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Next generation maternal health: external shocks and health-system innovations

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Abstract

In this Series we document the substantial progress in the reduction of maternal mortality and discuss the current state of science in reducing maternal mortality. However, maternal health is also powerfully influenced by the structures and resources of societies, communities, and health systems. We discuss the shocks from outside of the field of maternal health that will influence maternal survival including economic growth in low-income and middle-income countries, urbanisation, and health crises due to disease outbreaks, extreme weather, and conflict. Policy and technological innovations, such as universal health coverage, behavioural economics, mobile health, and the data revolution, are changing health systems and ushering in new approaches to affect the health of mothers. Research and policy will need to reflect the changing maternal health landscape.

Introduction

The papers in this Series document substantial progress in the reduction of maternal mortality over the past several decades and offer new ideas and technologies to improve maternal health. The Series recognises that maternal health is a product of a wide array of

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MEK had the concept for the paper and led the writing of the first draft with SK, CAM, and GY. SK led the quantitative analysis and SK, RMA, and CAM did the qualitative analysis for the Ghana case study. All authors drafted sections of the paper and provided input to the overall direction and content.

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factors from the structures and resources of societies, to the function and responsiveness of health systems. These societies and health systems are experiencing a rapid change that can reshape the possibilities of the future. An understanding of these larger forces is necessary to sustain gains and reach the women still excluded from the recent improvements in maternal health.

In this paper, we look outside of the field of maternal health to review the coming shocks and rapid societal and health-system changes that will influence the profile of the pregnant woman, her community, and her health clinic over the next 15 years. Although there are many potential shocks that could influence maternal health in the coming years, we believe those likely to have the biggest impact are: the anticipated rise in domestic health financing in low-income countries (LICs) and middle-income countries (MICs); shifts in governance for health; migration from rural to urban areas; and strains on the health system from infectious disease outbreaks, armed conflict, and severe weather events associated with climate change. In this context, we discuss some of the promising innovations with the potential to change current maternal health practice for the better, such as universal health coverage (UHC), insights from the field of behavioural economics, and the greater use of data and communication technology for health improvement. We conclude by laying out policy implications of these shocks and innovations.

External shocks

Economic growth and the potential for health convergence

Most maternal deaths occur in LICs and lower-MICs whose limited resources have historically hindered their ability to provide good quality health care. Over the next two decades, however, these countries are on course to experience substantial economic growth, which will increase their fiscal space for health investments. Annual growth in real gross domestic product from 2011 to 2035, is projected to be about 4.5% in LICs and 4.3% in lower-MICs—double that of high-income countries.¹ There is also tremendous scope to use new sources of domestic revenues, such as taxation of tobacco and alcohol, tourist taxes, and redirection of fossil fuel subsidies to the health sector.^{1–3}

If even a small portion of newly available revenues was harnessed for health, through publicly financed insurance, and health system and infrastructure investments, the monies could substantially improve health outcomes. The *Lancet* Commission on Investing in Health¹ assessed the resources required to achieve a grand convergence in health—a reduction in avoidable infectious, maternal, and child deaths to universally low levels by 2035.¹ The Commission estimated that the annual cost for LICs and lower-MICs to achieve convergence would be about US\$70 billion annually from 2015 to 2035. In LICs, this estimate means an additional \$23 per person—roughly double the health spending in 2015. In the 34 countries labelled as LICs in 2015, this additional cost would prevent 190 000 maternal deaths in 2035.²

The Commission's modelling suggests that most countries could fund health convergence themselves. However, two dozen countries are still likely to be classified as LICs by 2035, particularly the fragile and conflict-affected states, and these countries are likely to need

development assistance for health (DAH).¹ Additionally, some MICs might need assistance since they might lack the policy space or institutional arrangements to (1) deliver certain politically sensitive services, such as reproductive health care, or (2) reach certain populations (eg, refugees) with maternal health services.⁴ In this situation, a case can be made for targeted international assistance.⁵

What is the likely future trajectory for DAH for reproductive, maternal, newborn, child and adolescent health (RMNCAH)? Overall levels of DAH have stagnated in recent years, at about \$30 billion annually.⁶ Nevertheless, for RMNCAH there has been a gradual upward trend from 2008 to 2012 in external assistance.⁷ This trend could potentially be accelerated by the recent launch of the Global Financing Facility (GFF) in support of Every Woman, Every Child,⁸ which aims to mobilise more than \$57 billion for RMNCAH from 2015 to 2030, from both domestic resources and by “attracting new external support and improving coordination of existing assistance.”⁸ However, details of how the GFF will be funded have not been established.

Irrespective of income level, less future health financing will come from donors. The political will to increase national spending on health cannot be assumed; however, only seven countries in sub-Saharan Africa fulfil the Abuja Declaration obligation to allocate 15% of their budget to health.⁹ When the intrinsic value of health to individuals is included in national income, nearly a quarter of the growth in full income between 2000 and 2011 has come from the value of additional life-years gained.¹ This outcome makes health an exceptionally good investment—a point that might resonate with national finance ministers.

Shifts in governance for health

Two trends in the governance of global health create challenges and opportunities for maternal health. The first is the transition from the UN-sponsored Millennium Development Goals (MDGs) that expired in 2015 to the Sustainable Development Goals (SDGs). In the MDGs, maternal health was a stand-alone goal; however, it is one of many targets of the SDG on health: ensure healthy lives and promote wellbeing for all at all ages. The health MDGs focused on donor and domestic investments in maternal health, which encouraged the reduction of maternal mortality ratio (MMR) in some countries.^{10,11} By contrast, the large number of health SDG subgoals might dilute the focus on maternal health. Nevertheless, the SDGs present opportunities for the expansion of the maternal health agenda, as we discuss in the UHC section.¹²

A second trend relates to the ongoing fragmentation in governance and financing for maternal health and introduction of related initiatives, such as those focused on newborn babies, adolescents, family planning, and nutrition. The past decade has seen a proliferation of global efforts in maternal health with at least 18 high-profile initiatives striving to mobilise greater funding or to enhance provision of reproductive, maternal, and newborn health care in LICs and MICs. Examples include Every Woman, Every Child; Women Deliver; and Family Planning 2020. Each initiative has slightly different goals and strategies. In 2005, the Partnership for Maternal, Newborn and Child Health (PMNCH) was launched as an umbrella organisation to foster strategic alignment among maternal, newborn, and child health initiatives. However, a 2014 assessment noted that its mandate was unclear, and

that PMNCH should define their comparative advantage going forward.¹³ These initiatives could be synergistic, but they create difficulties for rational priority setting and programming for maternal health, particularly as funding and activities might be organised in a categorical manner that does not allow for reallocation or flexibility.

Although the entry of new funders and programmes can yield new approaches to address maternal mortality, most maternal health initiatives do not assess their impact.^{14,15} For example, pilot projects of innovative models of care and incentives for service uptake have substantially increased. Many are donor-supported and few have been subjected to rigorous assessment—with demand-side incentives, such as cash transfers, among the best studied.¹⁴

With the receding role of donors in national health systems, the effectiveness of health policies will be determined by state capacity, democratisation, and attention to women's rights. An important trend that will influence the implementation of policy agendas is the growth of government decentralisation in LICs and MICs, which shifts the balance of decision making from the federal level to the states, making uniform policy adoption a challenge. Decentralisation could have an effect on the achievement of the SDGs, for example, as provincial governments might feel less accountable to the SDG targets that the national government has committed to.

Decentralisation carries a potential trade-off between increased efficiency of services due to well grounded local planning and the danger of feeble performance, due to inadequate resources or poor governance. This challenge is now surfacing in India, where the federal government has decided to transfer a higher share of the central tax revenues to the states along with greater freedom to choose how they spend it. The accompanying cut in the federal health budget places greater responsibility on the states to make appropriate policy choices and allocate sufficient funds to health.

Evidence that members of the public are demanding better health care and taking a more active role in health-system decisions is growing. Across different countries and health conditions, health-system users have preference for high-quality care, even with greater cost or in convenience. For example, women frequently seek out more distant and costly providers and facilities that are more reputable for delivery,^{16,17} and active patients form active communities. Civil society is increasingly influencing health-care policies and reform. In many Latin American countries, community participation has grown with decentralisation and has shaped models of primary care and universal health coverage.^{18–21} This rise in demand for high-value health care will accelerate with the growth of a global, urban middle class. This community demand could also be channelled to lobby for greater health spending.

Urbanisation

The world's urban population nowadays exceeds the rural, with migration to cities proceeding quickest in LICs. By 2050, the UN projects that 66% of the population will live in urban areas,²² leading to an increase in the proportion of urban births. Our analyses show that by 2030, 52% of births will be in urban areas, rising to 60% by 2050. This change is a

rise from 39% in 2000 (figure 1). The changing demographics of delivery should transform our approaches to improve the access and quality of obstetric care.

Living in cities brings important benefits for pregnant women and newborn babies, including reduced travel time to clinics, greater choice of services, and greater concentration of well trained providers.^{23–27} These benefits result in lower maternal mortality in many more urban areas than in rural areas.²⁸ Families moving to cities could also rapidly adopt urban norms, such as the use of modern health care (figure 2).^{29,30} Despite these advantages, the rich–poor gap in the access to health services in urban areas is sizeable; this gap is sometimes larger than the gap in rural areas.^{31,32} Rural families migrating to urban centres often move to slums or informal settlements, where they face new barriers to the use of quality childbirth services, such as reliable transport, high cost of delivery in private clinics, security concerns, and poor treatment by health workers.^{33–35}

Poor women in cities can too often deliver at facilities that are unregulated, employ poorly trained providers, and are unequipped to handle obstetric emergencies.^{33,35} For example, a study in the slums of Nairobi found that although 70% of the women interviewed delivered in a health facility, only 48% of them delivered at a health facility with minimum standards for obstetric care.³⁶ Similarly, in the Dhaka slums of Bangladesh, only 37% of private-sector health staff had received formal training.³⁷

New urban models of care are emerging. In South Africa, onsite maternity units were introduced at hospitals to handle the increasing volume at secondary and tertiary urban facilities. These units are designed to provide appropriate care to low-risk pregnant women within hospitals and access to emergency services if needed.³⁸ The Manoshi programme in Bangladesh, managed by BRAC, a non-governmental organisation (NGO), was designed to address the barriers that urban pregnant women are facing (figure 3, panel 1).^{39–41} Although NGOs and other partners are essential, primary accountability for the health of urban dwellers resides with local and regional government. One crucial role of government is regulating a minimum quality of infrastructure and clinical care. For example, by recognising the need for policies specific to the urban poor, India created the National Urban Health Mission to improve access and quality.⁴²

Research in urban maternal health has not kept pace with the urbanisation of births. In the absence of vital registration and strong health-information systems, demographic surveillance systems can be used to track and understand the changing demographics and needs of people living in informal settlements. For example, the Nairobi Urban Health and Demographic Surveillance System was designed to capture information on the health and health care available to people living in Nairobi's slums.³⁶

Health crises

The health systems of LICs and MICs are often hampered by insufficient resources, high prevalence of disease, scarcity of providers, and weak governance at the best of times. When unexpected shocks, such as disease outbreaks, armed conflict, and natural disasters, lead to surging demand for care, these fragile systems can collapse. Such emergencies simultaneously increase the number of patients and decrease the capacity of the system to

care for them because of deaths and injuries of providers, destruction of facilities, and disruption of electricity, water and sanitation, and supply chains.^{43–45} Pregnant women and children are often disproportionately affected.^{46,47}

Disease outbreaks are among the most visible health crises. The 2014–15 Ebola virus outbreak in west Africa is an example of the profound effect that an outbreak can have on health systems and the health of mothers and newborn babies in fragile health systems.⁴⁸ Following the Ebola virus outbreak, which killed many health workers and closed delivery clinics, the MMR is projected to double to more than 1000 per 100 000 livebirths in Guinea and Liberia and to more than 2000 in Sierra Leone, returning to wartime levels.^{44,48} Infectious diseases also have a direct effect on maternal health; for example, Ebola appears almost universally fatal in pregnant women and newborn babies.⁴⁸

Armed conflict, which affected about 1·2 billion people in 2015,⁴⁹ harms civilians directly and limits access to maternal and reproductive health services through high levels of insecurity and collapse of basic health infrastructure.⁵⁰ Conflict and the post-conflict recovery period are marked by increased fertility and MMRs.⁵¹ In one analysis, sub-Saharan African nations experiencing recent armed conflict had MMRs that were 45% higher than did those countries without recent conflict.⁵²

Natural disasters, such as the 2010 earthquake in Haiti, Typhoon Hagupit in the Philippines in 2014, and the 2015 earthquake in Nepal, rendered large sections of the national health system virtually inoperable.⁵³ Global climate change might make extreme weather more common in the coming decades.^{54,55}

Previous crises have spurred migration on an epic scale. The UN estimates that 59·5 million people were forcibly displaced in 2014; the largest single annual increase in history, attributed largely to the war in Syria.⁵⁶ Pregnant women and women of reproductive age often face adverse maternal health outcomes both during the migration process and even after resettling in higher-income countries. Migrant women from LICs and conflict settings can face communication barriers and suboptimal care from providers, or might not trust the health system resulting in higher maternal morbidity and mortality than for native-born women in most, although not all, populations and contexts.^{57,58}

There is a growing consensus that health systems must become more resilient—ie, ready to effectively respond to crises, maintain core functions, and change course if the situation requires it.⁵⁹ A resilient health-care system is able to provide care both for victims of the crisis and for routine health needs—such as maternal and newborn care. Vertical or disease-specific funding and programming does not appear to build resilience. For example, Liberia, which received substantial donor funding, focused on a few vertical health goals and was able to achieve the child-health MDG but could not sustain provision of basic services under stress.⁴⁸

Resilience also requires that health systems be responsive to community needs and expectations in normal times to build the public trust that will be crucial during emergencies.⁵⁹ For example, the Zika virus epidemic in Brazil and other South American countries has highlighted the importance of implementing policies that promote women's

rights and are responsive to their health needs ahead of a crisis. The calls for women to avoid becoming pregnant highlighted the inadequate policies and services for family planning and safe abortion, and the lack of women's autonomy in reproductive decision making.⁶⁰

Health-system innovations

Universal health coverage

UHC has emerged as a key global aspiration, endorsed by a range of actors (individuals and organisations) and countries, and is included in the SDG on health.^{1,61,62} The WHO defines UHC as a means to ensure that people obtain essential health services without experiencing financial hardship.⁶³ This definition advances on past notions of expanded access to care (eg, Declaration of Alma Ata, Health Care for All) by including financial protection. This development responds to a growing concern about the large out-of-pocket health-care payments that can lead to impoverishment.^{64,65}

UHC advances maternal health in several ways and has an important role as part of an integrated RMNCAH agenda.¹² Pregnant women, particularly those with obstetric complications that require surgery and hospital admission, experience high health-care costs in countries without strong insurance systems, and will directly benefit from UHC.^{1,66–68} Countries that have adopted national health insurance programmes, such as Mexico and Rwanda, have reduced catastrophic health expenditures.^{69,70} A study in Ethiopia found that the inclusion of free caesarean sections in an essential health intervention package averted 98 cases of poverty per \$100 000 spent.⁷¹

To the extent that UHC promotes removal of point-of-care fees for essential services, it will probably help increase coverage of maternal health services. In sub-Saharan Africa, countries that removed user fees for delivery increased facility births and decreased neonatal mortality.^{72–74} Introduction of UHC does not guarantee pro-poor outcomes, however. To improve the health of poor women, health insurance has to cover conditions predominantly suffered by the poor and to ensure that the poor are exempted from premiums and copayments, as in Rwanda and Mexico—sometimes called progressive universalism.¹

UHC can also benefit pregnant women to the extent that it expands access to care for chronic and acute illness during pregnancy, childbirth, and post partum. As the burden of non-communicable diseases increases in LICs and MICs, indirect causes of maternal mortality will rise.⁷⁵ Pregnant women will increasingly present to clinics with chronic diseases; in Ghana in 2011, 46% of all obstetric complications recorded by health facilities were due to indirect causes.⁷⁶ Panel 2 highlights the challenges faced by one pregnant woman in Ghana with pre-existing cardiac disease as she navigated the health-care system. Mental health concerns such as depression that are prevalent among pregnant and post-partum women are largely neglected in maternal health programmes.^{77,78}

Introduction of UHC can also promote a life-course approach to address the non-obstetric health needs of women and their families. Antenatal care, labour, and delivery, and post-partum services can be a platform for diagnosis and addressing other health conditions. For example, when Mexico implemented its national health insurance, *Seguro Popular*, it saw an

increase in cervical cancer screening, mammography, and the treatment of hypertension for the patients who were insured.⁷⁹ Early diagnosis and treatment of these conditions might improve pregnancy outcomes as well. UHC and maternal health agendas should thus be viewed as complementary rather than competing.

UHC is a path rather than a destination and insurance reform is only one of many reforms required to improve health system performance. With increases in use, governments will need to invest in expanding health system capacity to avoid compromising quality. Expanding the pool of competent health workers through training midwives has been successful in this regard in several LICs.⁸⁰ However, access alone will not improve outcomes—high-quality health care is essential and has frequently been overlooked in the rush to get women into health facilities.^{81,82} The UHC's monitoring frameworks after the 2015 development agenda must include key maternal health indicators of coverage, quality, and health impact.^{82,83}

Behavioural economics to improve choices

Good maternal and neonatal health outcomes require high quality and accessible health-care systems, but also rely on decisions and actions taken by the mother and her partner, such as the frequency of antenatal care visits, the choice of delivery location, the timing of departure for the delivery facility, and whether and when to initiate post-partum contraception. Traditionally, maternal health programmes have focused on cost and information barriers seeking appropriate health care. Efforts to stimulate demand have therefore emphasised the use of mass media campaigns, community health worker outreach, text messages, and fee exemptions or vouchers.^{84,85}

However, growing evidence from the field of behavioural economics suggests that behavioural and psychological factors, from social norms to misinformation to procrastination, play a central role in decision making—individuals are not always fully informed rational actors. Systematic biases in decision making might help explain why, even when primary barriers to access are removed, the uptake of life-saving interventions is surprisingly low. Drawing on economics and psychology, behavioural economics examines why individuals make decisions that are inconsistent with their own stated goals and wellbeing, and how changes in the decision architecture and framing of choices can positively influence behaviour and outcomes.^{86,87}

Behavioural economists have found that people, and particularly those living with the daily stresses of poverty, might minimise their cognitive burden by choosing default options or using decision heuristics (eg, principles based on practice) to simplify complex choices, which could result in suboptimal choices.^{88,89} This might further exacerbate the lack of control experienced by those affected by poverty.⁹⁰ This insight has led to the integration of tools, such as defaults and reminders, into traditional policies and programmes. Reminders have shown promise for health—eg, in improving medication adherence.⁸⁸ Another common bias is time inconsistency: the tendency to overvalue the present and undervalue the future.^{91,92}

Behavioural economics has great potential to expand the policy toolkit for maternal health, particularly in situations in which coverage and outcomes remain suboptimal despite the elimination of access barriers. Three promising approaches are: (1) changing how choices are ordered (eg, desired choice made the default), (2) shifting how information is framed (eg, gain versus loss), and (3) providing economic incentives to help women resist social and cultural pressure (eg, cash for facility delivery) and offset present bias. We illustrate how common behavioural biases might affect the decisions of pregnant women and new mothers, and suggest behavioural economics approaches that could overcome these in the table.

Although behavioural economics has already been widely applied in tax, energy, and consumer finance policy, its role in health policy is still nascent.⁹³ Additionally, behavioural economics is not a panacea: in the context of deeply rooted poverty, women's economic dependency, inadequate health systems, and constrained care options, even good choices can result in bad outcomes. But interventions to correct biases might make maternal health strategies more effective and efficient—a hypothesis that needs testing in real-world conditions.

Mobile health (mHealth) and the data revolution

Over the past decade, a global telecommunications revolution has resulted in near-ubiquitous access to mobile phones, even in the most remote, resource-limited areas; the number of mobile phones exceeds the world's population.⁹⁴ Mobile phone networks cover large areas of territory that were previously inaccessible—at more than 95% signal accessibility worldwide. The field of mHealth leverages this cellular technology with the aim of improving public health, clinical research, and services. Device and connectivity costs have substantially reduced in the past decade, making it more feasible to use mobile phones for both routine communication and more complex data collection and information sharing.⁹⁵

Many countries are integrating mHealth strategies into national health information systems. For example, front-line workers equipped with simple devices are able to efficiently gather census population denominators (eg, women of reproductive age, pregnant women) and systematically plan surveillance and follow-up.⁹⁶ The DHIS2 system,⁹⁷ a web-based open-source health-information system that runs on mobile phones and computers, offers automated visualisation of data for health managers in 47 countries. Furthermore, civil registration and vital statistics systems (CRVS) in lower-MICs can benefit from innovative technological approaches. User-initiated short message service-based notifications of life events and digitisation of CRVS have created the opportunity for improved tracking systems.⁹⁸ However, CRVS remains fragmented from other health-information systems and pilot projects lack plans and funding for scaling.^{98,99}

At the individual level, mHealth has the potential to engage families and patients more directly in their health-care experience. With the growth of technology, patients will have more self-care and diagnostic tools that can be used at home, saving time and money. For example, in South Africa, the MomConnect programme sends informational text messages to pregnant and post-partum women.³⁹ Technology has also enabled the proliferation of social accountability mechanisms for users to demand quality services. Uganda and India

have systems for mobile-enabled citizen reporting—from corruption to facility dysfunction to experiences of disrespectful care.^{100,101}

Despite the enthusiasm for mHealth, considerations of equity, privacy, and the sparse evidence of effectiveness at regional and national scales must be kept in mind. Mobile technology might not be readily available in the most economically disadvantaged populations or those living in remote areas. Gender inequities could make it difficult for women to access mobile phones and for information to reach them.¹⁰²

Beyond mHealth, greater availability of data has led to a data revolution, a term that has increasingly entered the mainstream of policy and development discourse and refers to strengthening the use of data for decision making and accountability.¹⁰³ Additionally, growing interest in measuring results, particularly among global funders such as the World Bank's Health Results Innovation Trust Fund, has translated into many experiments in performance-based payments. These experiments have had mixed results, with more consistently positive results for increasing use than for improving productivity and quality.^{104,105} Nevertheless, there is some evidence that providing performance data back to providers can enhance performance and the quality of reporting.¹⁰⁶

Success of mHealth and, more broadly, the data revolution requires technology but also, crucially, data literacy. Advocates argue that data literacy is less a technical skill than a process for empowerment and social inclusion.¹⁰³ Building this process will demand a culture of data-informed decision making among policy makers and development partners alike. Critically, communities need to be empowered to actively engage with and control their own data.

Discussion

The maternal health landscape is rapidly changing. Major shifts in power, focus, and geography over the next 15 years will transform the possibilities to save lives and reduce maternal illness and disability. One of these shifts is projected robust economic growth in LICs and MICs that will generate more domestic resources that can be spent on health. As poor countries graduate to middle-income and high-income status, they will come to rely less on external health aid. National governments and, increasingly, state and local governments will be deciding the maternal health policy. Decentralisation holds both the promise of greater accountability and responsiveness to local needs, and also the likelihood of widening subnational inequities as provinces follow divergent policy paths and might struggle to effectively regulate the private sector. This devolution of power from global to local will be magnified by the 17 SDGs, whose 169 targets could be seen by governments of LICs and MICs as a list from which to select domestic priorities, rather than a commitment to a unified global compact.¹⁰⁷ The large number of health targets inevitably means more competition for limited resources and policy attention for maternal health. Additionally, future health crises, such as severe weather events, disease outbreaks, and conflicts, will further challenge health systems and probably distract from maternal health priorities.

However, there are opportunities for maternal health among these changes. At the global level, the large number of existing maternal health initiatives and commitments will propel the momentum on maternal health, particularly if they can focus rather than divide policy-maker attention. Furthermore, UHC could help to reintegrate maternal health into the broader women's health agenda by providing access to care throughout the life course, such as for chronic conditions. However, achieving UHC is fundamentally a political process and its success will require sustained political will, public support, and civil society advocacy. Greater engagement with communities is a crucial prerequisite for UHC and local governments in charge of health might be more motivated to seek it than distant bureaucrats. If so, the coming decades will see a more meaningful role for communities in health-system governance. Finally, urbanisation presents new opportunities to concentrate on quality health care and reduce geographic barriers to access. However, this promise will be undermined if new migrants live primarily in slums and informal settlements where clinics are unregulated or unaffordable.

These changes also require the maternal health community to embrace policy and technological innovation to improve the preconditions for maternal health and health-system performance. As an increasing number of women have a mobile phone and access to social media they will share their experiences, good and bad, driving higher expectations of health systems. The data revolution will strengthen measurement of health and health-system performance, but big data does not equal big insight. For this, policy makers and advocates need to meaningfully engage with data. Behavioural economics is another innovation that helps shed light on how biases and limited information prevent women from seeking or staying in care even when it is free and accessible. Insights from this field can help to close the gap between users' health aspirations and their actions.

How will the shocks and innovations discussed in this Review affect the experiences of pregnant women? In 15 years, the typical pregnant woman in an LIC or MIC could be living in a large urban slum, which might be subject to heat waves, droughts, and disease outbreaks. She will have fewer births than her mother. Her health system will receive little or no donor funding, and she will see fewer foreign NGO vehicles in her neighbourhood. She will certainly have a mobile phone and might have health insurance. Her pregnancy might be recorded in a database available to her health workers and health officials, and perhaps to the woman herself. This scenario has substantial benefits and risks, with several implications for policy.

First, strategic framework: the three delays model (ie, delays in seeking, reaching, and receiving care), which has been tremendously useful in the guiding of past maternal health strategy, will need to be updated to recognise the new geography of birth. The framework will need to address women living in urban and rural remote areas and emphasise high-quality routine childbirth services as a core health-system obligation. The first and second delay for urban women, and to some extent rural women, is likely to be reduced by 2030, through education, improved roads, increased health awareness, exposure to urban social mores, health insurance, and behavioural nudges. The third delay, receiving high-quality care, has been relatively neglected in the global discourse and needs urgent attention.

Research on quality and testing of improvement strategies must be central in global and domestic maternal health agendas.

Second, health-system financing: national and regional governments in even the poorest countries will face growing pressure to provide UHC. UHC initiatives must include the people living in poverty from day one or risk perpetuating inequities in maternal health. Efforts must be made to include women in the informal sector, recent urban migrants, and those in remote rural and urban slum settings. Inclusion of maternal health services and women's health across the life course should be at the core of all benefit packages.

Third, community action: communities will need to build pressure for greater domestic health spending and accountability for health-system performance. New technologies will help to provide civil society with information about facility quality, including respectful care. Communities and women's organisations will play an important role in demanding effective coverage with high-quality services and not coverage in name only.

Fourth, global-health governance: the role of donors in many countries will diminish, but global pressure for effective maternal health policy will continue to be important. In countries where donors still contribute substantial funds to health-care provision, the donor should assure that external funding complements, rather than replaces, domestic efforts to expand cost-effective maternal health care.¹⁰⁸ Donors' primary role should shift to the production of global public goods, such as research, support for norm setting via multilateral organisations, emphasis on rights and accountability, and technical assistance when requested. The inclusion of high-income countries in the SDGs should promote bidirectional tackling of common concerns, such as equitable financing, avoidance of over-intervention, and patient-centred care.

Finally, research: maternal health care must be restructured to respond to the changing demands of women, which requires new knowledge about utilisation patterns, population preferences, and quality and outcomes of care. Information must be timely and accessible to policy makers and health-system planners. A particular gap is the lack of research in urban health and the health of migrant women. Another priority for research lies in the testing of innovative service models that work for women in different contexts (remote, urban, rural) and deliver positive health outcomes. Furthermore, the use of implementation research can strengthen the quality and efficiency of programmes, thus maximising investments in health.

Over the next 15 years, health systems will be tested by global and domestic shocks. The systems will also have access to innovations in policies and technologies that can expand the solution space for improving maternal health. How national and global actors prepare for and harness these will determine the magnitude and reach of the gains in maternal and newborn health.

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Key messages

- Maternal health in the next 20 years will be transformed by social, political, environmental, and demographic changes.
- Future health systems must respond to the changing context of women's lives: urbanisation, greater access to information, and rising expectations for high-quality, woman-centred care.
- Donor assistance for health will continue to decline and countries need to increase domestic financing; potential revenue sources are economic growth, taxes on alcohol and tobacco, and reduction of fossil fuel and other subsidies.
- Rapid urbanisation has improved access to and quality of care for many, but not all, women; research is urgently needed on models of care for poor women in urban areas.
- Universal health coverage, with comprehensive maternal health services at its core, is a major opportunity for improving maternal health and reducing impoverishment.
- Behavioural economics and the data revolution offer new promising approaches for improving the effectiveness and responsiveness of health care.

Search strategy and selection criteria

We identified data by searches of PubMed and references from relevant articles using the search term maternal health combined with each of the following search terms (using AND): universal health coverage, urban health, urbanisation, behavioural economics, and mHealth. We only included articles published in English between 2006 and 2016.

For the **UN Demographic Yearbooks** see <http://unstats.un.org/unsd/demographic/products/dyb/dyb2.htm>

For the **UN World Urbanisation Prospects 2014** see <https://esa.un.org/unpd/wup/>

For the **UN World Population Prospects 2012** see https://esa.un.org/unpd/wpp/Publications/Files/WPP2012_Volume-I_Comprehensive-Tables.pdf

For the **WHO data** see http://apps.who.int/iris/bitstream/10665/164590/1/9789241564908_eng.pdf

Panel 1: Manoshi case study: maternal and newborn care innovations in the urban slums of Bangladesh

Rapid urbanisation poses unprecedented health challenges in Bangladesh. Health-care access and utilisation is especially low among the urban slum population. Barriers to care include physical and financial challenges, fear of the hospital environment, and disrespectful and abusive behaviour from health-care providers. In 2007, 86% of slum women gave birth at home with an unskilled attendant.³⁹

In response to the changing needs of urban residents, BRAC started Manoshi in 2007, a programme offering culturally appropriate, medically proven maternal and child health services for slum dwellers.⁴⁰ These services include antenatal check-ups, health and nutrition education, post-partum visits, and childhood immunisations. In response to women's desires to give birth at or near the home, BRAC established delivery centres within the slums, which provide safe and dignified delivery services and facilitate timely referral to higher-level facilities if complications arise.⁴¹

Manoshi has expanded to all major cities in Bangladesh, reaching 7 million slum dwellers by 2014 (figure 3). As a result of Manoshi, from 2007–11, the proportion of women in the targeted slums having four or more antenatal care visits increased from 27% to 52% and there has been an increase in facility based deliveries from 15% to 65% (Afsana K, unpublished).³⁹ Manoshi delivery centres are being upgraded to provide basic emergency obstetric care, to minimise unnecessary referrals to hospitals. Manoshi reaffirms that culturally appropriate and safe provision of delivery services, referral support, and the building of trust between the community and health system are paramount for the health of mothers and newborn babies, even among the slum populations.

Panel 2: A case study of a pregnant woman with heart disease navigating the health system in Ghana

A 21-year-old married primigravida living near the Buduburam refugee camp in Accra, Ghana, visits Government Hospital A when she is 4 months pregnant with complaints of extensive swelling in her legs. The woman has worked as a dishwasher at a local restaurant after completing 9 years of education. She is given a diuretic, instructed to avoid salt, and told that the swelling would subside after pregnancy. After moving to her brother's house on the other side of Accra, she delivers her child at term at a private hospital. The swelling does not subside and she develops shortness of breath, dizziness, a rapid heartbeat, and fatigue. She is referred by a doctor at the private hospital to a prayer camp, where she is prayed for, prescribed traditional medicine, and told her symptoms are due to a curse. She returns home after spending a few hours at the prayer camp. The following day (1 day after discharge from delivery), her symptoms unabated, she goes to Government Hospital B, where she is referred to Korle-Bu Teaching Hospital, the main teaching hospital in Accra, affiliated with the University of Ghana. At Korle-Bu, she is diagnosed with biventricular heart failure secondary to dilated cardiomyopathy and severe pulmonary oedema. Her condition deteriorates and she is placed on a ventilator for 5 days with invasive cardiac monitoring. After 3 weeks, she is declared ready for discharge from hospital, but is detained for an additional 10 days in the hospital because she lacks insurance and cannot pay her hospital bills. At this point, she registers for health insurance, which will assist with future financing for her chronic heart condition. She is referred to a hospital closer to her current home for continued management of her condition.

Figure 1. Urban and rural birth projections

Proportion of births in urban areas by region, 1970–2050. We used urban and rural crude birth rate data from the UN Demographic Yearbooks from 1970–2013, population data from the UN World Urbanisation Prospects 2014, and total crude birth rate data from UN World Population Prospects 2012 to estimate the percentage of births occurring in urban areas from 1970–2050 by region. We used average values of available urban and rural crude birth rates per country within the region as a proxy for the entire region.

Figure 2. Coverage of maternal health interventions by urban or rural residence in low-income and middle-income countries

Each circle represents a country. Black horizontal lines represent median value for each subgroup. Available data, 2005–13: 85 countries had data available for the births attended by skilled health personnel and 72 countries had data available for the antenatal coverage indicator. Data taken from WHO.

Figure 3.
Cities in Bangladesh where Manoshi operates

Table

Common biases in decision making and behavioural economics tools applicable to maternal health

	Definition	Examples of bias in maternal health	Potential behaviour economics applications to maternal health
Present bias or time inconsistency	Underweigh the value of benefits received in the future relative to today; decisions that would be made today and would be made tomorrow are inconsistent; behaviour economics tools: defaults, commitment devices, incentives, deadlines, reminders	Insufficient savings for delivery or transport; delay of initiation of contraception in the post-partum period resulting in unsafe birth spacing	Delivery savings accounts with SMS reminders; precommitment during ANC to initiate contraception post partum; vouchers for free contraception that expire
Social norms and pressure, persuasion	Make decisions on the basis of preferences, values, and interests of other rather than one's self; behaviour economics tools: commitment devices, incentives	Influence of family and social pressure about delivery decisions, breastfeeding, and use of contraception	Create social commitments (eg, ANC group meetings) to direct social pressure; create incentives for targeted behaviour that offer a reason to ignore social pressure
Limited attention	Inability to attend to all competing priorities for time and cognition; difficulty sorting through all the relevant costs and benefits of various options; behaviour economics tools: defaults, reminders, simplification, or framing of information, labelling, incentives	Limited ability to process facility choices; limited attention or cognitive capacity in early postnatal period influences use of contraception, postnatal, and neonatal care	Provide simplified information about facility choices; precommitment during ANC to initiate contraception post partum; vouchers for free contraception that expire; SMS reminders about postnatal and neonatal appointments
Incorrect beliefs	Decision making on the basis of false beliefs about facts and probabilities; behaviour economics tools: framing, timing, or salience of information	Underestimate the likelihood of complications from home delivery; incorrect beliefs about side-effects of contraception; incorrect beliefs about facility quality	Equip community health workers and ANC nurses with appropriately framed and simplified information; provide objective information on quality of facility options

Based partly on the conceptual framework developed by the Behavioral Economics and Reproductive Health Initiative (www.beri-research.org).⁸⁶
 SMS=short message service. ANC=antenatal care.