Changes in Maternal, Newborn and Child Health in 115 Rural Woredas of Amhara, Oromia, SNNP, and Tigray Regions of Ethiopia, 2008 - 2010

Findings from the L10K Baseline and Midterm Surveys

Addis Ababa, Ethiopia
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CHANGES IN MATERNAL, NEWBORN AND CHILD HEALTH IN 115 RURAL WOREDAS OF AMHARA, OROMIA, SNNP, AND TIGRAY REGIONS OF ETHIOPIA, 2008 – 2010

FINDINGS FROM THE LAST TEN KILOMETERS PROJECT BASELINE AND MIDTERM SURVEYS

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The Last Ten Kilometers: What it takes to Improve Health Outcomes in Rural Ethiopia

The Last Ten Kilometers: What it takes to Improve Health Outcomes in Rural Ethiopia is a Bill & Melinda Gates Foundation funded project implemented by JSI Research & Training Institute, Inc. The Last Ten Kilometers Project (L10K) aims to strengthen the bridge between households, communities, and the health extension program (HEP) of the Ethiopian Government. L10K mobilizes families and communities to more fully engage to improve household and community health practices, ultimately leading to improved key maternal, neonatal and child health (MNCH) outcomes and contributing towards achieving Millennium Development Goals 4 and 5 (i.e., decrease child and maternal mortality rates). In order to spread its reach and learning, L10K partners with and enhances the capacity of 12 local Civil Society Organizations and Non-Governmental Organizations to cover 115 *woredas* (i.e., districts) and reach about 14 million people in four of the most populous regions of the country: Amhara, Oromia, Tigray, and the Southern Nations, Nationalities and People's Region (SNNPR). The L10K foundational community strategy improves the skills of Health Extension Workers (HEWs) to work with their communities by organizing and utilizing a network of Community Health Promoters (CHPs), now the Health Development Army (HDA). The L10K project mobilizes existing community structures, organizations and institutions (such as *idirs*, churches, mosques, and women's and youth associations) to act as anchors to motivate and sustain the activities of the HDA. In addition to the foundational community strategy, L10K also implements four distinct innovative community strategies. These are: Community Based Data for Decision Making (CBDDM), Participatory Community Quality Improvement (PCQI), Community Solution Fund (CSF), and Non-Financial Incentives (NFI). These four strategies are implemented in addition to the L10K foundational strategy in a limited number of *woredas* (14 *woredas* per strategy) to demonstrate their added value in achieving the project objectives.

Abstract
Data from the December 2008 L10K baseline survey and the December 2010 midterm survey was used to assess changes in the *kebele* health systems supporting the HEP, changes in access and exposure to MNCH messages and services, and changes in MNCH care behavior and practices. For these purposes, bivariate statistical procedures were used to analyze information obtained from 6,292 women and 204 communities (i.e., *kebeles*) during the baseline survey and 9,960 women and 330 *kebeles* during the midterm survey. The findings indicate that the HEP coverage was almost universal during baseline; nevertheless, the midterm survey recorded further expansion of HEP infrastructure and greater deployment of human resources since then. Interactions between the HEP frontline workers, i.e., the HEWs and CHPs (now HDA), and households increased. MNCH behavior and practices including utilization of services improved in L10K areas between the survey periods. For example, over the analysis period the contraceptive prevalence rate increased from 29 to 40 percent; antenatal care coverage increased from 52 to 66 percent; institutional deliveries increased from 6 to 11 percent; coverage of any postnatal care increased from 8 to 19 percent; thermal care of the newborn increased from 12 to 23 percent; and initiation of breastfeeding immediately after birth increased from 43 to 53 percent. However, the rate of change of some indicators, mainly relating to delivery and postnatal care, were not on track to reach MDG 5; while the quality of services is still not optimal. Special attention will be needed to increase institutional deliveries, deliveries assisted by trained professionals and the quality of maternal and neonatal health services provided by HEWs. The report has implications for future maternal and newborn health interventions in the country.

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ACRONYMS

ACT	Artemisinin Combination Therapy
ANC	Antenatal Care
ARI	Acute Respiratory Infection
BCC	Behavioral Change Communication
BCG	Bacillus Calmette–Guérin Vaccine
CBRH	Community Based Reproductive Health
CBRHA	Community Based Reproductive Health Agents
CHP	Community Health Promoter
CPR	Contraceptive Prevalence Rate
DK	Don't Know
EDHS	Ethiopian Demographic and Health Survey
EmONC	Emergency Obstetric and Neonatal Care
EPI	Expanded Program of Immunization
ENA	Essential Nutrition Action
ESHE	Essential Services for Health in Ethiopia
FMOH	Federal Ministry of Health
FP	Family Planning
HDA	Health Development Army
HEP	Health Extension Program
HEW	Health Extension Worker
HH	Household
HMIS	Health Management Information System
HP	Health Post
IMNCI	Integrated Management of Newborn and Childhood Illness
IUD	Intrauterine device
JSI	JSI Research & Training Institute, Inc.
L10K	Last Ten Kilometers
MDGs	Millennium Development Goals
MF	Model Family
MNCH	Maternal, Neonatal and Child Health
M&NH	Maternal and Neonatal Health
NGO	Non-Governmental Organization
ORS	Oral Rehydration Salt
ORT	Oral Rehydration Therapy
PHCU	Primary Health Care Unit
PNC	Postnatal Care
PPS	Probability Proportional to Size

RHB   Regional Health Bureau

RHF   Recommended Home Fluid

RMNCH   Reproductive, Maternal, Neonatal, and Child Health

SNNP   Southern Nations, Nationalities and People's Region

TT2+   Two or More Tetanus Toxoid Injections

TTI   Tetanus Toxoid Injection

USAID   United States Agency for International Development

vCHW   Volunteer Community Health Worker

WHO   World Health Organization

ACKNOWLEDGMENT

EXECUTIVE SUMMARY

Introduction

Since December 2008, the Last Ten Kilometers Project (L10K), funded by the Bill & Melinda Gates Foundation and implemented by JSI Research & Training Institute, Inc., has provided grants and technical support to 12 regional-level civil society organizations. These civil society organizations implement innovative strategies to engage local communities to participate in and strengthen the Health Extension Program (HEP) of the Ethiopian Government to improve maternal, neonatal,[1] and child health (MNCH). These activities are ongoing in 115 rural *woredas*[2] of Amhara, Oromia, Southern Nations, Nations and Nationalities and Peoples (SNNP), and Tigray regions, and contribute towards Ethiopia's Millennium Development Goals (MDGs) 4 and 5.

A baseline survey was conducted in December 2008 – January 2009 to benchmark the MNCH indicators in the L10K intervention areas. A midterm survey was then conducted in December 2010. This report presents the changes between the baseline and midterm surveys in 1) the *kebele* health system situation supporting the HEP; 2) access and exposure to MNCH messages and services; and 3) MNCH behavior and practices.

Methodology

The baseline and midterm surveys were conducted with two-stage stratified cluster sampling of representative women and communities in the L10K intervention areas. In the first stage, *kebeles* were randomly selected; one community questionnaire was

completed in each *kebele* by interviewing at least one health extension worker (HEW). In the second stage, households in the *kebele* were selected for interviews with three target populations—women of reproductive age, women with children 0 to 11 months, and women with children 12 to 23 months. The WHO 30 by 7 sampling method was used to select respondents. During the baseline survey 204 *kebeles* were visited, from which 203 community questionnaires were completed and 6,292 women were interviewed, including 4,080 women of reproductive age, 2,448 women with children 0 to 11 months, and 2,040 women with children 12 to 23 months. During the midterm survey 330 *kebeles* were visited, from which 326 community questionnaires were completed and 9,967 women were interviewed, including 3,960 women of reproductive age, 3,959 women with children 0 to 11 months, and 3,948 women with children 12 to 23 months.

Data from the community questionnaires were used for the situation analysis of the *kebele* health systems. Interviews with women of reproductive age were used in the analysis of family planning indicators; interviews of women with children 0 to 11 months were used in the analysis of maternal and newborn health indicators; and interviews of women with children 12 to 23 months were used in the analysis of child health indicators. Tests were done to see whether differences in MNCH indicators over time and across regions were statistically significant. Thresholds for statistical significance were set at $p<0.10$ for the situation analysis of the *kebele* health systems, and $p<0.05$ for the analysis of the women's interviews. Only statistically significant results are presented in this report, and findings are generalizable to the L10K areas only.

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[1] Newborn and neonate are used synonymously in this report to indicate the first four weeks of life.

[2] *Woredas* are administrative units comprising about 20 *kebeles*, on average.

Results

Changes in the situation of kebele health services

Health extension program coverage: The percentage of *kebeles* with at least one health post increased from 77 to 91 percent between the baseline and midterm surveys. At midterm Tigray had the lowest proportion of *kebeles* with at least one health post (78 percent); health posts were more common in *kebeles* in Amhara (99 percent), SNNP, and then Oromia (87 percent). The proportion of *kebeles* with at least one HEW increased from 94 to 99 percent, while the population-to-HEW ratio remained unchanged. At the time of the midterm survey the population-to-HEW ratio was 3,104 people per HEW; which was higher in Amhara and Tigray (3,977 people per HEW, and 3,699 people per HEW, respectively) compared to SNNP and Oromia (2,290 people per HEW and 2,162 people per HEW, respectively).

The Last Ten Kilometers Project (L10K) coverage: Ninety-seven percent of HEWs reported during the midterm survey that they had received training from the L10K project, while 95 percent attended at least one review meeting organized by L10K. The level of L10K intensity in *kebeles* was measured using an index constructed from 11 items that assessed the HEWs' perception of the level of support they receive from the L10K project for each of the eleven MNCH components.[3] The average L10K intensity score during the midterm survey was 39 percent of the maximum possible score, with significant regional differences: Oromia (58 percent), Tigray (40 percent), Amhara (37 percent), and SNNP (18 percent).

Community health promoters (CHPs):[4] The median number of households (HHs) covered by one community health promoter (CHP) decreased from 99 to 31 HHs per CHP during the analysis period. During the midterm survey, the average number of HHs per CHP ranged between 29 and 37; 41 percent of CHPs were female—the proportion of female being the highest in Tigray (65 percent), followed by Oromia (45 percent), then Amhara and SNNP (36 and 28 percent, respectively).

The level of support HEWs provide to CHPs was measured with an index combining four aspects of HEW support.[5] Between the two survey periods the average score of this index increased from 61 to 85 percent of the maximum possible score. HEW support for CHPs was strongest in Amhara and Oromia and weakest in Tigray and SNNP. At the time of the midterm survey the HEW support for CHP was the highest in Amhara and Oromia (91 and 86 percent, respectively), followed by Tigray and SNNP (82 and 76 percent, respectively).

Like the HEP support for CHP index, the extent of CHPs' support for the HEP (as perceived by HEWs) was measured with an index combining 17 aspects of support from CHPs.[6] The average score on this index increased from 48 to 66 percent of the maximum between the surveys.

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[3] The MNCH components considered were EPI, nutrition/growth monitoring, essential newborn care, ANC, delivery, referral, PNC, breastfeeding counseling, complementary feeding, family planning and CHP training/follow-up.

[4] The CHP strategy was present during the time of the midterm survey. The CHPs are now being replaced by women volunteers referred to as the Health Development Army (HDA) with increased density. While one CHP was responsible for providing health education to 25 to 30 households, one HDA will be responsible for the same for 5 households.

[5] The index was the sum of four items: 1) conducted regular meeting with the CHPs, 2) planned activities together, 3) set and reviewed targets for CHPs, and 4) provided supportive supervision to the CHPs.

[6] The 17 items were: immunization, child health/nutrition, essential neonatal care, diarrhea management, recognition of the danger signs of childhood illnesses, breastfeeding practices, complementary feeding, family planning, maternal health (ANC, delivery & PNC), latrine construction and use, personal hygiene, community mobilization, training/follow-up of model families; personal hygiene, community mobilization, household visits, outreach services, HMIS, and malaria.

Kebele health committee: The regularity (i.e., at least one meeting in three months) of *kebele* health committee meetings increased from 38 to 54 percent of the maximum in the last two years. Support from *kebele* health committee for HEP activities was measured with an index combining 12 different aspects of support.[7] Between the survey periods the average *kebele* health committee support for HEP index score increased from 24 to 35 percent.

Supportive supervision: The regularity of supportive supervisory (i.e., at least one visit in the last three months) visits to HEWs increased from 62 to 76 percent between the surveys, with the lowest rates in Amhara followed by the other regions that ranged between 80 and 90 percent. The quality of supportive supervision was measured with an index constructed from 10 components of good supervision.[8] The average score on this index increased from 55 to 69 percent of the maximum possible.

Health management information system (HMIS): HMIS performance was measured with an index combining nine services monitored by HMIS.[9] The average HMIS performance score increased from 46 to 61 percent of the maximum. HMIS performance was strongest in Tigray (72 percent) and weakest in SNNP (51 percent); while it was in between in the other two regions.

Commodity availability: Three indices were constructed to measure the availability of MNCH commodities. The *contraceptive availability index* (i.e., availability of pills, condoms & injectables) increased from 59 to 85 percent of the maximum. The *child health commodity availability index* (i.e., ORS, Vitamin A, Vaccine, anthelmintics, cotrimoxizole, and ACT) score increased from 25 to 47 percent of the maximum. Child health commodities were more available in Amhara and Tigray (59 and 52 percent, respectively) than in SNNP and Oromia (where it was 39 and 33 percent, respectively). The *maternal health commodity availability index* (i.e., iron tablets, misoprostol and ergometrine) remained problematically low, at 11 percent of the maximum possible index score during the midterm survey. During the midterm survey, the maternal health commodity availability index score was the highest in Tigray (22 percent) followed by the other three regions (ranging from 8 to 10 percent).

Changes in exposure of households and families to the health extension program

Household visits by HEWs: The proportion of women visited by a HEW in the six months preceding the survey increased from 37 to 50 percent between the survey periods. The quality of household visits by HEWs was measured with an index composed of 12 items HEWs should discuss during a home visit (i.e., women were asked to recall which topics the HEW discussed).[10] The assumption is that better interaction of the HEWs' visit with women would result in better recall of the topics discussed during the interaction. The average score of this index increased from 27 to 32 percent of the maximum scores.

Household visits by CHPs: The proportion of women visited by a CHP in the six months

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[7] The 12 items were: planning and monitoring HEP activities, pulling essential supplies from the *woreda*, pulling supportive supervision from the *woredas*, identifying barriers to the quality of services, coordinating with local developmental partners, referral services for EOC, referral services for sick children, community mobilization, latrine construction, personal hygiene, school health, and, provide incentives/motivation to CHPs.

[8] The following 10 aspects of supportive supervision were summed to produce the index: supplies, record keeping and reporting (HMIS), observe client interaction, provide written feedback, provide encouragement, provide administrative and technical updates, discuss problems encountered, conducted household visits, reviewed work-plan and results, and discussed CHP activities.

[9] The following nine items were summed to construct the index: vaccination, growth monitoring, essential newborn care, ANC, delivery, PNC, family planning, follow-up model families, and follow-up CHPs.

[10]The following 12 items were summed to create this index: The items were latrine use, hygiene, pit latrine construction, immunization, child nutrition, safe water use, family planning, pregnancy care, HIV/AIDS, newborn care, diarrhea treatment, and PNC.

preceding the survey doubled from 16 to 32 percent, with higher coverage in Tigray (56 percent) and the lowest coverage in Oromia (20 percent). Similar to the quality of HEW's household visits, the quality of CHP household visits was measured with an index of 12 items that should be discussed (with women being asked to recall what the CHP discussed.[11] This score increased from 22 to 27 percent of the maximum.

Model family households: The percentage of the women in L10K areas who were from a model family household or working towards becoming one increased from 9 to 30 percent. Model families are more common in Amhara and Tigray (45 and 37 percent, respectively) than SNNP and Oromia (15 and 1 percent, respectively).

Family health cards: The percentage of women with a family health card increased from 6 to 36 percent between the survey periods, with the highest coverage in Tigray (49 percent), followed by the other three regions (which ranged between 32 to 37 percent).

Changes in family planning indicators

The percentage of women of reproductive age who were in a union and currently using a contraceptive method (i.e., the contraceptive prevalence rate or CPR) increased from 29 to 40 percent. The method mix shifted between the two surveys, the proportion of contraceptive users using injectables declined from 87 to 81 percent; the proportion using implants increased from four to 10 percent; while the proportion using oral pills declined from eight to five percent.

The proportion of contraceptive nonusers who were advised about family planning by a health worker increased from 25 to 40 percent in the last two years. During the midterm survey, the health worker's

interactions with contraceptive nonusers to discuss family planning were highest in Tigray (53 percent), followed by SNNP (43 percent), and then Amhara and Oromia (37 and 33 percent, respectively).

There were no changes in future desire to use contraceptives among nonusers (62 at midterm); the desired number of children among women of reproductive age (4.5 children); and the desire to limit childbirth among women of reproductive age (39 percent).

Changes in maternal and newborn health indicators

Household visits by health workers during pregnancy: The percentage of women with children 0 to 11 months who were visited by a HEW or CHP during their last pregnancy increased from 15 to 34 percent in midterm. At midterm household visits by health workers during pregnancy were the highest in Tigray (43 percent) and the lowest in Oromia (27 percent), and in-between in the other two regions. An index of quality of household visits by health workers during pregnancy (composed of 19 items health workers should discuss, as recalled by women in the survey) increased from 11 to 17 percent of the maximum possible.[12] The quality score during the midterm was the highest in Oromia (22 percent) followed by Tigray (18 percent), and then Amhara and SNNP (15 percent, each).

Tetanus toxoid injection: The percentage of women with children 0 to 11 months who reported that they received two or more tetanus toxoid injection during their last pregnancy increased from 41 to 45 percent in midterm. During the midterm the tetanus

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[11] The 12 items were: hygiene, pit latrine construction, immunization, child nutrition, latrine use, safe water use, HIV/AIDS, pregnancy care, family planning, diarrhea treatment, and family health services.

[12] The 19 items were: to get ANC, to get TT vaccination, take iron tablet, take extra food, take rest, avoid heavy work, seek care if health problem, exclusive breastfeeding, put the baby to breast after birth, to save money for emergency, delay bathing the newborn, sleep under bed net, counsel and test for HIV, No pre-lacteals, to arrange emergency transport, give colostrum, LAM, ensure a trained birth attendant, and apply nothing on umbilical stump.

toxoid coverage was the highest in SNNP (56 percent; while in the other regions it ranged between 39 and 48 percent.

Antenatal care: The percentage of women with children 0 to 11 months who visited a health facility during their last pregnancy for a check-up (i.e., ANC coverage) increased from 52 to 66 percent. ANC coverage varied significantly by region—coverage was the highest in Tigray (87 percent), then SNNP (74 percent), Oromia (64 percent), and then in Amhara (56 percent). The proportion of women receiving four or more ANC visits increased from 18 to 26 percent during the same period. The percentage receiving four or more ANC was the highest in SNNP and Tigray (37 and 34 percent, respectively) followed by Oromia (28 percent) and then Amhara (15 percent).

The source of ANC changed between the surveys. Whereas during the baseline more women received ANC at health centers (54 percent compared to 33 percent at health posts), by the midterm survey the two types of facilities each provided about half of ANC. ANC quality was measured with an index constructed from 7 types of services and counseling as recalled by women.[13] The assumption is that better interaction during ANC is expected to result in better recall of the services received by the women. The index increased from 27 to 40 percent of the maximum possible score. During the midterm the quality of ANC was the highest in Tigray (47 percent) and between 37 and 39 percent in the other regions.

Birth preparedness: The percentage of women with children 0 to 11 months who reported taking any birth preparedness measure during their last pregnancy increased from 68 to 75 percent. The number of birth preparedness measures taken by

women increased from 17 to 23 percent (of seven possible measures).[14]

Bed net use by pregnant women: The percentage of pregnant women in malarious regions who slept under a bed net during the night preceding the survey increased from 24 to 45 percent.

Safe and clean delivery: The percentage of institutional deliveries increased from six to 11 percent. At midterm, the practice of institutional deliveries was the highest in Tigray (18 percent) followed by the other three regions where it ranged between nine to 11 percent. Deliveries assisted by health professionals (including HEWs) increased from 10 to 16 percent. The indicator at midterm was the highest in Tigray (26 percent) followed by Oromia and SNNP (16 percent each), and then Amhara (11 percent).

Cutting the umbilical cord with a clean or sterile blade remained almost universal (97 percent at midterm). Tying the cut cord stump with sterile or clean thread increased from 54 to 64 percent; it was highest during the midterm survey in Tigray (84 percent) followed by SNNP (79 percent), then Oromia (60 percent), and then Amhara (52 percent). Application of butter to the stump of the umbilical cord decreased slightly, from 29 to 25 percent. At midterm, the practice of applying butter to the cord was least common in SNNP (10 percent), followed by Oromia (23 percent), and then Amhara and Tigray (30 and 35 percent, respectively).

Postnatal care: The percentage of women with children 0 to 11 months whose last birth took place at home and who received a postnatal check-up (PNC) within 7 days increased from 4 to 14 percent, while PNC within 48 hours increased from 1.6 to 5.8 percent. The highest coverage of PNC in 7 days was observed in SNNP and Tigray (20 and 17 percent,

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[13] The 7 items were: weight taken, blood pressure measured, urine sample taken, blood sample taken, iron supplement given, given drugs for malaria, and intestinal parasite drugs given.

[14] The 7 birth preparedness measures considered: financial, transport, food, arrange birth attendant, identify health facility for delivery, prepare delivery materials, and identify blood donor.

respectively) during the baseline survey, followed by Oromia and Amhara (11 percent each); with similar patterns for PNC in 48 hours coverage. The PNC quality was measured with an index summing 7 components of PNC.[15] Better quality of PNC was expected to lead to better recall of the services received. This index of the quality of PNC by HEWs and CHPs increased from 14 to 24 percent.

Newborn check-up: PNC coverage for women was used as a proxy for newborn check-up services provided by health workers. The quality of newborn check-ups was measured with an index of nine components of the check-up.[16] This index quality of newborn check-ups increased from 12 to 23 percent.

Newborn health practice: Of women with children 0 to 11 months whose last delivery was not attended by a skilled health professional, the proportion who *took clean care of the umbilical cord* (i.e., cleanly cut and tied the cord and applied nothing to the cut stump) increased from 30 to 42 percent. Clean cord care at midterm was the highest in SNNP (63 percent), followed by Tigray and Oromia (47 and 39 percent, respectively), then Amhara (30 percent). The proportion of women with children 0 to 11 months in L10K areas who reported that they *took thermal care of the newborn* increased from 12 to 23 percent.[17]

Breastfeeding the newborn: The proportion reported *giving first milk (i.e., colostrum)* to the baby increased from 44 to 53 percent, with the highest rate now being in Tigray (69 percent), followed by Oromia

(58 percent), SNNP (52 percent) and then Amhara (44 percent). *Putting the baby to the breast immediately after birth* also increased from 43 to 53 percent, with the highest rates now in SNNP and Oromia (68 and 66 percent, respectively) followed by Tigray (54 percent) and then Amhara (34 percent). *Feeding the baby only breast milk during the first three days of life* increased from 70 to 80 percent. Again, this indicator was lowest in Amhara (60 percent) while in the other regions it ranged between 89 and 96 percent.

Exclusive breastfeeding of infants under six months of age during the 24 hours preceding the survey increased substantially from 66 to 80 percent. During the midterm survey the practice of exclusive breastfeeding was more-or-less at the same levels in Tigray, Amhara and SNNP (between 82 and 87 percent) while it was lagging behind in Oromia (73 percent).

Changes in child health indicators

Childhood immunization: Access to immunization, as measured by coverage of the Bacillus Calmette–Guérin (BCG) vaccine for tuberculosis, remained more-or-less the same (at about 84 percent). BCG coverage was highest at midterm in Tigray (97 percent), followed by Oromia (86 percent), then the other two regions (about 81 percent each). The dropout rate between the first and third dose of pentavalent declined modestly from 26 to 21 percent. The dropout rate at midterm was lowest in Tigray (7 percent), followed by Oromia (20 percent), and then the other two regions (about 26 percent each). Measles vaccine coverage increased slightly, from 69 to 75 percent. At midterm, the measles vaccine coverage was the highest in Tigray (90 percent), followed by the other regions (which ranged between 71 and 74 percent). The percentage of children fully vaccinated increased from 45 to 52 percent; which during the midterm was the highest in Tigray (77 percent), followed by Oromia (53

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[15] The 7 items were: examined body, checked breast, checked for heavy bleeding, counseled on danger signs, counseled on family planning, counseled on nutrition, and referred to health center/hospital.

[16] The 9 items were: examined baby's body, weighed baby, checked cord, counseled on breastfeeding, observed breastfeeding, counseled on keeping baby warm, checked on danger signs, counseled on danger signs, and referred to health center/hospital.

[17] Thermal care of the newborn includes drying and wrapping the baby before the placenta was delivered or immediately after birth, delaying bathing the baby more than six hours, and always maintaining skin-to-skin contact.

percent), then the other two regions (about 46 percent each).

Childhood illness and its care seeking behaviors: Of children 0 to 23 months of age with any ARI symptoms, the percentage taken to a health provider or given antibiotics remained unchanged (36 and 27 percent, respectively). Of children 0 to 23 months of age with diarrhea, the percentage taken to a health provider increased from 36 to 45 percent. ORS treatment for children with diarrhea increased from 23 to 28 percent. Of children aged 0 to 23 months with fever, the percentage taken to a health provider or given anti-malarials remained mostly unchanged (41 and 4 percent, respectively).

Children sleeping under bed nets: The proportion of children between the ages 0 and 23 months who slept under a bed net the night before the survey increased by 13 percentage points from 31 to 44 percent. In the malarious area the increase was even greater (from 36 to 55 percent; i.e., increased by 19 percentage points). During the midterm survey the proportion of children in malarious areas who were sleeping under a bed net was lowest in Oromia (46 percent), while it ranged between 55 and 62 percent in the other areas.

Knowledge about danger signs of childhood illnesses: Mothers' knowledge of danger signs during childhood was measured with an index constructed from 19 items. This score increased from 18 to 23 percent of the maximum possible. The knowledge of childhood illness signs among women was higher at midterm in Tigray and Oromia (about 25 percent each) compared to the Amhara and SNNP (where it was 22 and 19 percent, respectively).

Conclusions and recommendations

There have been significant improvements in HEP infrastructure establishment and human resources

deployment in L10K areas. The *kebele* level health systems and functions supporting HEWs and the HEP have also improved; this includes the HMIS, MNCH commodity logistics systems, supportive supervision systems, *kebele* health committees and CHPs. Despite these improvements, the *kebele* health systems are still less than optimal; as such, the health and development partners (including L10K) should target their efforts on areas where performance is lagging behind expectations. **Special efforts will be required to improve maternal and child health commodity availability; to improve *kebele* health committee's support of HEP activities; to improve the performance of HMIS; to improve the availability of essential equipment and materials required to provide HEP services, and to improve the frequency and quality of supportive supervision.**

Although the coverage of L10K training for HEWs is universal, **the intensity of the support the project provides to HEWs can be improved further**. **The L10K project should also track CHPs who have been replaced by the HDA to ensure that they are properly trained on high impact MNCH interventions.**

The intensity, quality, and efficiency of the interactions between the frontline health workers—i.e., HEWs and CHPs—with households and families have been improving in L10K areas. However, there is room for improvement both in overall quality and in particular regions that are lagging behind. **The intensity of household visits by CHPs is lagging in Amhara, Oromia, and especially in SNNP; special attention will be required to help these regions catch-up with Tigray's achievements. Distribution of family health cards can also be improved in Amhara, Oromia and SNNP. All regions have room for improvement in the quality of health workers' interactions with families, with special attention towards improving counseling on**

maternal and newborn health during household visits.

There have been significant increases in contraceptive use, and there is evidence that women are beginning to choose longer-acting methods. This reflects the national family planning policy and its emphasis on promoting the use of implant. In the Ethiopia Demographic and Health Survey (EDHS) 2011 the total demand for family planning was 54 percent, which is not enough to reach the Federal Ministry of Health's (FMOH) target for CPR—65 percent. **As such, multi-sectorial initiatives will be required to increase the demand for family planning in Ethiopia**. T**here is also an opportunity for the FMOH to expand the use of intra-uterine devices (IUDs) and permanent contraceptive methods, which in the long run will reduce costs for the national family planning program.**

More and better interactions between the HEP frontline health workers and women during pregnancy, delivery, and postnatal periods have been taking place since the inception of the L10K project. However, the observed improvements are not sufficient to reach the maternal health related MDG targets of the FMOH. There is an opportunity for learning within the project to improve these maternal and newborn health (M&NH) indicators. **Best practices should be identified from high performing areas to be replicated in the others.** Still, replication of these best practices will not be sufficient to attain some of the MDG targets set by the Health Sector Development Program (HSDP) IV. **Special, additional initiatives will be required to increase PNC, skilled attendance during delivery, and institutional deliveries. The impact of the HEP on M&NH can be further enhanced by improvements in the quality of M&NH services.**

Over the past two years child immunization coverage improved in L10K areas. The dropout rate of immunization from DPT1 to DPT3 was higher at midterm in SNNP, Amhara, and Oromia (between 20 and 27 percent) compared to Tigray (7 percent), which is consistent with the EDHS 2011. **Immunization coverage strategies being implemented in Tigray should be identified and replicated.**

There have been no major improvements in the management of childhood illness in L10K areas, other than an increase in the use of oral rehydration therapy for treating diarrhea. As such it is encouraging to note that the Integrated Community Case Management of Common Childhood Illnesses (ICCM) is being scaled up in Ethiopia.

INTRODUCTION

Ethiopia has a formidable task in reducing its child and maternal mortality rates to reach Millennium Development Goals (MDGs) 4 and 5. To achieve the goals by 2015 the Federal Ministry of Health of the Government of Ethiopia (2010) has set several targets: reduce the neonatal mortality rate (NMR)—the risk of mortality within the first four weeks of life—by more than half from 37 per 1,000 live births observed in the EDHS 2011 to 15 per 1,000 live births; reduce the infant mortality rate by nearly half from 59 to 31 per 1,000 live births during the same period; and reduce the under-five mortality rate (U5MR) from 88 to 67 per 1,000 live births during the same period. Ethiopia must also reduce the maternal mortality ratio from 673 per 100,000 live births observed in EDHS 2005 to 267 per 100,000 live births by 2015. In order to reach these maternal and child mortality reduction targets the health sector development strategy aims to do the following: increase the contraceptive prevalence rate (CPR) from 29 percent observed in EDHS 2011 to 65 percent in 2015; increase antenatal care coverage from 66 to 90 percent; increase deliveries attended by skilled birth attendants from 18 to 60 percent; increase postnatal care coverage from 34 to 78 percent; increase measles vaccination coverage from 77 to 90 percent; increase management of newborn[18] asphyxia from 7 to 75 percent; increase management of newborn sepsis from 25 to 74 percent; and increase appropriate management of childhood illnesses in health posts from zero to 100 percent (FMOH 2010, 2010a).

Launched in 2003, the health extension program (HEP) and its support system is Ethiopia's primary means to achieve its health related MDGs (Temiess 2008, Koblinsky et al. 2010, FMOH 2010). The main strategies of the HEP include expansion of physical health infrastructure and training and countrywide deployment of a cadre of female health extension workers (HEWs) who mainly provide a package of promotive and preventive health care services, with some basic curative services (Admassie et al. 2009; CNHDE 2008; Temiess 2008; Wakabi 2008). The HEP achieved almost universal coverage by establishing at least one health post and deploying at least two HEWs in almost all of the 15 thousand *kebeles*[19] in the country (FMOH 2010a). The HEWs are expected to spend 75 percent of their time conducting household visits and community outreach activities; training families to adopt the desirable health practices and serve as 'models' in their neighborhood; and, organizing communities to participate in the expansion of HEP services (see Appendix 1 for further details on the HEP).

Over the past decade the U5MR in the country declined by nearly half from 166 deaths per 1,000 live births in 2000 to 88 deaths per 1,000 live births in 2011 (Central Statistical Agency and ICF Macro 2011, Central Statistical Agency and ORC Macro 2005)—indicating that the country is on track to meet its MDG 4 to reduce U5MR to 67 deaths per 1,000 live births by 2015, if the current trend is maintained. Similar to many other developing countries, the observed reduction in U5MR is mainly due to the reduction in mortality among children 1 to 59 months of age, while the NMR remained mostly unchanged (Central Statistical Agency and ICF Macro 2011, Central Statistical Agency and ORC Macro 2005, Oestergaard et al. 2011). Neonatal deaths now account for 63 percent of all infant deaths and 42 percent of all under-five deaths (Central Statistical Agency and ICF Macro 2011). Therefore, Ethiopia must reduce the NMR to maintain the

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[18] Newborn and neonate are synonymously used in this report to indicate the first four weeks of life.

[19] A *kebele* is the smallest administrative unit of the country with a population of about five thousand.

declining U5MR trend. A growing body of evidence shows that, in resource-poor settings, simple community-based interventions to change antenatal, delivery, and newborn health care practices can significantly reduce neonatal deaths (Darmstadt et al. 2005; Kumar et al. 2008, Bhutta et al. 2008, Manandhar et al. 2004, Jokhio et al. 2005). Adapting these community-based interventions is ideal for Ethiopia because 90 percent of the births in the country take place at home (EDHS 2011) and the Health Extension Program (HEP) of the country provides the perfect platform to implement community-based health interventions.

The Last Ten Kilometers Project (L10K)—funded by The Bill & Melinda Gates Foundation and implemented by JSI Research & Training Institute, Inc. (JSI)—rolled out innovative community-based, high impact maternal and newborn health strategies in December 2008. L10K enhance interactions between the HEWs and the households and communities to achieve more accessible, efficient and equitable MNCH services in 115 *woredas*.[20]

The specific objectives of the L10K project are:

Objective 1: HHs and *kebeles* actively engaged in the provision of *kebele*-based health services in conjunction with the HEP in order to increase availability of services and change household/*kebele* health practices.

Objective 2: Households and *kebeles* actively informing, leading, owning, planning and monitoring their own MNH interventions.

Objective 3: Households and *kebeles* address identified barriers to quality MNH household/ *kebele* health practices and services through innovative *kebele* approaches.

Objective 4: HEWs, vCHWs, and model families motivated by non-financial incentives to provide RMNCH services in a sustainable manner.

Objective 5: Civil society partners capable of implementing grants program and building capacities of households and *kebeles* to participate in health programming with HEWs.

Objective 6: L10K project partners learn, document, and disseminate project experiences through monitoring and evaluation.

A baseline survey was conducted in December 2008 – January 2009 to benchmark the MNCH indicators in the L10K intervention areas (L10K 2009). Subsequently, a midterm survey was conducted in December 2010. This report presents the changes during that time period in the situation of the *kebele* health systems supporting the HEP; changes in the access and exposure to MNCH messages and services; and, changes in MNCH behavior and practices. (Please visit www.l10k.jsi.com to learn more about the baseline and midterm surveys and their findings.)

The L10K strategy and the program theory

Since 2008, L10K has been working with 12 regional-level civil society organizations (CSOs)—i.e., tier one implementing partners (IPs) or grantees—and about 24 *woreda*-level public administrations and CSOs—i.e., tier two grantees. L10K and its grantees work to implement innovative strategies that engage local communities to participate in strengthening the HEP to improve MNCH. The program is being implemented in 115 rural *woredas* located in Amhara, Oromia, Southern Nations, Nations and Nationalities and Peoples (SNNP), and Tigray, the four most populous regions of the country. These four regions cover a population of about 14 million—i.e., about 19 percent of the population of Ethiopia. (The list of

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[20] *Woredas* are administrative units comprising about 20 *kebeles*, on average.

woredas is provided in Table 1A of Appendix 2.) In doing so, L10K collaborates and coordinates with the respective regional, zonal and *woreda* health bureau administrations and other development partners. The L10K project works towards the six objectives described above to achieve more, better, efficient and equitable MNCH services provided by the HEP at scale.

The L10K project provides technical support to the 12 tier one grantees to implement the foundational community strategy in all 115 *woredas.* The number of *woredas* to be covered by L10K in each of the four regions was determined by the project, while the regional health bureaus (RHBs)[21] identified the specific *woredas* that would be covered within their respective regions. The location of the 115 L10K *woredas* according to their implementing partners is illustrated in Map 1. Brief descriptions of the 12 grantees are provided in Appendix 3. The foundational community strategy improves the skills of HEWs to work with their communities, organizing and utilizing a geographically dispersed network of community health promoters (CHPs)—now the Health Development Army (HDA).[22] The CHPs and the HDA are model family members selected by the community to volunteer and help the HEWs deliver

Map 1: L10K woredas by tier one grantee oganization

health messages for changing health practices in their neighborhood. The Essential Services for Health in Ethiopia (ESHE) project, implemented in 2003-2008, demonstrated a significant impact on child survival programs in Ethiopia using CHPs as one of its components (ESHE 2008). As they gain experience, the HEP expects the HEWs to give short trainings, then to mentor, encourage and supervise the CHPs (FMOH 2007). To motivate and sustain support from households, CHPs and the community as a whole, the L10K project fosters participation through existing community structures, organizations or institutions (such as *idirs*,[23] churches, mosques, women's and youth associations). The value of embedding the community health program within community institutions or 'anchors' is hypothesized to improve and sustain community health outcomes. These anchors foster credibility and recognition for CHPs, leading to sustained volunteerism by working through recognized community structures. The project develops tools and job aids and supports tier one and tier two grantees to improve the skills the

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[21] The RHB is the section of the regional government that is responsible for coordinating and implementing all health related activities within the region, with policy guidance provided by the Federal Ministry of Health of the Government of Ethiopia.

[22] The CHP strategy was present during the time of the midterm survey. The CHPs are now being replaced by women volunteers referred to as the Health Development Army (HDA) with increased density. While one CHP was responsible for providing health education to 25 to 30 households, one HDA will be responsible for the same for 5 households.

[23] *Idirs* are community insurance groups to finance funerals

frontline workers—i.e., HEWs and the CHPs/HDA—use when interacting with households and communities. One major aid for this job is the family health card,[24] which the HDA provided to all households. The family health card contains pictorial information on key MNCH messages that the HEWs and HDA use to educate individuals in one-to-one health sessions. The foundational community strategy was rolled out to the 115 *woredas* in two phases, due to both management issues and difficulty in identifying appropriate tier one grantees. Phase one, initiated in December 2008, covered 71 *woredas* (i.e., 20 in Amhara, 22 in Oromia, 19 in SNNP, and 10 in Tigray); while Phase two, initiated in December 2009, covers 44 *woredas* (i.e., 15 in Amhara, 13 in Oromia, 11 in SNNP, and five in Tigray).

Four additional activities comprise the second-generation community strategies; these fall under objectives two, three and four. Once the foundational community strategy was in place in *woredas*, these four second-generation strategies were added as a means of achieving the overarching objectives of the project. These are: Community Based Data for Decision Making (CBDDM) under objective two; Participatory Community Quality Improvement (PCQI) and Community Solution Fund (CSF) under objective three; and, Non-Financial Incentives (NFI) under objective four. The four strategies were implemented in 14 *woredas* each (i.e., totaling 56 *woredas*). L10K coordinated with the respective RHBs to select the *woredas* for the second-generation activities. The list of L10K *woredas* according

to implementation phase and second-generation activities is given in Table 1A of Appendix 2 and illustrated in both Map 2 and Figure 1. The CBDDM activities were initiated in August 2009 in the Phase One *woredas* while the other three community strategies were initiated in June 2010 in Phase One and Phase Two *woredas*. The CBDDM and PCQI activities are implemented by tier two grantees (i.e., mainly *woreda* health bureaus, *woreda* administration and *woreda*-level CSOs) with technical support from the tier one grantee; while the CSF and NFI activities are implemented by tier one grantees.

The L10K program theory framework is illustrated in Figure 2, which is derived from the

Map 2: L10K woredas according to implementation phase and second-generation activity

NB: Phase two woredas are shown with diagonally striped lines

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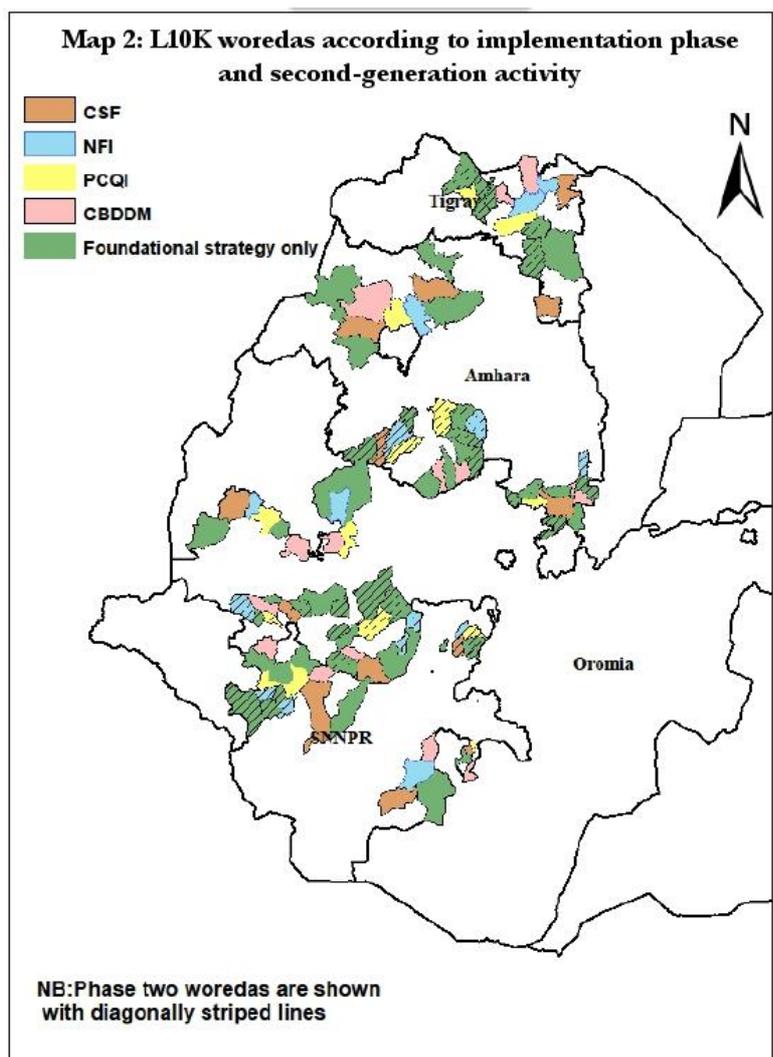
Figure 1: Distribution of the 115 L10K Woredas according to program strategy and phase

All			115		
Strategy	59 Foundation only	14 CBDDM	14 CSF	14 PCQI	14 NFI
Phase 1	31	14	11	9	6
Phase 2	28		3	5	8
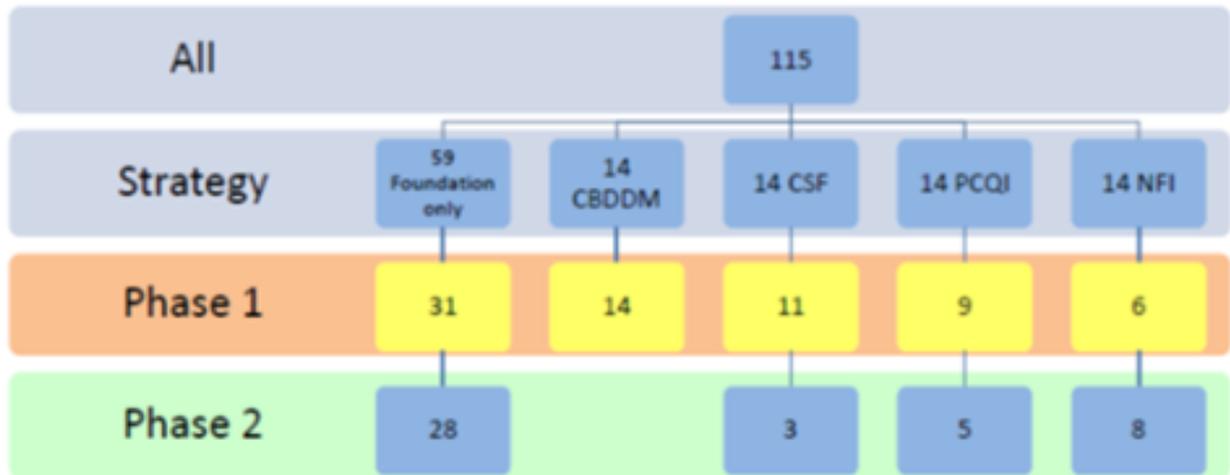
Figure 2: The L10K program theory framework
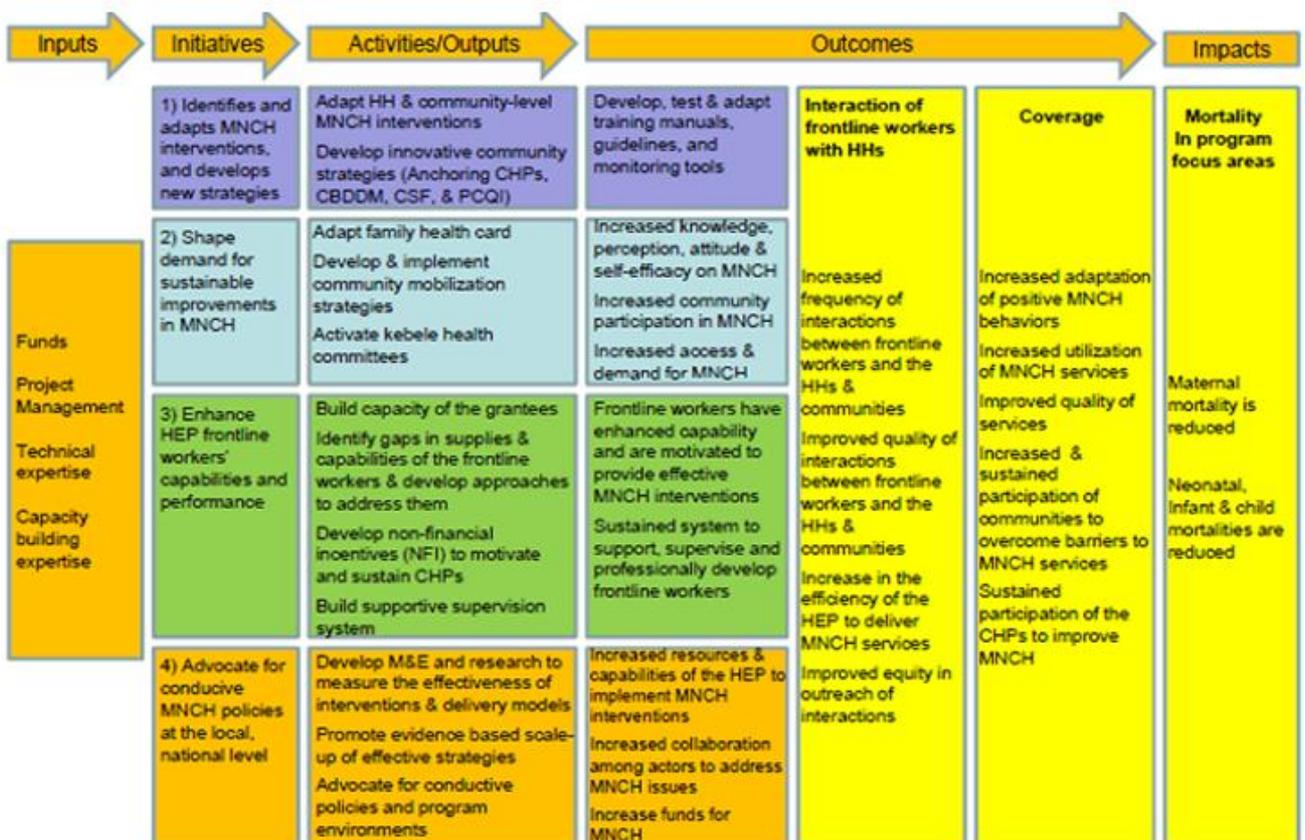
Key assumptions: 1) The supply-side systems, especially commodity supplies, technical support & referrals will be adequately responsive to the demand created by the enhanced interactions between frontline workers with the households and the communities; 2) increased coverage of effective interventions will significantly reduce maternal, newborn and child mortality . Acronyms: HH: households; CHP: community health promoter; CBDDM: community-based data for decision-making; CSF: community solutions fund; PCQI: participatory community quality improvement

maternal, neonatal, and child health strategy of the Bill & Melinda Gates Foundation (2009; 2011). To achieve its six objectives L10K includes four major initiatives: 1) identify and adapt effective household-, community- and health post-level MNCH interventions, and develop innovative community-

based strategies to deliver them; 2) increase demand for sustainable improvements in household and community MNCH behavior and practices, 3) enhance the skill of frontline workers (i.e., HEWs and CHPs/HDA) to improve their interactions with households and communities; and 4) advocate for conducive MNCH policies, funding, and leadership at the local, national and global level. Objectives one to five are embedded within the first three initiatives; while objective six is approached through the fourth initiative.

Although the framework separates the major activities (or outcomes) under the four L10K initiatives, there is also significant overlap. For example, the NFI activity (i.e., objective four) is listed under the third initiative (i.e., enhancing capabilities of the frontline workers). However, NFIs are also an output of the first initiative (i.e., identifying and adapting/developing interventions, tools & strategies) and contributes toward achieving the second initiative (i.e., shaping demand for sustainable improvement in MNCH outcomes). Similarly, anchoring CHPs (in the community) is listed under the first initiative but also contributes towards initiatives two and three; while the M&E and research activity listed under the fourth initiative cuts across all initiatives. All L10K initiatives are expected to contribute towards increased MNCH intervention coverage and reduced neonatal, infant and maternal mortality through more, better and equitable interactions between the frontline health workers and the households and community. As noted in Figure 2, the key assumptions of the program theory are 1) that supply-side systems, especially commodity supplies, technical support and referrals will be adequately responsive to the demand created by the enhanced interactions between frontline workers with the households and the communities; and 2) that increased coverage of effective MNCH interventions will significantly reduce maternal, newborn and child mortality.

METHODOLOGY

Study design

Using the L10K baseline survey, conducted in December 2008–January 2009, and the L10K midterm—also referred as the follow-up—survey conducted in December 2010, this study first examines whether there have been adequate improvements in indicators that measure 1) coverage of the health extension program and the performances of its systems; 2) interactions of the HEP frontline workers with households and families; 3) MNCH behavior and practices; and 4) the quality of MNCH services. The Institutional Review Board (IRB) clearance for this study was obtained from the Ethiopian Public Health Association (EPHA).

Data

The baseline and midterm surveys used two-stage stratified cluster sampling to obtain family planning related information from women of reproductive age (i.e., women 15 to 49 years); maternal, newborn and infant health and nutrition related measurements from women with children 0 to 11 months; child immunization and childhood illnesses related measurements from women with children 12 to 23 months; and HEP coverage, performance of the health systems supporting the HEP, and exposure to the L10K program coverage information from HEW interviews and observation of the health posts (HP). The questionnaires for women's interviews also collected data on the socio-demographic characteristics of the women, socio-economic and sanitation status of the households, and access and exposure to health messages and services. Altogether four survey instruments were used (i.e., three women's questionnaire and one community questionnaire; the questionnaires are available at www.l10k.jsi.com).The

women's questionnaires were pre-coded and translated into the three major local languages (Amharic, Oromifa and Tigregna). In SNNP there were at least 11 more local languages for which it was not feasible to translate the questionnaires. The interviewers, who were from these communities, translated the questions from Amharic into the local language while administering the questionnaires.

Most questions from the baseline survey were retained without changes in the midterm survey instrument. A few more questions were added to the midterm survey to measure the performance of the second-generation community strategies.

Baseline survey

With the statistical power set at 80 percent[25] and two-sided alpha error set at 0.05[26] the sample size for the women of reproductive age interviews during baseline was determined based on the assumption that the contraceptive prevalence rate would increase from 23 percent at baseline to 30 percent at the end of the project (in September 2012); for the women with children 0 to 11 months the baseline sample size assumption was that tetanus toxoid injection coverage during pregnancy would increase from 50 to 60 percent during the same period; and, for women with children 12 to 23 months the sample size assumption was that the children fully immunized would increase from 34 to 45 percent. The expected changes in the indicators were based on the trends observed by the Essential Services for Health in Ethiopia end-line survey (ESHE 2008). The cluster sampling design effect was assumed to be 1.5 for all the estimates. Accordingly,

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[25] Eighty percent chance to detect the difference in estimates between two samples when it truly exists in the population.

[26] Five percent or less chance to indicate that there is difference between two samples when in reality it does not exist in the population.

the sample size estimates (rounded) for the women of reproductive age sample was 1,000, for the women with children 0 to 11 months sample it was 600, and for the women with children 12 to 23 months it was 500. The analytic domains for the baseline survey were the four regions; as such, the estimated sample size was obtained from each region of the regions. During the first-stage of the cluster sampling, 50 *kebeles* each from Amhara, Oromia and SNNP were selected as the primary sampling units (PSUs) with the **p**robability **p**roportional to their population **s**ize (PPS). Populations of *kebeles* were obtained from each respective *woreda* administration because these data were more recent than the 2007 census.

In the course of another evaluation (the USAID funded Integrated Family Health Program [IFHP]), all *woredas* of Tigray, L10K and non-L10K, were included in the sampling frame and stratified into four domains (i.e., non-IFHP & L10K, non-IFHP & non-L10K, IFHP & L10K, and IFHP & non-L10K). The required number of clusters (*kebeles* were treated as clusters) from each domain were selected using PPS, which yielded 54 *kebeles* from the 15 L10K *woredas*. During the second-stage of the cluster sampling the World Health Organization (WHO) 30 by 7 cluster sample strategy, described by Lemeshow and Robinson (1985), was used to obtain information from 20 women of reproductive age (i.e., in ages 15 – 49 years), 12 women of reproductive age with children 0 to 11 months, and 10 women of reproductive age with children 12 to 23 months from each of the primary sampling units (the sample sizes according to sampling stage and domain is given in Table 1). The interviewers first went to the middle of the *kebele* where they randomly selected a household, and then visited every fifth household and interviewed all the women in that household if they were within the target population. Accordingly, if a woman of reproductive age had a child between 0 to 11 months of age she was

interviewed for the women of reproductive age questionnaire as well as the questionnaire for women with children 0 to 11 months. However, after completing the quota for women of reproductive age in a given *kebeles*, the interviewers only sought to complete interviews for the other target groups. Interviewing at least one HEW and reviewing the documents from the health post completed the community questionnaire, one per kebele.

The fieldwork was carried out by a number of survey teams, each team consisting of one field supervisor and four interviewers. Overall, in the four regions 89 interviewers, 30 supervisors, and 5 regional survey coordinators were deployed. The interviewers and supervisors were all health professionals working for regional health bureaus at the zonal or *woreda* levels and were recruited in close consultation with the regional health bureaus. To avoid bias the interviewers and the supervisors were not responsible for the areas in which they worked. A total of 30 four-wheel drive vehicles were also used for the survey.

Training of the field staff was conducted in three sessions; Amhara and SNNP survey field teams were trained together in one session in Addis Ababa; the Oromia team was trained in Jimma; and the team from Tigray was trained in Mekelle. The five-day training in each of the sessions consisted of a general introduction to the concepts and objectives of the L10K project, classroom instruction on interviewing techniques and field survey procedures, a detailed review of each item in the questionnaires, specific survey instructions, and role-play. The training concluded with a one-day field practice. Survey supervisors and regional survey coordinators were also given training on how to organize the survey, monitor and supervise the field work, and techniques for detecting errors in the field and correcting them on spot, among others. The whole survey including the

Table 1: Distribution of the study sample. Frequency distribution of the primary sampling units (i.e., *kebeles*) and the ultimate sampling units, i.e., the women respondents, during baseline (Dec 2008 – Jan 2009) and midterm (Dec. 2010) surveys, according to sampling stage and sampling domain.

		Primary sampling units			Ultimate sampling units			
		No. of *kebeles* revisited	No. of new *kebeles*	Total No. of *kebeles*/ cluster	Total No. of respondents	Women 15-49 yrs	Women with children 0-11 months	Women with children 12-23 months
Sampling domain according to program phase & strategy								
Phase 1	Baseline	NA	NA	50	1,518	1,000	600	500
	Midterm	50	26	76	2,253	912	912	900
Phase 2	Baseline	NA	NA	39	1,181	780	468	390
	Midterm	39	37	76	2,305	912	912	912
CBDDM	Baseline	NA	NA	27	843	540	324	270
	Midterm	12	64	76	2,321	912	911	912
PCQI (phase 1)	Baseline	NA	NA	20	620	400	240	200
	Midterm	3	34	37	1,124	444	444	444
PCQI (phase 2)	Baseline	NA	NA	9	280	180	108	90
	Midterm	2	12	14	404	168	168	168
CSF (phase 1)	Baseline	NA	NA	27	889	540	324	270
	Midterm	10	12	22	654	264	264	264
CSF (phase 2)	Baseline	NA	NA	5	153	100	60	50
	Midterm	1	5	6	193	72	72	72
NFI (phase 1)	Baseline	NA	NA	13	377	260	156	130
	Midterm	4	8	12	369	144	144	144
NFI (phase 2)	Baseline	NA	NA	14	431	280	168	140
	Midterm	8	3	11	344	132	132	132
Sample sizes according to analytic domains								
Phase 1	Baseline	NA	NA	110	3,404	2,200	1,320	1,100
	Midterm	67	80	147	4,400	1,764	1,764	1,752
CBDDM	Baseline	NA	NA	27	843	540	324	270
	Midterm	12	64	76	2,321	912	911	912
Phase 2	Baseline	NA	NA	67	2,045	1,340	804	670
	Midterm	50	57	107	3,246	1,284	1,284	1,284
Sampling strata according to administrative regions								
Tigray	Baseline	NA	NA	54	1,557	1,080	648	540
	Midterm	36	27	63	1,925	756	755	756
Amhara	Baseline	NA	NA	50	1,724	1,000	600	500
	Midterm	33	58	91	2,999	1,092	1,092	1,092
Oromia	Baseline	NA	NA	50	1,527	1,000	600	500
	Midterm	33	55	88	2,501	1,056	1,056	1,056
SNNP	Baseline	NA	NA	50	1,484	1,000	600	500
	Midterm	27	61	88	2,542	1,056	1,056	1,044
TOTAL	Baseline	NA	NA	204	6,292	4,080	2,448	2,040
	Midterm	129	201	330	9,967	3,960	3,959	3,948

training period took about one month to implement (from December 8, 2008 to January 17, 2009). On the whole, the fieldwork was completed on time as planned. Nevertheless, implementation was not without problems, especially due to geographic inaccessibility. In some instances, the field team had to travel on foot for three or more hours to get to the selected cluster. Out of the 204 originally selected clusters, eight were replaced due to extreme inaccessibility. The selections of the *kebeles* for replacement were randomly done.

During the baseline survey 204 *kebeles* or clusters from the 115 L10K *woredas* were visited, from

which 203 community questionnaires were completed and 6,292 women were interviewed (i.e., an average of 31 respondents per kebele). These included 4,080 women of reproductive age, 2,448 women with children 0 to 11 months, and 2,040 women with children 12 to 23 months. The sample sizes reported here vary slightly from those reported in the baseline survey report (L10K 2009) because the baseline report included five urban *woredas* in Tigray. These urban *woredas* were subsequently replaced by rural *woredas* as the L10K foundational community strategies were rolled out during the second phase of program implementation.

Midterm survey

The initial plan for any follow-up survey was to revisit the *kebeles* surveyed during the baseline to correlate programmatic changes within a *kebele* with the changes in the outcome measures to assess dose-response relationship between program exposure and the outcomes of interest. However, the number and location of the *woredas* for the L10K second-generation community strategies (i.e., CBDDM, PCQI, CSF & NFI) were not confirmed before the baseline survey. Moreover, the second-generation community strategies are limited to about half (usually 10) of the *kebeles* of an intervention *woreda*. As such, the baseline sample sizes within a second-generation community strategy area were not sufficient to measure their added value; and some of the *kebeles* that were surveyed from the second-generation community strategy *woredas* during the baseline were not selected for the second-generation activities. Therefore, the midterm survey had to increase the sample size within each of the second-generation community strategy areas and replace the *kebeles* surveyed during baseline that did not include the second-generation community strategy *woredas* with those that were. Selection of the replacement

kebeles were done randomly from the list of *kebeles* with second generation activities. Accordingly, the midterm survey of the L10K areas has six main strata, which are 1) the phase one *woredas* with only the foundational community strategy (31 *woredas*), 2) the phase two *woredas* with only the foundational community strategy (28 *woredas*), 3) the CBDDM *woredas* (14 phase one *woredas*), 4) the NFI *woredas* (six phase one and eight phase two *woredas*), 5) the PCQI *woredas* (nine phase one and five phase two *woredas*), and 6) the CSF *woredas* (11 phase one and three phase two *woredas*). Therefore, the sampling strategy of the first-stage of the two-stage cluster sampling during the midterm survey differed from the first-stage sampling strategy of the baseline survey.

Like the second-stage sampling strategy of the baseline survey, the second-stage sampling strategy during the midterm survey followed the WHO 30 by 7 cluster sampling technique in combination with the parallel sampling technique. The midterm survey interviewed 12 respondents from each of the three target populations in each *kebele* so that there is 80 percent power to detect at least 8 percentage points difference in the changes over time of an indicator between two programmatic domains (with baseline point estimates at the project level set at 50 percent, two-sided alpha error set at 0.05 and cluster survey design effect assumed to be 1.5).

Like the baseline survey, the fieldwork was carried out by a number of survey teams, each team consisting of one field supervisor and four interviewers. Overall in the four regions, 124 interviewers, 32 supervisors, and 10 regional survey coordinators were deployed. The interviewers were all health professionals working for regional health bureaus at the zonal or *woreda* levels and were

recruited in close consultation with the regional health bureaus. The supervisors were mostly the staff of the tier one grantees. To avoid bias the interviewers and supervisors were not responsible for the areas in which they worked. In addition, six consultants were hired who provided training and conducted supervision of the survey teams (see Appendix 4 for the list of the interviewers, supervisors, and the consultants). Training of the field staff followed the same format as with the baseline survey. The midterm survey likewise took about a month to implement (from December 4, 2010 to January 5, 2011).

Table 1 gives the distribution of the sampling units according to target population, region, and program strata. Of the 204 baseline *kebeles*, 129 *kebeles* were revisited during the midterm survey while 75 *kebeles* were replaced and126 new *kebeles* were added, resulting in visits to 330 total *kebeles* during the midterm survey. In all, the midterm survey in L10K areas involved the completion of 326 community questionnaires and interviews with 9,967 women (i.e., an average of about 30 women respondents per kebele), including 3,960 women of reproductive age, 3,959 women with children 0 to 11 months, and 3,948 women with children 12 to 23 months.

Although the midterm survey had six sampling domains due to the different L10K community strategies, the coverage and duration of the PCQI, CSF and NFI at the time of the midterm survey were considered negligible. As such, at the time of the midterm survey, the L10K areas effectively included three programmatic domains: 1) the phase one *woredas* with only the foundational community strategy (which includes phase one *woredas* with PCQI, CSF and NFI strategies with negligible duration—i.e., less than 3 months of

exposure); 2) the phase one *woredas* with CBDDM activities added to the foundational community strategy; and, 3) the phase two *woredas* with only the foundation strategy (which includes phase two *woredas* with PCQI, CSF and NFI strategies with negligible duration of exposure).

During the midterm survey, data was also collected from selected non-L10K *woredas* to serve as comparison areas. This was done to introduce an intervention-comparison group pretest-posttest design using data from the midterm and end-line surveys that would complement the initial dose-response relationship design that is being used to assess the impact of L10K strategies. During the midterm survey, data was collected from 2,308 women respondents from 30 non-L10K *woredas*, of which six *woredas* were in Tigray, and eight *woredas* were from each of the other three regions. The non-L10K sample included 912 respondents from each of the three survey target groups (see Table 2). The comparison *woredas* were either from the same zones[27] or near to where L10K *woredas* are located. While the baseline survey was conducted without the consideration of an intervention-comparison group evaluation design because a dose-response study was the initial design; in Tigray baseline data from potential comparison *woredas* were nevertheless available, as the survey in that region collected data from L10K and non-L10K *woredas* (due to reasons mentioned earlier). Thus, the six comparison *woredas* in Tigray also have baseline data from a total of 289 respondents (180 women of reproductive age, 108 women with children 0 to 11 months, and 90 women with children 12 to 23 months).

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[27] Zones are administrative areas comprising several *woredas*.

Table 2. Midterm sample distribution of the comparison areas. The number of comparison *woredas* and the distribution of the sampling units in the comparison areas in the midterm survey, by region.

	Tigray	Amhara	Oromia	SNNP	**Total**
No. of *woredas*	6	8	8	8	**30**
No. of *kebeles*	25	17	17	17	**76**
Total respondents	766	556	491	495	**2,308**
Women 15-49 yrs	300	204	204	204	**912**
Women with children 0-11 months	300	204	204	204	**912**
Women with children 12-23 months	300	204	204	204	**912**

Data quality assurance

The data collectors were RHB staff members who were eager to visit households and learn from their target population; training of the interviewers was thus essential for data quality. Data was collected using paper questionnaires. Almost all the responses were structured (i.e., open ended responses were avoided). After completion of interviews the team supervisors reviewed the responses for completeness before leaving the *kebeles*, and respondents were revisited if necessary. The regional survey coordinators randomly visited the survey teams and then visited households to validate responses. Epi Info 6 was used to capture the data electronically. The data entry package allowed only valid entries and had appropriate skip patterns to avoid data entry error as much as possible. Data was entered twice and validated.

Analysis

Due to the sampling strategy the sampling fractions of the program domains were different between baseline and midterm surveys. Accordingly, the sampling weights used during the baseline survey report were modified in order for the baseline survey estimates to be comparable to the midterm survey estimates. Therefore, the baseline survey estimates presented in this report will differ from those presented in the baseline survey report (L10K 2009) due to the combination of modified baseline sampling weights and replacement of *woredas* in the Tigray.

Unadjusted bivariate statistical analysis was done to compare changes in the indicators of interest between the baseline and midterm surveys. Statistically significant changes in proportions between the two surveys were assessed using Pearson's chi-squared statistics adjusted for sampling weights. Statistically significant changes between the survey periods (i.e., changes over time) in means were assessed using t-tests with linearized standard errors adjusted for sampling weights. Statistically significant changes over time in medians are assessed using quintile regression methods (see StataCorp [2009] for details). For the analysis of the community questionnaire, differences between baseline and midterm survey estimates with less than 10 percent two-sided alpha error were considered statistically significant and are discussed in the report. For the women's questionnaires, the cut-off point for the alpha error is set at 5 percent. Similar statistical tests were completed to compare the indicators of interest across categories during a specific survey period.

Effect modification analysis was done using regression models to assess differences in the changes of the outcomes of interest over time between the four regions. For a binary outcome variable (such as proportions) the differentials in the change over time between regions was assessed using a logit model which predicted the outcome using indicator variables for

survey period and regions with interaction terms
between survey period and regions, with adjustments
for sampling weights. Statistically significant (i.e., p<0.1)
interaction terms would indicate that the change of the
outcome variable between baseline and midterm surveys
varied across regions. Analogous linear regression
models were used for outcomes measured as
continuous variables.

HOUSEHOLD AND RESPONDENT CHARACTERISTICS

This section describes the sample characteristics of the midterm survey respondents and compares them with the baseline survey respondents. Only the unique respondents from all three target groups—i.e., women of reproductive age, women with children 0 to 11 months, and women with children 12 to 23 months—are included in the description (i.e., if a woman participated in more than one target group responses than she was counted only once).

Reliably demonstrating changes in MNCH care-seeking behavior and practices between the baseline and midterm surveys requires the assumption that respondents to the two surveys were otherwise similar; it was important that the background characteristics of the baseline and midterm survey respondents are similar or at least not very different. This is especially true since the midterm sampling strategy differed from the baseline sampling strategy.

Respondent characteristics

The percentage distributions of the baseline and midterm survey respondents by program domain, age group, marital status, education, number of children, religion, and the distance of the respondent's household from any health facility according to region are presented in Table 3. Whether differences in a particular sample characteristic between baseline and midterm survey respondents was assessed using Pearson's chi-squared statistics (adjusted for sampling weights). Since a major fraction of the survey respondents were selected conditionally upon having a child between the ages 0 to 11 months or having a child between the ages 12 to 23 months, the distribution of the background characteristics of L10K survey respondents were not expected to be similar to that of the general population of women of reproductive age in Ethiopia.

Baseline and midterm survey respondents in L10K areas were similar in terms of region and program domain, largely due to the application of sampling weights that adjusted for differences in sampling strategies between the baseline and midterm surveys. Fifteen percent of the L10K population is in Tigray, 41 percent in Amhara, 24 percent in Oromia, and 20 percent in SNNP. Encouragingly, the age distribution of the baseline and midterm survey respondents in L10K areas was similar, with about half of the respondents between 15 and 34 years old. Although the distribution of respondents according to parity varied between baseline and midterm surveys in Tigray and SNNP, on average, it was not different across L10K areas. Nearly half of the respondents already have four or more children.

The vast majority of respondents (92 percent) were married, a one percentage-point decrease in the percentage married. It is unlikely that this small difference in marital status between the baseline and midterm survey will bias the observed changes over time in MNCH indicators. At the time of the midterm survey, the percentage not married was the highest in Tigray (14 percent) followed by Amhara (11 percent), followed by the other two regions (5 percent in SNNP and 3 percent in Oromia).

Women's education improved slightly between the two survey periods in L10K areas, with increases recorded in all four regions. The proportion of respondents without any education in L10K areas was 81 percent during the baseline survey, declining to 78 percent during the midterm survey. This indicates that women's education in rural Ethiopia is improving, reflecting developmental momentum in rural Ethiopia.

Almost two-thirds of the respondents in L10K areas were Orthodox Christians, followed by Muslims

Table 3: Background characteristics of the respondents. Percentage distribution of the baseline (Dec. 2008) and midterm (Dec. 2010) survey women respondents by selected background characteristics according to region and L10K area.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Region										
Tigray									**13.7**	**14.7**
Amhara									**41.2**	**40.6**
Oromia									**25.2**	**24.7**
SNNP									**19.9**	**20.1**
Program domain										
Phase 1 (foundational)	10.5	11.2	6.9	7.1	7.3	6.5	8.0	7.5	**7.7**	**7.6**
Phase 1 & CBDDM	42.7	42.2	49.4	50.8	62.7	59.9	52.1	51.7	**53.4**	**51.9**
Phase 2 (foundational)	46.7	46.7	43.7	42.2	30.1	33.6	39.9	40.8	**39.9**	**40.5**
Age group										
15-19	8.2	7.6	7.6	7.2	7.0	6.1	6.5	6.5	**7.3**	**6.9**
20-24	22.8	20.8	22.6	21.2	26.2	23.8	23.3	23.7	**23.7**	**22.3**
25-34	45.2	44.4	48.6	48.6	47.6	51.4	51.8	51.8	**48.5**	**49.5**
35-49	23.8	27.1	21.2	23.0	19.2	18.7	18.4	16.9	**20.5**	**21.4**
Marital status		**		**				**		**
Not married	17.0	14.1	7.8	10.6	3.1	3.4	2.2	4.5	**6.8**	**8.2**
Married	83.0	85.9	92.2	89.4	96.9	96.6	97.8	95.5	**93.2**	**91.8**
Education		**		**		**		**		**
None	65.3	69.1	87.0	83.1	78.7	76.7	83.1	75.9	**81.2**	**78.1**
Primary	19.9	15.9	9.3	11.2	14.8	13.0	12.1	15.9	**12.7**	**13.3**
Higher	14.9	15.0	3.7	5.7	6.5	10.3	4.8	8.3	**6.2**	**8.7**
No. of children		**						**		
0	2.7	4.3	3.7	3.6	2.2	1.9	1.2	2.8	**2.7**	**3.1**
1	21.9	19.8	17.4	17.9	16.1	17.1	13.8	16.1	**17.0**	**17.6**
2	16.2	15.4	16.4	15.8	15.7	17.5	14.8	16.3	**15.9**	**16.2**
3	17.0	14.0	14.4	15.9	16.0	16.6	14.2	15.7	**15.2**	**15.7**
4+	42.2	46.5	48.1	46.8	49.9	46.9	56.0	49.2	**49.3**	**47.3**
Religion		**				**		**		**
Orthodox Christian	96.2	98.1	98.7	98.6	16.4	20.3	24.8	29.7	**62.9**	**65.9**
Protestant Christian	0.0	0.2	0.1	0.1	23.3	26.5	39.1	42.9	**13.7**	**15.0**
Muslim	3.3	0.9	0.8	0.8	59.7	52.0	32.0	24.6	**22.2**	**17.9**
Other	0.5	0.9	0.4	0.5	0.6	1.2	4.1	2.8	**1.2**	**1.2**
Distance to any health facility		**		**		**		**		**
<30 min.	44.4	53.5	58.2	71.0	53.5	63.4	52.7	64.2	**54.1**	**65.3**
30 min - <1 hr	31.7	31.9	24.4	23.1	19.8	26.4	24.1	24.9	**24.2**	**25.6**
1-<2 hrs	18.8	10.2	11.7	5.0	13.1	8.3	16.7	9.5	**14.0**	**7.5**
2+ hrs	5.2	4.4	5.7	0.9	13.7	1.8	6.5	1.4	**7.8**	**1.7**
No. of respondents	1,557	1,925	1,724	2,999	1,527	2,501	1,484	2,542	**6,292**	**9,967**

(about one-fifth), Protestants (about 14 percent) and others (about one percent). Orthodox Christianity predominated in Amhara and Tigray (96 percent) while in Oromia the majority of the respondents were Muslims (52 percent). The distribution of respondents according to religious background was slightly different between the baseline and midterm surveys, with the proportion of Muslim respondents declining by four percentage points and the proportion of Orthodox Christian respondents increasing by three percentage

points. The differences in religious background observed between the baseline and midterm surveys were not large enough to warrant major concerns regarding the comparability of survey respondents.

Access to a health facility increased in L10K areas in all four regions, signaling the expansion of health services during the two year baseline-to-midterm period. The average proportion of respondents whose household was within 30 minutes from any health facility in L10K areas increased from 54 to 65 percent between the two survey periods.

Household characteristics

Household water supply and sanitation

Households were considered to have a clean drinking water supply if the usual source was piped water inside the compound, piped water outside the compound, protected well, or protected spring. The proportion of households in L10K areas that had clean drinking water supplies increased from 53 percent during the baseline survey to 59 percent in the midterm survey (Table 4). Significant improvements in Amhara and SNNP contributed most of the observed improvement in clean water supply. The baseline proportion of households with clean drinking water supply in Tigray was high (78 percent), and the change in this region was not significant. More concerning is clean drinking water supply in Oromia, which was low (45 percent) during the baseline survey and remained mostly the same through the midterm survey. In the midterm survey, the leading source of drinking water in L10K areas was protected well or spring (36 percent), followed by open spring or well (24 percent), piped outside compound (21 percent), surface water (17 percent) and piped inside compound (only one percent).

Access to a water supply in L10K areas also improved over the past two years. The proportion of households within 30 minutes of a source of water increased from 77 to 87 percent. The observed improvements in access to water were not, however, uniform across the four regions. The improvements in access to a water supply were the most in Amhara and SNNP where access increased by 14 and 11 percentage points, respectively; followed by Tigray and Oromia where access improved by 6 and 5 percentage points, respectively. As a result, access to clean water at the time of the midterm survey was highest in Oromia (92 percent), while access in the other three regions was similar (between 84 and 86 percent).

The practice of treating drinking water remained low in L10K areas (8 percent at the time of the midterm survey). Among the regions, the practice of treating water before drinking was highest in Tigray (13 percent), followed by Oromia and SNNP (11 percent), and then Amhara (4 percent).

Impressive improvements in household ownership of sanitary latrines (i.e., pit latrine/traditional or ventilated/improved pit or flush toilets) have been recorded in L10K areas. Between the two surveys the percentage of respondents in L10K areas with a sanitary latrine in their household increased from 54 to 72 percent. Although improvements in sanitary latrine coverage were observed across all four regions, the degree of improvement varied. Encouragingly, Amhara—which had the lowest coverage during the baseline survey—saw the greatest increases in latrine ownership (from 33 to 60 percent). In contrast, SNNP region had the highest coverage (84 percent) during the baseline survey and saw the smallest increases in coverage (to 90 percent) by the time of the midterm survey. Moderate but substantial increases in latrine coverage were observed in Tigray (from 52 to 67 percent) and Oromia (from 67 to 81 percent). Of households with latrines in L10K areas, the

Table 4: Water and sanitation. Percentage distribution of respondents by household water and toilet facilities, according to survey period and region, L10K area, 2008 – 2010

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Source of drinking water	**		**		**		**		**	
Piped (inside comp.)	8.4	3.6	0.5	1.7	0.9	0.1	0.1	0.8	**1.6**	**1.4**
Piped (outside comp.)	25.0	16.2	21.3	25.8	8.6	4.5	33.7	36.1	**21.0**	**21.3**
Protected spring/well	44.6	55.6	27.6	32.0	35.0	43.0	19.8	21.3	**30.2**	**36.0**
Open spring/well	12.9	11.4	31.3	25.6	34.5	32.4	20.9	21.4	**27.5**	**24.3**
Surface water	9.1	13.3	19.3	15.0	21.0	19.9	25.6	20.4	**19.6**	**17.0**
Clean (piped & protected) drinking water supply β	78.0	75.3	** 49.4	59.4	44.5	47.6	** 53.6	58.2	** **52.9**	**58.7**
Time to obtain water β	**		**		**		**		**	
<30 minutes	77.9	83.6	71.3	85.1	88.3	92.1	75.3	86.4	**77.3**	**86.8**
30+ minutes	22.1	16.4	28.7	14.9	11.7	7.9	24.7	13.6	**22.7**	**13.2**
Water treated before drinking										
No	87.0	87.0	96.5	95.9	90.8	89.1	90.0	89.2	**92.5**	**91.6**
Yes	13.0	13.0	3.5	4.1	9.2	10.9	10.0	10.8	**7.5**	**8.4**
Toilet facility β	**		**		**		**		**	
Pit latrine/traditional	47.2	64.5	32.9	59.8	66.3	80.5	83.1	89.6	**53.3**	**71.4**
Ventilated/improved pit	2.8	1.0	0.3	0.2	0.5	0.1	0.4	0.2	**0.7**	**0.3**
Flush toilet	1.5	1.2	0.0	0.1	0.0	0.1	0.0	0.1	**0.2**	**0.2**
No facility/bush/field	48.4	33.4	66.8	39.9	33.3	19.3	16.5	10.2	**45.8**	**28.1**
Used toilet last time	**		**		**		**		**	
No	50.4	36.8	70.4	43.1	34.0	19.7	18.1	10.6	**48.1**	**30.0**
Yes	49.6	63.2	29.6	56.9	66.0	80.3	82.0	89.5	**51.9**	**70.0**
No. of respondents	1,557	1,925	1,724	2,999	1,527	2,501	1,484	2,542	**6,292**	**9,967**

φ p<0.1; β p<0.05 for region × change over time interactions;**p<0.05 are for change over time

predominant latrine type was pit latrines (more than 98 percent). Almost all (more than 96 percent) of the latrine owners reported that they used the latrine during last defecation. Changes in latrine use over time in the four regions followed the same pattern as changes in latrine ownership. Overall, latrine use in L10K areas increased from 52 percent during the baseline to 70 percent at the time of the midterm survey.

Bed net ownership

Information regarding bed net ownership was obtained from all respondents. The analysis of bed net availability was limited to areas where it is most important, that is, where malaria is endemic. HEWs' responses to the community questionnaire were used to determine whether a *kebele* was a malarious area or not.

Table 5: Bed Net Ownership. Percentage of respondents that have a bed net in their household; percent distribution of respondents by number of bed nets in their household; and the percent distribution of the respondents with bed nets in their household according to the most recently obtained bed net type, by region and survey period for malarious L10K areas, 2008 – 2010.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Ownership of bed nets [β]		**		**				**		**
	81.0	74.9	73.9	82.3	60.6	57.2	62.5	75.1	**69.4**	**73.7**
Number of bed nets										
0	19.0	25.1	26.1	17.7	39.4	42.8	37.6	24.9	**30.6**	**26.3**
1	24.3	15.5	25.6	30.7	24.7	19.9	27.5	31.7	**25.5**	**25.6**
2	40.4	38.3	39.4	41.1	31.1	27.9	31.1	35.5	**35.8**	**36.4**
3+ [β]	16.3	**21.1	9.0	10.6	4.8	**9.5	3.9	**7.9	**8.1**	****11.6**
No. of respondents	1,300	1,565	1,334	2,169	1,241	1,905	1,010	1,378	**4,885**	**7,017**
Type of bed net (most recently obtained)										
Permanent net [β]	92.2	92.2	74.7	73.5	86.7	**76.2	78.8	**92.9	**81.4**	**80.2**
Pretreated net	3.4	**0.2	5.6	**0.4	0.8	**2.4	2.5	**0.5	**3.6**	****0.8**
Untreated net	0.7	**6.3	1.0	**0.1	5.3	5.7	5.4	**0.0	**2.7**	**2.2**
Type unknown	3.7	**1.3	18.6	**26.0	7.3	**15.7	13.3	**6.6	**12.4**	****16.8**
No. with bed nets	1,012	1,215	1,023	1,775	777	1,121	652	1,081	**3,464**	**5,192**

[φ] p<0.1; [β] p<0.05 for region × change over time interactions;**p<0.05 are for change over time

Accordingly, *kebeles* were classified as malarious if the HEW reported that it was partly or wholly malarious.[28] The proportion of survey respondents in malarious L10K areas who had at least one bed net in their household varied in both direction and magnitude across the four regions between the two survey periods. In Tigray, the bed net ownership rate declined from 81 percent during baseline to 75 percent during midterm.

During the same period the bed net ownership rate increased from 74 to 82 percent in Amhara and from 63 to 75 percent in SNNP. Bed net ownership in Oromia was 61 percent during the baseline survey; this rate did not change significantly. Across all four regions there was a net increase in bed net ownership from 69 to 74 percent in malarious L10K areas. The proportion

of respondents from households with three or more bed nets also increased in malarious L10K areas from 8 to 12 percent during the same period.

Changes in the most common type of bed net were also observed between the two survey periods. Interviewers were trained to verify the type of bed nets present in the household. During the midterm survey more than 80 percent of households with bed nets owned a permanent net. Although, on average, the ownership of permanent nets did not change significantly in L10K areas, there was significant variation across the four regions. Between the baseline and midterm surveys, the share of permanent nets among bed net owners decreased in Oromia (from 87 to 76 percent) and increased in SNNP (from 79 to 93 percent). In Tigray and Amhara the share of permanent nets remained unchanged. Overall the share of

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[28] About three quarters of the respondents were from *kebeles* in mostly or partly malarious areas.

pretreated nets among bed net owners declined from four percent to about one percent; despite the increase in the share of pretreated nets in Tigray. Between the two survey periods the proportion of bed net owners who had untreated bed nets increased in Tigray and decreased in Amhara and SNNP; the overall result was that there was no net change in the share of untreated nets among bed net owners in malarious L10K areas. For about 17 percent of respondents to the midterm survey, the type of bed net could not be determined. The highest rates of unknown bed net type was observed in Amhara (26 percent), followed by Oromia (16 percent), SNNP (7 percent), and Tigray (one percent) regions.

Conclusion

There was significant economic and social development in L10K areas between the baseline survey conducted in December 2008 and the midterm survey conducted in December 2010. Improvements in women's education, access to health facilities, access to water, toilet facilities and household ownership of bed nets were observed. Improvements in education and health facility access likely contributed to changes in the MNCH indicators of interest for this study. However, the minor changes in sample characteristics (especially marital status and religion) between baseline and midterm survey respondents are less likely to be associated with changes in the MNCH indicators.

SITUATION ANALYSIS OF *KEBELE* HEALTH SERVICES

This section describes changes in health infrastructure, health services, and health systems that support the health extension program (HEP) in L10K area *kebeles* using data from the baseline and midterm community surveys. The midterm survey results are used to describe the current situation, with an emphasis on maternal, newborn and child health services. The specific topics included in this section are the coverage of the health extension program, measures of L10K program intensity, community health promoters and their anchors, the *kebele* health committee, supportive supervision, health management information system (HMIS), and logistics systems including the availability of essential health supplies and commodities.

The analysis of changes in the health services situation in L10K *kebeles* between the two survey periods is separated by region to better inform the regional health bureaus (RHBs), as these fairly autonomous bodies implement the HEP in their respective regions. However, sample sizes at the *kebeles* (i.e., community) level are small, ranging from 49 to 54 responses per *kebele* at baseline and 63 to 89 responses during the midterm survey. Thus there was insufficient statistical power to determine whether changes to the health services within each region were statistically significant (even if the changes appeared to be programmatically significant, in most cases).

Unadjusted bivariate statistical analyses were used to detect significant changes ($p<0.1$) over time or to detect significant differences ($p<0.1$) between regions during a single survey period. Effect modification analysis was used to assess whether the rate of change of the indicator was different between regions. Statistical tests for each outcome indicator of interest were done to answer the following questions:

1) Has there been significant change (of the indicator) between the baseline and the midterm surveys?

2) Is the rate of change of the indicator between baseline and midterm surveys different across regions? In other words, does the change over time of the indicator vary by region? If so, across which regions were the difference in change over time mainly observed? And,

3) Is there any significant variation of the indicator across the regions at the time of the midterm survey?

The primary limitation of this analysis by region is the small sample size. Therefore, statistical power to assess different rates of change in the health service situation across regions was very low. Only the statistically significant ($p<0.1$) results are described.

Health extension program coverage

Table 6 shows the coverage of L10K area *kebeles* with any health facility (i.e., health post, health center, health station,[29] or hospital), with a health post, with at least one HEW, and the mean number of people served by one HEW across survey periods. The findings indicate that the HEP has reached universal coverage in L10K areas. Between December 2008 and December 2010, the percentage of L10K *kebeles* with any health facility increased from 87 to 97 percent; the percentage with at least one health post increased from 77 to 91 percent; and the percentage with at least one HEW increased from 94 to 99 percent.[30] The change in the number of people covered by one HEW was not significant (from 3,267 to 3,104 people per HEW).

An increase in the presence of any health facility in *kebeles* was observed only in Amhara (from 94

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[29] Health centers and health stations are higher-level health facilities staffed with nurses, midwives and health officers.

[30] In the absence of health posts the HEWs work from rented houses. Accordingly, the presence of health posts indicated by the analysis includes only those that were constructed by the local government and reflects the performance of the government to expand the HEP.

Table 6: Health extension program coverage. Changes in the percentage of *kebeles* with any health facility (i.e., hospital, health center, health station or health post), with a health post, with a HEW, and the mean number of people per HEW according to region, L10K area, 2008 – 2010

	Presence of any health facility		Presence of health posts		Presence of HEWs		Population to HEW ratio β		Number of *kebeles*	
	Baseline (2008)	Midterm (2010)	Baseline (2008)	Midterm (2010)	Baseline (2008)	Midterm (2010)	Baseline (2008)	Midterm (2010)	Baseline (2008)	Midterm (2010)
Region										
Tigray	98.9	97.1	70.0	78.1	86.2	100.0	3,829	3,699	**54**	**63**
Amhara	93.5	*99.0	87.5	*98.7	100.0	100.0	3,697	3,977	**49**	**89**
Oromia	67.4	*92.7	56.8	*87.3	84.8	96.6	2,781	2,162	**50**	**88**
SNNP	91.0	97.6	88.4	90.8	99.3	100.0	2,686	2,290	**50**	**86**
Total	86.9	*96.7	76.9	*90.9	93.8	*99.1	3,267	3,104	**203**	**326**

β The analysis is among *kebeles* with at least one HEW. For change over time `*a*' indicates significance at p<0.1 while `*' indicates significance at p<0.05. None of the change over time significantly (p>0.1) vary across regions.

to 99 percent) and Oromia (from 67 to 93 percent) while in the other regions the change was not significant (p>0.1). The percentage of *kebeles* without a health facility was the highest during the midterm survey in Oromia (7 percent), while in the other regions the percentage was less than three percent.

An increase in the percentage of *kebeles* with at least one health post in the L10K areas during the observation period was mainly observed in Amhara (from 88 to 99 percent) and Oromia (from 57 to 87 percent). During the midterm survey the percentage of L10K area *kebeles* with at least one health post constructed ranged from the lowest in Tigray (78 percent), to Oromia and SNPP (87 and 91 percent, respectively), to the highest in Amhara (99 percent).

The ratio of population-to-HEW ratio still falls somewhat short of HEP goals. The aim of the HEP is to have one HEW for every 2,500 to 3,000 people (HSDP IV 2010), while the average in L10K areas was one HEW per 3,104 people during the midterm survey. At midterm the highest population-to-HEW ratio was observed in Amhara and Tigray (3,977 and 3,699 people per HEW, respectively). SNNP and Oromia both met the target: 2,290 and 2,162 people per HEW, respectively.

For the primary health care unit (PHCU)[31] to be effective (see Appendix 1 for details) the health centers should not be very far from the health post. Accessibility of a health center from health posts in L10K areas improved during the analysis period: the percentage of L10K area health posts within two hours of a health center increased from 64 to 74 percent (Figure 3). During the midterm survey access to a health center from the health post was lowest in Oromia (only 61 percent within two hours), followed by Amhara (80 percent) and SNNP (83 percent).

The Last Ten Kilometers Project (L10K) coverage

The analysis of HEW interviews from the community questionnaires in L10K *kebeles* indicated that the foundational training provided by the L10K project is universal—confirming the performance reports submitted by L10K grantees. Almost all (97 percent) of HEWs in L10K areas reported receiving training from the L10K project. The L10K project holds *woreda*-level review meetings with the HEWs to share experiences and provide refresher trainings. Again, almost all (95

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[31] The PHCU comprises of a health center with five satellite health posts covering 25,000 people and a primary hospital covering 100,000 people.

Figure 3: Percentage of health posts within 2 hours distance from a health center, according to region and survey periods, L10K areas, 2008-2010.

Change over time: (α)p<0.1; (*)p<0.05. The changes were not different between regions (p>0.1)
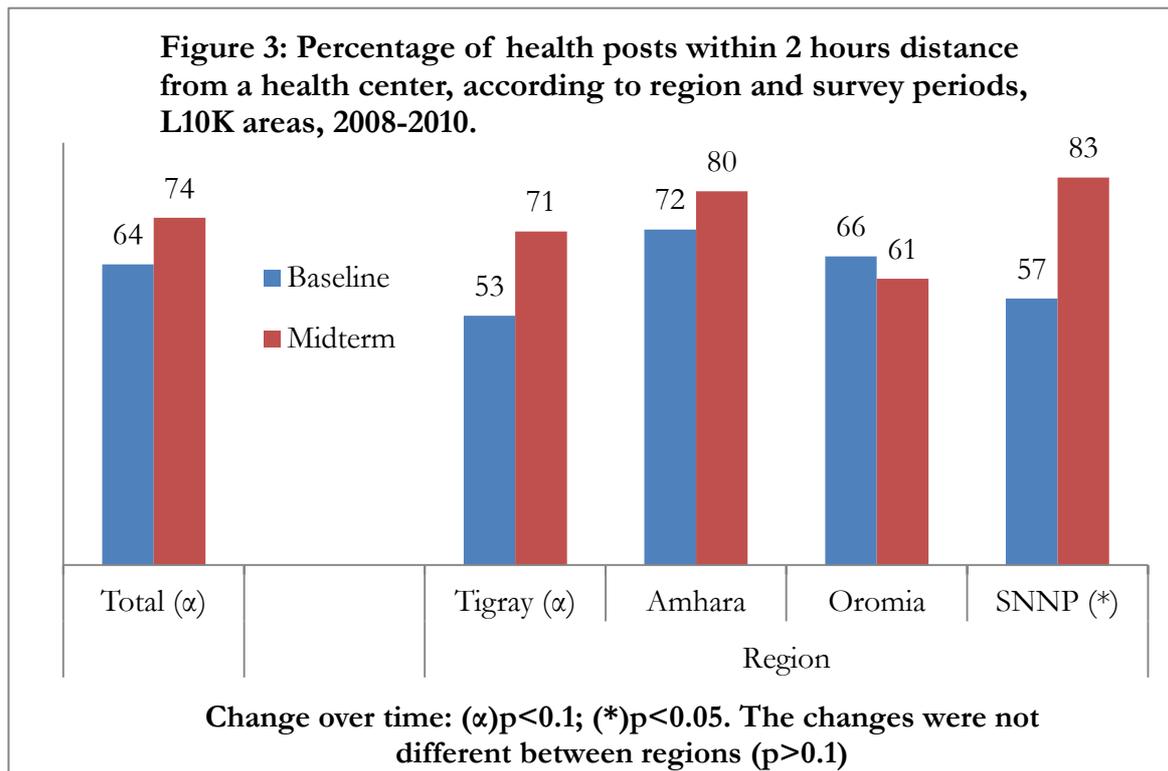
percent) of HEWs in L10K areas reported that they attended at least one review meeting organized by the L10K project. During the midterm survey period three review meetings were held in the phase one *woredas*. Nearly half (47 percent) of HEWs in L10K phase one areas attended three review meetings, while about another one-third attended two review meetings, and about one-tenth attended one review meeting. Only three percent of HEWs did not attend any review meetings.

To measure the intensity of L10K programs in a *kebele*, the community questionnaire listed 11 components of the MNCH interventions under the HEP (see Table 7). For each component the HEW was asked the following questions: 1) Is this service supported by an NGO? 2) If so, is the supporting organization different than L10K? 3) Was any training provided by an NGO? And, 4) was there any supportive supervision after the training? Table 7 shows the responses to the above four questions. The question regarding NGO support was asked during both survey

periods, while the questions on L10K support were asked only during the midterm survey. Support from NGOs for all eleven MNCH services increased dramatically in L10K areas. During the baseline survey the MNCH components that got the highest ranking for NGO support were immunization and family planning (27 percent of HEWs reported receiving NGO support), followed by delivery care (12 percent), growth monitoring (10 percent), antenatal care (7 percent), postnatal care (4 percent), and then others. During the midterm survey the ranking of MNCH components according to NGO support received by HEWs shifted dramatically.

NGO support for CHP training was the highest, with 81 percent of HEWs reporting NGO support, followed by antenatal care (72 percent), then essential newborn care, complementary feeding and postnatal care (70 percent), counseling for breastfeeding (68 percent), delivery care (65 percent), family planning (59 percent), immunization (56 percent), growth monitoring (48 percent), and then

Table 7: NGO and L10K support to *kebeles*. Percentage of *kebeles*, as reported by HEWs, that received support from NGOs for a particular service component during the baseline and midterm surveys; and the percentage of *kebeles*, as reported by HEWs, that receive support from L10K, received training from L10K, and receive supportive supervision from L10K during midterm survey

Service components	NGO Support		L10K survey during midterm (n=321)		
	Baseline (n=193)	Midterm (n=321)	Support	Training	Supportive supervision
EPI	27.3	56.0 **	36.1	32.9	16.5
Nutrition/growth monitoring	10.4	48.3 **	18.1	14.0	7.3
Essential neonatal care	0.7	70.4 **	59.1	52.2	24.9
ANC	6.7	72.4 **	57.1	50.8	24.9
Delivery	11.8	64.5 **	47.9	40.9	20.1
Referral	3.4	18.6 **	15.1	12.5	4.7
PNC	4.3	69.5 **	56.4	48.8	25.4
Breastfeeding counseling	3.8	68.1 **	57.2	49.5	23.2
Complementary feeding	5.2	70.2 **	50.3	42.2	19.1
Family Planning	27.0	59.0 **	39.6	35.6	17.7
CHP training/follow-up	2.3	80.5 **	66.9	56.9	28.6

*p<0.1; **p<0.05

referral services (19 percent). This shift in HEP components receiving supporting from NGOs corresponded with the current HEP emphasis as augmented by the L10K project.

NGO support for CHP training was the highest, with 81 percent of HEWs reporting NGO support, followed by antenatal care (72 percent), then essential newborn care, complementary feeding and postnatal care (70 percent), counseling for breastfeeding (68 percent), delivery care (65 percent), family planning (59 percent), immunization (56 percent), growth monitoring (48 percent), and then referral services (19 percent). This shift in HEP components receiving supporting from NGOs corresponded with the current HEP emphasis as augmented by the L10K project.

Other than for growth monitoring, at the time of the midterm survey most (>60 percent) of the NGO support for each MNCH service was due to L10K. For

example, 83 percent of NGO support for CHP training was attributed to L10K. Based on HEW responses, the services receiving the most L10K support was CHP training (67 percent), followed by essential newborn care (59 percent), breastfeeding counseling and antenatal care (57 percent), postnatal care (56 percent), complementary feeding (50 percent), delivery care (48 percent), family planning (40 percent), immunization (36 percent), growth monitoring (18 percent), and referral (15 percent).

Each *kebele* was assigned a L10K program intensity score based on HEW responses regarding their perceptions of L10K support for each of the 11 MNCH components listed in Table 7. Each MNCH component was assigned a score: a score of 0 for components not supported by L10K; a score of 1 for components supported by L10K but with no training or supportive supervision; 2 for components with training by L10K

Figure 4: Mean L10K intensity score as a percentage of the maximum score, according to region in the midterm survey (n=321)
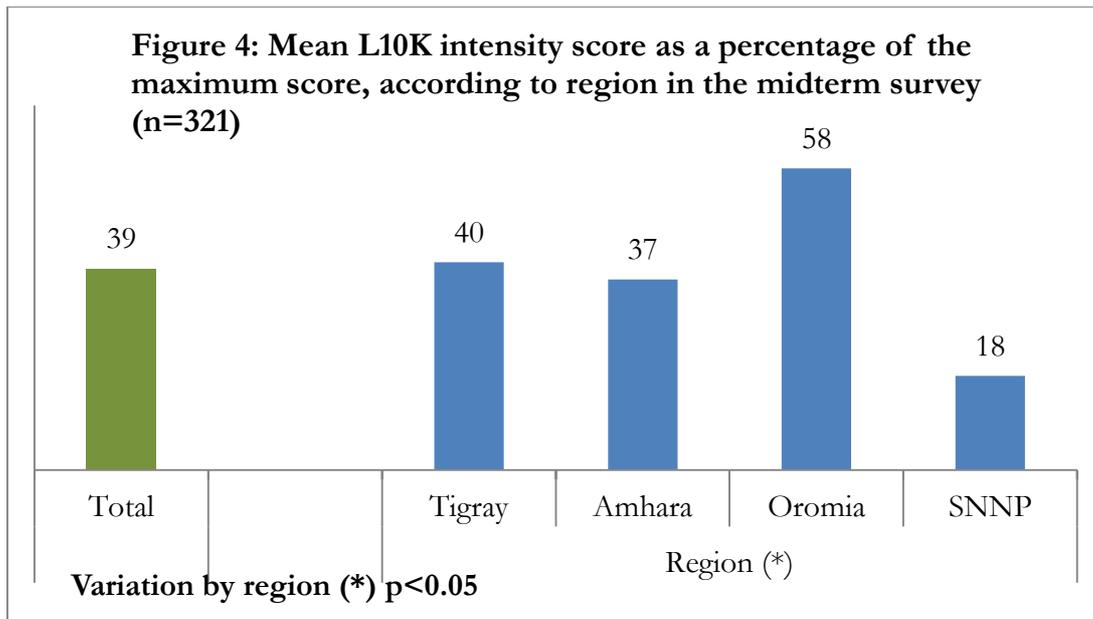
but no supportive supervision; and 3 for components with both training and supportive supervision. The 11 component scores were given equal weights and simply added to create the L10K program intensity index.[32] Possible scores on the raw L10K intensity index ranged from 0 to 33. The index was then rescaled to range between 0 and 100, with scores representing the percentage of the maximum raw score of 33. Figure 4 gives the L10K intensity score by region during the midterm survey.

The average L10K intensity score was 39 percent in L10K areas during the midterm survey. Interestingly, 27 percent of L10K *kebeles* had a L10K program intensity score of zero (analysis not shown), even though almost all HEWs had received training from the L10K project. The L10K intensity scores for the 50th, 75th and 100th percentiles of *kebeles* were respectively 45, 67 and 100 percent of the maximum.

The average L10K intensity scores varied across the four regions. The highest L10K program intensity, as perceived by the HEWs, was observed in Oromia (58 percent of the maximum) and the lowest was observed in SNNP (18 percent of the maximum);

in Tigray and Amhara the L10K intensity score was similar to the overall average of 39 percent.

Community health promoters (CHPs) and anchors

For the purpose of this report, community health promoters (CHPs) include any voluntary community health workers (vCHWs) established by the HEP, by L10K or by other development partners. One major component of the L10K foundational community strategy was helping HEWs to train CHPs who are anchored in their communities, mentoring them to improve community MNCH. Not surprisingly, the HEWs ranked support for CHP training and follow-up as the service for which they received the most L10K support. In accordance with the HEP strategy the L10K project attempted to establish one CHP for every 20 to 30 households (HHs). The number of CHPs in L10K *kebeles* increased more than three-fold. Due to the increase in the number of CHPs, the household (HH) to CHP ratio (i.e., the median number of HHs per CHP) in L10K *kebeles* decreased from 99 HHs per CHP during the baseline to 31 HHs per CHP during the midterm survey (Figure 5a). The decline in the

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[32] The internal reliability (i.e., Cronbach's alpha) of the items composing the L10K intensity index was 0.95.

Figure 5a: Changes in the median number of households per CHP between survey periods, according to region in L10K areas, 2008-2010.

Baseline (n=201)
Midterm (n=322)

99 / 31 — Total (**)
61 / 34 — Tigray (**)
68 / 29 — Amhara (**)
610 / 34 — Oromia (**)
122 / 37 — SNNP

Region

Change over time (**) p<0.05. Changes over time did not differ between regions (p>0.1). Note: Oromia baseline bar is truncated.
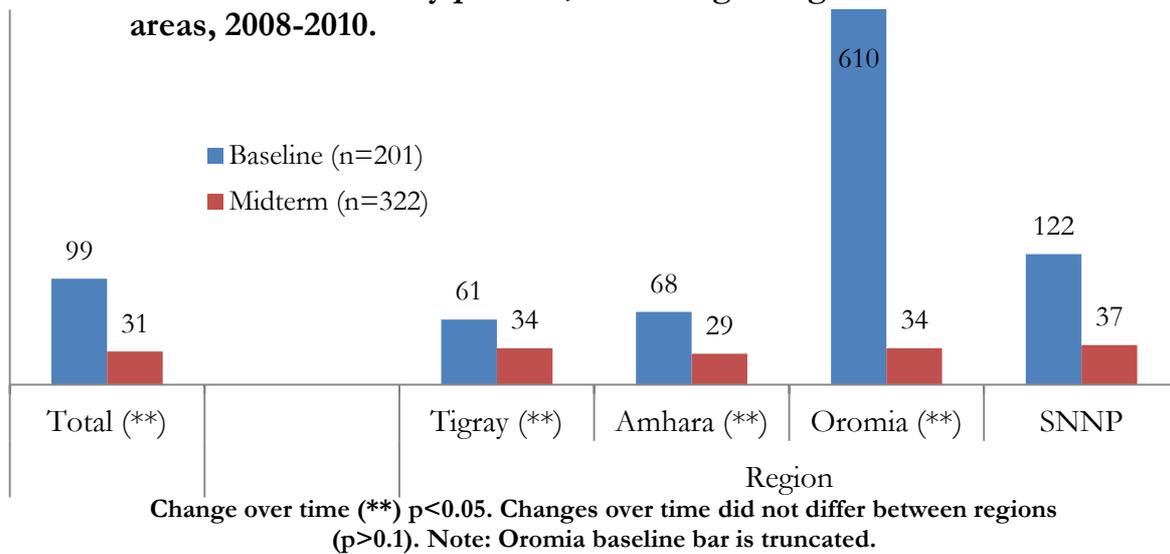
Figure 5b: Percentage of CHPs in the *kebele* who were female, according to region in L10K areas, midterm survey (n=319)

41 — Total
65 — Tigray
36 — Amhara
45 — Oromia
28 — SNNP

Region (**)

Variation by region (**) p<0.05
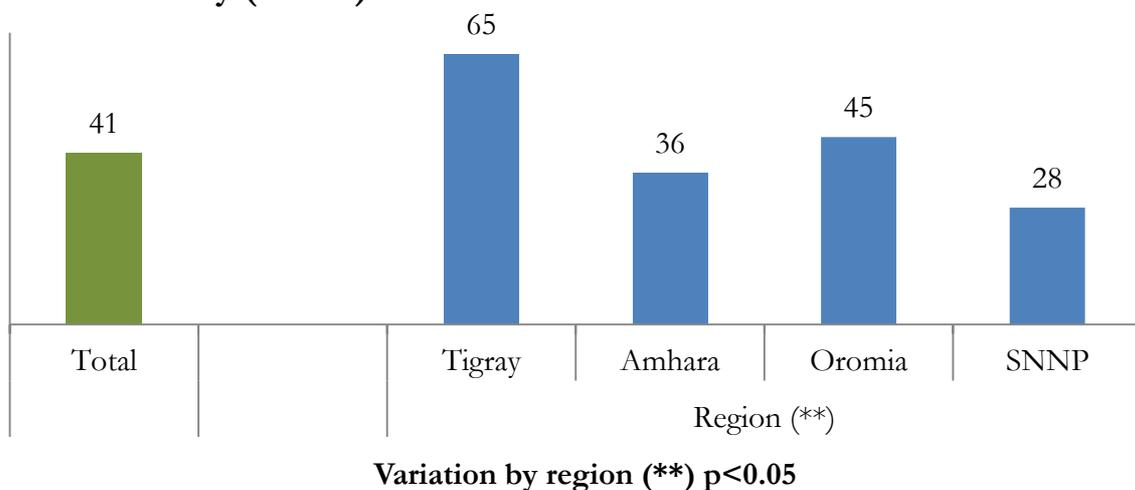
median number of HHs per CHP varied by region. The decline for the HH per CHP ratio was highest in Oromia (from 610 to 34 HHs per CHP), followed by SNNP (from 122 to 37 HHs per CHP), and then Amhara and Tigray (from 68 to 29 HHs per CHP and 61 to 34 HHs per CHP, respectively). The average number of HHs per CHP did not differ across the four regions at midterm, ranging from 29 to 37 HHs per CHP.

When the L10K project was initiated, the HEP normally recruited primarily male CHPs. However, after the initiation of the L10K project activities, some of the implementing partners suggested that female CHPs could better influence MNCH care-seeking behavior and practices in their communities. Accordingly, over

the year leading up to the midterm survey the L10K project encouraged HEWs to recruit and train female CHPs to replace male CHPs wherever possible. As a result, during the midterm survey the percentage of female CHPs in L10K *kebeles* was 41 percent (see Figure 5b), as opposed to the expectation that the vast majority of CHPs would be male. The percentages of female CHPs in a *kebele* varied across regions. The percentage of female CHPs in L10K areas was highest in Tigray (65 percent), followed by Oromia (45 percent), Amhara (36 percent), and then SNNP (28 percent).

Next, the support the HEWs provide to and receive from CHPs was analyzed (Table 8). Between the two survey periods the percentage of L10K area *kebeles* in which HEWs conducted monthly meetings with the CHPs increased from 74 to 93 percent. Likewise, the percentage of *kebeles* where HEWs planned activities with the CHPs increased from 48 to 79 percent; the percentage of *kebeles* where HEWs set and reviewed targets for CHPs increased from 53 to 80 percent; and the percentage of *kebeles* where HEWs provided supportive supervision to the CHPs increased from 68 to 90 percent.

A scale was constructed to measure the overall support HEWs provided to the CHPs by summing the four items described above, with each of the four items providing one point out of a total possible of four points. HEW support for CHP index score ranged from 0 to 4, with higher scores indicating greater support provided by the HEW to the CHPs.[33] As with the L10K program intensity index score, this index was re-expressed as a percentage of the maximum possible score. As expected, the HEW support for CHP index in L10K areas increased from 61 to 85 percent of the maximum score between the baseline and midterm surveys (Table 8). Improvement in this index scored varied by region (Figure 6)—with the

greatest improvements in Oromia (from 44 to 86 percent of the maximum). The other regions saw absolute increases ranging from 8 to 22 percentage points. At midterm the HEW support for CHP index score was highest in Amhara and Oromia (91 and 86 percent of the maximum, respectively), followed by Tigray and SNNP (82 and 76 percent of the maximum, respectively).

Next, CHPs' support for the HEP as perceived by the HEWs was analyzed (Table 8). HEWs were asked to rate the support they received from the CHPs for each of 17 components from the HEP service package, using a Likert-type scale ranging from 1 to 4 (1=none, 2=some, 3=moderate, 4=high). Other than the score for the CHP support for outreach services, the scores for every items measuring CHP support for HEP increased between the baseline and midterm surveys. All 17 items were summed to create a scale measuring overall CHP support for the HEP. This index of CHP support ranged from 17 to 68; with higher scores indicating greater CHP support for the HEP.[34] This index was then expressed as a percentage of the maximum score of 68. The CHP support for HEP index score increased from 48 to 66 percent of the maximum in L10K areas between the baseline and midterm surveys (Table 8). Figure 7 indicates that the largest improvement in this index score was in Oromia (from 36 to 62 percent of the maximum) followed by SNNP (from 49 to 67 percent of the maximum) and Amhara (from 52 to 68 percent of the maximum). The CHP support for HEP index score was not significantly different between the four regions during the midterm survey.

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[33] The Cronbach's reliability alpha of the HEW support index is 0.83.

[34] The Cronbach's reliability alpha of the CHP support index is 0.95.

Table 8: Community Health Promoters (CHPs). Support HEWs provided to CHPs and the HEWs' perception of the support they received from CHPs during the baseline and midterm surveys in L10K areas.

	Baseline (2008)	Midterm (2010)	
	(n=200)	(n=322)	
Percentage of *kebeles* where HEWs…			
a) Conducted monthly meeting with CHPs	73.5	92.6	**
b) Planned activities together with CHPs	47.9	79.2	**
c) Set and reviewed targets for CHPs	53.2	80.2	**
d) Provided supportive supervision to CHPs	67.9	89.7	**
HEW support for CHP index score (% of maximum score)	60.9	85.4	**
Average rating given by HEWs of support received from CHPs (scale ranges from low of 1 to high of 4) for …	(n=200)	(n=322)	
a) Immunization	3.0	3.3	*
b) Child health/nutrition	2.2	2.9	**
c) Essential neonatal care	1.7	2.7	**
d) Diarrhea management	2.1	2.6	**
e) Recognition of danger signs of childhood illness	2.0	2.7	**
f) Breast feeding practices	2.0	3.0	**
g) Complementary feeding	2.1	3.1	**
h) Family planning	2.9	3.5	**
i) Maternal health (ANC, delivery, PNC/nutrition)	2.4	3.1	**
j) Latrine construction and use	2.9	3.2	**
k) Personal hygiene	2.7	3.0	**
l) Community mobilization	2.9	3.1	**
m) Training/FU model families	2.3	2.6	**
n) Household visits	2.6	3.0	**
o) Outreach services	2.8	3.0	*
p) HMIS	2.0	2.8	**
q) Malaria	2.3	2.7	**
Index score of CHP support for HEP (% of the maximum score)	**47.6**	**65.6**	**

*p<0.1; **p<0.05

Figure 6: Changes in the mean HEW support for CHP index score between survey periods, according to region in L10K areas, 2008 - 2010.

Baseline (n=201)
Midterm (n=322)
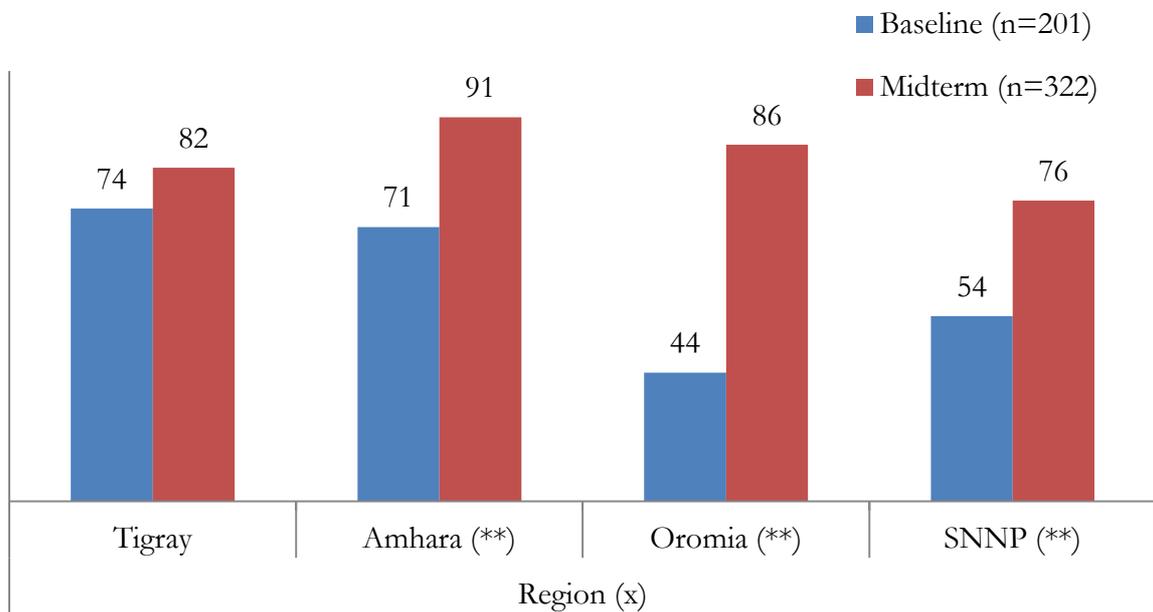
Region (x)

Change over time (**) p<0.05. The changes varied between the regions (x) p<0.05

Figure 7: Changes in the mean CHP support for HEP index score, according to region in L10K areas, 2008-2010.

Baseline (n=201)
Midterm (n=322)
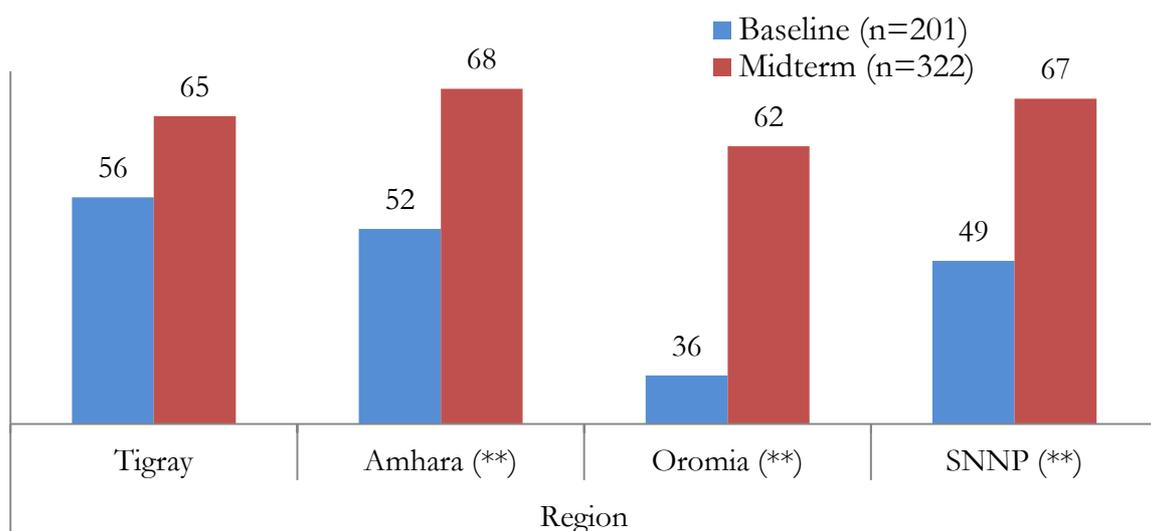
Region

Changes over time (**) p<0.05. The changes did not differ between regions (p>0.1)

Figure 8: Changes in the percentage of _kebeles_ where _kebele_ health committee meetings are held every month or every quarter, according to region in L10K areas, 2008 - 2010.

Change over time (**) p<0.05. The changes were not different between regions (p>0.1)
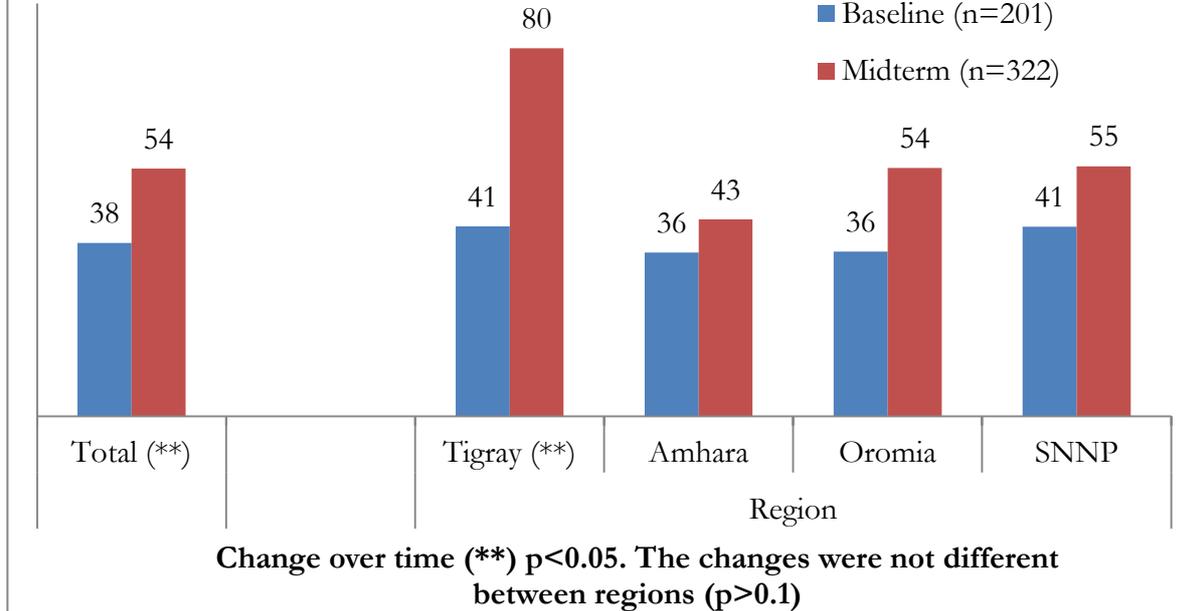
Kebele health committees

One of the two HEWs in a _kebele_ is expected to be a member of the _kebele_ administration and serve as the secretary of the _kebele_ health committee. The _kebele_ health committee is responsible for ensuring that the HEP is being smoothly implemented within the kebele. The L10K project encourages the HEWs to use the _kebele_ health committee to organize community mobilization activities including promoting community conversations, establishing anchors, motivating CHPs to sustain their activities, and mitigating problems associated with providing services within the _kebele_. In the CBDDM areas the _kebele_ health committee is also engaged in monitoring and evaluating MNCH services in the _kebele_. The percentage of the L10K _kebeles_ where _kebele_ health committee meetings usually take place every month or every quarter increased from 38 to 54 percent between the baseline and midterm surveys (Figure 8). This improvement in the regularity of the _kebele_ health committee meetings was significant only for Tigray (from 41 to 80 percent). _Kebele_ health

committee meetings were more regular at midterm in Tigray (80 percent) compared to the other three regions, where the indicator ranged from 43 to 55 percent. Next, the HEWs' perceptions regarding the support they receive from the _kebele_ health committee was analyzed. HEWs were asked to rate the support that they get from the _kebele_ health committee for each of the 12 components of the HEP service package. Each of the 12 components was assigned a score on a Likert-type scale ranging from 1 to 5 (1=none, 2=limited, 3=some, 4=frequent, 5=always). Other than the scores for transporting essential supplies from the _woreda_ and for school health, the scores for the all the items measuring _kebele_ health committee support for HEP increased (see Table 9). A scale was constructed to measure the overall support the HEP receives from the _kebele_ health committee by summing all the 12 items. The possible _kebele_ health committee support index score ranged from 12 to 60, with higher scores

Table 9: *Kebele* health committee support for HEP. Changes in HEW's perception of support received from *kebele* health committees between baseline and midterm surveys in L10K areas, expressed in a Likert-type scale from a low of 1 to a high of 5.

	Baseline (2008)	Midterm (2010)
	(n=196)	(n=312)
a) Plan and monitor health extension program activities (e.g. outreach services)	2.2	2.5 **
b) Pull essential supplies from the *woreda*	1.9	2.0
c) Pull supportive supervision from the *woreda*	1.6	2.0 **
d) Identify barriers to quality RMNCH services	1.8	2.4 **
e) Coordinate with local public and private sector developmental partners to overcome barriers to quality RMNCH services	1.8	2.4 **
f) Referral services for essential obstetric care	1.7	2.2 **
g) Providing referral services for sick children	1.8	2.2 **
h) Mobilizing the community	2.3	2.9 **
i) Constructing latrines	2.4	2.9 **
j) Promoting personal hygiene	2.2	2.7 **
k) Promoting school health	2.2	2.4
l) Providing incentives/encouragement to vCHWs/CHPs	1.4	2.5 **
Index score of *kebele* health committee support for HEP (% of maximum score)	24.1	35.3 **

*p<0.1; **p<0.05

indicating relatively stronger support from the *kebele* health committee.[35] The index was then expressed as a percentage of the maximum possible score. The average *kebele* health committee support index for L10K increased modestly from 24 to 35 percent of the maximum score between the baseline and midterm surveys.

Figure 9 indicates that changes in the *kebele* health committee support index scores differed by region. While the index score did not change in SNNP, the other three regions saw improvement between baseline and midterm: In Tigray it increased from 30 to 46 percent of the maximum, in Amhara from 15 to 26 percent, and in Oromia from 25 to 45 percent. Although the *kebele* health committee support index improved in Amhara, the average score there was still the lowest (26 percent), along with SNNP (32 percent).

Oromia's average *kebele* health committee support index score was 45 percent of the maximum, while in Tigray it was 46 percent.

Supportive supervision

Providing supportive supervision to the HEWs is vital to ensure the quality of HEP services, as well as to encourage and motivate HEWs and CHPs. The percentage of L10K area *kebeles* that received supportive supervision during the last three months increased from 62 percent during baseline to 76 percent during the midterm (Table 10). The improvements in supportive supervision varied between the four regions (Figure 9). The gains were mainly observed in Oromia (from 37 to 89 percent), and Tigray (from 49 to 90 percent). At midterm the lowest rate of supportive supervision was reported in Amhara (60 percent).

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[35] The Cronbach's reliability alpha of the *kebele* health committee support index was 0.95.

Figure 9: Changes in the mean *kebele* health committee support index score, according to region in L10K areas, 2008-2010.

Baseline (n=201)
Midterm (n=322)

Region	Baseline	Midterm
Tigray (**)	30	46
Amhara (**)	15	26
Oromia (**)	25	45
SNNP	35	32

Region (x)

Change over time (**)p<0.05. The changes over time varied between regions (x) p <0.05
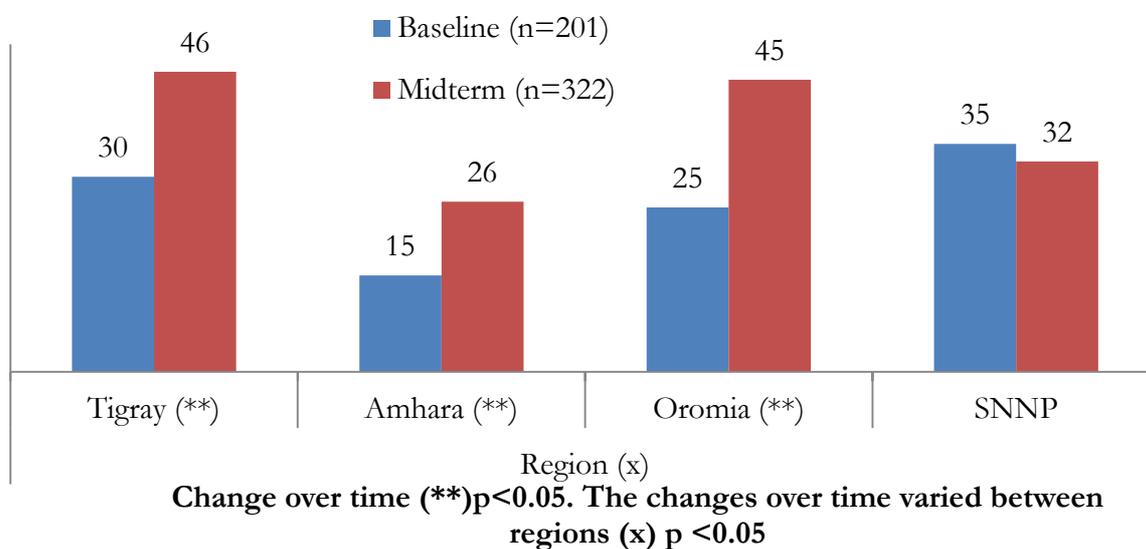
Figure 10: Changes in the percentage of *kebeles* that received supportive supervisory visits during the last three months, according to region in L10K areas, 2008-2010.

Baseline (n=201)
Midterm (n=322)

Region	Baseline	Midterm
Tigray (**)	49	90
Amhara	71	60
Oromia (**)	37	89
SNNP	86	80

Region (x)

Change over time (**) p<0.05. The changes over time differed between regions (x) p<0.05
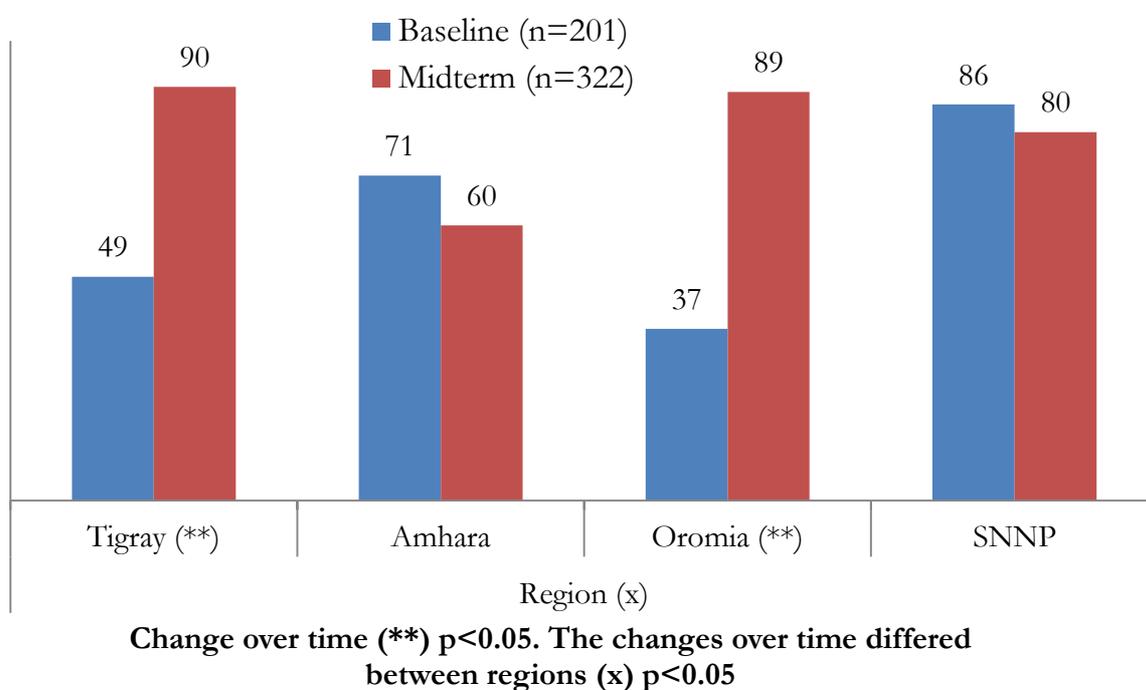
Table 10: Supportive supervision. During the baseline and midterm surveys in the L10K areas, the percentage of *kebeles* that received supportive supervision visits during the last three months; components of the supportive supervision visits; and the average number of components of the supportive supervision received during the most recent visit.

	Baseline (2008)	Midterm (2010)	
	n=200	n=320	
Supportive supervision visits within last three months	**62.3**	**76.2**	**
Supportive supervision visits included…			
a) Receiving supplies	51.7	61.5	
b) Reviewing record keeping and reporting (HMIS)	80.5	85.9	
c) Observing interaction with clients	46.3	54.2	
d) Providing written feedback	35.8	43.0	
e) Providing encouragement	68.3	79.6	*
f) Providing updates on administrative or technical issues	46.7	68.5	**
g) Discussing problems the HEW encountered	65.7	83.0	**
h) Conducting household visits	54.0	67.3	*
i) Reviewing work plans and results	63.7	80.6	**
j) Discussing CHP activities	36.4	71.3	**
Quality of supportive supervision index score (% of the maximum score)	**54.6**	**69.3**	**

*p<0.1; **p<0.05

Supportive supervision has several components, and the improvements between the baseline and midterm surveys were constituted largely by changes in a few activities. Discussions of CHP activities increased from 36 to 71 percent, followed by updates on administrative and technical issues (from 47 to 69 percent), discussion of problems encountered (from 66 to 83 percent), reviewing work-plans and results (from 64 to 81 percent), conducting household visits (from 54 to 67 percent), and providing encouragement (from 68 to 80 percent). Although there is still room for improvement in all areas of supervision, the supervisory areas that lagged at midterm include providing written feedback (43 percent), observing client interactions (54 percent), enquiring about the adequacy of supplies (62 percent), and conducting household visits (67 percent).

A scale was constructed to measure the quality of the supportive supervision in L10K areas by summing 10 items that measure supportive supervision.

Each item contributed one point to the index; possible scores on the supportive supervision index ranged from 0 to 10, with higher index scores indicating better quality of supportive supervisory visits.[36] The scale was then expressed as a percentage of the maximum possible score. The mean value of the supportive supervisory visit index score increased from 55 to 69 percent of the maximum between the baseline and midterm surveys (Table 10). Figure 11 indicates that improvements in the quality of supportive supervision varied by region, with the greatest improvements being observed in Oromia (from 43 to 74 percent of the maximum) and Amhara (from 54 to 69 percent of the maximum), followed by the other two regions. However, the quality of supportive supervision was similar across all four regions during the midterm survey.

[36] The Cronbach's reliability alpha of the quality of the supportive supervision index was 0.73.

Figure 11: Changes in the mean quality of supportive supervision index score by region in L10K areas, 2008 - 2010.

Baseline (n=201)　　Midterm (n=322)

Region	Tigray	Amhara (**)	Oromia (**)	SNNP
Baseline	68	54	43	56
Midterm	67	69	74	66

Region (**)

Change over time (**) p<0.05. The changes over time varied by region (x) p <0.05
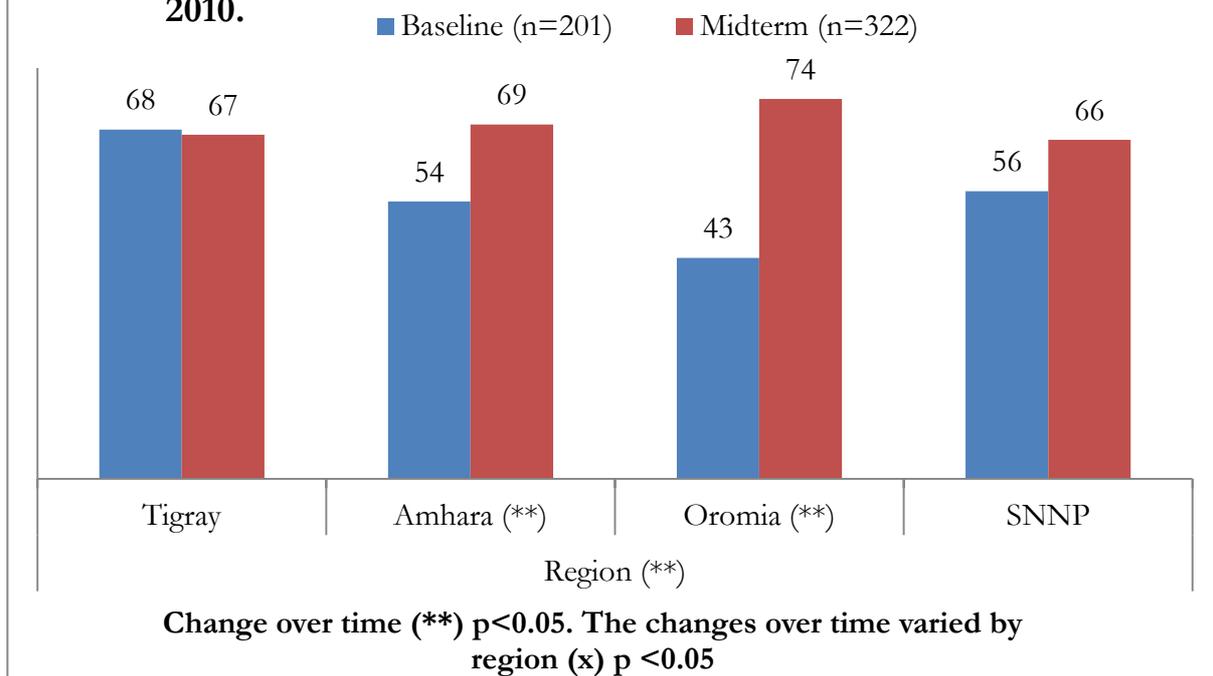
Health management information system (HMIS)

The health management information system (HMIS) forms the backbone of the HEP monitoring and evaluation system, helping HEWs to manage HEP services and ensure their quality. The percentage of L10K *kebeles* that kept records of a particular service and regularly reported their performance to the *woreda* is given in Table 11. Improvements in recording and reporting were observed between the baseline and midterm surveys in several services: essential newborn care (from 14 to 36 percent); training and follow-up of CHPs (from 15 to 39 percent); PNC (from 37 to 65 percent); ANC (from 63 to 83 percent); training and follow-up of model families (from 27 to 44 percent); and growth monitoring (from 41 to 51 percent). There is still room for improvement in recording and reporting all service components. The services where recording and reporting lagged the most at midterm

included essential newborn care (36 percent), training and follow-up of CHPs and model families (39 and 44 percent), delivery (49 percent), and PNC (65 percent).

The overall performance of the HMIS in L10K area *kebeles* was measured with an index created by summing the nine services components listed in Table 11, with each item contributing one point. Possible scores on the HMIS performance index ranged from 0 to 9, with higher index scores indicating a stronger HMIS in the kebele.[37] The index was then expressed as a percentage of the maximum possible score. According to the index score, HMIS performance improved from 46 to 61 percent of the maximum between the baseline and midterm surveys (Table 11). Figure 12 indicates that the improvement in the mean HMIS performance was mainly observed in Amhara and Oromia, regions that had low scores at baseline. The greatest improvement in the mean HMIS performance index score was observed in Oromia (from 30 to 62 percent of the maximum)

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[37] The Cronbach's reliability alpha of the HMIS performance index was 0.78.

Figure 12: Changes in the mean HMIS performance index score by region in L10K areas, 2008-2010.

Change over time (**) p<0.05. The changes over time vary by region (x) p<0.05
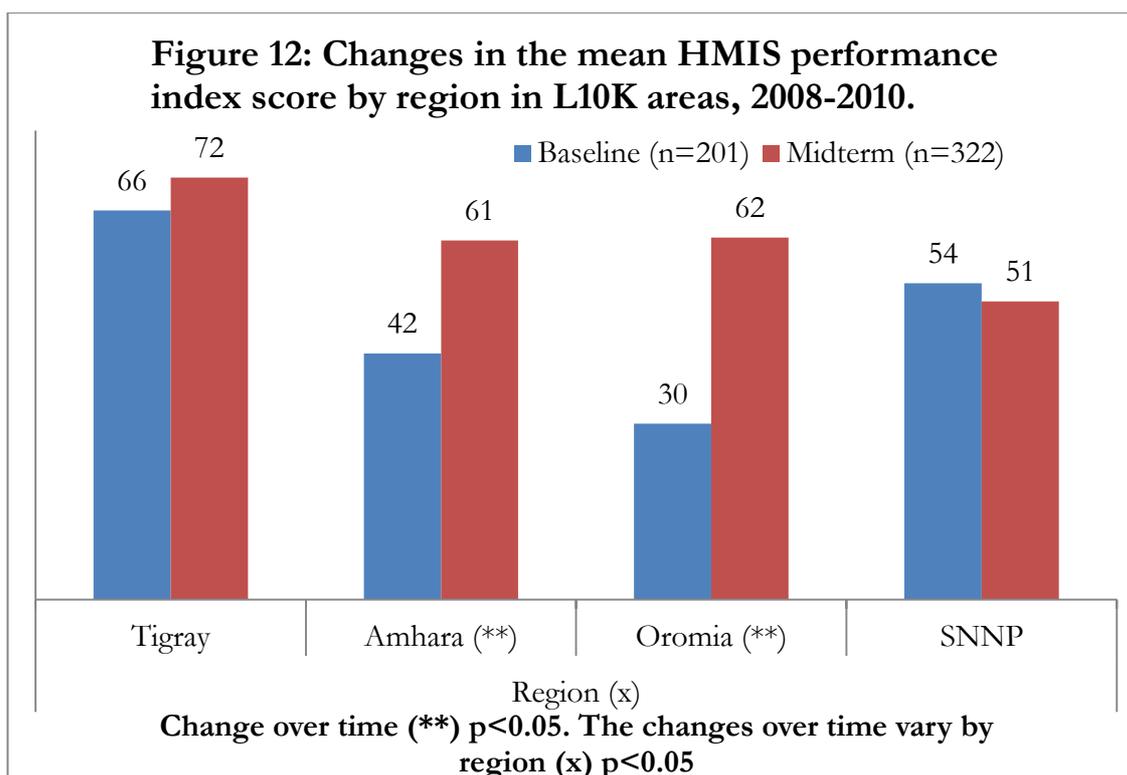
Table 11: *Kebele* health information system (HMIS). Percentage of *kebeles* maintaining records and reports on a particular service; and an index score of HMIS performance in L10K areas during baseline and midterm surveys.

Percentage of *kebeles* maintaining records and reports on...	Baseline (2008)	Midterm (2010)	
	n=184	n=324	
Vaccination (EPI)	83.0	87.2	
Growth monitoring/nutrition	40.6	51.1	*
Essential new born care	13.6	36.1	**
ANC	62.5	83.4	**
Delivery	41.3	49.3	
PNC	36.5	64.7	**
Family planning (contraception)	87.3	91.9	
Training and follow-up for model families	27.4	44.3	**
Training and follow-up CHPs	14.8	39.1	**
C performance index score (% of the maximum score)	**45.6**	**61.3**	**

*p<1.0; **p<0.05

followed by Amhara (from 42 to 61 percent). The HMIS performance index score was highest at midterm in Tigray (72 percent of the maximum), followed by Amhara and Oromia (62 and 61 percent, respectively), and then SNNP (51 percent).

Availability of commodities and supplies

Availability of essential medicines and supplies available at the *kebele* level is crucial for providing

optimal maternal, newborn and child health services. Stock-outs of essential commodities may lead to program failure; for example, family planning clients who leave health facilities without receiving contraceptives may have unintended pregnancies with all the adverse consequences. Therefore, availability of essential medicines in the *kebeles'* health posts is essential for the success of the HEP. The availability of essential commodities reflects the performance of HEP commodity supply chains. Contraceptive commodity availability in L10K *kebeles* improved substantially between the baseline and midterm surveys (Table 12). The percentage of *kebeles* where combination pill was available during the day of the survey visit increased from 60 to 83 percent; availability of injectable contraceptives improved from 64 to 88 percent; and the availability of male condoms increased from 49 to 68 percent. The availability of commodities for child health also improved substantially, including oral rehydration salts (ORS) (from 38 to 65 percent), vitamin A (30 to 62 percent), de-worming (18 to 51 percent), artemisinin combination therapy (ACT) (37 to 52 percent) and vaccines (19 to 36 percent). However, cotrimoxizole was not available anywhere, and availability of other child health commodities was less than optimal. Particularly concerning was the availability of iron tablets, a vital maternal health commodity, which was very low during the baseline survey (only 27 percent) and remained more-or-less the same during the midterm survey (29 percent).

Providing high-quality HEP services requires continuous availability of essential supplies, equipment, and tools, not to mention communication. The availability of most supplies and equipment in *kebeles* improved between the baseline and midterm surveys (Table 12). Nevertheless,

availability of a functional refrigerator and an ORT corner remains low (24 and 33 percent, respectively). The availability of the essential supplies listed in Table 12 was used to construct an essential supplies availability index, with higher scores indicating better availability of supplies. This index was also expressed as a percentage of the maximum possible score. The essential supplies availability index increased from 44 to 67 percent of the maximum between the baseline and midterm surveys.

Since the financing, procurement and supply chain systems for reproductive, child and maternal health commodities in the HEP may face different obstacles, the availability of commodities for reproductive, child, and maternal health were assessed separately. For this purpose, all the commodities within each service category were summed to produce commodity availability indices. The indices were then expressed as percentages of the maximum possible score. The contraceptive availability index includes the availability of combination pills, injectables and condoms; the child health commodity availability index includes ORS, vitamin A, vaccines, de-worming medication, cotrimoxizole, and anti-malarials; and the maternal health commodity availability index includes iron tablets, misoprostol and ergometrine. Table 12 shows that the contraceptive availability index score improved from 59 to 85 percent of the maximum between the baseline and midterm surveys in L10K areas; the child health commodity availability index score improved from 25 to 47 percent; and the maternal health commodity availability index score remained more-or-less unchanged during the same period (between 14 and 11 percent of the maximum). Figure 13 shows that the contraceptive availability index score in L10K area *kebeles* improved uniformly in all four regions. The availability of contraceptives was

Table 12: Availability of commodities and supplies. Percentage of *kebeles* with essential medicines, supplies, materials and equipment during baseline and midterm surveys inL10K areas.

Percentage of *kebeles* where the following essential medicines were available…	Baseline (n=200)	Midterm (n=322)	
Combined pills	59.7	83.3	**
Injectables	64.0	87.7	**
Condoms	48.8	68.4	**
ORS	38.0	65.2	**
Vitamin A	30.0	61.8	**
Vaccines	18.9	36.0	**
De-worming medicine	17.6	51.4	**
Cotrimoxizole	1.8	1.4	
ACT	37.3	52.4	**
Rapid test for malaria	37.5	47.3	*
Fansidar	2.2	0.9	
Bed nets	16.5	22.6	
Iron tablets	27.1	28.5	
Misoprostol	3.2	2.5	
Ergometrine	6.1	0.1	**
Index score of contraceptive availability (% of maximum score)	**59.2**	**84.5**	**
Index score of child health commodity availability (% of maximum score)	**25.3**	**46.6**	**
Index of maternal health commodity availability (% of maximum score)	**13.5**	**11.1**	
Percentage of *kebeles* where the following essential supplies/materials/equipment were available…			
Family health cards	47.7	89.0	**
Vaccination cards	69.8	75.5	
Immunization diplomas	53.8	78.5	**
Vaccine carrier with at least four ice packs	60.0	84.3	**
FP counseling cards	26.7	38.8	**
Training manual for CHPs	37.4	94.9	**
Training materials for model families	38.9	63.8	**
Functional BP apparatus	56.4	78.1	**
Functional weighing scale	43.6	75.8	**
Functional Salter scale	49.7	56.8	
Growth monitoring charts	35.3	52.1	**
Functional thermometer	42.5	75.2	**
Delivery kits	52.5	83.0	**
First-aid kits	50.9	64.0	**
ORT corner supplies	21.8	33.3	**
Delivery couch	48.3	80.6	**
Functional refrigerator	18.7	23.6	
Index score of availability of essential supplies (% of maximum score)	**44.4**	**67.4**	**

*p<0.1; **p<0.05

similar across regions (ranging from 78 to 93 percent of the maximum possible score) at midterm.

Figure 14 shows the child health commodity availability index score in L10K *kebeles* by region and survey period. Improvements in the availability of child health commodities in L10K *kebeles* varied by region, with the highest improvement observed in Amhara (the index score increased from 29 to 59 percent of the maximum)

and SNNP (from 13 to 39 percent). The availability of child health commodities was higher during the midterm survey in Amhara and Tigray (59 and 52 percent, respectively) compared to SNNP (39 percent) and Oromia (33 percent).

Figure 15 shows the maternal health commodity availability index score in L10K *kebeles* by region and survey period. Improvements in the

Figure 13: Changes in the mean contraceptive availability index score by region in, L10K areas, 2008-2010.

■ Baseline (n=2010)
■ Midterm (n=322)

Region	Baseline	Midterm
Tigray (**)	64	93
Amhara (**)	65	89
Oromia (**)	54	80
SNNP (**)	51	78

Region

Change over time (**) $p<0.05$. The changes over time did not vary by region ($p>0.1$)

Figure 14: Changes in the mean child health commodity availability index score by region in L10K areas, 2008-2010.

■ Baseline (n=201)   ■ Midterm (n=322)

Region	Baseline	Midterm
Tigray	47	52
Amhara (**)	29	59
Oromia (**)	17	33
SNNP (**)	13	39

Region (x)

Change over time (**) $p<0.05$. The changes over time varied by region (x) $p<0.05$

maternal health commodity availability index were only observed in Oromia (from 1 to 9 percent of the maximum). The apparent declines in maternal health commodity availability in Tigray and Amhara were not statistically significant. Availability of maternal health commodities during the midterm survey was highest in Tigray (22 percent of the maximum index score) followed by the other three regions, which ranged from 8 to 10 percent.

Figure 15: Changes in the mean maternal health commodity availability index score by region in L10K areas, 2008-2010.

Legend: ■ Baseline (n=201) ■ Midterm (n=322)

Tigray: 27, 22
Amhara: 20, 10
Oromia (**): 1, 9
SNNP: 7, 8

Region (**)

Change over time (**) p<0.05. The changes over time vary by region (x) p<0.0
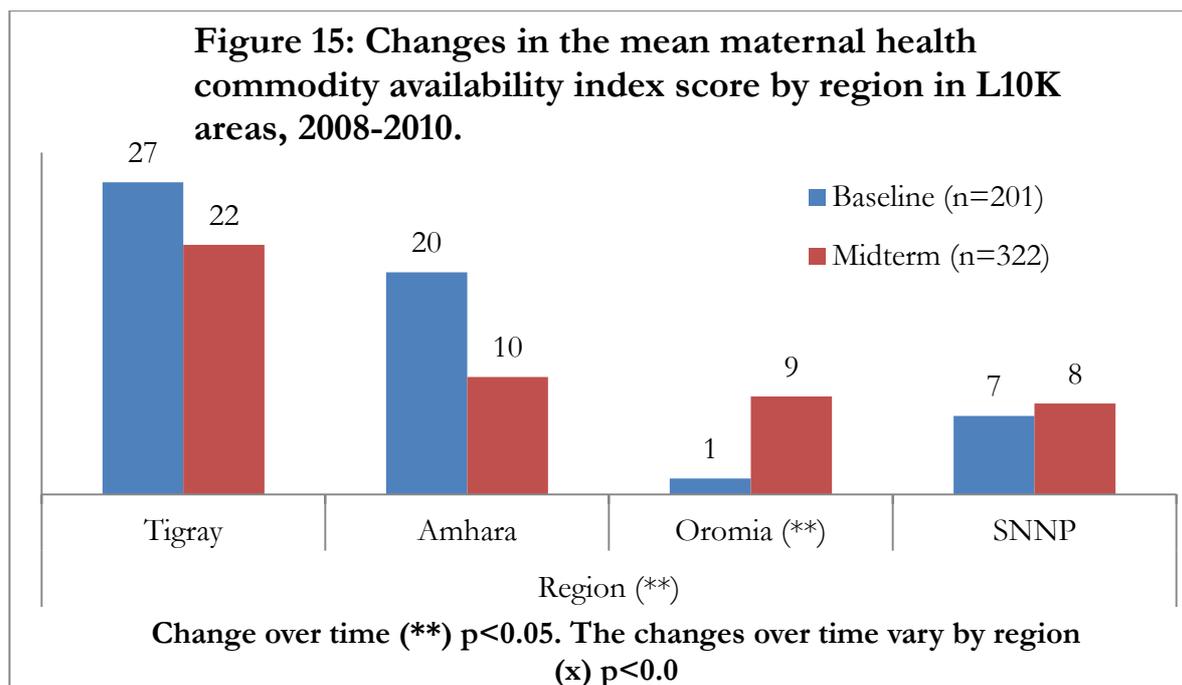
Conclusions and recommendations

Consistent with the 2010–2011 annual performance report of the Health Sector Development Program (HSDP) IV, this situation analysis of health services in L10K area *kebeles* indicates that there were significant improvements in HEP infrastructure and human resources between the baseline and midterm surveys. During the midterm survey 97 percent of L10K *kebeles* had at least one health facility, and 99 percent of L10K *kebeles* had at least one HEW. On average, about 3,104 people were served by each HEW, almost meeting the HEP target (one HEW per 2,500 people).

There have been impressive improvements to HEP support systems over the past two years in L10K areas. The index measuring NGO support for MNCH services (which was mainly contributed by L10K) improved from 10 to 61 percent of the maximum possible score. The density of CHPs in *kebeles* improved from 99 to 31 HHs per CHP. Almost all of the index scores constructed to measure HEP services improved: HEW support for CHP activities increased from 61 to 85 percent; HEWs' perception of the support they receive from CHPs to provide HEP services increased from 48 to 66 percent; the regularity of *kebele* health committee meetings increased from 38 to 54 percent; HEWs' perception of the support they get from *kebele* health committees for providing HEP services increased from 24 to 35 percent; regularity of supportive supervisory visits to the *kebele* increased from 62 to 76 percent; the quality of the supportive supervisory visits increased from 55 to 69 percent; HMIS performance increased from 46 to 61 percent; contraceptive availability increased from 59 to 85 percent; child health commodity availability increased from 25 to 47 percent; and availability of essential supplies increased from 44 to 67 percent. Unfortunately, the availability of maternal health commodities index score remained very low, at about 11 percent of the maximum score.

These improvements in factors supporting the HEP in L10K areas are encouraging; but more needs to be done to reach optimal HEP performance. As such, health and development partners including L10K should target their support towards the areas that are

lagging behind. **Special effort will be required to improve the availability of maternal health commodities. Efforts should also be made to improve the support of *kebele* health committees for HEP activities; to improve the performance of HMIS; to improve the availability of essential equipment and materials that are required to provide HEP services; and to improve supportive supervision visits and their quality**.

The coverage of the L10K training and review meetings organized for the HEWs was consistent with program performance reports from the grantees. Almost all of the HEWs (more than 95 percent) reported that they received training from L10K and attended review meetings organized by L10K. L10K-sponsored follow-up and support for MNCH services, as measured by the L10K program intensity scale, was not consistent across all *kebeles*. **As such, there is room to improve the intensity of L10K to a uniform level across *kebeles*.**

The improvement observed in HEW support for CHP activities, *kebele* health committee support for HEP activities, regularity of supportive supervision, quality of supportive supervision, HMIS performance, and availability of child health commodities varied by region. The improvements in these HEP support factors were generally greater in areas that were lagging during the baseline survey.

The analysis of HEP support by region indicates that **while there are opportunities for improvement in all regions, specific regions may require special attention on specific factors. Accordingly, special effort is needed to improve the accessibility of health centers from *kebeles* in Oromia and Tigray**. **The intensity of L10K support for MNCH services requires special attention in SNNP; the regularity of *kebele* health committee meetings needs to be improved in Amhara, Oromia and SNNP; and special initiatives will be required**

to improve the *kebele* health committee support for HEP activities in Amhara and SNNP. Amhara needs special attention to improve the regularity of the supportive supervisory visits. HMIS performance needs to improve most in SNNP, followed by Amhara and Oromia. Ensuring the availability of child health commodities needs special attention in Oromia and SNNP; and availability of essential equipment and materials to provide HEP services needs improvement in Oromia.**

The new Federal Ministry of Health (FMOH) policy of replacing CHPs with HDA is currently being rolled out. The respective RHBs believe that the HDA should be female; as such, about 60 percent of the L10K-trained male CHPs will likely be replaced by female HDA workers. This replacement of L10K-trained CHPs will thus be more common in the regions where the proportion of female CHPs is relatively low (i.e., in SNNP, followed by Amhara and Oromia). **The L10K project will need to track the CHPs who have been replaced by the HDA to ensure that they are properly trained on high impact MNCH interventions.**

Other new policies being rolled out will have implications for the HEP support system, including the strengthening of primary health care units (PHCUs) and the roll-out of the new HMIS. According to the PHCU policy, health center staff will actively provide supportive supervision, including technical support, to each of the five satellite health posts under it. **The L10K project should take advantage of these new HEP priorities to identify scalable strategies to support them, so that the trend towards improved supportive supervision systems and HMIS performance will continue.**

INTERACTION OF THE FRONTLINE HEALTH WORKERS WITH HOUSEHOLDS AND FAMILIES

Exposure or interactions of households and families with frontline health workers of the HEP—i.e., HEWs and CHPs/HDA—is measured by any health posts visits by women, any household visits by frontline health workers, model family (MF) households, and household's possession of family health card. The target populations for this analysis are the women in reproductive age, women with children 0 to 11 months, and women with children 12 to 23 months. The target populations for this analysis are the unique respondents from all the three target groups of women (i.e., the sample described in Table 3).

Unadjusted bivariate statistical analyses were done to detect statistically significant changes (p<0.1) over time or statistically significant differences (p<0.1) between regions. Effect modification analysis was done to assess whether the rate of change of indicators differed by regions. The results of these analyses were used to answer the following questions:

1) Were there significant changes in the interaction (or exposure) indicators between the baseline and midterm surveys?

2) Did the rate of change over time of an indicator differ by region? If so, across which regions was the difference mainly observed? And,

3) Are there currently any significant variations in the indicators across regions? If so, which regions are doing better or worse in terms of programmatic performance?

Health post visits during the preceding 12 months

The percentage of women who visited a health post in the last 12 months before the survey improved modestly, from 52 to 59 percent between the baseline

and midterm surveys (see Table 13). The highest increase in health post utilization was observed in Oromia (14 percentage points, from 50 to 64 percent), followed by SNNP (from 56 to 64 percent) and Tigray (53 to 59 percent). No appreciable change was observed in Amhara (51 percent at baseline and 53 percent at midterm).

The five most commonly reported reasons to visit a health post remained mostly the same between the survey periods (Table 13). The most common reasons for visiting health posts were child immunization (52 percent at midterm), followed by family planning (35 percent), maternal health (25 percent, including ANC, PNC and delivery care), malaria treatment (10 percent), health education (seven percent), and then referral of a sick child (six percent). Other reasons for visiting health posts included growth monitoring (three percent), diarrhea treatment (two percent), obtaining a bed net (one percent), and other reasons. Even though about 40 percent of survey respondents had children aged 0 to 11 months, newborn health care was still an uncommon reason for visiting a health post (one percent).

Household visits by HEWs during the last six months

During the baseline and midterm surveys women were asked whether they knew the HEWs in their *kebele*, followed by questions about interactions with the HEWs. The proportion of women in L10K areas who knew the HEW in her *kebele* increased from 73 to 87 percent between the baseline and midterm surveys (Table 13). The rate of increase in the awareness of the HEW among respondents varied across the four regions, with the higher rates of increase observed in

Table 13: Health post visits and household visits by HEWs. Percentage of respondents who visited a health post during the last 12 months and the reasons for visiting the health post; and the percentage of respondents who were visited by a HEW during the last 6 months and the topics discussed by the HEW; in L10K areas during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
No. of respondents	1,557	1,925	1,724	2,999	1,527	2,501	1,484	2,542	6,292	9,967
% visited health post in 12 mo [β]	53.4	**59.4	50.7	52.8	50.2	**64.4	56.4	**64.1	52.1	**58.8
Reasons for visiting the HP (n)	(897)	(1,205)	(856)	(1,595)	(766)	(1,696)	(777)	(1,659)	(3,296)	(6,155)
Child immunization	58.3	54.2	58.7	46.3	53.7	57.9	67.3	51.8	59.3	51.7
Family planning	20.3	25.3	37.9	38.5	31.3	39.9	32.5	31.4	32.7	35.4
Antenatal care (ANC)	27.5	20.6	9.4	17.9	22.2	21.1	22.4	25.3	17.8	20.8
Malaria treatment	13.4	25.8	14.8	8.1	22.2	9.7	8.7	2.8	15.1	10.0
Referral of sick child	27.6	5.8	4.7	5.7	9.5	6.0	6.0	4.5	9.4	5.5
Health education	3.0	9.0	5.6	2.6	2.4	12.5	7.8	7.4	4.9	7.2
Postnatal care (PNC)	2.4	1.9	0.9	1.9	4.5	5.4	1.2	1.1	2.1	2.7
Growth monitoring	8.8	8.9	1.5	1.1	0.4	3.3	1.4	1.6	2.3	2.9
Diarrhea treatment	6.0	3.9	3.1	1.8	6.4	1.9	2.0	1.1	4.1	2.0
Pneumonia treatment	2.2	1.0	2.1	1.2	3.7	0.5	1.0	0.3	2.3	0.8
Obtaining bed nets	0.9	1.4	1.1	1.7	0.0	1.0	1.2	0.3	0.8	1.2
Delivery care	0.9	1.4	0.6	1.4	0.9	0.7	0.5	0.5	0.7	1.0
Neonatal care	1.3	1.2	0.9	0.7	0.2	1.7	0.2	0.7	0.6	1.0
% heard of HEW [β]	56.2	**88.2	76.3	**87.5	66.1	**86.8	83.7	83.3	72.5	**86.6
% visited by HEW in 6 months [β]	36.7	**55.3	35.2	**49.0	35.1	**51.9	42.0	**47.7	36.7	**50.4
Topics recalled being discussed by the HEW (n)	(522)	(1,045)	(656)	(1,546)	(471)	(1,294)	(592)	(1,165)	(2,241)	(5,050)
Latrine use	53.8	60	45	59.3	58.1	63.5	51.9	60.3	50.9	60.7
Hygiene	78.7	69.6	39.8	45.4	49.2	66.2	69.6	65.6	54.1	58.3
Pit latrine construction	71	66	58.8	62.6	62.7	47.3	42.5	54.3	57.7	57.8
Immunization	45.9	51	58.9	47.2	38.9	49.1	33.2	44	46.5	47.7
Child nutrition	18	29.5	9.1	19.3	5.7	41.8	11	23.8	9.9	27.4
Safe water use	22.8	32.2	18.5	28.3	20.8	23.9	16.1	20.3	19.1	26.3
Family planning	22.6	33.6	16.3	12.2	18.5	28.8	11.3	12	16.6	19.7
Pregnancy care (ANC)	10.4	13.5	1.7	5.6	4.1	13.3	2.9	8.3	3.7	9.3
HIV/AIDS	14.7	15.1	2.5	5.9	2.7	10.4	8.5	6.9	5.6	8.7
Newborn care	NA	5.2	NA	4.8	NA	11.5	NA	9.4	NA	7.4
Diarrhea treatment	5.2	8	1.8	3.4	1.8	10	2.8	3.6	2.5	5.8
PNC	NA	4.3	NA	2.1	NA	4.9	NA	1.9	NA	3.1
% of the expected No. of topics recalled being discussed [β]	34.3	**37.9	25.2	**28.9	26.3	**35.4	25.0	**29.9	26.7	**32.2

[β] p<0.05 for region × change over time interactions; **p<0.05 for change over time. Statistical tests for the changes in the reasons for visiting the health posts and the changes in the topic items discussed by the HEW were not conducted.

regions with lower baseline rates. The highest rate of increase in the indicator was observed in Tigray (32 percentage points, from 56 to 88 percent), where the indicator was the lowest during the baseline survey. Oromia saw a 20 percentage-point improvement (from 66 to 87 percent); Amhara a 12 percentage-point increase (from 76 to 88 percent); and SNNP remained unchanged at about 83 percent. The current proportion of women who know their HEWs was lowest in SNNP (83 percent), while the other three regions range from 87 to 88 percent recognition.

The proportion of women in L10K areas who reported that the HEW visited (or contacted) them to discuss their or their children's health during the previous six months increased from 37 to 50 percent between the baseline and midterm surveys (Table 13). The rate of increase in household visits by HEWs between the two survey periods was lower in SNNP (from 42 to 48 percent) compared to the other three regions, where increases ranged between 14 and 18 percentage points. The proportion of households visited by HEW was the highest at midterm in Tigray (55 percent), followed by the other three regions (52 percent in Oromia, 49 percent in Amhara, and 48 percent in SNNP).

Women were asked about the information that was provided by the HEW during the last household visit. Their spontaneous responses were recording without any probing. The items they mentioned were matched with a list of ten expected topics. The percentage of these ten topics that women recalled the HEW discussing was then used as a measure of the quality of HEW household visits. The major assumption of this quality indicator is that higher quality interactions between HEWs and households will lead to better spontaneous recall of the topics discussed. According to this metric, the quality of household visits by HEWs increased from 27 to 32 percent between the two survey periods (Table 13). The largest increase was

seen in Oromia (nine percentage points) followed by the other three regions with increases of approximately 4 to 5 percentage points. The quality of household visits by the HEWs at midterm was highest in Tigray (38 percent), followed by Oromia (35 percent), and then Amhara and SNNP (29 and 30 percent, respectively). Household sanitation (including hygiene, latrine construction, and latrine use) and immunization were the major topics of discussion during the baseline survey and remained so during the midterm. Some notable increases in topics discussed by the HEWs during household visits were child nutrition (which increased from 10 to 27 percent), antenatal care (from 4 to 9 percent), diarrhea treatment (from 3 to 6 percent), HIV/AIDS (from 6 to 9 percent), and safe water use (from 19 to 26 percent). Although a few women recalled the HEW discussing postnatal care and newborn health care (3 and 7 percent, respectively), these levels were not optimal.

Household visits by CHPs during the last six months

The network of CHPs informs and reminds households to maintain good hygiene and household sanitation, and to utilize services offered by the HEP. One of the major activities of the L10K project has been to encourage and support the HEWs as they train and supervise the CHPs to promote maternal, newborn and child health. The proportion of women in L10K areas who reported that they knew the CHP in their neighborhood increased from 37 to 49 percent between the baseline and midterm surveys (Table 14). The highest increases in awareness of CHPs was seen in Amhara and SNNP (from 36 to 53 percent in Amhara and from 29 to 44 percent in SNNP), followed by Tigray (from 71 to 81 percent); awareness did not change significantly in Oromia. CHP awareness was highest at midterm in Tigray (81

Table 14: Household visits by CHPs. Percentage of respondents heard of the CHP and the percentage visited by a CHP during last 6 months and the topics discussed by the CHP, by region and survey periods, L10K area, 2008 – 2010.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
No. of respondents	1,557	1,925	1,724	2,999	1,527	2,501	1,484	2,542	**6,292**	**9,967**
% heard of CHP β	71.4	**81.2	36.3	**52.8	24.6	25.8	29.0	**43.8	**36.7**	****48.7**
% visited by CHP in 6 months β	42.9	**55.7	17.5	**31.3	4.4	**20.0	9.7	**28.6	**16.1**	****31.6**
Topic items recalled being discussed by the CHP (n)	(605)	(1,088)	(335)	(1,002)	(103)	(516)	(141)	(705)	**(1,184)**	**(3,311)**
Hygiene	60.2	65.7	25.0	47.7	20.1	69.9	58.3	63.7	**41.5**	**58.6**
Pit latrine construction	41.3	51.8	29.6	59.6	19.4	48.1	43.6	54.6	**34.8**	**54.9**
Immunization	55.8	59.9	68.1	53.7	69.4	53.7	40.2	45.9	**60.4**	**53.9**
Child nutrition	33.4	30.7	5.8	16.9	5.2	50.3	8.8	16.5	**16.1**	**25.5**
Latrine use	19.9	29.9	11.5	22.5	10.2	19.0	21.8	19.6	**15.7**	**23.4**
Safe water use	23.1	24.4	14.6	9.8	36.1	29.2	9.9	11.4	**18.5**	**16.8**
HIV/AIDS	16.4	14.5	3.7	8.2	9.8	16.5	6.1	9.7	**9.0**	**11.3**
Pregnancy care (ANC)	11.5	9.4	1.8	6.1	6.6	21.1	2.5	9.2	**5.7**	**9.8**
Family planning	11.2	9.1	5.8	4.1	18.6	20.0	11.6	5.4	**9.3**	**8.0**
Diarrhea treatment	5.6	6.1	2.3	3.6	7.3	10.0	5.2	2.6	**4.2**	**5.1**
Family health services	0.7	1.4	1.3	0.6	0.3	0.8	0.0	0.8	**0.9**	**0.9**
% of expected topics recalled being discussed β	27.6	**29.9	17.6	**24.6	17.9	**30.8	21.0	**24.5	**21.7**	****26.9**

ᶲ $p<0.1$; β $p<0.05$ for region × change over time interactions;**$p<0.05$ for change over time. Statistical tests for the changes in the topic items discussed by the CHP were not conducted

percent), followed by Amhara (53 percent), SNNP (44 percent), and then Oromia (26 percent).

The percentage of women in L10K areas who were contacted by the CHP to discuss their or their children's health during the six months preceding the survey increased by two-fold, from 16 to 32 percent between the two survey periods (Table 14). The rate of increase in the prevalence of household visits by CHPs was highest in Oromia (a 4.6-fold increase, from 4.4 to 20 percent), followed by SNNP (from 9.7 to 28.6 percent), Amhara (from 17.5 to 31.3 percent), and then Tigray (from 42.9 to 55.7 percent). The prevalence of household contacts by a CHP was highest during the midterm survey in Tigray (56 percent), then Amhara and SNNP (31 and 29 percent, respectively), and then Oromia (20 percent).

The quality of CHP household visits was assessed using methods similar to how the quality of household visits by a HEW was assessed. The percentage of items that women spontaneously recalled CHPs discussing, out of an expected list of 12 items, was used as a measure of the quality of household visits by the CHPs. The quality of CHP household visits, as measured by the index, increased from 22 to 27 percent of the maximum possible score between the two survey periods (Table 14). The rate of improvement of the CHP visit quality was the highest in Oromia (13 percentage points), followed by Amhara (7 percentage points), and then the other two regions (4 percentage points in SNNP and 2 percentage points in Tigray). The quality of CHP visits at midterm was the best in Tigray and Oromia (30 and 31 percent of the maximum, respectively) followed by the other regions (both at 25 percent). As expected, the top five types of information discussed by the CHPs were similar to the topics discussed most by the HEWs—they include hygiene, latrine construction, immunization, child nutrition and latrine use. According to the women's recollection, the

emphasis on most topics increased between the two survey periods. The rate of increase was highest for pregnancy care (a 1.7-fold increase from 5.7 to 9.8 percent), followed by child nutrition and pit latrine construction (1.6-fold increase), latrine use (1.5-fold increase), and hygiene (1.4-fold increase), followed by the other topics.

Model family households

The HEWs spent a significant portion of their time interacting with households on training model families. For a household to graduate as a model family, they must receive a number of training sessions and adopt a number of healthy household practices that are part of the primary health package of the HEP. Model families are believed not only to change their own behaviors, but also to act as role models to influence their neighbors and the community at large to improve health outcomes. The percentage of women in L10K areas who were from a model family household or working towards becoming one increased from 9 to 30 percent between the survey periods (Figure 16). The rate of increase in model family households was the highest in Oromia (an 11.0-fold increase in the percentage of model families), followed by Amhara (3.5-fold), Tigray (2.2-fold), and SNNP (1.7-fold). The prevalence of model families or families working towards becoming one was highest in Amhara (45 percent), followed by Tigray (37 percent), SNNP (15 percent), and then Oromia (11 percent).

Family health card possession

Family health cards were distributed by HEWs to all women of reproductive ages in a household. The cards are used as a tool to provide health education and thus promote MNCH. The card is also used to record the MNCH services provided to the household. The CHPs use the family health cards to re-enforce health education and remind households about the health services they can receive from the HEP. The percentage of women with a family health card increased from 6 to 36 percent between the baseline and midterm surveys (Figure 17). By region, the highest rate of increase in family health card possession was in Oromia, where coverage increased from 0.5 to 33.4 percent (a 67-fold increase). SNNP and Oromia saw 9.5-fold and 9.4-fold increases, respectively; Tigray had a two-fold increase. The possession of a family health card at midterm was highest in Tigray (49 percent), followed by SNNP (37 percent), Oromia (33 percent), and then Amhara (32 percent).

Conclusions and recommendations

The indicators measuring the exposure of households and families to the HEP—i.e., interactions of HEP frontline health workers with households and families—illustrate the recent changes in HEP outreach activities. More interactions between frontline health workers and families are taking place in L10K areas than at the inception of the project. The quality of interactions between health workers and households are also improving. The substantial increase in household visits by HEWs in L10K areas without concurrent improvements in the ratio of HEWs to the population indicates that HEWs are working more efficiently.

Encouragingly, the frequency of household visits by HEWs was similar across the four regions. However, **the frequency of household visits by CHPs in Amhara, Oromia, and especially in SNNP was low. Special attention will be necessary to help these regions catch up with the levels achieved in Tigray.** As the HDA policy is implemented, the male CHPs in these regions will be gradually replaced by female HDAs, so further attention is necessary to ensure that visit frequency increases with the new workers. Although the prevalence of model family households in L10K areas (30 percent) was slightly

Figure 16: Changes in the percentage of women who were from a model family household (graduated or working towards it), by region in L10K areas, 2008-2010.
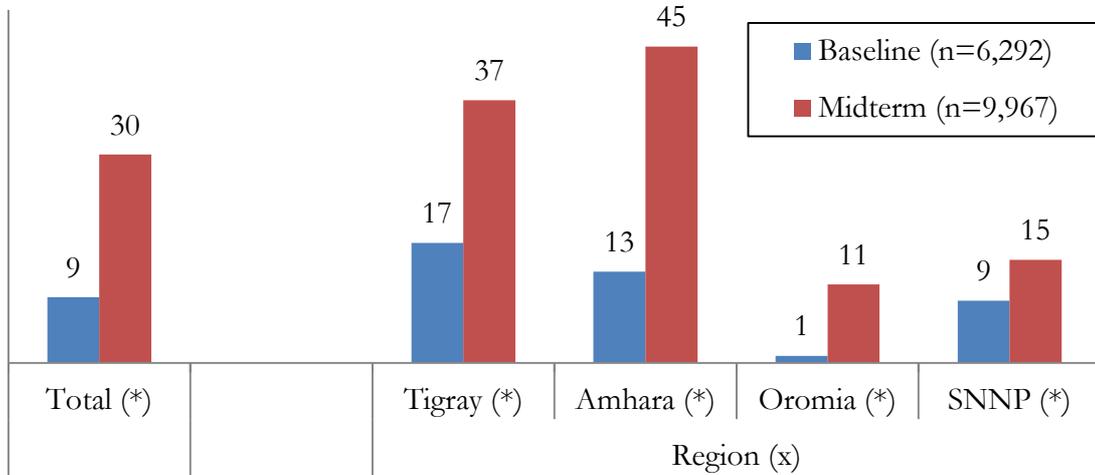
Change over time: (*) p<0.05. The changes differed between regions (x) p<0.05

Figure 17: Changes in the percentage of women who have a family health card, by region in L10K areas, 2008-2010.
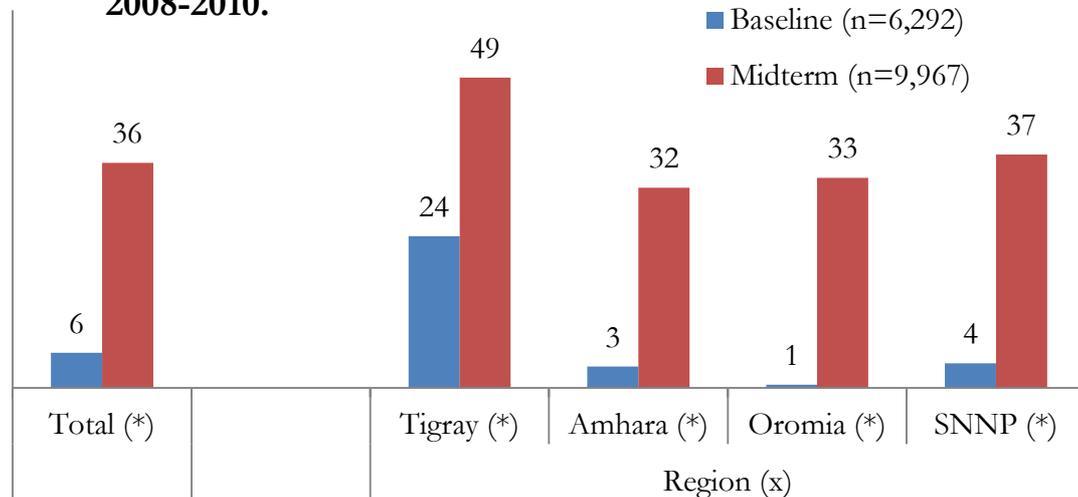
Change over time: (*) p<0.05. The changes differed between regions (x) p<0.05

higher at midterm than the national average (26 percent) reported by the Health Sector Development Program IV (2010), **Oromia and SNNP lag behind on model family prevalence and require special attention during the establishment of the HDA. Lastly,** **efforts should be made to improve the distribution of family health cards to households in Amhara, Oromia and SNNP, so that these regions can reach the levels attained by Tigray.**

**The quality of the health workers'
interactions with families in Amhara and SNNP
lagged behind the other regions**, as measured by
women's recall of the information provided during
household visits. **All four regions need to encourage
frontline health workers to discuss maternal and
newborn health more often during their household
visits.**

Interestingly, the magnitude of the increase in
household visits by CHPs (as recalled by women) was
not as great as expected, given the increase in the
density of CHPs gleaned from the HEW interviews.
Between the two survey periods the density of CHPs
increased by more than three-fold, while household
visits by CHPs increased by only two-fold. A
combination of factors may explain this incongruity.
First, some women may see the CHP as a community
member who is especially conscientious about health
and not as an agent (i.e., CHP) for promoting HEP
services. This is supported by the finding that only 49
percent of women were aware of the CHP in their
neighborhoods. Secondly, since most of the CHPs are
male, they may be contacting husbands to promote
maternal and child health issues; as such the women
may not be aware of this contact. Finally, the
incongruity could also be explained in part by relative
inactivity by some CHPs.

FAMILY PLANNING

Improving family planning (FP) is expected to decrease maternal and newborn health morbidity and mortality (Darmstadt et al. 2005; Dieltiens et al. 2005; Stover and Ross 2010). As part of its efforts to improve maternal and newborn health, the L10K project enhances the FP component of the HEP. This section describes changes in indicators that measure the interactions of frontline HEP health workers with women of reproductive age aimed at improving family planning indicators. The target population for this analysis included respondents to the questionnaire for women of reproductive age.

Unadjusted bivariate statistical analyses (i.e., crude associations) were conducted to answer the following questions:

1) Have the family planning indicators changed significantly between the baseline and the midterm surveys, and in the expected direction?

2) Does the rate of the change over time vary by region? If so, between which regions are differences in rates of change primarily observed? And,

3) Do the indicators currently (i.e., during the midterm survey) vary significantly across the regions? If so, which region is programmatically better or worse?

Knowledge and approval of family planning, and ever using contraceptives

Between the two survey periods the percentage of women of reproductive age who had heard of family planning increased modestly from 89 to 92 percent in L10K areas. The percentage of women who approved of family planning also increased modestly from 83 to 87 percent; the percentage of women who knew where to obtain family planning methods increased from 80 to 86 percent; and the percentage of women who had ever used family planning increased from 47 to 55 percent (Table 15).

The improvement in women's knowledge of family planning recorded in other l10K areas was not observed in SNNP (where it remained at about 83 percent). Women's knowledge of family planning methods at midterm was highest in Tigray and Amhara (about 96 percent each), followed by Oromia (91 percent), and then SNNP (83 percent).

Improvements in women's approval for family planning were seen in L10K areas, but the changes were mainly attributable to Amhara and Oromia. Approval of family planning improved by about five percentage points in Amhara and in Oromia, while changes in approval in Tigray and SNNP were not statistically significant. Approval of family planning remained the highest in Tigray and Amhara (about 91 percent, each), followed by Oromia (87 percent) and SNNP (79 percent).

Although improvements in women's knowledge regarding sources of family planning methods were observed in all four regions, SNNP experienced the least improvement. The percentage of women of reproductive age who knew where to obtain contraceptives increased between five and 10 percentage points in the other regions, but only three percentage points in SNNP. Women's knowledge of where to obtain family planning during the midterm survey was highest in Tigray (93 percent), followed by Amhara (89 percent), Oromia (86 percent) and SNNP (75 percent).

The rate of ever using contraceptives improved from six to 12 percentage points in L10K areas in Amhara, Oromia and SNNP, while it remained mostly the same in Tigray. Ever having used a family planning method at was highest during the midterm survey in Amhara (59 percent) compared to the other three

Table 15: Family planning method use and source. Percentage of women of reproductive age who heard of any family planning (FP) method, approve of using a FP method, know where to obtain a FP method, and ever used a FP method; percentage of women in union currently using a FP method; and the percentage distribution of women who were currently using a FP method by source of method currently used, between the baseline (2008) and midterm (2010) survey periods in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Ever heard of FP method [φ]	93.0	*96.0	92.0	*95.6	87.0	*91.2	82.8	83.3	88.9	*91.9
Approve of FP[φ]	88.8	90.9	86.0	*91.2	80.8	*86.8	78.0	78.8	83.4	*87.3
Knows where to obtain FP method [β]	87.9	93.1	82.9	*89.1	75.9	*86.0	72.8	*75.4	79.7	*86.0
Ever used a FP method [β]	50.2	51.2	47.2	*59.1	47.0	*53.3	42.7	*52.1	46.6	*55.0
No. of women in reproductive age	1,080	756	1,000	1,092	1,000	1,056	1,000	1,056	4,080	3,960
Currently using a FP method	24.3	*34.1	29.7	*44.6	31.4	*41.1	28.8	*36.8	29.3	*40.4
Pill	1.9	1.6	0.7	1.4	3.7	3.5	3.2	1.9	2.2	2.2
Injectables	20.9	*27.7	27.4	*36.7	26.2	*32.6	24.0	*30.6	25.4	*32.9
IUD	0.0	0.0	0.3	0.0	0.1	0.4	0.2	0.0	0.2	0.1
Implant	0.2	*4.3	1.3	*5.8	1.1	*3.4	1.3	2.5	1.1	*4.2
Condom	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Sterilization	0.1	0.3	0.0	0.3	0.0	0.5	0.0	0.3	0.0	0.4
Other modern methods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Traditional	0.7	0.0	0.0	0.0	0.2	0.6	0.0	0.8	0.2	0.4
Not mentioned	0.5	0.1	0.0	0.3	0.0	0.1	0.0	0.4	0.1	0.2
Currently using FP from health post [β]	8.6	*18.5	24.3	28.1	12.7	*27.0	21.8	24.2	18.5	*25.6
No. of women in union	879	598	881	916	957	1,005	971	958	3,688	3,477
Source of current method										
Health post [β]	35.6	*52.0	81.4	*61.1	40.1	*66.6	74.4	66.5	62.7	62.6
Health center/station [β]	58.8	*43.6	16.5	*31.7	39.8	*27.1	19.9	23.0	28.9	30.2
Hospital	0.8	1.5	0.7	1.9	1.8	1.7	0.9	2.7	1.1	2.0
Outreach	0.9	1.1	0.0	0.1	5.5	0.1	1.8	1.1	2.1	0.4
Ngo health facility	0.0	0.0	0.0	0.1	2.5	0.8	0.1	0.8	0.7	0.4
Private clinic	0.0	0.0	0.7	0.6	4.0	1.9	0.0	0.5	1.4	0.9
Pharmacy	0.2	0.0	0.3	1.2	3.7	0.6	0.7	0.3	1.3	0.7
DK/other/missing	3.8	1.8	0.4	3.3	2.6	1.1	2.3	5.0	1.9	2.9
No. of women using method	256	239	284	395	305	468	308	372	1,153	1,474

[φ] p<0.1; [β] p<0.05 for region ×change over time interactions; *p<0.05 for change over time

Figure 18: Changes in the percentage of women in union who are currently using a contraceptive method, by region in L10K areas, 2008-2010.

Change over time: (*) p<0.05. The changes did not differ between regions.
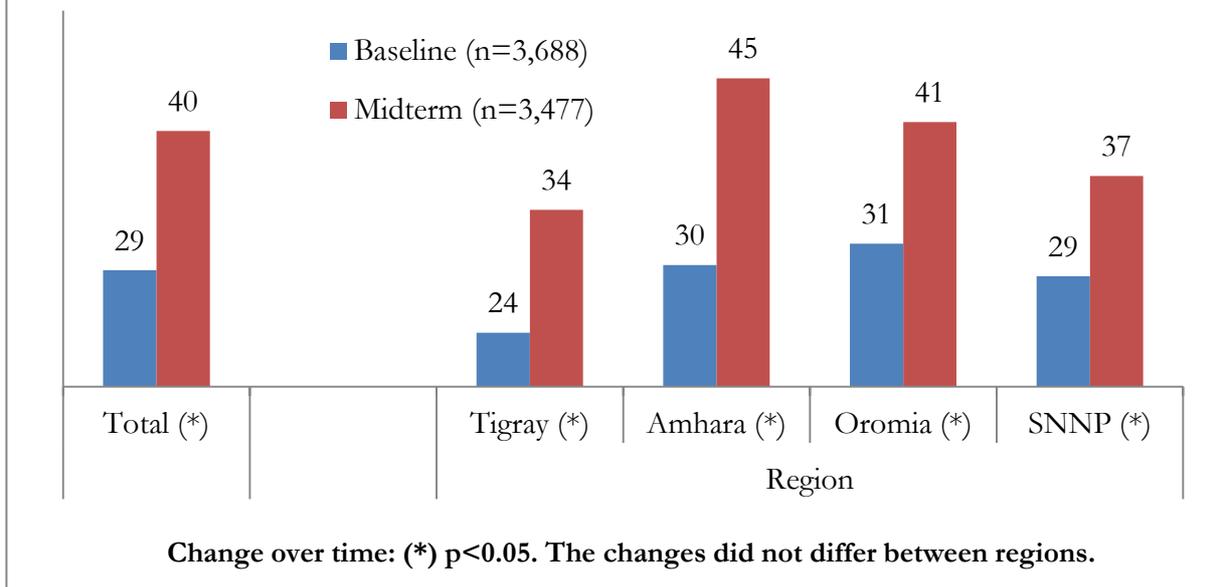
regions, where rates of ever using family planning varied between 51 and 53 percent.

Currently using contraceptives

The percentage of women of reproductive age who were in union and currently using contraception (i.e., the contraceptive prevalence rate or CPR) increased from 29 to 40 percent between the analysis periods, with similar rates of increase across the four regions (Table 15; Figure 18).The CPR was highest at midterm in Amhara and Oromia (45 and 41 percent, respectively), followed by SNNP (37 percent) and Tigray (34 percent). There was also a noticeable shift in the choice of contraceptive; the proportion of contraception users using injectables declined from 87 to 81 percent, while the proportion using implants increased from four to 10 percent. The proportion of contraception users using oral contraceptives also declined from eight to five percent between the baseline and midterm surveys.

The source of contraceptives in L10K areas remained mostly the same between the two surveys (63 percent from health posts and 30 percent from health centers at midterm). However, some regions saw different changes in source of contraception between the two surveys. Over the past two years the source of contraceptives in Oromia and Tigray shifted from health centers towards health posts, while the opposite trend occurred in Amhara; no change was observed in SNNP. In Oromia the proportion of women reporting health posts as their source for contraception increased from 40 to 67 percent, while health centers declined from 40 to 27 percent. In Tigray the proportion of women reporting health posts as their source increased from 36 to 52 percent, while health centers declined from 59 to 44 percent. In Amhara the use of contraceptives from health posts declined from 81 to 61 percent, while health centers increased from 17 to 32 percent.

Source of family planning messages

Women of reproductive age were asked whether they received any information regarding family planning from a list of potential sources during the six months preceding the survey (see Table 16). During the midterm survey the primary source for family planning messages was health workers (i.e., HEWs and other community health workers; 71 percent), followed by family or friends (23 percent), community events (21 percent), radio (17 percent) and then the others (i.e. television, newspaper or magazine, and pamphlet or posters). This relative order of importance for sources of family planning messages did not shift between the surveys.

In the baseline survey, 55 percent of women reported health workers as a source of FP information; this increased substantially to 71 percent during the midterm survey. This change was observed in all four regions, with the great increased in Oromia (a 25 percentage point increase). Radio as a source for FP messages increased in Tigray (from 11 to 16 percent), declined in Amhara (from 16 to 12 percent), and remained unchanged in the other two regions— resulting in no net change in L10K areas. Small increases were observed in the proportion receiving FP messages from television and pamphlet or posters, while the proportion receiving messages from community events and family or friends declined modestly.

Health workers' interactions with contraceptive nonusers

The percentage of contraceptive nonusers who were either contacted by a health worker at home to discuss family planning, or who discussed family planning with a health worker during a health facility visit in the last 12 months increased from 25 to 40 percent between the

baseline and midterm surveys (Table 16). The magnitude of increase in this indicator varied between 10 and 17 percentage points amongst the four regions. During the midterm survey the proportion of contraceptive nonusers reporting interactions with health workers was highest in Tigray (53 percent), followed by SNNP (43 percent), and then Amhara and Oromia (37 and 33 percent, respectively).

Future desire to use contraceptives

The proportion of contraceptive nonusers who want to use contraception in the future stayed constant between the baseline (64 percent) and midterm (62 percent) surveys (see Table 16), and changes over time were similar across the four regions. The proportion of nonusers who want to use contraceptives in the future was lowest at midterm in Amhara (58 percent), followed by the other three regions (between 63 and 67 percent).

Fertility preference

Fertility preference was measured in three ways: 1) desired number of children among women of reproductive age, 2) the desire to limit childbirth (i.e., not wanting any more children) among women of reproductive age, and 3) among currently pregnant women, whether the pregnancy was wanted. In L10K areas the average number of children desired by women of reproductive age remained constant at 4.5; the percentage of women who wanted to limit childbirth (39 percent) also did not change. Figure 19 indicates that the percentage of pregnant women who reported that their current pregnancy was desired increased from 59 to 69 percent.

Table 16: Family planning messages. Percentage of women in reproductive age who received family planning (FP) messages during the past six months, according to source; the percentage of contraceptive non-users who were contacted by a health worker; and the percentage of non-users who want to use a contraceptive method in the future, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Source of FP message										
Radio ß	10.9	*16.2	16.3	*11.8	26.9	25.5	18.7	18.2	**18.8**	**17.4**
Television ᵠ	2.6	*5.4	0.7	0.3	1.8	3.0	0.6	*1.5	**1.2**	***2.0**
Newspaper/magazine ß	2.0	1.6	1.1	0.5	1.5	*4.1	0.8	1.8	**1.3**	**1.9**
Pamphlet/poster ß	2.4	3.0	0.8	0.9	1.2	*9.9	0.9	*2.7	**1.1**	***4.0**
Any health worker ß	67.6	*82.5	54.9	*67.9	47.8	*73.6	55.9	*66.3	**55.1**	***71.2**
Community events ß	26.9	27.8	22.3	*13.0	30.7	34.1	21.5	*15.0	**25.0**	***21.2**
Friends/family ß	18.4	21.1	34.6	*20.6	26.3	29.2	24.6	21.5	**27.9**	***23.1**
No. of women in reproductive age	1,080	756	1,000	1,092	1,000	1,056	1,000	1,056	**4,080**	**3,960**
Percentage of non-users contacted by health worker who discussed FP ß	42.9	*53.0	21.7	*36.8	16.4	*33.1	28.9	*42.6	**25.2**	***39.8**
Percentage of non-users who want to use a FP method in the future	64.7	63.5	60.7	57.6	65.4	62.5	69.7	66.6	**64.4**	**61.8**
No. of non-users	817	508	712	658	587	577	691	658	**2,907**	**2,401**

ᵠ p<0.1; ß p<0.05 for region × change over time interactions; *p<0.05 for change over time

Figure 19: Changes in the percentage of women of reproductive age whose current pregnancy is wanted, baseline (n=276) and midterm (286) surveys, in L10K areas.
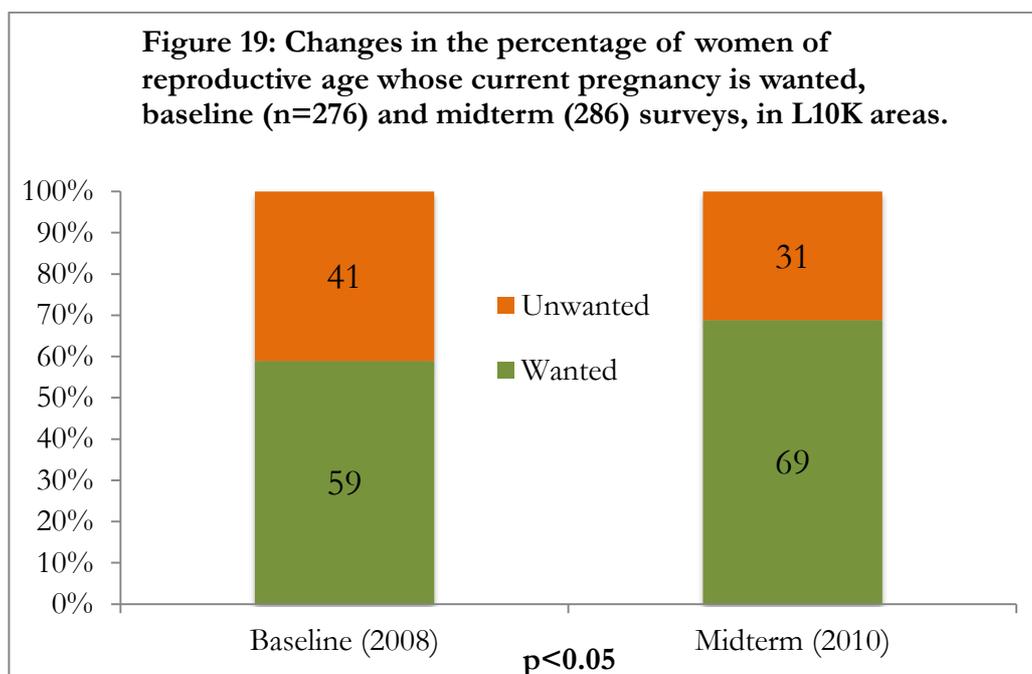
Conclusions and recommendations

In the last two years all family planning indicators have improved in L10K areas, with the sole exception being future desire to use contraceptives. The national family planning program has been training HEWs on how to insert implants. Unsurprisingly, the midterm survey found almost four-fold increase in this method. It is interesting to note that although several indicators were higher in Tigray (health workers' interaction with contraceptive non-users to discuss family planning, women's knowledge about family planning methods, women's approval of family planning, and women's knowledge of sources for contraceptives), the CPR in Tigray still lagged behind other regions.

The EDHS 2011 indicated that the total demand for family planning was 54 percent, which is not enough to reach the FMOH target for CPR. **As such, multi-sectorial initiatives will be required to increase the demand for family planning in Ethiopia**. There is potential for increasing the use of longer-acting and permanent contraceptive methods. The L10K midterm survey indicated that a significant fraction of women of reproductive age (i.e., 39 percent) do not want any more children; these are ideal clients for longer-acting and permanent methods. Therefore, the policy of the FMOH to promote implants is conducive to women's needs. **There is also an opportunity for the FMOH to expand IUDs and other permanent contraceptive methods, which in the long run will reduce costs for the national family planning program.**

MATERNAL AND NEWBORN HEALTH

This section describes changes in the frontline health workers' interactions with households and women to provide maternal and newborn health (M&NH) information and services. Similar analyses of the M&NH indicators were conducted, as compared to the family planning indicators. The target population for this analysis was women with children 0 to 11 months, with M&NH indicators measured only for the most recent pregnancy. As such, the antenatal period indictors reflect events mostly occurring over the 18 to 20 months preceding the survey, while the perinatal and postnatal indicators reflect events occurring over the 12 months preceding the survey.

Household visits by health workers during pregnancy

Table 17 indicates that frontline health workers' contact with pregnant women increased by more than two-fold during the analysis period. The percentage of women (with children 0 to 11 months) who were visited by a HEW or CHP during their last pregnancy increased from 15 to 34 percent over the last two years. The rate of increase of health workers' visits to pregnant mothers was highest in Oromia (a four-fold increase), where visits were lowest during the baseline, followed by in Amhara (2.3-fold), and then SNNP and Tigray (1.8-fold and 1.6-fold increases, respectively). Nevertheless, the indicator was still lowest in Oromia (27 percent), followed by Amhara and SNNP (34 and 37 percent, respectively), and highest in Tigray (43 percent). The change over time in health workers visits during pregnancy, disaggregated by HEW and CHP, is also provided in Table 17.

In addition to the increase in health workers' visits to pregnant women, the quality of visits also improved. Quality was measured with an index constructed by summing the types of M&NH information that women spontaneously recalled being discussed by health worker during the last visit, out of 19 possible items. The index was expressed as a percentage of the maximum possible score. This assumes that more effective interactions will result in better spontaneous recall of the topics discussed during the visit. On average, this quality index increased from 11 to 17 percent between the survey periods. The rate of improvement in the quality of household visits during pregnancy was uniform across the four regions. Quality scores were highest at midterm in Oromia (22 percent of the maximum), followed by Tigray (18 percent), and then Amhara and SNNP (15 percent each).

The frequency of recalling each topic increased between the two survey periods. The most dramatic increase was an 11.7-fold increase in discussing delayed bathing (from 0.6 to 7.1 percent). Other large increases in topics discussed included giving colostrum to the baby and putting the baby to breast immediately after delivery (four-fold increases), followed by arrangements for emergency transport, exclusive breastfeeding, saving money for an emergency, taking iron supplements, lactation as a family planning method, and ensuring the presence of a trained birth attendant (all increased by more than three-fold). The most commonly recalled information discussed was antenatal care (75 percent), following by tetanus toxoid injection (40 percent), taking extra food (40 percent), seeking care for any health problem (21 percent), avoiding heavy work (19 percent), taking rest (18 percent), taking iron supplements (18 percent), exclusive breastfeeding (18 percent), and putting the baby to breast after birth (10 percent), followed by other topics.

Table 17: Health worker visits during pregnancy. Percentage of women with children 0 to 11 months who were visited by a health worker during last pregnancy, and topics discussed by the health worker that were spontaneously recalled by the women, by region, baseline (Dec. 2008) and midterm (Dec. 2010) surveys, L10K area

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
No. of respondents	648	755	600	1,092	600	1,056	600	1,056	**2,488**	**3,959**
Health worker visited $^\beta$	26.1	*42.9	14.4	*33.7	6.6	*26.5	20.3	*36.7	**15.4**	***33.8**
HEW $^\beta$	10.5	*32.7	12.6	*27.5	4.8	*24.2	18.3	*33.7	**11.4**	***28.7**
CHP $^\beta$	10.4	*18.7	4.1	*15.1	1.9	*11.6	1.9	*9.9	**4.0**	***13.6**
Topics spontaneously recalled being discussed during home visit (n)	(167)	(334)	(92)	(420)	(36)	(302)	(113)	(401)	**(408)**	**(1,457)**
Receiving ANC	82.3	83.5	55.4	74.1	79.6	74.0	62.8	68.7	**67.0**	**74.6**
Receiving TT vaccination	46.8	31.6	50.5	44.4	37.8	42.1	22.0	38.5	**40.2**	**40.2**
Taking Iron folate tablet	9.7	35.9	6.9	18.0	5.6	10.1	0.6	12.3	**5.7**	**18.4**
Taking extra food	37.4	47.8	17.6	31.5	27.3	52.7	21.0	35.3	**24.6**	**39.8**
Resting	10.4	11.8	6.1	13.8	2.6	31.9	15.4	19.5	**9.4**	**18.4**
Avoiding heavy work	8.3	8.1	11.4	13.4	10.9	36.0	12.7	21.6	**10.9**	**18.9**
Seeking care for health problems	8.3	20.1	20.7	17.0	34.8	33.1	19.1	18.8	**18.7**	**21.3**
Exclusive breastfeeding	7.6	21.7	1.0	10.8	2.4	32.3	9.6	12.6	**5.2**	**17.7**
Putting baby to breast after birth	5.3	16.6	0.0	6.4	9.2	15.5	0.0	5.6	**2.4**	**10.0**
Saving money for an emergency	1.0	5.7	5.9	8.2	0.0	11.0	0.3	7.9	**2.4**	**8.2**
Delaying bathing the newborn	1.8	7.5	0.5	2.6	0.0	17.1	0.0	5.3	**0.6**	**7.1**
Sleeping under a bed net	4.7	9.9	2.7	5.4	8.6	7.8	3.2	6.5	**4.0**	**7.0**
Counseling and testing for HIV	7.6	15.8	2.5	6.6	1.2	4.5	4.4	2.3	**4.2**	**6.9**
Not giving pre-lacteals	3.0	5.0	0.5	8.0	3.6	11.5	4.0	4.0	**2.5**	**7.3**
Arranging emergency transport	0.4	4.2	3.9	5.5	0.0	7.1	0.0	5.6	**1.5**	**5.6**
Giving colostrum	1.4	8.1	0.0	6.3	0.0	7.1	3.2	2.6	**1.2**	**5.9**
LAM	0.6	4.1	0.0	2.7	9.2	6.8	0.0	2.4	**1.2**	**3.8**
Ensuring presence of a Trained Birth Attendant	2.9	4.6	0.0	1.6	3.6	5.1	0.0	3.8	**1.1**	**3.4**
Apply nothing on umbilical stump	0.2	3.7	0.0	4.5	4.3	7.7	6.8	2.3	**2.4**	**4.5**
Quality score of HEW/CHP contact at pregnancy (% of the maximum)	12.7	*18.3	9.8	*14.9	12.8	*21.8	9.8	*14.6	**10.9**	***16.9**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time; statistical tests for each of the topics of discussion were not conducted

Tetanus toxoid injection

Tetanus toxoid injection coverage, i.e., the percentage of women with children 0 to 11 months who reported receiving two or more tetanus toxoid injection during their last pregnancy (i.e., TT2+ coverage), increased from 41 to 45 percent between the survey periods (Table 18). The increase in TT2+ coverage was not uniform across the four regions. In Tigray and Amhara coverage remained mostly the same (at about 43 and 39 percent, respectively); increases in TT2+ coverage were mainly observed in Oromia and SNNP (10 and 7 percentage point increases, respectively). During the midterm survey TT2+ coverage was highest in SNNP (56 percent), followed by Oromia (48 percent), then Tigray and Amhara (43 and 39 percent, respectively).

Table 18: Antenatal care coverage. Percentage of women with children 0 to 11 months who received TT2+ and antenatal care during last pregnancy, source and components of the ANC during last pregnancy, and the percentage of currently pregnant women slept under a bed net, baseline (Dec. 2008) and midterm (Dec. 2010) surveys, L10K area

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Received TT2+ during last pregnancy $^\phi$	43.3	42.8	37.4	38.7	38.5	*48.4	49.2	*55.8	**41.0**	***45.4**
Received ANC	78.3	*87.1	37.5	*56.1	51.6	*63.5	60.5	*74.4	**52.0**	***66.4**
None	22.7	13.3	62.6	44.8	49.5	37.1	40.6	26.6	**48.8**	**34.3**
1	10.2	8.9	13.5	11.5	9.2	6.3	4.5	4.7	**10.0**	**8.3**
2	12.3	15.3	10.7	12.4	8.7	9.2	10.0	9.5	**10.3**	**11.4**
3	20.5	28.1	7.1	16.6	14.5	19.5	17.1	22.3	**13.0**	**20.3**
4+ $^\beta$	34.4	34.4	6.1	*14.8	18.1	*27.9	27.8	*37.0	**17.8**	***25.8**
No. of women	648	755	600	1,092	600	1,056	600	1,056	**2,448**	**3,959**
Source of ANC										
Hospital $^\beta$	3.1	1.6	2.7	3.0	5.0	3.0	0.7	*2.4	**2.9**	**2.6**
Health center	63.2	*52.6	69.2	*59.9	44.1	44.9	39.5	34.9	**54.1**	***48.8**
Health post $^\beta$	32.2	*44.2	24.9	*35.1	23.3	*48.7	54.2	59.5	**33.3**	***46.0**
Other $^\beta$	1.6	1.7	3.2	2.0	27.7	*3.4	5.6	3.2	**9.8**	***2.6**
Received ANC from health post during last pregnancy $^\beta$	25.2	*38.5	9.3	*19.7	12.0	*30.9	32.8	*44.3	**17.3**	***30.6**
ANC components										
Weight taken	85.8	*91.4	59.9	*70.0	71.0	*82.7	75.0	*86.3	**72.2**	***81.2**
Blood pressure measured	88.4	*93.2	62.4	*75.2	72.7	79.3	79.8	84.5	**75.1**	***81.9**
Urine sample taken $^\phi$	25.8	25.9	16.0	23.0	18.2	23.5	12.9	9.2	**18.0**	**20.4**
Blood sample taken $^\beta$	38.3	*63.3	25.7	*52.6	22.6	*36.8	27.5	25.4	**28.1**	***44.3**
Iron supplement given	35.2	*63.1	23.9	*48.0	8.1	*28.0	15.4	*36.4	**20.2**	***43.1**
Given drugs for malaria	12.3	*8.1	9.0	8.4	6.9	8.7	12.9	8.8	**10.1**	**8.5**
Intestinal parasite drug given $^\beta$	2.1	2.7	2.6	2.6	11.8	8.1	13.0	*3.9	**7.3**	***4.3**
Quality of ANC score (% of max.) $^\beta$	38.3	*47.0	23.1	*39.7	22.0	*39.1	26.5	*36.5	**27.0**	***40.2**
No. of women who received ANC	521	650	242	658	331	715	373	800	**1,467**	**2,823**
% were told about danger signs $^\beta$	20.0	*28.9	4.4	*15.9	4.2	*17.5	6.2	*18.0	**7.0**	***18.7**
% were told about breast feeding $^\beta$	17.6	*35.5	4.6	*19.2	6.4	*24.8	11.9	*28.3	**8.5**	***25.0**
% were told about birth preparedness $^\beta$	25.6	30.5	5.1	*18.5	3.6	*22.9	10.1	*22.7	**8.8**	***22.3**
No. of women	648	755	600	1,092	600	1,056	600	1,056	**2,448**	**3,959**
Percentage of pregnant women (in malarious areas) who slept under a bed net $^\beta$									**23.9**	***45.1**
No. of pregnant women									**290**	**299**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time

Antenatal care

Antenatal care coverage, at least one visit and at least four visits, were the indicators for measuring progress towards MDG 5. The percentage of women with children 0 to 11 months who visited a health facility during her last pregnancy for check-up (i.e., ANC coverage) increased by 14 percentage points from 52 percent in baseline to 66 percent in the midterm (Table 18). Similar rates of increases in ANC coverage were observed across all four regions. ANC coverage was highest at midterm in Tigray (87 percent), then SNNP (74 percent), Oromia (64 percent), and then the lowest in Amhara (56 percent).

The proportion of women (with children 0 to 11 months) who received four or more ANC visits (i.e., ANC 4+ coverage) increased from 18 to 26 percent over the last two years (Table 18; Figure 20). Although in Tigray the ANC 4+ coverage stayed the same (at 34 percent), the region was still among the highest for ANC 4+ coverage along with SNNP (37 percent). Amhara had the lowest current ANC 4+ coverage (15 percent) followed by Oromia (28 percent).

The source of ANC changed over the analysis period (Table 18). During the baseline survey the majority of women (54 percent) obtained their ANC from health centers; this declined to 49 percent during the midterm survey. The proportion of pregnant women receiving ANC from health posts increased from 33 to 46 percent. The decline in health centers' share as the source for ANC was mostly observed in Tigray and Amhara (each saw about a 10 percentage point decline); changes in the other two regions were not statistically significant. The trend of more ANC visits taking place in health posts was observed in Tigray, Amhara and Oromia, but not in SNNP.

The proportion of expectant mothers obtaining ANC from health posts is a better measurement of HEP performance. ANC coverage from health posts increased from 17 to 31 percent between the survey periods. This increase in ANC from health posts was observed in all four regions, with the greatest increases in Oromia (19 percentage point increase). Other regions saw increases of 11 to 13 percentage points. ANC from health posts was highest at midterm in SNNP (44 percent), followed by Tigray (39 percent), Oromia (31 percent), and then Amhara (20 percent).

The quality of ANC was measured with an index; ANC components received by women at least once during their last pregnancy were summed to create a score out of a maximum possible score of 7, and then expressed as a percentage of the maximum. As measured by this index, ANC quality improved from 27 to 40 percent of the maximum possible score during the survey period (Table 18). Improvement in ANC quality was observed in all four regions; Amhara and Oromia (17 percentage points each), and Tigray and SNNP (between 9 and 10 percentage points) all saw improvement. The observed improvement in the ANC quality index were primarily attribute to improvements in taking weight (from 72 to 81 percent), measuring blood pressure (from 75 to 82 percent), testing blood (from 28 to 44 percent), and giving iron supplements (from 20 to 43 percent). There was a decline in de-worming (from 7 to 4 percent), while testing urine and malaria preventive therapy remained unchanged (about 20 and 8 percent at midterm, respectively). ANC quality was highest at midterm in Tigray (47 percent of the maximum), followed by Amhara and Oromia (about 39 percent), and then SNNP (37 percent).

A woman was said to have complete ANC coverage if her weight was taken, blood pressure was measured, and urine and blood were tested at least once during pregnancy (Figure 21). Coverage of complete ANC increased from six to 10 percent between the survey periods, with the bulk of improvement observed in Amhara and Oromia (increases of six and seven

percentage points, respectively). Completeness of ANC was the highest at midterm in Tigray (20 percent), then Oromia (12 percent), Amhara (9 percent), and SNNP (5 percent).

Figure 20: Changes in the percentage of women with children 0 to 11 months who received at least four antenatal checkups during their last pregnancy, by region in L10K areas, 2008-2010.

■ Baseline (n=2,448)
■ Midterm (n=3,959)

Region (x)	Baseline	Midterm
Total (*)	18	26
Tigray	34	34
Amhara (*)	6	15
Oromia (*)	18	28
SNNP (*)	28	37

Change over time: (*) p<0.05. The changes differed between regions (x) p<0.05

Figure 21: Changes in the percentage who received complete ANC (weighed, BP checked, and urine & blood tested), by region in L10K areas, 2008-2010.

■ Baseline (n=2,448)
■ Midterm (n=3,959)

Region (x)	Baseline	Midterm
Total (*)	6	10
Tigray (α)	15	20
Amhara (*)	3	9
Oromia (*)	5	12
SNNP	5	5

Change over time: (*) p<0.05; (α) p<0.1. The changes differed between regions (x) p<0.05

Important components of ANC include whether pregnant women are informed about danger signs of pregnancy, breastfeeding the newborn, and birth preparedness. The coverage of advice on these all three of these subjects increased during the analysis period. The percentage of women (with children 0 to 11 months) told about danger signs at an ANC visit during their last pregnancy increased from 7 to 19 percent; the percentage told about breastfeeding increased from 9 to 25 percent; and the percentage told about birth preparedness increased from 9 to 22 percent.

Improvements in counseling for danger signs of pregnancy during ANC were observed in all four regions, with higher improvement in Amhara, Oromia and SNNP (ranging from 12 to 14 percentage points) compared to Tigray (9 percentage points). This indicator was highest during the midterm survey in Tigray (29 percent) compared to the other three regions (between 16 and 18 percent).

Likewise, improvements in counseling for breastfeeding during ANC were observed in all four regions. The rate of improvement was higher in Amhara and Oromia (4.2- and 3.9-fold increases, respectively) compared to SNNP and Tigray (2.4- and 2-fold increases, respectively). Counseling for breastfeeding during ANC was highest at midterm in Tigray (31 percent), followed by Oromia and SNNP (about 23 percent each) and then Amhara (19 percent).

Improvement in counseling for birth preparedness during ANC was observed in Oromia, Amhara and SNNP (where it improved by 6.4-, 3.6- and 2.2-fold, respectively), but not in Tigray, where the indicator was the highest during the baseline survey. During the midterm survey counseling for birth preparedness during ANC was highest in Tigray (31 percent), followed by SNNP and Oromia (23 percent each) and then Amhara (19 percent).

Bed net use by pregnant women

Sleeping under bed nets to prevent malaria is important for pregnant women. The percentage of pregnant women in malarious L10K areas who slept under a bed net increased from 24 to 45 percent during the survey period (Table 18).

Birth preparedness

Table 19 shows the birth preparedness measures taken by women with children 0 to 11 months during their last pregnancy. The percentage who reported taking any birth preparedness measure during their last pregnancy increased from 68 to 75 in the last two years. Improvements in birth preparedness were mainly observed in Tigray and Oromia (where it increased by about 10 percentage points). Coverage of birth preparedness was highest at midterm in Tigray (90 percent), then Oromia and SNNP (76 percent, each), followed by Amhara (68 percent). Women's recall of the specific birth preparedness measures taken during their last pregnancy improved for six of seven components considered (Table 19).

Of those components of birth preparedness, the following saw changes: making financial preparations improved from 20 to 35 percent, with improvements in Tigray, Amhara and Oromia, but not SNNP. Preparing transport increased from 5 to 11 percent, with improvements in Amhara, Oromia and SNNP, but not in Tigray. Food preparedness increased from 63 to 69 percent, with improvements in Tigray and Oromia, but not in Amhara and SNNP. Arranging birth attendants increased from 8 to 11 percent, with improvements only in Tigray and Oromia. Identifying a health facility for delivery increased from 3 to 6 percent, with improvements in all four regions; and preparing delivery materials increased from 19 to 30 percent, with higher improvements in SNNP and Oromia, and improvements in all four regions.

All the spontaneously recalled components of birth preparedness were added to construct a single measure of birth preparedness, i.e., the birth preparedness index, which was then expressed as a percentage of the maximum score. This birth preparedness index increased from 17 to 23 percent, with the highest gains in Oromia and the weakest gains SNNP (Figure 22). Birth preparedness was higher at midterm in Tigray and Oromia (about 27 percent of the maximum, each) than in Amhara and SNNP (about 20 percent each).

Table 19: Birth preparedness. Percentage of women with children 0 to 11 months who took any birth preparedness measures; percentage spontaneously recalled taking particular birth preparedness measures during their last pregnancy, and the birth preparedness index score, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Took any birth preparedness measure $^\beta$	79.4	*89.5	63.2	68.3	66.9	*76.1	71.5	76.0	**68.3**	***75.1**
Birth preparedness measures spontaneously recalled:										
Financial preparations $^\beta$	14.3	*33.5	17.3	*34.8	21.7	*37.4	29.0	31.3	**20.4**	***34.6**
Transport preparations	4.4	4.7	7.0	*15.4	5.6	*10.2	2.6	*6.3	**5.3**	***10.5**
Food preparations $^\beta$	73.3	*84.3	56.7	60.2	61.7	*70.7	66.4	70.0	**62.5**	***68.6**
Arranging for a birth attendant $^\beta$	6.5	*15.2	12.2	13.5	7.1	*13.3	2.1	1.0	**7.9**	***11.1**
Identifying health facility for delivery	3.1	*8.5	2.8	4.8	3.5	*8.2	0.8	*2.5	**2.6**	***5.8**
Preparing delivery materials $^\beta$	34.0	*40.9	13.4	*18.3	24.5	*41.7	11.1	*29.2	**18.8**	***30.1**
Identifying blood donor	0.4	0.1	0.4	0.4	0.1	0.3	0.0	0.2	**0.2**	**0.3**
Birth preparedness score (% of the maximum) $^\beta$	19.5	*26.9	15.7	*21.1	17.8	*26.1	16.0	*20.2	**16.9**	***23.0**
No. of women	648	755	600	1,092	600	1,056	600	1,056	**2,448**	**3,959**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time

Figure 22: Changes in birth preparedness score (percentage of the maximum possible score), by region in L10K areas, 2008-2010.

Change over time: (*) p<0.05. The changes differed between regions (x) p<0.05
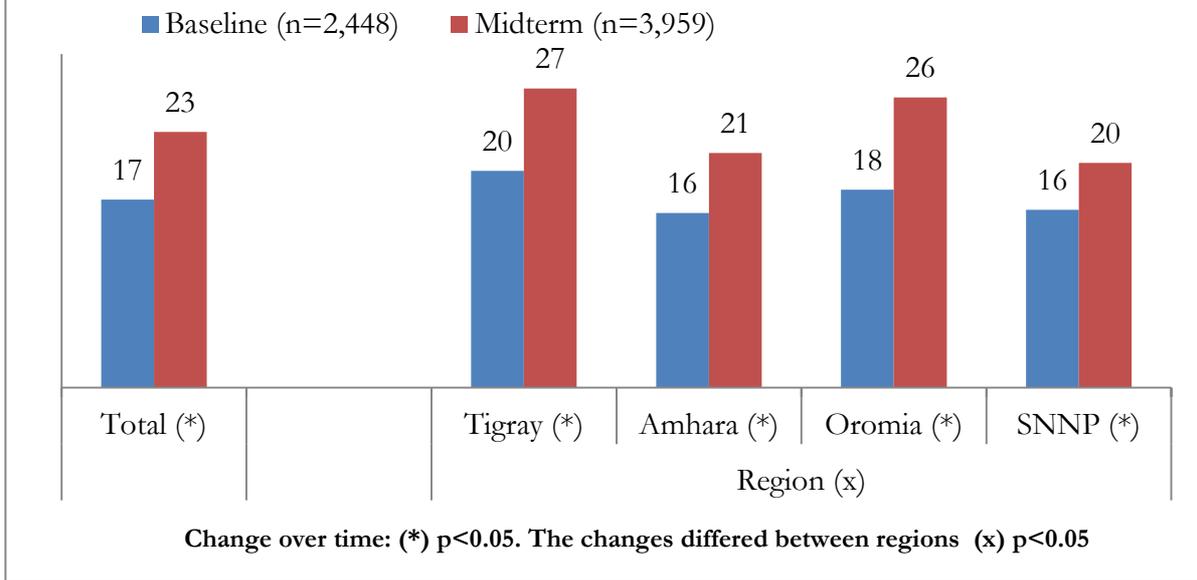
Safe and clean delivery

Fatal complications of pregnancy usually take place during childbirth or just afterwards. As such, institutional deliveries and deliveries attended by skilled professionals are key to reducing maternal morbidity and mortality (Campbell et al. 2006; Koblinsky et al. 2006). Since access to health facilities with basic obstetric care and access to skilled birth attendants are still not readily available in Ethiopia, L10K encourages HEWs to attend deliveries to ensure cleanliness and appropriate newborn care.

Institutional delivery

Among women with children 0 to 11 months, the percentage of institutional deliveries (for the last birth) increased by nearly two-fold in L10K areas, from 6 to 11 percent between the survey periods. Changes were similar changes across all regions (Table 20). Institutional deliveries were more common at midterm in Tigray (18 percent) compared to the other three regions, where it ranged between 9 and 11 percent.

Deliveries assisted by trained professionals

Table 20 indicates that the percentage of women with children 0 to 11 months whose last birth was assisted by a health professional increased from 10 to 16 percent over the last two years. Rates of change in delivery assisted by a health professional were similar across the four regions. However, the proportion of deliveries assisted by a health professional was the highest at midterm in Tigray (26 percent) followed by Oromia and SNNP (16 percent), and then Amhara (11 percent).

The proportion of deliveries assisted by HEWs is a more precise measurement of the performance of the HEP and the support it receives from L10K. Between the survey periods, the percent of HEW-assisted deliveries in L10K areas increased modestly, from 3.6 to 5.8 percent. The percent of HEW-assisted deliveries did not increase in Amhara. During the midterm survey HEW-assisted delivery was more common in Tigray (10 percent), followed by SNNP and Oromia (between 6 and 7 percent), and then Amhara (3 percent).

Table 20: Safe and clean delivery and postnatal care. Percentage of women with children 0 to 11 months whose last delivery took place at home; took place at an institution, was assisted by a health professional; was assisted by a HEW; was followed by PNC; and was followed by PNC by a HEW, during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Safe and clean delivery										
% delivered at home	88.0	*81.6	96.6	*90.5	93.2	*89.0	94.0	91.3	93.9	*88.9
% institutional delivery	12.0	*18.4	3.4	*9.5	6.8	*11.0	6.0	8.7	6.1	*11.1
% delivered by health professional	18.5	*26.2	6.8	*11.3	11.0	*16.1	10.3	*15.5	10.4	*15.7
% HEW-assisted deliveries $^\beta$	4.8	*10.0	3.8	3.0	2.4	*6.2	3.8	*7.3	3.6	*5.8
At home	4.6	7.1	3.0	2.0	1.8	4.3	3.3	6.2	3.0	4.2
At health post	0.3	2.9	0.8	1.0	0.6	2.0	0.6	1.2	0.6	1.6
% cut cord with clean/sterile blade (among home deliveries)	96.7	97.3	94.6	95.8	96.2	97.6	96.5	96.9	95.7	96.7
% tied cord with clean/sterile thread $^\beta$	85.3	84.1	41.0	*51.8	50.4	*59.9	58.4	*78.9	53.7	*64.4
% applied something to cord $^\beta$	48.1	*36.5	44.2	*34.4	21.0	25.3	15.7	12.1	32.4	*27.5
% applied butter to cord $^\beta$	46.4	*35.2	39.3	*30.2	18.9	22.7	13.2	9.8	29.3	*24.6
% took clean cord care $^{\chi, \beta}$	39.6	*47.1	15.9	*30.0	36.1	39.4	41.9	*63.4	29.8	*41.7
Postnatal period										
% received any PNC $^\phi$	12.5	*21.6	5.6	*15.9	5.4	*17.6	9.9	*23.3	7.5	*18.8
% home deliveries received PNC	9.3	*19.2	5.7	*15.0	5.1	*17.3	9.5	*24.2	6.9	*18.2
% home del. received PNC in 7 days	6.8	*16.9	3.7	*10.8	2.7	*11.0	5.6	*20.0	4.2	*13.6
% home del. rec. PNC by HEW in 7 days	4.2	*14.3	2.7	*9.7	1.3	*9.1	4.7	*17.6	3.0	*11.9
% home del. received PNC in 2 days	3.6	*7.4	0.7	*4.1	1.4	*4.2	2.4	*10.0	1.6	*5.8
% home del. rec. PNC by HEW in 2 days	1.9	*6.4	0.5	*4.0	0.7	*4.0	2.2	*9.1	1.1	*5.4
% received postnatal vitamin A $^\beta$	21.4	*43.2	7.0	*15.4	23.5	*30.0	15.1	18.9	15.2	*24.0
% visited by CHP after delivery $^\beta$	5.1	7.8	2.0	*5.2	0.6	*9.1	0.2	*5.8	1.7	*6.8
No. of women	648	755	600	1,092	600	1,056	600	1,056	2,448	3,959
No. of home deliveries	516	564	557	943	530	859	524	870	2,127	3,236
Quality of HEW/CHP counseling during postnatal period index score (in % of the max.)									14.2	*24.1
No. of women									213	904
PNC components …										
Examined body									44.7	35.9
Checked breast									23.8	25.1
Checked for heavy bleeding									26.9	26.4
Counseled on danger signs									14.8	19.0
Counseled on family planning									15.7	25.9
Counseled on nutrition									25.8	42.0
Referred to health center/hospital									3.9	4.3
Quality of PNC score (% of max.)									22.2	25.5
No. of women									132	372

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time; $^\chi$ cord cleanly cut, tied and applied nothing on cord among deliveries un attended by skilled health professionals

Clean umbilical cord care

Table 20 indicates that cutting the umbilical cord with a clean or sterile blade during the last birth among women with children 0 to 11 months was almost universal during baseline and midterm surveys (96 and 97 percent, respectively). Tying the cord with sterile or clean thread increased from 54 to 64 percent. The rate of increase in this indicator was highest in SNNP (by 36 percent) followed by Oromia and Amhara (between 19 and 26 percent); no change was observed in Tigray. The practice was most common at midterm in Tigray (84 percent) followed by SNNP (79 percent), Oromia (60 percent), and Amhara (52 percent).

Application of butter to the stump of the umbilical cord declined from 29 to 25 percent in the last two years. However, reduction in this harmful practice was not observed in Oromia and SNNP. The practice was least common in SNNP (10 percent), followed by Oromia (23 percent), then Amhara and Tigray (30 and 35 percent, respectively).

A composite indicator for *clean cord care* is defined if umbilical cord was cleanly cut and cleanly tied, and if nothing was applied to the cut stump. Among women whose delivery was not attended by a skilled health professional, the proportion who followed all three guidelines and thus *took clean care of the umbilical cord* increased from 30 to 42 percent during the last two years. The rate of increase in clean cord care was highest in Amhara and SNNP (increases of 89 and 51 percent, respectively), followed by Tigray (19 percent increase); and no improvement in Oromia. Clean cord care was highest during the midterm survey in SNNP (63 percent), followed by Tigray and Oromia (47 and 39 percent, respectively), and then Amhara (30 percent).

Postnatal period

Postnatal care

Early postnatal care is crucial for both the mother and the baby. The percentage of women with children 0 to 11 months whose last birth took place at home and who visited a health facility, or were visited by a HEW at home for check-up within 7 days (i.e., PNC in 7 days) increased from 4 to 14 percent in the last two years. The percentage who received such visits within 48 hours (i.e., PNC in 48 hours) increased from 1.6 to 5.8 percent (Table 20). The rates of increase in PNC within 7 days and PNC within 48 hours were uniform across the four regions. The highest coverage of PNC in 7 days coverage at midterm was observed in SNNP and Tigray (20 and 17 percent, respectively), followed by Oromia and Amhara (11 percent each); with similar patterns for PNC in 48 hours.

PNC coverage by HEWs is a better measure of HEP performance. Most (80 percent) of the PNC coverage observed was carried out by HEWs. As such, patterns of PNC by HEWs within 7 days and within 48 hours coverage are similar to those discussed above (see Table 20).

The quality of PNC counseling by HEWs or CHPs was measured with an index created by summing types of information provided during the PNC visit, as spontaneously recalled by women. The index score was expressed as a percentage of the maximum possible score (which is 10 in this case).The quality of HEW/CHP counseling during PNC increased during the analysis period from 14 to 24 percent of the maximum (Table 20). Similarly, the quality of PNC index is measured by summing the number of PNC check-up components that are spontaneously recalled by the women (see Table 20 for the list). The quality of the PNC index is expressed as the percentage of the maximum considered (in this case 7); higher score indicated better quality of the PNC. The quality of the

Figure 23: Changes in the percentage of women with children 0 to 11 months whose last delivery was at home and who received PNC, by region in L10K areas, 2008-2010.

Change over time: (*) p<0.05. The changes did not vary between regions (p>0.1)
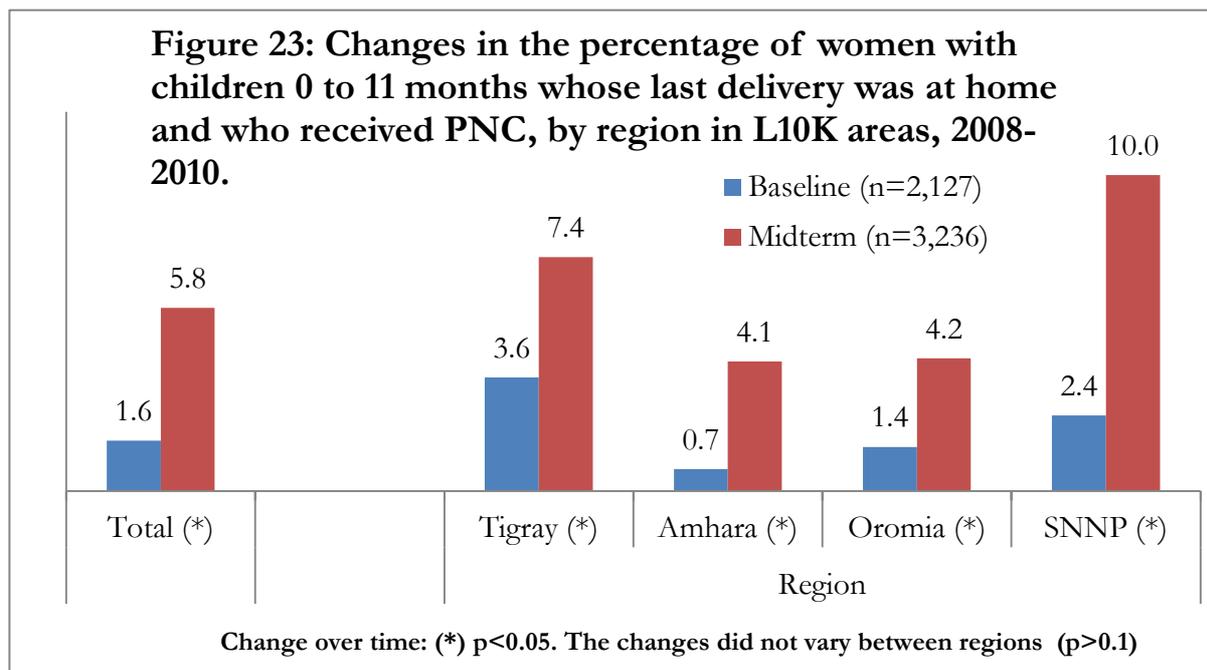
Table 21: Newborn check-up components. Components of newborn check-up and its quality, during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Baseline	Midterm
Percentage reporting components of newborn care…		
Examined baby's body	24.0	28.4
Weighed baby	21.6	20.5
Checked cord	12.7	*33.2
Counseled on breastfeeding	23.2	*46.2
Observed breastfeeding	8.7	*28.0
Counseled on keeping baby warm	8.4	*21.4
Checked on danger signs	4.8	10.8
Counseled on danger signs	6.4	12.4
Referred to health center/hospital	0.6	*4.0
Newborn check-up quality score (% of max.)	12.2	*22.6
No. of women	132	372

* p<0.05

PNC did not change significantly during the analysis period.

Newborn check-up

PNC coverage was also used as a proxy for newborn check-up coverage. Mothers were also asked to recall components of newborn checkups, and changes in these components are reported in Table 21. The proportion of women recalling a specific component increased for five of the nine items considered. The mostly commonly recalled newborn checkup components during the midterm survey were counseling for breastfeeding (46 percent), checking the umbilical cord (33 percent), examining the baby's body (28

Table 22: Newborn health care practices. Prevalence of selected newborn care behaviors associated with the last birth among women with children 0 to 11 months; and the percentage of women with children 0 to 5 months who were currently giving only breast milk to their baby, by region during baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Dried & wrapped baby after delivery [β]	66.2	*74.6	74.5	67.7	69.8	*88.4	69.9	67.6	71.1	*74.1
Always/frequent skin-to-skin contact [β]	51.7	*80.0	67.6	*50.8	88.6	*94.1	75.6	*84.9	72.4	73.6
Delay bathing newborn for >6 hours [β]	27.2	*37.4	39.0	*49.0	12.6	*32.4	23.6	*44.2	27.2	*42.0
Took thermal care of the baby [χ, β]	10.4	*25.1	17.8	16.7	7.5	*28.1	8.7	*27.9	12.1	*23.3
Baby put to breast within an hour of delivery [β]	40.0	*53.9	20.2	*34.2	64.7	65.9	60.7	67.9	43.3	*52.5
First milk (colostrum) given to baby [β]	47.4	*69.4	32.6	*43.9	50.1	*57.8	52.9	52.0	43.6	*53.0
Fed only breast milk during 1st 3 days of life	81.8	*88.7	40.9	*60.0	92.5	*95.9	88.0	91.3	70.4	*80.3
No. of women	648	755	600	1,092	600	1,056	600	1,056	2,448	3,959
Exclusively breastfed baby [β]	67.3	*86.9	77.4	82.5	55.2	*72.7	58.1	*81.7	66.2	*80.2
No. of women	322	359	276	517	258	545	259	568	1,115	1,989

[φ] p<0.1; [β] p<0.05 for region × change over time interactions; *p<0.05 for change over time; [χ] dried and wrapped baby immediately after birth, delayed bath by >6 hours & always maintained skin-to-skin contact

percent), counseling to keep baby warm (21 percent), weighing the baby (21 percent), counseling on danger signs (12 percent), and checking on danger signs (11 percent).

As with quality of PNC, the quality of newborn check-ups was measured with an index that summed the components of the check-up, which was then expressed as a percentage of the maximum possible score. This index increased by nearly two-fold during the analysis period, from 12 to 23 percent of the maximum.

Newborn health care

Simple newborn health care practices at the household level can avert significant neonatal morbidity and mortality (Darmstadt 2005 et al.). Thus the L10K project promotes hygiene during delivery, keeping the newborn warm, early initiation of breastfeeding, and exclusive breast-feeding. Coverage of hygienic delivery has already been discussed.

Keeping the baby warm

Thermal protection of the newborn includes a series of measures at birth and during the first days of life, all of which ensure that the baby does not become either too cold or too hot, but rather maintains a normal body temperature. At birth the newborn should immediately be dried and covered, before the cord is cut. While the baby is being dried, s/he should be on a warm surface such as the mother's chest or abdomen (skin-to-skin contact). Bathing the baby immediately after birth should be postponed (McCall et al. 2010).

The percentage of women with children 0 to 11 months in L10K areas who reported that they *dried and wrapped the baby* before the placenta was delivered or immediately after birth increased meagerly, from 71 to 74 percent (Table 22). However, changes in newborn care practice were not uniform across the four regions.

The practice improved the most in Oromia (by 18 percentage points), followed by Tigray (9 percentage points); no change was observed in Amhara and SNNP. During the midterm survey the practice of drying and wrapping the baby immediately after birth was highest in Oromia (88 percent), followed by Tigray (75 percent), and then Amhara and SNNP (about 68 percent each).

Although it appears that the practice of *always maintaining skin-to-skin contact* to keep the baby warm did not change overall in L10K areas, this was mainly due to the decline of the practice in Amhara. Always maintaining skin-to-skin contact with the newborn increased from 52 to 80 percent in Tigray, from 76 to 85 percent in SNNP, and from 89 to 94 in Oromia; in Amhara it declined from 68 to 51 percent. The practice was the highest at midterm in Oromia (94 percent), followed by SNNP (85 percent), Tigray (80 percent) and then Amhara (51 percent).

Delaying bathing of the newborn by 6 hours or more increased substantially in L10K areas, from 27 to 42 percent. Delayed bathing increased by about 20 percentage points in Oromia and SNNP, and by 10 percentage points in Amhara and Tigray. Delayed bathing coverage was highest at midterm in Amhara (49 percent), and then SNNP (44 percent), Tigray (37 percent), and Oromia (32 percent).

The percentage of women in L10K areas who reported that they *took thermal care of the newborn* (i.e., dried and wrapped the baby before the placenta was delivered or immediately after birth, delayed bathing the baby more than six hours, and always maintained skin-to-skin contact) increased from 12 to 23 percent between the two surveys. This improvement in thermal care was observed in all regions except Amhara. Good thermal care practice was lowest at midterm in Amhara (17 percent) compared to the other three regions, where it ranged from 25 to 28 percent.

Early initiation of breastfeeding

The proportion reported *giving first milk (i.e., colostrum)* to the baby increased from 44 to 53 in the last two years. Unlike in the other regions, giving first milk did not change in SNNP. The practice was highest at midterm in Tigray (69 percent), followed by Oromia (58 percent), SNNP (52 percent) and then Amhara (44 percent).

Putting the baby to the breast immediately after birth also increased during the analysis period, from 43 to 53 percent. Although breastfeeding behavior did not change in Oromia and SNNP, those two regions were still among the highest for that indicator (66 and 68 percent, respectively). During the midterm survey the indicator was 54 percent in Tigray and only 34 percent in Amhara.

The proportion of women who reported *feeding the baby only breast milk during the first three days of life* increased from 70 to 80 percent in the last two years. The increase of the breastfeeding practice in the four regions corresponds reciprocally to its status at baseline. The increase in giving only breast milk during the first three days of life was greatest in Amhara (a 20 percentage point increase) where it was lowest during the baseline survey, followed by in Tigray (7 percentage points),then Oromia and SNNP (three percentage points each). The rank of regions according to this indicator remained the same as during the baseline survey. Coverage was highest at midterm in Oromia and SNNP (96 and 91 percent, respectively), followed by Tigray (89 percent) and then Amhara (60 percent).

Exclusive breastfeeding

For infants who were less than six months old, *exclusive breastfeeding* during the 24 hours preceding the survey increased substantially from 66to 80 percent between the survey periods (Table 22). Exclusive breastfeeding was at similar levels in Tigray, Amhara and SNNP (between 82 and 87 percent) during the midterm survey, while it lagged behind in Oromia (73 percent).

Figure 24: Changes in percentage following key newborn health practices during last birth among women with children 0 to 11 months, in L10K areas, 2008 - 2010.

Practice	Baseline (n=2,448)	Midterm (n=3,959)
Fed only breast milk during 1st 3 days of life (*)	70	80
First milk (Colostrum) given to baby (*)	44	53
Baby put to breast within an hour after delivery (*)	43	53
Delay bathing newborn for >6 hours (*)	27	42
Always/frequent skin-to-skin contact	72	74
Dried & wrapped baby after delivery (*)	71	74

Changes over time (*) p<0.05
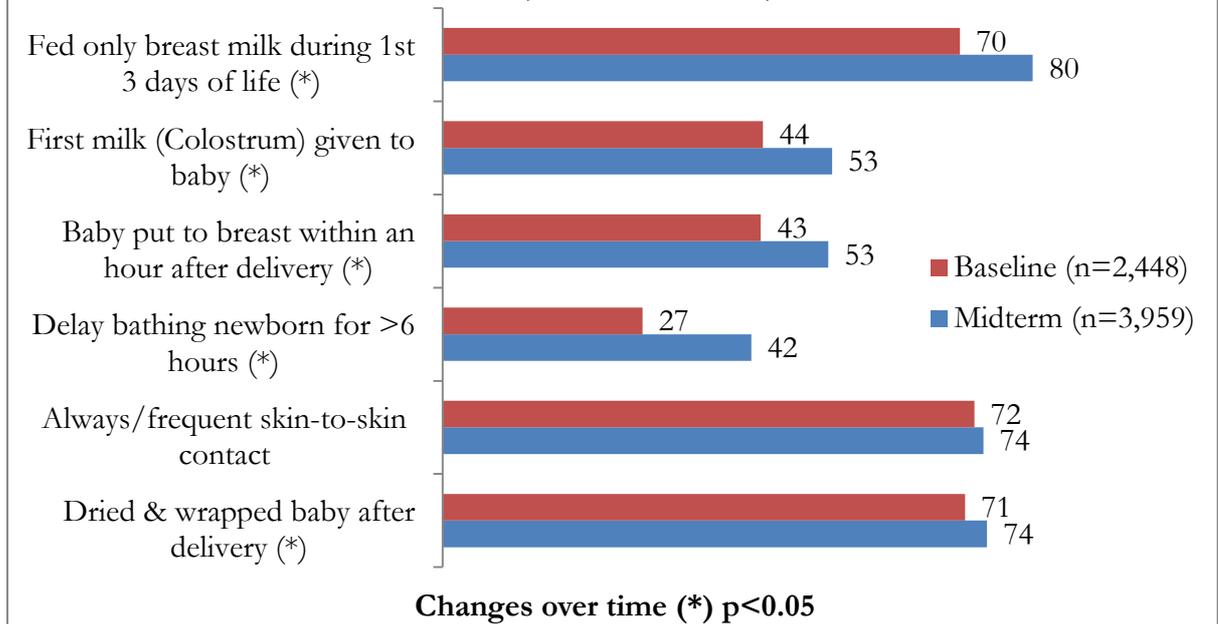
Knowledge of danger signs

A woman's knowledge of maternal and newborn danger signs—during pregnancy, childbirth, and the postnatal period—is partly attributable to her interaction with HEP frontline workers as they provide M&NH services.

Danger signs during pregnancy and childbirth

Knowledge of pregnancy and childbirth danger signs among women with children 0 to 11 months was measured with an index created by summing the number of danger signs spontaneously recalled by women. The index is expressed as the percentage of the maximum possible score (11 in this case). The list of danger signs during pregnancy and childbirth that were recalled by women with children 0 to 11 months is given in Table 23. The index of danger sign knowledge increased from 17 to 20 percent of the maximum during the analysis period (see Table 23). Knowledge of danger

signs was highest at midterm among women in Tigray (24 percent of the maximum score), followed by Oromia (21 percent), Amhara (19 percent), and SNNP (17 percent).

Danger signs during postnatal period

Knowledge of danger signs during the postnatal period was measured with a similarly constructed index, created by summing danger signs recalled for women, then expressing the index as a percentage out of a maximum possible score of six. The list of danger signs during postnatal period that were recalled by women is given in Table 23. The index of knowledge of danger signs during the postnatal period increased from 22 to 30 percent of the maximum in the last two years. The index increased the least in Amhara (only 6 percentage points), compared to the other three regions where increases ranged between 9 and 10 percentage points. Knowledge of danger signs was highest at midterm among women in Tigray (37 percent of the maximum), followed by Oromia (35 percent), SNNP (29 percent) and then Amhara (19 percent).

Table 23: Knowledge of danger signs. Percentage of women with children 0 to 11 months who spontaneously recalled danger signs and complications of childbirth; mean score (percentage of the maximum score) for index of knowledge of danger signs during pregnancy & childbirth; percentage who recalled postnatal danger signs; mean score (percentage of the maximum score) for index of knowledge of postnatal danger signs; percentage who recalled neonatal danger signs; and mean score (percentage of the maximum score)for index of knowledge of neonatal danger signs, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Pregnancy & childbirth danger signs recalled										
Excessive vaginal bleeding	52.6	68.3	28.4	38.9	36.2	41.4	21.2	37.1	**32.5**	**43.5**
Foul-smelling discharge	1.0	3.6	0.9	3.6	1.7	9.4	1.4	2.3	**1.2**	**4.9**
High fever	16.6	29.0	13.5	18.6	33.2	36.6	10.9	27.4	**18.5**	**26.7**
Baby's hand or feet come first	3.8	7.6	4.6	6.4	4.0	8.1	2.9	6.3	**4.0**	**7.0**
Baby's in abnormal position	9.1	17.3	11.4	12.7	12.3	16.6	5.4	9.9	**10.0**	**13.8**
Prolonged labor (>12 hours)	68.4	70.9	76.6	72.7	77.7	78.7	71.5	66.5	**74.6**	**72.7**
Retained placenta	57.4	61.2	40.0	44.6	39.4	38.7	25.6	31.3	**39.4**	**42.7**
Rupture uterus	5.2	4.1	3.4	4.1	1.8	2.6	1.6	3.6	**2.8**	**3.6**
Prolapsed cord	1.3	2.6	0.4	1.5	1.8	0.8	0.0	1.3	**0.8**	**1.5**
Cord around neck	1.4	1.7	0.2	0.6	1.8	0.9	0.3	0.4	**0.8**	**0.8**
Convulsions	1.9	2.8	2.0	2.2	2.6	3.3	1.9	1.6	**2.1**	**2.5**
Index score for knowledge of pregnancy and childbirth danger signs(% of maximum)$^\beta$	19.7	*24.4	16.3	*18.6	19.1	*21.4	12.9	*16.9	**16.8**	***19.8**
Postnatal danger signs recalled										
Excessive vaginal bleeding	70.5	85.2	45.9	58.4	45.2	58.7	33.3	52.6	**46.7**	**61.2**
Foul-smelling discharge	0.5	13.6	1.2	5.5	1.6	13.1	2.5	7.2	**1.5**	**9.0**
High fever	33.4	44.7	22.0	27.1	46.6	56.8	25.7	48.0	**30.9**	**41.9**
Severe abdominal pain	51.4	39.7	39.7	39.9	53.2	50.3	44.0	48.6	**45.9**	**44.4**
Convulsions	11.7	15.9	6.6	3.9	7.9	11.1	4.8	4.7	**7.3**	**7.7**
Unconsciousness	0.0	23.4	0.0	14.0	0.0	19.7	0.0	10.3	**0.0**	**16.1**
Index score for knowledge of postnatal danger signs (% of maximum)$^\beta$	27.9	*37.1	19.3	*24.8	25.8	*34.9	18.4	*28.6	**22.1**	***30.1**
Neonatal period danger sign (n)	648	755	600	1,092	600	1,056	600	1,056	**2,448**	**3,959**
Vomiting	3.5	13.6	46.6	47.3	60.8	78.5	43.3	55.2	**43.2**	**52.1**
Fever	88.2	85.6	79.2	78.3	91.0	94.4	76.6	89.2	**83.1**	**85.9**
Poor sucking or feeding	36.4	40.2	21.5	31.6	36.6	43.1	24.0	18.5	**28.2**	**33.1**
Difficulty in breathing	23.6	22.4	18.7	16.6	23.7	20.7	27.0	15.6	**22.5**	**18.3**
Baby feels cold	3.9	9.0	1.5	1.4	5.2	12.0	1.7	3.9	**2.9**	**5.8**
Baby too small/early birth	1.6	2.0	1.1	1.1	0.7	3.1	0.7	0.7	**1.0**	**1.7**
Redness/discharge on cord	1.2	7.3	0.3	0.9	0.3	2.2	0.6	1.6	**0.5**	**2.4**
Red swollen eye/discharge	4.5	10.5	3.4	3.0	4.1	4.9	1.5	2.1	**3.3**	**4.4**
Yellow palm/sole/eye	3.6	1.7	0.4	0.6	0.6	1.0	0.0	0.5	**0.8**	**0.8**
Lethargy	0.7	3.8	1.4	0.5	1.2	2.0	0.3	1.4	**1.0**	**1.5**
Unconscious	3.4	4.6	1.0	1.9	2.0	2.7	0.7	1.4	**1.5**	**2.4**
Index score for knowledge of neonatal danger signs (% of maximum) $^\beta$	15.4	*18.1	15.7	16.5	20.4	*23.9	15.9	*17.1	**16.9**	***18.8**
No. of women	648	755	600	1,092	600	1,056	600	1,056	**2,448**	**3,959**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time; statistical tests were not conducted for the individual components of the knowledge scores

Figure 25: Changes in women's (with children 0 to 11 months) knowledge of neonatal danger signs score (percentage of the maximum possible score), by region in L10K areas, 2008-2010.

■ Baseline (n=2,448) ■ Midterm (n=3,959)

| Total (*) | | Tigray (*) | Amhara | Oromia (*) | SNNP (*) |
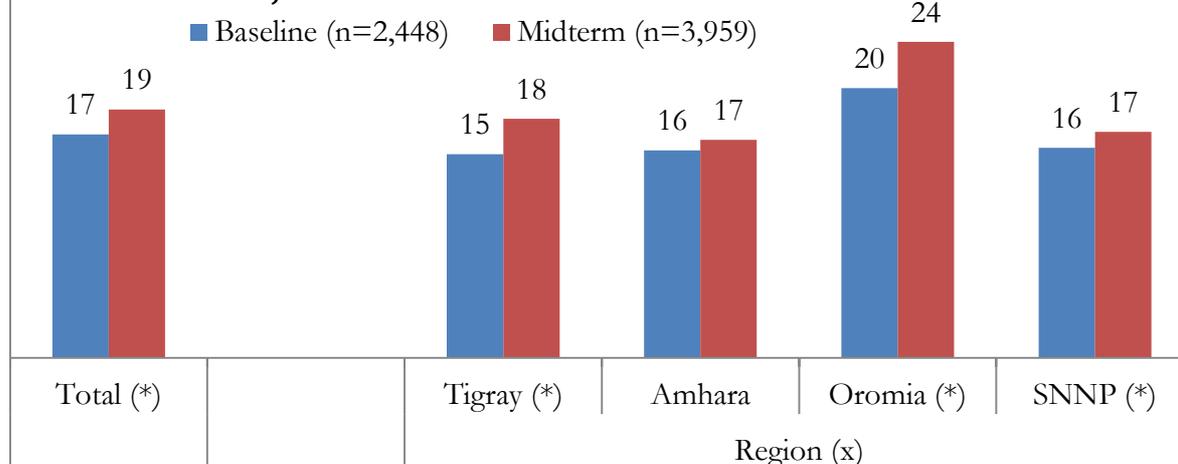
Region (x)

Change over time: (*) p<0.05. The changes varied between regions (x) p>0.1

Danger signs during neonatal period

The neonatal period danger signs spontaneously recalled by women with children 0 to 11 months are given in Table 23. These danger signs were summed to create a neonatal danger sign knowledge index, expressed as the percentage of the maximum (11 in this case). The neonatal danger sign knowledge index increased modestly from 17 to 19 percent of the maximum in the last two years (Figure 25). The index did not improve in Amhara. Knowledge of neonatal danger signs was highest during the midterm survey among women in Oromia (24 percent of the maximum), followed by Tigray (18 percent), and then SNNP and Amhara (about 17 percent each).

Conclusions and recommendations

Since the beginning of the L10K project more interactions between HEP frontline health workers and women have been taking place during pregnancy,

delivery, and the postnatal periods. M&NH behaviors and outcomes have correspondingly increased. There is evidence that the quality of these interactions, for the most part, have also improved in L10K areas. These improvements in the frequency and quality of interactions between frontline workers and women and households have been achieved without any significant change in ratio of HEWs to population density; this indicates that the HEP has become considerably more efficient at providing M&NH services.

Although the observed improvement in M&NH indictors have generally occurred in all four regions, M&NH indicator levels are better in some

regions than in others. In general, Tigray is doing better in terms of maternal health indicators, while Oromia is doing better on newborn health indicators. **Best practices for achieving improved maternal health in Tigray and best practices for achieving better newborn health in Oromia should be identified and replicated throughout all four regions.** Nevertheless, even reaching the levels of maternal health intervention

coverage in Tigray would not be sufficient to attain some of the MDG targets set by HSDP IV. **Special initiatives will thus be required to increase PNC, skilled attendance during delivery, and institutional deliveries.**

Lastly, it should be noted that although the quality of the services provided by frontline health workers are generally improving, they are still less than optimal. Alarmingly, the quality of PNC did not change over the last two years. **As such, special strategies are needed to further improve the quality of M&NH services provided by frontline health workers.**

CHILD HEALTH

This section describes change in interactions between frontline health workers and women and households to provide child nutritional advice, improve childhood immunization coverage, and improve childhood illnesses care-seeking behaviors. Analyses of these child health indicators were similar to the previous analyses. The analysis of childhood nutritional counseling and childhood illness indicators is among children 0 to 23 months of age, while the analysis of childhood immunization is among children 12 to 23 months.

Health workers' interaction with households for child nutrition

The proportion of women with children 0 to 23 months who were visited by a health worker (i.e., HEW or CHP) to discuss the health and nutrition of their child increased from 11 to 26 percent between the two surveys (Table 24). The rate of increase in child nutrition interactions between health workers and women was highest in Oromia (a 4.7-fold increase), followed by Amhara and SNNP (2.6- and 2-fold, respectively) and Tigray (1.5-fold). Child nutrition interactions with households were most common at midterm in Tigray (32 percent), followed by SNNP (27 percent), and finally Oromia and Amhara (about 24 percent each).

Women were asked to recall what information health workers provided during visits regarding child health and nutrition. The percentage of the total number of topics women recalled discussing (out of a total of 11 topics) was used as an index to measure the quality of the interaction. The quality of household visits by health workers for child nutrition counseling increased from 20 to 27 percent between the baseline and midterm surveys (Table 24); the largest increase was in Oromia (14 percentage points), followed by Amhara (8 percentage points) and SNNP (4 percentage points);

there was no change in Tigray. The quality of interactions index was highest at midterm in Oromia (32 percent), followed by Amhara and Tigray (about 26 percent each), then SNNP (22 percent). The most common information recalled by mothers was to consume extra food (72 percent), followed by exclusively breastfeeding the baby until six months of age (50 percent), beginning complementary feeding at six months (40 percent), immunizing the child (26 percent), frequency of breastfeeding (24 percent), using different foods to enrich porridge (19 percent), family planning (19 percent), continuing breastfeeding until two years and beyond (16 percent), frequency of feeding (16 percent), and then other topics.

Childhood immunization, vitamin A and de-worming

Table 25 presents changes in immunization, vitamin A and de-worming coverage among children 12 to 23 months between the two survey periods. Women with children 12 to 23 months were asked whether they had a vaccination card for the child. If a card was available, the vaccination information from it was recorded. If the card was not available then the mother was asked whether the child had received BCG, pentavalent (PENTA), poliomyelitis (Polio) and measles vaccines. For PENTA and Polio, the number of injections or oral doses given was also obtained. Estimation of immunization coverage was based on either the information obtained from the card (if available) or mother's recall (if the card was not available). The proportion of women with children 0 to 11 months in L10K areas who had immunization cards declined slightly over the last two years, from 40 to 36 percent.

Access to immunization, as measured by BCG coverage, remained unchanged between the surveys (at about 84 percent). BCG coverage at midterm was the

Table 24: Child health and nutrition visits. Percentage of women with children 0 to 23 months who were visited by a health worker to discuss child health and nutrition, and the topics that women spontaneously recalled being discussed by the health worker, according to region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
% visited by a health worker to discuss child health and nutrition β	22.1	*32.2	8.9	*23.5	5.1	*23.9	13.5	*26.8	**10.8**	***25.6**
No. of women	1,188	1,511	1,100	2,184	1,100	2,112	1,100	2,100	**4,488**	**7,970**
Topics women recalled being discussed:										
Mothers should take extra food	86.7	73.9	72.6	77.8	59.6	74.4	54.5	57.5	**70.7**	**71.8**
Exclusive breastfeeding	35.2	47.3	18.2	47.8	67.2	54.2	40.7	52.1	**34.9**	**50.2**
Frequency of breastfeeding	12.2	13.0	12.1	28.4	20.3	35.0	22.3	15.5	**15.7**	**24.3**
Complete feeding with one breast before switching to the other	3.6	9.7	3.3	7.9	3.6	13.7	1.7	5.1	**3.0**	**9.0**
Continue breastfeeding until 2 years and beyond	10.6	21.0	5.2	10.1	3.1	28.4	5.0	7.0	**6.6**	**15.9**
Begin complimentary feeding at 6 mo	41.1	54.0	12.3	30.5	16.8	39.9	19.0	40.9	**23.3**	**39.5**
Frequency of feeding	12.6	6.3	12.7	18.0	5.8	22.3	6.3	13.1	**10.2**	**15.8**
Use of different food to enrich porridge	24.1	20.2	20.3	24.2	3.3	18.7	18.1	12.0	**18.9**	**19.4**
Immunize the child	15.7	14.8	21.5	28.6	11.6	31.8	22.8	24.1	**18.9**	**25.8**
LAM	3.4	5.8	1.8	3.2	5.4	8.3	1.6	3.8	**2.7**	**5.1**
Family planning	14.3	18.6	18.4	15.2	15.9	26.2	12.9	16.3	**15.5**	**18.8**
Percentage of the topics recalled β	23.3	25.5	17.9	*26.2	18.0	*31.7	17.8	*22.2	**19.5**	***26.5**
No. of women	232	486	113	593	45	550	129	570	**519**	**2,199**

Φ p<0.1; β p<0.05 for region × change over time interactions; *p<0.05 for change over time. Statistical tests were not conducted for the individual topics of discussion.

highest in Tigray (97 percent), followed by Oromia (86 percent), then the other two regions (about 81 percent each). The dropout rate between the first and third dose of pentavalent declined slightly from 26 to 21 percent, a declined largely observed in Oromia, where the dropout rate declined from 32 to 20 percent. The dropout rate was the lowest at midterm in Tigray (7 percent), followed by Oromia (20 percent), then the other two regions (about 26 percent each). Measles vaccine coverage (one of the MDG monitoring indicators) increased slightly from 69 to 75 percent. Measles vaccine coverage was highest at midterm in Tigray (90 percent), followed by the other regions (which range from 71 to 74 percent).

The percentage of children fully vaccinated increased by seven percentage points, from 45 to 52 percent. Oromia and Tigray contributed much of things change, declining by 15 and 8 percentage points, respectively. The percentage of children fully immunized was the highest at midterm in Tigray (77 percent), followed by Oromia (53 percent), and then Amhara and SNNP (about 46 percent each).

The L10K project encourages the distribution of immunization diplomas to households if their children complete all vaccines in due time (i.e., measles by 9 months). The distribution of the diploma not only acts as an incentive by recognizing responsible parents,

Table 25: Immunization, vitamin A and deworming coverage. Among children 12 to 23 months, percentage with immunization card, with specific immunizations, with vitamin A, and with deworming medication, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
% retained immunization card	66.6	63.3	40.4	36.7	34.4	29.6	25.2	22.5	**39.5**	***35.8**
% received BCG [β]	96.1	96.5	84.2	80.9	78.4	*85.7	81.4	81.4	**83.8**	**84.6**
% received DPT1/PENTA1 [β]	93.7	94.8	84.4	82.6	76.1	*85.7	85.2	84.6	**83.8**	**85.6**
% received DPT2/PENTA2 [β]	93.2	92.2	74.6	72.9	65.7	*77.3	76.2	73.7	**75.3**	**77.1**
% received DPT3/PENTA3 [β]	87.5	89.1	61.0	61.6	53.5	*69.1	61.0	62.2	**62.9**	***67.8**
% dropped out between PENTA1 & PENTA3 [φ]	8.7	7.2	28.9	25.9	31.8	*19.6	28.5	26.6	**26.2**	***21.3**
%received polio1	94.6	93.7	89.6	89.5	89.0	92.6	90.5	87.9	**90.4**	**90.6**
%received polio2	90.9	90.3	82.1	79.1	81.0	83.4	81.5	*76.0	**83.0**	**81.3**
%received polio3	83.3	83.8	64.6	62.9	72.7	71.8	66.0	62.5	**69.8**	**68.2**
% received measles	84.0	*90.0	67.1	70.8	64.8	*72.7	68.3	*74.1	**69.2**	***74.8**
% received all vaccine [β]	68.1	*76.5	43.0	46.1	37.7	*52.7	43.3	46.0	**45.4**	***52.3**
% have immunization diploma [β]	9.6	*42.1	12.2	14.7	5.2	*23.0	18.3	*24.6	**11.3**	***23.0**
% received vitamin A during last cycle [β]	85.8	86.0	83.3	*90.5	92.5	*87.9	87.5	*80.3	**86.9**	**87.0**
% received deworming medicine in last 6 months [β]	35.3	*19.0	33.0	*6.3	36.0	32.3	34.5	*18.6	**34.5**	***17.6**
No. of women	540	756	500	1,092	500	1,056	500	1,044	**2,040**	**3,948**

[φ] p<0.1; [β] p<0.05 for region × change over time interactions; *p<0.05 for change over time

it is also expected to encourage other parents with infants to do the same. The proportion of women with children 12 to 23 months who had an immunization diploma increased by more than two-fold during the analysis period, from 11 to 23 percent. Increases in the percentage possessing an immunization diploma was mainly observed in Tigray and Oromia. During the midterm survey immunization diploma possession was highest in Tigray (42 percent), then Oromia and SNNP (23 and 25 percent, respectively) and then Amhara (15 percent).

Among children aged 12 to 23 months, vitamin A coverage during the last distribution cycle remained unchanged in L10K areas (at about 87 percent). However, changes over time varied by region: vitamin A coverage declined in SNNP and Oromia (by 7 and 5 percentage points, respectively), increased in Amhara (by 7 percentage points), and remained the same in Tigray. During the midterm survey vitamin A coverage was highest in Amhara (91 percent), followed by Tigray and Oromia (86 and 88 percent, respectively), and then SNNP (80 percent).

Table 26: Reasons for not vaccinating children. Lack of knowledge and barriers to access to immunization according to region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Lack of knowledge	28.6	19.1	70.3	*58.0	54.2	45.6	62.2	*47.6	**59.7**	***49.9**
Place and time not known	4.8	0.9	7.5	10.9	22.9	19.6	22.4	16.6	**16.6**	**14.1**
Unaware of the need	11.5	1.8	18.4	17.2	9.0	11.0	11.0	10.4	**12.7**	**13.0**
Unaware of need to return	3.4	6.0	23.4	10.0	13.4	9.2	17.1	11.4	**16.9**	**9.9**
Postponed until another time	9.4	8.6	13.9	7.3	8.3	5.9	5.8	8.3	**9.6**	**7.2**
Fear of side reactions	0.0	0.0	14.2	11.4	3.9	1.0	8.1	2.1	**8.0**	**5.6**
Incorrect ideas about contraindications	1.3	0.0	11.6	7.6	3.4	5.6	4.6	3.1	**6.2**	**5.5**
No faith in immunization	1.1	3.5	2.6	0.8	1.1	1.6	1.6	1.5	**1.7**	**1.3**
Rumors	0.7	0.0	1.0	0.5	0.0	0.6	5.2	1.1	**1.5**	**0.6**
Barriers to access	15.6	27.3	35.7	37.2	46.1	49.9	39.8	46.5	**39.4**	**42.5**
Mother too busy	4.1	12.8	17.3	21.8	25.9	25.3	16.1	27.4	**19.5**	**23.6**
Vaccinators absent	0.5	8.1	3.7	4.7	5.9	8.1	4.2	7.6	**4.4**	**6.5**
Vaccine not available	0.6	0.9	5.2	1.7	3.8	9.4	10.9	8.6	**5.6**	**5.5**
Time of immunization inconvenience	0.6	0.0	6.2	3.1	3.8	6.9	4.6	2.3	**4.5**	**3.9**
Place of immunization too far	10.0	1.3	4.0	4.9	5.8	3.8	5.8	2.5	**5.5**	**3.8**
Child ill - not brought	0.0	4.2	0.4	3.0	9.2	5.4	1.5	1.6	**4.0**	**3.5**
Child ill -brought but not given immunization	0.0	0.6	0.9	0.0	0.5	0.9	0.2	1.8	**0.5**	**0.7**
Long waiting time	0.0	0.0	0.9	0.7	1.2	0.3	0.5	0.6	**0.8**	**0.5**
No. of children	99	83	165	350	266	348	191	375	**721**	**1,156**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05 for change over time

It is discouraging to note that deworming among children 12 to 23 months declined in L10K areas from 35 to 18 percent between the two surveys. This decline in deworming coverage was not significant in Oromia. Deworming coverage was lowest at midterm in Amhara (6 percent), followed by Tigray and SNNP (19 percent each), and then Oromia (32 percent).

Reasons for not immunizing children are given in Table 26. Reasons related to lack of knowledge or misinformation declined during the analysis period from 60 to 50 percent. Reasons related to lack of knowledge that play the greatest role were not knowing immunization times (14 percent), unaware of the need

of immunization (13 percent), unaware of the need to return for the 2nd or 3rd dose (10 percent), postponed until another time (7 percent), fear of reactions and wrong ideas about contra-indications (6 percent each), and then others reasons. Reasons for not immunizing children associated with barriers to access remained mostly the same, varying between 39 and 43 percent. Current major barriers to access included the mother being too busy (24 percent), followed by vaccinator absence (7 percent), unavailable vaccines (6 percent), and inconvenient immunization timing, inconvenient place of immunization, and ill child (4 percent each), and then others.

Table 27: Childhood illnesses. Among children 0 to 23 months, prevalence of ARI, diarrhea, and fever and associated care-seeking behavior, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Prevalence of ARI $^\beta$	13.6	*4.7	5.0	*4.3	13.8	*10.1	12.6	*9.4	**10.2**	***7.0**
% with ARI taken to (n) …	(162)	(69)	(62)	(99)	(138)	(216)	(151)	(213)	**(513)**	**(597)**
taken to any provider	40.8	35.2	27.9	24.7	19.5	*34.8	51.8	45.3	**33.7**	**35.5**
taken to Hospital	0.0	3.7	0.7	0.0	0.0	0.9	0.5	0.0	**0.3**	**0.7**
taken to Health Center	27.9	30.7	17.6	21.6	4.1	17.1	33.3	29.5	**19.0**	**23.0**
taken clinic/health station	2.6	0.0	0.0	0.0	3.1	2.8	1.5	3.2	**2.0**	**2.0**
taken to Health Post	9.8	2.0	2.9	0.6	3.9	2.2	5.3	4.0	**5.2**	**2.3**
taken to other providers	2.6	2.0	9.6	2.5	10.7	16.7	16.0	12.0	**10.3**	**10.6**
given antibiotics	28.5	26.5	12.2	16.8	11.8	*27.7	39.4	35.7	**22.4**	**27.3**
Prevalence of diarrhea	22.0	*14.2	17.7	*12.9	27.5	*15.7	31.3	*23.2	**23.8**	***16.0**
Prevalence of bloody diarrhea	6.0	*2.5	2.4	*1.2	4.4	*2.2	5.5	*3.6	**4.1**	***2.2**
% of diarrhea cases taken to (n) …	(251)	(191)	(193)	(254)	(273)	(313)	(338)	(490)	**(1,055)**	**(1,248)**
taken to any health provider	39.4	44.1	29.9	36.6	35.4	*47.6	39.9	*49.9	**35.6**	***44.5**
taken to hospital	0.4	0.0	1.1	0.8	0.9	1.1	0.0	0.1	**0.6**	**0.6**
taken to health center	26.6	34.4	19.8	20.9	8.0	20.1	21.8	30.8	**17.7**	**25.4**
taken clinic/health station	0.8	0.0	1.9	0.1	6.1	5.7	0.7	4.2	**2.7**	**2.8**
taken to health post	12.6	10.9	6.0	8.8	12.5	4.6	6.8	5.7	**9.1**	**7.1**
taken to other providers	4.6	4.5	5.4	10.3	12.4	22.3	17.0	15.9	**10.6**	**14.3**
% of diarrhea cases given ORS	35.2	33.7	23.0	24.6	21.7	26.5	19.8	*30.3	**23.4**	***28.0**
% of diarrhea cases given ORT	61.8	57.6	39.1	46.4	43.7	49.5	37.7	44.7	**43.2**	**48.1**
Prevalence of fever $^\beta$	24.5	*11.6	14.1	*10.6	27.9	*15.0	26.5	*18.3	**21.9**	***13.5**
Number of fever cases (n)	(283)	(161)	(163)	(232)	(289)	(320)	(297)	(407)	**(1,032)**	**(1,120)**
% taken to any health provider	40.1	48.3	34.6	33.9	22.6	*36.7	50.4	48.4	**35.6**	**40.6**
% taken to hospital	0.7	2.2	2.1	0.4	0.0	1.0	0.8	0.8	**0.8**	**0.9**
% taken to health center	24.4	36.3	21.3	20.6	3.8	18.0	28.0	30.7	**17.7**	**24.7**
% taken to clinic/health station	1.5	1.1	0.0	0.1	3.7	2.6	1.0	3.3	**1.8**	**1.9**
% taken to health post	10.8	7.9	7.6	2.8	4.5	3.1	7.9	4.8	**7.2**	**4.1**
% taken to other providers	4.7	4.3	6.2	12.1	11.7	16.3	17.1	12.1	**10.6**	**12.3**
% given anti-malarial	2.0	1.8	5.3	3.7	2.5	2.7	6.5	5.4	**4.1**	**3.7**
% slept under a bed net	41.4	*46.3	34.6	*47.1	22.9	*41.5	28.7	*40.3	**31.3**	***44.1**
% slept under a bed net (malarious areas only)	45.6	*55.3	38.0	*58.3	26.7	*45.5	37.5	*61.6	**36.0**	***54.8**
No. of children 0 to 23 months	1,188	1,511	1,100	2,184	1,100	2,112	1,100	2,100	**4,488**	**7,907**
No. of children 0 to 23 months in malarious areas	1,012	1,223	858	1,584	902	1,608	748	1,116	**3,520**	**5,531**

$^\phi$ p<0.1; $^\beta$ p<0.05 for region × change over time interactions; *p<0.05

Childhood illness and care-seeking behaviors

Table 27 presents changes in the prevalence of childhood illnesses and related care-seeking behaviors over the analysis period. Interestingly, the prevalence of childhood illness during the two weeks preceding the survey among children aged 0 to 23 months declined over the last two years. Prevalence of acute respiratory infection (ARI) declined from 10 to 7 percent; diarrhea prevalence declined from 24 to 16 percent; bloody diarrhea declined from 4 to 2 percent; and the prevalence of fever declined from 22 to 14 percent. Although the prevalence measures in both surveys were taken during the same time of the year, it is still possible that the observed decline in childhood illnesses prevalence was due to seasonal variation and epidemiologic patterns rather than actual declines.

Care-seeking behavior for childhood illnesses remained similar for ARI and fever. During the midterm survey 27 percent of children aged 0 to 23 months with ARI received antibiotics, while only four percent of those who had fever received anti-malarial treatment. Children 0 to 23 months of age with diarrhea were more likely to be taken to health providers (45 percent) during the midterm survey than they were during the baseline survey (36 percent). Consequently, children with diarrhea were more likely to receive oral rehydration solution at midterm, increasing from 23 to 28 percent in the last two years.

The proportion of children aged 0 and 23 months in L10K areas who slept under beds net the night before the survey increased from 31 to 44 percent. In malarious areas the increase was even higher (from 36 to 55 percent). The rate of increase in children sleeping under bed nets observed in the surveys was uniform across the four regions. The midterm proportion of children in malarious areas who were sleeping under bed nets lagged behind in Oromia (46

percent) compared to the other regions (where it ranged between 55 and 62 percent).

Knowledge of danger signs of childhood illnesses

Mothers of children aged 0 to 23 months were asked to spontaneously recall signs and symptoms of illnesses that require the child to be taken to a health facility or to a health worker; results are listed in Table 28. The number of danger signs spontaneously reported produced an index of knowledge of childhood illness danger signs, expressed as a percentage of a maximum of 19 danger signs. This index improved from 18 to 23 percent between the two survey periods. Improvements in knowledge of childhood illness danger signs was lower in SNNP (3.3 percentage points) compared to the other three regions (where improvements ranged from 4.9 to 5.7 percentage points). Knowledge of childhood illness danger signs among women was higher at midterm in Tigray and Oromia (about 25 percent of the maximum score in each) compared to Amhara and SNNP (22 and 19 percent of the maximum, respectively).

Conclusions and recommendations

Child immunization coverage improved in L10K areas over the last two years. Although lack of knowledge declined as a reason for not immunizing children, barriers to access remained unchanged. The situation analysis of *kebele* health systems indicate that although vaccine availability improved, it was only 36 percent at midterm, indicating that there are still supply side barriers to childhood immunization services. Childhood immunization coverage in SNNP, Oromia and Amhara lagged behind Tigray; this is consistent with the EDHS 2011. **The strategies implemented by Tigray to**

Table 28: Childhood illness danger signs. Percentage of women with children 0 to 23 months who spontaneously recalled danger signs of childhood illnesses, by region during the baseline (Dec. 2008) and midterm (Dec. 2010) surveys in L10K areas.

	Tigray		Amhara		Oromia		SNNP		Total	
	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm	Baseline	Midterm
Percentage recalling childhood illness danger signs:										
Repeated watery stools	29.8	52.2	50.1	73.4	36.5	65.5	32.3	67.9	**39.8**	**67.0**
Any watery stools	63.8	61.0	32.9	41.6	43.7	37.9	35.7	28.7	**40.9**	**40.8**
Repeated vomiting	52.7	70.8	41.3	54.1	38.9	59.1	23.0	42.9	**38.5**	**55.6**
Any vomiting	15.6	28.8	23.1	27.6	31.1	36.2	20.7	18.5	**23.6**	**28.1**
Blood in stools	12.0	22.6	7.4	26.8	8.3	17.1	4.1	7.3	**7.6**	**19.5**
Fast breathing	9.4	16.5	10.3	12.8	11.4	18.0	9.7	7.4	**10.3**	**13.6**
Difficult breathing	8.5	13.3	13.3	12.1	12.9	17.0	13.3	9.4	**12.5**	**13.0**
Noisy breathing	3.1	6.9	1.6	6.4	3.8	7.1	1.9	2.3	**2.5**	**5.8**
Fever	85.9	85.1	75.8	73.5	72.2	79.2	74.6	80.2	**76.1**	**78.1**
Convulsions	5.1	7.4	1.3	4.8	2.9	11.6	8.8	4.6	**3.9**	**6.9**
Stiff neck	0.2	3.4	1.2	3.2	0.4	4.0	1.6	1.0	**0.9**	**3.0**
Marked thirst	0.6	3.1	1.1	2.5	1.7	4.1	1.0	1.7	**1.2**	**2.9**
Unable to drink	2.5	7.6	2.8	7.9	7.2	8.7	3.3	5.0	**4.0**	**7.5**
Not eating/not drinking well	19.8	12.3	16.2	18.4	24.8	24.3	9.8	13.2	**17.7**	**18.0**
Getting sicker/very sick	10.0	10.7	5.0	10.6	13.7	8.7	2.1	6.1	**7.4**	**9.2**
Not getting better	1.5	7.3	4.2	7.8	4.1	6.3	1.7	3.3	**3.3**	**6.4**
Sick for a long time	3.7	5.7	5.3	8.8	8.2	9.6	1.6	3.1	**5.0**	**7.4**
Sunken eyes	2.3	1.9	1.1	3.4	3.0	4.5	1.8	1.0	**1.9**	**3.0**
Cough	64.1	68.3	23.1	34.9	40.1	49.7	45.7	51.2	**38.4**	**47.2**
Index score for knowledge of childhood illness danger signs(% of maximum)$^{\phi}$	20.4	*25.4	16.7	*22.4	19.1	*24.6	15.3	*18.6	**17.6**	***22.6**
Number of women	1,188	1,511	1,100	2,184	1,100	2,112	1,100	2,100	**4,488**	**7,907**

$^{\phi}$ p<0.1; $^{\beta}$ p<0.05 for region × change over time interactions; *p<0.05 for change over time. Statistical tests were not done for the individual items of the knowledge score.

improve immunization coverage should be identified and replicated in the other regions.

The decline in deworming in L10K areas (with the exception of Oromia) is concerning. Other than improvements in oral rehydration therapy for treating diarrhea, there have not been major improvements in the management of childhood illness in L10K areas. Therefore, it is encouraging to note that the Integrated Community Case Management of Common Childhood Illnesses (ICCM) is being scaled up in Ethiopia.

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APPENDIX 1

THE HEALTH EXTENSION PROGRAM

The figure below depicts the Ethiopian public health system as envisioned by the government. The primary health care unit (PHCU) includes five health posts and one health center supported by a primary hospital. The HEWs are trained to provide a package of 16 services from the health posts and outreach activities. The health centers have nurses and health officers[38] and provide a wide range of mainly curative services; they are in the process of being equipped to provide basic emergency obstetric and neonatal care (EmONC)[39] services and technical including supportive supervision support to the health posts. One health center from each *woreda* will be equipped to provide Comprehensive EmONC.[40] More specialized health care is available at the zonal or regional level.

Community health promoters (CHPs) support the HEWs, one for every 25 to 30 households. The FMOH modified the strategy for CHPs and proposed to increase the concentration of CHPs, one for every five households, and renamed them as health development army (HDA) (FMOH 2011). Although the Federal Health Ministry of the Government of Ethiopia (FMOH) dictates the HEP policies, the respective regional health bureaus (RHB) of the eleven regions of the country enjoy considerable autonomy in implementing it (FMOH 2010).

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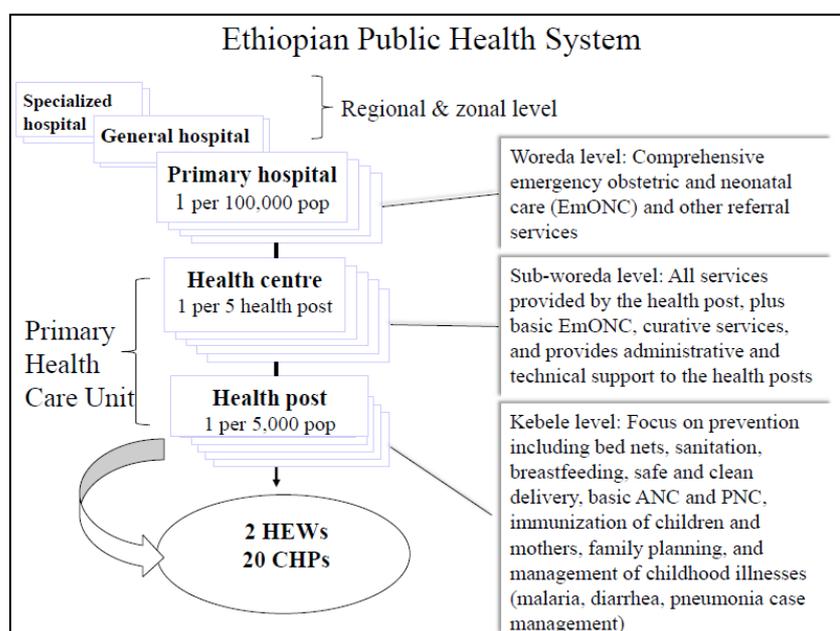
[38] Health officers are higher-level paramedics with advanced training but not a fully qualified medical doctor.

[39] Basic EmONC includes parenteral antibiotics, parenteral oxytocics, parenteral anticonvulsants, manual removal of the placenta, removal of retained products, assisted or instrumental vaginal delivery, and neonatal resuscitation.

[40] Comprehensive EmONC includes all the basic EmONC components plus blood transfusion and caesarian delivery.

APPENDIX 2

Table 1A: List of L10K intervention *woredas* according to program phase and second-generation community strategy.

Amhara	Oromia	SNNP	Tigray
(Phase 1)	*(Phase 1)*	*(Phase 1)*	*(Phase 1)*
1. Aneded α	1. Gida Ayana μ	1. Amaro	1. Ahferom α
2. Awabal	2. Guto Gida β	2. Burji	2. Kola Tembein β
3. Baso Liben	3. Haro Limu	3. Derashe μ	3. Laelay Maichew α
4. Dejen α	4. Ibantu	4. Arba Minch Zuria π	4. Werei Leke π
5. Enemay	5. Kiramu	5. Mirab Abayea α	5. Ganta Afeshum π
6. Alefa	6. Limu π	6. Dilla-Zuria β	6. Saesie Tsaeda Emba μ
7. Chilga α	7. Sasiga α	7. Gedeb α	7. Tahtay Koraro β
8. Debark	8. Bedele	8. Wenago μ	8. Enderta
9. Dembia β	9. Bilo Nopha	9. Yergachefe	9. Hintola Wajirat
10. East Belessa	10. Chora	10. Bita	10. Ofla μ
11. Gondar Zuria π	11. Metu α	11. Chena β	*(Phase 2)*
12. Metema	12. Dedo μ	12. Decha μ	11. Tahtay Maychew
13. Takusa μ	13. Goma	13. Gewata	12. Degua Temben
14. West Belessa	14. Omo Nada	14. Gimbo α	13. Laelay Adiabo
15. Wogera μ	15. Seka Chekorsa α	15. Konta	14. Medebay Zana
16. Ankober	16. Begi	16. Andaracha	15. Samre Sehart
17. Baso Worena μ	17. Boji Birmeji	17. Masha α	
18. Mojjana Wonder	18. Gimbi α	18. Yeki β	
19. Siadebrena Wayu β	19. Gudetu Kondole	19. Yem	
20. Tarmaber α	20. Kiltu Kara π	*(Phase 2)*	α CBDDM: Community based data for decision making
(Phase 2)	21. Man Sibu μ	20. Gurafereda	
21. Enarj Enawga	22. Nejo β	21. North- Bench	
22. Enbise Sar Midir π	*(Phase 2)*	22. Sheko π	β PCQI: Participatory community quality improvement
23. Goncha Siso Enese	23. Ale β	23. Shewa-Bench π	
24. Hulet Eju Enese β	24. Bure π	24. South Bench	
25. Shebel Berenta	25. Gechi	25. Alicho-Werero π	
26. Angolela Tera	26. Halu	26. Dalocha	
27. Efratana Gidem π	27. Hurumu μ	27. Hulberg μ	μ CSF: Community solutions fund
28. Ensaro	28. Yayu	28. Lanfaro	
29. Kewet	29. Chora Botor	29. Silte β	
30. Moretena Jeru	30. Gumay	30. West-Azernt	π NFI: Non-financial incentives
31. Burie μ	31. Limu Kosa β		
32. Dembecha β	32. Limu Seka		
33. Jabi Tehnan π	33. Nonno Benja		
34. Quarite	34. Shebe Sambo		
35. Womberma	35. Sokoru π		

TIER ONE L10K GRANTEES

The L10K Project provides financial and technical support to 12 local civil society organizations, or first tier grantees, to manage L10K community-based project activities in the four project regions of Amhara, Oromia, SNNP and Tigray. The organizations collaborate with *woreda* and *kebele* administrations to improve reproductive, maternal, neonatal, and child health (RMNCH) outcomes.

List of L10K partners (Tier 1 Grantees) by Region

Amhara

1. Amhara Development Association (ADA): The mission of ADA is to focus on the development endeavors of the Amhara people in the areas of health, education, basic skills training, and development through community participation and mobilization of resources. ADA covers all the 35 L10K *woredas* in Amhara.

Oromia

2. Oromia Development Association (ODA): Committed to the social and economic development of the Oromia, ODA has supported the construction of schools, water distribution points, roads, and flour mills. They have also been instrumental in supporting the training and deployment of community-based reproductive health agents. ODA covers 26 of the 35 L10K *woredas* in Oromia.

3. Fayyaa Integrated Development Organization (FIDO): FIDO was established with the aim to address the root causes of poverty and empower communities to help themselves by providing economic opportunity, accessible basic services, relief in emergencies, and addressing discrimination. FIDO covers four of the 35 L10K *woredas* in Oromia.

4. Illu Women and Children Integrated Development Association (IWCIDA): The goal of IWCIDA is to improve the lives of needy people, particularly women and children affected by HIV and AIDS. They focus on promoting literacy, rights, and health of girls and children. It covers five of the 35 *woredas* in Oromia.

Southern Nations, Nationalities and People's Region (SNNPR)

5. Bench Maji Development Association (BDA): BDA aims to alleviate poverty and improve the lives of people in the Bench Maji Zone by mobilizing the talents and resources of its people to create sustainable development and accessible basic services. BDA covers five of the 30 L10K *woredas* in SNNPR.

6. Ethiopian Kale Hiwot Church (EKHC): One of the oldest Evangelical nonprofit churches in the country, EKHC now encompasses over 7,000 local churches. It has implemented community development projects in the fields of agriculture, reforestation, water and sanitation, health and nutrition, urban income generating activities, as well as gender and human rights. It covers six of the 30 L10K *woredas* in SNNPR.

7. Kaffa Development Association (KDA): KDA is devoted to improving the social and economic development of the Kaffa people, aiming for community empowerment as their ultimate goal. They have implemented projects in health education, water, women's empowerment and harmful traditional practices. Notably, they have established a

revolving drug fund to address a drug shortage and provided special support for education for the Menja sub-ethnic group. It covers five of the 30 L10K *woredas* in SNNPR.

8. Sheka Peoples' Development Association (SPDA): SPDA is committed to furthering the social and economic development of the Sheka people. They have implemented projects in education and health, focusing on reproductive health, in all *woredas* of the Sheka Zone. It covers three of the 30 L10K *woredas* in SNNPR.

9. Siltie Development Association (SDA): SDA seeks to bring economic development, prosperity, and social justice to the Siltie people. The Organization has supported various development activities in the sectors of health and HIV prevention, education, water provision, and natural resource preservation. It covers six of the 30 L10K *woredas* in SNNPR.

10. Southern Region's Women's Association (SRWA): SRWA's mission is to advocate for the economic, social, and political rights of women in an effort to achieve women's equality. It has also implemented trainings for women on lobbying skills, provided non-formal education to rural women, facilitated scholarships for girl students, and organized awareness raising workshops on reproductive health, gender issues, women's rights, and HTPs. It covers five of the 30 L10K *woredas* in SNNPR.

Tigray

11. Relief Society of Tigray (REST): REST was originally established to meet the needs of people affected by the civil war and drought in Tigray. It eventually started supporting the agricultural sector through rehabilitation and disaster preparedness programs. Today, the organization focuses on health, education, and women's empowerment. It covers ten of the 15 l10K *woredas* in Tigray.

12. Women's Association of Tigray (WAT): WAT is a women-led association with members in every *kebele* of Tigray. The Association seeks to empower women by improving their socio-economic and political conditions, raising awareness, and mobilizing women's participation in development activities. It covers five of the 15 L10K *woredas* in Tigray.

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	Ayele Kibret	Bahiru Tujuba	Bajura Zeritu	Asrat Woldegerima
	Bisrat Tache	Belayneh Mengist	Bogale Haile	Ataklti Berhane
	Eshetu Gebey	Daniel Wegari	Chiksa Sultan	Equare Gebre
	Esubalew Berihun	Desalegn Tamiru	Dagim Fetene	G/her Desta
	Fantahun Worku	Endalew Melaku	Daniel Endale	G/her Ebuy
	Getachew Hussien	Feyuma Debeli	Debena Daca	G/her Yohanes
	Jejaw Berihun	Hailu Bogale	Degu	Gebre Michael Guesh
	Kiflemariam Tsegaye	Haimanot Yitagesu	Endale Emiru	Huluagersh Kassaye
	Mebrihit Rezene	Jebena Beyena	Fikadu Zeleke	Kindeya Halefom
	Melkamu Amera	Kelbessa Abdisa	Getahun Gaye	Lemlem Kebede
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	Taye Endalemaw	Silenat Alemu	Seide Kelifa	Yibrah Alemu
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