

Center for National Health Development in Ethiopia

Ethiopia Health Extension Program Evaluation Study, 2005-2007

Volume – I

Household health survey



Amhara, Oromia, and SNNP Regions
2008



Center for National Health
Development in Ethiopia

 **The Earth Institute**
AT COLUMBIA UNIVERSITY

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The Ethiopia Health Extension Program Evaluation Study, 2005-2007 (HEP Evaluation Study) is one of the monitoring and evaluation activities undertaken by the Center for National Health Development in Ethiopia (CNHDE) in support of the Ethiopian Ministry of Health. This evaluation study was funded by the Blaustein Foundation, the Earth Institute at Columbia University and the Gates Foundation.

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Table of contents

SUMMARY OF KEY FINDINGS	XI
1. INTRODUCTION	1
1.1 BACKGROUND	1
1.2 RATIONAL FOR HEP EVALUATION STUDY	2
2. SURVEY METHODOLOGY	3
2.1 OBJECTIVES AND OUTCOME MEASURES	3
2.2 SAMPLES SIZE	3
2.3 STUDY DESIGN	4
2.4 DURATION OF HEP IMPLEMENTATION IN THE INTERVENTION VILLAGES	8
2.5 QUESTIONNAIRES	10
2.6 DATA COLLECTION	10
2.7 HUMANITY AND ETHICS	11
2.8 DATA PROCESSING	11
2.9 BASELINE DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS	12
3. HYGIENE AND ENVIRONMENTAL SANITATION	14
3.1 WATER MANAGEMENT	14
3.1.1 <i>Access to improved source of water</i>	14
3.1.2 <i>Water treatment practice at the source</i>	14
3.1.3 <i>Water storage and treatment practice at home</i>	14
3.2 SANITATION	16
3.2.1 <i>Household toilet facilities</i>	16
3.2.2 <i>Solid and human waste management</i>	17
3.3 HEALTHY HOUSE ENVIRONMENT	17
3.3.1 <i>Improved house construction</i>	17
3.3.2 <i>House construction with separate place for animals</i>	18
3.3.3 <i>House construction with separate kitchen</i>	18
3.3.4 <i>House cleaning practice</i>	18
3.4 HYGIENE	19
3.4.1 <i>Hand washing practices</i>	19
3.4.2 <i>Knowledge of illnesses related with personal hygiene</i>	20
3.4.3 <i>Knowledge on prevention of mouth, teeth and gum illnesses</i>	20
3.5 FOOD HANDLING DURING PREPARATION	21
3.5.1 <i>Care during food preparation</i>	21
3.5.2 <i>Food contamination</i>	21
3.6 CONCLUSIONS	22
4. MATERNAL AND CHILD HEALTH	24
4.1 FAMILY PLANNING	24
4.1.1 <i>Knowledge of contraception methods</i>	24
4.1.2 <i>Ever use of contraception methods</i>	26
4.1.3 <i>Contraceptive prevalence rate (CPR)</i>	28
4.2 MATERNAL HEALTH	31
4.2.1 <i>Antenatal care (ANC)</i>	31
4.2.2 <i>Delivery care</i>	33
4.2.3 <i>Postnatal care (PnC)</i>	35

4.3	CHILD HEALTH	35
4.3.1	<i>Vaccination coverage</i>	35
4.3.2	<i>Breastfeeding</i>	38
4.3.3	<i>Fever/cough cases in children</i>	39
4.3.4	<i>Diarrhea in children</i>	39
4.4	CONCLUSIONS	41
5.	MALARIA	43
5.1	MODES OF MALARIA TRANSMISSION AND PREVENTION METHODS	43
5.1.1	<i>Malarious and non-malarious villages</i>	43
5.1.2	<i>Knowledge on modes of malaria transmission</i>	43
5.1.3	<i>Knowledge and practice on malaria prevention method</i>	43
5.1.4	<i>Knowledge and perception of mosquito nets</i>	44
5.2	PREVALENCE OF MALARIA EPISODES AND TREATMENT BEHAVIOR.....	44
5.2.1	<i>Fever/malaria episodes</i>	44
5.2.2	<i>Malaria treatment practice</i>	45
5.3	MOSQUITO NETS OWNERSHIP AND UTILIZATION	46
5.3.1	<i>Household possession of mosquito nets</i>	46
5.3.2	<i>Mosquito net utilization</i>	49
5.4	INDOOR RESIDUAL SPRAYING.....	49
5.5	CONCLUSIONS	50
6.	HIV/AIDS AND TUBERCULOSIS.....	52
6.1	KNOWLEDGE OF HIV/AIDS	52
6.2	STIGMA AND ACCEPTING ATTITUDES TOWARDS THOSE LIVING WITH HIV	54
6.3	HIGHER-RISK SEX AND USE OF CONDOMS	55
6.4	VOLUNTARY COUNSELING AND TESTING (VCT)	56
6.5	TUBERCULOSIS	57
6.5.1	<i>Knowledge about tuberculosis (TB)</i>	57
6.5.2	<i>Tuberculosis cases and treatment</i>	58
6.6	CONCLUSIONS_HIV/AIDS	59
6.7	CONCLUSIONS_TUBERCULOSIS.....	60
7.	HEP SERVICE UTILIZATION AND SATISFACTION.....	61
7.1	BACKGROUND CHARACTERISTICS OF RESPONDENTS.....	61
7.2	COMMUNITY AWARENESS OF HEP	62
7.2.1	<i>Awareness of the community on HEP</i>	62
7.2.2	<i>Awareness on the type of health services provided by HEP</i>	62
7.3	COMMUNITY UTILIZATION OF HEP SERVICES	63
7.3.1	<i>HEP services sought by community</i>	63
7.3.2	<i>HEP services provided by HEWs at home</i>	64
7.4	COMMUNITY SATISFACTION WITH HEP	65
7.4.1	<i>Satisfaction with individual HEP health service packages</i>	65
7.4.2	<i>Satisfaction with the service of HEWs</i>	67
7.4.3	<i>Satisfaction on access to health provider (HEW), health post, and medicines</i>	68
7.4.4	<i>Satisfaction with quality of health post</i>	69
7.4.5	<i>Overall satisfaction</i>	69
7.5	COMMUNITY PERCEPTION ON HEP SERVICES	70
7.5.1	<i>Fulfillment of individual health needs by HEP</i>	70
7.5.2	<i>Fulfillment of community health needs by HEP</i>	70

7.5.3	<i>Communities' perception on constraints of HEP</i>	71
7.5.4	<i>Happiness of the community with provision of HEP in their villages</i>	72
7.6	CONCLUSIONS	73
8.	RECOMMENDATIONS	75
8.1	HYGIENE AND ENVIRONMENTAL SANITATION	75
8.2	MATERNAL AND CHILD HEALTH	75
8.3	MALARIA	77
8.4	HIV/AIDS AND TUBERCULOSIS	77
8.5	HEP SERVICE UTILIZATION AND SATISFACTION.....	77

List of Tables and Figures

Table 1.1: HEP health service packages by major health programs	2
Table 2.1: Primary and secondary outcome measures for the study objective	3
Table 2.2: Selection of sample villages at baseline and status of HEP intervention during follow-up	7
Table 2.3: Distribution of sample participants for community perception survey by sex and regions	8
Table 2.4: Number of HEWs deployed and duration of implementation of HEP in intervention villages	9
Table 2.5: Baseline demographic characteristics of sample household heads by study group	13
Table 3.1: Percent distribution of households by water treatment at home and methods used	15
Table 3.2: Percent of households practicing drinking water handling methods after its arrival at home	15
Table 3.3: Percent of households who use sound methods of disposing human and solid waste management	17
Table 3.4: Percent distribution of households by characteristic of house construction	18
Table 3.5: Percent of households with separate kitchen and washing practice	18
Table 3.6: Percent distribution of frequency of cleaning the floor of their houses	19
Table 3.7: Percent of respondents who wash their hands at specific times	19
Table 3.8: Percent of households with special hand washing apparatus and correct washing practice	20
Table 3.9: Percent of respondents who mentioned illnesses that result if eyes are not kept clean	20
Table 3.10: Percent of households who know methods to avoid illnesses of mouth, teeth, and gum	20
Table 3.11: Percent of households who mentioned ways in which food may be contaminated	22
Table 4.1: Knowledge of contraceptive method among all women and currently married women	25
Table 4.2: Ever use of contraception methods among all women and currently married women	27
Table 4.3: Current use of contraception methods among all women and currently married women	29
Table 4.4: Percent distribution of most recent source of modern contraceptive method	30
Table 4.5: Percentage distribution of women by source of information about contraception methods	31
Table 4.6: Percent distribution of antenatal care (ANC) visits by number and timing	32
Table 4.7: ANC provider for the most recent birth	33
Table 4.8: Percent distribution of births in the five years preceding the survey by place of delivery	34
Table 4.9: Percent distribution of live births by person providing assistance during delivery	34
Table 4.10: Percent distribution of first PNC checkup by time after delivery, type of place and health provider	35
Table 4.11: Percentage of children age 12-23 months who received specific vaccines	37
Table 4.12: Prevalence and treatment of fever/cough by survey period	39
Table 4.13: Prevalence and treatment of diarrhea in children by survey round and study groups	40
Table 4.14: Percent distribution of children with diarrhea by the amount of liquid and food offered	40
Table 5.1: Percent distribution of households by knowledge on transmission and prevention methods	44
Table 5.2: Knowledge and perception of mosquito nets	44
Table 5.3: Households with members ill with fever or malaria prior to the survey	45
Table 5.4: Percent distribution of severity of illness in the 2 weeks preceding the survey	45
Table 5.5: Malaria treatment with anti-malaria drug same / next day outside home	46
Table 5.6: Percentage of households with mosquito net and average number of nets per household	46
Table 5.7: Source of mosquito nets and how they were obtained by study period and group	47
Table 5.8: Mosquito net utilization by study round and group	49
Table 5.9: Prevalence of indoor residual spraying and perception of respondents on IRS	50
Table 6.1: Percent of respondents aged 15-24 with awareness about AIDS and prevention methods	52
Table 6.2: Percent of respondents aged 15-24 with awareness on HIV transmission	53
Table 6.3: Percent of respondents with accepting attitudes toward those living with HIV	55
Table 6.4: Percent of respondents with multiple sexual partners and higher-risk sex in the past 12 months	56
Table 6.5: Percent of respondents who use condom as contraceptive method	56
Table 6.6: Percent of respondents who have heard about pulmonary tuberculosis	57
Table 6.7: Percent of respondents with knowledge about symptoms and transmission of tuberculosis	58
Table 6.8: Number of TB cases and treatment 12 months preceding the survey	59

Table 7.1: Socio-demographic variables of respondents	61
Table 7.2: Respondent's relationship to household head	62
Table 7.3: Awareness of the community about HEP and HEWs in the village	62
Table 7.4: Community's awareness on the type of activities (services) undertaken by HEWs	63
Table 7.5: Percent of respondents who had contact with HEWs in one month preceding the survey	63
Table 7.6: Percent distribution of reasons for the community members visiting HEWs	64
Table 7.7: Percent of respondents by type of HEP services received	64
Table 7.8: Percent distribution of satisfaction levels of respondents on HEP health service packages by gender	66
Table 7.9: Proportion of respondents satisfied during last visit to HEW	67
Table 7.10: Respondents experience during last visit to the health post	68
Table 7.11: Overall perception of respondents on the service they received in the health post at last visit	68
Table 7.12: Respondent's satisfaction on the cleanliness of the health post during last visit	69
Table 7.13: Respondents satisfaction on the health post (renovation, equipments, supplies)	69
Table 7.14: Percentage of respondents who would visit again and recommend the same HP to friends	70
Table 7.15: Percent distribution of respondents' perception of HEP in addressing individual needs	70
Table 7.16: Percent distribution of respondents rating of HEP in addressing needs of the community	70
Table 7.17: Percent of respondents by perception on constraints facing HEP	71
Table 7.18: Percent of respondents by suggested measures to improve services at the health post	72
Table 7.19: Happiness rating with the provision of HEP in the village by the community	73

Figure 2.1: Flow chart of recruitment process of study villages	6
Figure 3.1: Percent distribution of households by water treatment at source and methods used by study period	14
Figure 3.2: Percent distribution of households by type of sanitation facility according to study period	16
Figure 3.3: Percent distribution of households by type of sanitation facility at follow-up by study group	16
Figure 3.4: Percent of households who mentioned ways of care while preparing food by study period	21
Figure 4.1: Percentage of children age 12-23 months who received specific vaccines during follow-up survey	38
Figure 4.2: Percent of children under three years living with the mother exclusively breastfed by study period	38
Figure 4.3: Percent of children under three years living with the mother exclusively breastfed by study period	39
Figure 5.1: Percent distribution of respondents by reason for not having mosquito nets at baseline and follow-up study	48
Figure 5.2: Percent distribution of respondents by reason for not having mosquito nets by study groups (follow-up study)	48
Figure 6.1: Percent of respondents with knowledge of prevention of MTCT	54
Figure 6.2: Percent of respondents by awareness, attitude and practice on VCT, by study period	56
Figure 6.3: Percent distribution of reasons for not wanting to get VCT, by study period	57

Abbreviations and acronyms

ANC	Antenatal care
BCG	Bacille Calmette Guerin
CHW s	Community Health Workers
CNHDE	Center for National Health Development
CPR	Contraceptive prevalence rate
CSA	Central Statistics Authority
DHS	Demographic and Health Survey
DHMO	District health management office
DPT	Diphtheria, Pertussis (whooping cough) and Tetanus toxoids
EPI	Expanded program of immunization
FMOH	Federal Ministry of Health
HC	Health Center
HEP	Health Extension Program
HEWs	Health Extension Workers
HIV/AIDS	Human Immunodeficiency Virus /Acquired Immunodeficiency Syndrome
HS	Health Station
IRB	Institutional Review Board
ITNs	Insecticide Treated Nets
IUDs	Intra-uterine Devices
HSDP	Health Sector Development Program
MDG	Millennium Development Goals
MTCT	Mother to child transmission
MVP	Millennium Village Project
NGOs	Non-Governmental Organizations
ORS	Oral rehydration salt
RHB	Regional Health Bureau
SNNP	Southern Nations Nationalities and People
PHC	Primary Health Care
TB	Tuberculosis
TBA	Traditional Birth Attendants

Preface

The Center for National Health Development in Ethiopia (CNHDE), The Earth Institute at Columbia University, is pleased to present an Evaluation Survey Report of the Ethiopia Health Extension Program for 2005 – 2007. The principle objective of the evaluation survey is to generate critical information for policy-makers and program managers working in health. The CNHDE provides an independent evaluation of HEP to supplement the regular monitoring and evaluation activities undertaken by the Federal Ministry of Health (FMOH). This report summarizes the findings of the survey which was conducted in Amhara, Oromia and SNNP regions. The surveys were undertaken at the end of 2005 (baseline) and end of 2007 (follow-up). The evaluation report is prepared to inform the FMOH and Regional Health Bureaus (RHBs) on the implementation status in terms of achieving the goals and objectives of the HEP and identify challenges in the implementation of HEP. We also hope that it will be useful to stakeholders and partners to identify specific areas where they would support in the improvement of the program.

The evaluation report attempts to supplement the existing monitoring and evaluation programs of the FMOH and other surveys such as Demographic Health Survey (DHS) and Malaria Indicator Survey (MIS). Although, the routine health information system of the FMOH and RHBs provide critical information, it is not sufficient in providing wide ranges of data to show the impact of HEP. Household health surveys such as the DHS, although provide important information on demographic and health indicators for overall assessment of the health situation of the country, it doesn't provide the marginal effect of HEP on the health indicators. Moreover, the topics and indicators covered by DHS are not comprehensive enough to cover the 16 health service packages of HEP. Issues related to health facility performance and health provider, which are critical in addressing challenges and constraints in the implementation of HEP are also not covered by DHS and the existing health information systems.

In this report, we provide result of household survey, health provider (HEWs) survey, and health facility (health post) survey that cover all the 16 HEP service packages. We have provided a detailed result of the survey on all major areas of HEP and some recommendations intended to stimulate discussions and debate among all stakeholders for eventual improvement of the program are included.

The material within each result section is organized similarly. In most of the sections, a brief introduction of the topic and its importance in achieving the goals and objectives of HEP is given. The questions administered to household members or HEWs is indicated, and finally the response of respondents is presented. We have tried to organize the result sections by bringing similar topics together and as much as possible we tried to make the organization similar to other surveys such as DHS, where appropriate, to help users of the report cross reference with DHS.

The report is divided into three volumes, which enabled us to cover a wide range of program monitoring and evaluation areas. Volume I covers the results of the household survey. Chapter 1 of this Volume is concerned with introduction of the Ethiopian health system and particularly with description of HEP and rationale of the HEP evaluation. Chapter 2 deals with the methodology of the HEP evaluation including the study design and sampling methods. A large part of the remainder of Volume I deal with the result of the household survey. Various areas under hygiene and environmental sanitation are contained in Chapter 3. The results of maternal and child health survey is provided in Chapter 4. The three major infectious diseases, malaria (Chapter 5), HIV/AIDS and Tuberculosis (Chapter 6) were also dealt with. Chapter 7 covers various topics that deal with community

perception, utilization and satisfaction of HEP services. The last Chapter (Chapter **8**) deals with recommendations organized by major program areas.

Volume **II** covers HEWs performance. The first two Chapters deal with background and rationale for HEWs performance survey (Chapter **1**) and study methodology (Chapter **2**) briefly covering specific areas with regard to HEWs, which are not covered in Volume **I** of the report. Chapter **3** provides perception and satisfaction of HEWs on various topics. The time allocation into the various components of HEP collected through diary method is given in Chapter **4**. Chapter **5** covers the assessment of the technical skills of HEWs. At the end of Chapters **3-5** are conclusions of the results of the survey and recommendations made.

Volume **III** covers health post performance. The first two chapters deal with brief description of the health posts and rationale of the study (Chapter **1**) and study methodology (Chapter **2**), which are not covered in Volume **I** of the report. The remainder of Volume **III** report is organized into different areas of health facility performance such as infrastructure availability (Chapter **3**), HEP service availability and organization (Chapter **4**), readiness of health posts to provide HEP services (Chapter **5**), productivity of health posts (Chapter **6**), quality of services (Chapter **7**), and referral system (Chapter **8**).

Survey on the management system of HEP at district level has been undertaken. The type of data collected is primarily qualitative in nature, and it is not ready for dissemination when this report is published due to time constraint. It will be reported soon as Volume **IV** of the HEP survey.

Lastly, we hope that the survey results facilitate the improvement of the problems highlighted in the survey. The data generated will contribute to the ongoing efforts of the FMOH, RHBs and other stakeholders of HEP including non-governmental organizations and international agencies in supporting and formulating effective measures to address challenges for the benefit of the health and well-being of the rural communities in Ethiopia.

Acknowledgements

CNHDE is greatly indebted to the Blaustein Foundation, the Earth Institute at Columbia University and the Gates Foundation for providing funding to undertake the evaluation survey. CNHDE is grateful to the FMOH and RHBs for their logistic support and allowing us to undertake the study at the health posts and district health management offices.

Special thanks are due to all individuals and organizations who participated in the development of survey tools including questionnaires and survey personnel guidelines as well as translation of survey tools into local languages; who coordinated the field work during training of survey personnel and data collection; who developed database for the survey; who did the data processing and analysis; and who developed the report. Persons involved in survey design, organization, data analysis, and report preparation are listed at the end of the report.

Special thanks also to Cindy Paladines (Earth Institute, Columbia University) and Tigist Alemu (MVP) for their valuable comments and editions of the report.

CNHDE would like to lend special thanks to the survey field personnel for their tireless work to collect quality data and survey respondents who were important for the successful completion of the study.

SUMMARY OF KEY FINDINGS

The Health Extension Program (HEP) was launched in 2004 to expand the Health Sector Development Program (HSDP) to include community-based health interventions as a primary component. In this regard, the HEP forms part of the government's core Primary Health Care (PHC) strategy. As such, the HEP is primarily focused on preventative and promotive activities, with a limited focus on curative services. HEP services are organized at the village-level, alongside comprehensive networks of "primary health care units" that link every rural village of 5000 or more people to a referral health facility. To achieve this, roughly 15,000 health posts will need to be constructed, and a total of about 30,000 HEWs will need to be deployed to the 15,000 villages.

The primary objective of the evaluation of the HEP study is to assess whether the implementation of HEP significantly improves the health of the people. The HEP evaluation was designed to enable comparison of the relative change in outcome measures among intervention and control villages. The study employed repeated cross-sectional comparison between a sample of intervention (HEP) villages with a matched control sample of villages; both sets of villages were surveyed before the implementation of HEP in 2005, and after implementation in 2007.

Questionnaires were developed to address the many objectives and activities that the HEP health service package intends to target. The questionnaires elicited a wide-range of data: basic household demographic information, knowledge of hygiene and environmental sanitation, malaria and tuberculosis, family health, HIV/AIDS; and community perception and satisfaction with HEP services. Household, hygiene and environmental sanitation, malaria and tuberculosis modules were completed by household heads. Women between the ages of 15-49 years and men between the ages of 15-59 years were interviewed on

family health, HIV/AIDS and Tuberculosis, and community perception on HEP services. . Data for the baseline was collected from November 1 – December 30, 2005, and for the evaluation (follow-up) study from November 1 – December 30, 2007. This report includes households within villages that have both baseline and follow-up data (25 intervention villages & 14 control villages).

Although the follow-up period was two years, the duration of HEP implementation in the 25 intervention villages ranged from one to two years using one or two HEWs. It is also necessary to note that the interventions were not up to the HEP standard because the health posts were not fully ready to provide quality services (see HEP EVAL Volume-III report). Thus, the HEP effect presented in this report is the impact of an average 1.2 years of HEP intervention under sub-optimal conditions.

To determine the effect of the program, data from the baseline was compared to data in the follow-up survey for each group; this intra-group difference was then compared across groups, to proxy the 'effect' of the treatment vis-avis the control group over the evaluation period. A summary of findings is given below:

HYGIENE AND ENVIRONMENTAL SANITATION

Overall water management improved during the study period but the effect of HEP was negligible.

Access to improved sources of water, which is not directly related with HEP, was similar between the two groups – 51.8% in the intervention and 47.5% in the control villages. Water treatment at the source to improve its safety increased from roughly 26% during the baseline to 45% at the time of the follow-up survey for both groups. Similarly, treating water at home to make it safer for drinking improved from a

level of roughly 15% of households at baseline to about 36% of households at the time of the follow-up survey; again, these levels were similar across both the intervention and control groups.

The Data suggests that HEP had a dramatic effect in improving access to sanitary services over the study period. The overall access to sanitation improved from 34.4% at baseline to 59.7% during the follow-up survey. During the follow-up survey, the proportion of households with access to improved sanitation reached 75.6% in the intervention villages (from 39.4% at baseline); in contrast, access to improved sanitation in the control villages increased from 27.4% at baseline to 36.3% during the follow-up survey period. The most common type of toilet facility used by households was the traditional pit latrine.

HEP improved human waste management practices contributing to the overall, human waste management practices over the study period. The proportion of households who used sanitary and environmentally sound methods of disposing stool of babies and young children increased from 37.6% at baseline to 48.2% during the follow-up study. Although the baseline level was higher in the intervention (43.3%) than control (26%) villages, at the time of the follow-up survey, significantly higher proportion of households practiced proper human waste management in the intervention (57.6%) than control (34%) villages.

The effect of HEP on solid waste management was moderate, and the overall practice improved over the study period despite the low coverage. Although the use of sanitary and environmentally sound methods of disposing solid wastes was practiced in few households during the baseline (4.9%) and intervention (9.6%) studies, the relative improvement was by nearly 100% over the follow-up period. The improvement in the intervention villages was by over a 110% (from 5% to 10.7%), while in the control

villages it increased by about 70% (from 4.6% to 7.9%).

HEP contributed to a healthy house environment by increasing proportion of houses with improved ventilation, separate place for animals, and separate kitchen. The overall proportion of houses with a window capable of ventilation increased from 38.4% during the baseline to 43.1% during the follow-up study. The magnitude of the overall increase over the two years period was small; however, more households in the intervention villages (46.9%) than in the control villages (37.5%) had proper ventilation during the follow-up study. Although, the proportion of houses with a separate place for animals did not show overall improvement over the study period, the proportion of houses with a separate place for animals during the follow-up study was higher in the intervention villages (46.6%) compared to the control villages (31.8%). The proportion of houses with a separate kitchen showed overall improvement over the study period – from 27.8% at baseline to 36.7% at follow-up. Moreover, the proportion of houses with a separate kitchen was higher in the intervention villages (38.9%) compared to the houses in the control villages (33.6%).

HEP increased availability of special apparatus for hand washing, but hand washing practices was similar between the intervention and control villages. Although hand washing practices at appropriate times has generally increased over the study period, there was no difference in hand washing practices of households between the HEP and control villages. Special apparatus for hand washing was available in almost 50% of households during the follow-up survey compared to about 42% of households during the baseline survey. The proportion of households with special apparatus for hand washing in the intervention villages was 55.7%, while it was 39.9% in the control villages. The baseline levels were 44.8% and 38% respectively.

MATERNAL AND CHILD HEALTH

HEP improved the knowledge of contraceptive methods. Overall knowledge of any contraception methods increased from 66.7% at baseline to 75.8% at follow-up survey among all women. Similarly, it increased from 72.9% at baseline to 78% at follow-up among married women. Although pills (62.2%) and injections (61.0%) were almost equally widely known by all women at the time of the baseline survey, injections (70%) became more popular than pills (64.8%) at follow-up survey. The knowledge of any contraception method among married women in the HEP villages increased from 73.9% to 81% during the follow-up period, while there was only a minimal change in the control villages (from 71.7% to 72.7%) over the same period.

HEP improved the use of contraceptive methods and CPR. Overall, the percent of currently married women who have ever used any contraception methods at least once in their life increased from 30.6% to 41.5% during the follow-up period. The increment in ever use of any method among currently married women was high in the HEP villages (from 31.1% to 45.9%) than the control villages (from 30% to 33.7%). Injections became the most commonly ever used contraception method over the study period (from 17.6% to 26.6%) than pills (from 12.9% to 15.1%). The overall contraceptive prevalence rate (CPR) did not change over the study period. The CPR of any modern contraception methods in the HEP and control villages was 24.8% and 21.2%, at the time of the follow-up study from baseline levels of 21.7% and 23.1%, respectively.

HEP had little effect on ANC coverage. Overall, the percent of mothers who received antenatal care (ANC) for the most recent birth was 40.4% at baseline and 44.3% at follow-up survey. Given the low coverage of ANC in the HEP villages during the baseline survey, the relative improvement was higher in the HEP villages

(from 37.4% to 43.3%) than in the control villages (from 45.5% to 46.3%).

Among the women who attended antenatal care, mothers who received at least four antenatal care visits increased from 14.6% at baseline to 22.5% during the follow-up survey. Percent of mothers who received their first ANC visits during the first trimester was low, but showed some improvement – from 5.7% to 8.3% over the study period. HEP had no effect on these aspects of ANC.

A majority of mothers went to a health professional for ANC during both survey periods, and there was no difference between the HEP and control villages. During the follow-up survey, HEWs attended 37.3% of pregnancies in the HEP villages and 8.7% of pregnancies in the control villages.

Assisted skilled deliveries improved over the study period, but HEP. Home deliveries were the most common place to give birth during both survey periods, with 90.7% and 87.8% deliveries occurring at home during the baseline and follow-up survey period, respectively. Overall health facility delivery increased from 4.6% at baseline to 8.9% at the time of follow-up. There was no difference between the HEP and control villages.

Although, the overall picture of assisted skilled deliveries is poor, it nearly doubled over the study period – from 6.6% to 13%. During the follow-up survey, HEWs attended 6.6% of deliveries in the HEP villages. However, the proportion of deliveries attended by skilled health personnel in the HEP villages (11.8%) was lower than that of the control villages (15.7%). The only plausible explanation for such difference could be that HEP also promotes the involvement of volunteers such as TBAs and home deliveries, which might have resulted in decreased number of mothers coming to health posts and higher facilities.

HEP contributed to the improvement of postnatal coverage and quality. Although, postnatal care (PNC)

coverage was generally low, it increased by more than 40% from 4.5% at baseline to 6.5% at follow-up. The relative increase in PNC coverage over the study period was higher in the HEP than control villages. Home was the second most common place following hospitals/HC as the place where first PNC took place during the baseline survey, but it was replaced by health posts, which became the second common place during the follow-up survey. Similarly, during the follow-up survey, HEWs replaced TBAs to become one of the two main types of health providers of mother's first PNC checkup. Thus, in addition to the increased coverage of PNC over the study period, the quality is expected to improve.

HEP's effect on immunization was very small. Generally, the overall improvement in immunization coverage of children from baseline to follow-up period was not significant. The only improvements in immunization coverage were seen in the coverage of BCG and measles vaccinations. The percentage of children aged 12-23 months who received BCG vaccination increased from 48.3% at baseline to 57.1% during the follow-up survey. Similarly, measles vaccination coverage increased from 32.2% to 39.5% over the follow-up period.

The difference in the percentage of children who receive vaccination on BCG, DPT3, Polio3, and measles between the HEP villages and control villages was 0.2, 4.4, 2.7, and 5.3, respectively. These correspond to increases in vaccination coverage of BCG, DPT3, Polio3, and measles in the HEP villages by 0.4%, 14.0%, 13.2% and 14.1%, respectively, compared to villages that were not covered by HEP.

The overall treatment seeking behavior for children with fever/cough improved over the study period. The percent of children under the age of 5 years, who had fever/cough in the two weeks preceding the survey, was 8.8% and 12.0% at baseline and follow-up, respectively. The percentage of children with fever for whom treatment was sought from a health facility or

provider was 29.3% and 37.42% at baseline and follow-up, respectively. There was no difference between the study groups.

HEP helped increase the percentage of children receiving Oral Rehydration Salts (ORS) for the treatment of diarrhea. Among the children under the age of five who had had diarrhea in the two weeks preceding the survey, the overall percentage who received ORS increased from 11.1% at baseline to 19.4% at follow-up survey. The improvement was more significant in the HEP villages (from 11.3% to 22.2%) than in the control villages (from 10.8% to 15%) over the study period.

HEP improved feeding practices by persuading caregivers to offer more liquid at the time of diarrhea, contributing to overall improvement in this area: The overall practice of offering more liquid than usual to children who had diarrhea improved over the study period from 18.4% at baseline to 33% at follow-up. Although the improvement was in both study groups, it was by nearly 100% in the HEP villages (from 19.3% to 36.9%), while it was by about 50% in the control villages (from 16.8% to 26.7%) over the study period. In contrast, the overall percent of children who were offered more or same amount of food as usual decreased over the study period from 47.2% to 40.1%, which was mainly due to the decline in the control villages, because there was no change in the HEP villages.

MALARIA

HEP improved knowledge on correct mode of malarial transmission. Overall knowledge on the correct modes of malaria transmission increased from 50.6% to 57.1% over the study period. The relative change in knowledge was similar in both study groups, but higher proportion of respondents in the intervention villages (67%) than the control villages (43.6%) correctly mentioned mosquito bites as a cause of malaria transmission at the time of the follow-up

survey. The rate of misconception on the modes of malaria transmission decreased in the HEP villages (from 18.6% to 15.5%), but not in the control villages (from 14.2% to 30.5%).

Knowledge of ITNs use became universal. The proportion of respondents who have ever heard about mosquito nets increased from 66.5% to 98% during the follow-up period. The perception, among respondents that sleeping under mosquito nets protects those people from malaria also increased from 85.1% during the baseline survey to 95.8% during the follow-up survey. Since the knowledge of mosquito nets became universal, there was no difference between the HEP and control villages.

HEP helped led to a significant increase in the proportion of people that received prompt treatment of fever or malaria cases over the study period. The proportion of households with members who reported being ill with fever or malaria in the past 12 months decreased significantly over the study period. The rate at which people sought early treatment with effective anti-malarial drugs increased from 31.1% at baseline to 48.6% at the time of follow-up survey. Moreover, there was a marked difference between the HEP and control villages. In the HEP villages, about 53.3% of patients with fever/malaria sought malaria treatment with anti-malaria drugs the same or next day after the onset of illness; in control villages, only 20% of patients sought treatment under similar conditions. The baseline values were 33.1% and 26.3% respectively.

HEP contributed to the overall improvement in mosquito net ownership and utilization over the study period. Overall household possession of at least one mosquito net per household increased dramatically from 41.5% to 76.1% during the follow-up period. From roughly similar levels of coverage at baseline, ownership of nets increased more significantly in the HEP villages (87%) than in the control villages (61.5%) during the follow-up period.

Mosquito net utilization among the total population was low, although there was improvement over the study period. During the baseline survey, the rate of mosquito net utilization was 13.4% and 14.1% in the intervention and control villages, respectively. At the time of the follow-up survey, mosquito net utilization among the total population was higher in the intervention (37.2%) than control villages (22.6%). However, the mosquito net utilization among people who own mosquito nets was similar in both study groups at the time of follow-up survey.

HIV/AIDS AND TUBERCULOSIS

HIV/AIDS

Awareness of AIDS was widespread among both study groups.

Although comprehensive knowledge on HIV/AIDS preventive methods was generally low, it improved over the study period with significant contribution from HEP. The overall knowledge of condoms as preventive method improved significantly from 31.5% to 48% during the study period. Knowledge on condoms was low in the intervention villages; however, the level of knowledge increased by 78% and 46% over the study period in the HEP and control villages, respectively. Roughly about 60% of respondents in both study groups mentioned limiting to one partner as preventive measure, but level of knowledge at the time of follow-up survey was significantly higher in the HEP (59.2%) than control (40.7%) villages. The comprehensive knowledge on preventive methods increased by 65% in the HEP villages (from 15% to 24.7%), while there was no improvement in the control villages (from 24.7% to 20.3%), resulting in an overall increase of comprehensive knowledge from 18.9% to 23.1% over the study period.

Knowledge on many of the HIV transmissions and misconceptions improved over the study period, but it was comparable in both study groups. Although

comprehensive knowledge on HIV transmission was low, knowledge on one or the other indicators was reasonably high. The awareness that a person can't become infected by sharing food with a person who has AIDs was universal in both study groups. Majority of respondents also reported that a healthy-looking person can have AIDs virus with significant improvement over the study period (from 62.7% to 73.3%). It was slightly higher in the HEP (74%) than control (71.8%) villages at the time of the follow-up survey. Similarly, the percentage of respondents who believe that a person can't be infected by HIV through supernatural power improved significantly over the study period from 60.4% to 75.7%. However, misconception about transmission of AIDs by mosquito or other insect bites was high, with only 58.2% of respondents rejecting the misconception at the time of the follow-up survey in both study groups.

Comprehensive knowledge of PMTCT increased by over 80% - from 10.1% to 18.8% over the follow-up period, but it was similar in both study groups. Awareness about the transmission of HIV through breastfeeding was high, but did not show improvement (roughly 67% in both study periods). Although, awareness on reducing risk of PMTCT by ART drugs was low, it increased from 13.7% to 26.8% over the study period.

The accepting attitude towards those living with HIV/AIDS showed overall improvement over the study period, with some contribution from HEP. However, the level of stigma and discrimination towards those living with HIV/AIDS still remains high. The accepting attitude indicators that showed improvement over the study period include willingness to care for family member with AIDS (from 60% to 63.9%); readiness to buy fresh vegetables from shopkeeper who has AIDS (from 35% to 38.7%); and willingness to allow own child to play with a child who has HIV/AIDS (from 29.7% to 32.2%). However, there was no improvement in keeping secret that a family member got infected with AIDS virus. Overall,

expressing accepting attitude on all four indicators increased from 8.6% to 11.7% over the study period.

The accepting attitudes towards buying fresh vegetables and not keeping secret about a family member infected with HIV increased more significantly in the HEP than control villages. The relative improvement with regard to willingness to care for family member with AIDS and allowing own child to play with a child who has HIV/AIDS was lower in the HEP than control villages, although the accepting attitudes were higher at the time of follow-up survey in the HEP than control villages. In general, the increase in expressing accepting attitude on all four indicators was higher in the HEP villages (from 9% to 13.3%) than in the control villages (from 8.1% to 8.6%) over the study period.

Condom use rate at high-risk sexual intercourse was low with slight improvement over the study period – from 15.2% to 16.3%. The improvement was relatively higher in the HEP than control villages, but generally low in the HEP villages. The use of condoms as contraceptive methods was low during both study periods, but increased from 0.58% at baseline to 2.1% at follow-up.

About half of respondents were aware about VCT, and there was a significant improvement over the study period. Majority of the respondents who have heard about VCT also know where to go for VCT service, and 9 in 10 respondents would like to be tested in the future. On the other hand the level of VCT was generally low, with some improvement over the study period (from 12% to 15%). The HEP and control villages were similar in all aspects of VCT outcome measures above.

Tuberculosis

Awareness about tuberculosis was moderate, but showed a moderate increase from 58% at baseline to 65.1% of respondents at follow-up having heard about tuberculosis. The level of awareness was slightly higher in the HEP than control villages. Knowledge on

symptoms of tuberculosis was generally low, and did not show improvement over the study period. Moreover, knowledge about symptoms of tuberculosis was similar between the HEP and control villages. Long standing cough as symptoms of TB was the only widely known symptom, but other symptoms of tuberculosis were less known. Knowledge on tuberculosis transmission was also low, with only less than half of respondents able to mention one or the other ways of transmission. Awareness about tuberculosis transmission showed minimal improvement over the study period, however, there was no major difference between the HEP and control villages.

Although, the number of tuberculosis cases reported was very small to make a reliable comparison, the data indicated improvement in receiving and completing treatment over the study period. Similarly, it indicated higher seeking and completion of treatment in the HEP than control villages.

HEP SERVICE UTILIZATION BY COMMUNITY

Overall, 87.5% of respondents had heard about HEP. Relatively more men (90.1%) had heard about HEP than women (86.3%). Majority of respondents were aware that HEP provides immunization and family planning services.

The community mainly seeks treatment of illnesses, immunization, and family planning service among the HEP services. On the other hand, HEWs primarily offer immunization, water and sanitation, health talks, and family planning services among the HEP services. The least offered HEP services were supplementation, first aid, postnatal, delivery and growth monitoring services.

Community expressed higher satisfaction on immunization, family planning, health talks, and water and sanitation services. Community satisfaction was the lowest for the treatment of other illnesses (other than malaria & diarrhea), postnatal care, growth

monitoring, micronutrient supplementation, and delivery services of the HEP services.

Overall satisfaction of the community on technical quality of HEWs services was moderate. The highest satisfaction was on the helpful suggestions, explanations and attention they received from HEWs. Three-fourths of respondents were satisfied with the helpful suggestions and understandable explanations they received from HEWs. However, only 58% of respondents were satisfied with the skill of HEWs.

Majority of respondents were satisfied with the attention they received from the HEW (76.9%), while about two-thirds of respondents were satisfied by the fact that HEWs made them feel free to ask questions (62.1%) and HEWs discussed treatment options with them (65.6%).

The satisfaction with regard to the interpersonal manner of the HEWs was variable. Majority of respondents were satisfied by the fact that the HEW appeared to enjoy caring for them (75.8%) and treated them well (74%). On the other hand, only one-third of respondents thought that the HEW seemed friendly (35.5 %).

More than two-third of respondents were satisfied with the time the HEW spent with them and felt that they were given a complete explanation (69.3%).

Satisfaction on the accessibility and convenience (access to HEWs and health post) dimension was generally good, with more than 90% of respondents reporting no difficulty to get to the health post, and more than four-fifth of respondents reporting no difficulty finding the HEWs (82.8%). Most (81%) claimed that they did not wait too long before receiving care.

Satisfaction on the technical quality of the health service dimension was generally poor. About a third of respondents reported that the recommended medicines were available at the health post (36.5%),

while only 15% reported that they received materials for seeing or reading at the health post.

Respondents' satisfaction with regard to the health posts infrastructure, equipments and supplies was also very low. Less than a third of respondents were satisfied (8.4% very satisfied and 20.4% satisfied) with the renovation of health post infrastructure, and the availability of equipments and supplies in the health posts.

Overall satisfaction on the HEP services was good. This was measured indirectly by asking respondents if they would visit the health post again for the same health issue and if they would recommend the same health post to other people. Both measurements revealed that about two-thirds of the respondents were satisfied by the overall service, and specifically, 64.9% and 64.7% of respondents reported that they would visit the health post again and would recommend the same health post for other people, respectively.

CONCLUSION

In conclusion, this study indicates a significant improvement in health outcome measures over two years period, mainly attributed to HEP, and it should serve as incentive to all stakeholders of HEP to continue their support to strengthen the program in order to attain its goals and targets and contribute to achieving the health MDGs. The evaluation was undertaken during the infancy stage of HEP and early implementation process of the program. The finding of the HEWs and health post performance surveys, reported in Volume II and III of the report, indicated that the technical skills of HEWs particularly in some key HEP services was not up to the standard, and majority of health posts were not adequately equipped with the necessary medical equipments, drugs and supplies. Moreover, some of the health posts were staffed with one HEW. Considering all these situations, the significant gains in most of the

outcome indicators achieved so far is extraordinary. Some recommendations to facilitate the improvement of the problems highlighted in the survey are made for consideration by all responsible stakeholders.

1. INTRODUCTION

1.1 BACKGROUND

Ethiopia is one of the sub-Saharan countries affected by high disease burden reflected by the high rates of maternal and child mortality. Approximately 60 to 80 percent of the health problems in Ethiopia are due to infectious and communicable diseases. The major challenges of the health system include low access to health care services, widespread poverty, inadequate access to clean water and sanitation facilities, and low health service utilization. In response to the poor health situation in the country, the Ethiopian government established a Health Sector Development Program (HSDP), in 1997/8 which is a comprehensive national plan and framework. Although, the overall performance of the health sector has improved under HSDP, most of the progress has occurred in urban areas. The success to reach essential services to the people at the grass roots level through HSDP has been quite limited. As a result, overall levels of disease burden, and child and maternal mortality appear hardly to have shifted significantly in the six years that followed. Maternal and child mortality as well as the incidence of the major killers such as HIV/AIDs and malaria continue to be one of the highest in the world. The challenges are overwhelming, and new approach and rigorous effort were necessary to complement the HSDP program if further progress was to be made.

In 2004, Ethiopia launched Health Extension Program (HEP) to expand the national health program to include community based health interventions as a primary component of the HSDP. Re-orienting HSDP towards PHC approach would deliver better and high quality health care and improve the health of the people and ensure that the health system remains sustainable into the future. Moreover, majority of the health problems in Ethiopia are due to infectious and communicable diseases, which are better managed by an approach that focuses on preventive and promotive health services. International evidence suggests that health systems based on a strong PHC orientation are more efficient, have lower costs and more equitable health outcomes, and can achieve higher user satisfaction than those whose health systems have only a weak PHC orientation.

HEP is a nationwide comprehensive program targeting all rural populations and all health issues, which will narrow the gaps between population groups by addressing the health problems of families or individuals under-served. It is “a package of basic and essential promotive, preventive and basic curative health services targeting households in a community, based on the principle of Primary Health care to improve the families’ health status with their full participation”. The goal of the HEP is to create healthy society that will play an active role in poverty reduction. The overall objectives of HEP are to improve equitable access to quality essential health interventions provided at kebele and household levels with a focus on sustained preventive health actions and increased health awareness, and to serve as an effective mechanism for shifting health care resources from urban to the rural population.

The national program became operational beginning mid-2004 along with the recognition of the need for a massive scaling up of health post construction, the recruitment, training and engagement of health extension workers (HEWs) and community health workers. HEP services are organized along geographic lines (villages). The implementation of HEP involves construction of a comprehensive network of “primary health care units” with

health posts in every rural village of 5000 people linked to referral health facilities. Each health post is staffed and managed by two HEWs. The services provided under HEP include 16 essential health packages under four major program areas (Table 1.1).

Table 1.1: HEP health service packages by major health programs

Major programs	Health service packages	Major programs	Health service packages
Family health services	1. Maternal and child health	Hygiene and environmental sanitation	1. Excreta disposal system
	2. Family planning		2. Solid & liquid waste management
	3. Immunization		3. Water supply safety measures
	4. Adolescent reproductive health		4. Food hygiene
	5. Nutrition		5. Healthy home environment
	6. Arthropods and rodent control		
	7. Personal hygiene		
Disease prevention and control	HIV/AIDS	Education and Communication	1. Cross cutting
	6. Tuberculosis		
	7. Malaria		
	8. First aid		

1.2 RATIONAL FOR HEP EVALUATION STUDY

The implementation of nation-wide HEP, which is considered the most important institutional framework for achieving the Millennium Development Goals (MDGs), should be accompanied by monitoring and evaluation studies to demonstrate that the goals and objectives are achieved and to document factors that affect the implementation and success of the program. The government of Ethiopia is spending huge resources to fund the nationwide implementation of HEP. The policy-makers and health workers need scientific evidence to improve the implementation of HEP, and to determine the impact of the huge investment on the health of the people. Moreover, given the limited resources in the country, information on the effectiveness of the program is needed to guide resource allocation decisions. However, HEP has never been evaluated systematically. In the absence of evidence based interventions and sustained progress, resources could be wasted. Thus, there is a need to monitor and evaluate all the activities at all levels of the health system including the community, and its impact on the health of the people. More importantly, an independent monitoring and evaluation is central to the success of HEP program.

We have designed a repeated cross-sectional study to investigate the effectiveness of HEP in rural villages of Ethiopia. The primary study objective is to assess the effectiveness of HEP in terms of health outcome measures through the comparison of villages surveyed before HEP implementation and re-surveyed after HEP implementation with a control sample of villages. The government aims to cover all rural villages with HEP by 2009, thus the only opportunity to compare outcome indicators between villages covered by the program, and villages that are not yet covered by the program would be before full scale-up of the program to all rural villages. The result of the primary study objective is covered in this Volume (Volume I) of HEP evaluation report. The secondary objective is to assess the health system including HEWs and health posts performance in terms of the implementation process of HEP in a village. The result is covered in Volume II and III of the HEP evaluation report.

2. SURVEY METHODOLOGY

2.1 OBJECTIVES AND OUTCOME MEASURES

The primary objective of the HEP evaluation study was to assess the effectiveness of HEP in improving the health situation of the people. The specific objectives were to: 1) establish baseline health outcome measures of rural population targeted for HEP in 2005; 2) determine the effect of at least one year implementation of HEP on the health outcomes; 3) determine the overall improvement in health outcome measures over two years period; 4) assess the perception, utilization and satisfaction of the community on the HEP services; and 5) identify specific health service areas that require further strengthening, and provide recommendations. The study was designed to address as many outcome indicators as possible about the effect of HEP on a range of health indicators that cover the 16 HEP service package. The primary and secondary outcome measures which are of primary interest in the context of the primary research objective are presented in table 2.1.

Table 2.1: Primary and secondary outcome measures for the study objective

	Primary outcome measures	Secondary outcome measures
Child health	One year-old children immunized for measles Proportion of diarrhea cases properly treated Treatment sought for fever/cough	Prevalence of diarrhea Prevalence of fever/cough
Maternal health	Contraceptive prevalence rate Births attended by skilled health personnel	Knowledge of contraceptive methods Ever use of any modern method Coverage of ANC
Malaria	Prompt treatment of malaria cases Household possession of mosquito nets Mosquito nets utilization by population Mosquito nets utilization by children	Prevalence of malaria/fever Knowledge of prevention methods Utilization among population who own net
HIV/AIDS	Condom use rate of the CPR Condom use at last higher-risk sex (15-24 years) Comprehensive knowledge of HIV/AIDS (15-24 years) Voluntary Counseling and Testing	Accepting attitudes toward those living with HIV Misconceptions about HIV/AIDS (15-24 years) Knowledge of MTCT of HIV prevention
Tuberculosis	Prevalence of TB cases TB cases treated with combination drugs	Knowledge on mode of transmission Completion of treatment
Sanitation & environmental sustainability	Access to improved source of water Access to improved sanitation facility Percent of population using proper waste management	Percent with healthy house environment Hygiene and hand washing
Community perception and satisfaction on HEP	Percent of people who use HEP services Percent of people satisfied with HEP services People experiencing difficulties in obtaining HEP services	Percent of people aware of HEP services Percent of people satisfied with HEP Percent of people who think their health needs are fulfilled

2.2 SAMPLES SIZE

The sample size determination for the primary study objective was based on one of the primary outcomes “Percent of children who are fully vaccinated” indicator, because this indicator is most demanding in terms of

sample size. In doing so, the requirements of all other indicators will be satisfied. For this indicator, it was assumed that 50% of children in that age group will be fully immunized at baseline. In order for us to statistically demonstrate a difference of 15 percentage points between the groups in the proportion of children fully vaccinated, and using standard parameters of 95 percent level (two sided) of significance (α) and 90 percent power (β), 360 children were needed in each group. Taking into consideration a design effect of 1.5 to allow for correlation between observations arising from clusters, the total sample size became 540 children in each group. Therefore, 540 households from each group who have children under five were needed for the study, which would provide sufficient power for the analysis of the primary questions. To obtain 540 households from each group, 22 villages would be sampled from each group with the assumption that 25 households from each village would be selected. The sampling was undertaken using multi-stage sampling involving the following stages: (1) random selection of districts from each region; and (2) random selection of four villages (clusters) within selected districts; (3) random selection of households within selected villages; and (4) selection of individuals within selected households.

2.3 STUDY DESIGN

Evaluation of the impact of HEP involves determination of the degree to which any changes observed in the outcome measures can be attributed to HEP's efforts. The HEP evaluation was designed to enable comparison of the relative change in outcome measures among intervention and control villages. The study employed repeated cross-sectional comparison between a sample of villages surveyed before HEP implementation in 2005 and re-surveyed after HEP implementation in 2007; with a matched control sample of villages surveyed in 2005 and 2007. The two-step strategy was employed to estimate the average effect of the program for the intervention villages. Initiating HEP program in a village is determined by the implementer, ministry of health, and the way HEP was rolled out meant that it was not possible to undertake a randomized controlled comparison. The study method employed constitutes a quasi-experiment design involving matching of comparison groups, which ensures that the intervention and control villages are comparable and equally exposed to all observable factors. Thus, any difference in outcome measures between the intervention and control villages will be assumed to be due to the presence of HEP in the intervention group.

When the study was initiated in 2005, it was not possible to determine which villages would be covered by HEP by 2007. Thus, our study involved recruitment of randomly selected villages prior to implementation of HEP at baseline with the expectation that some villages would be covered by the program and others would not during two years of follow-up. Then, villages covered by the program and villages not covered by the program at follow-up served as sampling frames for the intervention and control groups, respectively. To ensure comparability of the study groups, control villages were selected by matching using factors which were believed to affect the prioritization in the selection of a village by district health management office (DHMO) to be involved in the program. Through matching the study groups would be similar in terms of access to other health services (eg. access to health center or hospital) and in terms of socio-demographic factors. A detailed description of the procedure is presented below.

Recruitment of villages for baseline assessment: We aimed to obtain 22 villages (clusters) in each study group with baseline and follow-up data. It was necessary to enroll more villages during the baseline assessment than the

required sample size. A sampling frame of 13591 rural villages within 591 districts in 7 regions was obtained from the Central Statistics Authority (CSA) for the baseline recruitment. The regions included were Tigray, Afar, Amhara, Oromia, SNNP, Harare, and Dire-Dawa. Multi-stage cluster sampling method was used, with village as the cluster unit. The multi-stage sampling in the selection of clusters involved two stages: (1) random selection of districts from each region; and (2) random selection of four villages (clusters) within selected districts. At the first stage of sampling, 59 districts were selected with probability-proportional-to-size (PPS) approach (Tigray=7, Afar=2, Amhara=15, Oromia=18, SNNP=15, Harare=1, and Dire-Dawa=1). At the second stage of sampling, four kebeles (clusters) per district were selected from the 59 district with equal probability within a district. Respective regions and districts were informed through telephone and a letter with a short description of the study. Out of the 59 sample districts, 47 districts were enrolled in the study. A total of 188 villages were enrolled from the 47 districts, and 4700 households surveyed to provide baseline data (Tigray=7, Afar=2, Amhara=15, Oromia=11, SNNP=10, Harare=1, and Dire-Dawa=1). Seven districts from Oromia and 5 districts from SNNP regions were not enrolled for different reasons.

Selection of villages for the follow-up survey: Information was collected from the villages sampled at baseline (188 villages) on the following factors: 1) HEP implementation status; 2) presence of health post infrastructure; 3) distance of the village from district town; and if HEP was implemented in the village – 4) the criteria used by DHMO for prioritizing the village among other villages to initiate HEP; 5) duration of implementation; and 6) number of HEWs assigned. This information was used to identify and match villages that would serve as intervention and control villages for the evaluation study (Table 2.2). Three criteria were used in the selection of intervention and control villages. 1) One of the matching factors used was district. The pairs of intervention and control villages should be selected from the same district. Thus, inclusion of a district for the follow-up survey was based on the availability of intervention and control villages within the district. If the 4 villages within a district were all covered by HEP, the district was excluded because there were no matching control villages. Similarly, if the 4 villages within the district were not all covered by HEP, the district was again excluded due to lack of matching intervention villages. Thus, only districts which have villages with and without HEP implementation were considered for the follow-up study. 2) Fulfillment of the definition of intervention and control villages was used as inclusion and exclusion criteria for villages. Villages that have been covered by HEP for at least one year were considered as intervention villages, while villages never initiated HEP were considered as control villages. Villages that have implemented HEP for less than one year were excluded. 3) Once we have candidate intervention and control villages within a district that fulfill the definition, a third step which involved matching by a number of factors was used to select comparable study groups. Intervention and control villages within a district should match by distance from district town, which ensures that both study groups have similar access to a health center or hospital. Presence of a health post infrastructure independent of HEP implementation indicates commitment of the community to organize and build a health post or indicates the prioritization of the village by DHMO to implement HEP. To control these potential confounding factors, the comparison groups were also matched by the presence or absence of a health post infrastructure in the village.

Based on the first criteria, the 2 districts from Afar were excluded because none of the villages had implemented HEP. Similarly, 22 districts were excluded from Tigray (7), Amhara (6), Oromia (3), SNNP (4), Harare (1), and Dire Dawa (1) because the 4 villages were all covered by HEP. Only 23 districts remained that have potential

intervention and control villages within the respective district. The 23 districts were from Amhara (9), Oromia (8), and SNNP (6) regions. The HEP coverage of the four villages in each of these 23 districts varied from one to three villages. The HEP implementation status in the 92 villages within the 23 districts (4 villages per district) was as follows: 52 villages implemented HEP for at least one year, 12 villages implemented for less than one year, while HEP was not implemented in 28 villages. Based on the second criteria, the 12 villages which have implemented HEP for less than one year only were excluded.

Using the third criteria, intervention and control villages were matched by distance from district town, and presence of health post infrastructure in the village. Based on these factors, 14 intervention villages and 14 control villages matched, which resulted in reduced number of clusters for the follow-up survey. Two approaches were taken to augment the primary sampling design. The first one was to increase the ratio of matching intervention to control villages to 2:1 (as opposed to 1:1), which was used to increase the number of villages with pre- and post-intervention data. The implementation of this approach was also meant to increase the sample size for the secondary study objective, which only targets the intervention villages. This approach resulted in selection of additional 14 intervention villages. The second remedy involved selection of new villages, which were not enrolled during the baseline assessment but matched with villages that were part of the baseline assessment. The final number of villages selected for the follow-up survey became 42 intervention villages and 28 control villages. The recruitment process of villages is summarized in figure 2.1.

Figure 2.1: Flow chart of recruitment process of study villages

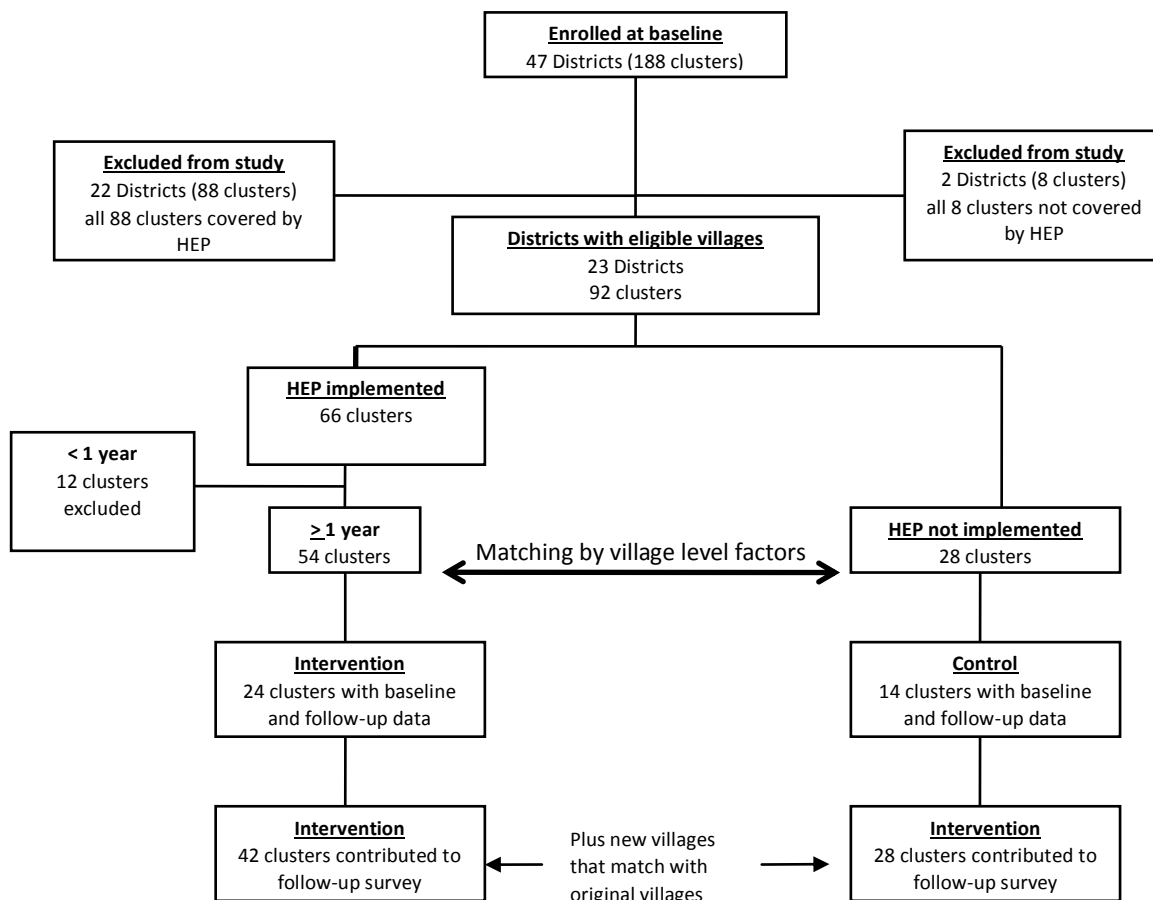


Table 2.2: Selection of sample villages at baseline and status of HEP intervention during follow-up

Region	Total no of districts	Total no of villages	No of sampled districts	Districts enrolled at baseline	No of villages enrolled	Districts excluded from follow up	Districts with eligible villages	Total eligible villages	HEP implementation in eligible villages					
									HEP not started	< 1 year	HEP implemented		2 years	
											1 year	2 HEWs	1 HEW	2 HEWs
Tigray	34	593	7	7	28	7	0							
Afar	29	311	2	2	8	2	0							
Amhara	138	3013	15	15	60	6	9	36	8	8	1	1	4	14
Oromia	253	6155	18	11	44	3	8	32	14	3	3	5	3	4
SNNP	135	3471	15	10	40	4	6	24	6	1	6	2	8	1
Harar	1	17	1	1	4	1	0							
DireDawa	1	31	1	1	4	1	0							
Total	591	13591	59	47	188	24	23	92	28	12	10	8	15	19

Community perception: The target for the assessment of community perception on HEP, the rates of service utilization and satisfaction were all the households within the intervention villages targeted for the primary study objective. Thus, the total number of households included for this study was 1050 from the intervention villages (42 villages). The target groups for this module were women and men between 15-49 years old. The selection involved one woman from each household, and one man from every other household, which resulted in a total of 1840 individuals. Women accounted for 67.2% (1230) and men accounted for 32.8% (610) of the selected sample. The distribution of the sample participants by region is presented in table 2.3.

Table 2.3: Distribution of sample participants for community perception survey by sex and regions

	Characteristics	No.	Percent
Sex	Male	610	32.8
	Female	1230	67.2
Region	Amhara	712	38.7
	Oromia	500	27.2
	SNNP	628	34.1
Total		1840	100

2.4 DURATION OF HEP IMPLEMENTATION IN THE INTERVENTION VILLAGES

The information compiled in these report comprises data from 24 intervention (HEP) villages and 14 control (no HEP) villages, that contributed data both at the time of the baseline and follow-up surveys. Villages that have only baseline data and the new villages that were included during the follow-up survey are not part of this report. Although, the follow-up period from the time of baseline survey to the time of follow-up survey was two years, the implementation of HEP did not occur immediately in all the 24 intervention villages. The effect of HEP interventions, among other things, depends on the duration of implementation and human resources deployed. HEP was implemented immediately in 14 villages, and thus, the community received HEP intervention for two years. In 8 intervention villages, HEP was implemented one year later, thus, community received one year of intervention.

Moreover, the number of HEWs deployed varied from village to village, some villages had two HEWs for two years or one year, other villages had one HEW for one or two years, and the remaining villages had one HEW for one year and two HEWs for another one year. The number of HEWs and duration of each HEW's deployment is presented in table 2.4. The Federal Ministry of Health (FMOH) standard is two HEWs per health post, and when we talk about the impact of HEP, it should be about HEP implemented based on the standard of FMOH. Considering the number of years HEP was implemented and the number of HEWs deployed, each of the 24 intervention village received an average of 1.2 years of HEP intervention with 2 HEWs. There was some variation among the regions, and the intervention villages in Amhara, Oromia, and SNNP regions received, on average, 1.4 years, 1.3 years, and 0.8 years of HEP intervention, respectively. Thus, the effect of HEP presented in this report is not the effect of two years implementation but, the effect of an average 1.2 years of HEP intervention implemented using two HEWs.

Table 2.4: Number of HEWs deployed and duration of implementation of HEP in intervention villages

Region	Village ID	Number of	Number of years	Number of years	Standardized* duration of HEP
Amhara	1	1	2	-	1
	2	2	2	2	2
	3	2	2	2	2
	4	1	2	-	1
	5	2	2	2	2
	6	1	1	-	0.5
	7	1	2	-	1
Average standardized duration of HEP implementation with 2 HEWS - Amhara					1.4 years
Oromia	1	1	2	-	1
	2	2	1	1	1
	3	2	2	1	1.5
	4	1	2	-	1
	5	2	1	1	1
	6	2	2	1	1.5
	7	2	-	-	-
	8	2	2	2	2
	9	2	1	1	1
Average standardized duration of HEP implementation with 2 HEWS - Oromia					1.3 years
SNNP	1	-	-	-	-
	2	2	1	1	1
	3	1	2	-	1
	4	1	1	-	0.5
	5	1	1	-	0.5
	6	1	2	-	1
	7	2	1	1	1
	8	1	2	-	1
Average standardized duration of HEP implementation with 2 HEWS - SNNP					0.8 years
Average standardized duration of HEP implementation with 2 HEWS – all regions					1.2 years

* – “2 HEWs – year” based on the standard of HEP

Another issue that should be taken into consideration when interpreting the findings of the evaluation study is whether the necessary health facility infrastructures, facilities, medical equipments, drugs, and medical supplies were fulfilled to enable the provision of HEP based on the standard of the FMOH. Fulfilling the necessary inputs to implement a nationwide program such as the HEP requires huge financial resources and time. The study was undertaken at the early stage of HEP implementation before the regions and districts had the time to fully implement the program according to the standard. The accompanying survey report of health post performance (Volume-III) showed that the health posts were not fully equipped according to the HEP standard, and the HEP interventions were not fully implemented as per the standard. Thus, the effects of HEP reported in this document

are not the result of a fully functioning HEP program, but the result of HEP interventions for an average of 1.2 years under sub-optimal conditions.

2.5 QUESTIONNAIRES

Questionnaires that covered a range of topics were developed to collect household level information. The questionnaires were developed based on the objectives and activities of the HEP health service packages, although many of the questions are consistent with DHS questionnaires. The questionnaires included 6 modules organized as follows: a) Household module on household characteristics (20 items); b) Hygiene and Environmental Sanitation Module (34 items); c) Malaria and tuberculosis Module (69 items); d) Family Health Module (90 items including contraceptive use, antenatal care, delivery and postnatal care, immunization, diarrhea, etc.); e) HIV/AIDS Module (57 items); and f) community perception and satisfaction on HEP services (28 items). The questionnaires were translated from English into the different local languages. The same questionnaires were used for the baseline and follow-up studies, however, the community perception and satisfaction on HEP was undertaken during the follow-up survey only in the intervention villages. No changes to content or question wording were made for questionnaires used at baseline and follow-up surveys for comparability purposes.

2.6 DATA COLLECTION

Survey team and training: Survey teams each consisted of half female and half male interviewers, supervisors and regional coordinator were organized in each region, with Center for National Health Development in Ethiopia (CNHDE) staff supporting the regional coordinators. The number of data collectors and supervisors varied across the regions depending on the number of households sampled in each region. All data collection personnel were health officers or nurses with previous survey experience, fluent in local language, and experience with community level work. Six-day training was given to all survey personnel and an additional day of training for supervisors. To achieve high quality data and homogeneity in the administration of the questionnaires, the training was standardized to include an exhaustive explanation on how to conduct the interview including the use of personalized introduction to respondents, the use of the survey instruments, simulation of the interview by means of role-playing techniques, and practice interview in rural households.

Selection of Sample households: Following the selection of districts (1st stage) and clusters (2nd stage), the multi-stage sampling involved additional two stages: (1) random selection of households within selected villages (3rd stage); and (2) selection of individuals within selected households (4th stage). At the third stage of sampling, 25 households were randomly selected from each cluster. For this study, a household was defined as a family that eats together, and individuals who lived in the household for at least 12 months were considered family members. The random-walk method used in EPI (expanded program of immunization) cluster surveys was employed in the selection of sample households. Based on the household members listing in the household module, individuals were selected for questionnaires that target household members.

Interview procedures: The study contents and survey purposes were explained to the head of household or spouse, and oral informed consent was obtained from households that agreed to participate in the study prior to undertaking data collection. Household, hygiene and environmental sanitation, and malaria and tuberculosis

modules were completed from each household. If households had eligible target people for the other modules (women between the ages of 15-49 years, and men between 15-59 years), family health, HIV/AIDS, and community perception questionnaires were completed. The family health and HIV/AIDS questionnaires were completed by all women between the ages of 15-49 years in each of the households, and all eligible men between the ages of 15 – 59 years in every other household. The community perception on HEP module, targeting households in the intervention villages during the follow-up survey, was completed by a randomly selected woman from each household and a man from every other household. Data for the baseline was collected from November 1 – December 30, 2005, and for the evaluation study from November 1 – December 30, 2007.

Quality control & assurance measures: Quality control and assurance measures were implemented to ensure that the procedures and data are reasonably valid, and compatible within and among regions and between intervention and control villages. The quality assurance measures were directed at the clarity of questions, interview technique, the preparation of the field work, the conduct of the study, and finally at the plausibility of the database. The questionnaires were pre-tested in non-participating rural villages to check its comprehension and clarity, sensitivity and acceptability of question items, and duration of interview. The interviewers were trained and provided with guidelines containing step-by-step instructions for completion of the questionnaire and appropriate explanations for each item in the questionnaires. A set of aids was introduced to reinforce the memory of study participants such as vitamin A, anti-malarial drugs, contraceptive devices, etc. to avoid recall bias. During the data collection, supervisors reviewed and edited all completed questionnaire to ensure that all necessary information was filled properly. When mistakes and missing data were identified, corrections were made before they leave the cluster. Supervision by CNHDE staff was made to each study village at the beginning of the data collection to identify and solve challenges. Incoming filled questionnaires were checked by CNHDE for quality and completeness of data.

2.7 HUMANITY AND ETHICS

The study is approved by the Ethics Committee of the Ethiopian Science and Technology Commission and Institutional Review Board (IRB) of the Columbia University. All households and individuals interviewed in this study were informed about the purpose and the procedures in their local language. They were informed that their participation is entirely voluntary and they may decide to withdraw from the study at any time. Oral consent was obtained from participants. The confidentiality of all study participants is protected in accordance with a good epidemiological practice.

2.8 DATA PROCESSING

Upon completion of the data collection and editing, data entry clerks (7 for baseline and 4 for follow-up) having competency and experience were hired. Data managers at the CNHDE developed the data entry format and gave training to the data entry clerks. Data was cleaned and analyzed with STATA. Two data managers, a biostatistician and an epidemiologist were involved to undertake the statistical analysis. Regions that have not contributed to the follow-up survey (Tigray, Afar, Harar, and Dire-Dawa) were excluded from the analysis. Matched 14 control villages and 24 interventions villages from Amhara, Oromia, and SNNP regions that contributed data to baseline

and follow-up surveys were included in the analysis. During both survey periods, a total of 350 and 600 households from the control and intervention villages respectively were sampled and included in the analysis. In addition to the exclusion of some of the regions, the complex sampling procedures employed in this study resulted in different probabilities of selection of sampling units from the three regions at different stages of sampling. The regional distribution of the villages is as follows: 7, 9 and 8 HEP villages, and 3, 7, and 4 control villages from Amhara, Oromia and SNNP regions respectively. Due to the small sample size, regional estimates were not considered in the analysis; however, the sample size enabled us to estimate a pooled estimate for the three regions. To determine the pooled estimates for the three regions, the statistical analyses was undertaken using appropriate weights to address the complex design of multi-stage sampling design. Weighted estimators are asymptotically unbiased for their corresponding population parameters. The weighting strategy considered adjustments at the different stages of sampling to obtain a final set of survey weights, which match regional population size.

2.9 BASELINE DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

The quasi-experiment design which employed matching of comparison villages enabled us to obtain participants in the intervention and control groups with similar baseline demographic characteristics (Table 2.5). The distribution of gender of household heads was comparable among the intervention and control groups with women accounting for 15.7% of the participants in the intervention group, and 13.6% in the control group. The percent distribution of the ages of the household heads in the intervention and control groups was similar with small variation. The distribution of the marital status of the household heads was comparable between the intervention and control groups with married household heads accounting for 83.3% of the participants in the intervention group, and 82.3% in the control group. Never married household heads also accounted for 1.9% and 1.7% of the participants in the intervention and control groups, respectively. Proportion of household heads that were widowed, divorced, or separated was about 14% in both groups. The household heads level of education was similar in both groups with never enrolled accounting for 59.9% and 64.9% of participants in the intervention and control groups, respectively. Proportion of household heads that were grade 11 and above was 3.4% and 3% in the intervention and control groups, respectively. The occupation of the household heads was similar in both groups with farmers accounting for 87.4% and 91.8% of the participants in the intervention and control groups, respectively.

The major difference in the baseline characteristics was on the percent distribution of religion with orthodox accounting for 44.7% and 22.8%, Islam accounting for 31.3% and 37%, and Protestant accounting for 20.2% and 27% of the participants in the intervention and control groups, respectively. We also examined the distribution of participants by region in the two study groups. Probability-proportional sampling design was employed during the enrollment of villages at baseline, however, the different rates of coverage of villages by HEP in the different regions resulted in non-proportional final sample. The distribution varied by region in the comparison groups. In the intervention, 29.2%, 37.5% and 33.3% of the sample households, and in the control group, 21.4%, 50% and 28.6% of the sample households were obtained from Amhara, Oromia and SNNP regions respectively.

Table 2.5: Baseline demographic characteristics of sample household heads by study group

	Background characteristics	Intervention¹	Control¹	Total
Sex (%)	Male	84.3	86.4	85.3
	Female	15.7	13.6	14.7
Age (%)	15 - 19	1.1	1.5	1.26
	20 - 29	18.1	16.8	17.5
	30 - 39	29	24.1	26.8
	40 - 49	21.8	15.8	19.1
	50 - 59	10.8	13.8	12.1
	60 +	19.1	27.3	22.8
Marital status (%)	Never married	1.9	1.7	1.8
	Married	83.3	82.3	82.9
	Widowed/divorced/separated	14.3	14.7	14.5
Education (%)	Never enrolled	59.85	64.91	62.1
	Primary (1 - 8)	34.37	27.58	31.4
	Secondary (9 - 12)	3.83	6.00	4.8
	More than secondary	1.01	0.46	0.8
	Not stated	0.95	1.06	1.0
Religion (%)	Orthodox	44.7	22.8	34.9
	Islam	31.3	37.0	33.9
	Protestant	20.2	27.0	23.2
	Other	3.6	13.2	7.9
Occupation (%)	Farmer	87.4	91.8	89.2
	Unemployed	0.1	0.8	0.4
	Other	12.2	6.9	9.9
Region (%)	Amhara	29.2	21.4	26.3
	Oromia	37.5	50.0	42.1
	SNNP	33.3	28.6	31.6
Number		597	350	947

¹The percentages for age, marital status, education, religion, and occupation do not add up to 100% due to missing data.

3. HYGIENE AND ENVIRONMENTAL SANITATION

3.1 WATER MANAGEMENT

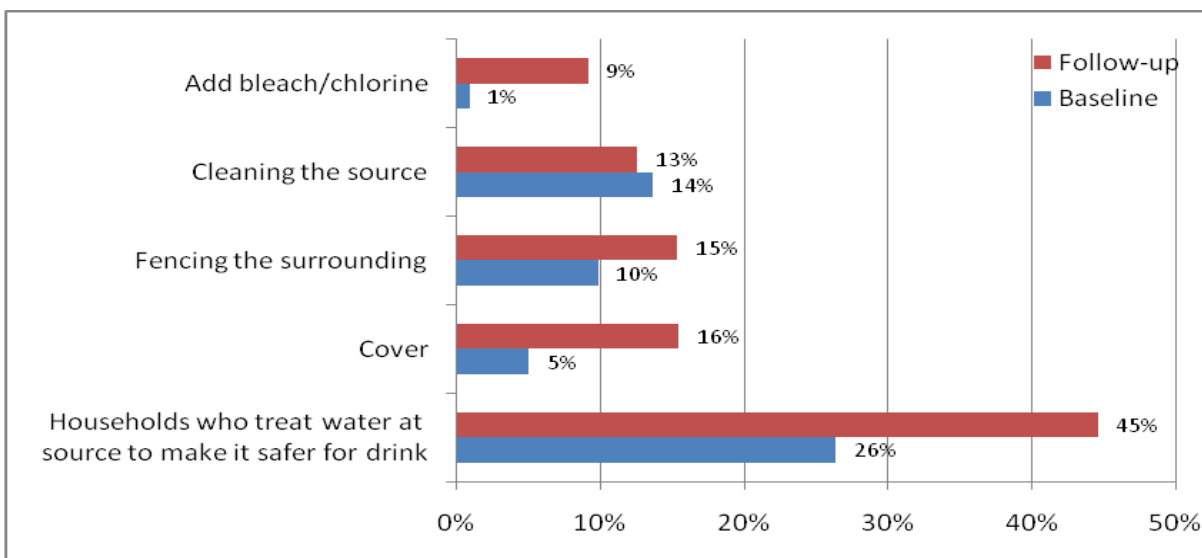
3.1.1 ACCESS TO IMPROVED SOURCE OF WATER

About 50% of all households in intervention and control villages had access to improved source of water. There was slight difference between the groups; with 51.8% in the intervention and 47.5% in the control villages having access to improved source of water.

3.1.2 WATER TREATMENT PRACTICE AT THE SOURCE

The practice of treating the source of water by households to make the water safer for drinking has improved dramatically over two years. The proportion of households who treat water at the source to make it safer was 26.4% during the baseline, and 44.6% during the follow-up period. The methods used to treat water at the source in order of frequency during the follow-up period were covering (15.5%), fencing the surrounding area (15.4%), cleaning the source (12.6%), and adding bleach or chlorine (9.2%). Adding bleach or chlorine to the source of water, which was practiced by only 1% of households during the baseline survey, was used by 9% of households during the follow-up survey. There was no difference between the HEP and control villages in treating water at the source.

Figure 3.1: Percent distribution of households by water treatment at source and methods used by study period



3.1.3 WATER STORAGE AND TREATMENT PRACTICE AT HOME

Treatment of water at home: The practice of treating water at home to make it safer for drinking has improved over the study period. At baseline, 14.7% of households treated water at home to make it safer for drinking, and during the follow-up survey, 36.1% of households practiced it. This practice improved independently in the two study groups. In the intervention group, it increased from 12.6% at baseline to 33.5% at follow-up, and similar

magnitude of change was observed in the control group from 17.8% to 36.1%. The commonest methods used for treating the water at baseline were boiling and letting it stand to settle. During the follow-up study, the commonest methods were boiling and adding bleach or chlorine. Adding “Wuha Agar” to the drinking water, which was not practiced during the baseline survey, was used by 3.7% of households during the follow-up survey.

Table 3.1: Percent distribution of households by water treatment at home and methods used

Methods used to treat water	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Treat water at home	12.6	17.8	14.7	33.5	36.1	36.1
Methods of water treatment						
Boil	5.9	6.6	6.2	11.7	8.0	10.2
Add bleach/chlorine	0.5	0.2	0.4	13.8	2.5	9.2
Filter with clean cloth	2.4	2.3	2.3	6.7	9.5	7.8
Let it stand and settle	3.6	7.4	5.1	4.8	11.3	7.4
Add “Wuha Agar”	0.0	0.0	0.0	2.1	6.1	3.7
Number households	624	350	974	617	348	965

Household water storage: Assessment of water handling after water arrives at home was undertaken at baseline as well as follow-up surveys. Handling water with clean container was practiced by 55.7% and 55.9% of respondents at baseline and follow-up surveys respectively, with no improvement over the two years period. Covering the drinking water with clean material was practiced by 31.7% of households during the baseline study, and this increased to 60% during the follow-up study, which is almost a 100% increase over the study period. The percent of households that put water in clean place increased from 13.7% at baseline to 22.6% at follow-up survey. The practice of safe handling of water at home was similar in both the HEP and control villages (Figure 3.2).

Table 3.2: Percent of households practicing drinking water handling methods after its arrival at home

Water handling practices after its arrival at home	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Handle water with clean container	62.3	46.2	55.7	51.0	55.9	55.9
Cover with clean material	26.6	39.2	31.7	62.9	55.7	60.0
Put water in clean place	16.6	9.5	13.7	22.4	22.8	22.6
Number households	624	350	974	617	348	965

Knowledge on illnesses related with drinking unsafe water: Respondents’ knowledge on illnesses or problems thought to be caused by drinking water, which is not properly treated, was assessed. The responses during baseline in order of frequency were parasite worms (53.6%), diarrhea (46.2%), and abdominal cramp (26.1%). During the follow-up survey, the responses in order of frequency were diarrhea (65.9%), parasite worms (41.4%),

and abdominal cramps (27.7%). There is an increase in knowledge of diarrhea as being ascribed to drinking unsafe water by about 50% over the study period. There was no difference between the study groups.

3.2 SANITATION

3.2.1 HOUSEHOLD TOILET FACILITIES

Access of households to improved sanitation has improved within two years. The overall access to sanitation, which was 34.4% at baseline, has increased to 59.7% during the follow-up survey. More interesting is the spectacular increase in access to improved sanitation in the intervention groups. During the follow-up survey, the proportion of households with access to improved sanitation reached to 75.6% in the intervention villages (from 39.4% at baseline). The improvement in access to improved sanitation in the control villages was not comparable to the intervention villages – from 27.4% at baseline to 36.3% during follow-up study.

Figure 3.2: Percent distribution of households by type of sanitation facility according to study period

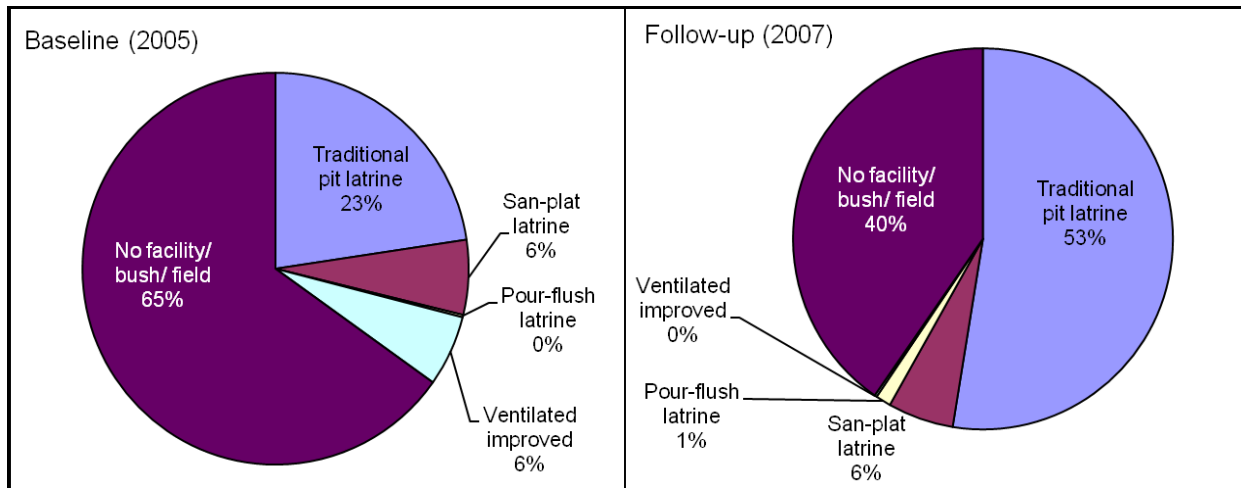
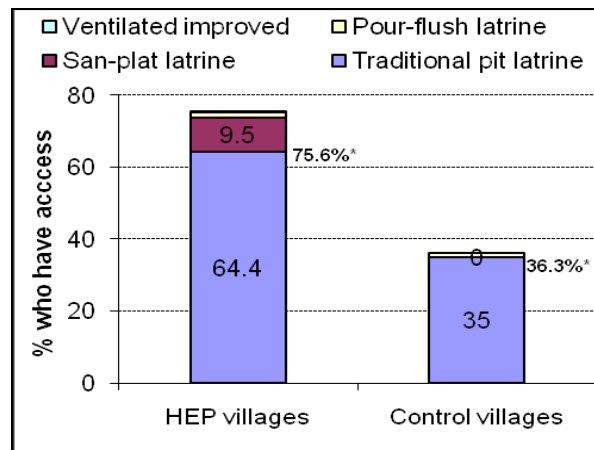


Figure 3.3: Percent distribution of households by type of sanitation facility at follow-up by study group



*Total households with access to improved sanitation

The most common type of toilet facility during both survey periods was traditional pit latrine (Figure 3.3). The increase in access to improved sanitation at follow-up period was mainly due to the increase in the use of traditional pit latrines. An interesting observation is the reduction in the proportion of households using ventilated improved latrines from 6% at baseline period to less than one at the follow-up period.

3.2.2 SOLID AND HUMAN WASTE MANAGEMENT

The use of sanitary and environmentally sound methods of disposing stools of babies and young children has improved over the two years period (Table 3.3). Overall, 37.6% of households used sanitary and environmentally sound methods of disposing stools of babies and young children at baseline, and the coverage increased to 48.2% during the follow-up study. During the follow-up survey, proper human waste management was practiced by 57.6% of households in the intervention villages, while it was practiced by 34% of households in the control villages. The baseline coverage was 43.3% and 26%, respectively. Although the use of sanitary and environmentally sound methods of disposing solid wastes was practiced in fewer households during both periods of study, there was an improvement in the practice by almost 100% over the two years. At baseline, only 4.9% of households used sanitary and environmentally sound methods of disposing garbage, refuse and rubbish, and the practice increased to 9.6% of households during the follow-up survey. The use of the sanitary and environmentally sound methods of disposing solid waste was slightly higher in the intervention villages (10.7%) than the control villages (7.9%).

Table 3.3: Percent of households who use sound methods of disposing human and solid waste management

Sound methods of disposing	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Stools of babies and young	43.3	26.0	37.6	57.6	34.0	48.2
Number of households	494	200	694	504	251	755
Garbage/ refuse/ rubbish	5.0	4.6	4.9	10.7	7.9	9.6
Number of households	624	350	974	617	348	965

3.3 HEALTHY HOUSE ENVIRONMENT

3.3.1 IMPROVED HOUSE CONSTRUCTION

House with improved ventilation: The overall proportion of houses having proper window increased from 38.4% during baseline to 43.1% during the follow-up study. The magnitude of the overall increase over the two years period was small, however, more houses in the intervention villages (46.9%) than in the control villages (37.5%) had proper window during the follow-up study.

House with separate sleeping room: Overall, the proportion of houses with a separate room for sleeping improved over the two years period - from 30.5% during baseline to 37.8% during follow-up study. The difference between the two study groups at follow-up was significant, specifically, 42.2% of houses in the intervention and 31.4% in the control villages had houses with a separate room for sleeping.

3.3.2 HOUSE CONSTRUCTION WITH SEPARATE PLACE FOR ANIMALS

The proportion of houses with a separate place for animals did not show overall improvement over the two years period. However, the proportion of houses with a separate place for animals during the follow-up study was higher in the intervention villages (46.6%) compared to the houses in the control villages (31.8%).

Table 3.4: Percent distribution of households by characteristic of house construction

Characteristics of house environment	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Housing with proper window	42.4	32.5	38.4	46.9	37.5	43.1
Have separate room for sleeping	30.1	31.1	30.5	42.2	31.4	37.8
Have separate sleeping rooms	19.2	21.7	21.7	25.8	25.6	25.7
Have separate place for animals	40.8	44.2	42.2	46.6	31.8	40.6
Number of households	624	350	974	617	348	965

3.3.3 HOUSE CONSTRUCTION WITH SEPARATE KITCHEN

The proportion of houses with a separate kitchen showed overall improvement over the two years period – from 27.8% during the baseline to 36.7% during follow-up surveys. Moreover, the proportion of houses with a separate kitchen was higher in the intervention villages (38.9%) compared to the houses in the control villages (33.6%). The availability of shelves for kitchen ware showed a moderate increase over the two years period. The proportion of households who had shelves for kitchen ware during the baseline was 31.2%, while it was 37.6% during the follow-up study. However, much of the improvement occurred in households within the intervention villages. During the follow-up survey, about 43% of households in the intervention villages and 29.5% of households in the control villages had shelves for kitchen ware. Washing dishes and cooking utensils with water and soap/ash also improved over the two years period – from 30.1% of households practicing during the baseline to 42.3% during the follow-up. Moreover, the proportion of households who wash dishes and cooking utensils with water and soap/ash during the follow-up study was higher in the intervention villages (45.3%) than in the control villages (37.9%).

Table 3.5: Percent of households with separate kitchen and washing practice

Characteristics of kitchen	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Tot	HEP	Control	Tot
Have separate kitchen	29.5	25.4	27.	38.9	33.6	36.
Have shelves for kitchen ware	29.6	33.5	31.	43.1	29.5	37.
Wash dishes & cooking utensils with soap/ ash	31.4	28.3	30.	45.3	37.9	42.
Have an energy saving stove	3.0	13.5	7.3	5.2	11.4	7.7
Number of households	624	350	974	617	348	965

3.3.4 HOUSE CLEANING PRACTICE

Cleaning the floor of houses was almost universal in both rounds of the study. More than 90% of households clean the floor of their houses at least once a day in both study groups.

Table 3.6: Percent distribution of frequency of cleaning the floor of their houses

Frequency of house cleaning	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
At least once a day	92.5	96.1	94.0	94.2	96.4	95.1
1 - 6 times a week	5.8	3.1	4.7	5.5	2.7	4.3
Once in more than a week	0.1	0.0	0.1	0.0	0.4	0.2
Number of households	624	350	974	617	348	965

3.4 HYGIENE

3.4.1 HAND WASHING PRACTICES

Hand washing practices at appropriate times has generally increased over the two years of the study period. The specific times of hand washing reported in order of frequency during the follow-up survey were before eating food (67.8%), before food preparation (63.7%), before feeding children (26.8%), after defecation (15.2%), and after attending to a child who has defecated (3.6%). The specific times of hand washing in order of frequency was also similar during the baseline survey, although the coverage was relatively lower than during the follow-up study. However, the proportion of respondents who practice hand washing at all appropriate times was very low – with only 1.7% and 2.7% during the baseline and follow-up surveys, respectively. There was no difference in hand washing practices of households in the HEP and control villages.

Special apparatus for hand washing was available in almost 50% of households during the follow-up survey compared to about 42% of households during the baseline survey. The difference in having special apparatus for hand washing between the households in the intervention and control villages was large during the follow-up survey. The proportion of households with special apparatus for hand washing in the intervention villages was 55.7%, which is higher than the 39.9% of households in the control villages.

Table 3.7: Percent of respondents who wash their hands at specific times

Hand washing practices	Percent of	
	Baseline	Follow-up
Before eating food	69.4	67.8
Before food preparation	54.6	63.7
Before feeding children	11.5	26.8
After defecation	6.7	15.2
After attending to a child who has defecated	3.1	3.6
Practice hand washing at all appropriate ways	1.7	2.7
Number of households	974	96

Hand washing with soap/ash was practiced in higher proportion of households during the follow-up survey (40.3%) than it was during the baseline survey (33.1%). Similarly, more households in the intervention villages practice hand washing with soap/ash (43.8%) than in the control villages (35.1%) during the follow-up survey.

Table 3.8: Percent of households with special hand washing apparatus and correct washing practice

Hand washing apparatus and practice	Percent of households					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Households with special hand washing apparatus	44.8	38.0	42.0	55.7	39.9	49.3
Households who wash their hands with soap	35.2	30.0	33.1	43.8	35.1	40.3
Number of households	624	325	949	617	323	940

3.4.2 KNOWLEDGE OF ILLNESSES RELATED WITH PERSONAL HYGIENE

Respondents' knowledge on illnesses or problems thought to result if their eyes were not kept clean showed improvements over the two years period. The responses during baseline in order of frequency were trachoma (57.7%), blindness (35%), and reddening of the eye (19.7%). During the follow-up survey, the responses in order of frequency were trachoma (71.5%), blindness (28.9%), and reddening of the eye (20.7%). However, the knowledge of respondents between the intervention and control villages did not show much difference.

Table 3.9: Percent of respondents who mentioned illnesses that result if eyes are not kept clean

Type of illnesses	Percent of respondents					
	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Trachoma	61.6	52.2	57.7	70.4	73.2	71.5
Blindness	32.8	38.3	35.0	29.6	27.9	28.9
Reddening of the eye	23.0	15.0	19.7	24.2	15.6	20.7
Number of households	624	325	949	617	323	940

3.4.3 KNOWLEDGE ON PREVENTION OF MOUTH, TEETH AND GUM ILLNESSES

The overall knowledge of respondents on methods to avoid illnesses and problems of the mouth, teeth and gums improved over the two years period. The proportion of respondents who mentioned washing mouth with clean water in the morning after getting from bed increased from 42.8% at baseline to 55.5% at follow-up survey. The proportion of respondents who mentioned washing or rinsing mouth with clean water after food also increased from 43.5% at baseline to 50.3% at follow-up study. Not eating sweet food regularly was mention by small proportion of respondents at both periods – 1.7% and 4.5% during baseline and follow-up surveys, respectively. On the other hand, in spite of the modest improvement over the two years period, the knowledge of respondents did not differ by study group.

Table 3.10: Percent of households who know methods to avoid illnesses of mouth, teeth, and gum

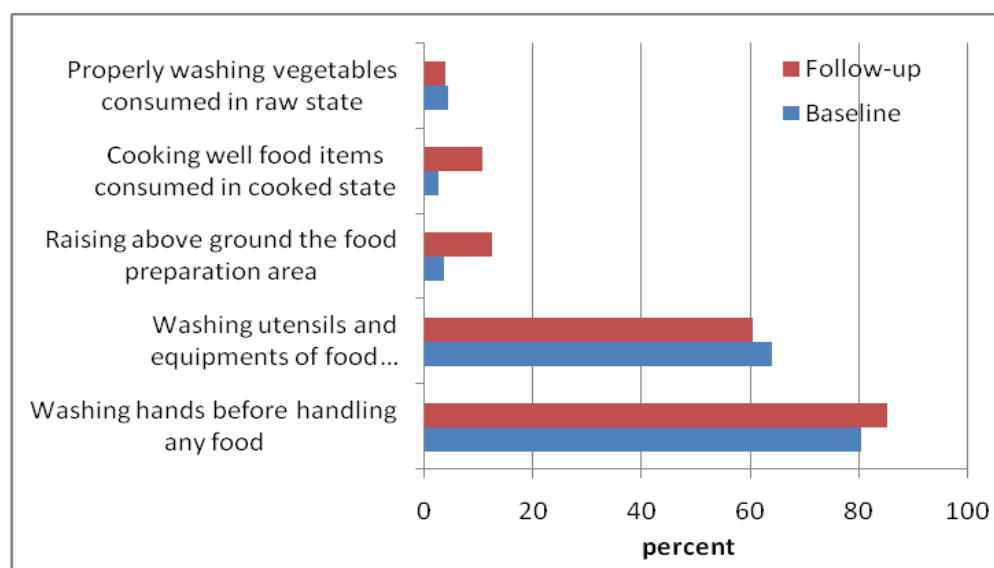
Methods to avoid illness	Percent of	
	Baseline	Follow-up
Washing mouth with clean water in the morning	42.8	55.5
Washing/rinsing mouth with clean water after food	43.5	50.3
No sweet food should be regularly taken	1.7	4.5
Number of households	949	940

3.5 FOOD HANDLING DURING PREPARATION

3.5.1 CARE DURING FOOD PREPARATION

The overall knowledge of respondents on ways of care that should be taken while preparing food showed small improvements over the study period (Figure 3.4). The level of knowledge was similar in both study groups. The ways of care in order of frequency at the time of baseline survey were washing hands before handling food (80.3%), washing utensils and equipments of food preparation (64%), raising above ground the food preparation area (3.5%), cooking well (2.6%), and properly washing vegetables consumed in raw state (4.3%). At the time of the follow-up survey, the ways of care were washing hands before handling food (85%), washing utensils and equipments of food preparation (60.3%), raising above ground the food preparation area (12.3%), cooking well (10.3%), and properly washing vegetables consumed in raw state (3.7%).

Figure 3.4: Percent of households who mentioned ways of care while preparing food by study period



3.5.2 FOOD CONTAMINATION

Generally, the overall knowledge of respondents on ways in which food may be contaminated was low during both study periods, although there was some improvement over the two years period (Table 3.11). For example, dirty market place as a cause of food contamination was mentioned by 3.7% and 14.7% of respondents during the baseline and follow-up surveys, respectively. Similarly, fruit and vegetables produced in contaminated field were mentioned by 0.8% and 9.7% of respondents during the baseline and follow-up surveys as a cause of food contamination. Although the relative improvement is modest, the overall knowledge was low, and similar in both study groups.

Table 3.11: Percent of households who mentioned ways in which food may be contaminated

Ways of food contamination	Percent of households	
	Baseline	Follow-up
Dirty market places	3.7	14.7
Food washed or prepared with contaminated water	10.8	14.0
From unclean or dirty kitchens	14.5	13.4
Food handlers who have infectious diseases	3.5	11.4
Fruit and vegetable produced in contaminated field	0.8	9.7
Infected animals	4.3	7.7
Touching pets while handling food	1	4.9
Number of households	949	940

3.6 CONCLUSIONS

A. HEP effect on outcome measures of hygiene and environmental sanitation

HEP had satisfactory effect on the following outcome measures

- HEP had dramatically improved access to improved sanitation: The coverage in HEP villages improved from 39.4% at baseline to 75.6% at follow-up, while the improvement in the control villages was small.
- HEP improved human waste management practice adequately: 57.6% of households in the intervention villages used sanitary and environmentally sound methods of disposing stools of babies and young children at follow-up survey, while it was only 34% of households in the control villages.
- The effect of HEP on solid waste management was small with 10.7% of households in the intervention compared to 7.9% of households in the control villages using sanitary and environmentally sound methods of disposing solid waste at follow-up survey.
- HEP contributed significantly to improved healthy house environment by increasing proportion of houses with improved ventilation, and proportion of houses with separate place for animals and separate kitchen. Higher proportion of houses in the intervention villages had proper window (46.9%), separate place for animals (46.6%), and separate kitchen (38.9%) than houses in the control villages, which had proper window (37.5%), separate place for animals (31.8%), and separate kitchen (33.6%).
- HEP moderately increased the availability of special apparatus for hand washing. Higher proportion of households in the intervention (55.7%) than control village (39.9%) had apparatus for hand washing.

HEP had minimal or no effect in improving the following

- Access to improved source of water and water treatment practice at the source and at home improved similarly in both the intervention and control villages.
- The improvement in hand washing practices was similar in the intervention and control villages.

B. Overall change on outcome measures on hygiene and environmental sanitation over study period

The following outcome measures improved over the study period

- Overall water management improved over study period
- Overall access to improved sanitation increased over the study period. The overall access to sanitation improved from 34.4% at baseline to 59.7% during the follow-up survey. The commonest type of toilet facility used by households during both survey periods was traditional pit latrine.
- Overall human waste management practice improved over the study period. The proportion of households who used sanitary and environmentally sound methods of disposing stools of babies and young children increased from 37.6% at baseline to 48.2% during the follow-up study.
- Although the use of sanitary and environmentally sound methods of disposing solid wastes was practiced in fewer households during both periods of study, there was an improvement in the practice by almost 50% over the two years – from 4.9% at baseline to 9.6% at follow-up survey.
- Overall proportion of houses with healthy house environment increased over the study period characterized by improved ventilation, and separate kitchen.
 - The overall proportion of houses having proper window increased from 38.4% during baseline to 43.1% during the follow-up study.
 - The magnitude of the overall increase in the proportion of houses with a separate place for animals over the study period was minimal.
 - The proportion of houses with a separate kitchen showed overall improvement over the study period – from 27.8% at baseline to 36.7% at follow-up.
- The proportion of households with special apparatus for hand washing increased from 42% to 50% over study period; similarly hand washing practices at appropriate times has increased over the study period.

4. MATERNAL AND CHILD HEALTH

4.1 FAMILY PLANNING

4.1.1 KNOWLEDGE OF CONTRACEPTION METHODS

Acquiring knowledge about contraception methods is an important step towards gaining access and use of a suitable contraception method. Women who have adequate information about the available methods of contraception are in a better position to make choices about family size. Information was collected for eight modern methods of contraception (female and male sterilization, pills, intrauterine device (IUD), injections, implants, condoms, and diaphragm/foam/jelly), and three traditional methods of contraception (periodic abstinence, withdrawal, and breastfeeding). Knowledge levels were estimated for all women and married women by survey period and group.

The overall (HEP and control villages combined) knowledge of any contraception methods among married women increased from 72.9% at baseline to 78% at follow-up survey. Similarly, overall knowledge of any contraception methods among all women increased from 66.7% at baseline to 75.8% at follow-up survey. The increment in knowledge of any modern methods among married women and all women over the follow-up period was similar to that of any contraception methods. The level of knowledge on contraception methods – during baseline and follow-up surveys, was higher among married women than among all women. The most widely known methods during the baseline survey were pills (by 62.2% of all women) and injections (by 61.0% of all women). During the follow-up survey, these two methods were also widely known by all women; however, more women knew injections (70%) than pills (64.8%). Condoms and implant were mentioned by 6.6% and 4.9% of women during baseline and by 7.0% and 7.3% of women during the follow-up survey, respectively. The level of knowledge on IUDs is very low, however, the proportion of women who knew IUDs increased dramatically to 6.9% during the follow-up survey from the baseline level of only 1.5%. Knowledge of any traditional method was low both during the baseline (1.3%) and follow-up surveys (3.4%).

To compare the difference between HEP villages and control villages in knowledge of contraception methods, the knowledge levels of married women was used. The proportion of married women who knew at least one method (any method) in the HEP villages increased from 73.9% at baseline to 81% at follow-up survey, while there was slight change in the control villages (71.7% at baseline and 72.7% at follow-up surveys). The levels of knowledge among married women for the two most widely known contraception methods (pills and injections) were also high in the HEP villages than the control during the follow-up survey. The proportions of married women who knew pills were 68.2% and 59% in the HEP and control villages respectively. Similarly, higher proportion of married women knew about injections in the HEP villages (75.6%) than in the control villages (64.8%).

Table 4.1: Knowledge of contraceptive method among all women and currently married women

Method	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
ALL WOMEN						
Any method	71.2	61	66.7	78.8	70.5	75.8
Any modern method	71.1	61	66.6	78.6	70	75.6
Pill	65.6	57.9	62.2	67.9	59.2	64.8
Injections	66.2	54.5	61	73.8	63	70
Condom	8.3	4.4	6.6	5.2	10.4	7
Implant/Norplant	5.8	3.8	4.9	6.7	8.3	7.3
IUD (LOOP)	1.1	2.1	1.5	4.6	11.2	6.9
Diaphragm/foam/jelly	1.1	0	0.6	0.3	0.8	0.5
Female sterilization	0.1	0.1	0.1	0.4	0.6	0.5
Male sterilization	0	0.1	0	0.2	0.4	0.3
Any traditional method	0.9	1.7	1.3	2.8	4.3	3.4
Periodic abstinence	0.4	1.1	0.7	0.7	1.3	0.9
Withdrawal	0	0	0	0.3	0.6	0.4
Breastfeeding	0.5	0.6	0.5	2.4	3.5	2.8
None	28.8	39	33.3	21.3	29.6	24.2
Number	541	314	855	621	317	938
MARRIED WOMEN						
Any method	73.9	71.7	72.9	81	72.7	78
Any modern method	73.7	71.7	72.8	80.7	72.2	77.6
Pill	67.3	67.3	67.3	68.2	59	64.9
Injections	69.1	64.5	67.1	75.6	64.8	71.7
Condom	5.4	4.2	4.9	3	10.2	5.6
Implant/Norplant	5.3	4.9	5.1	6.2	8.5	7
IUD (LOOP)	0.8	1.9	1.3	3.2	11.1	6.1
Diaphragm/foam/jelly	0.9	0	0.5	0.3	0.5	0.2
Female sterilization	0	0.1	0.1	0.1	0.2	0.2
Male sterilization	0	0	0	0	0	0
Any traditional method	0.7	2	1.2	2	4.3	2.8
Periodic abstinence	0.4	1.2	0.7	0.3	0.8	0.5
Withdrawal	0	0	0	0.2	0	0.1
Breastfeeding	0.3	0.8	0.5	1.9	3.5	2.5
None	26.1	28.3	27.1	19	27.3	22
Number	416	233	649	458	246	704

4.1.2 EVER USE OF CONTRACEPTION METHODS

Ever use of contraception methods provides a measure of the cumulative experience with family planning. Information was collected for the same contraception methods. Only women who had/have a husband/partner were included. The overall proportion of married women who have ever used any contraception methods increased from 30.6% at baseline to 41.5% at follow-up survey. Similarly, overall proportion of all women who have ever used any contraception methods increased from 25.2% at baseline to 33.9% at follow-up survey. The increment in ever use of any modern methods among married women and all women over the follow-up period was similar to that of any contraception methods. The ever use of contraceptive methods was higher among married women than among all women during baseline and follow-up surveys. The most commonly ever used modern contraception methods during the baseline survey were injections (by 17.6% of all women) and pills (by 12.9% of all women). During the follow-up survey, these two methods were also commonly used by all women; however, ever use of injections (26.6%) became more common than pills (15.1%). The proportion of all women who have ever used condom as contraception method was low during both baseline (0.7%) and follow-up surveys (1.5%). It was also similar for married women. The ever use of IUDs was very low. Ever use of any traditional method was low both during the baseline (0.3%) and follow-up surveys (1.6%).

To compare the difference between HEP villages and control villages in proportion of women who have ever used contraception methods, the ever use levels of married women was used. The proportion of married women who have ever used at least one method (any method) in the HEP villages increased from 31.1% at baseline to 45.9% at follow-up survey, while the change in the control villages was small – from 30% at baseline to 33.7% at follow-up surveys. The changes of ever use rates among married women over the follow-up period for the two most commonly used contraception methods (pills and injections) were different in the HEP villages and control villages. The ever use rates for pills among married women in the HEP villages did not change over the follow-up period (from 16.1% to 17.8%), however, ever use for pills in the control villages increased from 13.6% at baseline to 18% at follow-up. On the other hand, the ever use rates for injections among married women in the HEP villages increased from 20.3% at baseline to 37.1% at follow-up survey (an increase by 82.8%), while in the control villages it was small (from 22.7% at baseline to 24.8% at follow-up).

Table 4.2: Ever use of contraception methods among all women and currently married women

Method	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
ALL WOMEN						
Any method	27.5	22.4	25.2	37.6	27.2	33.9
Any modern method	27.3	21.8	24.9	36.1	26.7	32.8
Pill	14.8	10.5	12.9	15.1	14.9	15.1
Injections	18.3	16.8	17.6	30.1	20.1	26.6
Condom	1.1	0.3	0.7	0.4	3.7	1.5
Implant/Norplant	0.6	0.3	0.4	0.3	1.0	0.5
IUD (LOOP)	0.0	0.2	0.1	1.1	1.1	1.1
Diaphragm/foam/jelly	0.5	0.0	0.3	0.0	0.0	0.0
Female sterilization	0.1	0.0	0.1	0.1	0.0	0.1
Male sterilization	0.0	0.0	0.0	0.3	0.0	0.2
Any traditional method	0.1	0.6	0.3	2.1	0.7	1.6
Periodic abstinence	0.1	0.6	0.3	0.5	0.0	0.3
Withdrawal	0.0	0.0	0.0	0.3	0.0	0.2
Breastfeeding	0.0	0.0	0.0	1.5	0.7	1.2
None	72.5	77.6	74.8	62.5	72.8	66.1
Number of women	541	314	855	621	317	938
MARRIED WOMEN						
Any method	31.1	30.0	30.6	45.9	33.7	41.5
Any modern method	31.1	29.2	30.3	44.5	33.1	40.4
Pill	16.1	13.6	15.1	17.8	18.0	17.9
Injections	20.3	22.7	21.4	37.1	24.8	32.7
Condom	0.2	0.4	0.3	0.3	4.8	1.9
Implant/Norplant	0.7	0.4	0.6	0.4	0.9	0.6
IUD (LOOP)	0.0	0.3	0.1	1.3	1.4	1.4
Diaphragm/foam/jelly	0.2	0.0	0.1	0.0	0.0	0.0
Female sterilization	0.0	0.0	0.0	0.0	0.0	0.0
Male sterilization	0.0	0.0	0.0	0.4	0.0	0.2
Any traditional method	0.0	0.8	0.3	2.1	0.8	1.7
Periodic abstinence	0.0	0.8	0.3	0.3	0.0	0.2
Withdrawal	0.0	0.0	0.0	0.0	0.0	0.0
Breastfeeding	0.0	0.0	0.0	1.9	0.8	1.5
None	68.9	70.0	69.4	54.1	66.3	58.5
Number of women	416	233	649	458	246	704

4.1.3 CONTRACEPTIVE PREVALENCE RATE (CPR)

Contraception prevalence rate is accepted as the "best" performance indicator for family planning programs. It measures the actual contraceptive practice at the time of the survey. It is defined as the percentage of women, aged 15–49 in marital or consensual unions, who are practicing, or whose sexual partners are practicing, any form of contraception. It provides insight into one of the principal determinants of fertility, and serves to assess the success of family planning programs.

The overall contraceptive prevalence rate did not change over the two years period. However, similar to the rate of ever use, the current use of contraception showed differential change in the HEP and control villages. The contraceptive prevalence rate among married women showed increment in the HEP villages, while it decreased in the control villages. The current use of any modern contraception methods in the HEP villages increased from 21.9% to 24.8% over the two years period, while it decreased from 24% to 21.2% in the control villages. The difference between the HEP and control villages was that while the users of injections increased in the HEP villages, the users of pills increased in the control villages. Although, the current use of traditional contraception methods was low in both survey periods, there was a tendency of decreasing their use over the two years. The striking finding is that only less than 1% of women used condoms for contraceptive purposes.

Table 4.3: Current use of contraception methods among all women and currently married women

Method	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
ALL WOMEN						
Any method	19.0	16.9	18.1	19.6	16.5	18.5
Any modern method	18.9	16.3	17.8	19.2	16.5	18.2
Pill	4.5	3.8	4.2	3.4	5.4	4.1
Injections	13.8	13.6	13.7	16.1	12.4	14.9
Condom	0.7	0.3	0.5	0.0	1.4	0.5
Implant/Norplant	0.5	0.0	0.3	0.1	0.6	0.3
IUD (LOOP)	0.0	0.1	0.0	0.8	0.0	0.5
Diaphragm/foam/jelly	0.2	0.0	0.1	0.0	0.0	0.0
Female sterilization	0.1	0.0	0.1	0.1	0.0	0.1
Male sterilization	0.3	0.0	0.2	0.3	0.0	0.2
Any traditional method	0.1	1.0	0.5	0.4	0.0	0.3
Periodic abstinence	0.0	1.0	0.4	0.4	0.0	0.3
Withdrawal	0.0	0.0	0.0	0.0	0.0	0.0
Breastfeeding	0.1	0.0	0.1	0.0	0.0	0.0
None	81.0	83.1	81.9	80.4	83.6	81.5
Number of women	493	280	773	582	284	866
MARRIED WOMEN						
Any method	21.9	24.0	22.8	24.8	21.2	23.5
Any modern method	21.7	23.1	22.3	24.5	21.2	23.3
Pill	5.2	4.9	5.1	4.3	7.4	5.4
Injections	15.6	19.2	17.1	20.6	16.1	19.0
Condom	0.0	0.5	0.2	0.0	2.0	0.7
Implant/Norplant	0.7	0.0	0.4	0.2	0.4	0.2
IUD (LOOP)	0.0	0.2	0.1	0.9	0.0	0.6
Diaphragm/foam/jelly	0.2	0.0	0.1	0.0	0.0	0.0
Female sterilization	0.0	0.0	0.0	0.0	0.0	0.0
Male sterilization	0.2	0.0	0.1	0.4	0.0	0.3
Any traditional method	0.2	1.4	0.7	0.3	0.0	0.2
Periodic abstinence	0.0	1.4	0.6	0.3	0.0	0.2
Withdrawal	0.0	0.0	0.0	0.0	0.0	0.0
Breastfeeding	0.2	0.0	0.1	0.0	0.0	0.0
None	78.1	76.0	77.3	75.2	78.8	76.5
Number of women	372	200	572	421	213	634

Source of modern contraception methods: During the baseline survey, the commonest sources were government health posts (40.4%) and community health workers (29.4%) for pills, and government health center (30.5%) and

health posts (30.5%) for injectables. During the follow-up survey, the health centers and health posts became the commonest sources for both contraceptive methods. Overall, about 35.5% of the most recently used pills during the follow-up survey were obtained from health centers, while about 48.2% of injectables were obtained from health posts. The contribution of private health facilities and non-governmental facilities as a source of modern contraception methods was very low (Table 4.4).

The sources of the modern contraception methods varied between the HEP villages and control villages. During the follow-up survey, the commonest source of the commonly used contraception methods – injectables and pills – in the HEP villages was health posts, with 63.5% of injectables and 25.7% of pills obtained from health posts. On the other hand, the commonest source of pills and injectables in the control villages was health center, with 48.4% of pills and 49.4% of injectables obtained in the health centers.

Table 4.4: Percent distribution of most recent source of modern contraceptive method

Source	Baseline						Follow-up					
	HEP		Control		Total		HEP		Control		Total	
	Pills	Inject.	Pills	Inject.	Pills	Inject.	Pills	Inject.	Pills	Inject.	Pills	Inject.
Public sector												
Gov. hospital	0	1.6	15.5	4.3	6.1	2.8	4.4	1.7	6	12.3	5.1	4.8
Gov. health center	7.8	23.1	11.9	40.3	9.4	30.5	24.9	18.3	48.4	47.7	35.5	26.7
Gov. clinic	8.6	28.6	17.3	18.6	12.1	24.2	27.2	11.4	13.3	19.7	20.9	13.8
Gov. health post	45.8	30.9	32.1	30	40.4	30.5	25.7	63	22.2	11.4	24.1	48.2
CHWs	37.7	9.6	16.6	3.4	29.4	6.9	5	2.2	0	1.7	2.7	2
Other public	0	0	0	0	0	0	0	0	0	0	0	0
Private sector												
NGO health facility	0	1.2	0	0	0	0.7	0	0	5.1	2.2	2.3	0.6
Private hosp/clinic	0	5.1	0	2.3	0	3.9	0	2.5	5.1	4.9	2.3	3.2
Pharm./drug vendor	0	0	0	0	0	0	0	0	0	0	0	0
Other source												
Shop	0	0	3.6	0	1.4	0	0	0	0	0	0	0
Friends/relatives	0	0	2.9	0	1.1	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0
Not stated	0	0	0	1	0	0.4	12.9	0.9	0	0	7.1	0.7
Number of women	22	69	16	38	38	107	18	102	19	38	37	140

Source of information about modern contraception methods: The most common sources of information about contraceptive methods during the baseline survey (Table 4.5) was a health worker from any health institution (41.4% in HEP villages and 37.3% in control villages), community health worker (22.2% and 29%, respectively), friends/relatives (20.8% and 7.9%, respectively), and radio (11.8% and 7.7%, respectively). Less frequently mentioned were HEW (0% in both groups), TV (0.9% and 1.7%, respectively), and newspaper or magazine (0.7% and 0.5%, respectively). A few respondents said that they received information in church or mosque (5.2% and 3.2%, respectively).

During the follow-up survey, health workers, HEWs, community health workers (CHWs), and radio were the commonest sources of information for modern contraception methods. The commonest sources of information in the HEP villages in order of frequency were a health worker (39.6%), HEW (34.7%), radio (21.5%), and CHWs (20.5%). In the control villages, the commonest sources of information were a health worker (41.1%), CHWs (22.5%), radio (17%), and friends or relatives (10.1%). HEWs were mentioned by 11.6% of women in the control village as the source of information, probably due to the use of HEP services in neighboring villages with HEP. As the relative importance of CHWs and friends/relatives as source of information declined, the relative importance of HEWs and radio increased over the study period.

Table 4.5: Percentage distribution of women by source of information about contraception methods

Source of information	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Health worker	42.3	36.5	39.7	39.6	41.1	40.1
HEWs	0.0	0.0	0.0	34.7	11.6	26.5
CHWs	23.0	27.6	25.1	20.5	22.5	21.2
Radio	12.2	7.2	10.0	21.5	17.0	20.0
Friends/relatives	21.7	7.5	15.4	7.4	10.1	8.4
Church/mosque	5.5	3.0	4.4	4.4	3.7	4.2
Pamphlets/posters	0.9	0.4	0.7	1.8	0.8	1.4
TV	1.0	1.6	1.3	0.7	2.3	1.2
Newspaper/magazines	0.7	0.5	0.6	0.6	0.9	0.7
Other	1.3	3.0	2.1	1.2	1.7	1.4
Number of women	541	314	855	621	317	938

4.2 MATERNAL HEALTH

The health care that a woman receives during her pregnancy and at the time of delivery is essential for her survival and well-being, as well as for that of her child. Complications of pregnancy, delivery, and the postpartum period that are not treated or treated properly are a leading cause of death for women in Ethiopia. Antenatal care attended by skilled health professional is critical in identifying and treating conditions such as malnutrition, infections (such as tuberculosis and syphilis), severe anemia, preeclampsia, and eclampsia. Pregnant women can receive tetanus injections and micronutrient supplements, and can get advice on health and nutrition during antenatal care. Moreover, antenatal care is important to help women make preparations for the birth and plan what to do if complications arise. Similarly, skilled health professional assistance with delivery and postnatal care is crucial to prevent maternal complications.

4.2.1 ANTENATAL CARE (ANC)

Antenatal care coverage: The overall improvement over the two years follow-up period in the coverage of pregnant women with antenatal care for the most recent birth was moderate, from 40.4% at baseline to 44.3% at follow-up survey. This improvement was due to the improvement in antenatal coverage among pregnant women in the HEP villages, although the ANC coverage in the control villages was high in both study periods. The

antenatal care coverage in the HEP villages increased from 37.4% at baseline to 43.3% at follow-up survey, whereas, the coverage in the control villages did not show any improvement over the two years period (from 45.5% to 46.3%).

The contribution of antenatal care in preventing adverse outcomes of pregnancy depends on the timing of the first visit and continuation throughout the pregnancy. It is recommended that every pregnant woman have at least four antenatal care visits during her pregnancy. In this regard there is an overall improvement between the survey periods. Among the women who attended antenatal care during the baseline survey, 14.6% women had at least four antenatal care visits during pregnancy, and this was increased to 22.5% during the follow-up survey.

It is also recommended that the first antenatal care visit should occur during the first three months of pregnancy. The improvement with this measure was only minimal. Only 5.7% pregnant women during baseline survey were in their first trimester of pregnancy when they first received antenatal care, while it was 8.3% during the follow-up survey.

Table 4.6: Percent distribution of antenatal care (ANC) visits by number and timing

Number and timing of ANC visits	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Had ANC	37.4	45.5	40.4	43.3	46.3	44.3
Number of ANC visits						
None	62.6	54.5	59.6	56.7	53.7	55.7
1	4.3	6.0	4.9	3.7	1.6	3.0
2-3	19.2	23.6	20.9	17.8	18.6	18.1
4+	13.9	15.9	14.6	21.3	24.8	22.5
Don't know	0.0	0.0	0.0	0.5	1.3	0.7
Months pregnant at first visit						
No visit	62.6	54.5	59.6	56.7	53.7	55.7
<4	5.7	5.7	5.7	7.6	9.7	8.3
4-5	16.6	11.8	14.8	15.3	15.2	15.3
6-7	10.2	14.6	11.8	15.8	10.1	13.9
8+	4.9	13.4	8.1	3.5	10.1	5.7
Not stated	0.0	0.0	0.0	1.1	1.3	1.1
Number of women	339	154	493	350	159	509

Antenatal care provider: During baseline survey, 92.3% of pregnant women who attended antenatal care went to a health professional (from any health institution) for antenatal care, while, during the follow-up survey, about 95.8% went to health professionals (68.3% went to health professionals and 27.5% went to HEWs). The introduction of HEP in the villages resulted in shifting of pregnant women from visiting higher health professionals to HEWs, and a slight increase in proportion of pregnant women seen by health professionals. During the follow-up survey, HEWs attended 37.3% of pregnancies in the HEP villages and 8.7% of pregnancies in the control villages among women who attended ANC. The involvement of HEWs in the control villages might be due to the presence

of HEP in neighboring villages. Overall, the proportion of pregnancies attended by trained or untrained traditional birth attendants (TBAs) decreased from 5.8% at baseline to 3.3% at follow-up survey.

Table 4.7: ANC provider for the most recent birth

Service provider	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Health professional	92.2	92.5	92.3	59.7	84.5	68.3
HEWs	0.0	0.0	0.0	37.3	8.7	27.5
Trained TBA	1.7	5.2	3.2	2.4	3.7	2.9
Untrained TBA	4.5	0.0	2.6	0.0	1.1	0.4
Other	1.0	2.3	1.6	0.0	0.0	0
Number of women	132	74	206	146	72	218

4.2.2 DELIVERY CARE

The good outcome of pregnancy depends upon many factors including care received during delivery. Hygienic conditions and proper medical assistance during delivery can reduce the risk of complications and infection for both the mother and the child, thus contributing to the reduction of illness and death of both the mother and the new born. When women develop obstetric emergencies or medical complications during or immediately after delivery, skilled attendants are crucial in managing the problem quickly and effectively. Due to the difficulty of measuring maternal mortality, a series of process indicators for evaluating the progress towards the reduction of maternal mortality by focusing on professional care during pregnancy and childbirth are usually used.

The proportion of deliveries attended by skilled personnel is the percentage of deliveries attended by personnel trained to give the necessary care to women during labor, to conduct deliveries and to care for newborns. Traditional birth attendants, even if they have received a short training course, were not considered as skilled health personnel in the analysis.

Place of delivery: Women were asked about the place of birth. Home deliveries were the commonest place during both survey periods, with 90.7% deliveries during baseline and 87.8% deliveries during the follow-up survey occurring at home, which indicates a slight increase in health facility delivery. Overall health facility delivery increased from 4.6% at baseline to 8.9% at follow-up. However, most of the health facility deliveries during the follow-up survey were from the control villages (15.6%), which was higher than the HEP villages (5.7%).

Table 4.8: Percent distribution of births in the five years preceding the survey by place of delivery

Place of delivery	Type of health facility	Baseline			Follow-up		
		HEP	Control	Total	HEP	Control	Total
Government	Hospital	1.5	0.9	1.3	0.3	6.6	2.3
	Health Center	0.8	2.0	1.3	2.5	4.4	3.1
	Health station/clinic	0.5	1.0	0.7	0.5	2.7	1.2
	Health Post	0.2	0.0	0.1	1.4	0.9	1.2
Private	PVT. Hospital	1.0	0.0	0.1	0.0	1.0	0.3
	PVT. Clinic	0.5	0.6	0.5	0.0	0.0	0.0
	Other private and NGO	1.0	0.0	0.6	0.9	0.0	0.7
Total health facility deliveries		5.4	4.6	4.6	5.7	15.6	8.9
Home	Own Home	89.2	93.4	90.7	91.3	80.5	87.8
	Others home	4.0	1.2	3.0	1.6	3.4	2.2
Not stated		2.2	0.9	1.7	1.4	0.6	1.2
Number of births		327	149	476	325	142	467

Deliveries attended by skilled personnel: Although, there was an improvement in the percent of live births assisted by health professionals over the study period, the overall picture is poor. Overall, the skilled health personnel (doctors, nurse, midwife or HEWs) attended births of 6.6% deliveries during baseline and 13% during follow-up. During the follow-up survey, HEWs attended 6.6% of deliveries in the HEP villages. However, the proportion of deliveries attended by skilled health personnel in the HEP villages (11.8%) was lower than that of the control villages (15.7%). About a quarter of the delivers were assisted by traditional birth attendants during the baseline (27.4%) and follow-up (24.6%) surveys.

Table 4.9: Percent distribution of live births by person providing assistance during delivery

Provider	Baseline			Follow-up			
	HEP	Control	Total	HEP	Control	Total	
Health professional	Doctor/Health officer/Midwife	1.5	1.8	1.6	0.9	9.2	3.6
	Nurse/health assistant	5.2	4.0	4.7	4.0	5.9	4.6
	HEWs	0.5	0.0	0.3	6.6	0.0	4.5
	Other health professional	0.0	0.0	0.0	0.3	0.6	0.4
Total by skilled personnel		7.2	5.7	6.6	11.8	15.7	13.0
Other health worker	Trained birth attendant	12.1	11.2	11.8	11.8	11.5	11.7
	Traditional birth attendant	29.8	23.4	27.4	26.8	20.0	24.6
	Community health worker	6.3	2.1	4.7	3.6	6.6	4.6
Non-health workers	Family Member	26.0	25.2	25.7	24.8	27.3	25.6
	Other	13.8	17.0	15.0	9.6	6.0	8.4
	No one	4.4	15.3	8.5	10.8	12.9	11.5
Not stated		0.4	0.0	0.2	0.9	0.0	0.6
Number of births		327	149	476	325	142	467

4.2.3 POSTNATAL CARE (PNC)

The postnatal care coverage was low. The proportion of mothers who received postnatal care within 45 days increased from 4.5% at baseline to 6.5% at follow-up, which corresponds to an increase in coverage by more than 40%. The PNC coverage within the critical first two days after delivery was extremely low. Only a fraction of mothers received PNC within the first two days. The PNC coverage of mothers within 45 days after delivery in the HEP and control villages was similar during the follow-up survey, but relative to the respective baseline level of coverage, the improvement over the study period was higher in the HEP than control villages.

Table 4.10: Percent distribution of first PNC checkup by time after delivery, type of place and health provider

Indicators of PNC checkup		Baseline			Follow-up		
		HEP	Control	Total	HEP	Control	Total
Time after delivery of mother's first PNC checkup	Within 1 day	0.8	0	0.5	0.7	0.9	0.8
	2 days	0.4	0	0.2	0.2	0.6	0.3
	3-45 days	2.6	5.5	3.7	5.5	5.2	5.4
	46-90days	0.7	0.5	0.7	1.1	1.0	1.1
	Within 45 days	3.8	5.5	4.5	6.4	6.7	6.5
Place where the first ANC checkup took place at	Home	0.5	3.5	1.6	1.9	1.3	1.7
	Hospital/HC/HS	2.8	2.6	2.7	4.8	5.9	5.2
	Health post	0.2	0	0.1	2.9	0.5	2.1
	NGO/Private health facilities	0.6	0	0.4	0	0	0
Type of health provider of mother's first PNC checkup	Doctor/HO/midwife/nurse	3.2	5.5	4.1	5.0	6.3	5.4
	HEWs	0	0	0	4.5	1.4	3.5
	TBAs/CHWs	0.9	0.6	0.8	0	0	0
Didn't receive PNC checkup		95.0	94.0	94.6	88.1	90.6	88.9
Number of women		338	159	497	347	153	500

The commonest places where the first PNC checkup took place during the baseline survey were hospitals/HC and home, while it was hospital/HC and health post during the follow-up survey. Similarly, the main health providers of mother's first PNC checkup changed from higher health professionals and TBAs during the baseline to higher health professionals and HEWs during the follow-up survey.

4.3 CHILD HEALTH

4.3.1 VACCINATION COVERAGE

Immunization of children against the six vaccine-preventable diseases, which includes tuberculosis, diphtheria, whooping cough, tetanus, polio, and measles, is one of the HEP health service packages. Data on immunization coverage was collected during baseline and follow-up surveys from villages covered by HEP and villages not yet

covered by HEP. A detailed information on immunization coverage of children aged 12-23 months by survey period and study group is presented in table 4.11.

Overall change in coverage: Generally, the overall improvement in immunization coverage of children from baseline to follow-up period was not big. The only improvements were seen in the immunization coverage of BCG and measles vaccinations. The percentage of children aged 12-23 months who received BCG vaccination increased from 48.3% at baseline to 57.1% during the follow-up survey. This corresponds to an increase in coverage of BCG vaccination by 18.2% relative to the baseline coverage. Similarly, the percentage of children aged 12-23 months who received measles vaccination increased from 32.2% at baseline to 39.5% during the follow-up survey. This corresponds to an increase in coverage of measles vaccination by 22.7% relative to the baseline coverage. The overall improvement in DPT3 coverage was very small – from 31.3% at baseline to 33% during the follow-up study. On the other hand, the overall coverage of polio 3 vaccination decreased from 32.2% at baseline to 21.4% during the follow-up period.

Difference in coverage between HEP and control villages at follow-up: The difference in the percentage of children who receive vaccination on BCG, DPT3, Polio3, and measles between the HEP villages and control villages were 0.2, 4.4, 2.7, and 5.3, respectively. These correspond to an increase in vaccination coverage of BCG, DPT3, Polio3, and measles in the HEP villages by 0.4%, 14.0%, 13.2% and 14.1%, respectively, compared to villages that were not covered by HEP.

Coverage change attributed to HEP: Additionally, the change in immunization coverage of children was not different in the HEP and control villages. The net change in immunization coverage due to HEP was calculated using the difference-in-difference method. The difference in immunization coverage between the study groups at baseline was subtracted from the difference in coverage between the study groups at follow-up period. This results in the determination of the percentage of children who receive vaccination which is attributed to HEP. The percentage of children who receive vaccination on BCG, DPT3, Polio3, and measles attributed to HEP were -0.1%, 5.1%, 2.2%, and 5.3%, respectively. These correspond to improvement of vaccination coverage of BCG, DPT3, Polio3, and measles due to HEP by -0.2%, 16.5%, 6.8% and 16.5%, respectively, relative to a counterfactual situation where there was no HEP program.

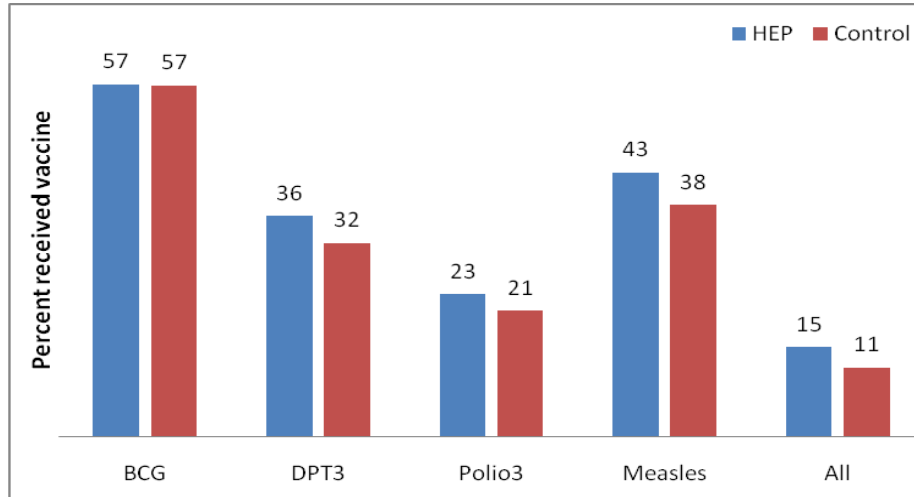
Table 4.11: Percentage of children age 12-23 months who received specific vaccines

Vaccine	Baseline									Follow-up								
	HEP			Non-HEP			Total			HEP			Non-HEP			Total		
	Card	Report	Either	Card	Report	Either	Card	Report	Either	Card	Report	Either	Card	Report	Either	Card	Report	Either
BCG	13.7	34.7	48.5	21.1	27.1	48.2	16.8	31.6	48.3	18.7	38.5	57.3	15.9	38.6	57.1	16.8	38.3	57.1
DPT1	12.8	36.4	49.2	20	23.6	43.6	15.8	31.1	46.9	18.4	38.6	57	11.9	38.3	50.2	14	38.4	52.4
DPT2	10.7	31.5	42.2	14.7	21.8	36.5	12.3	27.5	39.9	13.4	33.6	47.1	10.1	32.9	43	11.2	33.1	44.4
DPT3	7.8	23.2	31	13.6	18.1	31.7	10.2	21.1	31.3	10.4	25.5	35.9	6.8	24.7	31.5	8	25	33
Polio0	4	55.7	59.6	6.2	34.1	40.3	4.9	46.8	51.7	8	44.5	52.5	3.9	47.9	51.8	5.2	46.8	52
Polio1	12.6	51.7	64.3	19.9	32.4	52.3	15.6	43.8	59.4	18.4	41.4	59.8	14.6	42.3	56.9	15.8	42	57.9
Polio2	10.2	42.6	52.9	15.8	26.6	42.4	12.5	36	48.5	13.4	31.3	44.7	12.7	33.9	46.6	12.9	33.1	46
Polio3	7.5	24.9	32.4	13.8	18.1	31.9	10.1	22.1	32.2	10.4	12.8	23.2	7.8	12.7	20.5	8.6	12.8	21.4
Measles	6.5	25.7	32.2	12.3	19.9	32.2	8.9	23.3	32.2	5.6	37.4	43	4.6	33.1	37.7	4.9	34.5	39.5
All ¹	5.5	10.9	16.4	9.2	10.1	19.2	7	10.5	17.5	4.9	9.7	14.6	3.9	7.3	11.2	4.3	8.1	12.3
Number	400	400	400	204	204	204	604	604	604	418	418	418	191	191	191	609	609	609

¹ BCG, measles, and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth)

Card - Source of information is vaccination card; Report - Source of information is mother's report; Either - Source of information is either sources

Figure 4.1: Percentage of children age 12-23 months who received specific vaccines during follow-up survey



4.3.2 BREASTFEEDING

The breastfeeding status of youngest children under three years living with the mother was assessed. Generally, a large proportion of children under 6 months of age were not exclusively breastfed. However, there was a significant improvement in the proportion of children who were exclusively breastfed over the study period. At the time of the baseline survey, 60% of children under 2 months, 59% of children under 4 months, and 51% of children under 6 months were exclusively breastfed, which increased to 88%, 84% and 66% respectively at the time of the follow-up survey (Figure 4.2). The proportion of exclusively breastfed children under 4 months increased from 65% to 85% in the HEP villages and from 46% to 81% in the control villages over the study period (Figure 4.3). The introduction of complementary foods was delayed for a significant proportion of children. At 6-9 months of age, 6% and 21% of children were still exclusively breastfed at the time of baseline and follow-up surveys respectively. Complementary food was introduced in only 13% and 15% of children 6-9months at the time of baseline and follow-up surveys, respectively.

Figure 4.2: Percent of children under three years living with the mother exclusively breastfed by study period

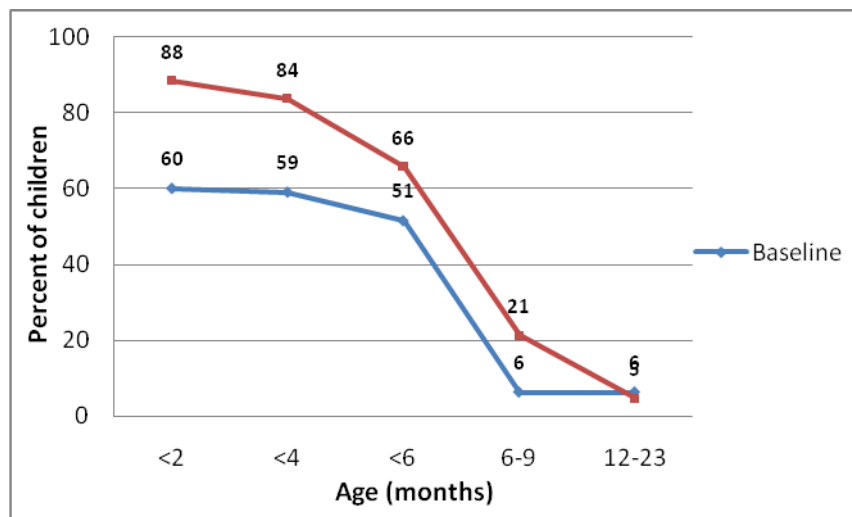
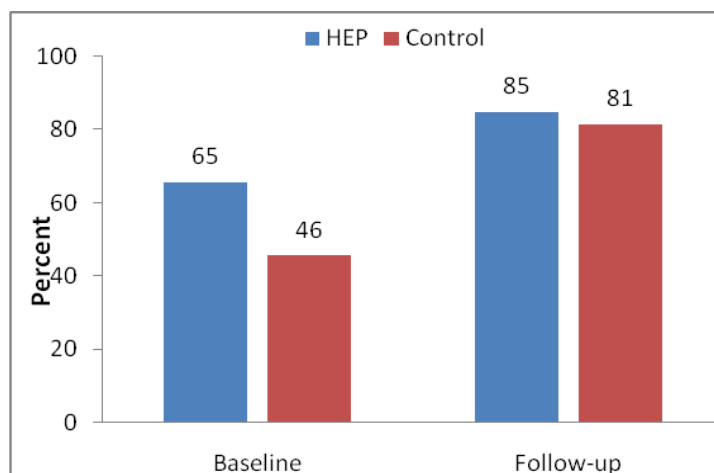


Figure 4.3: Percent of children under three years living with the mother exclusively breastfed by study period



4.3.3 FEVER/COUGH CASES IN CHILDREN

The percent of children under the age of 5 years, who had fever/cough in the two weeks preceding the survey, were 8.8% and 12.0% at baseline and follow-up respectively. The percentage of children with fever for whom treatment was sought from a health facility or provider was 29.3% and 37.42% at baseline and follow-up surveys respectively. There was no difference between the HEP and control villages.

Table 4.12: Prevalence and treatment of fever/cough by survey period

Variables	Baseline	Follow-up
Prevalence of fever/cough	8.8	12.0
Percent of children with fever/cough for whom treatment was sought	29.3	37.4
Total no. of children	46	75

4.3.4 DIARRHEA IN CHILDREN

Prevalence and treatment: The prevalence of diarrhea among children under the age of five in the two weeks preceding the survey showed small change from baseline to follow-up surveys, and small difference between the HEP and control villages (Table 4.13). The overall prevalence was 11.7% and 10.3% at baseline and follow-up, respectively. The prevalence of diarrhea was 9.5% and 12.1% in the HEP and control villages at follow-up survey. However, there was significant improvement in treatment between the study periods, mainly in the HEP villages. Among the children under the age of five who had diarrhea in the two weeks preceding the survey, the overall percentage of children who received oral rehydration salt (ORS) increased from 11.1% at baseline to 19.4% at follow-up survey. At follow-up survey, the percentage of children with diarrhea who received ORS was 22.2% and 15% in the HEP and control villages respectively, and much of the overall improvement from baseline to follow-up period was due to the improvement in the HEP villages. The percentage of children with diarrhea who received pills/syrup decreased over the study period from 19.7% at baseline to 12.4% at follow-up. This improvement (withholding of unnecessary treatment – pill/syrup) was seen only in the HEP villages. In the HEP villages, it decreased from 18.5% at baseline to 6.1% at follow-up, while there was no change in the control villages (from 21.7% at baseline to 22.3% at follow-up).

Table 4.13: Prevalence and treatment of diarrhea in children by survey round and study groups

	Baseline			Follow-up			
	HEP	Control	Total	HEP	Control	Total	
Total number of children	327	149	476	325	142	467	
Number of children with diarrhea	44	19	63	31	16	47	
Percent of children with diarrhea	11.8	11.6	11.7	9.5	12.1	10.3	
Percent of children with diarrhea who received:	ORS	11.3	10.8	11.1	22.2	15.0	19.4
	Pill/Syrup	18.5	21.7	19.7	6.1	22.3	12.4
	Injection	0.0	0.0	0.0	4.7	0.0	2.9
	Herbal	4.1	0.0	2.6	0.0	0.0	0.0
	Not stated	11.9	9.3	11.0	10.0	19.1	13.5

Feeding practices during diarrhea: The overall practice of offering more amount of liquid compared with normal practice to children who had diarrhea improved over the study period from 18.4% at baseline to 33% at follow-up. Although improvement was seen in both study groups, the improvement in the HEP villages was by nearly 100% from 19.3% at baseline to 36.9% at follow-up; in contrast, it improved by about 50% in the control villages from 16.8% to 26.7% over the study period. However, among the children who had diarrhea, the percent of children who were offered more or same amount of food as usual decreased over the study period from 47.2% at baseline to 40.1% at follow-up, which was mainly due to the decline in the control villages. There was no change in this indicator in the HEP villages (38.6% at baseline and 39% at follow-up). The percent distribution of children under five years who had diarrhea in the two weeks preceding the survey by amount of liquids and food offered compared with normal practices is presented in table 4.14 by survey round and study group.

Table 4.14: Percent distribution of children with diarrhea by the amount of liquid and food offered

	Amount	Baseline			Follow-up		
		HEP	Control	Total	HEP	Control	Total
Amount of liquid offered	More	19.3	16.8	18.4	36.9	26.7	33.0
	Same as usual	27.6	24.6	26.5	17.0	24.7	20.0
	Less than usual	37.4	34.7	36.4	20.0	6.5	14.8
	None	1.2	14.6	6.1	18.4	22.3	19.9
	Don't know	0.0	0.0	0.0	0.0	0.0	0.0
	Not stated	14.5	9.3	12.6	7.7	19.8	12.4
Amount of food offered	Same or more	38.6	62	47.2	39	41.8	40.1
	Less than usual	45.8	17.9	35.6	42.8	17.7	33.1
	None	5.2	4.9	5.1	12.0	22.3	16.0
	Don't know	0.0	0.0	0.0	0.0	0.0	0.0
	Not stated	10.4	15.3	12.2	6.3	18.1	10.9
Number of children with diarrhea		44	19	63	31	16	47

Mother's knowledge of ORS packets: Overall, the percent of mothers who gave birth on the five years preceding the survey in all study villages who know about ORS packets increased from 58% at baseline to 67% at follow-up survey. There was no difference in mother's knowledge of ORS packets by study groups.

4.4 CONCLUSIONS

A. HEP effect on outcome measures of maternal and child health

HEP had satisfactory effect in improving the following outcome measures

- HEP improved the knowledge of any contraceptive methods. The knowledge of any contraception method among married women in the HEP villages increased from 73.9% at baseline to 81% at follow-up survey, while there was slight change in the control villages (71.7% at baseline and 72.7% at follow-up surveys).
- HEP improved the ever use of contraceptive methods and CPR. The increment in ever use of any method among currently married women was high in the HEP villages (from 31.1% to 45.9%) than the control villages (from 30% to 33.7%). The CPR of any modern contraception methods in the HEP and control villages was 24.8% and 21.2%, respectively at follow-up study.
- Relatively the increment in proportion of pregnant women who attended ANC was higher in the intervention villages (from 37.4% to 43.3%) than in the control villages (from 45.5% to 46.3%), however, given the low coverage of ANC at baseline in the HEP villages the coverage at follow-up was similar in both study groups.
- HEP contributed to the improvement in PNC coverage. HEP's effect on shifting place and provider from TBAs at home to HEWs at health post is expected to improve quality of PNC.
- HEP improved the treatment of children who had diarrhea with ORS. Among the children under the age of five who had diarrhea in the two weeks preceding the survey, at follow-up survey, the percentage of children with diarrhea who received ORS was 22.2% and 15% in the HEP villages and control villages respectively.
- HEP improved feeding practice of offering more liquid during diarrhea: Although improvement was seen in both study groups (HEP and control villages), the percent of children who were offered more liquid was higher in the HEP villages (36.9%) than in the control villages (26.7%).

HEP had minimal or no effect in improving the following outcome measures

- Proportion of mothers who received at least four ANC visits and mothers who received their first ANC visits during the first trimester were similar in the intervention and control villages.
- HEP did not improve assisted skilled deliveries. HEWs attended 6.6% of deliveries in the HEP villages during the follow-up survey; however, the proportion of deliveries attended by skilled health personnel in the HEP villages (11.8%) was lower than that of the control villages (15.7%).
- HEP's effect on immunization was very small.
- The proportion of exclusively breastfed children under 4 months increased from 65% to 85% in the HEP villages and from 46% to 81% in the control villages over the study period.

- The percentage of children with fever for whom treatment was sought from a health facility or provider was the same in the intervention and control villages.
- HEP's impact on prevalence of diarrhea was minimal, although indicative of potential effect
- HEP did not improve feeding practice of offering more food during diarrhea. Among the children who had diarrhea, the percent of children who were offered more amount of food were similar in the study groups.

B. Overall change on outcome measures on maternal and child health

- The overall knowledge of any contraception methods among married women increased from 72.9% to 78% over the study period. The most widely known methods were pills and injections.
- Ever use of any contraception methods among married women increased from 30.6% to 41.5% over the study period. The most commonly ever used modern contraception methods were injections and pills.
- The overall contraceptive prevalence rate (CPR) showed slight improvement over the study period.
- There was small overall improvement in ANC coverage for the most recent birth over the study period – from 40.4% to 44.3%.
- Among the women who attended antenatal care, mothers who received at least four antenatal care visits increased from 14.6% to 22.5% over the study period. Mothers who received their first ANC visits during the first trimester increased from 5.7% to 8.3% over the study period.
- Overall health facility delivery increased from 4.6% to 8.9% over study period. Home deliveries were the commonest place during both survey periods.
- The percent of live births assisted by health professionals doubled over the study period (from 6.6% at baseline to 13% at follow-up).
- Although postnatal care coverage was low, it showed improvement over the study period.
- Although a considerable proportion of children under 6 months were not exclusively breastfed, there was a significant improvement in the proportion of children who were exclusively breastfed over the study period.
- Complementary food was introduced in minority of children 6-9months - 13% and 15% at the time of baseline and follow-up surveys, respectively.
- Improvements in immunization coverage were seen in the coverage of BCG and measles vaccinations.
- The overall treatment seeking behavior for children with fever/cough improved over the study period from 29.3% at baseline and 37.42% at follow-up.
- The treatment of diarrhea among children under the age of five with ORS showed significant improvement over the study period – from 11.1% at baseline to 19.4% at follow-up survey.
- The overall practice of offering more amount of liquid to children who had diarrhea improved over the study period from 18.4% at baseline to 33% at follow-up.

5. MALARIA

5.1 MODES OF MALARIA TRANSMISSION AND PREVENTION METHODS

5.1.1 MALARIOUS AND NON-MALARIOUS VILLAGES

The sample of villages included in the HEP evaluation study included malarious as well as non-malarious villages. For the analysis and reporting of the malaria survey, only malarious villages were considered. Villages were grouped into malarious and non-malarious areas based on the interviewees' response to the question "is there malaria in your area?" The grouping has been made in such a way that the village was grouped into malarious area, if 10 percent and above of the respondents within the village have positively responded to the same question; otherwise into non-malarious area. Based on this approach, nine villages among the 14 control villages were grouped into malarious villages; and 12 villages among the 24 intervention villages were grouped into malarious villages. Thus, the result of the malaria survey presented in this report is based on 9 control and 12 intervention villages.

5.1.2 KNOWLEDGE ON MODES OF MALARIA TRANSMISSION

Knowledge on malaria is almost universal during baseline and follow-up surveys as well as among intervention and control villages. Overall knowledge on the correct modes of malaria transmission (by mosquito bites after biting an infected person) has increased from 50.6% to 57.1% over the two years. However, the difference in knowledge of respondents on modes of transmission between the intervention and control villages was large during the follow-up survey, with 67% of respondents in intervention villages correctly mentioned mosquito bites as a cause of malaria transmission, while only 43.6% had correct knowledge in the control villages. Respondents' misconception on the modes of malaria transmission was higher in the control group (30.5%) than the intervention group (15.5%).

5.1.3 KNOWLEDGE AND PRACTICE ON MALARIA PREVENTION METHOD

The general knowledge on malaria prevention and control methods has improved over the two years. Knowledge on preventing malaria by covering body with mosquito nets at night increased from 21.3% at baseline to 59.8% during the follow-up survey. Similarly, respondents' knowledge on spraying the house with chemicals to prevent malaria increased from 7.2% during the baseline to 21.6% during the follow-up survey. However, there was no change on the proportion of respondents who were aware of clearing busy and swampy areas to prevent malaria.

Much of the improvements were seen in the intervention villages, and respondents in the intervention group had higher knowledge of malaria prevention methods such as mosquito nets and spraying house with chemicals. About 70.8% and 25.5% of respondents in the intervention villages knew about covering body with mosquito nets and spraying houses with chemicals to prevent malaria, respectively; while it was 44.8% and 16.4%, respectively in the control villages. Improvement in practicing the malaria prevention methods was only seen with covering body with mosquito nets at night. The use of mosquito nets at night to cover the body increased from 11.3% during baseline to 48% during the follow-up survey. Much of the improvements came from intervention villages with

60.7% of respondents practicing the method during the follow-up survey, while it was only 30.9% in the control villages. Clearing busy and swampy areas did not show improvements and both intervention and control villages practiced equally. Indoor residual Spraying (IRS) is undertaken by the government, and any increase in use of the method would be ascribed to that effort.

Table 5.1: Percent distribution of households by knowledge on transmission and prevention methods

Measures of knowledge and practice on malaria transmission and prevention		Baseline			Follow-up		
		HEP	Control	Total	HEP	Control	Total
Knowledge on malaria	Heard about malaria	96.9	87.2	84.3	98.6	97.7	98.2
Modes of malaria transmission	Infected Mosquito bites	65.0	37.3	50.6	67	43.6	57.1
	Misconception	18.6	14.2	16.3	15.5	30.5	21.9
Knowledge of prevention methods	Covering body with mosquito nets	16.4	21.3	18.9	70.8	44.9	59.8
	Spraying the house with chemicals	9.6	4.9	7.2	25.5	16.4	21.6
	Clearing bushy, swampy areas	28.4	13.2	20.5	17.2	17.2	17.2
Ever use of prevention methods	Covering body with mosquito nets	8.3	14.0	11.3	60.7	30.9	48.0
	Spraying the house with chemicals	3.2	1.9	2.5	3.7	3.4	3.6
	Clearing bushy, swampy areas	15.9	4.7	10.0	10.1	12.1	11.0
Number		300	225	525	300	223	523

5.1.4 KNOWLEDGE AND PERCEPTION OF MOSQUITO NETS

The proportion of respondents who have ever heard about mosquito nets increased from 66.5% during the baseline to 98% during the follow-up survey. As the knowledge on mosquito nets became almost universal, there was no difference between the intervention and control villages. The perception, among respondents who have ever heard about mosquito nets, that sleeping under the mosquito nets protect from malaria also increased from 85.1% during baseline to 95.8% during the follow-up survey, and the improvement was similar in both study groups.

Table 5.2: Knowledge and perception of mosquito nets

Knowledge and perception	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Ever heard of mosquito nets	77.6	57.3	66.5	97.9	98.2	98.0
Think nets protects from malaria	83.1	87.3	85.1	96.9	94.4	95.8
No. of respondents	300	225	525	299	221	520

5.2 PREVALENCE OF MALARIA EPISODES AND TREATMENT BEHAVIOR

5.2.1 FEVER/MALARIA EPISODES

Proportion of households with members who had been ill with fever or malaria in the 12 months preceding the surveys decreased from 41.2% of households during the baseline to 31.8% during the follow-up survey. However, the proportion of households who had reported fever or malaria in the 12 months preceding the survey was higher in the intervention group (36.8%) than the control group (25.1%). This difference might be due to the intrinsic difference in malaria transmission in the study groups, because it was also higher in the intervention group (47.8%) than the control group (41.2%) during the baseline survey. The proportion of households with members who had been ill with fever or malaria in the 2 weeks preceding the survey also decreased from 18.1% during the baseline to 6% during the follow-up survey. The incidence in the 2 weeks preceding the survey was higher in the intervention villages (7.9%) than the control villages (3.4%).

Table 5.3: Households with members ill with fever or malaria prior to the survey

Households with members who had been ill with fever or malaria	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
In the 12 months preceding	47.8	41.2	44.2	36.8	25.1	31.8
In the 2 weeks preceding	15.5	20.3	18.1	7.9	3.4	6.0
Number	300	225	525	300	223	523

Severity of the febrile or malaria illnesses: The severity of the fever or malaria episodes in the two weeks preceding the survey was assessed based on the ability of the patient to undertake normal daily tasks. During baseline, about 52% of patients were reported to have been confined to bed, while it was 39.9% of patients during the follow-up study. Only about 5% of the patients claimed doing normal daily activities in both study periods. Table 5.4 presents the percent distribution of the febrile or malaria illnesses during both survey periods by severity.

Table 5.4: Percent distribution of severity of illness in the 2 weeks preceding the survey

Severity of illness	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Confined to bed	55.3	50.0	52.1	47.8	14	39.9
Stayed at home	19.3	20.7	20.1	39.2	44.2	40.4
Doing limited daily activities	17.0	26.0	22.5	6.2	14	8
Doing normal daily activities	8.4	3.3	5.3	6.7	0.0	5.2
Not stated	0.0	0.0	0.0	0.0	27.9	6.6
Total Number	73	62	135	21	8	29

5.2.2 MALARIA TREATMENT PRACTICE

Early treatment with effective anti-malarial drugs showed improvements over the survey periods from 31.1% at baseline to 48.6% at follow-up survey. Moreover, there was a marked difference between the intervention and control villages during the follow-up survey. In the intervention villages, about 53.3% of patients with fever/malaria sought malaria treatment with anti-malaria drug the same or next day of the onset of illness, while it was 20% in the control villages.

Table 5.5: Malaria treatment with anti-malaria drug same / next day outside home

Background characteristics	Baseline			Follow-up			
	HEP	Control	Total	HEP	Control	Total	
Age in years	< 5	37.0	28.6	35.3	55.6	-	55.6
	5 +	32.1	26	30.3	52.4	20	46.2
Sex	Female	31.8	32.3	32.0	50.0	0.0	44.4
	Male	34.3	19.2	30.3	57.1	33.3	52.9
Total		33.1	26.3	31.1	53.3	20.0	48.6

5.3 MOSQUITO NETS OWNERSHIP AND UTILIZATION

5.3.1 HOUSEHOLD POSSESSION OF MOSQUITO NETS

Overall household possession of mosquito nets increased dramatically from 41.5% with at least one bed net during the baseline to 76.1% during the follow-up survey. The difference between the intervention and control villages in household possession of mosquito nets was large, with 87% in the intervention and 61.5% in the control villages during the follow-up survey. The difference during the baseline survey was not large – 40.8% in the intervention and 42.2% in the control villages. The household possession in the intervention group more than doubled within two years. The large gap between the villages in mosquito net possession could be primarily ascribed due to differential distribution of free nets by the government in the two study groups. However, the difference in awareness of mosquito nets that was created by the presence of HEP in the intervention villages might have contributed to the increased mosquito net possession by increasing acceptance by the community. The proportion of households who own more than one mosquito nets also increased proportionally from 18% during baseline to 46.7% during the follow-up survey. Similarly, more than 55% of the households in the intervention villages possessed more than one mosquito net, while the proportion was 35.2% in the control villages during the follow-up survey.

Table 5.6: Percentage of households with mosquito net and average number of nets per household

Number of mosquito nets	Pre HEP			Post HEP		
	HEP	Contro	Total	HEP	Control	Total
Own at least one net	40.8	42.2	41.5	87.0	61.5	76.1
Own more than one net	15.6	20.7	18.0	55.2	35.2	46.7
Households by no. of nets						
0	59.2	57.8	58.5	12.7	35.6	22.5
1	25.2	21.5	23.5	31.7	26.3	29.4
2	11.4	19.6	15.3	48.8	33.7	42.3
3	4.2	0.0	2.2	5.8	1.1	3.8
4+	0.0	1.1	0.5	0.6	0.4	0.5
Average no. of nets /household	0.6	0.7	0.6	1.5	1.0	1.3
Mosquito nets in good condition	93.1	95.9	94.5	87.0	76.9	83.5
No. of households	224	122	346	292	208	500

The condition of the mosquito nets was assessed. Interestingly, most of the mosquito nets (94.5%) possessed by households at the time of the baseline survey were in good condition in both study groups. However, lower proportion (83.5%) of the nets was in good condition during the follow-up study. Most of the mosquito nets were distributed during the last three years, and almost all of the nets during baseline survey were one year old, while the nets available during the follow-up study were 1-3 years old. More mosquito nets in the intervention villages were in good condition (87%) compared with nets in the control villages (76.9%).

Source of mosquito nets: Majority of mosquito nets which were available in both rounds of surveys were distributed by the government. However, during the baseline survey, about 8% of the mosquito nets were provided by private market, where as at the time of follow-up survey almost all were provided by the government. About 75.9% and 97.8% of the mosquito nets found at the time of baseline and follow-up surveys respectively, were given for free. There was no difference by study groups on these aspects.

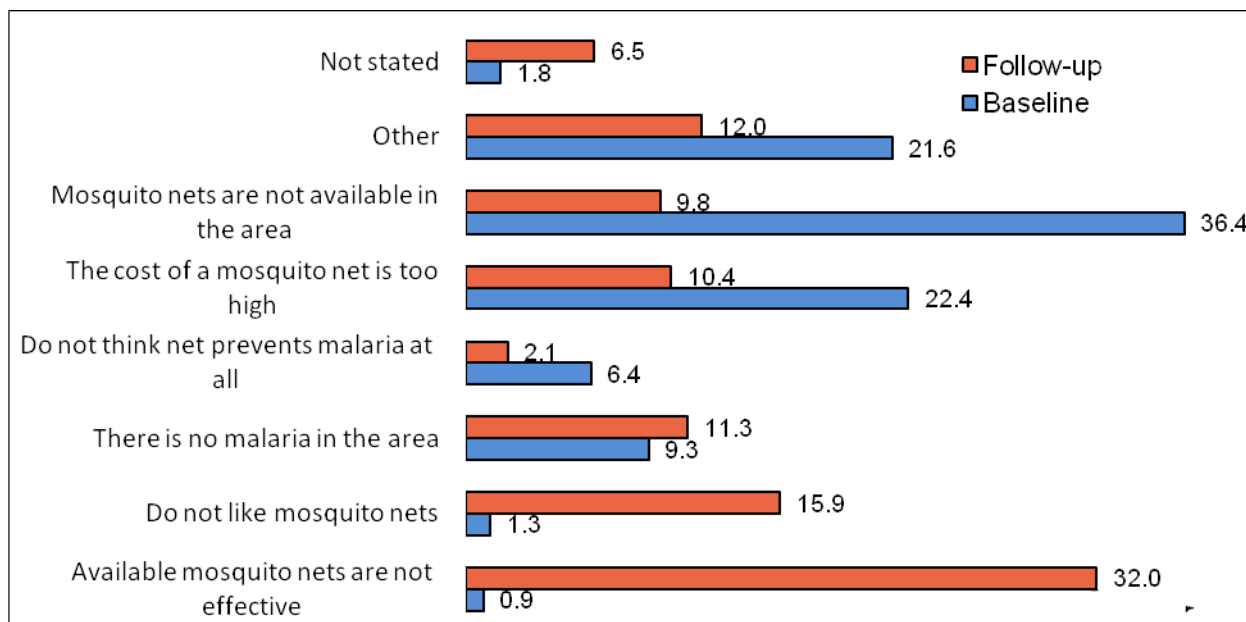
Table 5.7: Source of mosquito nets and how they were obtained by study period and group

Source and how nets were obtained	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Source						
Government health facility	86.4	97.9	91.9	97.1	100	98.1
NGO	0.0	0.0	0.0	0.3	0.0	0.2
Private market	13.6	2.1	8.1	0.4	0.0	0.2
Other	0.0	0.0	0.0	1.1	0.0	0.7
Not stated	0.0	0.0	0.0	1.1	0.0	0.7
How net were obtained						
Given for free	63.1	89.7	75.9	97.1	99	97.8
Bought	26	6.4	16.6	0.3	0.0	0.2
Can't remember	10.9	3.9	7.6	0.8	1	0.8
Not stated	0.0	0.0	0.0	1.9	0.0	1.2
Number of households	79	55	134	264	127	391

Reason for not having mosquito nets: Households who did not own mosquito nets were asked why they did not own mosquito nets. The three commonest respondents' response for the main reasons why they did not own nets, during the baseline survey, in order of frequency were "mosquito nets are not available in the area" (36.4%), "the cost is too high" (22.4%) and "don't think mosquito nets prevent malaria" (6.4%). The three commonest respondents' response for the same question, during the follow-up survey, in order of frequency were "the available mosquito nets are not effective in preventing malaria" (32%), "don't like mosquito net" (15.9%), and "no malaria in the area" (11.3%). These show a dramatic change over time of the main reasons for not owning mosquito nets by households. Over the last two years, the government has distributed mosquito nets free of charge all over the malarious areas of the country. Thus, availability of mosquito nets in the area and cost of the nets, which were the top reasons during the baseline survey, were not among the top three reasons during the

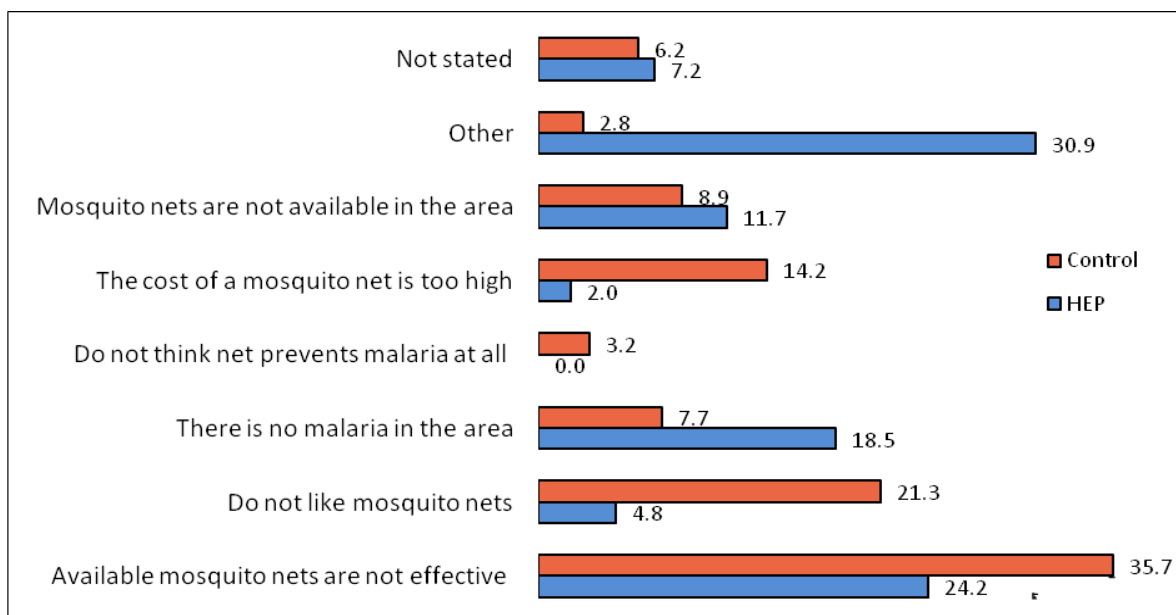
follow-up survey. On the other hand, reasons related to perception of quality and preference became the main reasons during the follow-up survey.

Figure 5.1: Percent distribution of respondents by reason for not having mosquito nets at baseline and follow-up study



The three commonest respondents' response in the intervention villages for the main reasons why they did not own nets in order of frequency were "the available mosquito nets are not effective in preventing malaria" (24.2%), "no malaria in the area" (18.5%) and "mosquito nets are not available in the area" (11.7%). The three commonest respondents' response for the same question in the control villages, during the follow-up survey, in order of frequency were "the available mosquito nets are not effective in preventing malaria" (35.7%), "don't like mosquito net" (21.8%), and "the cost is too high" (14.2%).

Figure 5.2: Percent distribution of respondents by reason for not having mosquito nets by study groups (follow-up study)



5.3.2 MOSQUITO NET UTILIZATION

People (children and adults) who slept under an ITN the previous night (percentage)

Among all households: The percent of people who slept under a mosquito net the previous night increased from 13.7% to 31.4% over the study period. The percent of people who slept under a mosquito net the previous night was higher in the intervention (37.2%) than control (22.6%) villages at the time of the follow-up survey. At the time of the baseline survey, the coverage was 13.4% and 14.1% in the intervention and control villages, respectively. There was no difference between children and adults.

Among households who own mosquito nets: The percent of people who slept under a mosquito net among households who own mosquito nets were similar in both study groups. Among households who own mosquito nets, the percent of people who slept under a mosquito net decreased from 50.7% to 41.8% over the study period. At the time of the baseline survey, the percent of households who own mosquito nets was low, and a quarter of these households purchased their nets, which may indicate that these people had favorable behavior in mosquito net utilization. At the time of the follow-up survey, almost all the mosquito nets were obtained for free, which might have resulted in distributing mosquito nets to many households whose behavior is less favorable (difficult to change behavior) to mosquito net utilization. These are the only plausible explanation for the reduced utilization of nets among people who own nets over time. The coverage was higher in the intervention (43.7%) than control (37.7%) villages. The percent of children and adults who slept under a mosquito net the previous night was similar in both study groups and study periods.

Table 5.8: Mosquito net utilization by study round and group

Survey period	Study group	Total population	No. of people living in HHs who own net	Persons who slept under net the previous night	% who slept under net the previous night among households who own net	% who slept under net the previous night among all households
Baseline	HEP	1,523	416	204	49.0	13.4
	Control	1,113	294	157	53.0	14.1
	Total	2,636	710	361	50.7	13.7
Follow-up	HEP	1,612	1,370	599	43.7	37.2
	Control	1,044	626	236	37.7	22.6
	Total	2,656	1,996	835	41.8	31.4

5.4 INDOOR RESIDUAL SPRAYING

Respondents were asked if their houses were sprayed by chemicals 12 months preceding the survey to prevent malaria and their perception on its effect. The proportion of houses sprayed with chemicals 12 months preceding the survey increased slightly from 4.5% at baseline survey to 5.9% during the follow-up survey. There was some variation between the intervention and control villages in the proportion of houses sprayed by chemicals, but this difference can't be attributed to the HEP intervention.

The perception of respondents on the effect of spraying houses with chemicals to prevent malaria, however, can be affected by HEP. The proportion of respondents who think spraying houses with chemicals prevent malaria increased from 63.2% at baseline to 82.2% during the follow-up survey. There was small difference between the

intervention (84.5%) and control (79.1%) villages in the proportion of respondents who think spraying houses with chemicals prevents malaria.

Table 5.9: Prevalence of indoor residual spraying and perception of respondents on IRS

Variables	Baseline		Follow-up			
	HEP	Control	Total	HEP	Control	Total
Think IRS prevents malaria	76.1	52.5	63.2	84.5	79.1	82.2
Sprayed 12 months preceding the survey	7.3	2.2	4.5	5.4	6.6	5.9
Number of households	300	225	525	299	221	520

5.5 CONCLUSIONS

A. HEP effect on outcome measures of malaria

HEP had satisfactory effect in improving the following

- HEP improved the knowledge on correct mode of malaria transmission, with 67% of respondents in intervention villages and 43.6% in the control villages correctly mentioned mosquito bites as a cause of malaria transmission. Respondents' misconception on the modes of malaria transmission was higher in the control group (30.5%) than the intervention group (15.5%).
- Knowledge on ITNs became universal in both intervention and control villages.
- HEP significantly contributed to the improvement of prompt treatment of fever or malaria cases. In the intervention villages, about 53.3% of patients with fever/malaria sought malaria treatment with anti-malaria drug the same or next day of the onset of illness, while it was 20% in the control villages.
- HEP contributed to the improvement in mosquito nets ownership and utilization over the study period. The difference between the intervention and control villages in household possession of mosquito nets was large, with 87% in the intervention and 61.5% in the control villages during the follow-up survey.
- The percent of people who slept under mosquito nets the previous night among all households was higher in the intervention villages (37.2%) than in the control villages (22.6%) during the follow-up survey.

HEP had minimal or no effect in improving the following

- The percent of people who slept under mosquito net the previous night among households who own mosquito nets were similar in both study groups.

B. Overall change on outcome measures on malaria

The following outcome measures improved over the study period

- Overall knowledge on the correct modes of malaria transmission increased over the study period.
- The proportion of respondents who have ever heard about mosquito nets increased from 66.5% during the baseline to 98% during the follow-up survey.

- The perception , among respondents who have ever heard about mosquito nets, that sleeping under the mosquito nets protect from malaria also increased from 85.1% during baseline to 95.8% during the follow-up survey.
- Proportion of households with members who had been ill with fever or malaria in the 12 months as well as 2 weeks preceding the surveys decreased significantly over the study period.
- Early treatment with effective anti-malarial drugs showed improvements over the survey periods from 31.1% at baseline to 48.6% at follow-up survey.
- Overall household possession of mosquito nets increased dramatically from 41.5% with at least one bed net during the baseline to 76.1% during the follow-up survey.
- Mosquito nets utilization among total population increased over the study period.
- Overall coverage of households with indoor residual spraying increased slightly from 4.5% at baseline to 5.9% at follow-up survey.
- Overall knowledge and perception of the community on IRS increased dramatically over the study period - 63.2% at baseline and 82.2% at follow-up think that IRS prevents malaria.

6. HIV/AIDS AND TUBERCULOSIS

6.1 KNOWLEDGE OF HIV/AIDS

Awareness of HIV/AIDS: The study found that awareness of AIDS was widespread among study participants during the baseline and follow-up surveys. Majority of participants aged 15-24 years (88%) have heard about HIV/AIDS during both survey periods, and the level of knowledge was similar between the HEP villages and control villages. Although, more men than women have heard of AIDS, majority of both men and women have heard about AIDS (data not shown).

Knowledge on HIV prevention methods: The percentage of respondents who mentioned that the transmission of the AIDS virus can be reduced by using condoms during sexual encounters increased from 31.5% at baseline to 48% at follow-up surveys. Although, the level of knowledge was higher in the control villages, the relative increment of knowledge over the study period was higher in the HEP villages compared to the control villages. Knowledge of condoms as preventive methods increased from 38.2% to 55.9% in the control villages, while it increased from 24.3% to 43.4% in the HEP villages over the study period. Although, the percent of respondents who mentioned limiting (be faithful) to one partner showed reduction over the study period, the level of knowledge on limiting sex to one partner was higher in the HEP villages (59.2%) than the control villages (40.7%) during the follow-up survey. Similarly, the comprehensive knowledge (respondents who mentioned both the use of condom during sexual encounter and limiting to one partner) improved over the study period from 18.9% at baseline to 23.1% at follow-up. The difference between the study groups was also significant. The percent of respondents who mentioned both the use of condom during sexual encounter and limiting to one partner increased from 15% at baseline to 24.7% at follow-up in the HEP villages, while the level of comprehensive knowledge in the control did not show improvement (from 24.2% to 20.3%, respectively). The levels of knowledge of respondents aged 15-24 years for the HIV/AIDS prevention methods by survey periods and by study groups is presented in table 6.1.

Table 6.1: Percent of respondents aged 15-24 with awareness about AIDS and prevention methods

Measures of awareness	Baseline			Follow-up		
	Control	HEP	Total	Control	HEP	Total
Knowledge of AIDS (heard of AIDS)	94.2	82.7	88.6	86.0	89.9	88.5
Knowledge of HIV prevention						
Use of condoms	38.2	24.3	31.5	55.9	43.4	48.0
Be faithful to one partner	64.6	60.6	62.6	40.7	59.2	52.4
Use of condom and be faithful to one partner	24.2	15.0	18.9	20.3	24.7	23.1

Knowledge on HIV transmission: Multiple questions to assess the occurrence of misconceptions about AIDS were included in the study, particularly during the follow-up survey. The questions include whether a healthy-looking person can have the AIDS virus; whether the AIDS virus can be transmitted by mosquito or other insect bites;

whether a person can be infected by HIV through supernatural power; and if a person can be infected by sharing food with a person who has AIDs.

Majority of respondents reported that a healthy-looking person can have AIDs virus, with significant improvement over the study period - 62.7% during the baseline and 73.3% during the follow-up survey. There was slight difference between the study groups at follow-up survey, with 74% and 71.8% of respondents mentioning that a healthy-looking person can have AIDs virus in the HEP villages and control villages respectively. Similarly, the percentage of respondents who believe that a person can't be infected by HIV through supernatural power improved significantly over the study period from 60.4% at baseline to 75.7% at follow-up survey. Although, the level of misconception about transmission of AIDs by mosquito or other insect bites was relatively higher than the other common misconceptions, majority of responds (58.2%) believe that AIDs can't be transmitted by mosquito or other insect bites, and the level of knowledge was similar among the study groups. On the other hand, the level of awareness that a person can't become infected by sharing food with a person who has AIDs was universal, with more than 98% of respondents rejecting the misconception during both survey periods, and in both study groups.

Table 6.2: Percent of respondents aged 15-24 with awareness on HIV transmission

Misconceptions on HIV transmission	Baseline			Follow-up		
	Control	HEP	Total	Control	HEP	Total
Percent who mention a healthy-looking person can have AIDS virus	62.2	63.3	62.7	71.8	74.0	73.3
Percent who mention AIDS cannot be transmitted by mosquito or other insect bites ¹	-	-	-	58.2	58.2	58.2
Percent who mention a person cannot be infected by HIV through supernatural power			60.4			75.7
A person cannot become infected by sharing food with a person who has AIDS	99.3	98.4	98.9	99.3	97.8	98.3
Percentage who say that a healthy-looking person can have the AIDS virus and who reject the two most common local misconceptions ^{1,2}	-	-	-	47.1	45.1	45.8
Percentage with a comprehensive knowledge about AIDS ^{1,3}	-	-	-	15.4	16.3	16.0

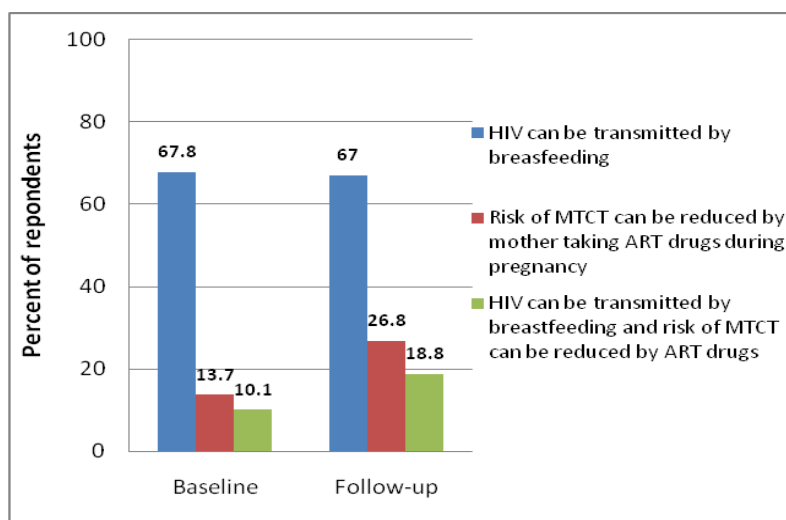
¹ There was no data during the baseline survey. ² AIDS can be transmitted through mosquito bites and by sharing food. ³ Respondent knows that using a condom at every sexual intercourse, be faithful to partner, and rejects the two most common local misconceptions-AIDS can be transmitted through mosquito/insect bites and sharing food with infected person.

During the follow-up survey, the percent of respondents who believe that a healthy-looking person can have AIDs virus, and who reject both of the common misconceptions (that AIDs can be transmitted by mosquito or other insect bites and that a person can be infected by sharing food with a person who has AIDs) was about 45.8%, and it was similar in both study groups. The level of comprehensive knowledge of HIV/AIDS prevention and transmission defined as comprehensive knowledge on HIV/AIDS prevention methods (both the use of condom and limiting to one partner), being aware that a healthy-looking person can have HIV, and rejecting the two most common local misconceptions was assessed during the follow-up survey. Overall, only 16% of respondents had comprehensive knowledge of HIV/AIDS prevention and transmission, and the level of knowledge was similar between the HEP (16.3%) and control villages (15.4%).

Knowledge about Mother-to-Child Transmission of HIV (MTCT)

About two-thirds of respondents during both survey periods were aware that HIV can be transmitted through breast feeding. However, only 13.7% and 26.8% of respondents during the baseline and follow-up surveys respectively, knew that the risk of MTCT can be reduced by mother taking ART drugs during pregnancy. The improvement on this aspect of MTCT was almost by 100%. Similarly, only 10.1% of respondents at baseline and 18.8% of respondents at follow-up were aware that HIV can be transmitted through breastfeeding and risk of MTCT can be reduced by mother taking ART during pregnancy. Although the low level of knowledge was low, the improvement over the study period was by more than 80%.

Figure 6.1: Percent of respondents with knowledge of prevention of MTCT



6.2 STIGMA AND ACCEPTING ATTITUDES TOWARDS THOSE LIVING WITH HIV

The accepting attitude towards those living with HIV/AIDS showed some overall improvement over the study period, and significant improvement in the HEP villages compared to the control villages. The percentage of respondents who were willing to care for family member with the AIDS virus in their home increased from 60% at baseline to 63.9% at follow-up. At follow-up survey, the percentage who was willing to care for a family member with the AIDS virus was 65.4% and 61.2% in the HEP villages and control villages, respectively. Similarly, 35% and 38.7% of respondents during the baseline and follow-up surveys, respectively, reported that they would buy fresh vegetables from shopkeeper who has the AIDS virus. The accepting attitude of respondents towards shopkeeper who has the AIDS virus during the follow-up survey was significantly higher in the HEP villages (41.5%) than the control villages (33.5%).

The overall percent of respondents who would allow their own child to play with a child who has HIV/AIDS improved slightly over the study period from 29.7% at baseline to 32.2% at follow-up. The difference between the study groups was also small. On the other hand, the percent of respondents who would not want to keep secret that a family member got infected with the AIDS virus did not show any improvement over the study period (44% at baseline and 42% at follow-up). However, more respondents in the HEP villages (46.6%) than in the control villages (33.3%) during the follow-up survey would not want to keep secret that a family member got infected with HIV. Although, the percentage expressing accepting attitude on all four measures was low during both study periods, it showed some improvement from 8.6% at baseline to 11.7% at follow-up. There was also difference

between the study groups, with 13.3% and 8.6% of respondents expressing accepting attitude on all four measures in the HEP and control villages, respectively.

Table 6.3: Percent of respondents with accepting attitudes toward those living with HIV

Accepting attitudes	Baseline			Follow-up		
	Control	HEP	Total	Control	HEP	Total
15 – 49 years						
Are willing to care for family member with the AIDS virus in the respondent's home	56.5	63.2	60.0	61.2	65.4	63.9
Would buy fresh vegetables from shopkeeper who has the AIDS virus	35.1	34.9	35.0	33.5	41.5	38.7
Would allow own child to play with a child who has HIV/AIDS virus	25.5	33.5	29.7	30.3	33.2	32.2
Would not want to keep secret that a family member got infected with the AIDS virus	44.9	43.2	44.0	33.3	46.6	42.0
Expressing accepting attitudes on all four indicators	8.1	9.0	8.6	8.6	13.3	11.7
Number of respondents who have heard of HIV/AIDS	398	604	1,002	388	775	1,163
15-24 years						
Are willing to care for family member with the AIDS virus in the respondent's home	57.1	64.2	60.4	69.7	68.8	69.1
Would buy fresh vegetables from shopkeeper who has the AIDS virus	36.5	41.4	38.7	45.3	43.1	43.9
Would allow own child to play with a child who has HIV/AIDS virus	22.6	42.6	31.7	35.7	36.9	36.5
Would not want to keep secret that a family member got infected with the AIDS virus	38.8	38.8	38.8	30.1	48.1	41.7
Expressing accepting attitudes on all four indicators	5.6	10.7	8.0	8.2	16.4	13.5
Number of respondents who have heard of HIV/AIDS	178	213	391	125	231	356

6.3 HIGHER-RISK SEX AND USE OF CONDOMS

Among respondents who had sex in the previous 12 months, less than 1% of respondents during the baseline and follow-up surveys reported that they had two or more sexual partners in the 12 months preceding the survey. The percent of respondents who reported that they had higher-risk sexual intercourse (sexual intercourse with a non-main partner) in the 12 months preceding the survey was 4% and 2.4% during the baseline and follow-up surveys, respectively. The percent of respondents that had two or more sexual partners and the percent who had higher-risk intercourse in the past 12 months was lower in the HEP villages than the control villages (table 6.4). The use of a condom at high-risk sexual intercourse showed slight improvement over the study period (from 15.2% at baseline to 16.3% at follow-up). The comparison by study group showed a higher improvement in the HEP villages (from 8.2% at baseline to 13.4% at follow-up) than in the control villages (from 25.4% to 20.1%, respectively), although the baseline condom use level was higher in the control villages (table 6.4).

The use of condoms as contraceptive methods was low during both study periods, but increased from 0.58% at baseline to 2.1% at follow-up (Table 6.5). Moreover, less than 1% of respondents reported that they were currently using condoms as contraceptive methods.

Table 6.4: Percent of respondents with multiple sexual partners and higher-risk sex in the past 12 months

Measures of high-risk sexual behavior	Baseline			Follow-up		
	Control	HEP	Total	Control	HEP	Total
Had 2+ partners in the past 12 months	1.0	0.6	0.8	1.6	0.2	0.7
Had higher-risk intercourse in the past 12 months ¹	3.8	4.3	4.0	2.9	2.2	2.4
Used a condom at last higher-risk intercourse ¹	25.4	8.2	15.2	20.1	13.4	16.3

¹Sexual intercourse with a non-main partner

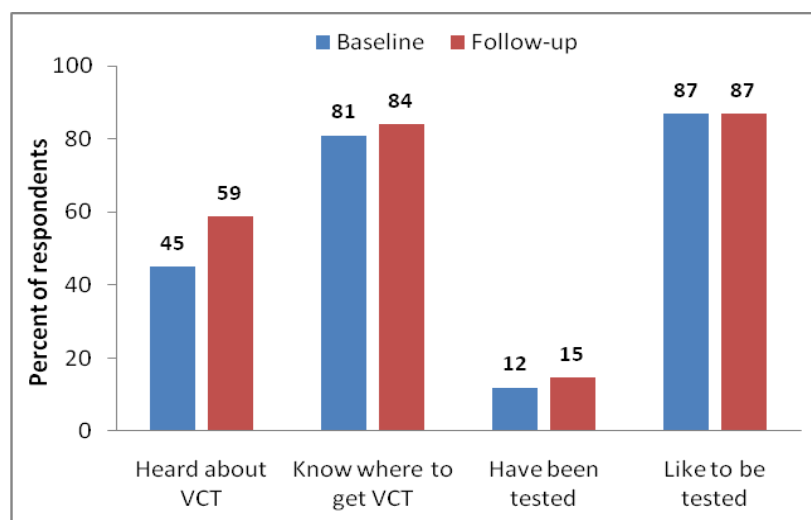
Table 6.5: Percent of respondents who use condom as contraceptive method

Use of condom	Baseline		Follow-up	
	Number	%	Number	%
Ever use of condom	5	0.58	20	2.1
Currently using condom	3	0.35	6	0.64
Number of respondents	855		938	

6.4 VOLUNTARY COUNSELING AND TESTING (VCT)

About half of respondents were aware about VCT, and there was a significant improvement in the level of awareness about VCT over the study period (Figure 6.2). Majority of the respondents who have heard about VCT also knew where to go for VCT service, but the improvement over the study period was minimal. On the other hand the level of voluntary counseling and testing was generally low, with some improvement over the study period. At baseline, 12% of respondents reported that they have been tested, and at follow-up, 15% reported they have been tested. Almost all respondents (9 in 10 respondents) who have never been tested before reported that they would like to be tested in the future. The HEP and control villages were similar in all aspects of VCT outcome measures above.

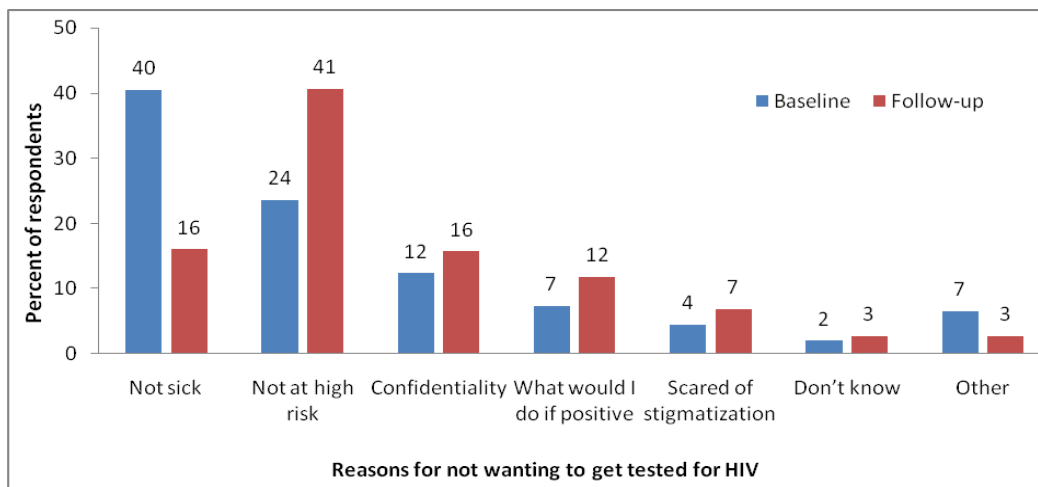
Figure 6.2: Percent of respondents by awareness, attitude and practice on VCT, by study period



The respondents who reported that they would not want to be tested in the future were asked why. The responses of the respondents are presented in figure 6.3 by study period. The commonest reasons were “not

being sick” and “not being at high risk”. The most interesting finding is that the importance of these reasons reversed over the study period. At baseline, “not being sick” was the commonest reason for not wanting to get tested, while at follow-up, “not being at high risk” became the main reason for not wanting to get tested in the future. This trend shows the increased awareness among the respondents that all people including a healthy person need to be tested. The trend of responses were similar between the HEP and control villages.

Figure 6.3: Percent distribution of reasons for not wanting to get VCT, by study period



6.5 TUBERCULOSIS

6.5.1 KNOWLEDGE ABOUT TUBERCULOSIS (TB)

The overall knowledge about the disease tuberculosis increased moderately over the study period. During the baseline survey, 58% of respondents had heard about pulmonary tuberculosis, and at follow-up survey, 65.1% of respondents have heard about pulmonary tuberculosis. The increment in the proportion of respondents who have heard pulmonary tuberculosis was similar in the HEP and control villages. In the HEP villages, the proportion of respondents who have heard about pulmonary tuberculosis increased from 57.6% at baseline to 65.7% at follow-up, while it was from 58.5% to 64.1%, respectively, in the control villages. Generally, more men than females have heard of pulmonary tuberculosis during both survey periods (eg. 57.4% of females and 66.4% of males at follow-up survey).

Table 6.6: Percent of respondents who have heard about pulmonary tuberculosis

Sex	Baseline						Follow-up					
	HEP		Control		Total		HEP		Control		Total	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Female	51.5	94	40.3	43	46.9	137	54.8	89	61.1	53	57.4	142
Male	58.7	503	61.3	307	59.9	810	67.5	507	64.5	289	66.4	796
Total	57.6	599	58.5	350	58.0	949	65.7	597	64.1	343	65.1	940

Among respondents who have heard of TB, percent of respondents who can tell a person has TB by different symptoms were similar during both study periods, and there was no major improvement over the study period.

The knowledge on symptoms of TB such as blood sputum, fever, night sweating and chest deformity increased moderately over the study period, while knowledge on symptoms such as long standing cough, loss of appetite and body weight, and difficulty of breathing showed no improvement. Although, the overall knowledge of long standing cough as symptoms of TB was wide spread, knowledge on other symptoms was generally low. Similarly, there was no difference on the percent of respondents who can tell a person has TB by different symptoms between the HEP and control villages.

Similarly, there was no significant improvement over the study period in the percent of respondents who reports the different mechanism that TB could spread through. The only major improvement was on the percent of respondents who report that TB is spread through living with sick/chronically coughing person (22.9% at baseline and 47.6% at follow up). Moreover, the knowledge about ways of tuberculosis transmission was not different between the HEP villages and control villages.

Table 6.7: Percent of respondents with knowledge about symptoms and transmission of tuberculosis

Among respondents who have heard of TB, who:	Baseline			Follow-up		
	HEP	Control	Total	HEP	Control	Total
Tell a person has TB if he/she has						
Long standing cough	83.5	82.5	83.1	77.4	80.3	78.4
Blood sputum	33.4	16.5	25.9	34.5	30.0	32.8
Fever	11.1	10.6	10.9	9.6	16.7	12.2
Night sweating	9.2	6.7	8.1	11.1	10.0	10.7
Loss of appetite	13.6	14.8	14.2	8.0	11.0	9.1
Loss of body weight	35.5	26.1	31.3	24.2	22.9	23.7
Difficulty in breathing	8.5	12.6	10.3	9.1	6.0	7.9
Chest deformity	1.5	0.5	1.1	3.6	1.0	2.6
Generalized body weakness	12.6	3.5	8.5	7.9	5.8	7.1
Report that TB is spread through:						
Living with sick/chronically coughing person	22.3	23.7	22.9	45.6	51.0	47.6
Inhaling breath from infected person	50.1	35.1	43.4	36.2	43.1	38.8
Sharing feeding & drinking utensils with sick person	38.9	19.0	30.0	30.8	25.2	28.7
No. of respondents	377	217	594	416	223	639

6.5.2 TUBERCULOSIS CASES AND TREATMENT

Since the number of tuberculosis cases reported during both study periods were small, comparison between study periods and study groups will not be reliable. The data on tuberculosis cases, treatment, place and completion of treatment is presented in the form of numbers to show the situation (table 6.8). There were 7 and 10 tuberculosis cases reported at baseline and follow-up surveys, respectively. Among the reported tuberculosis cases, seven cases (100%) at baseline, and 9 cases (90%) at follow-up have received treatment for tuberculosis. Among these cases again, four cases (57%) at baseline and five cases (50%) at follow-up finished the assigned treatment. At follow-up survey, all three (100%) tuberculosis cases reported in the HEP villages received and

finished their treatment, while only two (29%) out of 6 tuberculosis cases reported in the control villages received and finished their treatment.

Table 6.8: Number of TB cases and treatment 12 months preceding the survey

		Baseline			Follow-up		
		HEP	Control	Total	HEP	Control	Total
Number of TB cases	Female	4	0	4	2	3	5
	Male	1	1	2	1	4	5
	Not stated	1	0	1	0	0	0
	Total	6	1	7	3	7	10
Number (%) who received treatment for TB		6 (100)	1 (100)	7 (100)	3 (100)	6 (86)	9 (90)
Number (%) who finished assigned treatment		4 (67)	0 (0)	4 (57)	3 (100)	2 (29)	5 (50)
Place treatment received	Gov. hospital	2	0	2	0	4	4
	Gov. health center	3	1	4	3	2	5
	NGO health facility	1	0	1	0	0	0

6.6 CONCLUSIONS_HIV/AIDS

C. Current levels of outcome measures of HIV/AIDS

- Awareness of AIDS was widespread among both study groups during the baseline and follow-up surveys.
- Knowledge on various HIV prevention methods was moderate, but comprehensive knowledge was low.
- Knowledge on many of the HIV transmissions and misconceptions was reasonably high, although comprehensive knowledge was low.
- The level of stigma and discrimination towards those living with HIV/AIDS was generally high.
- Awareness about the transmission of HIV through breastfeeding was high, but awareness on reducing risk of PMTCT by ART drugs was low.
- Condom use rate at high-risk sexual intercourse was low.

D. HEP effect on outcome measures of HIV/AIDS

HEP had satisfactory effect on the following outcome measures

- The improvement in knowledge of condoms as preventive method was higher in HEP than control villages.
- Knowledge of limiting to one partner as preventive measure was significantly higher in the HEP villages (59.2%) than in the control villages (40.7%).
- Comprehensive knowledge on preventive methods increased by 65% in the HEP villages, but showed no improvement in the control villages.
- Slightly more respondents in the HEP villages were aware that a healthy-looking person can have AIDS virus than respondents in the control villages.
- The level of comprehensive knowledge of HIV/AIDS prevention and transmission was slightly higher in the HEP villages (16%) than the control villages (15%).

- HEP significantly decreased the level of stigma and discrimination towards those living with HIV/AIDS.
- HEP improved the use of condoms at high-risk sexual intercourse relative to the baseline levels.

HEP had minimal or no effect in improving the following

- The level of misconception about transmission of AIDS by mosquito or other insect bites was similar in the HEP and control villages.
- There was no difference between the HEP and control villages on the level of awareness that a healthy-looking person can have AIDS virus and rejecting both of the common misconceptions.

E. Overall change on outcome measures of HIV/AIDS over study period

The following outcome measures improved over the study period

- The knowledge of condoms as preventive method of HIV/AIDS transmission improved significantly.
- The overall comprehensive knowledge on preventive methods improved moderately.
- Awareness that a healthy-looking person can have AIDS virus improved significantly.
- There was a significant improvement on awareness that a person can't be infected by HIV through supernatural power.
- There was significant improvement in proportion of respondents who believe that a healthy-looking person can have AIDS virus and rejected both of the common misconceptions.
- Stigma and discrimination towards those living with HIV/AIDS decreased.
- Comprehensive knowledge of PMTCT increased by over 80%.
- The use of condom at high-risk sexual intercourse improved slightly.

The following outcome measures did not show significant improvement over the study period

- There was no improvement in wanting to keep secret that a family member got infected with AIDS virus.
- Awareness about HIV transmission through breastfeeding did not show improvement.

6.7 CONCLUSIONS_TUBERCULOSIS

- Awareness about tuberculosis was low with only half to two-thirds of respondents having heard about tuberculosis, and it was slightly higher in the HEP than control villages.
- Generally, knowledge on symptoms of tuberculosis was low. Long standing cough as symptoms of TB was widely known, but other symptoms were less known. The level of knowledge was similar in both study groups and there was improvement over the study period.
- Knowledge on tuberculosis transmission was low, with only less than half of respondents able to mention one or the other ways of tuberculosis transmission equally in both study groups. There was only minimal improvement over the study period.
- Although, the number of tuberculosis cases reported during both survey periods was very small to make a reliable comparison, the data indicated improvement in receiving and completing treatment over the study period, particularly in the HEP villages.

7. HEP SERVICE UTILIZATION AND SATISFACTION

7.1 BACKGROUND CHARACTERISTICS OF RESPONDENTS

The community utilization and satisfaction survey targeted a randomly selected woman from each sample household and a man from every other household. The total sample was 1,840. The socio-demographic characteristics of respondents are presented in table 7.1. About two-thirds (67.2%) of respondents were females and one-third (32.8%) were males. The majority of respondents were between the ages of 20-29 years (30.3%) followed by the age group between 30-39 years (28.8%). The educational status of majority of respondents was never enrolled (71%), while a quarter of respondents completed some primary (1-8) education (25.5%). Married respondents account for 87.5% of respondents. The distribution of respondents by region was as follows: 38.7% from Amhara, 27.1% from Oromia, and 34.1% from SNNP regions.

Table 7.1: Socio-demographic variables of respondents

	Characteristics	No.	Percentage
Gender	Male	610	32.8
	Female	1230	67.2
Age group	<20	86	4.7
	20-29	558	30.3
	30-39	530	28.8
	40-49	340	18.4
	>=50	326	17.7
Education	Never enrolled	1,307	71.0
	Primary (1-8)	469	25.5
	Complete Secondary (9-12)	36	1.9
	More than secondary	10	0.5
Socio-economic rank	Lowest	180	9.8
	Second	268	14.6
	Middle	405	22.0
	Fourth	491	26.7
	Highest	481	26.2
Marital status	Never Married	39	2.2
	Married	1589	87.5
	Divorced	65	3.6
	Separated	23	1.3
	Widowed	101	5.6
Region	Amhara	712	38.7
	Oromia	500	27.2
	SNNP	628	34.1

Majority of respondents were either head of the household (43.7%) or spouse (45.9%). Among the male respondents, majority (83.1%) were head of the household. Among the female respondents, majority were spouse (65.7%).

Table 7.2: Respondent's relationship to household head

Relationship to HH	Percent of respondent by gender		
	Male	Female	Total
Head	83.1	24.2	43.7
Spouse	6.1	65.7	45.9
Son/daughter	2.9	2.0	2.3
Others	7.5	7.6	7.6
Not Stated	0.3	0.6	0.5

7.2 COMMUNITY AWARENESS OF HEP

7.2.1 AWARENESS OF THE COMMUNITY ON HEP

Overall, 87.5% of respondents had heard about HEP. Relatively more men (90.1%) had heard about HEP than women (86.3%). Majority of respondents (92.6%) were aware of the presence of HEWs working in their village; however, there was no significant difference between men (93.7%) and women (92.0%). About 23.6% of respondents reported that either of the two HEW working in their village was related with them.

Table 7.3: Awareness of the community about HEP and HEWs in the village

Variables	Percent aware by gender		
	Male	Female	Total
Heard about HEP	90.1	86.3	87.5
Aware that HEWs are working in their village	93.7	92.0	92.6
Related to the HEW working in the village	21.9	24.4	23.6

7.2.2 AWARENESS ON THE TYPE OF HEALTH SERVICES PROVIDED BY HEP

More than two-third (69.9%) of respondents knew that HEP provides immunization services. A little more than half (51.9%) of respondents knew about the provision of family planning services through HEP. Only a third of respondents also knew the provision of health talks (36.2%), antenatal care (34.7%), water and sanitation (33.3%), and treatment of malaria (32.0%) through HEP in their villages. Relatively more women than men knew about the provision of immunization (70.1% vs. 69.2%), family planning (54.1% vs. 47.5%), health talks (37.7% vs. 33.1%), and antenatal care (35.3% vs. 33.5%). On the other hand, relatively more men than women knew about water and sanitation (39.5% vs. 30.3%) and treatment of malaria (35.4% vs. 30.3%).

Table 7.4: Community's awareness on the type of activities (services) undertaken by HEWs

Type of activities (services)	Percent aware by gender		
	Male	Female	Total
Immunization	69.2	70.2	69.9
Family planning	47.5	54.1	51.9
Health talks	33.1	37.7	36.2
Antenatal care	33.5	35.3	34.7
Water sanitation activities	39.5	30.3	33.3
Treatment of malaria	35.4	30.3	32.0
Delivery services	18.4	25.4	23.1
Vector control e.g. mosquitoes	25.3	20.4	22.0
HIV/AIDS talks	22.1	22.0	22.0
Treatment of diarrhea	19.6	15.6	16.9
Training of model HH	17.4	14.4	15.4
Treatment of other illness	14.1	11.2	12.1
Micronutrient nutrition	14.1	9.7	11.2
First aid	11.3	10.0	10.4
Postnatal	2.9	6.7	9.6
Working with health committee	8.3	8.5	8.4
Growth monitoring	8.3	7.6	7.8
Disease investigation	9.7	6.5	7.5
Supplementation	3.4	5.0	4.5

7.3 COMMUNITY UTILIZATION OF HEP SERVICES

To assess the utilization of the HEP services by the community, respondents were asked two questions: 1) if the respondent or any household member visited the health post or HEWs, 2) if the HEWs visited the respondent's household in the one month preceding the survey. Less than half (42.6%) of respondents (with more females - 45.1% than males - 37.6%) reported that the respondent or any other household member visited the health post or HEWs in the one month preceding the survey. On the other hand, 61.4% of respondents reported that HEWs visited their home in the one month preceding the survey.

Table 7.5: Percent of respondents who had contact with HEWs in one month preceding the survey

Type of contact (visit)	Percent who had contact by gender		
	Male	Female	Total
Household member visited HEWs	37.6	45.1	42.6
HEWs visited household	59.8	62.1	61.4
Total number	610	1230	1840

7.3.1 HEP SERVICES SOUGHT BY COMMUNITY

The utilization of HEP by the community was assessed, based on respondents' self report. Respondents who had approached the HEW proactively to seek HEP services at the health post or at the community in the one month preceding the survey were asked for the HEP service they sought. The HEP services sought in the one month

preceding the survey in order of frequency were to seek treatment for illness including malaria and diarrhea (63.6%), to receive immunization (36.3%), and for family planning service (27.8%). Other reasons reported by the respondents were health advice/counsel and delivery services, which are shown in table 7.6.

Table 7.6: Percent distribution of reasons for the community members visiting HEWs

HEP services sought by community	Percent sought by sex		
	Male	Female	Total
Illnesses (free drugs)	76.2	58.7	63.6
<i>Treatment of malaria</i>	<i>(21.8)</i>	<i>(19.5)</i>	<i>(20.1)</i>
<i>Treatment of diarrhea</i>	<i>(16.1)</i>	<i>(8.5)</i>	<i>(10.6)</i>
<i>Other illnesses</i>	<i>(38.3)</i>	<i>(30.7)</i>	<i>(32.9)</i>
Immunization	36.1	36.3	36.3
Family planning	17.2	32.0	27.8
Health advice/counsel	16.4	18.5	17.9
Delivery services	2.2	2.1	2.1

7.3.2 HEP SERVICES PROVIDED BY HEWS AT HOME

Respondents who were visited at home by HEWs were also asked for the type of HEP service they received. The most commonly received four HEP services in order of frequency were immunization (29.4%), water and sanitation (27.2%), health talks (23%), and family planning (17.6%). The least received four HEP services were supplementation (1.7%), first aid (1.7%), postnatal (2.1%), and growth monitoring (2.9%).

Table 7.7: Percent of respondents by type of HEP services received

HEP services received from the HEW at home	Percent received by sex		
	Male	Female	Total
Immunization	29.0	29.6	29.4
Water and sanitation activities	33.9	23.9	27.2
Health talks	19.6	24.6	23.0
Family planning	18.2	17.4	17.6
Vector control e.g. mosquitoes	18.3	12.7	14.5
Treatment of malaria	15.3	13.7	14.3
HIV/AIDS talks	9.2	9.6	9.5
Treatment of diarrhea	7.6	7.3	7.4
Micronutrient nutrition	8.8	6.6	7.3
Training of model HH	8.7	6.5	7.2
Antenatal care	6.4	5.7	5.9
Disease investigation	6.1	3.8	4.5
Delivery services	3.9	3.8	3.9
Working with health committee	2.9	4.0	3.7
Treatment of other illness	3.4	3.4	3.4
Growth monitoring	3.2	2.7	2.9
Postnatal	2.0	2.1	2.1
First aid	2.1	1.6	1.7
Supplementation	1.3	1.9	1.7

7.4 COMMUNITY SATISFACTION WITH HEP

The purpose of the community satisfaction study on HEP was to determine patterns of satisfaction with regard to the various HEP health service packages, overall satisfaction on the program as well as satisfaction related with health providers (HEW), and with health facility (health post) in a population-based sample of women and men who recently used the HEP services.

The satisfaction of the community on HEP services was assessed through various questions. The questions included satisfaction with the quality of each HEP health service package they received; questions that assess the general satisfaction with HEW related aspect of services grouped in various satisfaction dimensions: 1) technical quality of services, 2) communication with providers (HEWs), 3) interpersonal manner of HEWs, 4) amount of time spent with HEWs, 5) trust, and 6) accessibility and convenience of health post and health provider. Moreover, their satisfaction with the infrastructure renovation, availability of necessary medical equipments and medicines were assessed. Respondents indicate their degree of satisfaction with most items on a 5-point scale (minimum=1 and maximum=5), and satisfaction on some other items were on “yes” or “no” scale.

7.4.1 SATISFACTION WITH INDIVIDUAL HEP HEALTH SERVICE PACKAGES

Respondents expressed relatively high degree of satisfaction (very satisfactory or satisfactory) on the following HEP services: immunization (55.3%), family planning (45.7%), health talks (41%), and water and sanitation (36%). Respondents were least satisfied with the following HEP services: treatment of other illnesses - other than malaria & diarrhea (13%), supplementation (14.4%), micronutrient supplementation (15.3%), and delivery services (19%). The degree of satisfaction on other HEP services is presented in table 7.8.

Table 7.8: Percent distribution of satisfaction levels of respondents on HEP health service packages by gender

HEP service received	Percent of respondents by level of satisfaction and gender																				
	Very satisfactory			Satisfactory			Fair			Poor			Very poor			Don't know			Missing		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Immunization	31.0	32.1	31.7	24.4	23.1	23.6	15.6	14.1	14.6	2.9	1.5	2.0	1.0	0.3	0.5	16.4	18.1	17.5	8.7	10.7	10.1
Family planning	21.5	23.2	22.6	23.6	22.9	23.1	16.2	15.9	16.0	2.1	2.6	2.5	1.3	1.1	1.2	23.6	22.1	22.6	11.6	12.3	12.1
Health talks	18.0	22.1	20.8	23.6	18.5	20.2	13.4	14.7	14.3	2.3	2.4	2.4	1.8	1.4	1.6	24.6	23.5	23.9	16.2	17.2	16.9
Water sanitation activities	17.9	15.3	16.1	24.4	17.7	19.9	15.6	14.6	15.0	3.3	5.2	4.6	3.4	2.7	3.0	21.5	27.6	25.5	13.9	16.8	15.9
HIV/AIDS talks	14.8	14.6	14.6	23.9	17.7	19.8	13.9	14.8	14.5	4.7	3.3	3.8	2.0	1.5	1.7	25.6	29.9	28.5	15.1	18.1	17.1
Training of model HH	13.4	11.7	12.3	17.9	17.0	17.3	10.1	8.1	8.8	3.4	4.3	4.0	2.5	1.8	2.0	34.9	37.1	36.4	17.7	19.8	19.1
Treatment of malaria	13.1	11.0	11.7	18.7	17.1	17.6	15.6	11.7	13.0	5.7	6.1	6.0	2.8	2.8	2.8	27.1	32.1	30.4	17.1	19.3	18.5
Vector control e.g. mosquitoes	13.9	15.4	14.9	16.9	12.5	13.9	11.6	10.2	10.7	6.2	3.8	4.6	3.9	3.1	3.4	32.5	38.4	36.4	14.9	16.7	16.1
Antenatal care	15.4	10.4	12.1	13.6	17.1	15.9	10.8	14.5	13.3	7.5	6.0	6.5	2.9	2.5	2.7	33.8	31.9	32.6	15.9	17.4	16.9
Working with health committee	8.2	7.9	8.0	15.3	15.7	15.5	9.2	6.5	7.4	3.4	2.8	3.0	3.6	2.6	2.9	35.1	38.1	37.1	25.3	26.3	25.9
First aid	10.5	7.2	8.3	16.6	13.3	14.4	17.7	16.3	16.8	6.7	5.6	6.0	2.1	1.6	1.8	28.6	35.6	33.3	17.7	20.3	19.5
Treatment of diarrhea	11.0	8.9	9.6	16.7	11.0	12.9	17.2	16.1	16.5	9.2	10.7	10.2	2.8	3.5	3.3	26.7	31.7	30.1	16.4	18.1	17.6
Delivery services	7.2	5.4	6.0	12.6	13.1	13.0	10.2	12.8	12.0	14.3	12.2	12.9	3.9	4.2	4.1	34.4	33.7	34.0	17.4	18.5	18.1
Micronutrient nutrition	7.5	5.5	6.2	10.5	8.5	9.1	13.1	10.7	11.5	9.8	8.2	8.8	1.5	2.2	1.9	40.0	44.7	43.2	17.9	20.2	19.4
Supplementation	6.6	5.8	6.0	10.5	7.4	8.4	11.3	11.0	11.1	11.3	9.4	10.1	4.6	3.7	4.0	35.7	41.6	39.7	20.0	21.2	20.7
Treatment of other illness	5.9	4.7	5.1	10.2	6.8	7.9	14.9	14.1	14.4	15.7	13.1	14.0	7.2	5.5	6.0	29.5	37.3	34.7	16.6	18.5	17.9

M=males, F=females, and T= total

7.4.2 SATISFACTION WITH THE SERVICE OF HEWS

Satisfaction on technical quality of services received: About three-fourth of respondents were satisfied with the helpful suggestions made by HEWs (72.5%) and understandable explanations they received (77.9%). Two-third of respondents reported that HEWs understood them when they shared their problem (66.9%) and HEWs helped them to understand their illness (64.6%). The satisfaction on the skill of the HEWs was relatively lower than the other measures of technical quality. About 58% of respondents thought that the HEWs appeared skillful. The level of satisfaction was similar in both sex groups (Table 7.9).

Satisfaction on communication with HEWs: The satisfaction with regard to communication with the HEWs was high (Table 7.9). About three-fourth of respondents were satisfied with the attention they received from the HEW (76.9%), while about two-third of respondents reported that HEWs made them feel free to ask questions (62.1%) and discussed the treatment options with them (65.6%).

Satisfaction on interpersonal manner: The satisfaction with regard to interpersonal manner of the HEWs was variable. Majority (75.8%) of respondents was satisfied with the appearance of HEW to enjoy caring for them, and majority (74%) of respondents was satisfied by the fact that HEWs treated them well with respect. On the other hand, only one-third of respondents thought that the HEWs seemed friendly (35.5%).

Satisfaction on time spent with HEW: More than two-third of respondents were satisfied with the time the HEW spent with them to give complete explanation (69.3%).

Satisfaction on trust: About half of respondents (48.1%) expressed trust that the personal information they share with HEWs will be kept.

Table 7.9: Proportion of respondents satisfied during last visit to HEW

Satisfaction Dimensions	Items	Percent satisfied by sex		
		Male	Female	Total
Technical Quality	Explained things in an understandable manner	78.3	77.7	77.9
	Made helpful suggestion	73.1	72.2	72.5
	Understood you when you shared your problem	66.3	67.1	66.9
	Helped you to understand your illness	64.5	64.7	64.6
	Appeared to be skillful	57.1	58.2	57.9
Communication	Was really attentive for you	77.7	76.5	76.9
	Discussed with you the treatment option	66.0	65.3	65.6
	Made you to feel free to ask questions	63.3	61.6	62.1
Interpersonal manner	Appeared to enjoy caring for you	77.3	75.1	75.8
	Treated you with respect	73.4	74.3	74.0
	Seemed friendly	33.3	36.6	35.5
Time spent with HEW	Give complete explanations	69.6	69.3	69.3
Trust	Personal information shared with HEW will be kept	44.1	50.2	48.1

7.4.3 SATISFACTION ON ACCESS TO HEALTH PROVIDER (HEW), HEALTH POST, AND MEDICINES

Accessibility and convenience: Satisfaction on the accessibility and convenience dimension was generally good, with more than 90% of respondents reporting no difficulty to get to the health post, and more than four-fifth of respondents reporting no difficulty finding the HEWs (82.8%) and did not wait too long before receiving care (81%). On all three items included under accessibility and convenience satisfaction dimension, women were relatively more satisfied than men.

Technical quality: Satisfaction on the technical quality dimension at the health post level was generally low. Two items were assessed – the availability of recommended medicines and materials for seeing or reading. About a third of respondents reported that the recommended medicines were available at the health post (36.5%), while only 15% of respondents reported that they received material for seeing or reading from the HEWs. The levels of satisfaction on both items were similar for men and women.

Table 7.10: Respondents experience during last visit to the health post

Satisfaction Dimensions	Items	Percent satisfied by sex		
		Male	Female	Total
Accessibility and convenience	Did not wait too long before receiving care	78.9	82.1	81
	Had no difficulty to find the HEWs	78.7	84.7	82.8
	Had no difficulty to get to the health post	89.5	90.6	90.3
Technical Quality	Recommended medicines were available	36.2	36.7	36.5
	Received material for seeing/reading from HEWs	15.2	14.9	15

The overall perception of respondents on the quality of care, services, and information they received was assessed. About 12% of respondents reported that the quality of care, and services and information they received was excellent, while 43.9% reported as good. Overall, 35.4% of respondents were not happy with the services, and reported that the overall services were fair, poor or very poor.

Table 7.11: Overall perception of respondents on the service they received in the health post at last visit

Rating on service received	Percent of respondent by sex		
	Male	Female	Total
Excellent	13.4	11.2	11.9
Good	43.2	44.3	43.9
Fair	22.2	24.2	23.6
poor	7.0	6.9	6.9
Very poor	5.1	4.7	4.9
Don't know	4.1	3.9	4.0
Missing	4.9	4.8	4.8

7.4.4 SATISFACTION WITH QUALITY OF HEALTH POST

Cleanliness of health post: Respondents perception and satisfaction on the general cleanliness of the health post was assessed. About 16.4% and 30.7% of respondents were very satisfied and satisfied respectively with the cleanliness of the health post during their last visit.

Table 7.12: Respondent’s satisfaction on the cleanliness of the health post during last visit

Rating on cleanliness	Percent of respondent by sex		
	Male	Female	Total
Very satisfactory	16.2	16.5	16.4
Satisfactory	30.6	30.7	30.7
Fair	25.2	22.1	23.1
Unsatisfactory	5.1	2.9	3.6
Very unsatisfactory	0.8	0.2	0.4
Don't know	20.7	25.7	24.1

Health post renovation and medical supplies: Respondents’ satisfaction with regard to the health posts infrastructure, equipments and supplies was very low. Only 8.4% of respondents reported that they were very satisfied and 20.4% reported that they were satisfied with the renovation of health post infrastructure, and the availability of equipments and supplies in the health posts. Although 32.8% of respondents responded “don’t know”, about a third of respondents were not satisfied with the health post infrastructure and medical supplies.

Table 7.13: Respondents satisfaction on the health post (renovation, equipments, supplies)

Rating on health post	Percent of respondent by sex		
	Male	Female	Total
Very satisfactory	8.1	8.6	8.4
Satisfactory	20.2	20.5	20.4
Fair	24.7	21.6	22.6
Unsatisfactory	13.5	11.1	11.9
Very unsatisfactory	3.3	2.0	2.4
Don't know	29.6	34.3	32.8
Missing	0.7	2.0	1.6

7.4.5 OVERALL SATISFACTION

The satisfaction of respondents on the overall services provided by HEWs at the health post was assessed indirectly. Respondents were asked if they would visit the health post again for the same health issue and if they would recommend the same health post to other people. Both measurements revealed that about two-third of respondents were satisfied by the overall service, and specifically, 64.9% and 64.7% of respondents reported that they would visit the health post again and would recommend the same health post for other people, respectively.

Table 7.14: Percentage of respondents who would visit again and recommend the same HP to friends

Items	Percent of respondent by sex		
	Male	Female	Total
Visit again for a similar problem	68.1	63.4	64.9
Recommend the same health post to others	68.3	63.0	64.7
Total	610	1230	1840

7.5 COMMUNITY PERCEPTION ON HEP SERVICES

7.5.1 FULFILLMENT OF INDIVIDUAL HEALTH NEEDS BY HEP

Perception of respondents on how much of their health related needs are met by HEP was assessed. The endorsement by respondents was as follows: only 15.4% of respondents think that all of their health related needs are addressed by HEP, and another 28.1% of respondents thought that most of their health needs are addressed by HEP. More than half of respondents thought that only some of their health needs are met (41.6%) or none of their health needs are met (9%) by HEP.

Table 7.15: Percent distribution of respondents' perception of HEP in addressing individual needs

Level of individual health related needs addressed by HEP	Percent of respondent by sex		
	Male	Female	Total
All health related needs	16.5	14.8	15.4
Most of my needs	25.5	29.4	28.1
Only some of my needs	44.4	40.3	41.6
None of my needs	7.7	9.6	9.0
Missing	3.3	3.3	3.3
Don't know	2.6	2.6	2.6

7.5.2 FULFILLMENT OF COMMUNITY HEALTH NEEDS BY HEP

Respondents were asked if HEP addresses the health needs of the community in general. They were asked to rate their agreement with the statement that HEP addresses all health needs of the village on a 5-point scale (strongly agree up to strongly disagree). Most of respondents either strongly agree (20%) or agree (51.8%) that the health needs of the village is addressed by HEP. However, more than a quarter of respondents did not agree that HEP addresses the health needs of the village – with 2.7% strongly disagreeing, 5.2% disagreeing, and 15.3% neutral.

Table 7.16: Percent distribution of respondents rating of HEP in addressing needs of the community

HEP addresses community health needs	Percent of respondent		
	Male	Female	Total
Strongly agree	21.8	19.1	20.0
Agree	50.5	52.5	51.8
Neutral	14.8	15.6	15.3
Disagree	6.2	4.7	5.2
Strongly disagree	2.3	2.9	2.7
Missing	4.3	5.3	5.0

7.5.3 COMMUNITIES' PERCEPTION ON CONSTRAINTS OF HEP

Concerns and challenges expressed by community: The most important community concern identified by respondents relates to the general unavailability of various medicines. The proportions of respondents who reported the unavailability of antimalarial drugs, ORS, injections and other drugs (for treating other illnesses) were 19.3% , 12.3% , 8.5% and 27.8%, respectively.

Table 7.17: Percent of respondents by perception on constraints facing HEP

Area	Concerns and constraints	Percent of respondent by sex		
		Male	Female	Total
Drugs	Antimalaria	15.7	21.1	19.3
	ORS	16.2	10.2	12.3
	Injection	8.8	8.4	8.5
	Other drug	30.9	26.3	27.8
Medical supplies	Vaccines	3.8	4.0	3.9
	Bed nets	4.0	3.8	3.9
	Pills	2.0	3.1	2.7
	Condom	0.8	0.4	0.5
Human resource	Lack of adequate skill	12.8	11.0	11.6
	Inadequate number of HEWS	6.7	6.2	6.4
Support and supervision	No supervision	12.2	10.2	10.9
	Lack of housing for HEWs	11.8	7.3	8.8
	Support from district	6.3	6.2	6.3
	Support from Kebele council	6.1	8.2	7.5
	Support from community	7.0	5.1	5.7
	No health committee	3.5	3.3	3.4
	Community health promoter	3.5	0.9	1.8
	Poor remuneration	1.8	1.4	1.5
Health facility	Lack of health post	3.0	3.6	3.4
	Inadequate space at the health post	2.3	2.3	2.3

Lack of adequate skill of HEWs to manage health problems of the community was reported by 11.6% of respondents, while 6.4% reported inadequate number of HEWs as the important concern for HEP. Lack or inadequate support and supervision of HEWs were also commonly cited by respondents. In order of importance, the following were the some of the other concerns reported by the respondents: no supervision at all (10.9%), lack of housing for HEWs (8.8%), inadequate support from Kebele council (7.5%), and lack of support from district (6.3%). Other important concerns included inadequate or lack of medical supplies such as vaccines (3.9%), bed-nets (3.9%), contraceptive pills (2.7%) and condom (0.5%).

Communities’ recommendations to improve HEP services: The community was asked to suggest important measures that would improve the health services. The most common suggestion made by the community was to improve the supply and availability of drugs (50.7%), followed by fulfilling the necessary equipments, which was suggested by about a third of respondents (31.9%).

The suggestions made by the community with regard to improving human resource at the health post were also common. The communities’ suggestions include assigning highly skilled health workers at the health post (29.6%), increasing the professional level of HEWs (27.1%), increasing the number of HEWs (9.1%), and making HEWs to be available regularly (9.0%).

The recommendations made by the community with regard to support and supervision include regular supervision of HEWs (12.9%), increase motivation of HEWs (11.7%), ensure support to HEWs from supervisors (6%), and involving community in supervision (3.9%).

With regard to the health facility, 5.8% and 4.7% of respondents suggested to increase the working hours of the health post and increase the space of the health post respectively.

Table 7.18: Percent of respondents by suggested measures to improve services at the health post

Area	Measures	Percent of respondent by sex		
		Male	Female	Total
Drug and medical supplies	Improve drug supplies	54.1	49.0	50.7
	Fulfill necessary equipment	34.0	30.8	31.9
Human resources	Assign highly skilled health worker	36.8	26.1	29.6
	Increase professional level of HEWs	27.4	26.8	27.1
	Increase number of HEW	10.3	8.5	9.1
	Make HEW regularly available	11.0	8.0	9.0
Support and supervision	Supervise HEWs	11.5	13.6	12.9
	Increase motivation of HEWs	11.2	12.0	11.7
	Ensure support to HEWs from supervisors	6.3	5.8	6.0
	Involve community in supervision	5.3	3.2	3.9
Health facility	Increase working hours of the health post	6.4	5.5	5.8
	Increase space of health post	4.7	4.8	4.7

7.5.4 HAPPINESS OF THE COMMUNITY WITH PROVISION OF HEP IN THEIR VILLAGES

Irrespective of the community’s utilization and satisfaction of the HEP services in their village, respondents were asked to rate the degree of their happiness with availability of HEP services in the village. About 27.5% of respondents reported that they were very happy, and 50.2% of respondents reported that they were happy. A total of 14.3% of respondents expressed unhappiness with the provision of HEP in their village, with 13% and 1.3% of respondents reporting that they were ‘unhappy’ and ‘very unhappy’, respectively.

Table 7.19: Happiness rating with the provision of HEP in the village by the community

Rating of happiness	Percent of respondent by sex		
	Male	Female	Total
Very happy	27.1	27.7	27.5
Happy	51.9	49.3	50.2
Neutral	12.2	13.3	13.0
Unhappy	2.8	3.7	13.0
Very unhappy	1.9	1.0	1.3
Missing	4.0	5.0	4.7

7.6 CONCLUSIONS

- Overall, 87.5% of respondents in the intervention villages had heard about HEP.
- Awareness of community on the type of service provided through HEP is low. Immunization and family planning are known by majority, and about a third of respondents were aware of health talks, antenatal care, water and sanitation, and treatment of malaria.

Community Utilization of HEP Services

- Community demand was mainly for treatment of illnesses, immunization, and family planning service.
- The most frequently rendered services by HEWs at home of respondents were immunization, water and sanitation, health talks, and family planning.
- The least frequently rendered services by HEWs at home of respondents were supplementation, first aid, postnatal, and growth monitoring.

Community Satisfaction with HEP

High satisfaction

- With regard to the HEP health service packages, majority of respondents expressed highest satisfaction on immunization, family planning, health talks, and water and sanitation services.
- With regard to HEWs service, majority of respondents expressed high satisfaction on the helpful suggestions, explanation and attention they received from HEWs.
- Satisfaction on the accessibility and convenience (access to HEWs and health post) was generally good, with majority of respondents reporting no difficulty to get to the health post, no difficulty finding the HEWs, and did not wait too long before receiving care.
- Overall satisfaction on the HEP services was good.

Low satisfaction

- With regard to HEP service packages, majority of respondents expressed lowest satisfaction on treatment of illnesses, postnatal care, growth monitoring, micronutrient supplementation, and delivery services of the HEP services.
- With regard to HEWs service, majority of respondents expressed dissatisfaction on the skill and friendliness of HEWs.
- Satisfaction on the technical quality of the health service measured by the availability of recommended medicines and materials for seeing or reading was generally poor.
- Respondents' satisfaction with regard to the health posts infrastructure, equipments and supplies was very low.

Perception

- Majority of respondents perceived that individual as well as community health needs are fulfilled by HEP.
- However, respondents thought that the most important challenges in the implementation of HEP were unavailability of various medicines, and lack of adequate HEWs' skill to manage health problems of the community.
- Majority of the respondents thought that improving the supply of drugs and equipments, and increasing the professional level of HEWs and assigning highly skilled health workers at the health post would be important to improve HEP services.

8. RECOMMENDATIONS

The HEP evaluation study was designed to enable comparison of the relative change in outcome measures among intervention and control villages. A quasi-experiment design was used, which employed repeated cross-sectional comparison between a sample of villages surveyed before HEP implementation in 2005 and re-surveyed after HEP implementation in 2007; with a matched control sample of villages surveyed in 2005 and 2007. The following recommendations are made for consideration by all responsible stakeholders.

8.1 HYGIENE AND ENVIRONMENTAL SANITATION

- HEP is not expected to improve access to improved source of drinking water because all villages (HEP and control villages) have equal opportunity to receive support from districts in the provision of improved water source. However, the similar improvement in both intervention and control villages in water treatment practice at the source and at home indicates the low level of focus and prioritization given by HEWs.
- Although access to improved sanitation has improved dramatically within a short period of time due to HEP intervention, continued education to bring about behavioral change is necessary to ensure proper utilization of the sanitary facilities. Moreover, there is a need to standardize the type of sanitary facilities in order to encourage household members use it regularly.
- Despite the significant improvement in human waste management practice, the coverage in the HEP villages is a little more than 50% of the households. The management of solid waste is alarmingly very low - practiced by one in ten households. There is a need to further impart knowledge on human and solid waste management practice coupled with demonstration to achieve the desired level of waste management practices supported by community leaders through reinforcement of household as well as public waste management practices.
- Improvement in healthy house environment does not come in a short period of time due to the associated costs for construction. However, the level of improvement seen in the HEP villages is encouraging and should be further strengthened.
- The increased in availability of special apparatus for hand washing, although an important step, should be associated with increased hand washing behavior through imparting knowledge on diseases caused by poor sanitation and unhygienic situation.

8.2 MATERNAL AND CHILD HEALTH

- The knowledge and ever use of any contraception method improved significantly, but mainly on injectables and pills. The knowledge and utilization of other alternative contraception methods such as condom and long term methods is still low. There is a need to increase awareness about FP and about all available modern contraception methods in order to create demand. This should be accompanied by increased access to appropriate choices of methods to ultimately increase the utilization of modern contraception methods

including condom and long acting family planning methods to a level that can impact the total fertility rate. Moreover, collaborative outreach as well as home visits should be the main sources of contraceptive services.

- The HEWs performance survey (Volume II) showed that the level of knowledge and skills of HEWs in family planning counseling techniques was not adequate, which might have contributed to the non-significant improvement in contraceptive prevalence rate. Thus, there is a need to improve the FP counseling skills of HEWs through focused refresher training sessions.
- Continuous availability of contraceptive methods is critical to improve CPR because the findings in the health post performance survey (Volume III) showed high stock-out rates of contraceptive methods.
- The lack of improvement in ANC coverage and assisted skilled deliveries could be due to lack of adequate skill as shown by HEWs' competence survey (Volume II), lack of necessary equipments and facilities as shown by the health post performance survey (Volume III), and lack of demand due to low awareness by the community and cultural factors. Without improving these issues, HEP's contribution to the reduction of maternal and child mortality will be limited. Thus, there is a need for a focused practical training of HEWs to develop their knowledge and skills, to equip the health posts with the necessary equipments, and more importantly creating demand through behavioral change. To boost the demand of the community, other interventions such as provision of incentives to mothers as well as TBAs that bring mothers could be considered.
- Immunization coverage can only improve when the health posts are equipped with the necessary cold chain facilities and vaccines. However, the health post performance survey indicated that majority of health posts lack these facilities and immunization services are provided by outreach services from the nearest health centers and DMHO similar to villages without HEP. Equipping the health posts with cold chain facilities and vaccines will be critical to ensure access and improve coverage.
- In spite of the improved diarrheal treatment with ORS, the coverage is alarmingly very low – only one child in five children received ORS. Feeding practice of offering more liquid and food during diarrhea is critically important, however, despite the improvement, it was practiced by a third of mothers. Diarrhea is one of child killer diseases but can be treated easily. HEWs should focus on creating awareness on connection between ORS and re-hydration, and they should carry ORS during home visits in order to provide and demonstrate ORS use to mothers of children with diarrhea. However, the health post performance survey indicated that there were stock-outs of ORS, and without improving the availability of this life saving medicine, diarrheal treatment with ORS can't be ensured. Moreover, HEWs need to empower mothers with the necessary knowledge and skills of managing their children at home.
- Although, HEWs don't provide treatment of pneumonia, they are expected to advice home treatment of upper respiratory infections and immediately refer cases of pneumonia. The lack of improvement in the treatment seeking behavior for children with fever/cough in the HEP villages indicates lack of awareness among the community and lack of referral system. Moreover, the community expressed dissatisfaction on treatment of such illnesses. Creating awareness and strengthening the referral system would improve treatment of pneumonia and contribute to reduction of child mortality.

8.3 MALARIA

- Although there is an improvement in knowledge on correct mode of malaria transmission and reduction on misconception on the modes of malaria transmission, the level of knowledge is still unacceptable. The main reason for the low mosquito net utilization, despite the relatively high ownership of mosquito nets could be due to the lower knowledge of mosquito bites as a cause of malaria transmission. HEWs need to focus on creating correct knowledge of malaria transmission and how mosquito nets prevent infection. Moreover, HEWs need to demonstrate use of nets and monitor the utilization by house to house visit.
- The accomplishment in increased prompt treatment of fever or malaria cases should further be improved to achieve universal access to effective and quality treatment of malaria cases. HEWs activity on behavioral change should focus on the importance of early and prompt treatment of malaria so that the community can report cases immediately. Moreover, HEWs need to carry antimalarial drugs and RDTs with them during their home to home visits.

8.4 HIV/AIDS AND TUBERCULOSIS

- Mass media and IEC has to continue its efforts to augment behavioral change and bring about comprehensive knowledge on HIV/AIDS and address the existing misconceptions. IEC materials using local languages that are culturally sensitive need to be developed.
- There is high level of stigmatization and discrimination towards those living with HIV/AIDS. To decrease stigmatization and enhance accepting attitudes towards those living with HIV/AIDS, the roll-out HEP into all villages and the high political commitment should be supported by the mass media.
- Awareness of PMTCT needs to be improved, although it should also be accompanied by increased availability of services to reduce the risk of PMTCT.
- Promotion of safe sex including limiting sexual partners and the use of condoms for all sexually active individuals should continue and HEWs need to individualize the promotion activities. Moreover, in addition to educating on preventive methods, females should be encouraged to demand condom use. Stakeholders such as Kebele and religious leaders should be involved to influence behavior changes.
- The low level of HIV testing can be improved by increased awareness about and importance of VCT to promote behavioral change along with expansion of VCT services to increase accessibility, particularly to those who would like to be tested.
- All the activities should be supported by creation of anti-AIDS clubs, through school and peer education.

8.5 HEP SERVICE UTILIZATION AND SATISFACTION

- One in ten households was not aware of HEP program in their village. Among respondents who were aware of the HEP program, only few knew the various HEP service packages, while majority knew only some HEP service packages. For these reasons, the community utilization of HEP services on demand was limited to very few HEP services, mainly on treatment of illnesses, immunization, and family planning service.

- Similarly, HEWs' effort was also focused on providing few HEP health service packages during home visits, which mainly included immunization, water and sanitation, health talks, and family planning, while their service supplementation, first aid, postnatal, and growth monitoring was limited.
- The first step in the implementation of HEP program should be in creating awareness and demand to all HEP services, and provision of quality services.
- Majority of respondents expressed highest satisfaction only on immunization, family planning, health talks, and water and sanitation services. Community satisfaction was the lowest on HEP service packages such as treatment of illnesses, postnatal care, growth monitoring, micronutrient supplementation, and delivery services that were rendered less frequently by HEWs and had low demand from the community. Majority of respondents expressed dissatisfaction on the skills of HEWs in general. Moreover, HEWs competence survey showed HEWs lack competence and skill on these specific HEP services. More efforts should be exerted to ensure all community members are satisfied with all HEP services. To increase satisfaction of the community, HEWs need to give more focus and create demand for these HEP services. More importantly, HEWs' skill and competence on these services should be developed through re-fresher trainings, supportive supervision, and provision of guidelines and reference materials.
- Satisfaction with regard to helpful suggestions, explanation and attention received from HEWs was high and these should continue and strengthen further.
- The high satisfaction on the accessibility and convenience (HEWs and health post) indicates that two HEWs and a health post in a village of 5,000 people are adequate to ensure accessibility. However, it is also important to encourage HEWs spend more time in their village to further improve accessibility and satisfaction.
- The lowest satisfaction on the technical quality of the health service was due to lack of recommended medicines and materials for seeing or reading. Thus, improving the supply of medicines and other materials according to the standard of the HEP would increase the satisfaction of the community resulting in higher community utilization of services.

Majority of respondents thought that “the most important challenges in the implementation of HEP were unavailability of various medicines and lack of adequate HEWs' skill to manage health problems of the community”.

- The low satisfaction with regard to the health posts infrastructure, equipments and supplies would contribute to the low community demand of various HEP services. Health post performance survey indicated most health posts were poorly equipped with the necessary equipments and supplies, and improving the infrastructure, fulfilling the necessary equipments and supplies to ensure quality service is critical in attracting the community to increase utilization.

Majority of the respondents thought that “improving the supply of drugs and equipments, and increasing the professional level of HEWs and assigning highly skilled health workers at the health post would be important to improve HEP services”.

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