Tables D.9 to D.11.

Table D.9: Estimated maternal lives saved under the 'improve performance' scenario

Year	Number of maternal deaths under baseline scenario	Number of maternal deaths under 'improve performance' scenario	Maternal lives saved
2016	1,478	1,460	18
2017	1,462	1,436	26
2018	1,448	1,413	35
2019	1,439	1,404	35
2020	1,435	1,400	35
2021	1,439	1,404	35
2022	1,443	1,408	35
2023	1,446	1,411	35
2024	1,454	1,419	35
2025	1,465	1,430	35
2026	1,472	1,436	36
2027	1,475	1,440	35
2028	1,476	1,441	35
2029	1,475	1,440	35
2030	1,475	1,440	35
Total	**21,882**	**21,382**	**500**

[h] It would increase from 57% to 70%, which is a 13 percentage point increase, and a 23% increase.

Table D.10: Estimated newborn* lives saved under the 'improve performance' scenario

Year	Number of neonatal* deaths under baseline scenario	Number of neonatal* deaths under 'improve performance' scenario	Newborn* lives saved
2016	34,402	34,320	82
2017	34,041	33,919	122
2018	33,716	33,555	161
2019	33,499	33,340	159
2020	33,392	33,238	154
2021	33,499	33,339	160
2022	33,593	33,433	160
2023	33,659	33,499	160
2024	33,836	33,675	161
2025	34,089	33,927	162
2026	34,249	34,086	163
2027	34,336	34,173	163
2028	34,343	34,181	162
2029	34,331	34,169	162
2030	34,319	34,158	161
Total	**509,304**	**507,012**	**2,292**

*up to 28 days after live birth.

Table D.11: Estimated stillbirths averted under the 'improve performance' scenario

Year	Number of stillbirths under baseline scenario	Number of stillbirths under 'improve performance' scenario	Stillbirths averted
2016	11,128	11,101	27
2017	11,014	10,973	41
2018	10,911	10,858	53
2019	10,843	10,791	52
2020	10,811	10,760	51
2021	10,848	10,796	52
2022	10,881	10,829	52
2023	10,905	10,853	52
2024	10,965	10,913	52
2025	11,050	10,998	52
2026	11,105	11,052	53
2027	11,136	11,083	53
2028	11,141	11,088	53
2029	11,139	11,087	52
2030	11,138	11,086	52
Total	**165,015**	**164,268**	**747**

D.2.4 Projection for option 3: More graduates with more competencies

The 'option 3' projection was identical to the baseline projection, with the following exceptions:

- The CPR was projected to increase to 40% by 2021 and then linearly to 50% by 2030
- Coverage of antibiotics for neonatal sepsis (one of the additional competencies that graduate midwives will have: see Table 13 in Section 5.2.1) would be increased by 23% in 2023 and remain at that level until 2030.
- For the remaining LiST interventions, there would be no increase in coverage until 2023 (when the midwifery graduates join the workforce), then a steep increase in 2023 such that 100% of the improvement expected between 2016 and 2030 will be achieved by 2023. This reflects the pattern of results seen in Section 5.2.1.

LiST then calculated the expected number of maternal deaths, neonatal deaths (within 1 month of delivery) and stillbirths expected for each year 2016–2030 (inclusive) under the 'more graduates with more competencies' scenario, so these could be compared against the baseline scenario. The results are shown in Tables D.12 to D.14.

Table D.12: Estimated maternal lives saved under the 'more graduates with more competencies' scenario

Year	Number of maternal deaths under baseline scenario	Number of maternal deaths under 'more graduates with more competencies' scenario	Maternal lives saved
2016	1,478	1,446	32
2017	1,462	1,421	41
2018	1,448	1,396	52
2019	1,439	1,374	65
2020	1,435	1,356	79
2021	1,439	1,340	99
2022	1,443	1,288	155
2023	1,446	1,278	168
2024	1,454	1,276	178
2025	1,465	1,275	190
2026	1,472	1,271	201
2027	1,475	1,264	211
2028	1,476	1,253	223
2029	1,475	1,241	234
2030	1,475	1,230	245
Total	**21,882**	**19,709**	**2,173**

Table D.13: Estimated newborn* lives saved under the 'more graduates with more competencies' scenario

Year	Number of neonatal* deaths under baseline scenario	Number of neonatal* deaths under 'more graduates with more competencies' scenario	Newborn* lives saved
2016	34,402	33,496	906
2017	34,041	32,818	1,223
2018	33,716	32,172	1,544
2019	33,499	31,619	1,880
2020	33,392	31,163	2,229
2021	33,499	30,621	2,878
2022	33,593	29,356	4,237
2023	33,659	29,107	4,552
2024	33,836	29,024	4,812
2025	34,089	28,997	5,092
2026	34,249	28,878	5,371
2027	34,336	28,695	5,641
2028	34,343	28,439	5,904
2029	34,331	28,161	6,170
2030	34,319	27,886	6,433
Total	**509,304**	**450,432**	**58,872**

*up to 28 days after live birth.

Table D.14: Estimated stillbirths averted under the 'more graduates with more competencies' scenario

Year	Number of stillbirths under baseline scenario	Number of stillbirths under 'more graduates with more competencies' scenario	Stillbirths averted
2016	11,128	10,834	294
2017	11,014	10,618	396
2018	10,911	10,411	500
2019	10,843	10,234	609
2020	10,811	10,088	723
2021	10,848	9,954	894
2022	10,881	9,544	1,337
2023	10,905	9,465	1,440
2024	10,965	9,441	1,524
2025	11,050	9,434	1,616
2026	11,105	9,398	1,707
2027	11,136	9,340	1,796
2028	11,141	9,259	1,882
2029	11,139	9,171	1,968
2030	11,138	9,083	2,055
Total	**165,015**	**146,274**	**18,741**

E

Annex E: The national assessment team for SRMNAH workforce assessment

Department of Health Professional Resource Development and Management
Prof. Dr. Nwe Nwe Oo (Director General)
Dr. Tin Tin Lay (Deputy Director General)
Daw Nwe Nwe Khin (Director)
Daw Htay Htay Hlaing (Deputy Director)
Daw Nant Kyu Kyu Khaing (Assistant Director)
Daw Mya Mya Nyo (Assistant Director)
Daw Nwe Ni Sein Myint (Nursing Officer)

Department of Public Health
Dr. Theingi Myint (Director, Maternal and Reproductive Health)
Dr. Hnin Hnin Lwin (Deputy Director, Maternal and Reproductive Health)
Dr. Thet Thet Mu (Director, Health Information)

Department of Medical Services
Daw Khin Mar Kyi (Director-Nursing)

Myanmar Medical Association
Professor Dr. Mya Thida (President, Ob-Gyn Society of the Myanmar Medical Association)

Myanmar Nurse and Midwife Association
Professor Daw Yin Mya (President)

Myanmar Nurse and Midwife Council
Daw Phyu Phyu (President)

Myanmar Maternal and Child Welfare Association
Dr. May Soe Oo (Executive Committee Member)

Jhpiego
Dr. Hnin Wai Hlaing (Deputy Country Director)

Marie Stopes International
Dr. Sithu Aung (Project Manager)

UNOPS
Dr. Panna Erasmus (MNCH Specialist, 3MDG Fund)

WHO
Dr. Kyu Kyu Khin (National Technical Officer)

UNICEF
Dr. Sarabibi Thuzar Win (Health Specialist-MNCH)

UNFPA
Dr. Hla Hla Aye (Assistant Representative)
Dr. Phone Myint (National Consultant)
Dr. Ohnmar Kyi (National Consultant)
Dr. Win Aung (Programme Analyst)
Yin Yin Swe (Programme Assistant)