

WOMEN AND HEALTH INITIATIVE WORKING PAPER SERIES

# CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS

*in low- and middle-income countries for post-2015:  
Researchers' perspectives*



Maternal Health **Task Force**

**About the author**

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This document aims to summarize the priorities expressed by the global maternal health researchers who were interviewed, and does not necessarily reflect the views of the Canadian Institutes of Health Research, the Maternal Health Task Force, or the Pierre Elliott Trudeau Foundation.

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## EXECUTIVE SUMMARY

Between June and October 2014, the Maternal Health Task Force at the Harvard T.H. Chan School of Public Health consulted 26 international maternal health researchers to gather perspectives on the most critical and neglected areas for knowledge generation to improve maternal health in low- and middle-income countries.

### Cross-cutting Themes

- Respondents prioritized implementation research for health systems strengthening to deliver existing evidence-based interventions with high-quality and at scale.
- Respondents emphasized evaluating effectiveness, feasibility, and equity impacts of health system interventions to increase the quality and utilization of maternity services.
- The priorities identified were comprehensive, including not only the prevention of direct obstetric deaths, but contraception, abortion, morbidities, non-communicable diseases, and the need for knowledge generation to address social determinants of maternal health.
- Several of the respondents called for a paradigm shift away from causal linearity towards systems thinking. This shift needs to be reflected in measurement tools, health information systems, and the design of implementation research and evaluation.
- Respondents noted the need to overcome narrow specializations in maternal health and to conduct interdisciplinary research. They also called for thinking strategically about evidence for policy advocacy.
- Finally, the respondents consulted observed that persuading donors and researchers of the value of rigorous evaluation and implementation science is crucial to support progress towards eliminating preventable maternal mortality and morbidity and promoting women's health.

### Priorities for Research and Knowledge Generation

The Maternal Health Task Force asked respondents to identify research and evaluation priorities in three broad areas: 1) persistent and critical knowledge gaps that need to be filled to accelerate reductions in maternal mortality and morbidity in low-and middle income countries; 2) crucial maternal health issues that have not been given adequate attention by research and donor communities; and 3) new situations and emerging challenges that require research to improve maternal health outcomes.

- 1) Persistent and critical maternal health knowledge gaps:** The respondents interviewed emphasized that strengthening health service delivery needs to be the primary focus for knowledge generation. Health systems research questions were oriented towards identifying models that can deliver what is known to be effective to prevent and treat the main causes of maternal death at scale in different contexts and to sustain coverage and quality over time. The second most commonly mentioned priority area for knowledge generation was

improvement of quality of care. Other specific topics frequently mentioned were increasing the availability and quality of information about maternal mortality; women's empowerment; contraception; and abortion. The one departure from the focus on health systems and implementation research was identification of the need for basic research and randomized controlled trials to develop and test new treatments for major causes of maternal mortality (pre-eclampsia/eclampsia and obstetric hemorrhage)

- 2) Crucial issues in maternal health that have not received adequate attention from donors and researchers:** The health workforce was the most frequently mentioned topic considered not to have received adequate attention from donors and researchers. Respondents identified the need for implementation research to improve distribution and retention of healthcare workers, facilitate task shifting, transform training to improve “hands-on” skills and promote evidence-based practice, and increase managerial capacity at different levels of the health system. Other specific topics frequently mentioned as having been relatively neglected were: over-medicalization of birth; prevention and elimination of disrespect and abuse; demand generation; and the measurement, prevention and treatment of maternal morbidities.
- 3) New situations and emerging challenges that affect maternal health:** Respondents identified the following as the key factors that will shape the landscape of maternal health over the next decade: increasing burden of non-communicable diseases among pregnant women and women of reproductive age; the persistence of social and economic inequality and vulnerability; and urbanization. With respect to new opportunities, the most frequently mentioned was the potential for information and communication technologies to enhance decision-making by women, healthcare providers and policymakers. Several respondents identified the need to translate the growing evidence about the developmental origins of health and disease, specifically how women's health prior to conception and the uterine environment influence the long-term health outcomes of their children, into policy, programs and health information systems. The need to attend to geopolitical determinants of maternal health, such as climate change and food insecurity, the proliferation of conflict and humanitarian crises, and the rise of religious fundamentalism, was also mentioned.

# **Priorities for Maternal Health Research in Low- and Middle-Income Countries Post-2015: Perspectives of Global Maternal Health Researchers**

## **INTRODUCTION**

Between June and October 2014, the Maternal Health Task Force at the T.H. Chan Harvard School of Public Health consulted 26 international maternal health researchers to gather perspectives on the most critical and neglected areas for knowledge generation to improve maternal health in low- and middle-income countries (LMIC). The consultation was undertaken in the context of evaluating progress and looking forward to the post-2015 development agenda, with the objective of sharing identified priorities with the maternal health community.

## **METHODS**

The analysis is based on semi-structured interviews with 26 global maternal health researchers.<sup>1</sup> Criteria for invitation to participate included 1) experience conducting maternal health research in low- and middle-income countries; 2) recent maternal health publications in high-impact journals; 3) knowledge about the policy and donor landscape for international maternal health research; 4) and geographic distribution. Researchers from academic institutions and implementing agencies in Africa, Asia, Europe, North America, and South America participated. Nearly 40% of the respondents resided in low- and middle-income countries (10 of 26).

Information was collected through telephone and face-to-face interviews that ranged in length from 30 to 60 minutes and explored three broad questions:

- What are the persistent and critical knowledge gaps that need to be filled to improve maternal health outcomes and reduce maternal mortality and morbidity in low- and middle-income countries?
- What are the crucial maternal health issues that have not been given adequate attention by researchers and donors?
- What new situations and emerging challenges affecting maternal health require implementation research?

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<sup>1</sup> In total 30 researchers were invited to participate. One declined because she was no longer working in the field of maternal health, one did not participate because of scheduling difficulties and two did not respond to the invitation. The effective response rate was 87%. A list of participants is included as Annex 1.

Detailed notes were taken during the interviews and immediately transcribed. Transcriptions were analyzed thematically and a content analysis of the most frequently mentioned priorities for knowledge generation was completed (Table 1).<sup>2</sup>

## PERSISTENT AND CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS

### Implementation research for health system strengthening

The most frequently mentioned critical knowledge gap was summed up by the researcher who said: “*We know what to do. But the interactions between the interventions and the health system have not been studied.*” Improving the efficiency and quality of service delivery was identified as crucial because, as one respondent noted, service delivery represents approximately 80% of the cost of healthcare, as opposed to 20% for technical inputs (commodities). The broad priority area identified by respondents is the need to identify the barriers to and optimal models for implementation of what is known to be effective to prevent and treat the main causes of maternal death at large scale and to sustain coverage and quality over time. Respondents frequently stated that implementation research is needed on how to deliver, scale up and sustain interventions: 1) to prevent and treat obstetric hemorrhage (appropriate use of misoprostol, oxytocin, active management of third stage of labor) and 2) to treat pre-eclampsia and eclampsia (magnesium sulfate). Respondents emphasized the need for health system research on delivery of basic and comprehensive emergency obstetric care, as well as on a broader range of evidence-based interventions to promote maternal health.<sup>3,4</sup>

The need for implementation research to develop and test models to “*deliver the right package of care at the right level*” of the health system and optimize linkages between different levels of the system was a common concern. What are the optimal organizational forms for providing care? Which services should be provided in the community and which should be provided at the facility-level? For example, several respondents questioned the effectiveness of caring for women categorized as low-risk for complications at low volume, primary health care clinics that are located far from facilities that can provide Comprehensive Emergency Obstetric Care (CEmOC). Location of primary health care clinics next to or nearby referral hospitals was cited

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<sup>2</sup> There was significant overlap in the topics identified by respondents as “persistent knowledge gaps” and those considered “not to have received adequate attention from donors and researchers”. The decision to classify a specific topic as a “persistent knowledge gap” or an area that has “not received adequate attention” was made by the author based on: a) the frequency with which a topic was mentioned in response to one or the other question and b) grouping of related topics.

<sup>3</sup> Signal functions for basic emergency obstetric care (BEmOC): administer parenteral antibiotics, administer uterotonic drugs (i.e. oxytocin), administer parenteral anticonvulsants for pre-eclampsia and eclampsia (i.e. magnesium sulfate), manually remove the placenta, perform assisted vaginal delivery (e.g. vacuum extraction, forceps delivery), perform basic neonatal resuscitation (bag and mask). Comprehensive emergency obstetric care (CEmOC) includes signal functions 1-7 as well as the ability to perform surgery (e.g. cesarean section) and provide blood transfusion. WHO. Monitoring emergency obstetric care: a handbook [Internet]. Geneva, Switzerland: WHO; 2009. Available from: <http://www.who.int/reproductivehealth/publications/monitoring/9789241547734/en/>

<sup>4</sup> The Partnership for Maternal, Newborn & Child Health. Essential Interventions, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Health: A Global Review of the Key Interventions Related to Reproductive, Maternal, Newborn and Child Health (RMNCH) [Internet]. Geneva, Switzerland: WHO; 2011. Available from: [http://www.who.int/pmnch/knowledge/publications/201112\\_essential\\_interventions/en/](http://www.who.int/pmnch/knowledge/publications/201112_essential_interventions/en/)



as a promising model that needs to be evaluated in more settings. Respondents described the evidence base for interventions to provide women with transportation to facilities (prior to labor and delivery and during obstetric emergencies), as “*anecdotal*”. Similarly, evidence for some interventions designed to overcome barriers to facility-based delivery for women who live far away from facilities, such as maternity waiting homes, was characterized as weak. The evidence-base for service delivery models and specific interventions to overcome the challenges of distance, transportation and referral needs to be strengthened.

Once a package of care is selected for a given context, what content should be delivered by different members of the health workforce and where (skill mix and team composition)? While respondents generally expressed a preference for midwifery-led care for normal births, several respondents noted that there is a lack of evidence about whether doctor-led or midwife-led care is preferable and whether this varies by context.

Respondents emphasized the need for attention to context and a sophisticated health systems perspective on how application of technical interventions and health system reforms interact. Several respondents noted that the “portfolio” of actions that will “*bend or shift the curve*” will change over time based on economic, social and epidemiological transitions and health system development. For example, for a particular social, economic, and disease context and stage in health system development, broad-based social interventions such as increasing girls’ enrollment in school may have a great impact on maternal mortality. With social and economic transformation that includes increasing access to and coverage of health services, for example through health insurance for the poor or establishment of universal health care, supply-side interventions may become relatively more important for improving outcomes. Effectiveness, feasibility, and equity impacts of health system interventions to increase the quality and utilization of maternity healthcare services need to be assessed.

Some respondents argued that rather than attempting to deliver the full range of evidence-based interventions to promote maternal health, researchers and policymakers should focus on identifying the key interventions that will produce results in a given context: “*without the funds, the impetus, the drive: what is the small set of reforms that will produce results? These are technical interventions plus systems adjustments. And I am not talking about 28 things, I am talking about the 4 or 5 things that will really move the needle.*”

### **Improving the quality of maternal healthcare**

*“Coverage alone isn’t sufficient to save lives and guarantee human rights”*

Respondents expressed great concern about the quality of facility-based maternity care. Over the past five years, the proportion of women having facility-based births has increased rapidly, particularly in Asia, but “*we have no idea about the quality of services that we are pushing women into*”. Respondents identified an urgent need for more information about the quality of

care, as well as to refine indicators and instruments for assessing quality of care. Knowledge generation is needed at the national, district level and facility level.

Respondents identified the need for basic health system information about the availability and distribution of human and physical infrastructure in relationship to the current and projected need for maternal health services. Many researchers emphasized the need to improve access to information about the health system at the sub-national level. In this context, the work done by the Health Information Systems Program (HISP)<sup>5</sup> was described as a “*hopeful challenge*”. HISP has contributed to improving data collection and quality, but in many settings information management “fiefdoms” within the national Ministries of Health prevent district managers from accessing information. Respondents noted that effective use of health information systems demands organizational change and, potentially, reconfiguration of power relations between different actors and levels of the health system.

Respondents also called for more data collection on actual coverage of interventions and facility readiness. The need to validate indicators used in household surveys to permit better estimates of population coverage of interventions (uterotonics, breastfeeding, postpartum check-up) was identified as a priority. With respect to facility readiness, one respondent suggested analysis of Demographic Health Surveys (DHS) to make the case for the risks associated with partial delivery of BEmOC and CEmOC. Others noted that surveys on facility readiness must be modified or complemented to capture more detail about relevant measures. For example, one respondent stated that the DHS only captures whether or not the facility has running water while the real issue for quality of maternity care is the reliability of the water supply in the labor and delivery ward.

Further, respondents advocated for the development of more sophisticated health information systems that can better link coverage indicators to health outcomes. For example, information systems that can track the relationship between quality of facility-based care and outcomes in the community, such as adverse effects of hospital acquired infections during the postpartum period.

Of course, measurement is only a priority in as far as it contributes to improved outcomes, thus respondents want to identify “*the right indicators at different levels of the health system to ensure quality*”. In this context, one respondent said, “*in 1997 it was established what a signal function was. We need a new document and leadership around functional measurement.*”

There was notable interest among respondents in improving the tools for measuring quality of care at the facility level. A number of respondents identified the need to develop and test a “*checklist*” or “*small and simple algorithm or dashboard*” that can be used routinely (monthly) to measure quality of care at the facility level. Respondents emphasized that the tool must be simple and inexpensive to foster routine, systematic use. Relevant dimensions of measurement

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<sup>5</sup> Please see the HISP website at the University of Oslo (<http://www.mn.uio.no/ifi/english/research/networks/hisp/>) or the dedicated website of the Health Information Systems Program ([www.hisp.org](http://www.hisp.org)) for additional information.

included: 1) health outcomes (number of stillbirths, near misses, complications, case fatality rates), 2) context (time of day, day of the week, number of births compared to staffing levels) and 3) process targets (urinalysis, use of partograph).

Respondents had differences of opinion about whether this tool should include both technical and interpersonal measures of quality of care. Some respondents considered that what is currently needed in terms of implementation research is a focus on technical quality, while others felt that the “quality checklist” should incorporate indicators to measure both interpersonal and technical quality. The interviews also identified a tension related to the emphasis on ease of routine use by several respondents, and the view of another respondent that the short checklist approach is not “fine-grained” enough for local measurement and quality improvement.

With respect to measurement for quality improvement several respondents emphasized the importance of internal and inclusive quality improvement processes and building the capacity of healthcare providers and other staff members to “*produce and use their own data for quality improvement*”.

### **Improving the quality and availability of information about maternal mortality**

In 2014, the Independent Expert Review Group of the Commission on Information and Accountability for Women’s and Children’s Health agreement called for “universal and effective Civil Registration and Vital Statistics systems [to be] a post-2015 development target.”<sup>6</sup> Improving vital registration was the most commonly mentioned priority for improving information about maternal mortality mentioned by the respondents consulted. They also highlighted the need for more autopsy data on cause of maternal deaths, including autopsies of women who die during childbirth in the community. Blind, minimally invasive, needle autopsies are a potentially promising intervention that should be evaluated for this application. Verbal autopsies should also be improved. One respondent characterized verbal autopsy as a “*very imprecise tool for determining cause of maternal death*” as many of the indicators have not been validated for pregnant and postpartum women but rather only for adults of reproductive age. Respondents also indicated the need for improved measurement of indirect causes of maternal deaths. Finally, some respondents mentioned the need to better understand relationships between indirect and direct causes of maternal death. In particular, the need to better understand how communicable diseases such as HIV, tuberculosis, and malaria interact with direct causes of maternal death such as postpartum hemorrhage and sepsis was highlighted.<sup>7</sup>

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<sup>6</sup> iERG Every Woman, Every Child: A Post-2015 Vision. The third report of the independent Expert Review Group on Information and Accountability for Women’s and Children’s Health [Internet]. Geneva, Switzerland: WHO; 2014. Available from: [http://apps.who.int/iris/bitstream/10665/132673/1/9789241507523\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/132673/1/9789241507523_eng.pdf)

<sup>7</sup> For a detailed discussion of research and evaluation priorities for maternal health and HIV please see Kendall, T., Danel, I. (2014). *Research and Evaluation Agenda for HIV and Maternal Health in Sub-Saharan Africa: Women and Health Initiative Working Paper No. 1*. Women and Health Initiative, Harvard School of Public Health: Boston MA. ([www.mhtf.org](http://www.mhtf.org)) or Kendall T, Danel I, Cooper D, Dilmitis S, Kaida A, Kourtis AP, et al. Eliminating preventable HIV-related maternal mortality in Sub-Saharan Africa: What do we need to know? *J Acquir Immune Defic Syndr*. 2014 Dec 1;67 Suppl 4:S250-8.

## Supporting women's empowerment

*“How can we design service delivery models that empower women?”*

Implementation research on interventions that could improve the status of women and their capacity to utilize maternal health services by increasing their autonomy, decision-making power, and control over resources was prioritized. Evaluation of interventions to economically empower women (cash transfer and conditional cash transfer, vouchers for transportation and maternal health services, access to mobile banking) were frequently mentioned. Gender norms limiting women's movement, related intimate-partner violence, high-levels of community violence, and violence targeting women in public spaces were all mentioned as important barriers to women using *and* providing maternal health services. Respondents noted the need to evaluate women's groups and peer approaches oriented towards generating local solutions to overcoming barriers to care and improving quality of the available community and facility-based services in more settings.<sup>8</sup> The need for attention to local context and the generation and adaptation of programs and interventions through formative research was emphasized.

Another dimension of women's empowerment prioritized for evaluation by respondents was the effect of mechanisms that seek to transform the relationships between women, healthcare providers, and institutions through increased participation and accountability. Respondents called for participatory approaches that include women in the design and implementation of research, as well as the design and monitoring of health services.

At the facility and national level, respondents called for research to assess how social accountability mechanisms<sup>9</sup> improve women's access to the interventions they should receive according to national guidelines and to ensure high-quality, respectful care. For example, what is the impact of social accountability mechanisms on prevalence of disrespect and abuse during childbirth? Does legal advocacy increase coverage and quality of maternal health interventions? How can professional associations be mobilized and deployed to ensure that women receive the interventions covered by national health insurance and voucher schemes?

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<sup>8</sup> Prost A, Colbourn T, Seward N, Azad K, Coomarasamy A, Copas A, et al. Women's groups practising participatory learning and action to improve maternal and newborn health in low-resource settings: a systematic review and meta-analysis. *Lancet*. 2013 May 18;381(9879):1736-46.

<sup>9</sup> Social accountability refers to the broad range of actions and mechanisms beyond voting that citizens and civil society organizations can use to hold those who have power and responsibilities (usually, though not exclusively, governments) to account, as well as actions on the part of government, and other actors (e.g. media, private sector, donors) to facilitate or promote these actions. In the case of maternal health, social accountability encompasses activities relating to information disclosure (e.g. availability of financial and other information and strengthening of the mechanisms to make this information available, such as freedom of information laws, voluntary publication of financial information about maternal health and project outcomes), demystification and dissemination (e.g. participatory analysis of maternal health budgets, establishment and dissemination of patient's bills of rights); complaints handling; and independent and/or participatory monitoring (e.g. observatories for maternal mortality that include civil society participation, national independent committees that conduct maternal death surveillance and review, community participation in service design and monitoring and evaluation, institutional ombudspersons), as well as more traditional mechanisms such as public protests or public interest litigation. For illustrative examples of commitments to transparency and accountability in maternal health and specific projects that have sought to improve the quality of maternal health through social accountability mechanisms see:

Commission on Information and Accountability for Women's and Children's Health. *Keeping Promises, Measuring Results* [Internet]. Geneva, Switzerland: WHO; 2013. Available from:

[http://www.who.int/topics/millennium\\_development\\_goals/accountability\\_commission/Commission\\_Report\\_advance\\_copy.pdf](http://www.who.int/topics/millennium_development_goals/accountability_commission/Commission_Report_advance_copy.pdf). Frisancho A, Vasquez ML. Citizen monitoring to promote the right to health care and accountability [Internet]. 2013. Available from:

<http://www.copasah.net/citizen-monitoring-to-promote-the-right-to-health-care-and-accountability.html>; Papp SA, Gogoi A, Campbell C. Improving maternal health through social accountability: a case study from Orissa, India. *Glob Public Health*. 2013;8(4):449-64

There is emerging evidence that social accountability, empowerment, and human rights-based approaches can contribute to maternal health, but there is need to evaluate impact of different interventions in a variety of settings.<sup>10</sup> The Independent Expert Review Group for the Commission on Information and Accountability for Women’s and Children’s Health has recommended prioritizing quality of care “to reinforce the value of a human rights-based approach to women’s and children’s health.”<sup>5</sup>

### **Increasing the availability and uptake of contraception**

*“Absolutely the most important gap in terms of avoidable causes of maternal mortality is unintended pregnancy. It is often not included as part of maternal health but it needs to be.”*

The respondents consulted prioritized implementation research to increase the use of contraceptives, particularly long-acting reversible contraceptives (LARC), while respecting women’s rights and choice. Respondents stated that research is required to assess and address women’s knowledge and beliefs, providers’ knowledge, beliefs and skills, and when and how to provide contraceptive services. Some respondents highlighted the need to evaluate the effectiveness and cost-effectiveness of different models of healthcare provider training, contraceptive counselling and service delivery. Respondents noted that adolescents and older women are most affected by “unmet need” for contraception. In general, respondents focused on the need for different types of health systems and service delivery research to increase voluntary contraceptive use among women. One respondent identified the need for more randomized controlled trials to evaluate interventions in this field (i.e., methodologically rigorous evaluation).

### **Increasing access to safe abortion services**

Many respondents noted that in spite of the importance of unsafe abortion as a cause of maternal morbidity and mortality, it does not receive adequate research attention. The ongoing stigmatization of abortion and restrictive legal contexts make it difficult to do research on the topic, and few donors support abortion research. Respondents identified the need for improved methodologies to assess the prevalence of unsafe abortion and contribution to maternal mortality and morbidity in order to bring greater visibility to the issue. They also identified the need for implementation research to identify and evaluate different strategies for improving access, utilization, and quality of abortion care. Key topics regarding demand and access included how to overcome abortion stigma (which persists even where abortion is legal or not restricted), to facilitate earlier access to abortion, and to reduce inequities in access and outcomes. With respect to service-delivery, respondents identified the need for research on how to introduce best practices (for example medical abortion) and task-shifting to expand safe and effective access.

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<sup>10</sup> Ferguson L, Halliday E. Participation and human rights: impact on women’s and children’s health: What does the literature tell us?. In: Bustero F, Hunt P, editors. Women’s and Children’s Health: Evidence of Impact of Human Rights. Geneva, Switzerland: WHO; 2013. 68-80; Wallerstein N. What is the evidence on effectiveness of empowerment to improve health? [Internet]. Copenhagen: WHO Regional Office for Europe 2006. Available from: <http://www.euro.who.int/Document/E88086.pdf>

Several other respondents who identified eliminating unsafe abortion as one of the most critical actions to reduce maternal mortality and morbidity said that what is needed is not research *per se*, but research to generate the best evidence for advocacy to expand women’s access to safe abortion services.

### **New treatments for major causes of maternal death**

While most respondents focused on implementation research questions, a number highlighted the need for basic research and randomized controlled trials to develop and test the efficacy of new treatments for the major causes of maternal death, specifically obstetric hemorrhage and pre-eclampsia/eclampsia. In spite of the existence of evidence-based interventions to address postpartum hemorrhage, several respondents noted the need for further clinical research on alternative formulations of uterotonics (for example heat stable oxytocin), as well as trials to evaluate treatment not based on uterine contraction, such as tamponades, sutures, and tranexamic acid.<sup>11</sup> In the case of pre-eclampsia and eclampsia, researchers called for basic and clinical research to improve prevention, screening, and protocols for existing treatments and to foster development of innovative treatments.<sup>12</sup> The need to better understand and treat peripartum cardiomyopathy, a relatively rare but serious condition, was also mentioned.

## **CRUCIAL MATERNAL HEALTH ISSUES THAT HAVE NOT RECEIVED ADEQUATE ATTENTION FROM DONORS AND RESEARCHERS**

### **Health Workforce**

The health workforce was the topic mentioned most frequently by respondents when they were asked to identify crucial areas for maternal health that have not been given adequate attention by researchers and donors. Respondents commented on the insufficient availability of well-trained healthcare workers to provide maternal health services in LMIC. They further noted that the current situation will only be exacerbated by the aging of practicing healthcare providers, out-migration of healthcare workers from LMIC, and increasing demands for health service delivery associated with demographic trends, urbanization, and Universal Health Care.<sup>13</sup> Some interviewees described the situation as “*the human resource crisis*”. Respondents stated that national governments, donors, and researchers had paid less attention to improving the availability and quality of human resources than to improving infrastructure.

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<sup>11</sup> For more information please see Herrick TM, Harner-Jay CM, Levisay AM, Coffey PS, Free MJ, LaBarre PD. Prioritizing investments in innovations to protect women from the leading causes of maternal death. *BMC Pregnancy Childbirth*. 2014 Jan 9;14:10; Novikova N, Hofmeyr GJ. Tranexamic acid for preventing postpartum hemorrhage. *Cochrane Database Syst Rev*. 2010 Jul 7;(7):CD007872;

<sup>12</sup> PRE-EMPT (Pre-eclampsia and eclampsia monitoring, prevention and treatment) partnership (<https://pre-empt.cfri.ca/about>) is a focused on developing interventions to prevent, screen and treat pre-eclampsia and eclampsia and translating knowledge into policy and practice.

<sup>13</sup> For more information please see Global Health Workforce Alliance and World Health Organization. *A Universal Truth: No Health Without a Workforce* [Internet]. Geneva, Switzerland: WHO; 2014. Available from: <http://www.who.int/workforcealliance/knowledge/resources/hrreport2013/en/>

Respondents called for implementation research to develop, test, and demonstrate the feasibility of scaling up strategies to attract, deploy, and retain healthcare providers. Some promising interventions to address maldistribution of human resources, and therefore warranting evaluation, included: 1) training local people to provide maternity services; 2) providing hardship pay to relocate or remain in less desirable areas; and 3) taking action to improve the living conditions and physical security of healthcare workers, particularly women.

Monetary and non-monetary recognition were also identified as important strategies for attracting and retaining healthcare workers. Several respondents noted the need for continued evaluation of financial incentives for performance. In addition, evaluating interventions designed to address gender discrimination and gender inequalities in society as well as in the workplace were mentioned. Policy and programmatic interventions to increase women's status, access to education and training, role in decision-making in the workplace, and control over working conditions were identified as potentially important levers to attract and retain maternal healthcare workers.

### ***Task-Shifting***

Respondents prioritized task-shifting as a needed policy and practice to expand access to quality maternity care. However, "*many countries don't prioritize task shifting as it shifts powers [from physicians] to others.*" Respondents identified physician advocacy to maintain regulations that exclude other professionals from relevant scopes of work and resistance to competency-based and team based care as a significant barrier to task-shifting. Respondents stated that regulations need to be changed to allow for nurse practitioners, expand the remit of midwives and, in some settings, create new cadres of health workers. Evidence on task-shifting is needed for policy advocacy and health system design. Implementation research must be conducted to assess how non-physician providers and different cadres can safely and effectively "*fill HR gaps*" especially in rural and other settings with a low proportion of facility births. Respondents specified provision of cesarean sections and abortion by providers who are not physicians as areas for implementation research on task-shifting.

### ***Training***

Two key topics for implementation research related to training were identified by respondents: 1) introducing evidence-based practice and 2) increasing technical competence through modifications to pre-service and in-service training.

**Introducing evidence-based practice:** The respondents consulted identified intergenerational transmission of poor clinical practice, resistance to standardization of obstetric care, and rejection of evidence-based practice developed elsewhere with the pretext of resisting "*medical colonialism*" as barriers. Respondents argued for standardized parameters for measurement, definitions of conditions, diagnosis and treatment based on the best available evidence, creating "*a common global language*". To develop this common language, the need to generate and

analyze evidence persists. An example of research that permits global standardization is the INTERGROWTH-21<sup>st</sup> Project. The project conducted research to develop and disseminate international standards for normal fetal growth and newborn size.<sup>14</sup> Predictive decision-making algorithms for preventing and treating the main causes of maternal death based on “*multivariable level regressions on the evidence available, not by committee*” can also contribute to evidence-based practice.

Beyond evidence generation and the creation of curricula, training, and decision-making tools, many respondents expressed that transformation of clinical practice requires “*profound changes in how institutions are structured and how the actors in institutions relate to each other; in addition there have to be profound changes in the curriculum and in the practices of trainers.*” Research is needed on how to effectively bring about changes in disciplinary and institutional hierarchies and training to produce the desired attitudinal and behavioral changes amongst clinicians.

**Increasing technical competence:** Respondents identified the need to develop and test strategies to train providers in technical skills as a lynchpin for improving quality. It was noted that nurses and midwives in Africa and Asia are graduating without sufficient “hands-on” skills. Promising practices for in-service training include simulation labs and expanding opportunities for practical training by using all facilities, at all levels of care, for teaching. Respondents identified the need to have simple tools to tailor in-service training to actual knowledge gaps. They also highlighted the need to test and scale up innovative programs for mentorship, skill-transfer, and skill-retention. An example of this type of research is the Maternal Health Task Force’s joint work with the Ethiopian Ministry of Health and the Addis Continental Institute of Public Health to introduce innovative training techniques including emergency drills for in-service training and a “midwife exchange” program between a referral hospital and health centers. Emerging evidence demonstrates that the program has reduced inappropriate referrals, increased the number of births occurring in community health centers, and been an effective vehicle for hospital midwives to maintain their labor and delivery skills and improve the technical skills of midwives working at the community health center level. The Ethiopian Midwifery Association and the Ethiopian Ministry of Health have expressed their intention to scale up the midwife exchange nationally.<sup>15</sup>

### ***Leadership and supervision***

Regarding leadership and supervision, evaluation of interventions to improve the managerial capacity at the facility and district level was the most frequently identified priority for

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<sup>14</sup> Villar J, Papageorgiou AT, Pang R, Ohuma EO, Cheikh Ismail L, Barros FC, et al. The likeness of fetal growth and newborn size across non-isolated populations in the INTERGROWTH-21<sup>st</sup> Project: the Fetal Growth Longitudinal Study and Newborn Cross-Sectional Study. *Lancet Diabetes Endocrinol*. 2014 Oct;2(10):781-92. Additional information and clinical tools are available at <http://www.intergrowth21.org.uk/>

<sup>15</sup> Ethiopian Ministry of Health and the Maternal Health Task Force. *Health Facility Networking for Maternal Health: Lessons from the Field*. November 20, 2014, Addis Ababa, Ethiopia.



implementation research. Respondents specifically mentioned evaluation of training in management for physicians who are district managers; managerial decision-making support tools; and the introduction of new cadres specialized in health management. The impact of different supervisory models on performance was also noted as a knowledge gap.

Respondents also prioritized evaluation of interventions to promote accountability across the health system from the ministerial level down to individual providers. At the macro-level of bilateral, multilateral, and philanthropic donors, one respondent promoted linking provision of funds to processes of accountability and to evaluation of the quality of technical and interpersonal care. At the individual manager and health worker level, respondents called for the evaluation of the role of performance-based incentives for increasing accountability. Others prioritized research on the systems of mentorship that result in effective leadership and increased accountability from managers at different levels of the health system.

### ***Private/unregulated providers***

Respondents pointed to huge knowledge gaps about the scope of practice and competence of private and unregulated providers, as well as about the health outcomes for women who receive maternal health services from these providers. Respondents noted that private and unregulated providers currently offer a significant proportion of maternity care in low- and middle-income countries, and forecasted that the numbers of women cared for by these individuals will increase with economic growth and urbanization. Other respondents noted that use of private services may also increase if financial crises undermine governments' capacities to sustain or introduce free maternity services. Respondents said that private and unregulated providers are currently ignored as part of the health system, and underutilized by governments for meeting the health needs of the population. One respondent characterized this situation saying: "*They give anti-malarial injections, why can't they give contraceptive injections?*" Respondents identified a need to generate information about the scope of practice, knowledge, and skills of these providers, as well as related health outcomes for women. They also observed that governments have a responsibility to develop effective combinations of training and regulation to guarantee that the private sector provides competent care and to evaluate health outcomes, and mentioned governments' responsibility to implement and evaluate mechanisms for signaling the competence of private providers to women.

### **Preventing and eliminating disrespect and abuse**

Respondents noted the continuing need for research on the drivers and consequences of disrespect and abuse during maternity care, as well as for the development and evaluation of interventions to end this human rights abuse. Several respondents stated that there is a need for qualitative research to better understand provider behavior and reasons for mistreating and abusing women during childbirth. Many respondents stated that disrespect and abuse is related to working conditions, however research is needed to confirm this intuitive association. The impact

of pre-service and in-service training that emphasizes professional and medical ethics and social accountability interventions to prevent and eliminate disrespect and abuse were identified as topics for evaluation. Trials evaluating continuous support for women during childbirth have identified a range of positive clinical and psychosocial outcomes, including greater likelihood of a spontaneous vaginal birth and women being less likely to rate their childbirth experience negatively.<sup>16</sup> Continuous support during labor may also reduce the occurrence of disrespect and abuse. Given the documented benefits and lack of harm associated with birth companionship, formative and implementation research should be undertaken to address perceived barriers such as facility infrastructure and the relationship between health professionals and birth companions, as well as to evaluate the impact of birth companionship on prevalence of disrespect and abuse.

### **Over-medicalization of birth**

Respondents noted that an excessively medicalized approach to childbirth is well-established in Latin America and that Asian countries are following this model in their national efforts to reduce maternal mortality. The central concern raised by respondents was that the increased proportion of women giving births in facilities is accompanied by an unwarranted rise in rates of cesarean section. Increases in rates of cesarean section are so steep in LMIC that one respondent said *“in a few years, I think normal birth will be cesarean birth.”* Respondents observed that most of these cesarean sections are not medically indicated, and were concerned about the contribution of unnecessary cesarean deliveries to maternal and perinatal mortality and morbidity. An example of this was given by a respondent who noted that *“fetal monitoring is inaccurate and about 9 out of 10 cesarean sections are unneeded—driving maternal morbidity and mortality.”* Respondents emphasized that the practice of unnecessary cesareans is a complex health systems issue related to the model of service delivery (obstetrician led care), remuneration of physicians, and a corresponding lack of a political constituency advocating against unnecessary cesarean deliveries: *“The same obstetricians who should be raising the alarm are supporting cesarean sections.”* Respondents also commented on the *“schizophrenic distribution”* of cesarean sections within countries. In private facilities there are very high rates of cesarean section, but the poorest women are unable to access cesarean delivery *“even if they are dying.”* How to reduce unnecessary cesarean sections while ensuring that women who require cesarean sections receive them was identified as a pressing question for the design, implementation, and evaluation of health systems and models for provision of maternal healthcare.

In addition to the rising rates of unnecessary cesarean deliveries, respondents noted the need to study the unintended effects of expanding use of medical technologies, such as ultrasound and continuous electronic fetal monitoring, on quality of care in overstretched health systems.

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<sup>16</sup> Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database Syst Rev.* 2013 Jul 15;7:CD003766.

## **Demand generation**

A priority knowledge gap that was identified universally by African researchers but was not mentioned by researchers from other continents was the need to better understand the sociocultural factors that are barriers to women seeking facility-based care.

Respondents also prioritized implementation research to evaluate and optimize the functioning of mechanisms to overcome financial barriers to utilization of maternal health services (cash transfer, vouchers, and national health insurance schemes). Several respondents noted that research is needed to support the orderly elimination of user fees while guarding against financial shortfalls at the health facility level, particularly for staff salaries and commodities. Evaluation of the provision of incentives for women to attend and health workers to deliver antenatal and postpartum care was also identified as a research priority.

More broadly, several respondents raised the need to monitor how different models of health financing will affect coverage and quality over time for different populations to make systems adjustments.

## **Maternal morbidities**

*“To create momentum, we must demonstrate the burden of morbidity on women’s quality of life and for health care expenditure, and the cost-effectiveness of morbidity prevention and treatment”*

Respondents noted that as maternal mortality declines there is a need for greater focus on the measurement, prevention, and treatment of maternal morbidities to continue to improve maternal health. With respect to measurement of morbidities, respondents noted that “maternal near miss”<sup>17</sup> has not been sufficiently validated and mainstreamed. Several respondents noted that “near miss” does not provide fine-grained information about specific morbidities.

To date, there are very little data about the burden of morbidities internationally. DHS captures information about anemia, but very little is known about other conditions, like fistula. Some intermediate measures, such as blood loss to ascertain severity of hemorrhage and availability and use of magnesium sulfate and calcium for hypertension have been used. Respondents observed that generating reliable information about morbidities will be more costly than information about mortality because of the need for data collectors with more skills. Comorbidities will further complicate the measurement of morbidities.

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<sup>17</sup> A maternal near miss case is defined as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.” There are three approaches used to identify maternal near miss. First, women with “potentially life-threatening conditions” are identified, based on whether they had any severe complication (e.g. severe postpartum haemorrhage, severe pre-eclampsia, eclampsia, sepsis or severe systemic infection, ruptured uterus). Second there is an intervention based criteria based on women received a critical intervention (e.g. blood products, laparotomy, admission to intensive care unit). Third, near-miss cases are classified using stricter criteria based on identification of organ dysfunction by clinical, laboratory and management markers. See Say L, Souza JP, Pattinson RC. Maternal near miss-toward a standard tool for monitoring quality of maternal health care. *Best Pract Res Clin Obstet Gynaecol*, 2009 Jun;23(3):287-96; Tuncalp O, Souza JP. Maternal near-miss audits to improve quality of care. *BJOG*, 2014 Sep;121 Suppl 4:102-4.

Some respondents highlighted the need for standardized definitions and tools to measure maternal morbidities—a process that the World Health Organization has been leading in collaboration with other stakeholders since 2012. The Maternal Morbidity Stakeholders meeting convened by WHO in October 2014 agreed upon a definition of maternal morbidity as “any health condition attributed to or complicating pregnancy and childbirth that has a negative impact on the woman’s well-being or functioning.”<sup>18</sup> Proposed dimensions for measurement include negative maternal outcomes, functional impact and disability, and social and health-related factors (such as socioeconomic determinants, pre-existing conditions, and care seeking during pregnancy). Tools to measure morbidities are being pilot tested now. In sum, measurement of morbidities is at an early stage, and there is little information in the global literature.

Research is needed to estimate economic and health system consequences of unaddressed morbidity. Specific morbidities that were identified as priorities by respondents to develop proof of concept for prevention and treatment included uterine prolapse and perineal tears. There is also a need for implementation research on scale up of interventions to address anemia and fistula.

## NEW SITUATIONS AND EMERGING CHALLENGES THAT AFFECT MATERNAL HEALTH

### **Increasing burden of non-communicable diseases**

Respondents identified the need for research to understand the causes of and develop effective treatment for non-communicable diseases (NCD) among pregnant women in LMIC. Basic research and randomized controlled trials to test treatments for cardiomyopathy and hypertension among pregnant women were specifically mentioned.

Other respondents insisted on the need to assess prevalence of NCD. Obesity, hypertension and diabetes were the most frequently mentioned conditions. For instance, one respondent said that despite relatively high and increasing disease burden and impact on intrapartum care and maternal and neonatal outcomes “*obesity is off the radar in low and middle-income countries.*” Respondents also prioritized implementation research to identify the best models of care and develop specific tools and guidelines to identify, prevent and treat NCDs among pregnant women. Implementation research is needed to adapt evidence-based guidelines to local conditions. For example, one respondent asked: “*what are realistic guidelines for clinical management in low and middle-income countries given that health systems are stressed?*” Integrated service delivery and strengthening of referral systems were also identified as necessary actions to take advantage of the unique opportunity that pregnancy offers for reaching

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<sup>18</sup> Maternal Morbidity Measurement Stakeholders Meeting, October 2-3 2013, Istanbul, Turkey.

women to address other health issues. A stronger preventive focus that takes a lifecycle perspective to women's health before, after, and between pregnancies was mentioned as an important conceptual shift.

A few respondents expressed equity concerns about shifting attention and health service delivery towards NCD. They noted that increased service delivery for NCD may favor the urban elite and that the women who are mostly affected are not *“the poorest of the poor in resource poor countries. The poorest of the poor are still dying of postpartum hemorrhage.”*

### **Persistence of social and economic inequality**

*“Over and above medicine, we cannot forget about the socioeconomic situations—poverty and inequity—that lead to morbidity and mortality”*

While per capita income is rising in many countries that are currently classified as low or middle income, inequality is not necessarily declining within countries, and in some cases is increasing.<sup>19</sup> Respondents expressed concern that vulnerable groups and *“the lowest quintiles are not going away and the situation may become relatively worse for them.”*

Respondents observed that there are few metrics and little data on social and economic inequality and vulnerability. Further they stated that existing measures are too narrowly focused on economic inequity and called for development of more sophisticated measures to explain variation in quality of care and health outcomes and to track progress towards narrowing equity gaps. Better data will allow *“equity enhancing interventions”* as well as *“differential programming—to target programs to the most disadvantaged in different contexts.”* Several respondents spoke out in favor of implementation research on community-level and community-based interventions because they are the most promising for reaching the poorest women. Priorities include further evaluation of providing misoprostol for postpartum hemorrhage and magnesium sulfate for pre-eclampsia/eclampsia at the community level, as well as provision of abortion and cesarean section by non-physician health workers.

It is important to emphasize that many of the research priorities discussed in the previous sections on health service delivery and the health workforce are oriented towards improving the availability, accessibility and quality of maternal health services for women who experience different forms of social and economic vulnerability (location of normal delivery services, transportation, maternity waiting homes, training, technical competencies and scope of practice of different cadres of healthcare providers, disrespect and abuse, etc.).

As well as making almost universal reference to the needs of the poor and closing the equity gap between rural and urban populations, respondents identified the following populations as

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<sup>19</sup>Melamed C, Samman E. Equity, Inequality and Human Development in a Post-2015 Framework. New York, NY: United Nations Development Programme;2013. Kabber N. Can the MDGs provide a pathway to social justice? The challenges of intersecting inequalities. Brighton, UK: Institute of Development Studies; 2010.

requiring specific attention: mobile populations (migrants, nomads, pastoralists); informal sector workers; the urban poor; those affected by religious fundamentalisms or residing in areas with marked gender inequality; individuals who experience infertility; and adolescents.

### ***Adolescents***

With regards to adolescents, several respondents noted that research, policy, and programming for adolescent reproductive health have “*suffered from approaches that have tried and failed*”. However, rather than turning away from this critical population, respondents argued that the relatively weak evidence base on effective interventions to meet the reproductive health needs of this population is a reason for redoubling implementation research efforts. Respondents noted the need to conduct analysis of the legal and policy context and sociocultural issues affecting delivery of sexual and reproductive health education and services for adolescents. There is also a generalized need to develop and test models to effectively provide sexual and reproductive health services to adolescents, including contraceptives for married and unmarried adolescents. In the area of policy change and addressing the social determinants of health, respondents called for research on interventions to bring about an end to child marriage, increase age at first birth, and to increase inter-birth spacing among adolescents. Respondents identified the need to consider the legal and policy context and social determinants of health when designing policy and programs and evaluating models of service delivery. This focus on the importance of understanding and addressing the broader context and structural factors to promote adolescent maternal health agrees with a recent systematic review which found that positive reproductive health outcomes for young people can be achieved through comprehensive approaches that combine direct access to sexual and reproductive health services with programs to address social determinants of health (educational supports and incentives, conditional cash transfers), and include meaningful youth participation and community mobilization.<sup>20</sup> Finally, while new analyses show that maternal mortality among adolescents is similar to that among women aged 20-24<sup>21</sup>, recent research also documents higher rates of some obstetric complications and worse neonatal health outcomes among adolescents as compared to women in their early twenties.<sup>22</sup> There is a continued need to generate knowledge about adolescent maternal health.

### **Urbanization**

Urbanization will exacerbate existing stressors on health systems, potentially undermining the urban health advantage. At the same time, the respondents consulted observed that urbanization will change social norms, life patterns, and expectations of and demands for maternal health services. Respondents noted the need for knowledge generation on health service delivery and

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<sup>20</sup> Kagesten A, Parekh J, Tuncalp O, Turke S, Blum RW. Comprehensive Adolescent Health Programs That Include Sexual and Reproductive Health Services: A Systematic Review. *Am J Public Health*. 2014 Dec;104(12):e23-36.

<sup>21</sup> Blanc AK, Winfrey W, Ross J. New Findings for Maternal Mortality Age Patterns: Aggregated Results for 38 Countries. *PLoS One*. 2013 Apr 16;8(4):e59864; Nove A, Matthews Z, Neal S, Camacho AV. Maternal mortality in adolescents compared with women of other ages: Evidence from 144 countries. *Lancet Glob Health*. 2014 Mar;2(3):e155-64.

<sup>22</sup> Ganchimeg T, Ota E, Morisaki N, et al. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. *BJOG*; 2014; 121 (Suppl 1), 40-48.

utilization in urban spaces, particularly among the urban poor. There is a need for research, design, and evaluation of urban maternal health services that span the continuum from antenatal to postnatal care.

### **Information and communication technologies to enhance maternal health**

The potential for information and communication technologies (ICT) to improve maternal health by enhancing decision-making among women, healthcare providers and policymakers was the most frequently mentioned emerging opportunity.

Respondents called for rigorous evaluation of interventions that use ICT to disseminate information about quality of care and facility preparedness, as well as to increase women's linkage to care. Examples given included applications to rate perceived quality of care at different facilities (through crowdsourcing) and applications that could provide women (as well as providers) with real time information about facility preparedness to respond to obstetric emergencies. Respondents also noted the need to evaluate applications of text messaging for reminders and follow-up. The potential for ICT to facilitate women's access to information and their participation in evaluation of quality of care, and the need to understand how to best "*take advantage of technology in the hands of women*", was identified as a research and evaluation priority.

ICT were also perceived as an essential tool to facilitate training and provision of technical guidance and clinical decision-making tools to healthcare providers working on the frontlines. For example, one respondent said "*we can use it to support individuals who have had abbreviated clinical training with decision making algorithms in smart phones. Then all community-level providers need to know is how to ask good questions, a few key clinical skills for measurement, and to give a tablet and an intramuscular injection.*" The effects of e-learning modules and decision-making algorithms delivered through mobile technologies on providers' knowledge, practice and women's health outcomes need to be evaluated. Finally, ICT were perceived as creating opportunities to improve decision-making by linking information on coverage, cost, and health outcomes to "*empower policymakers and managers to take informed real time decisions*".

In that they focused on evaluating how ICT can enhance health system functioning, delivery and utilization of high-quality evidence-based maternal health interventions, the research questions raised by the respondents were very similar to those identified during the "mhealth for maternal health" technical meeting hosted by the Maternal Health Task Force in collaboration with the World Health Organization and the John Hopkins School of Public Health<sup>23</sup>

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<sup>23</sup> Maternal Health Task Force. mHealth for Maternal Health: Bridging the Gaps. 2014. Available from: <http://www.mhtf.org/document/mhealth-for-maternal-health-meeting-report/>

## **Translating knowledge about the developmental origins of health and disease into practice**

Several respondents identified the need to translate increasing evidence about the developmental origins of health and disease, specifically how women's health prior to conception and the uterine environment influence the long-term health outcomes of their children, into policy, programs and health information systems.<sup>24</sup> Translating this growing evidence base into changes in how maternal health is conceptualized and how services are delivered and monitored was identified by respondents as an emerging opportunity. Respondents stated that our growing knowledge about how preconception health and the intrauterine environment influence long-term outcomes, including through epigenetic mechanisms, requires reconceptualization of maternal health to include the pre-conception period and intergenerational effects. In turn, this reconceptualization necessitates health information systems that can track intergenerational outcomes. One respondent affirmed that "*post-2015 we will be taking a longer view of the life course, rather than ignoring the interplay between the mother and the girl*". Respondents also commented that knowledge about the effects of the intrauterine environment on long-term health outcomes of offspring highlight the importance of improving nutrition for women and girls, addressing non-communicable diseases, and preventing exposure to environmental contaminants in both rural and urban settings.

## **Geopolitical factors influencing maternal health**

Several respondents referred to geopolitical factors that affect maternal health when asked to identify emerging issues and challenges. The most often mentioned were: food insecurity; fragile states, humanitarian crises, and conflict; the rise of religious fundamentalism; and climate change. In some cases, respondents identified concrete implementation research needs. For example, to develop and evaluate approaches to delivering reproductive and maternal health services to women living in refugee camps. In other cases, respondents simply noted that these geopolitical factors will transform the context for maternal health and represent challenges for improving maternal health outcomes.

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<sup>24</sup> See for example Roura LC, Arulkumaran SS. Facing the noncommunicable disease (NCD) global epidemic—the battle of prevention starts in utero—the FIGO challenge. *Best Pract Res Clin Obstet Gynaecol.* 2015 Jan;29(1):5-14.



## RESEARCH APPROACHES

While respondents were not specifically asked about research methods and approaches, several themes related to this issue were prominent in their responses. In general, respondents emphasized the need to increase the amount and quality of implementation research and evaluation. This was summed up by the respondent who said: *“There has been more focus on the drugs and the magic bullets, there has been a lot of focus on the interventions and inventions—the need [now] is to focus less on the inventions and more on implementation research.”* Several respondents noted the importance of persuading donors of the value of rigorous evaluation: *“When donors think about adding value they do not think about evaluation. We as researchers need to change that conversation. [...] If their project is well-evaluated—to learn from failure or success or how to adjust—it can have huge knock-on effects and amplify their investment.”*

Respondents called for a paradigm shift from causal linearity to systems thinking and for more attention to local context. One respondent noted a mismatch between donors demand for scalability and the value researchers place on generalizability with local specificity, calling for *“a paradigm change to local level improvement. If that is the goal then it doesn’t matter that the same thing doesn’t work everywhere.”* Attention to context and the importance of generating and making information available at the district and facility level for quality improvement were strong themes across the interviews.

Respondents also noted the need to think strategically about the relationships between research and policy advocacy. Respondents identified policymakers’ lack of knowledge about public health and maternal health as a critical barrier to the development of evidence-informed policy and allocation of funds for maternal health. Providing basic public health education to policymakers, increasing the research capacity of national Ministries of Health, and engaging policymakers in the development and implementation of maternal health research were noted as potential solutions. Further, in order to move towards implementation of what works, particularly for controversial topics, we need *“research as advocacy, research for political argumentation.”* This includes national demonstration projects for evidence-based interventions (e.g., medical abortion), and estimates of costs and lives saved.

Finally, the need to overcome disciplinary siloes within maternal health and conduct interdisciplinary research was frequently mentioned. Respondents identified that going beyond narrowly defined areas of specialization would advance maternal health: *“I am a pre-eclampsia-ologist, there are postpartum hemorrhage-ologists—everyone is an ologist, we need maternal health-ologists to pull it all together.”* Respondents also made emphatic and repeated calls for interdisciplinary research. Most commonly, respondents mentioned the need for qualitative research, including ethnography, and working with social scientists specialized in studying behavior change and community and institutional cultures (for example social and behavioral psychologists, and medical anthropologists and sociologists). The value of other interdisciplinary

collaborations, such as working with hospital architects to improve infrastructure and facility readiness, was also mentioned.

## CONCLUSIONS

The high priority global maternal health researchers consulted by the Maternal Health Task Force placed on implementation research to improve the delivery of existing evidence-based maternal health interventions echoes the results of a recently published international survey on priorities for maternal and perinatal health research.<sup>25</sup> The key issue identified by the respondents consulted by the Maternal Health Task Force was the need for research to support health system strengthening and improve quality of care. The vision of maternal health shared by respondents, and the corresponding priorities to improve outcomes for women, was comprehensive. While emphasizing the role of high-quality labor and delivery services for preventing maternal morbidity and mortality, respondents also prioritized improving the provision of other evidence-based interventions that benefit maternal health, such as contraception and safe abortion services, and addressing social determinants such as gender discrimination and social and economic inequality. Respondents emphasized evaluating effectiveness, feasibility, and equity impacts of health system interventions to increase the quality and utilization of maternity services.

To make progress, respondents noted the need to incorporate systems thinking, overcome narrow specializations in maternal health, and conduct interdisciplinary research. They also called for thinking strategically about evidence for policy advocacy. Finally, respondents observed that persuading donors and researchers of the value of rigorous evaluation and implementation science is crucial to support progress.

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<sup>25</sup> Souza JP, Widmer M, Gulmezoglu M, Lawrie TA, Adejuyigbe EA, Carroli G. Maternal and perinatal health research priorities beyond 2014: an international survey and prioritization exercise. *Reprod Health*. 2014 Aug 7;11:61.

TABLE 1: Content analysis of priorities for knowledge generation to improve maternal health in low- and middle-income countries

<p align="center"><b>PRIORITIES FOR KNOWLEDGE GENERATION TO IMPROVE MATERNAL HEALTH IN LOW AND MIDDLE INCOME COUNTRIES</b> N=26 respondents</p>	<p align="center">IDENTIFIED AS A PRIORITY BY # of RESPONDENTS</p>
<b>PERSISTENT AND CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS</b>	
Implementation research to strengthen health systems to deliver evidence-based interventions at scale and with quality	19
Improving quality of maternal healthcare	16
Improving the quality and availability of information about maternal mortality	7
Supporting women’s empowerment	7
Increasing the availability and uptake of contraception	6
Increasing access to safe abortion services	6
New treatments for major causes of maternal death	6
<b>CRUCIAL MATERNAL HEALTH ISSUES THAT HAVE NOT RECEIVED ADEQUATE ATTENTION FROM DONORS AND RESEARCHERS</b>	
Health workforce (allocation and retention, task-shifting, training, and leadership and supervision, role of private and unrecognized providers)	15
Preventing and eliminating disrespect and abuse	9
Over-medicalization of birth	8
Demand generation	7
Measurement, prevention and treatment of maternal morbidities	7
<b>NEW SITUATIONS AND EMERGING CHALLENGES THAT AFFECT MATERNAL HEALTH</b>	
Increasing burden of non-communicable disease	13
Persistence of social and economic inequality	10
Urbanization	9
Translating knowledge about the developmental origins of health and disease into practice	7
Information and communication technologies to enhance maternal health	7

TABLE 2: Specific topics for knowledge generation mentioned by respondents

<b>PRIORITIES FOR KNOWLEDGE GENERATION TO IMPROVE MATERNAL HEALTH IN LOW AND MIDDLE INCOME COUNTRIES: SPECIFIC TOPICS</b>
<b>PERSISTENT AND CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS</b>
<p><b>Implementation research to strengthen health systems to deliver evidence-based interventions at scale and with quality</b></p> <ul style="list-style-type: none"> <li>• How do you translate the known evidence base for prevention and treatment of maternal mortality into large scale actions of high quality and sustain implementation in different contexts?</li> <li>• Model of care: what interventions should be delivered by different human resources and where?</li> <li>• What is the portfolio of key interventions (technical interventions and health system reforms) to improve maternal health in different settings?</li> <li>• Implementation research on interventions to overcome geographic barriers to women accessing CEmOC (transportation, maternity waiting homes)</li> </ul>
<p><b>Improving quality of maternal healthcare</b></p> <ul style="list-style-type: none"> <li>• Landscape analysis of interventions that have been shown to work to improve quality of care (safe childbirth checklist, triage interventions).</li> <li>• Documentation of service operation and coverage.</li> <li>• Documentation of risks associated with partial delivery of BEmOC and CEmOC.</li> <li>• Validating indicators for better estimates of coverage of interventions (uterotonics, breastfeeding, postpartum checkup).</li> <li>• Refinement of measures of facility readiness.</li> <li>• Development of a simple “checklist” or “dashboard” to evaluate quality of care for frequent monitoring at the facility level.</li> <li>• What outcomes do these minimum standards produce? What are the right indicators at different levels of the health system to measure to ensure quality?</li> <li>• Development of health information systems that link measurements of quality to outcomes, including in the community during the postpartum period.</li> </ul>
<p><b>Improvement of the availability and quality of information about maternal mortality</b></p> <ul style="list-style-type: none"> <li>• What are the barriers to improved vital registration? What types of implementation research and policy advocacy improve vital registration?</li> <li>• Can blind needle autopsies provide gold standard autopsy data on cause of maternal death that occurs in the community?</li> <li>• How accurate are verbal autopsies for maternal death compared to autopsy?</li> <li>• How does the language and structure of verbal autopsy questionnaires affect recall?</li> <li>• How will strengthening death audits at the country and facility level impact on maternal health outcomes?</li> <li>• Measurement of indirect causes of maternal death. Challenging because of the need for medical diagnosis.</li> <li>• What are the relationships between direct and indirect causes of maternal death? For</li> </ul>

example, between postpartum hemorrhage and HIV.

**PERSISTENT AND CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS  
(continued)**

**Supporting women's empowerment**

*Evaluation of interventions to improve the status of women, autonomy, decision-making, and control over resources*

- Economic empowerment: cash transfer, vouchers, access to mobile banking.
- Women's groups and peer approaches.
- Transforming gender norms regarding women's movement and increasing physical safety of users and providers of health services.

*Social accountability and participation*

- Can women rate the quality of care that they receive during childbirth? What is the effect of them doing so?
- Do social accountability mechanisms reduce disrespect and abuse?
- How can professional associations and legal structures be strengthened to ensure that people can access the care that should be provided? How can women be linked to these mechanisms to support their demands for care?

**Increasing availability and uptake of contraception**

- How do we increase access to and use of contraceptives, particularly long acting reversible contraceptives (LARC)?
- What are women's knowledge/beliefs and preferences regarding LARC?
- What are providers' knowledge of, beliefs about and skills to provide the intrauterine device and hormonal implants?
- What are effective models for increasing use of contraceptives while ensuring respect for women's rights and choice?
- How can postpartum contraceptive uptake be increased?
- How can uptake of contraceptives for birth spacing be increased?
- Can LARC substitute for surgical sterilization in the 69 poorest countries that don't have the human resources and infrastructure to provide tubal ligation?

**Increasing access to safe abortion services**

- What are the policy and service delivery barriers to implementing the best practices to increase access to safe abortion?
- How can task-shifting to allow providers other than physicians to provide abortions be implemented in different settings?
- What are barriers to medical abortion?
- Why does abortion remain stigmatized even where it is legal or not as restricted? How does stigma affect access? What are the dynamics around late access, especially for younger women?
- How do we overcome inequities in access to safe abortion and poor health outcomes related to unsafe abortion?

**PERSISTENT AND CRITICAL MATERNAL HEALTH KNOWLEDGE GAPS  
(continued)**

**New treatments for major causes of maternal death**

- What are effective alternative methods of treating obstetric hemorrhage? Need for clinical research on tamponade, sutures, tranexamic acid, and heat stable oxytocin.
- Why are women in low resources settings more susceptible to hypertension during pregnancy?
- What are the causes of hypertension during pregnancy and how can we treatment them?
- Basic research on the biology of pre-eclampsia and eclampsia.
- What are alternative methods to prevent and treat pre-eclampsia and eclampsia?
- What is the cause of cardiomyopathy during pregnancy and how to we treat peripartum cardiomyopathy?

**TABLE 2: PRIORITIES FOR KNOWLEDGE GENERATION TO IMPROVE  
MATERNAL HEALTH  
IN LOW AND MIDDLE INCOME COUNTRIES: SPECIFIC TOPICS  
CRUCIAL MATERNAL HEALTH ISSUES THAT HAVE NOT RECEIVED  
ADEQUATE ATTENTION  
FROM DONORS AND RESEARCHERS**

**Health Workforce**

- What financial and non-financial incentives are effective for improving healthcare worker distribution, retention, and performance?
- Programs that train local people to provide maternity services should be rigorously evaluated.
- Need to address gender discrimination to improve conditions for female healthcare workers (gender norms that limit women's movement, workplace discrimination, etc.).

*Task-shifting*

- How can political and regulatory barriers to task shifting be overcome?
- Evaluation of provision of cesarean section and abortion services by non-physician health workers.

*Training*

- Evaluation of alternative modes of acquiring hands-on skills (simulation, extending training beyond teaching hospitals).
- Follow-up to evaluate use of skills learned in training in institutions.
- Implementation research on interventions to improve and maintain skills (skills and drills, midwife exchange).
- Development of tools to more effectively target in-service training.
- Knowledge generation to permit standardized measurement and clinical protocols for maternity care.
- Evaluation of training that uses Information and Communication Technologies (ICT).
- Implementation research on how to transform hierarchical relationships and training practices and promote evidence-based practice

*Supervision and leadership*

- Does training in management for physicians improve maternal health outcomes?
- Evaluate effect of alternative cadres of medical officers trained in administration and management
- Evaluation of ICT to support with administration and provide tools for managerial decision-making

*Role of private/unregulated providers in health service delivery*

- What kind of services do they provide? What are the outcomes?
- What are effective models for training, accreditation and regulation of these providers?
- How can the government effectively communicate the quality of care offered by private providers to women?

<b>CRUCIAL MATERNAL HEALTH ISSUES THAT HAVE NOT RECEIVED ADEQUATE ATTENTION FROM DONORS AND RESEARCHERS (continued)</b>
<p><b>Over-medicalization of birth, particularly unnecessary cesarean delivery</b></p> <ul style="list-style-type: none"> <li>• What health systems adjustments can reduce unnecessary caesarean deliveries?</li> <li>• How does introduction of ultrasound and electronic fetal monitoring in under-resourced health systems affect quality of care?</li> </ul>
<p><b>Prevention and elimination of disrespect and abuse</b></p> <ul style="list-style-type: none"> <li>• What are the causes of disrespect and abuse? Need for both qualitative and quantitative research on provider behavior in rural and urban contexts.</li> <li>• What are the relationships between working conditions and disrespect and abuse?</li> <li>• How does pre-service and in-service training that emphasizes professional and medical ethics in training (professionalism, peer review) impact on disrespect and abuse?</li> <li>• What are the barriers to implementation of continuous birth support? How can they be overcome? How does continuous birth support affect disrespect and abuse?</li> <li>• Evaluate interventions designed to reduce disrespect and abuse (e.g. open birth days, training for healthcare providers).</li> <li>• Do social accountability processes impact disrespect and abuse?</li> </ul>
<p><b>Demand generation</b></p> <ul style="list-style-type: none"> <li>• What are the sociocultural barriers to women seeking facility-based birth in different African contexts?</li> <li>• How can we optimize the functioning of interventions to overcome financial barriers to utilization of maternal health services (cash transfers, vouchers, insurance for poor)?</li> <li>• What are the effects of incentivizing antenatal care or postpartum care for women or providers?</li> <li>• Addressing the effects of elimination of user fees on facility level health financing.</li> </ul>
<p><b>Measurement, prevention and treatment of maternal morbidities</b></p> <ul style="list-style-type: none"> <li>• Validation of maternal “near miss” and implementation research to promote mainstreaming.</li> <li>• Need to develop and standardize definitions of maternal morbidities and develop measurement tools.</li> <li>• Need for research on prevention of morbidities (e.g. pelvic floor exercise in ANC package for morbidity prevention).</li> <li>• Implementation research on how to scale up interventions to address anemia and fistula.</li> <li>• Costing of the health system and broader social and economic burdens of maternal morbidity.</li> <li>• Cost-effectiveness of prevention and palliation of morbidities.</li> </ul>



**TABLE 2: PRIORITIES FOR KNOWLEDGE GENERATION TO IMPROVE  
MATERNAL HEALTH  
IN LOW AND MIDDLE INCOME COUNTRIES: SPECIFIC TOPICS  
NEW SITUATIONS AND EMERGING CHALLENGES THAT AFFECT MATERNAL  
HEALTH**

**Increasing burden of non-communicable disease**

- Prevalence of obesity, diabetes, and hypertension among pregnant women in LMIC.
- Development and evaluation of appropriate guidelines for prevention, screening, and management of women with chronic conditions during childbirth to improve outcomes.
- Implementation research to evaluate models of service delivery for NCD as part of maternal healthcare.
- Evaluation of models to strengthen referral systems to take advantage of women’s contact with health services during pregnancy.

**Persistence of social and economic inequality**

- Generation of more knowledge about social and economic inequality and women’s vulnerability.
- Development and implementation of metrics that go beyond the measurement of economic inequity.
- Evaluation of equity enhancing interventions and differential programming.

*Populations:* rural and urban poor; mobile populations (migrants, nomads, pastoralists); informal sector workers; those affected by religious fundamentalisms or residing in areas with marked gender inequality; individuals who experience infertility; and adolescents.

**Translating knowledge about the developmental origins of health and disease into practice**

- Health information systems that capture intergenerational effects.
- Reconceptualization of maternal health—preconception and before.
- Prioritize improving women and girls nutrition and reducing exposure to environmental pollutants.

**Information and communication technologies to enhance service delivery and utilization**

- Evaluate how ICT can increase access to information for women, providers, and healthcare decision-makers (managers).
- Evaluate how ICT can empower participation and improve decision-making and service delivery and access for women, providers, and healthcare decision-makers.

## ANNEX 1: Participant List

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