IDEAS
Evidence to improve
maternal & newborn health

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Maternal and newborn health care

Baseline findings from Gombe State, Nigeria, **April 2013**

Interactions between families and frontline workers (their frequency, quality, and equity), and coverage of interventions for mothers and newborns

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Images right
Top: A lady carrying water back to her family home, Nigeria. © iStockphoto
Middle: A hospital bed, Nigeria. © Dr Bilal Avan
Bottom: Frontline workers being trained in Ante-natal care, Gombe State, Nigeria. © Society for Family Health
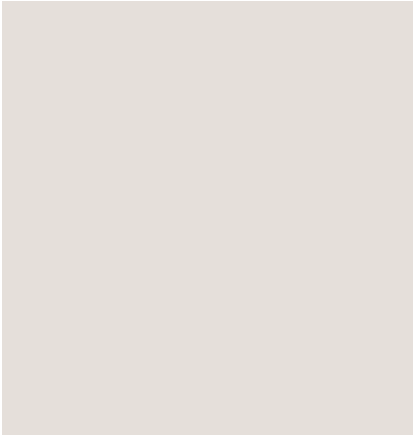
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Executive summary

The IDEAS baseline study of interactions between families and frontline workers and coverage of critical interventions for mothers and newborns was conducted in June 2012 in Gombe State, North-Eastern Nigeria.

Photo above: A pregnant woman sitting with her family, Nigeria. © iStockphoto

Its aim was to gather information about the frequency, quality, and equity of interactions that women have with frontline workers during pregnancy, delivery and in the first 28 days after birth, and to measure the coverage of life saving interventions that frontline workers are able to deliver to mothers and newborns. In the context of Gombe State, frontline workers include community volunteers, traditional birth attendants, and health staff at primary level health facilities.

In addition to a descriptive analysis of interactions and intervention coverage, our purpose was to investigate whether more frequent or better quality interactions between families and frontline workers were associated with higher levels of intervention coverage. At least two years after baseline, an endline survey will also be carried out to investigate the extent to which projects working in Gombe State that aim to enhance family and frontline worker interactions (by making them more frequent, better quality and more equitable) result in measurable increases in intervention coverage.

This investigation was carried out in the context of the Bill & Melinda Gates Foundation funding strategy to support projects that aim to enhance innovations between families and frontline workers. In Gombe State, the primary point of access to health services for women and children is through traditional birth attendants working in the community and through primary level health facilities. The Society for Family Health in Nigeria received a demonstration grant in 2009 which aimed to test different innovations for enhancing interactions in Gombe State. In 2012, a new grant was awarded to scale-up a set of refined innovations across the State. These innovations were to enhance frontline worker services by expanding the network of community based volunteers who visit mothers and newborns, implementing a call centre

for maternal and newborn health that provides advice on care seeking, and implementing an emergency transport scheme for women who need to reach a health facility during childbirth.

Data was collected from 10 of the 11 local government areas in Gombe State (excluding Gombe Town) through a population-level household survey that asked women about live births in the 12 months preceding survey. This was linked to interviews with the frontline workers and the primary health facilities providing maternal and newborn health services to those households. Across 40 clusters, a total of 1844 households, 25 primary and 4 referral health facilities, and 61 frontline workers were surveyed. This report presents key findings on interactions and coverage of critical interventions along the continuum of care from pregnancy to newborn.

Pregnancy care
Almost all pregnancy care was delivered at primary level health facilities rather than in the community. In their last pregnancy, two-thirds of women had at least one pregnancy care visit, and 40% had the recommended four visits, despite only a quarter of frontline workers correctly reporting that the recommended number of pregnancy care visits was four. Pregnancy care services were only available in a quarter of health facilities on the day of survey. Further, many facilities lacked some of the basic items needed to deliver good quality pregnancy care (for example urine test kits and a timing device) – to the extent that just eight percent of primary health facilities were both providing services on the day of survey and had all the basic equipment they needed to provide focussed pregnancy care. At the population level, just 12% of women received all eight components of focussed pregnancy care by the end of their pregnancy.

Making preparations for a safe delivery while pregnant also had potential for improvement. Just half of the frontline workers interviewed cited birth planning as a core component of pregnancy care, and only half of women reported preparing anything for their delivery.

Forty four percent of women received the critical intervention tetanus toxoid protection (at least two doses in the last three years, or five doses in a life time), 53% received iron supplementation, and 41% received at least two doses of intermittent presumptive treatment for malaria: the items required to deliver these interventions were in stock in approximately three-quarters of facilities. Just six percent of women received a syphilis test result during pregnancy and only eight percent of health facilities had tests kits in stock on the day of survey.

The poorest women experienced far less pregnancy care than other women, with women in the least poor households having double the coverage of at least four pregnancy care interactions and double the coverage of life saving interventions than women in the poorest households.

Finally, there was evidence that more pregnancy care interactions had a positive relationship with more components of good quality care being delivered, and had a positive relationship with higher coverage of critical interventions in the pregnancy period.

Intra-partum care
Thirty percent of births were reported to take place in a health facility and 22% of births were attended by a skilled birth attendant (doctors and registered or auxiliary nurse/midwives). On the day of survey, almost one quarter of primary level health facilities that provided intra-partum care had these services available plus had all the commodities required to monitor and manage labour using a partograph. Uterotonics were available in 64% of facilities, eye ointment for the newborn available in 40%, and partographs available in just 36% of facilities. Frontline workers attending births in communities had far fewer commodities available to them, not surprisingly impacting on their ability to provide life-saving care during labour. For example, the critical intervention to administer prophylactic uterotonics during the intra-partum period was estimated to occur in 67% of births attended by a frontline worker in a facility, and in 23% of births attended by a traditional birth attendant. After adjustment for the volume of births attended by different frontline worker cadres, and for the 43% of women who did not deliver with a frontline worker (they delivered alone or with family and friends), we estimated the population level coverage of women receiving prophylactic uterotonics during delivery to be 30%.

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Two-thirds of women accessed pregnancy care at least once but fewer than half had the recommended four visits, and the quality of care received was low when measured at the population level."

> "
> Women from the least poor households had almost four times higher coverage of skilled attendance at birth than women from the poorest households."

Women had little knowledge of the range of danger signs that might occur in the intra-partum period, but excessive bleeding was mentioned by 40% of women as a danger sign that might require extra care. Knowledge amongst health facilities workers about what to do in the event of excessive bleeding in the intra-partum period was reasonably high, with staff citing four recommended actions on average – considerably higher than knowledge amongst traditional birth attendants who cited one recommended action on average, most commonly to refer the woman to a health facility. When asked about care-seeking for danger signs in delivery, just 25% of the women who had been advised to seek extra care during delivery actually went for that extra care.

As for pregnancy care, there were considerable inequities in coverage of interactions and critical interventions. Women from the least poor households had almost four times higher coverage of skilled attendance at birth than women from the poorest households – inevitably having a similar impact on inequitable coverage of all the critical interventions.

Finally, skilled birth attendance, but not more pregnancy care interactions, had a positive association with better quality of intra-partum care, and better quality intra-partum care had a positive association with higher coverage of life saving interventions during the intra-partum period.

Post-partum care

Very little post-partum care was taking place at the time of the Gombe baseline survey. Just 10% of women reported that anyone checked on their health in the first week after birth and no women received all five components of good quality post-partum care (breasts and bleeding checked, counselling of danger signs, use of family planning, and nutrition). Further, there was evidence of a very large gap in coverage of post-partum care between the poorest – only three percent of whom had a post-partum check, and the least poor – 21% of whom had a post-partum check.

However, amongst women who did receive post-partum care, there was a relationship between the number of interactions they had and the quality of the post-partum care received.

Post-natal care

Frontline worker interactions with newborns that could lead to a life saving intervention take place both at the time of delivery (e.g. clean cord cutting and tying, immediate breastfeeding, drying and wrapping of the newborn), and in the first days of life (e.g. exclusive breastfeeding for the first three days, clean cord care, and skin-to-skin care). Some of these behaviours appeared to be very high. Ninety five percent of newborns were dried and 87% were wrapped within 30 minutes of birth. Seventy-seven percent had their cord cut with a sterilised or new blade, and 61% had their cord tied with new or boiled string or a cord clamp. However, only 40% of newborns were breastfed within one hour of birth. Interestingly, the only immediate intervention with statistical evidence of any inequity by household socio-economic status, or distance between households and the nearest frontline worker, or by place was birth, was clean cord tying which was higher amongst newborns born in a facility than at home (75% vs. 55%).

Post-natal checks – where life saving newborn behaviours can be reinforced – were largely absent at baseline (as for post-partum care): 10% of babies born in a health facility had at least one post-natal check in the first week of life compared to four percent of those born at home, almost all checks being on newborns in the least poor households. Seventy four percent of newborns had nothing put on their cord in the first week of life, again with no evidence of a difference by place of birth. Just 28% of newborns had clean cord cutting, and clean cord tie, and nothing put on the cord in the first week of life. As for immediate breastfeeding, exclusive breastfeeding had the lowest coverage of newborn interventions. Only 43% of newborns were breastfed exclusively for the first three days of life, and this was higher for newborns born in a health facility than those born at home (55% vs. 38%).

Limitations

A number of limitations are present. First, survey data collection approaches to measure behaviours that occur during pregnancy, intra-partum and newborn periods may be susceptible both to recall error and to recall bias, although efforts were made to limit these in the survey methods applied. Second, estimating population level coverage of some intra-partum interventions is problematic and our estimates of prophylactic use of uterotonics, and of active management of the third stage of labour are derived from triangulated data sources. Finally, this survey was powered to calculate a range of outcomes measured from the household survey and had a relatively small sample of facilities and frontline worker interviews: 15 household clusters had no dedicated primary level health facility and seven household clusters had no dedicated facility or frontline worker.

Overall, the survey results present a picture of maternal and newborn health care in Gombe State that is comparable to other high mortality settings in sub-Saharan Africa.

Two-thirds of women access pregnancy care at least once but fewer than half have the recommended four visits, and the quality of care received was low when measured at the population level – due to frontline workers not providing appropriate counselling as well as to facilities not being fully equipped. Only around half of women were benefitting from any of the life saving interventions available to them in pregnancy.

A much smaller number of women accessed facility based intra-partum care, fewer still had skilled attendance at birth. There were large differences in the quality of health care that a frontline worker was able to deliver depending on her place of work, and on her knowledge of appropriate care. The coverage of life saving intra-partum interventions that should reach all women when giving birth was low, particularly for those giving birth at home: if an increase in skilled attendance at birth could be realised however, there was indication that coverage of these interventions could increase dramatically. Post partum and post natal care were almost completely absent in the State, being provided mainly to the least poor families. But even when post-partum or post-natal care interactions took place, they did not appear to be having a measurable effect on life saving behaviours in the first days after birth. It will be important to consider the changes that newly trained frontline workers might be able to make happen over the next phase of work in Gombe, and before the endline survey takes place. ■

Photo above: Woman and child washing clothes outside their house. © ThinkStock
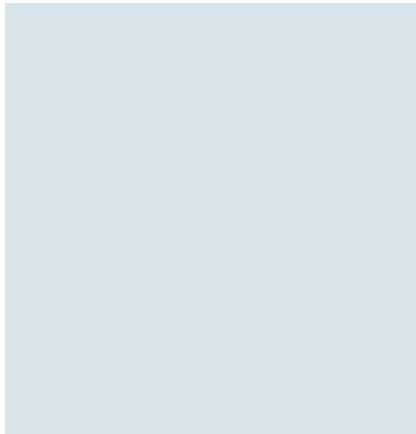
Introduction and background

Photo above: Traditional Birth Attendant using a flip chart to give health messages to a mother, Gombe State, Nigeria. © Society for Family Health

[1] Maternal Mortality: 1990 to 2010. WHO, UNICEF, UNFPA and The World Bank estimates. Available at http://whqlibdoc. who.int/ publications/2012/9789241503631_ eng.pdf (last accessed 15/3/13)

[2] Inter-agency Group for Child Mortality Estimation: 2012. WHO, UNICEF, UNFPA, and the World Bank. Available at http://www.who.int/healthinfo/ statistics/mortality_child/en/ (last accessed 15/3/13)

Maternal and newborn health profile in Nigeria

Maternal and newborn mortality in Nigeria is amongst the highest in the world. In 2010 there were an estimated 40,000 maternal deaths, with one woman in 29 dying of complications arising due to child birth. The maternal mortality ratio (number of maternal deaths during a given time period per 100,000 live births during the same time period) was 630 maternal deaths for every 100,000 live births (95% CI 370-1,200)[1]. Neonatal mortality in the county is also high with an estimated 254,000 neonatal deaths in 2010, translating to 39 deaths in the first 28 days of live per 1,000 live births.[2]

The context of this investigation

The work fits into a broad portfolio of investigation by the IDEAS project (Informed Decisions for Actions in maternal and newborn health) based at the London School of Hygiene and Tropical Medicine and funded by the Bill & Melinda Gates Foundation. The foundation has developed a Theory of Change that shapes its investments to improve the survival outcomes of

mothers and newborns (figure 1). This Theory of Change supposes that in order to reduce mortality, the coverage of interventions that are known to save lives (critical interventions, see Annex 1) must be increased, and in order to increase coverage of interventions the interactions between families and the frontline workers who can deliver interventions must be enhanced (in that they occur more often, are better quality, are equitably distributed, and are cost-effective to implement, see Annex 2 for a list of indicators for enhanced interactions). To realise these changes the foundation supports innovations that aim to enhance interactions between families and frontline workers in three high mortality geographies: North-Eastern Nigeria, Ethiopia, and Uttar Pradesh, India.

In areas where projects funded by the foundation are working to enhance interactions between families and frontline workers, the IDEAS project is investigating whether and how these projects are able to enhance interactions, and whether the coverage of critical interventions increases as a result. In doing so, IDEAS carried out a baseline survey in households, health facilities, and frontline workers across these three geographies in 2012, and

will repeat this survey after at least two years of implementation by foundation funded projects. These quantitative data will be supplemented by qualitative data collected around the time of the endline survey.

This report describes results from Gombe State, Nigeria.

Enhancing interactions in Gombe State, North-Eastern Nigeria

Interactions between families and frontline workers in North-Eastern Nigeria occur primarily at primary care facilities and in communities. In 2009 the Society for Family Health received a grant from the foundation to set up a demonstration project which aimed to test different innovations for enhancing interactions in Gombe State. In 2012, a new grant was awarded that aimed to scale-up a set of refined innovations across the State.

Primary care facilities include health centres, clinics, dispensaries and health posts, and typically provide preventive and basic pre-referral care. They are financed and managed by the Local Government Authority (LGA) under supervisory oversight of the State government, and employ the following frontline workers: nurses, midwives, community health officers, community health extension workers, and environmental health officers. Pregnant women, women in labour, and new mothers and their newborns all receive clinic based care through these frontline workers. In Gombe State, the Society for Family Health has a grant from the foundation to enhance these interactions through community mobilization activities, through support of call centres for MNH services, and through coordination of an emergency transport scheme.

In communities there are multiple informal women's groups, but at baseline only Traditional Birth Attendants (TBA), and volunteers from the Federation of Muslim Women Association of Nigeria (FOMWAN) provided frontline worker health services to women and newborns. The Society for Family Health will also introduce frontline worker services through volunteers from the Lutheran Church of Christ in Nigeria (LCCN), and the Pastoral Resolve (PARE). These four groups will all have targeted training to extend their capacity to provide services to mothers and newborns.

Further detail about the work of the Society for Family Health in Gombe can be found at the IDEAS website: http://ideas.lshtm.ac.uk

Organisation of survey findings

The report presents data collected in 2012. The results are organised in chapters for each stage along the continuum of care: pregnancy, intra-partum, post-partum, and post-natal periods. Within each chapter, the number, quality, and equity of interactions between families and frontline workers are presented, and the coverage of critical interventions that save lives at each stage. A summary paragraph is included for each stage to link data from households, primary care facilities, and frontline workers where possible.

This forms the basis for meeting one of the IDEAS' goals which is to investigate whether foundation funded projects that aim to enhance interactions do lead to more frequent, better quality, and more equitable interactions between families and frontline workers, and whether the coverage of critical interventions for mothers and newborns increase as a result. ■

Figure 1 – Bill & Melinda Gates Foundation Theory of Change to improve maternal and newborn survival

Initiatives
1. Discover, develop and introduce new or adapted technologies, tools and treatments
2. Shape demand and improve health practices
3. Enhance frontline worker capabilities and performance
4. Advocate for conductive policy and programme environment

Innovations
Maternal & newborn healthcare delivered in a new way

Enhanced interactions
between families & frontline workers

Scale up
adoption of innovations beyond grantees' areas

Increased coverage
of critical interventions (practices that save lives)

Health outcome
Improved maternal & newborn survival

Methodology

Photo above: A group of Nigerian children playing in their village. © ThinkStock

Timeline

The surveys were implemented in June 2012. Household interviews with all women aged 13-49 refer to their contact with frontline workers during the six months prior to survey (Dec 2011 – May 2012). Household interviews with women aged 13-49 who had a live birth refer to births that occurred in the 12 months preceding survey (June 2011 – May 2012). Facility assessments refer to availability of equipment and

supplies on the day of survey (June 2012), and data extracted from facility registers for the six month period prior to survey (Dec 2011 – May 2012). Frontline worker interviews refer to their career as a frontline worker, and to the last birth that they attended.

Survey modules

The survey design uses population level probability sampling to select household clusters, and then also surveys the primary level health facilities and frontline workers assigned to provide maternal and newborn care services to those household clusters.

The household survey comprised of three modules. (1) A household module asked all household heads about characteristics of the household, ownership of commodities, and registered all normally resident people in the household. (2) A women's module asked all women aged 13-49 years and normally resident in the household about the health care available to them, their recent contact with frontline workers, and their birth history in the two years preceding the survey. (3) A mother's module asked all women who reported a birth in the last two years (identified in women's module) a detailed set of questions about their contact with health services across the continuum of care from pregnancy to post-natal care.

The facility survey comprised of four sections. (1) An inventory of equipment and supplies that were available and functioning on the day of survey. (2) An inventory of staff employed at the facility, their cadre, training and whether they were present on the day of survey. (3) An interview with the in-charge of the facility about the services available

> **"** Linked household, primary health facility and frontline worker surveys were carried out in June 2012."

at that facility, and about recent supervision visits they had received. (4) Data extraction from facility registers recorded the number and outcomes of all births at the facility during the previous six months.

The frontline worker survey comprised of four sections. (1) The services provided by the frontline worker and the amount of time they typically spend on each service. (2) The training and supervision the frontline worker had received to provide those services. (3) The workload of the frontline worker during the month preceding survey, and their recall of activities that took place during the last delivery they attended. (4) An interview comprising unprompted questions about knowledge of appropriate care for mothers and newborns.

The content of each survey module or section was informed by existing large scale survey tools such as the Demographic and Health Surveys, the Service Provision Assessment, Averting Maternal Death and Disability, and Safe Motherhood. All questionnaires were extensively pre-tested prior to survey implementation.

Sample size and selection

A map of Gombe State relative to the rest of Nigeria is shown in figure 2, and a map of the sampled households, facilities and frontline workers in figure 3. A total of 40 clusters from 10 of the

Photo below: Survey team member with children in one of the surveyed villages, Gombe State, Nigeria. © Health Hub

Photos right:
Right: Mother and child, Nigeria.
© Fotolia
Far right: Nigerian children playing.
© Bill & Melinda Gates Foundation

11 LGAs in Gombe State (excluding Gombe Town) were selected for survey using probability proportional to size of the cluster. A cluster was defined as an enumeration area and all households in each selected enumeration area were surveyed (or in a segment of 75 households from the selected enumeration area if the enumeration area had more than 75 households). In addition, the health facility assigned to provide primary level care to those households was visited, and any frontline workers providing maternal and newborn health services to the households were identified and interviewed. Finally, the nearest referral facility was also visited for record review and data extraction on births and birth outcomes.

The minimum target number of households per cluster was set at 50, meaning a minimum total number of 2000 households. In this high fertility setting (the 2008 Demographic and Health Survey estimated the total fertility rate to be 7.2), this number of households would result in a minimum number of 200 women with a live birth in the previous 12 months (i.e. one in every ten households surveyed). This size of sample was sufficient to measure as statistically significant, and with 90% power, changes of 20 or fewer percentage points in a range of interaction and intervention coverage indicators across the continuum of care.

Survey implementation

The survey was implemented by Health Hub (www.africahealthhub.com). Questionnaires were written to handheld digital devices (Samsung

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At the time of survey there was considerable insecurity in the area and a curfew was in place across Gombe State. The security of the survey team was a priority when planning survey logistics."

model GT-S6102) using Open Datakit (ODK) software. Interviewers from Gombe State were recruited, predominantly from a pool of interviewers previously employed by the Nigerian census bureau. Survey teams comprised of one supervisor, four household interviewers, one facility and frontline worker interviewer who was medically trained, and one mapper who listed households and segmented enumeration areas as necessary. Each team aimed to complete one cluster every two days. At the time of survey there was considerable insecurity in the area and a curfew was in place across Gombe State. The security of the survey team was a priority, and every effort was made to ensure that all team members had returned to their overnight base before night fall: the implication for survey quality being (1) additional efforts were needed to gain permission from village leaders to proceed with the work each day, in addition to individual informed voluntary consent, and (2) additional survey days were used to make call-backs to women who had

not returned home before the interviewers had to leave the cluster.

The survey teams were trained in-house for five days to familiarise themselves with the questionnaires and procedures, followed by a full pilot (including a review of data downloads) in two clusters (not included in the final 40 cluster survey).

In addition to pre-testing the questionnaires, training interviewers, and pilot testing all protocols, during field work supervisors carried out at least three re-interviews a day and observed each interviewer in his team each day of data collection. These re-interviews and observations were used as a means of providing feedback to interviewers, ensuring consistency between interviewers, and continuously improving the standard of work.

Data management and analysis

Every day, data were synchronised from the interviewer devices to the supervisor's laptop: these daily downloads were then burned to a labelled and securely stored compact disk. In addition, when the supervisor

had internet connectivity, data were uploaded from the laptop to a secure, dedicated server.

Data modules were linked using a set of automatically generated unique identifiers and data tables for analysis constructed. Data were analysed using STATA 12. Clustering was adjusted for using svy commands when tabulating single percentages or calculating means. For evidence of association between more or better interactions and coverage of interventions, random effects at the cluster level were adjusted for using xtmelogit for binary response models of association between variables, and xtmixed for linear mixed models of association between variables.

Research ethics

This work obtained ethical approval in Nigeria at the Federal level (National Health Research Ethics Committee, Federal Ministry of Health, Abuja) and at the State level from State Ministry of Health in both Gombe and in Abuja. Ethical approval was also obtained from LSHTM (reference 6088). ■

Photo left: Some villages were hard to reach and vehicles got stuck in sand, Gombe State, Nigeria. © Health Hub

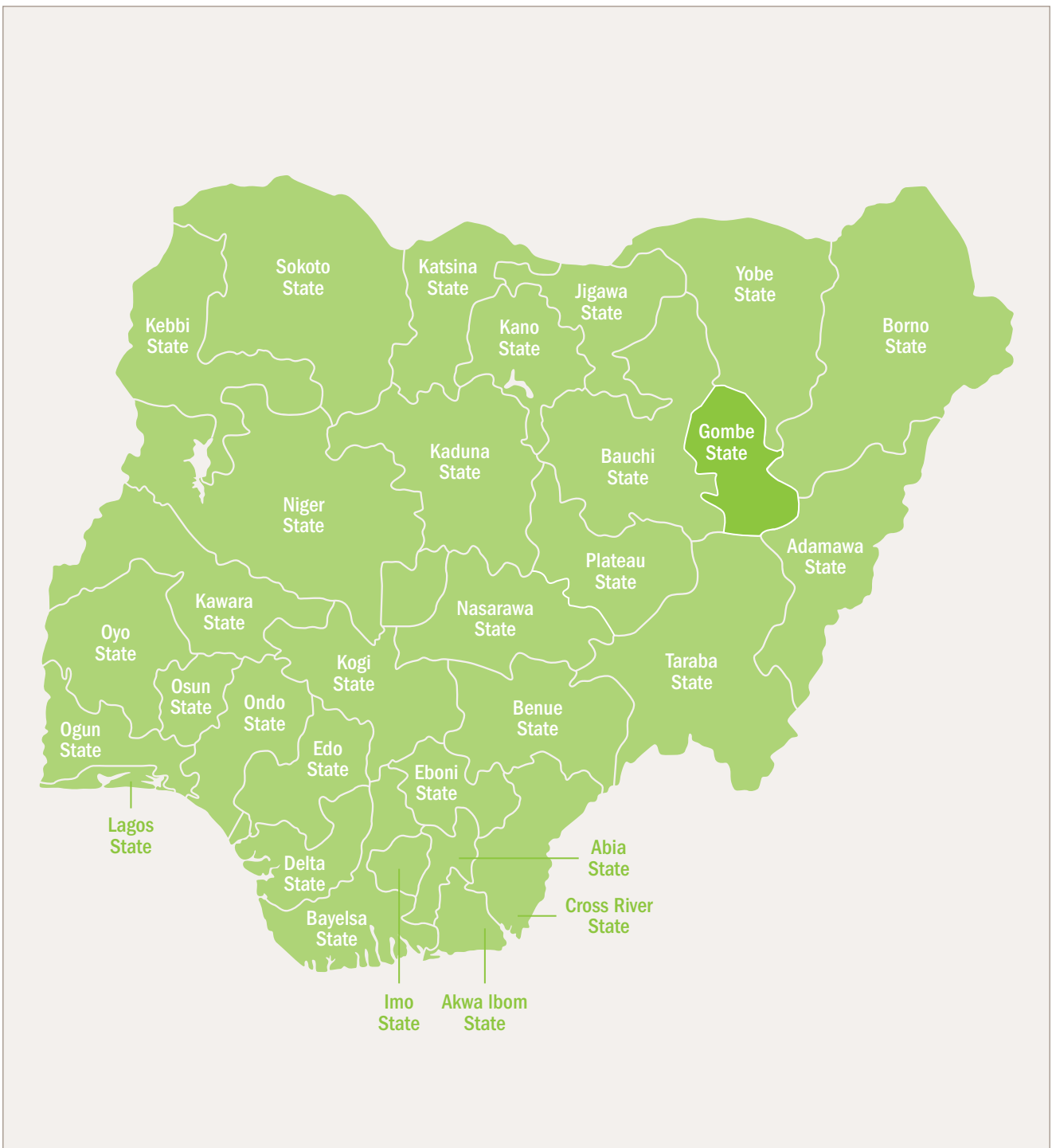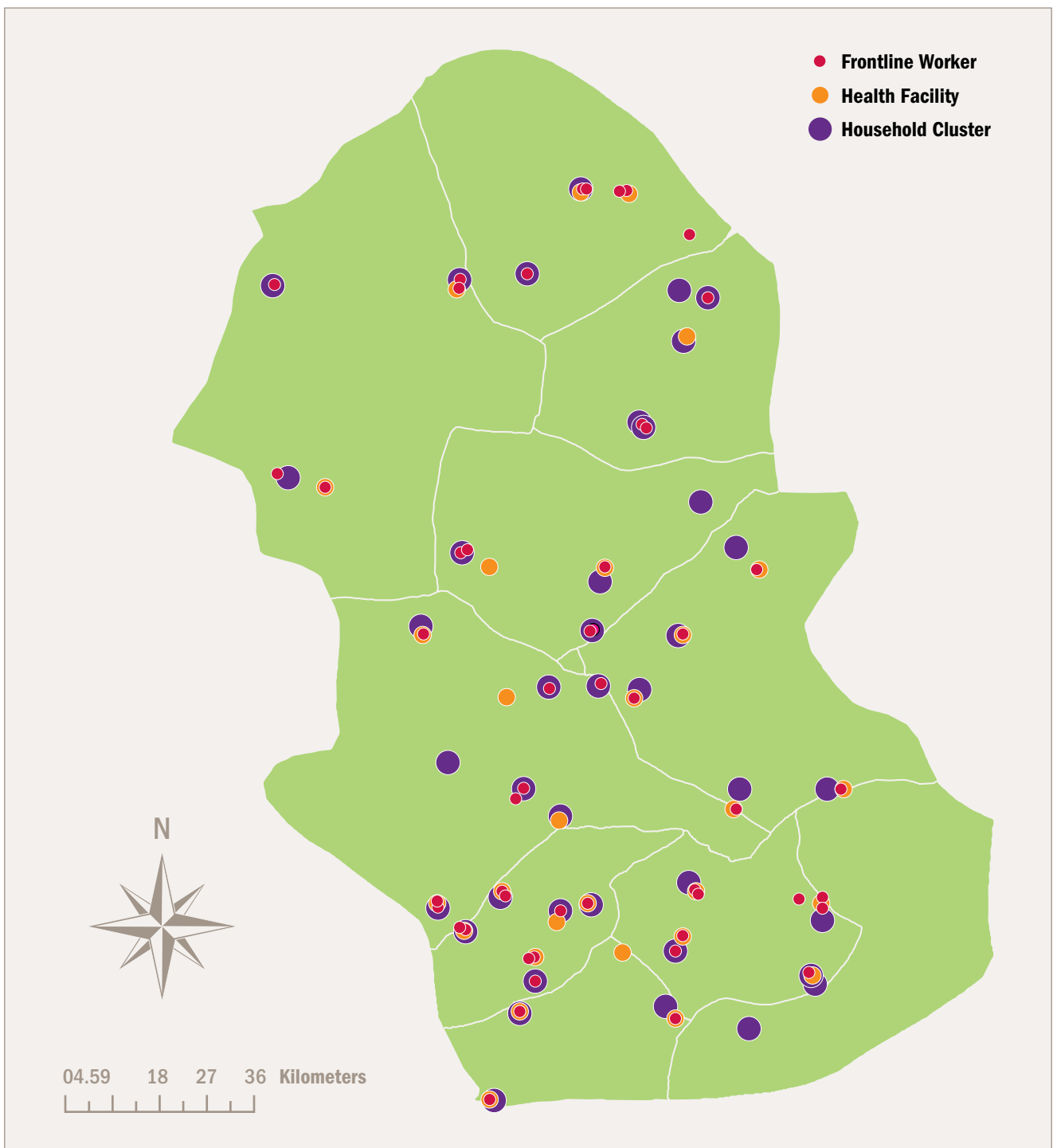Figure 2 – Map of Nigeria showing location of Gombe State

Figure 3 – Map of Gombe State showing household cluster locations (purple dots), and the location of the surveyed primary health facilities assigned to household clusters (orange dots), and the location of interviewed frontline workers providing services to household clusters (red dots)

Characteristics

Characteristics of the primary level health facilities surveyed

Sample selection and maternal and newborn health services provided

Some household clusters shared a primary level health facility so the total number surveyed (n=25) is fewer than the total number of clusters (n=40). Many primary level health facilities shared a referral (secondary level) facility and just four secondary level facilities were visited. All surveyed facilities were government led, with the exception of two primary level facilities that were led by non-government organisations. The number of facilities and number of deliveries they conduct is shown in table 1.

Most primary level health facilities surveyed provided the full range of basic maternal and newborn health care services, and 22 of the 25 facilities were reported to be open seven days per week. However many services were not available on the day of survey (figure 4).

Table 1 – Facilities surveyed and number of deliveries recorded in the six months preceding survey

| Facility type	N	Total number of deliveries in last six months	Mean number of deliveries per facility, per month	Percent of deliveries by caesarean section	Percent of deliveries ending in a live birth
Primary level	25	1517	10	0.1	96.2
Secondary level	4	2273	95	4.0	84.8
All facilities	29	3790	22	2.5	89.4

Photos right:
Right: Woman with child. © iStockphoto
Far right: Woman demonstrating breastfeeding a newborn during a frontline worker training session with Society for Family Health, Gombe state, Nigeria. © Society for Family Health

Figure 4 – Services provided at primary level health facilities, and services available on the day of survey
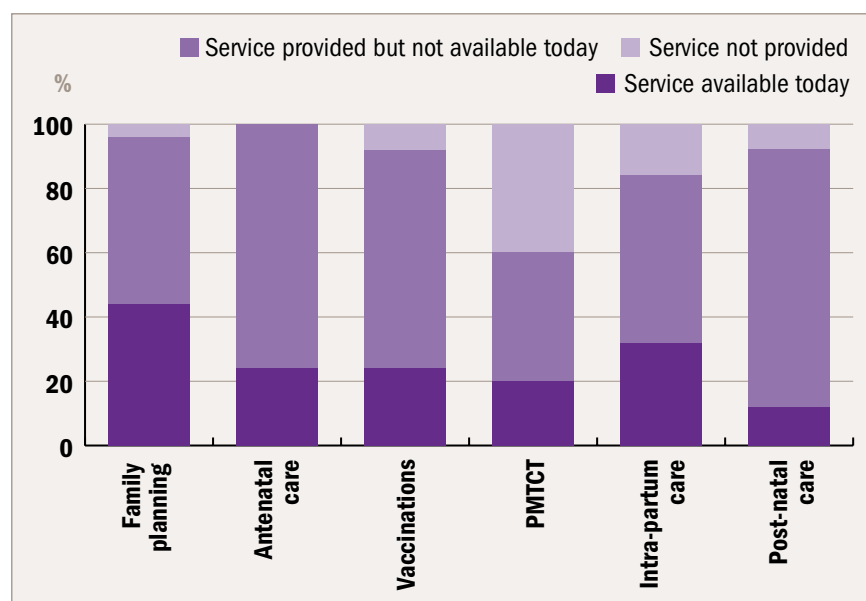
Infrastructure and availability of basic equipment and supplies in primary health facilities

There were many gaps in the basic infrastructure of primary level health facilities (table 2). Around half of health facilities were connected to electricity (13/25) but just one facility had electricity on the day of survey, and just three facilities had a functioning light source. Four facilities had motorised transport for referral, all present on the day of survey. Each facility in-charge was asked which transport was used the last time obstetric referral out of the facility was needed. Four reported using the facility vehicle, four used the patients' own transport, 17 reported that the woman used public transport. Only half of facilities had any means of telephone communication, and three quarters of these were mobile phones owned by facility staff.

Equipment and supplies to provide basic maternal and newborn health

care were checked for availability and functionality in the primary health facilities surveyed and are shown in table 3. The list of items recorded was synthesised from existing large-scale facility-based data collection tools including the Averting Maternal Disability and Death needs assessment[1], the Measure DHS Service Provision Assessment[2], and the WHO Safe Motherhood Needs Assessment[3].

[1] AMDD. *EmONC Needs Assessment.* Available from: http://www.amddprogram. org/d/content/needs-assessments

[2] Measure-DHS. *SPA overview.* http://www. measuredhs.com/aboutsurveys/spa/start. cfm

[3] WHO. *Safe Motherhood. Needs Assessment,* 2001; Available from: http://www.who.int/reproductivehealth/ publications/maternal_perinatal_health/ rht_msm_96_18/en/index.htm

Table 2 – Infrastructure of primary care facilities, Gombe State

Item	Primary level facilities with item (N=25) % (95% CI)
Running water	76% (55-90)
Toilet for facility users	68% (46-85)
Electricity supply[4]	52% (31-72)
Functional steriliser or stove	52% (31-72)
Functional fridge	48% (28-68)
Room providing physical privacy	48% (28-68)
Any means of telephone communication	48% (28-67)
Motorised transport for referral	16% (5-36)
24 hr light source	12% (3-31)

[4] Only four percent of facilities had a working electricity connection on the day of survey

Table 3 – Essential equipment and supplies to provide basic maternal and newborn health care at primary level health facilities

Item	Primary level facilities with item (N=25) % (95% CI)
General items for basic MNH	
Fetal stethoscope	100% (-)
Single use syringes/needles	96% (80-100)
Stethoscope	92% (74-99)
Thermometer	88% (69-97)
Sterile scissors or blade	88% (69-97)
Sharps container	84% (64-95)
Disinfectant	84% (64-95)
Soap	84% (64-95)
Blood pressure cuff	84% (64-95)
Disposable gloves	76% (55-91)
Disposable clamp/umbilical tie	76% (55-91)
Suture material with needle	72% (51-88)
Infant weighing scale	68% (46-85)
IV fluids with infusion set	68% (46-85)
Needle holder	64% (43-82)
Waste receptacle with lid	60% (39-79)
Watch/timing device	48% (28-69)
Disposable paper towels	44% (24-65)
Speculum	36% (18-57)
Manual vacuum aspirator	32% (15-54)
Blanket for newborn	28% (12-49)
Vacuum extractor	16% (5-36)
Bag and mask for resuscitation	16% (5-36)
Suction bulb for mucus extraction	16% (5-36)
Baby warmer	8% (1-26)
Phototherapy	4% (1-20)
Oxygen	4% (1-20)

Item	Primary level facilities with item (N=25) % (95% CI)
Diagnostics for MNH	
HIV rapid test kits	72% (51-88)
Pregnancy test kit	64% (43-82)
Haemoglobin test	60% (39-79)
Urine dipstick	60% (39-79)
Partographs	36% (18-57)
Malaria rapid test kits	16% (5-36)
Syphilis test kit	8% (1-26)
Medications for MNH	
Sulphadoxine pyrimethamine	84% (64-95)
Ferrous sulphate and folic acid	76% (55-91)
Oral antibiotics	72% (51-88)
Cotrimoxizole	68% (46-85)
Oxytocin or ergometrin	64% (43-82)
Local anaesthetics	60% (39-79)
IV metronidazole	60% (39-79)
Vitamin K	44% (24-65)
Diazepam	44% (24-65)
Tetracycline/eye ointment	40% (21-61)
IV gentamycin	36% (18-57)
Corticosteroids	12% (3-31)
IV ampicillin	12% (3-31)
Vaccinations for MNH:	
Tetanus toxoid vaccines	72% (51-88)
Oral Polio Vaccine (OPV)	68% (46-85)
Bacille Calmette Guerin (BCG)	56% (35-76)

Photo right: Demonstrating the importance of birth attendant hand washing before assisting in childbirth during a frontline worker training session, Society for Family Health, Gombe state, Nigeria. © Society for Family Health

Staff employed and at work in primary health facilities

Staff employed across all primary level health facilities, broken down by cadre, is shown in figure 5. The largest group employed were staff with no medical training (34%), followed by clinicians (27%), and community health officers (26%). At least one clinician was employed in 60% of facilities, and at least one registered nurse or midwife was employed in 52% of facilities: 72% of facilities employed at least one clinician or registered nurse/midwife. Just 40% of employed staff were at work on the day of survey, with the biggest absenteeism observed amongst clinicians (30% of those employed were at work), followed by registered nurses/midwives (45% at work), and the lowest absenteeism observed amongst community health extension workers (58% at work) and community health officers (67% of those employed were at work).

Supervision at health facilities

All facilities had received a supervision visit in the six months preceding survey, the median time between survey date and last supervision visit being 15 days (inter-quartile range 8-22 days). Approximately half of supervision visits were made by the Local Government Area health team, one quarter by State Ministry of Health staff, and one quarter by Federal Ministry of Health staff. ■

Figure 5 – Staff employed at primary health facilities, by cadre
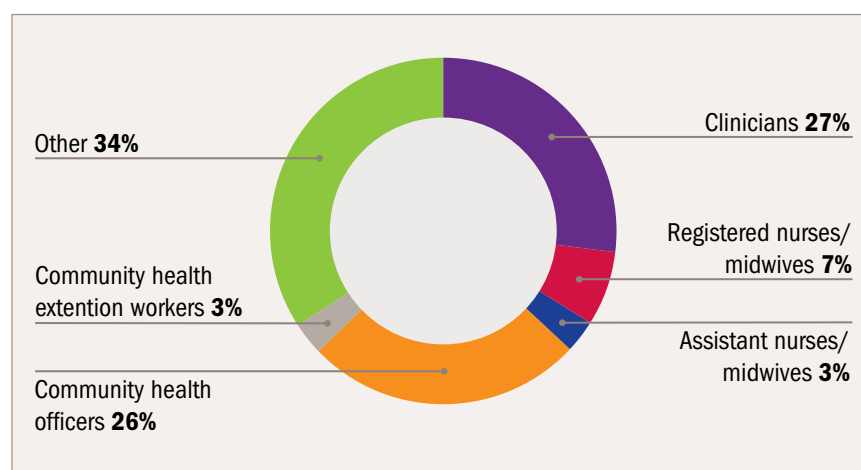
"
72% of facilities employed at least one clinician or registered nurse/midwife. But just 40% of employed staff were at work on the day of survey."

Characteristics

Characteristics of frontline workers interviewed

Photos above:
Above right: Health worker in a primary health facility, Gombe State, Nigeria. © Dr Bilal Avan
Above far right: Frontline workers being trained in Ante-natal care, Gombe State, Nigeria. © Society for Family Health

Sample selection

A total of 61 frontline workers providing maternal and newborn care were interviewed across the 40 household clusters: 20 from primary level health facilities, 35 TBA, and six FOMWAN working at community level (table 4). All FOMWAN reported having been trained by the Society for Family Health (as expected, since FOMWAN did not previously provide any maternal and newborn health services).

Services provided by frontline workers

Frontline workers were asked to estimate the number of hours they

spend in a typical week on service provision for mothers and newborns. While the responses given do not triangulate well with a review of the work books (table 4), it was interesting to see how they perceived their time to be allocated. The relative distribution of time estimated by different cadre of frontline worker (but not the absolute number of hours) is shown in figures 6-8 below. FOMWAN volunteers perceived they spent most time on providing post-natal care, particularly identifying and providing support for low birth weight babies. TBAs perceived they spent most time attending deliveries and providing post-natal care, particularly providing support to establish breastfeeding. Staff in health facilities who provide maternal and newborn care perceived

Table 4 – Frontline workers interviewed who provide maternal and newborn health services to the selected household clusters and their volume of work in the last month, by cadre

Frontline worker type	N	Total N trained by SFH	Years worked (median)	Number of women seen for pregnancy care in last month (median)	Number of deliveries attended in last month (median)*	Number of post partum visits in last month (median)	Number of post natal visits in last month (median)
Facility staff	20	5	8.5	42	14	0	4
TBA	35	14	10	0	3	0	0
FOMWAN	6	6	2.5	0	0	0	0

* three of six FOMWAN, all TBA, and 16 of 20 facility staff had ever attended a delivery

they spent most time attending deliveries, but estimated an equal distribution between time spent providing pregnancy care, post-natal care, and sexual health services. Note that the term 'pregnancy care' is used throughout this report to describe antenatal care delivered in health facilities as well as care of pregnant women delivered in communities.
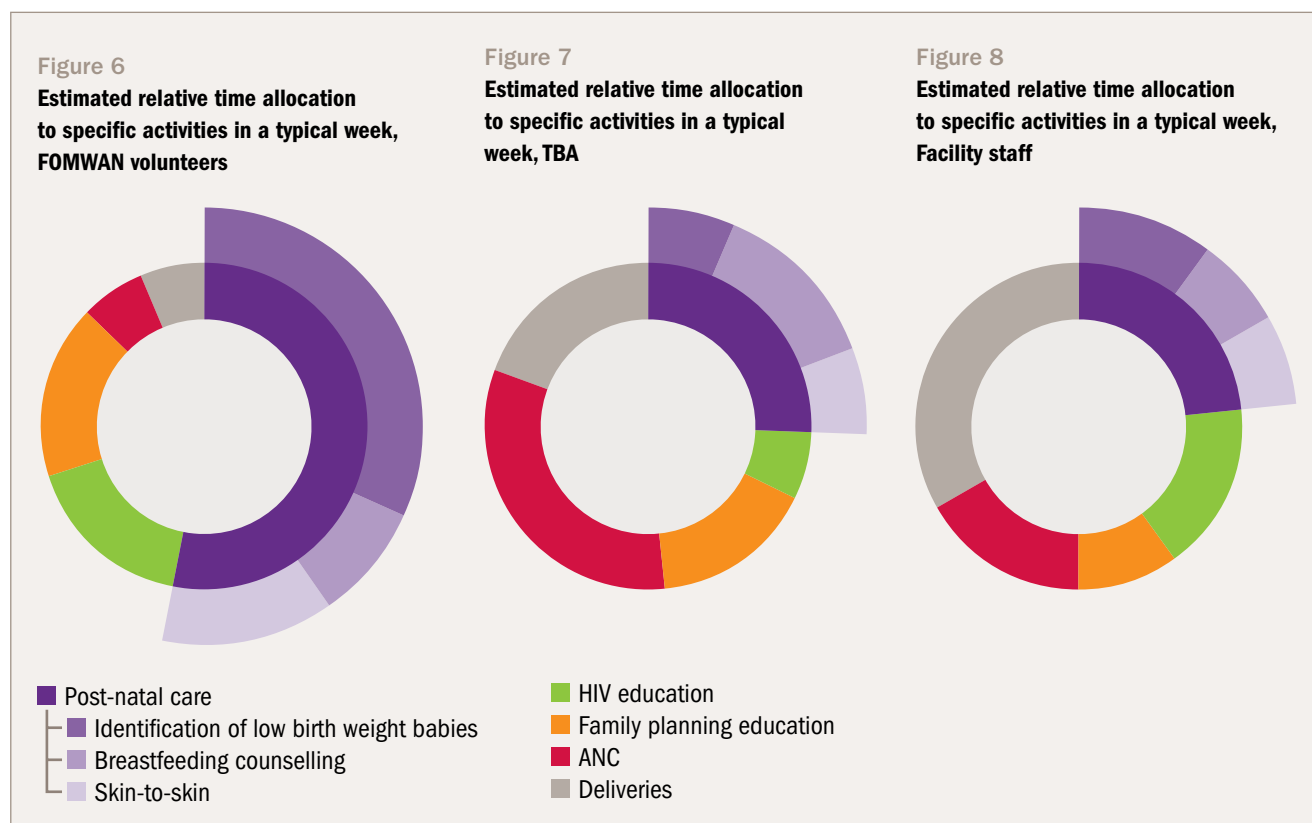
Training and supervision of frontline workers

One quarter of frontline workers interviewed (26%, 95% CI 14-38) had received training in maternal and newborn health topics in the 12 months preceding survey, 75% of which was conducted by Society for Family Health, the remainder conducted by Gombe State health teams.

Half of frontline workers (52%, 95% CI 40-65) had their work supervised in the 12 months preceding survey, 40% of supervision visits conducted by Society for Family Health, the remainder conducted by Gombe State health teams. Supervision activities reported by the 32 frontline workers who had a supervision visit were: (1) checking or delivering supplies (72% of supervised frontline workers), (2) accompanied household visits and/or client interaction observation (41%), (3) receiving feedback on observed work (38%), (4) record keeping (94% of supervised frontline workers). ■

Figure 6-8 – Estimated relative time allocation to specific activities in a typical week, FOMWAN volunteers, TBA and Facility staff

Figure 6
Estimated relative time allocation to specific activities in a typical week, FOMWAN volunteers

Figure 7
Estimated relative time allocation to specific activities in a typical week, TBA

Figure 8
Estimated relative time allocation to specific activities in a typical week, Facility staff

- Post-natal care
  - Identification of low birth weight babies
  - Breastfeeding counselling
  - Skin-to-skin
- HIV education
- Family planning education
- ANC
- Deliveries

Characteristics

Characteristics of households and women interviewed

Photo above right: The Head of a community with the survey team, Gombe State, Nigeria. © Health Hub

Sample selection

A total of 1868 household heads from the 40 clusters were invited to participate in the survey, 1844 of whom agreed. The average household size was 5.5 people. The total number of women aged 13-49 years living in surveyed households was 2718, 74% (2021) of whom were interviewed in detail about their recent fertility history. Amongst these 2021 women, 349 had a live birth in the 12 months preceding survey and completed a detailed module about that birth. Of these, two percent were aged 13-49years, 13% aged 15-19years, 44% 20-29 years, 23% 30-39 years, and five percent were aged 40-49 years.

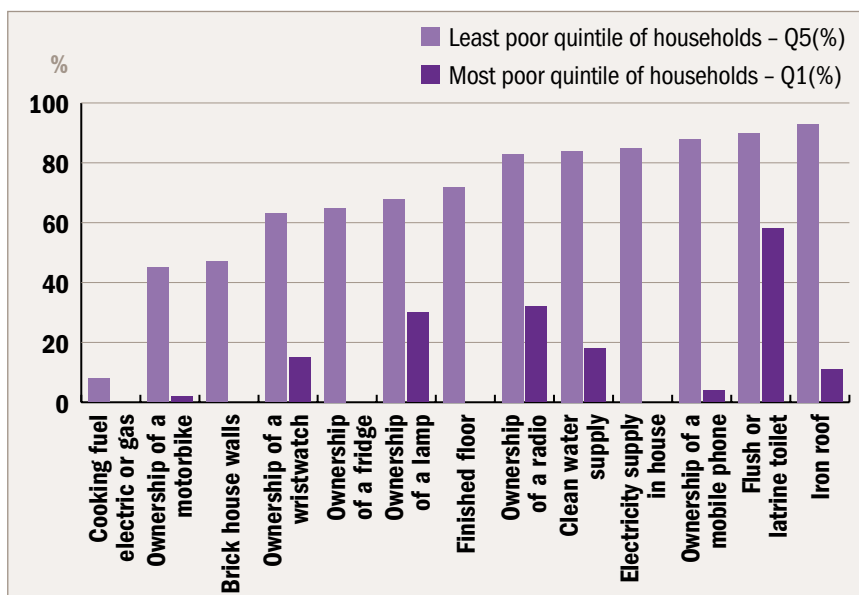## Equity measures

Socio-economic status of households
The household module asked questions about household building materials (walls, roof, floor), utilities (water, sanitation, cooking fuel, electricity), and assets (radio, bicycle, fridge, television, mobile phone, bed, kerosene or pressure lamp, wrist watch, motorcycle, generator, fan).

In order to examine the relationship between key coverage outcomes and socioeconomic status, an index of socioeconomic status was constructed for each household using principal components analysis. The continuous index variable produced by the principal components analysis was divided into five equal sized groups (quintiles) of households from quintile 1 (most poor) to quintile 5 (least poor). Characteristics of households in the most poor and the least poor quintiles are demonstrated in figure 9.

Distance from household to nearest maternal and newborn health frontline worker
The distance between each household and the nearest primary level health facility or community based frontline worker was calculated using latitude and longitude measures. Three hundred and eighty three households from across seven clusters had no distance estimate because there was neither a facility nor a frontline worker identified to be providing services there. Of the households

Figure 9 – Characteristics of building materials and ownership of assets in the most poor (Q1) and the least poor (Q5) households surveyed

with a distance measure (n=1461) 52% were less than ten kilometres from the nearest MNH frontline worker.

There was a very strong relationship between household socio-economic quintile and distance from frontline worker: 86% of the most poor households were ten or more kilometres away from the nearest frontline worker, compared to 22% of the least poor households.

Characteristics of individuals interviewed

The characteristics of individuals interviewed in the households are shown in Table 5. The sample comprised a predominantly married and Muslim population from a large mix of ethnic groups, two-thirds of whom had no formal education. ■

Photo below: Woman working through files in her office. © Chalie Hopkinson

Table 5 – Characteristics of household survey respondents

Characteristic	Household heads N=1844	Women aged 13-49 yrs N=2021	Women with a live birth in the 12 months preceding survey N=349
Ethnicity			
Fulani	40%	38%	40%
Tangale	15%	14%	11%
Hausa	11%	12%	13%
Waja	10%	11%	9%
Other (18 groups)	24%	25%	27%
Religion			
Muslim	77%	77%	83%
Christian	23%	23%	17%
Socio-economic status			
Q1 (most poor)	19%	18%	21%
Q2	20%	19%	13%
Q3	20%	21%	22%
Q4	20%	20%	21%
Q5 (least poor)	20%	22%	23%
Distance to nearest frontline worker			
Less than 10km	52%	54%	50%
Marital status			
Married	94%	81%	93%
Education level			
None	60%	64%	66%
Primary	15%	17%	17%
Secondary	25%	19%	17%
Mean age (yrs)[1]	40 years	26 years	26 years

[1] Exact age was missing for 23% of household heads, 15% of women aged 13-49, and 14% of women with a live birth in the 12 months preceding survey

❝

A total of 1844 households from 40 clusters participated in the survey and 2021 women aged 13-49 agreed to be interviewed, of whom 349 had a live birth in the 12 months preceding survey and answered detailed questions about care.”
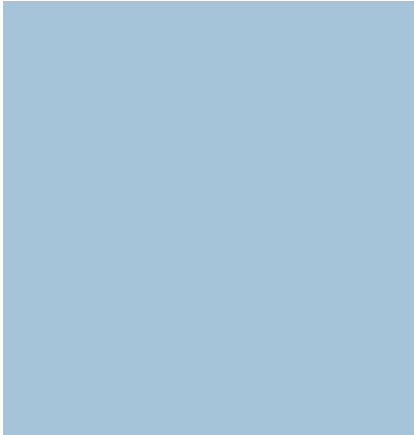
Pregnancy Care

Photo above: A pregnant African woman. © iStockphoto

This chapter presents results on the frequency of interactions, the quality of those interactions, and the coverage of critical interventions. Interaction frequency and intervention coverage are also broken down by socio-economic status of households.

Frequency of pregnancy care interactions

Antenatal care provided in health facilities is described under the label 'pregnancy care' which includes care delivered to pregnant women by different cadres of frontline worker.

On average, women in Gombe State who had a live birth in the 12 months preceding survey had 2.6 (95% CI 2.0-3.2) pregnancy care interactions during the pregnancy leading to that live birth. Overall, 61% (95% CI 50-72) had at least one pregnancy care interaction and 40% (95% CI 30-51) had the recommended four interactions. Thirty-five percent of women (95% CI 26-43) saw a doctor or a nurse at least once during pregnancy.

Women who went to a health facility at least once for pregnancy care went on to have an average of 4.3 pregnancy care interactions there (95% CI 3.9-4.5). Fifty nine percent of them (95% CI 43-59) saw a doctor or a nurse at their first visit to the health facility. Just four percent of women (95% CI 1-7) had any home visits for pregnancy care.

Inequities in frequency of interactions
Considerable inequity was observed in the percent of women who had at least four pregnancy care interactions, coverage being three and a half times higher amongst women from the least poor households compared to the most poor (figure 10). Similarly, coverage of at least four pregnancy care visits was almost double amongst women living within ten kilometres of a frontline worker (57%, 95% CI 44-70; vs. 30%, 95% CI 18-46).

Quality of pregnancy care interactions

The quality of pregnancy care interactions was evaluated from six different perspectives (box 1).

1. Women's knowledge of danger signs in pregnancy
Sixty-eight percent of women (95% CI 60-77) were able to state at least one danger sign, with each woman stating an average of 1.7 pregnancy danger signs (95% CI 1.4-2.0) without any prompting from the interviewer. A breakdown of the frequency with which different danger signs were mentioned by women is provided in figure 11.

2. Women's preparations for delivery
Counselling during pregnancy care interactions includes advising women to make preparations for their delivery

Figure 10 – Percent of women who had at least four pregnancy care interactions, by socio-economic status of household
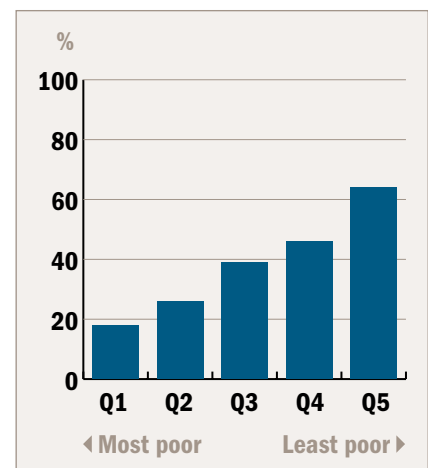
Box 1 – Perspectives of quality of pregnancy care and their justification

	Quality perspective	Justification
1	Women's knowledge of danger signs in pregnancy[1]	Frontline workers aim to counsel women about danger signs: retention of this knowledge is one perspective of the quality of that counselling
2	Women's preparations for delivery[1]	Frontline workers aim to counsel women about the preparations needed for a safe delivery: taking action on this is one perspective of the quality of that counselling
3	Median gestation at first pregnancy interaction[1]	High quality care should encourage pregnancy visits to be made in a timely way, usually recommended for first visit to occur before 16 weeks of gestation
4	Components of pregnancy care by the end of pregnancy[1]	Women come into contact with a range of frontline worker cadres throughout pregnancy, but by the end of pregnancy all women should have had a core set of pregnancy health care (weight, height and blood pressure measured, urine and blood tested, counselled on birth preparedness, danger signs, and breastfeeding)
5	Frontline worker knowledge of the elements of focussed pregnancy care[2]	The knowledge that frontline workers have about recommended pregnancy care could influence the quality of care that they are able to deliver
6	Availability of essential commodities to provide basic pregnancy care at primary health facilities[3]	The quality of pregnancy care delivered to women is influenced by the availability of essential commodities to provide that care (stethoscope, blood pressure cuff, thermometer, adult scale, fetal stethoscope, timing device, disposable gloves, urine protein test kit, single use syringes, tetanus toxoid vaccines, ferrous/folate, sulphadoxine pyrimethamine)

namely: to put aside some money, to plan transport and food requirements, and to identify a birth attendant and a health facility. In Gombe, 51% (95% CI 42-61) reported making any preparations for delivery, but no women prepared all five things (figure 12).

3. Median gestation at first pregnancy care interaction

The median gestation at first pregnancy interaction was 16 weeks (inter-quartile range 9-20).

4. Components of pregnancy care received by women by the end of pregnancy

Good quality pregnancy care includes a minimum of eight core components, including checks on the health of the pregnant woman and providing life saving counselling. Twelve percent of women (95% CI 6-17) who had a live birth in the 12 months preceding survey reported having received all eight components by the end of their

pregnancy period (figure 13). Eighteen percent of women (95% CI 12-25) received the five medical components that involve measurement or testing but not counselling).

5. Frontline worker knowledge of the elements of focussed pregnancy care

Thirteen percent (95% CI 5-22) of frontline workers had unprompted knowledge of all six elements of focussed pregnancy care (figure 14). But knowledge was considerably different by cadre of frontline worker with 35% of health facility staff able to cite all six elements compared to three percent of TBAs and no FOMWAN volunteers: for this survey almost all pregnancy care was provided by health facility staff. The most frequently cited component was to prevent illness and promote health (mentioned by 66% of all frontline workers (95% CI 52-79), and mentioned by 90% (95% CI 65-98) of health facility staff.

[1] Measured during the household survey: women with a live birth in the 12 months prior to survey

[2] Measured during the frontline worker survey: frontline workers who have pregnancy care interactions with women in the household survey location or nearest health facility

[3] Measured during the primary health facility survey: health facilities allocated to provide pregnancy care to the household survey location

Figure 11 – Unprompted knowledge of danger signs in pregnancy amongst women with a live birth in the 12 months preceding survey
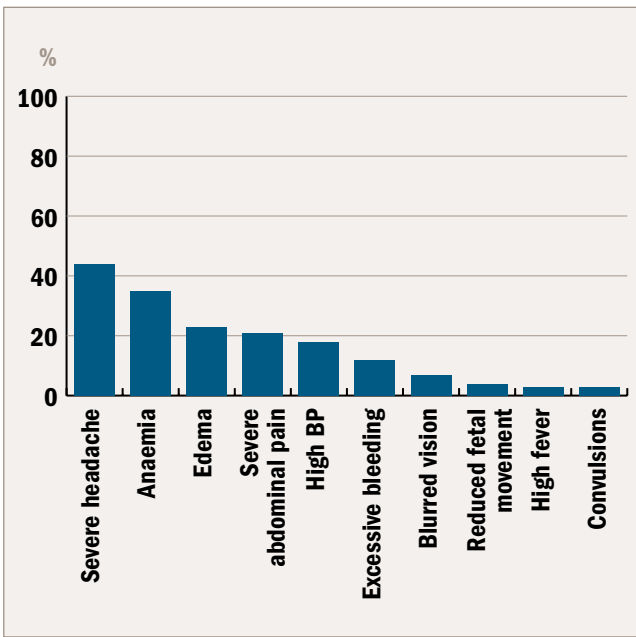

Figure 12 – Preparations made for delivery by women during pregnancy
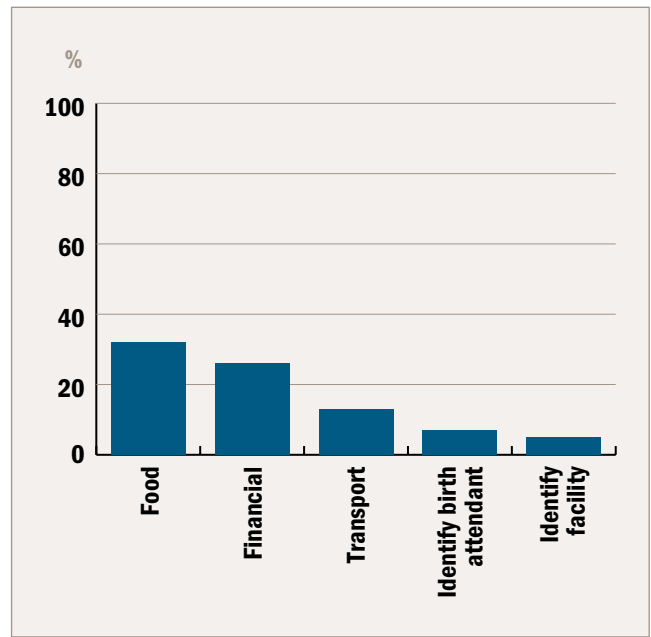

Figure 13 – Coverage of core components of good quality pregnancy care by the end of the pregnancy period
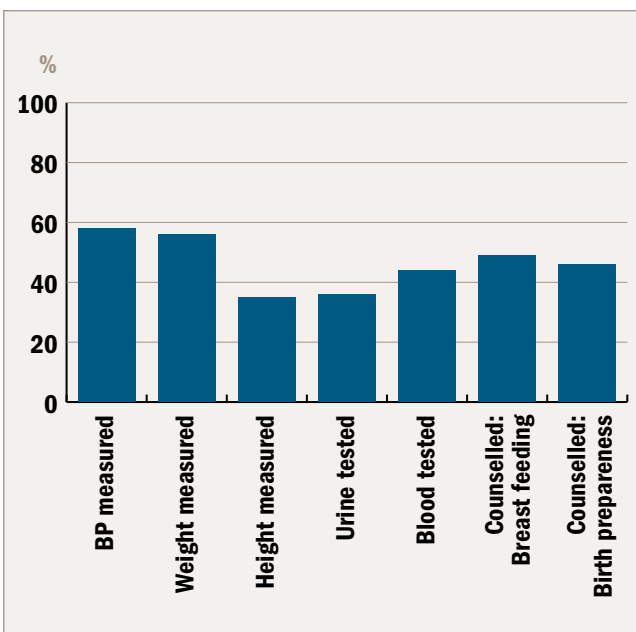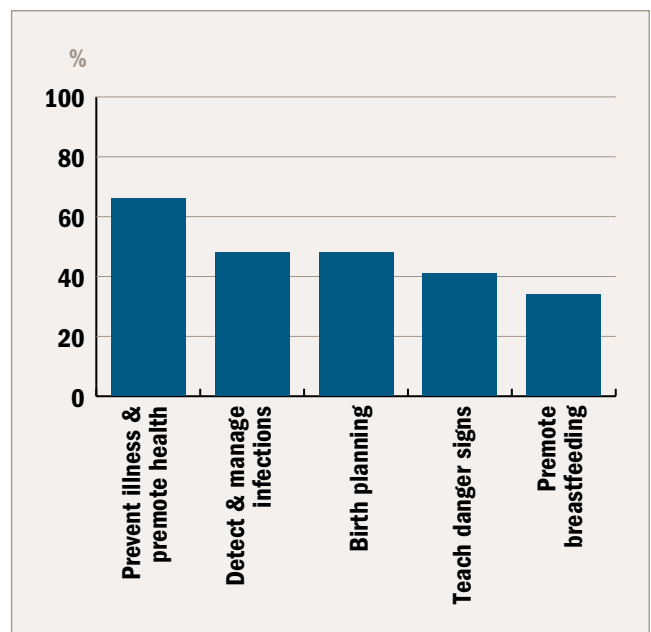

Figure 14 – Unprompted knowledge of the elements of focussed pregnancy care amongst all frontline workers

6. Availability of essential commodities to provide basic pregnancy care at primary health facilities

On the day of the survey, 32% (95% CI 14-50) of primary health facilities had all essential commodities required to provide pregnancy care. The item most frequently missing was a working watch or timing device: just 48% (95% CI 29-67) of facilities had one available (figure 15).

Coverage of pregnancy care critical interventions

Coverage of the pregnancy care critical interventions is shown in table 6.

The coverage of pregnancy care interventions that can be delivered at community or primary level of health care is presented in table 6. Approximately half of the women with a live birth in the 12 months preceding survey received iron supplementation when pregnant, all of whom reported that they used the supplement, the median days of use being 21 days (inter-quartile range 9-30). Around four in every ten women (44%, 95% CI 33-54) were protected from tetanus toxoid (in that they received at least two doses of the vaccine in the last three years, or five in their lifetime) and received at least two doses of intermittent presumptive treatment of malaria (IPTp; 41%, 95% CI 32-50). Only six percent of women (95% CI 3-9) reported receiving a test result for syphilis while pregnant.

Inequities in coverage of critical interventions in pregnancy

As for frequency of pregnancy care interactions, there was marked inequity in coverage of critical interventions. Figure 16 shows the coverage of iron prophylaxis and of at least two doses of intermittent

Figure 15 – Availability of commodities to provide pregnancy care in primary health facilities
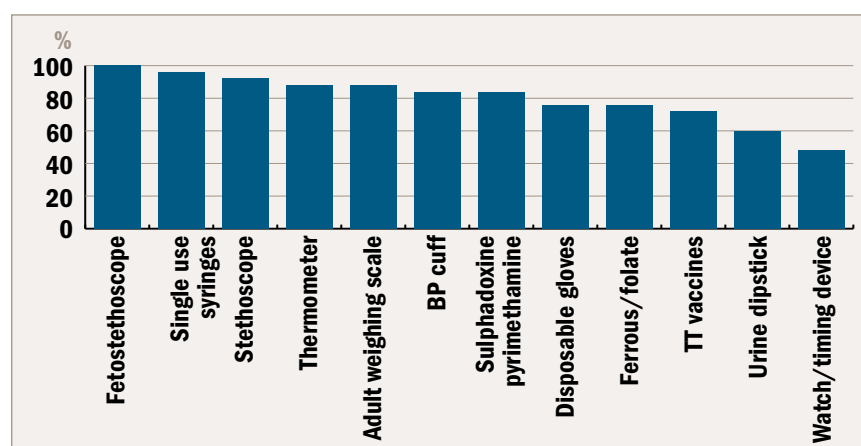

Table 6 – Coverage of pregnancy care critical interventions amongst women with a live birth in the 12 months preceding survey

Critical intervention	Coverage amongst women with a live birth in the 12 months preceding survey (N=349) % (95% CI)
Iron supplementation: received	53% (41-64)
Iron supplementation: used	53% (41-64)
Tetanus toxoid protection	44% (33-54)
Intermittent preventive treatment for malaria (≥2 doses)	41% (32-50)
Syphilis prevention*	6% (3-9)

* Women receiving a test result for syphilis during ANC

Figure 16 – Coverage of iron prophylaxis and of intermittent presumptive treatment for malaria (IPTp2), by socio-economic status of household
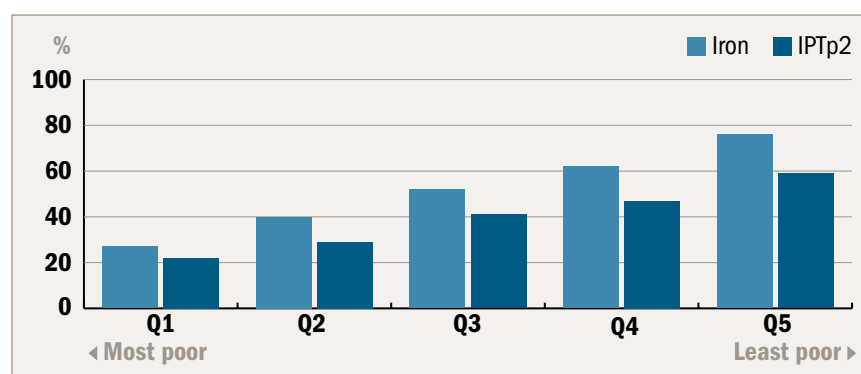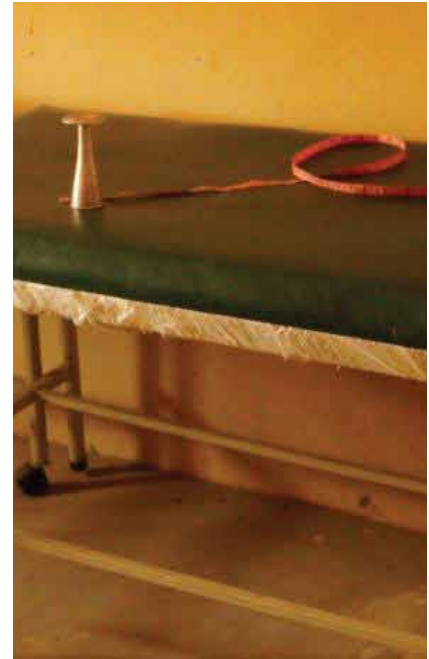
Photos above:

Above: Woman receiving a vaccine, possibly to protect her against tetanus toxoid, in a health facility, Gombe State, Nigeria.
© Dr Bilal Avan

Above right: Health facility bed with Ante-natal care equipment: measuring tape and pinard.
© Dr Bilal Avan

presumptive treatment of malaria by socio-economic status of households. Coverage of both interventions was almost three times higher amongst women living in the least poor households compared to those living in the most poor households. A similar pattern was observed by distance with women living less than ten kilometres from the nearest frontline worker having almost double the coverage of malaria prevention than women living further away (59%, 95% CI 47-70; vs. 34%, 95% CI 22-48), and double the coverage of iron prophylaxis (77%, 95% CI 66-85; vs. 38%, 95% CI 22-57).

Triangulation of data sources on pregnancy care

In the frontline worker survey, just 26% of frontline workers stated four pregnancy visits to be a core component of pregnancy care

(unprompted). The facility survey found just 24% of health facilities to be providing pregnancy care services on the day of the survey, and just eight percent were both providing services that day and were fully equipped (Annex 3). From the household survey, the average number of pregnancy care visits per woman was 2.6, with 40% of women having the recommended four visits. Stark inequities were observed, with women from least poor households having three and a half times the coverage of four pregnancy care visits than women from the most poor households.

From the household survey we observed that just 12% of women received all the components of basic ANC by the end of their last pregnancy. Half the women interviewed prepared anything for delivery and no women made the five recommended preparations. Approximately half of frontline workers cited birth planning as a core component of pregnancy care (unprompted).

Again in the household survey, women reported an average of 1.7 pregnancy-related danger signs (unprompted), with 32% of women not able to report any danger signs. Less than half of frontline workers cited teaching danger signs to be a core component of pregnancy care (unprompted).

Approximately half of women at the population level received the critical interventions tetanus toxoid protection, iron supplementation, and intermittent presumptive treatment for malaria: the items required to deliver these interventions were in stock in approximately three-quarters of facilities. Just six percent of women received a syphilis test result during pregnancy and just eight percent of health facilities had test kits in stock on the day of survey. ■

> "Women who had more pregnancy care interactions received better quality pregnancy care and had higher coverage of life saving interventions."

Box 2 – Relationship between number and quality of intra-partum interactions, and between the number or the quality of interactions and coverage of intra-partum critical interventions at baseline

The foundation Theory of Change (figure 1) hypothesises that enhanced interactions can increase the coverage of critical interventions. Here we examine that theory by looking for evidence of an association between more pregnancy interactions and better quality pregnancy care, and evidence of an association between more pregnancy interactions and higher coverage of critical interventions in the pregnancy period.

More interactions and better quality pregnancy care by the end of pregnancy
Example 1. More pregnancy interactions is associated with more components of good quality pregnancy care received by individual women
For every increase in number of pregnancy care interactions, women received 0.6 more components of good quality pregnancy care (coefficient 0.65, 95% CI 0.54-0.74, p<0.001). Similarly, women who had the recommended four pregnancy interactions received two and a half more components of good quality

pregnancy care than women who had fewer than four pregnancy interactions (coefficient 2.5, 95% CI 1.9-3.0, p<0.001).

Example 2. More pregnancy care interactions is associated with better knowledge of danger signs in pregnancy by individual women
For every increase in number of pregnancy care interactions, women were able to state 0.16 more danger signs in pregnancy (coefficient 0.16, 95% CI 0.09-0.22, p<0.001). Similarly, women who had the recommended four pregnancy interactions knew 0.6 more pregnancy danger signs than women who had fewer than four pregnancy care interactions (coefficient 0.60, 95% CI 0.25-0.96, p=0.001).

More interactions and higher coverage of critical interventions
Example 3. More pregnancy interactions is associated with higher coverage of tetanus toxoid protection in pregnancy
For every increase in number of pregnancy care interactions, tetanus

toxoid protection increased by seven percent (coefficient 0.07, 95% CI 0.04 – 0.08, p<0.001). Similarly, women who had the recommended four pregnancy interactions had over three times the tetanus toxoid coverage than women who had fewer than four pregnancy care interactions (odds ratio 3.2, 95% CI 1.8-5.9, p<0.001).

Example 4. More pregnancy interactions is associated with higher coverage of at least two doses of intermittent presumptive treatment for malaria in pregnancy
For every increase in number of pregnancy care interactions, coverage of at least two doses of intermittent presumptive treatment for malaria increased by eight percent (coefficient 0.08 (95% CI 0.06-0.10, p<0.001). Similarly, women who had the recommended four pregnancy interactions had over five times the coverage of two doses of intermittent presumptive treatment for malaria than women who had fewer than four pregnancy care interactions (odds ratio 5.1, 95% CI 2.9-8.8, p<0.001).
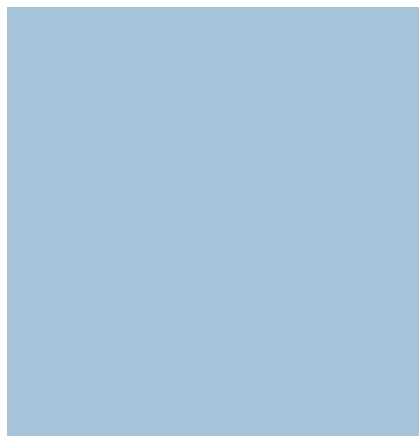
Intra-partum Care

Photo above: Woman with newborn, Nigeria. © Pep Bonet/Save the Children

This chapter presents results on the frequency of interactions, the quality of those interactions, and the coverage of critical interventions. Interaction frequency and intervention coverage are also broken down by socio-economic status of households.

Frequency of intra-partum care interactions

Just 30% (95% CI 20-40) of women who gave birth between June 2011 and May 2012 in Gombe State did so in a health facility, 22% (95% CI 14-29) attended by a skilled attendant (doctors and registered or auxiliary nurse/midwives) during birth (table 7). Twenty percent of women gave birth alone (95% CI 13-27), 21% (95% CI 11-30) were attended by a TBA, and 23% (95% CI 16-27) of women were attended by friends or family. The remainder were attended by a community health extension worker or community health officer.

In the household survey, two percent of women reported that their baby was delivered by caesarean section, consistent with the data extracted from health facility registers (primary and referral levels combined) which recorded two and a half percent of health facility births being conducted by caesarean.

Inequities in frequency of interactions
There was considerable inequity in the percent of women having a skilled attendant at birth, with women in the least poor households having almost four times the coverage of women in the most poor households (43% vs. 12%, figure 17). Similarly women living in households closer than ten kilometres to a frontline worker had more than double the coverage of

Figure 17 – Percent of women who had a skilled attendant at birth (doctor, registered nurse/midwife or assistant nurse/midwife), by household socio-economic status quintile
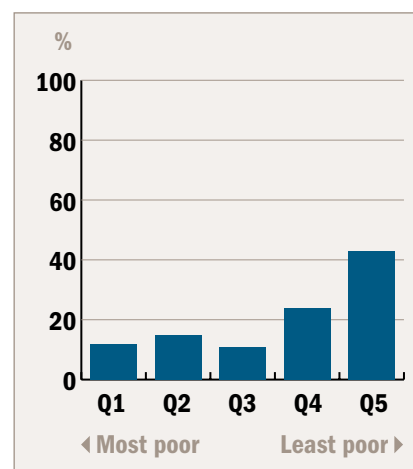
Table 7 – Frequency of intra-partum interactions between women and frontline workers during the intra-partum period

Interaction type	Coverage amongst women with a live birth in the 12 months preceding survey (N=349) % (95% CI)
Births in a health facility	30% (20-40)
Births attended by a skilled attendant (doctor, registered or auxiliary nurse or midwife)	22% (14-29)
Births by caesarean section	2% (0-3)
Women advised to seek extra care who did seek extra care (home – facility; intra-facility)*	25% (11-39)

* 68 women reported they were advised to seek extra care during the intra-partum period

"

Almost four times more women in the least poor households had skilled attendance at birth compared to women living in the most poor households."

skilled attendance at birth that of women living in households further than ten kilometres from a frontline worker (36%, 95% CI 26-48; vs. 17%, 95% CI 10-26).

Quality of intra-partum care interactions

The quality of intra-partum care interactions was evaluated from four different perspectives (box 3).

1. Women's knowledge of intra-partum danger signs
On average, women who had a birth in the 12 months preceding survey were able to cite 1.4 intra-partum danger signs (95% CI 1.0-1.8). A breakdown of the frequency that each danger sign was cited is provided in figure 18.

2. Frontline worker knowledge of actions to take when a woman bleeds heavily during labour
Amongst primary level health facility staff who had ever attended a birth, 13% (95% CI 3-42) stated all eight possible responses for actions to take when a woman bleeds heavily during or immediately after labour, and stated 3.9 responses (95% CI 2.6-5.1) on average. No TBAs stated all eight possible responses, and stated 1.2 responses (95% CI 0.8-1.6) on average. The frequency with which

Box 3 – Perspectives of quality intra-partum care and their justification

	Quality perspective	Justification
1	Women's knowledge of intra-partum danger signs[1]	Women who are better informed about intra-partum danger signs will be better placed to seek quality care
2	Frontline worker's knowledge of actions to take when a woman bleeds heavily during labour[2]	The knowledge that frontline workers have about recommended care could influence that quality of care that they are able to deliver
3	Frontline workers have all the essential items they need to provide good quality care[2]	The quality of intra-partum care delivered to women is influenced by the items that frontline workers have access to during delivery (sterile gloves, disinfectant, gauze, clean cloths, sterile cord cutter, cord ligature, uterotonic, eye ointment)
4	Availability of essential equipment to provide basic intra-partum care at health facilities[3]	The quality of intra-partum care delivered to women is influenced by the availability of essential equipment to provide that care (stethoscope, bp cuff, infant weighing scale, fetal stethoscope, sterilizer, thermometer, manual vacuum aspirator, speculum, vacuum extractor)

[1] Measured during the household survey: women with a live birth in the 12 months prior to survey

[2] Measured during the frontline worker survey: frontline workers who have intra-partum care interactions with women in the household survey location or nearest health facility

[3] Measured during the primary health facility survey: health facilities allocated to provide pregnancy care to the household survey location

Figure 18 – Unprompted knowledge of intra-partum danger signs amongst women interviewed in the household survey who had a live birth in the 12 months prior to survey
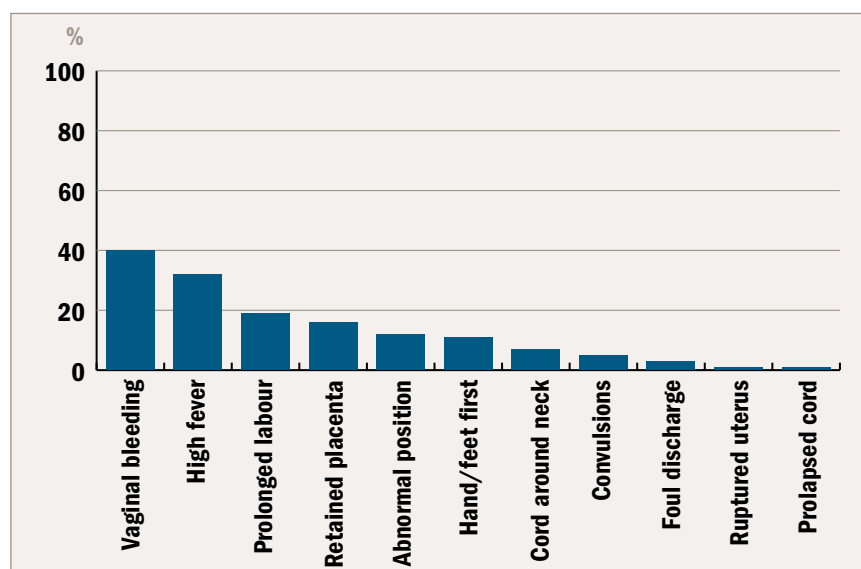
each possible response was stated is shown in figure 19. Around two-thirds of TBA and three-quarters of facility staff said that a woman with heavy bleeding should be referred to the next level of care.

3. Frontline workers have all the essential items they need to provide good quality care

A breakdown of frontline worker reports about the last birth attended, specifically whether they had been able to prepare all essential items, and whether they had monitored the progress of labour during that birth, is provided in figure 20. All health facility staff had been able to prepare all items except for uterotonics, gauze, and eye ointment for the newborn (lack of stock cited as the primary reason for not preparing the item). Availability of items was less high amongst TBAs who most frequently reported that the main reason for not preparing gloves, disinfectant, or gauze was because of lack of stock. In addition to having no stock of uterotonics and eye ointment, TBAs also reported they lacked training to use these items.

By linking the frontline worker and household survey data at the level of the cluster we observe that no women gave birth in a cluster where the frontline worker providing services to that cluster had been able to prepare all essential items at the last birth attended, mainly due to a lack of uterotonics and lack of eye ointment for the newborn.

4. Health facilities have the equipment needed for basic intra-partum care

An inventory of equipment available in the primary health facilities surveyed indicated that just eight percent (95% CI 0-20%) had the equipment required to provide basic intra-partum care (figure 21).

Figure 19 – Frontline worker knowledge of actions to take when a woman bleeds heavily during labour, amongst TBAs or facility staff who have ever attended a delivery
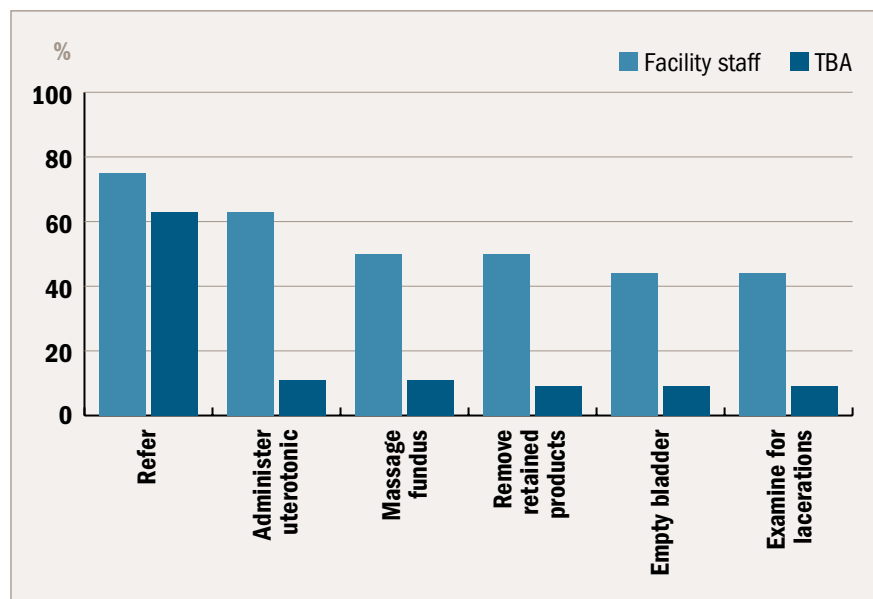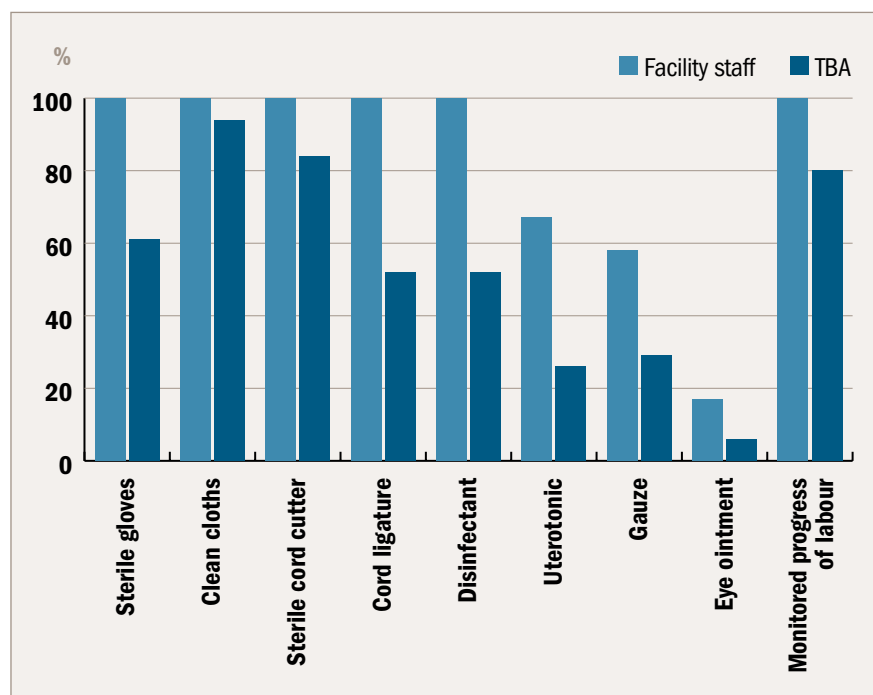

Figure 20 – Frontline worker experience at the last birth attended, amongst TBAs or facility staff who were able to recall the last birth they attended

Coverage of intra-partum care interventions

Four intra-partum critical interventions amenable to delivery by frontline workers are presented. Frontline workers providing intra-partum care include doctors, nurses, community health extension workers and community health officers attached to primary level health facilities, and frontline workers (predominantly traditional birth attendants) who are entirely community based.

The intra-partum interventions (1) administration of prophylactic uterotonics to prevent post-partum haemorrhage and (2) active management of the third stage of labour (administration of prophylactic uterotonic and uterine massage and controlled cord traction) were measured through interviews with frontline workers who attend deliveries, and the estimates applied to household survey responses about the birth attendant for individual women. Large differences in delivery of these two interventions were observed by cadre of frontline worker, being higher amongst health facility workers – who attend the most deliveries – than amongst TBAs (figure 22).

In order to estimate coverage of these interventions amongst recently delivered women who delivered with a frontline worker, we adjusted the frontline worker reports by the volume of births each cadre of frontline worker had attended in the month prior to survey.

In Box 4 we observe that the expected percent of women who were attended by a frontline worker and who received prophylactic uterotonics was 53% (95% CI 49-58). To extrapolate this to the population level it is necessary to adjust for the 43% of women who did not deliver with a frontline worker (20% delivered alone and 23% of women delivered at home with family or friends). Thus we estimate the

Figure 21 – Primary health facility equipment for basic intra-partum care
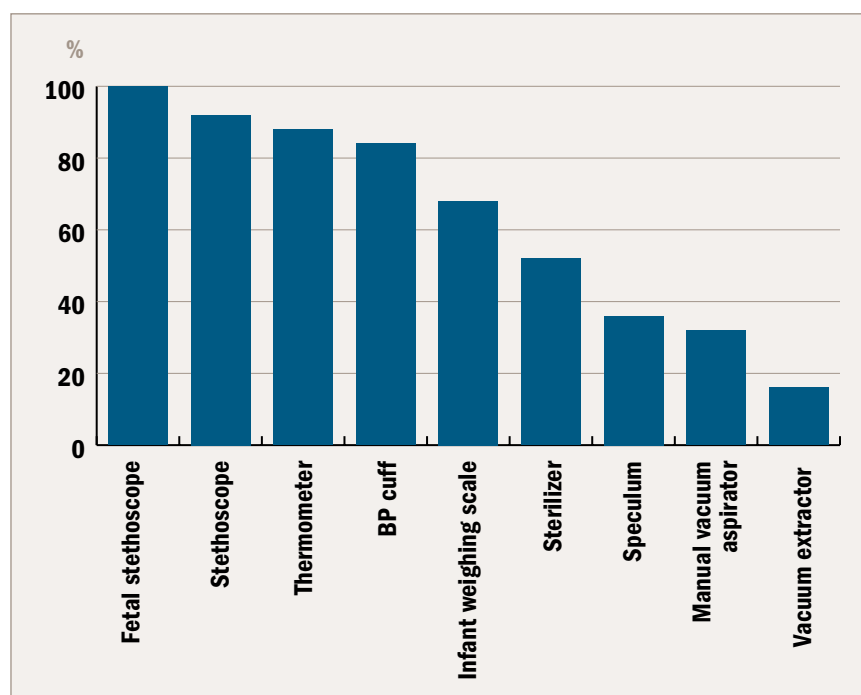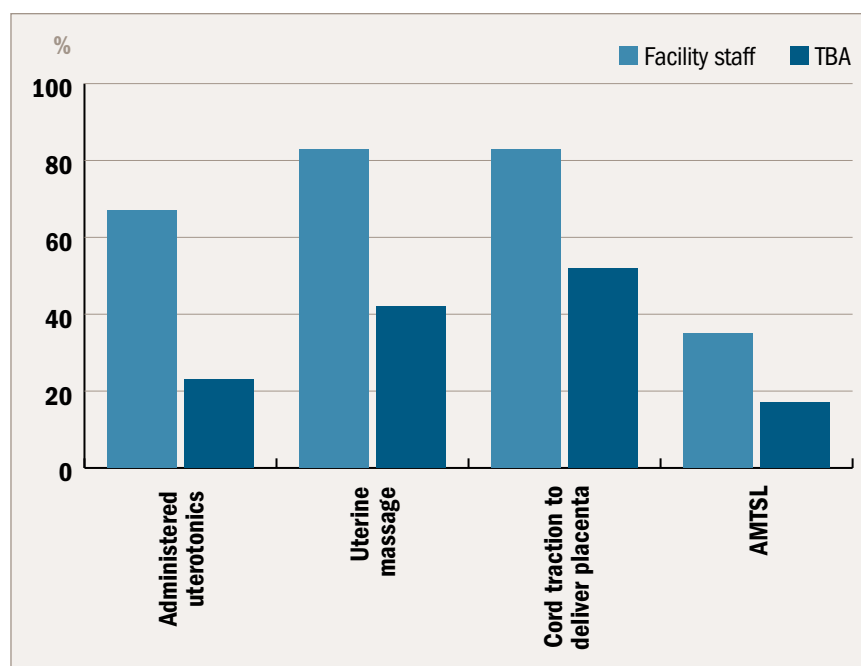

Figure 22 – Frontline worker reported behaviour with regard to components of active management of the third stage of labour at the last delivery attended

population level coverage of prophylactic uterotonics during delivery to be 53*(1.0-0.43) = 30% (table 8).

In Box 5 we observe that the expected percent of women who were attended by a frontline worker and who had active management of the third stage of labour was 29% (95% CI 25-33). To extrapolate this to the population level it is necessary again to adjust for the 43% of women who did not deliver with a frontline worker. Thus we estimate

the population level coverage of AMTSL to be 29*(1.0-0.43) = 17% (table 8).

The intra-partum interventions (3) hand-washing with soap and (4) use of gloves by the delivery attendant were measured in the household survey interview with women with a live birth in the 12 months preceding survey, and estimated separately for women who delivered in a health facility or at home (table 9). Coverage of both these interventions was considerably

higher amongst women who delivered in health facilities compared to those who delivered at home.

Inequities in coverage of critical interventions in the intra-partum period

Again, considerable socio-economic inequities were observed in the coverage of hand washing with soap, and of glove wearing, by the delivery attendant (figure 23).

Box 4 – Expected percent of women who were attended by a frontline worker to have had prophylactic uterotonics administered during their delivery.
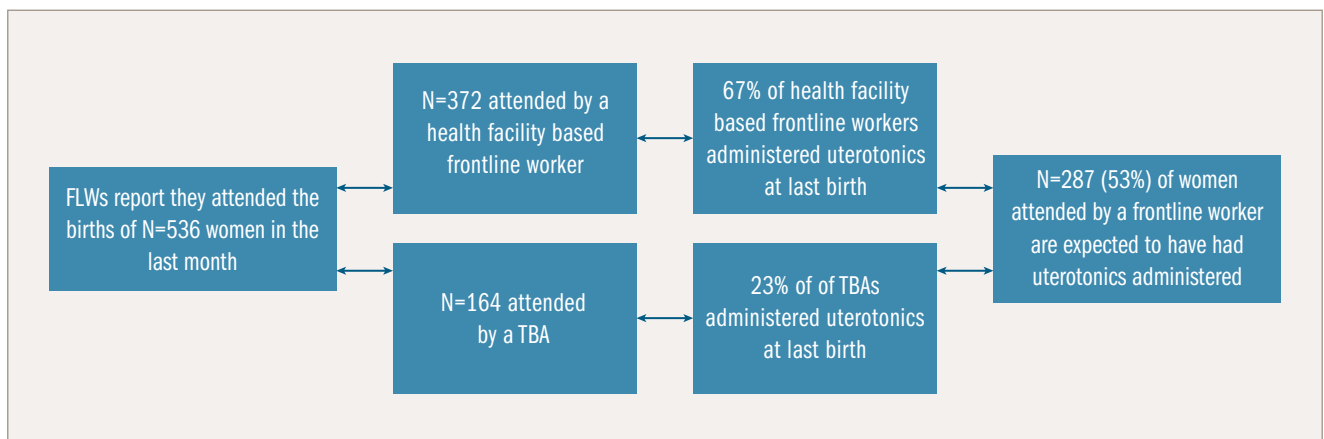
Box 5 – Expected percent of women in the study area who were attended by a frontine worker to have had Active Management of the Third Stage of Labour during their delivery.
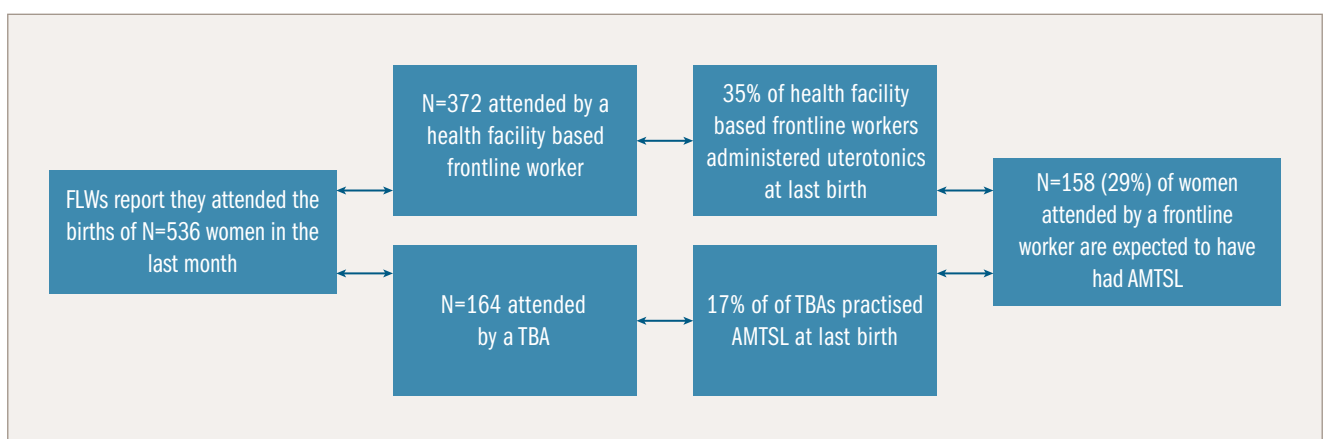
Table 8 – Estimated coverage of intra-partum care critical interventions (1-2)

Critical intervention	Estimated population level coverage[1]
Administration of prophylactic uterotonics	30%
Active management of the third stage of labour[2]	17%

Table 9 – Coverage of intra-partum care critical interventions (3-4) measured through interviews with women with a live birth in the 12 months preceding survey

Critical intervention	Coverage amongst women with a live birth in the 12 months preceding survey (N=349) % (95% CI)
Hand washing with soap by the delivery attendant	
Health facility delivery	82% (69-90)
Home delivery	38% (29-48)
Use of gloves by the delivery attendant	
Health facility delivery	90% (80-96)
Home delivery	18% (11-28)

Figure 23 – Coverage of critical interventions in the post-natal period, by socio-economic status of households

[1] Based on frontline worker reports about volume of deliveries in the month preceding survey and the actions taken at the last delivery attended (frontline worker survey), and the birth attendant reported by women who had a live birth in the 12 months preceding survey (household survey).

[2] Active management of the third stage of labour (AMTSL) includes administration of prophylactic uterotonics, uterine massage, controlled cord traction to deliver the placenta.

Photo below: Baby sleeping in a health facility, Gombe state, Nigeria. © Dr Bilal Avan

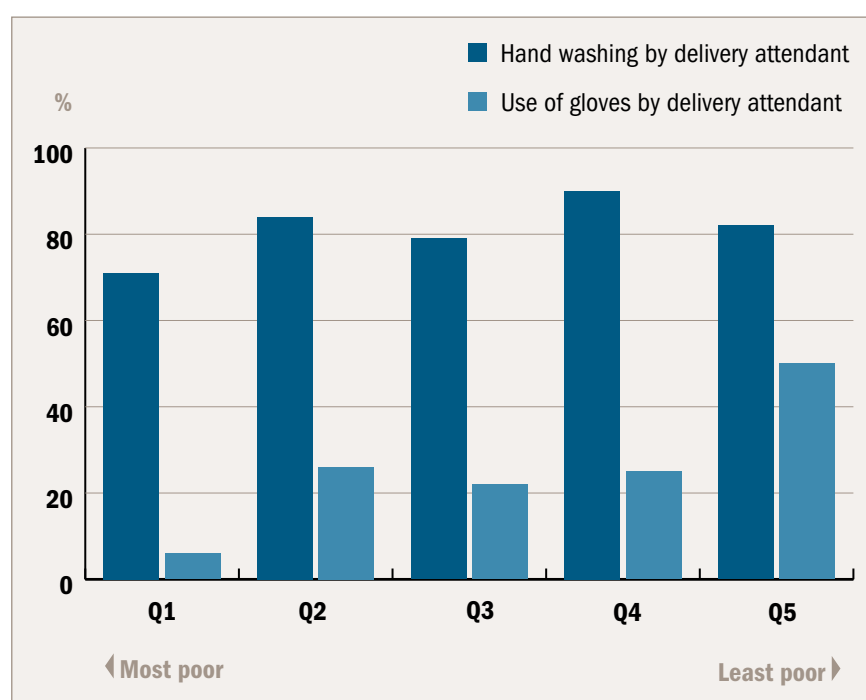**Photo above:** Birth demonstration during a frontline worker training session with Society for Family Health, Gombe state, Nigeria. © Society for Family Health.

Women living closer to frontline workers also reported hand washing with soap by the delivery attendant more frequently than women living further away, although there was no statistical evidence of difference (67%, 95% CI 55-80; vs. 51%, 95% CI 34-68). Distance had a stronger association with glove wearing by delivery attendants however (65%, 95% CI 50-78 amongst women living closer; vs. 39%, 95% CI 24-57 amongst women living further away).

Triangulation of data sources on intra-partum care

At the population level, 30% of births were reported to take place in a health facility, and 22% of births were attended by a skilled birth attendant. On the day of survey, 24% of the health facilities surveyed were providing maternity services that day and had all the commodities required monitoring and managing labour using a partograph (Annex 3). When asked about the items they had been able to prepare at the last delivery they attended, frontline workers in health facilities had most essential items, but frequently lacked uterotonics and eye ointment. TBAs lacked a lot of basic items.

Not surprisingly therefore, frontline worker behaviour with regard to the critical interventions was very different between those based in primary level health facilities and those based in the community. Administration of prophylactic uterotonics was estimated to occur in 67% of births attended by a frontline worker based in a facility, and 23% of births attended by a TBA. After adjusting for the volume of births occurring in both places, and the births not attended by any cadre of frontline worker, we estimated that, at the population level, just 30% of women received prophylactic uterotonics at birth. Use of gloves during delivery was another example where frontline worker behaviour was strongly linked to supplies. Gloves were available in 67% of health facilities, but available to only 26% of TBAs. We observed that population level coverage of use of gloves by the delivery attendant was 90% for facility births and 18% for home births.

Knowledge of danger signs during the intra-partum period was low. Women who had a birth in the 12 months preceding survey were able to cite an average of 1.4 danger signs – bleeding being the most common one, mentioned by 40% of women. Frontline workers had variable levels of knowledge about the actions they should take when providing care to a woman with heavy bleeding during the intra-partum period: knowledge amongst health facility based frontline workers was much better than amongst TBAs, but the majority of respondents from both frontline worker groups reported that they would refer a woman who was bleeding excessively during delivery. When asked about care-seeking for danger signs in delivery, just 25% of the women who had a birth in the 12 months preceding survey who had been advised to seek extra care during delivery actually went for that extra care. ■

Box 6 – Relationship between number and quality of intra-partum interactions, and between the number or the quality of interactions and coverage of intra-partum critical interventions at baseline

The foundation Theory of Change (figure 1) hypothesises that enhanced interactions can increase the coverage of critical interventions. Here we examine that theory by looking for evidence of an association between more pregnancy or intra-partum interactions and better quality intra-partum care, and evidence of an association between better intra-partum interactions and higher coverage of critical interventions in the intra-partum period.

More interactions and better quality intra-partum care
Example 1. More pregnancy care visits were not associated with better knowledge of the complications that can occur during delivery

There was no evidence that increases in the number of pregnancy care interactions had a statistical relationship with better knowledge amongst women of the complications that can occur during delivery (coefficient 0.04, 95% CI 0.02-0.11, p=0.17). Similarly, women who had the recommended four

pregnancy interactions did not have better knowledge of delivery complications than other women (coefficient 0.08, 95% CI 0.25-0.42, p=0.62).

Example 2. Skilled attendance at birth was associated with better knowledge of complications that can occur during delivery

However, there was statistical evidence that having a skilled birth attendant at birth, compared to not having a skilled birth attendant, was associated with a two-fold increase in knowledge of the number of different complications that can occur during birth (coefficient 0.55, 95% CI 0.17-0.93, p=0.005).

Better interactions and higher coverage of intra-partum critical interventions
Example 3. Better knowledge of danger signs amongst women is associated with higher coverage of use of gloves by the delivery attendant.

For every increase in the number of delivery complications known about, coverage of use of gloves by the delivery attendant increased

by 5% (coefficient 0.049, 95% CI 0.02-0.08, p=0.003).

Example 4. Better frontline worker knowledge of actions to be taken when heavy bleeding occurs during delivery has a weak association with the practise of active management of the third stage of labour, but better availability of essential supplies such as uterotonics has a strong relationship.

There was weak evidence that for every increase in knowledge of the number of actions to be taken by the frontline worker when heavy bleeding occurs during delivery there was a five percent increase in the practise of active management of the third stage of labour (coefficient 0.05, 95% CI -0.003 – 0.11, p-value 0.064). However, the link between frontline worker availability of a uterotonic and practise of active management of the third stage of labour was very strong with a 78 fold increase in the odds of practising active management of the third stage of labour amongst frontline workers who were able to prepare uterotonics at the last delivery (OR 78.0, 95% CI 7.8-774.4, p<0.001).

> At the population level, 30% of births took place in a health facility. On the day of survey, 24% of the health facilities surveyed were providing maternity services that day and had all the commodities required for monitoring and managing labour using a partograph."

Post-partum Care
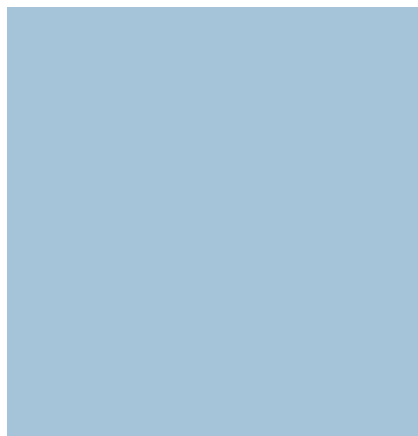
Box 7 – Perspective of quality post-partum care and its justification

	Quality perspective	Justification
1	Components of post-partum care received by women in the first week after birth[1]	Good quality post-partum care includes the following five core elements: breasts and bleeding checked, counselled on danger signs, family planning, and nutrition

[1] Measured during the household survey: women with a live birth in the 12 months prior to survey

Table 10 – Frequency of post-partum interactions between women and frontline workers during the first week after birth

Interaction type	Coverage amongst women with a live birth in the 12 months preceding survey (N=349) % (95% CI)
Any post-partum check in the first month after delivery	16% (11-21)
Post-partum check within 2 days of birth (all women)	7% (4-9)
Facility birth	8% (4-14)
Home birth	6% (3-11)
Post-partum check within 7 days of birth (all women)	10% (7-14)
Facility birth	14% (9-22)
Home birth	9% (5-14)
Provider of all first post-partum checks*	
Community health extension worker/health officer	28% (15-45)
Doctor	17% (8-33)
Nurse/midwife	33% (20-49)
TBA	22% (12-38)

* 58 women reported that they received any post-partum care

This chapter presents results on the frequency of interactions, the quality of those interactions, and the coverage of critical interventions. Interaction frequency and intervention coverage are also broken down by socio-economic status of households.

Frequency of post-partum care interactions

There was very little evidence of timely post-partum care taking place in Gombe State. Sixteen percent of women in the household survey (95% CI 11-21) reported having any post-partum checks during the first month after birth, 10 percent (95% CI 7-14) having only one post-partum check (table 10).

Just seven percent (95% CI 4-9), and 10% (95% CI 7-14) respectively reported that anyone checked on their health within the recommended first two days and the first seven days after birth (table 10). Post-partum health checks were carried out predominantly by nurses or midwives (33%), followed by community health extension workers (28%) or TBAs (22%).

Inequities in interactions
Any post-partum check in the first month after birth occurred least

Photo left: A Nigerian family. © Bill & Melinda Gates Foundation

frequently amongst women living in the most poor households in the sample (three percent, 95% CI 0-10), and most frequently amongst women living in the least poor households (21%, 95% CI 14-32), figure 24.

Quality of post-partum care interactions

The quality of post-partum care interactions was evaluated from one perspective (box 7).

1. Components of post-partum care received by women in the first week after birth

A good quality post-partum check should include physical examination of the women to check her breasts, and extent of bleeding, plus counselling on danger signs that might occur post-partum, use of family planning, and nutrition. Amongst women who had a birth in the 12 months preceding survey, none received all five components of post-partum care in the first week after birth: a breakdown of the frequency of each component is provided in figure 25.

Coverage of post-partum care interventions

The post-partum care interventions amenable to delivery by frontline workers are detection and treatment of anaemia, and detection and treatment of post-partum sepsis. In this survey, no women with a live birth in the 12 months preceding survey reported having these complications and no women reported seeking advice for any adverse health conditions during the post-partum period. ■

Figure 24 – Percent of women who had any post-partum check in the first month after birth, by household socio-economic status
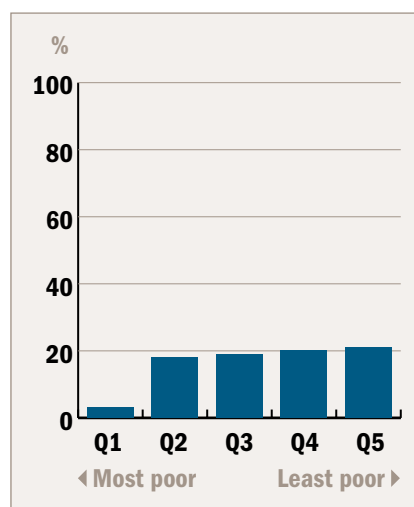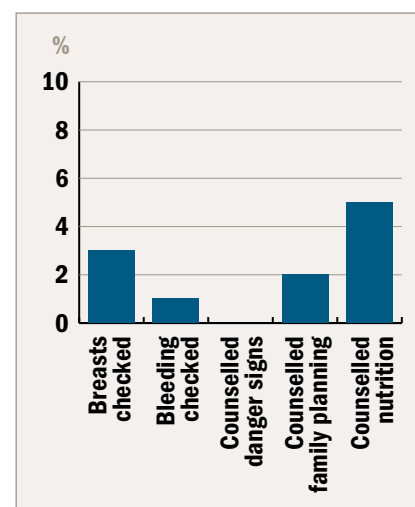

Figure 25 – Coverage of core components of good quality post-partum care checks in the first week after birth

Box 8 – Relationship between number and quality of post-partum care interactions at baseline

The foundation Theory of Change (figure 1) hypothesises that enhanced interactions can increase the coverage of critical interventions. Here we examine that theory by looking for evidence of an association between more post-partum interactions and better quality post-partum care. The absence of danger signs reported by women in the post-partum period means that we lack data to extend this analysis to critical interventions.

More interactions and better quality post-partum care
Example 1. More interactions in the post-partum period is associated with more components of good quality post-partum care received by individual women in the first month after birth

In the first month after birth, for every increase in number of post-partum care interactions, women received 0.3 more components of good quality post-partum care (coefficient 0.27, 95% CI 0.21-0.32, p<0.001).

Example 2. Post-partum care in the first week after birth was associated with more components of good quality post-partum care received by individual women

Women who had at least one post-partum care interaction within seven days of birth received almost one more component of good quality post-partum care than women who did not have a post-partum care interaction within seven days of birth (coefficient 0.77, 95% CI 0.64-0.90, p<0.001).

Post-natal Care

Photo above: Newborn baby.
© Dr Chris Drakeley

This chapter presents results on the frequency of interactions, the quality of those interactions, and the coverage of critical interventions. Interaction frequency and intervention coverage are also broken down by socio-economic status of households.

Frequency of post-natal care interactions

In the household survey, eight percent of mothers (95% CI 4-12) reported that their newborn had any post-natal checks during the first month of life, five percent (95% CI 0-8) having more than one post-natal check (table 11).

Just four percent (95% CI 2-8), and five percent (95% CI 3-10) of mothers respectively reported that anyone checked on the health of their newborn within the recommended first two days and the first seven days after birth (table 11). Post-natal health checks were carried out approximately equally by community health extension workers, nurses or midwives, and community volunteers (including TBAs).

Amongst newborns who had experienced at least one danger sign in the first month of life, 38% (95% CI 13-63) were taken outside the home

Figure 26 – Percent of newborns who had any post-natal check in the first month after birth, by household socio-economic status quintile.
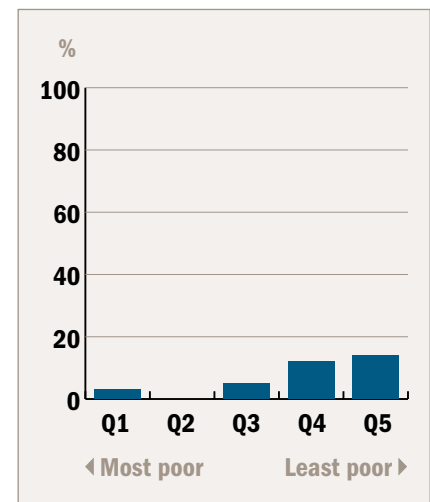
to seek health care. The main reasons for not taking a newborn outside the home to seek health care were because the caregiver expected the newborn to get better without drugs or because the health facility was too far from the home.

Any post-natal check in the first month after birth occurred most frequently amongst newborns living in the least poor households, and were

"

Just 1 in 4 newborns were breastfed exclusively for the first three days of life."

largely absent amongst newborns living in poorer households (figure 26).

Quality of post-natal care interactions

The quality of post-natal care interactions was evaluated from two perspectives (box 9).

1. Components of post-natal care received by newborns in the first week of life

A good quality post-natal check should include physical examination of the newborn to check weight and the umbilical cord, plus counselling the caregiver on newborn danger signs, breastfeeding, and newborn thermal care. All components were universally low at the population level. One newborn, who was born in a health facility, received all five components of post-natal care: a breakdown of the frequency of each component is provided in figure 27.

2. Frontline worker knowledge of actions to take for the low birth weight newborn

Twenty percent (95% CI 7-44) of staff in health facilities, but no FOMWAN or TBAs had unprompted knowledge of at least four actions to take for low weight newborns (ensure good thermal care, support breastfeeding, try to prevent infections, and monitor the newborn closely). The frequency with which each action was cited is shown in figure 28. Of the three frontline worker groups, TBAs were least likely to mention any of these actions.

Table 11 – Frequency of post-partum interactions between women and frontline workers during the first week after birth

Interaction type	Coverage amongst women with a live birth in the 12 months preceding survey (N=349) % (95% CI)
Any post-natal check in the first month after delivery	8% (4-12)
Post-natal check within 2 days of birth (all live births)	4% (2-8)
Facility birth	7% (3-16)
Home birth	3% (1-7)
Post-natal check within 7 days of birth (all live births)	5% (3-10)
Facility birth	10% (4-21)
Home birth	4% (2-8)
Provider of all first post-natal checks[1]	
Community health extension worker/ health officer	30% (17-47)
Doctor	7% (1-31)
Nurse/midwife	30% (12-56)
TBA/community volunteer	26% (13-44)
Newborns with ≥1 danger sign in the first month of life for whom care was sought outside the home2	38% (13-63)

[1] 27 mothers reported that their newborn had a post-natal check in first 30 days of life

[2] 29 mothers reported that their newborn had at least one danger sign in first 30 days of life

Box 9 – Perspectives of quality post-natal care and their justification

	Quality perspective	Justification
1	Components of post-natal care received by newborns in the first week of life[1]	Good quality post-natal care includes the following five core elements: physical examination of the newborn to check weight and the umbilical cord, plus counselling the caregiver on newborn danger signs, breastfeeding, and newborn thermal care
2	Frontline worker knowledge of actions to take for the low birth weight newborn	The knowledge that frontline workers have about the recommended actions to take for low birthweight newborns could influence the quality of care that they are able to deliver.

[1] Measured during the household survey: women with a live birth in the 12 months prior to survey

[2] Measured during the frontline worker survey: frontline workers who deliver services to women and newborns in the household survey location or nearest health facility

Coverage of post-natal care interventions

Life saving interventions for the newborn that can be delivered at community or primary health facility level predominantly focus on three sets of behaviours: clean cord care, thermal care, and breastfeeding: a breakdown of these is shown in table 12.

Three quarters of newborns had their umbilical cord cut with a new blade, three quarters had nothing put on the cord, and two thirds had their cord tied with a new or boiled string, but just one quarter of newborns had all these elements of clean cord care (28%, 95% CI 20-36).

Coverage of the live saving thermal care behaviours immediate drying, immediate wrapping and delayed bathing were all high with over 80% of newborns receiving each one. Approximately one third of mothers reported that they always held the newborn skin to skin in the first week of life.

Photo above: Newborn baby.
© Dr Tanya Marchant

Figure 27 – Coverage of core components of good quality post-natal care checks in the first week of life
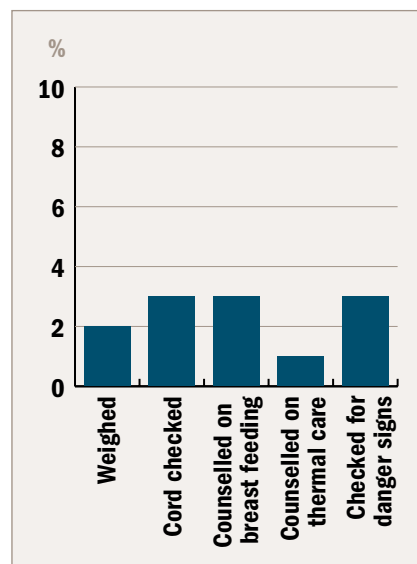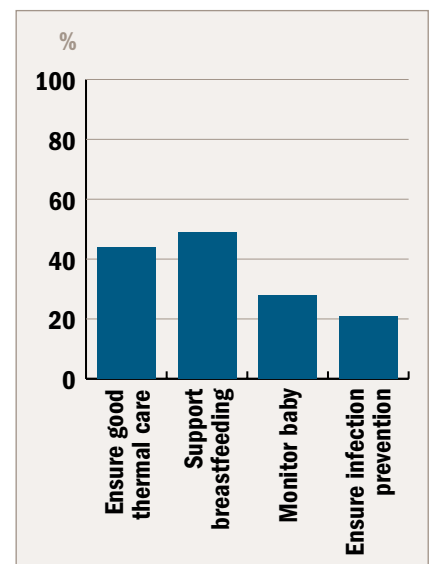
Figure 28 – Unprompted knowledge of the actions to take for the low birth weight newborn, all frontline workers

"

Good quality post-natal care was almost entirely absent."

Forty percent (95% CI 33-47) of newborns were breastfed immediately at birth, and 43% (95% CI 36-50) breastfed exclusively for the first three days of life. Thirty-three percent (95% CI 24-42) of mothers reported that they discarded their milk in the first days after birth.

Inequities in coverage of critical interventions for newborns

There was no statistical evidence of difference in newborn life saving behaviours by socio-economic status of households (figure 29). The difference in point estimates between newborns living in the most and the least poor households was most pronounced for immediate breastfeeding (27%, 95% CI 16-41 vs. 46%, 95% CI 34-58, p=0.2) and for exclusive breastfeeding (38%, 95% CI 27-51 vs. 52%, 95% CI 43-61, p=0.4). Neither was any statistical evidence of difference in coverage of these critical interventions by distance between households and frontline workers. The only critical interventions with statistical evidence of difference by place of birth were clean cord tie (75% of those born in a facility, 95% CI 61-85 vs. 55% of those born at home, 95% CI 42-67, p=0.04) and exclusive breastfeeding (55% of those born in a facility, 95% CI 46-64 vs. 38% of those born at home, 95% CI 31-45, p=0.003).

Finally, vaccination coverage amongst live infants who were born six to 12 months prior to survey is presented in table 13. Approximately one third of infants had received BCG, OPV 0 and DPT1 vaccine, but only 18% (95% CI 10-26) and 8% (95% CI 2-13) had received OPV 2 and DPT3 respectively.

Table 12 – Coverage of post-natal care critical interventions: behaviours that save newborn lives

Interaction type	Coverage amongst newborns born to women with a live birth in the 12 months preceding survey (N=349) (95% CI)
Clean cord care	
Cutting using a new blade	77% (70-83)
Tying cord with new or boiled string*	61% (51-70)
Nothing put on the cord	74%(67-80)
Newborns with clean cord care*	28% (20-36)
Thermal care	
Immediate drying (<30 minutes)*	95% (92-98)
Immediate wrapping (<30 minutes)*	87% (81-92)
Delayed bathing (>6hrs)	82% (76-88)
Newborn held skin to skin always in first week of life	39% (31-48)
Breastfeeding	
Immediate (<1hr)	40% (33-47)
Exclusive (first 3 days of life)	43% (36-50)

* Don't know responses excluded from denominator: tying N=324; drying N=266; wrapping N=306

Figure 29 – Percent of newborns who received a life saving behaviour, amongst those born in the most poor quintile and the least poor quintile of households
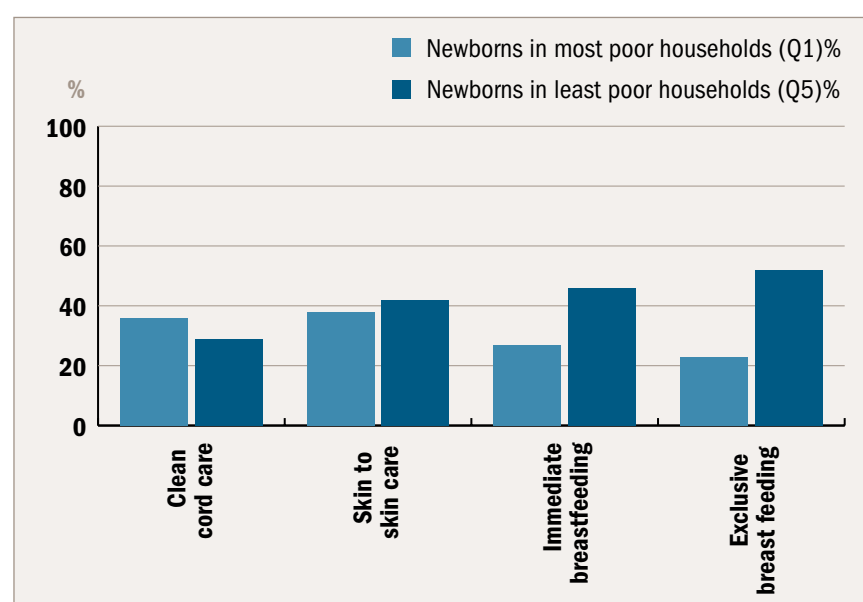
Photos above:

Above: A mother holding her baby.
© Dr Bilal Avan

Above right: Newborn baby having anthropometric measures taken during a post-natal check. © Dr Tanya Marchant

Triangulation of data sources on post-natal care

Some of the life saving newborn care interventions occur at birth (cord cutting and tying, immediate drying and wrapping, immediate breastfeeding), while others depend on behaviours that take place in the first days after birth (not putting anything on the cord for cord care, skin-to-skin care, and exclusive breastfeeding for the first three days, plus care seeking for danger signs (which may lead to a treatment intervention). There was no statistical evidence of difference in any of the newborn interventions by either socio-economic status of households or by distance between households and the nearest frontline worker. There was evidence of a difference by place of birth for clean cord tying and exclusive breastfeeding of newborns.

Population level coverage of newborn interventions that occur at birth was highest for immediate drying and wrapping (no difference between home and facility births), followed by clean cord cutting (no statistical difference by place of birth,

then clean cord tying (higher amongst newborns born in a facility (75% vs 55%, p=0.04), and lowest for immediate breastfeeding (weak evidence of being higher for newborns born in a facility (48% vs. 37%, p=0.09). The estimates for clean cord care and thermal care in health facilities were surprising given that in our sample of health facilities just 28% and 16% of facilities had the essential items required to provide either clean

Table 13 – Vaccination coverage amongst infants born six to 12 months prior to survey

Vaccination coverage	Coverage amongst infants alive on the day of survey who were born in the 6-12 months preceding survey (N=182) % (95% CI)
BCG	38% (28-49)
OPV 0	36% (25-47)
OPV 1	26% (17-36)
OPV 2	18% (10-26)
DPT 1	29% (19-39)
DPT 2	20% (12-28)
DPT 3	8% (2-13)

cord care or immediate drying and wrapping of the newborn, and were providing services on the day of survey (Annex 3).

Post-natal care checks – where life saving newborn behaviours in the first days after life can be reinforced – were largely absent in Gombe State. So although some frontline worker cadres felt they spent most time providing newborn health care (see figures 6-8), this was not well reflected in the household survey data. The newborns who did receive a check were predominantly born in health facilities (10% vs. 4% amongst those born at home), and predominantly from the least poor households. Population level coverage of newborn interventions that occur in the first days after birth was highest for not putting anything on the cord (no

statistical difference between home and facility births). Forty three percent of newborns had exclusive breastfeeding in the first three days of life, with higher coverage amongst those born in a health facility (55% vs. 38%, p=0.003).

Care outside the home was sought for just one third of newborns who had a danger sign in the first month of life. And just 20% of frontline workers in health facilities had good knowledge about actions to take for the low birth weight baby.

All newborns should receive two vaccinations in the first two weeks of life, BCG and OPV. Both vaccines were received by approximately one third of newborns and BCG was in stock in just over half of facilities, OPV in approximately two thirds of facilities. ■

"

Few newborns were receiving post-natal care, and there was no evidence of an association between post-natal care and coverage of life saving interventions."

Box 10 – Relationship between number and quality of post-natal care interactions, and between number of interactions and coverage of critical interventions at baseline

The foundation Theory of Change (figure 1) hypothesises that enhanced interactions can increase the coverage of critical interventions. Here we examine that theory by looking for evidence of an association between more post-natal interactions and better quality post-natal care, and more post-natal interactions and higher coverage of critical interventions for newborns.

More interactions and better quality post-natal care
Example 1. More interactions is associated with more components of good quality post-natal care received by individual newborns in the first month after birth

In the first month after birth, for every increase in number of post-

natal care interactions, newborns received 0.4 more components of good quality post-natal care (coefficient 0.44, 95% CI 0.37-0.51, p<0.001).

More interactions and better care seeking for sick newborns
Example 2. More post-natal interactions was not associated with better care seeking for sick newborns

No relationship was apparent between the number of post-natal care interactions in the first month of life and care seeking outside the home for sick newborns (coefficient 0.18, 95% CI -0.23 – 0.27, p=0.88). Neither was there evidence of an association between having a post-natal care interaction in the first week of life and care seeking outside

the home (coefficient 0.17, 95% CI 0.01 – 56.2, p=0.55).

More interactions and higher coverage of critical interventions
Example 3. No evidence between more post-natal interactions and coverage of the critical interventions clean cord care, exclusive breastfeeding for the first three days of life, or skin-to-skin care

There was no statistical evidence of an association between having a post-natal care visit in the first seven days of life and clean cord care (odds ratio 1.25, 95% CI 0.4-4.1, p=0.71), or exclusive breastfeeding for the first three days (odds ratio 1.38, 95% CI 0.5-3.8, p=0.53), or practising skin-to-skin care (odds ratio 0.36, 95% CI 0.10 – 1.3, p=0.12).

Frontline worker contact with families

In the household survey, 2020 women aged between 13-49 were asked about the contact that they and their families have with frontline workers.

Contact with frontline workers at primary health facilities
Excluding 282 don't know responses, the median time to travel on foot from the household to the nearest primary level health facility was estimated to be 25 minutes (inter-quartile range 10-40);76% of women said they walked to the facility the last time they went. Thirty four percent of women (n=679) had visited a primary health facility at least once in the six months preceding survey: of those who had not attended, 81% said they had had no reason to attend, 14% said the facility was too far away, and two percent each said they had no money or they had no permission to visit a facility.

Amongst the 679 women who had visited a primary health facility in the last six months, 44% said

> " Six percent of women reported having a home visit by a frontline worker in the previous six months, and the most common topic of conversation was maternal and newborn health."

that treatment seeking was the primary reason for their last visit, 32% for child immunisation or routine child health checks, 15% for pregnancy care, three percent for intra-partum care, and one percent for family planning.

Contact with frontline workers at home

Six percent of women (n=112) reported having a home visit by a frontline worker in the previous six months, 91% saying that the frontline worker came to speak to her personally, nine percent to the household head. The most commonly reported frontline worker cadre to visit were Community Health Extension Workers or Community Health Officers (together making 38% of home visits in the last six months), TBAs (making 36% of visits in the last six months) and FOMWAN volunteers (making 17% of visits in the last six months).

The 112 women who had been visited by a frontline worker reported that the most common topics of conversation with the frontline worker were: maternal and newborn health care (43% of visits), child nutrition and immunisation (30%), water, sanitation and hygiene (13%), and sexual health (12% of visits).

Contact with frontline workers in community meetings

Three percent of women (n=54) had attended a community meeting to discuss health issues in the previous six months. These meetings had been organised by community health volunteers (43%), primary health facility staff (41%), village or district health committees (9%), or by independent projects (four percent, naming UNICEF and Society for Family Health). These 54 women reported that the most common topics of conversation with the frontline worker at community meetings were maternal and newborn care (35% of meetings), child nutrition and immunisation (30%), water, sanitation and hygiene (16%), and sexual health (10% of meetings).

Knowledge of demand-creation innovations implemented by Society for Family Health

Finally, women were asked whether they had any knowledge of the innovations implemented by Society for Family Health that target demand creation. They were asked directly whether they had heard of the project, and whether they had heard of and used the emergency transport scheme and call centre, with prompts provided by interviewers to describe these innovations. Twenty-five percent (95% CI 20-31) had heard of the project "Inganta Rayuwar Iyali"; six percent (95% CI 4-9) had heard of the MNH call centre, and 0.5% (n=12) had already accessed it; three percent of women (95% CI 1-5) had heard of the emergency transport scheme, and 0.7% (n=15) had already accessed it. ■

Photos below:
Below: Meeting with local leaders to discuss family health, Gombe State, Nigeria. © Society for Family Health
Below left: A traditional market place, Lagos, Nigeria. © iStockphoto

Discussion
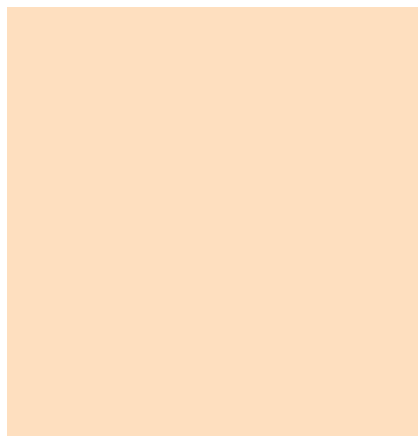
Photos above:
Above right: A mother and child recieving treatment. © Teun Bousema
Above far right: Hosptial beds, Nigeria. © Dr Bilal Avan

This report has presented findings from the 2012 Gombe State survey of interactions between families and frontline workers, and coverage of critical interventions for mothers and newborns. For each stage along the continuum of care between pregnancy and the newborn period, the number and quality of interactions has been described, and the coverage of critical interventions at the population level estimated. Where possible, number of interactions and coverage of interventions has also been disaggregated by indicators of equity. We have also presented analysis showing which interactions appear to have an important relationship with improved quality and coverage of interventions.

Overall, the survey results present a picture of maternal and newborn health care in Gombe State that is comparable to other high mortality settings in sub-Saharan Africa, and results that provide detailed insight into different elements of maternal and newborn care. A detailed review of these findings in light of previous survey results from North-Eastern Nigeria is planned.

For women, there was a great deal of inequality in both the number of interactions and in the coverage of life saving interventions for the poorest women when compared to the least poor. The majority of women access pregnancy care at least once, but fewer than half have the recommended four visits, and the quality of care received is low when measured at the population level – due to frontline workers not providing appropriate counselling as well as to facilities not being fully equipped. Only around half of women benefitted from any of the life saving interventions available to them in pregnancy. However, there was evidence that more pregnancy care interactions had a positive relationship with more components of good quality care being delivered, and had a positive relationship with higher coverage of life saving interventions in the pregnancy period.

A much smaller number of women accessed facility based intra-partum care, fewer still had skilled attendance at birth. There were large differences in the quality of health care that a frontline worker was able to deliver depending on her place of work, but also depending on her knowledge of appropriate care. The coverage of life saving interventions that should reach all women when giving birth was low, particularly for those giving birth at home: as for pregnancy care, considerable inequities

were observed in both the frequency of interactions and in the coverage of interventions between women living in the most poor and the least poor households. However, there was evidence of a positive relationship between more skilled attendance at birth, better quality of care, and higher coverage of the interventions that save lives: if more frontline workers become available to provide these services then it is possible that coverage of these interventions could increase dramatically.

Post partum and post natal care were almost completely absent in the State, being provided mainly to the least poor families. But even when post-partum or post-natal care interactions took place, they did not appear to have a measurable effect on life saving behaviours in the first days after birth.

Limitations
A number of limitations are present. First, survey data collection approaches to measure behaviours that occur during pregnancy, intra-partum and newborn periods may be susceptible both to recall error and to recall bias. We tried to limit recall error by only analysing data on births from the last 12 months

in the household survey, and the last birth attended by frontline workers. Recall bias is harder to control (for example a frontline worker may strongly prefer to report that she had used uterotonics at the last birth attended, even if she had not), but by triangulating data from different sources we have tried to understand whether the story of maternal and newborn health was coherent and consistent, and to highlight areas where it was less clear. Second, estimating population level coverage of some intra-partum interventions is problematic: frontline workers cannot provide population level estimates where the large majority of women have no skilled attendance at birth, and women cannot reliably answer questions about the drugs or medical behaviours they received during labour. Therefore, for two intra-partum life saving interventions we have attempted to combine frontline worker reports about behaviours together with population level reports about who attended births. It will be interesting to repeat this analysis with other data sources to see how well it translates to other settings. Third, this analysis has presented binary associations throughout. It is likely that analysis that adjusts for education level or age of women will also be important: this will be carried out in the next phase of work. Fourth, due to the security

situation in Gombe State the main investigators from IDEAS were not able to be present throughout the data collection periods: we are grateful to Health Hub for the careful coordination of the field work. Finally, this survey had a relatively small sample of facilities and frontline worker interviews: the survey was powered to calculate a range of outcomes measured from the household survey. It was unknown before going to field how many primary level facilities or frontline workers would be present in the household clusters sampled. Fifteen household clusters had no dedicated primary level health facility and seven household clusters had no dedicated facility or frontline worker.

Next steps
The next step will be to repeat the household, facility and frontline worker survey in Gombe State at least two years after the baseline: IDEAS remains in close contact with the Society for Family Health to understand the extent to which their innovations are implemented at scale in the State. At the time of that endline survey, an analysis of change between baseline and endline indicators in interactions and coverage of critical interventions will be made, after adjusting for important contextual factors. ■

> "
> Overall, the survey results present a picture of maternal and newborn health care in Gombe State that is comparable to other high mortality settings. Two-thirds of women accessed pregnancy care at least once but fewer than one-quarter had skilled attendance at birth and fewer than 10% had any post-partum care."

Abbreviations and acronyms

Acronym	Meaning
95% CI	95% confidence interval
AMTSL	Active management of the third stage of labour
ANC	Antenatal care
BCG	Bacille Calmette Guerin
BP cuff	Blood pressure monitor
DHS	Demographic and Health Survey
DPT	Diptheria, pertussis, tetanus vaccination
FOMWAN	Federation of Muslim women association of Nigeria
IDEAS	Informed Decisions for Action in maternal and newborn health
IPTp	Intermittent presumptive treatment for malaria
LBW	Low birth weight
LGA	Local Government Area
LSHTM	London School of Hygiene and Tropical Medicine
MNH	Maternal and newborn health
OPV	Oral polio vaccine
PMTCT	Prevention of mother to child transmission of HIV
SFH	Society for Family Health
TBA	Traditional birth attendant
TT vaccines	Tetanus toxoid vaccination
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

Annex 1

Critical interventions for mothers and newborns.

Interactions between families and frontline workers target the delivery of *critical interventions*[1] for mothers and newborns, as summarised in table A1.

[1] Adapted from "Partnership for Maternal Newborn & Child Health, Essential Interventinos, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Heallth. A Global Review of the Key Interventions Related to Reproductive, Maternal Newborn and Child Health (RMNCH), 2011."

Table A1 – Critical interventions for mothers and newborns along the continuum of care that are amenable to be delivered by frontline workers

Pregnancy care	Intra-partum care	Newborn immediate and post-natal care	Maternal post-natal care
1. Tetanus toxoid vaccine (effective protection being at least two doses in last three years or five in a lifetime)	1. Prophylactic uterotonics to prevent post-partum haemorrhage	1. Clean cord care (cutting, tying, nothing put on cord)	1. Detection and treatment of maternal anaemia
2. Iron supplementation	2. AMTSL (above + cord traction)	2. Breastfeeding (immediate (<1hr) and exclusive (3 days)	2. Detection and treatment of post partum sepsis
3. Prevention of malaria with IPTp and personal use of ITNs	3. Hand washing with soap by delivery attendant	3. Thermal care (immediate drying, wrapping, immediate skin to skin, delayed bathing)	
4. Syphilis prevention and management	4. Use of gloves by delivery attendant	4. Detection and appropriate management of complications (infection, respiratory, low birth weight, preterm)	

Annex 2

Indicators for enhanced interactions (more and better) between families and frontline workers across the continuum of care.

Table A2 – Indicators for enhanced interactions (more and better) between families and frontline workers across the continuum of care

Stage	Indicator
More pregnancy care interactions	
1	Mean number of pregnancy interactions per woman[1]
2	Percent of women who had any pregnancy care[1]
3	Percent of women who attended a health facility at least once for pregnancy care[1]
4	Percent of women who had a least one pregnancy care interaction with a skilled provider[1]
5	Percent of women who had a least four pregnancy care interactions (with any provider)[1]
Better pregnancy care interactions	
1	Percent of women who had (unprompted) knowledge of at least one danger sign in pregnancy (valid responses included: severe headaches, blurred vision, reduced foetal movement, high blood pressure, convulsions, excessive bleeding, severe abdominal pain, high fever, anaemia)[1]
2	Percent of women who reported having made any preparations for delivery (Components included preparing finances, transport, food, and identification of a birth attendant and a facility)[1]
3	Median gestation at first pregnancy care interaction[1]
4	Percent of women who reported having received good quality pregnancy care (components included weight, height and blood pressure measured, urine and blood tested; counselled for breastfeeding, danger signs, birth preparedness)[1]
5	Percent of frontline workers who have knowledge of focussed pregnancy care[2]
6	Percent of primary level facilities with all essential commodities needed to deliver pregnancy care[2]
More intra-partum interactions	
1	Percent of women who delivered in a health facility[1]
2	Percent of women who were attended by a skilled attendant during last birth[1]
3	Percent of women who were advised to seek extra care during intra-partum period who did seek extra care[1]
4	Percent of births delivered by caesarean section[1, 2]
Better intra-partum interactions	
1	Women with (unprompted) knowledge of at least one intra-partum danger sign (Valid responses included: vaginal bleeding, foul discharge, high fever, foetus hand or feet present first, foetus in abnormal position, prolonged labour, retained placenta, ruptured uterus, prolapsed cord, cord around newborns neck, convulsions)[1]
2	Percent of frontline workers with knowledge of actions to take when a women bleeds heavily in the intra-partum period[2]
3	Percent of frontline workers who have the essential items they need to provide good quality care
4	Percent of health facilities with essential commodities needed for intra-partum care[2]

Stage	Indicator
More postpartum interactions	
1	Percent of women who had at least one postpartum check within 2 days of birth[1]
2	Percent of women who had at least one postpartum check within 7 days of birth[1]
Better postpartum interactions	
1	Percent of women who reported receiving good quality postpartum care (breasts checked, bleeding checked, counselled for: danger signs, family planning, nutrition)[1]
More postnatal interactions	
1	Percent of newborns who had at least one postnatal check within two days of birth[1]
2	Percent of newborns who had at least one postnatal check within seven days of birth[1]
3	Percent of mothers whose newborn had at least one danger sign in the first 28 days of life who sought care for that danger sign outside the home[1]
Better postnatal interactions	
1	Percent of newborns receiving good quality postnatal care (components include newborn weighed, cord checked, mother counselled on breastfeeding, thermal care, and newborn danger signs)[1]
2	Percent of frontline workers with knowledge of actions to take for low birth weight newborns[2]

[1] Measured through household surveys, interviewing women with a live birth in the 12 months preceding survey

[2] Measured through health facility and frontline worker surveys, recording availability of supplies on the day of survey

Annex 3

Routine obstetric and newborn signal functions for all mothers and babies.

The basic care requirements for all mothers and newborns include the following signal functions[1]: (1) monitoring and management of labour using partograph, (2) infection prevention measures (hand-washing, gloves), (3) active management of third stage of labour (AMTSL), (4) thermal protection of the newborn, (5) infection prevention including hygienic cord care, (6) immediate and exclusive breastfeeding. In addition, basic pregnancy care includes checking temperature, weight, blood pressure, foetal heartbeat, testing urine for protein and testing blood for syphilis, providing tetanus toxoid protection, iron prophylaxis and protection from malaria. In Table A3 below we present facility readiness to provide each of these functions (excluding AMTSL since the commodity required, a uterotonic drug, is included in monitoring and management of labour using a partograph, and immediate and exclusive breastfeeding since these do not require commodities under normal circumstances).

[1] Gabrysch et al (2012) New Signal Functions to Measure the Ability of Health Facilities to Provide Routine and Emergency Newborn Care. PloS Med 9(11).

[2] Stethoscope, BP cuff, thermometer, adult scale, fetal stethoscope, timing device, disposable gloves, urine protein test kit, single use syringes, tetanus toxoid vaccines, ferrous/folate, sulphadoxine pyrimethamine.

[3] Partograph, BP cuff, urine dipstick, fetal stethoscope, thermometer, oxytocin.

[4] Disinfectant, disposable gloves, soap.

[5] Towel to dry the newborn, blanket to wrap the newborn.

[6] Sterile cord cutter, cord tie.

Figure A.3. Facility readiness (services provided and commodities available) to provide focussed pregnancy care and four basic obstetric and newborn signal functions to all mothers and newborns (excluding the third signal function, AMTSL, which overlaps with monitoring and management of labour using a partograph, and the sixth signal function: immediate and exclusive breastfeeding which has no essential commodity)
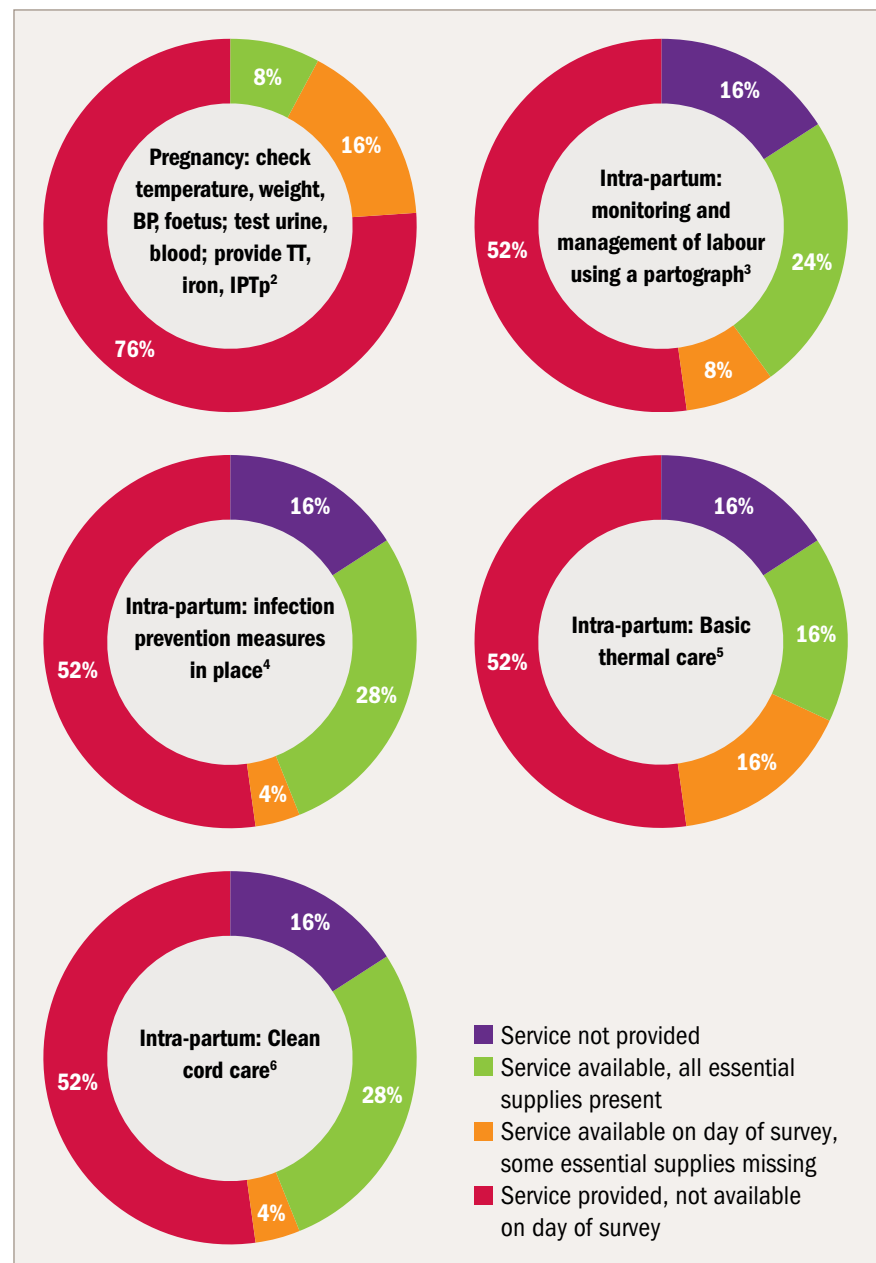
Photo: Mother and child.
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IDEAS project

IDEAS (Informed Decisions for Actions) aims to improve the health and survival of mothers and babies through generating evidence to inform policy and practice. Working in Ethiopia, North-Eastern Nigeria and the state of Uttar Pradesh in India, IDEAS uses measurement, learning and evaluation to find out what works, why, and how in maternal and newborn health programmes.

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