

Appendix 1 (as supplied by the authors): Description of study areas including implementation activities, sampling strategy and justification

Gombe State, north-eastern Nigeria

Implementation activities

After consultation with the Bill & Melinda Gates foundation (the foundation) and partners in Gombe State it was decided that the evaluation should be carried out at state level. The scope of implementation there, together with important contextual differences between states meant that no appropriate comparison area could be identified, thus a before-after survey design was proposed while also collecting information about the intensity of implementation. The Society for Family Health received a grant in 2009 for a learning project in Gombe State which aimed to test different innovations designed to enhance interactions. In 2012 a new grant was awarded for three years that aimed to refine and scale-up these innovations across the state. Society for Family Health innovations included (i) a programme of home visits to pregnant women by trained community health volunteers (traditional birth attendants and volunteers from the Federation of Muslim Women's Associations in Nigeria (FOMWAN)) to counsel families on care seeking across the continuum of care from pregnancy to the early newborn period, and on healthy home behaviours. Within this innovation, financial incentives were provided to volunteers for their contacts with families, and mothers-in-law and men were also targeted for advocacy purposes; (ii) a Call Centre to provide families with advice about maternal and newborn health care in the state; (iii) an Emergency Transport Scheme to provide free transport to health facilities in the event of a medical emergency; (iv) limited upgrading of primary health care facilities. Towards the end of this period PACT also received a grant from the foundation to strengthen the management and coordination of frontline worker organisations in Gombe, but that grant did not operate at the community level and so is not included here.

Further detail about this work can be found on the Society for Family Health website <http://www.sfhigeria.org/the-maternal-and-neonatal-health-project-2012-2016/> and the IDEAS website <https://ideas.lshtm.ac.uk/>

Sampling strategy and justification

In 2012, 40 clusters were sampled, increased to 80 clusters in 2015, selected from the 11 local government areas of the State. Clusters were defined as segmented enumeration areas (defined by the National Population Commission). Cluster sampling was performed by listing all enumeration areas, cumulating their population size, and systematically selecting areas with probability proportional to size. All households in selected enumeration areas were listed, and enumeration areas segmented into groups of 75 or fewer households: field teams randomly selected one segment from each enumeration area as the cluster to be surveyed. All households within the selected cluster were visited.

In 2012 the minimum target number of households per cluster was set at 50 so that a minimum total number of 2,000 households would be visited. In this high fertility setting (the 2008 Demographic and Health Survey estimated the total fertility rate in north-eastern states to be 7.2)¹, this number of households would result in interviews with a minimum of 200 women with a live birth in the

¹ <http://www.dhsprogram.com/pubs/pdf/FR222/FR222.pdf>

previous 12 months (i.e. one in every 10 households surveyed). This size of sample was sufficient to measure as statistically significant, and with 90% power, changes of 20 percentage points in a range of interaction and intervention coverage indicators across the continuum of care. Because of adjustments to the funding strategy in 2015, and to prepare for future evaluation work in the state, the number of sampled clusters was doubled in 2015, and cluster size increased to a uniform 75 households per cluster.

Ethiopia

Implementation activities

After consultation with the foundation and partners in Ethiopia the study setting for this work was defined by a sub-set of the implementation area of the Last 10 Kilometers project (L10K), run by John Snow Incorporated. L10K works closely with the Government of Ethiopia to implement innovations that are sustainable at scale by engaging local communities in activities designed to improve maternal, newborn and child health. Core to this strategy is improving linkages between Ethiopian families, communities and the Government of Ethiopia's Women's Development Army (formally known as the Health Development Army) and Health Extension Workers.

L10K began its first phase of activity in October 2007 in 115 woredas (districts) over four regions: Amhara, Oromia, SNNP and Tigray. During the first phase of L10K activity, 59 woredas were exposed only to the foundational "Anchor" innovation. "Anchors" are teams of community members who support the Women's Development Army at community meetings and offer them continued assistance and encouragement. The remaining 56 woredas with L10K activity were exposed to other combinations of innovation that were tested by L10K for impacts in maternal and newborn health.

During the L10K supplemental phase of activity, from 2012 to 2015, L10K innovations tested in other woredas and found to be effective were rolled out in the 59 woredas previously exposed only to the "Anchor" innovation. These included: (a) "community-based data for decision making" helping Health Extension Workers to work with the Health (*Women's*) Development Army to map households and monitor access to maternal and newborn health services and prioritise efforts e.g. for hard-to-reach families; (b) "non-financial incentives for the Women's Development Army" (e.g. badges, certificates) as recognition of good service to motivate members to increase the number, completeness and timeliness of interactions with families of pregnant women and new mothers and with other community members; (c) "Health (*Women's*) Development Army training" by supporting Health Extension Workers to train volunteers in kebeles, guided by a handbook and using communication materials; and (d) "participatory community quality improvement" which works through primary health care units to encourage partnership between communities and service providers and to share responsibility for the quality of maternal and newborn health care.

Further detail about the work of L10K during this period can be found on the project website <http://l10k.jsi.com/>

Sampling strategy and justification

Ethiopia is organised by region, zone, *woreda* (district), *kebele* (similar to a ward; lowest level of census population data) and *gote* (proxy for village). Forty clusters were systematically sampled from 76 implementation *woreda* across four regions of Ethiopia (Amhara, Oromia, SNNP and Tigray, a cluster being defined as a segmented *gote*. Sampling was performed by listing all *woreda* geographically from north to south, listing *kebeles* and their population size alphabetically within

each *woreda*, and 40 *kebele* sampled with probability proportional to population size. *Gotes* within each *kebele* were listed and one *gote* per *kebele* selected using simple random sampling. At each selected *gote*, all households were listed and *gotes* segmented into groups of 75 or fewer households: field teams randomly selected one segment from each *gote* as the cluster to be surveyed. All households within each selected cluster were visited.

In 2012 the minimum target number of households per cluster was set at 50 so that a minimum total number of 2,000 households would be visited. In Ethiopia, where the total fertility rate was estimated to be 4.3,² this number of households would result in interviews with a minimum of 200 women with a live birth in the previous 12 months (i.e. one in every 10 households surveyed). This size of sample was sufficient to measure as statistically significant, and with 90% power, changes of 20 percentage points in a range of interaction and intervention coverage indicators across the continuum of care. In 2015 the survey teams increased cluster size to a uniform 75 households per cluster.

State of Uttar Pradesh, India

Implementation activities

After consultation with the foundation and partners in Uttar Pradesh, it was decided that the evaluation should focus on six districts where the Community Mobilisation Project (CMP)³ was active throughout the study period: Jhansi, Hardoi, CSM Nagar, Maharanjganj, Sultanpur, Raebarailly. The Community Mobilisation Project was an initiative embedded within the Rajiv Gandhi Mahila Vikas Pariyojana (RGMVP) platform,⁴ a rights-based organisation that works for poverty reduction, women's empowerment and rural development in Uttar Pradesh. It organises poor rural women into community institutions in the form of self-help groups - consisting of 10-20 women each - that act as social platforms to address issues of financial inclusion, healthcare, livelihoods, education and the environment. These self-help groups act as a platform for community mobilisation to expedite changes in family health care seeking behaviours and social norms, as well as establish strong links with the health care system at a local level to improve access to health care services.

The Community Mobilisation Project trained community health activists, or Swasthya Sakhis, to conduct regular meetings in villages, spread awareness and facilitate both community participation in regular antenatal check-ups, as well as access to healthcare services and entitlements.

Other projects present in the six districts during this period were:

- Manthan (Intrahealth International Inc.) who were active in two of the six districts between 2010-2014.
- Better Birth (Harvard School of Public Health, USA, in collaboration with World Health Organization, Population Services International, India and Community Empowerment Lab@ Shivgarh) who were active in high-volume health facilities in two of the six districts since 2014.

² Demographic and Health Survey Ethiopia 2011

³ The Community Mobilisation Project was implemented by a consortium led by the Public Health Foundation of India, and includes RGMVP, Community Empowerment Lab at Shivgarh, the Population Council and Boston University's Centre for Global Health and Development

⁴ <http://www.rgmvp.org/>

In 2015, a new project, the Technical Support Unit (JSI Research & Training Institute, Inc. partnering with the University of Manitoba) had also become active in one of the six districts at the time of the 2015 survey, but was not expected to have a detectable effect on outcomes given the short interval between its launch and the survey.

Further detail about the work of these projects can be found on the IDEAS website <https://ideas.lshtm.ac.uk/>

Sampling strategy and justification

Uttar Pradesh is organised by district, block, and village. Population data is available at the village level from the 2001 Census. Both surveys included 80 clusters, a cluster being defined as a segmented village. Sampling was performed by listing all villages from 51 blocks spread across the six districts in Uttar Pradesh (Hardoi, Jhansi, Sultanpur, Maharajganj, CSM Nagar (Amethi), Raebareli), cumulating their population size and systematically selecting 80 villages with probability proportional to size. All households in sampled villages were listed, and villages segmented into groups of 75 or fewer households: field teams randomly selected one segment from the selected village as the cluster to be surveyed. All households within the selected cluster were visited.

The minimum target number of households per cluster was set at 75, meaning a minimum total number of 3,000 households for each survey. In this fertility setting (the National Family Health Survey in 2005-6 estimated the total fertility rate to be 3.8) this number of households would result in a minimum of 200 women with a live birth in the previous 12 months (i.e. one in every fifteen households surveyed). The size of this sample was sufficient to measure as statistically significant, and with 90% power, changes of 20 percentage points in a range of interaction and intervention coverage indicators across the continuum of care.

Summary of key survey features⁵

1. What was the research question posed?

Amongst women aged 15-49 who had a live birth within the 12 month period prior to survey, in an area of large-scale complex intervention, did coverage of eight essential maternal and newborn health indicators improve between 2012-2015 and if so, was there evidence of a change in relation to inequity?

2. Was the target population defined, and was the sample representative of the population?

Population of interest: women living in the implementation area

Sampling frame: Areas of implementation (entire State for Gombe State, 59 districts across 4 regions of Ethiopia, 6 districts of Uttar Pradesh)

3. Was a systematic approach used to develop the questionnaire?

Modular questionnaires were used that were based on Demographic and Health Surveys. We adopted pre-tested questions from the Demographic and Health Survey to enhance harmonisation and, for new questions in maternal and newborn health, pre-tested afresh where no standard maternal and newborn health indicator existed for a recommended intervention. All pre-testing was conducted in local languages and back translations done independently.

4. Was the questionnaire tested?

Entire survey methodologies were pilot tested in each setting, each survey year with the survey teams being deployed to complete a cluster exercise outside the clusters sampled for survey. Pilot data was discarded once training was completed. Questionnaires were implemented using personal digital assistants and pilot testing included programme checks, downloading data, secure storage and transfer, supervisor checking mechanisms and quality control checks.

5. Were questionnaires administered in a manner that limited both response and nonresponse bias?

In each country and each survey year, survey teams were trained in-house for five days followed by a two day full pilot and one final day in-house to resolve any issues emerging during the pilot. At all times team members carried survey manuals that detailed best practise on interviewing techniques, adapting the content of Demographic and Health Survey manuals.

The method of questionnaire administration was appropriate for a population based household survey in areas with mixed literacy/education levels.

No incentive to participate was provided. Survey mappers had visited all households during the week prior to survey to sensitise village leaders and ask for permission for survey teams to proceed. In the event of any difficulty during sensitisation visits the senior survey supervisor was called (this occurred once in Gombe State, Nigeria in 2012 but was resolved after consultation with local leaders). During individual household visits, each person approached for interview was individually consented and provided with an extensive information sheet. Direct refusal to participate was rare, in part because of the cultural context where village leaders agree for their community to

⁵ Checklist adapted from Burns and Kho (2015) How to assess a survey report: a guide for readers and peer reviewers [CMAJ](#). 2015 Apr 7; 187(6): E198–E205

participate. Indirect refusal may have occurred through non-availability for interview after three call-back visits, although this cannot be quantified and overall response rates were high.

6. Was the response rate reported, and were strategies used to optimize the response rate?

Response rates in Gombe State were 74% and 91% in 2012 and 2015 respectively; response rates were close to 90% both survey years in Ethiopia and in Uttar Pradesh.

Sample size was justified as sufficient to estimate change in a range of coverage indicators between two survey periods. Sample size estimates were inflated by 20% to account for non-response (not available or refusals)