EVALUATION OF PREVENTIVE CARE PACKAGE PROJECT FOR PEOPLE LIVING WITH HIV/AIDS IN ETHIOPIA

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With support from the American people, the Preventive Care Package (PCP) project funded by USAID was implemented by a team of three international health organizations: Population Services International (PSI), Intrahealth, and Population Council.

The PCP project was supported by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), the largest commitment ever by any nation for an international health initiative dedicated to addressing a single disease. PEPFAR is a multi-faceted initiative for combating HIV/AIDS around the world through programs to prevent HIV infection and provide comprehensive care and treatment to those affected and infected by HIV/AIDS.

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ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
BCC	Behavior Change Communication
EDHS	Ethiopia Demographic and Health Survey
FMoH	Federal Ministry of Health
HAPCO	HIV/AIDS Prevention and Control Office
HIV	Human Immunodeficiency Virus
ITN	Insecticide Treated Net
PCP	Preventive Care Package
PEPFAR	President's Emergency Plan for AIDS Relief
PLWHA	People Living with HIV/AIDS
PSI/E	Population Services International/Ethiopia
ORS	Oral Rehydration Salt
STI	Sexually Transmitted Infection
SWS	Safe Water System
USAID	United States Agency for International Development
SNNPR	Southern Nations, Nationalities, and Peoples Region

EXECUTIVE SUMMARY

Preventive Care Package (PCP) for People Living with HIV/AIDS (PLWHA) in Ethiopia was a three-year project, funded by the United States Agency for International Development (USAID)/President's Emergency Plan for AIDS Relief (PEPFAR). The goal of the project was to reduce morbidity and mortality due to opportunistic infections among PLWHA by promoting the use of basic hygiene practices and disease prevention items provided in a pre-packaged kit. The PCP, pre-packaged kits that include soap, condoms, insecticide treated bednets (ITNs), WuhaAgar/PUR, de-worming agents, and narrow mouthed water vessels, were distributed free-of-charge to PLWHA at government health facilities. The project was implemented in four major regions of Ethiopia (Amhara; Oromiya; Southern Nations, Nationalities, and Peoples Region (SNNPR); and Tigray) and the Addis Ababa City Administration. Population Services International (PSI) led the project, with IntraHealth as its partner. Population Council oversaw the project evaluation.

In order to measure changes in knowledge, attitudes, practices, utilization of the intervention products, and morbidity associated with the PCP project, the Population Council conducted evaluative surveys among PLWHA in project sites. This evaluation report is based on a baseline survey, conducted in 2009 and an endline survey undertaken in 2011, among female and male PLWHA clients in selected health facilities. The list of facilities where the project was to be implemented in the first year of the project served as a sampling frame for the intervention sites, and the list of facilities where the project was planned to be implemented in the third year of the project served as a sampling frame for the control sites. Respondents were selected in two stages. First, 33 health facilities from the intervention sites and 12 health facilities from the control sites were selected for inclusion in the study based on probability proportional to size of ever-enrolled HIV-positive clients and equal allocation of respondents. Second, clients within the catchment area of the facilities were selected systematically until the predetermined sample of 1,588 respondents was reached (34 respondents from each of 38 selected intervention and control health facilities in the four regions and 44 respondents from selected health facilities in Addis Ababa). Selection was conducted without replacement. Respondents were asked questions related to exposure to PCP products, utilization of the product items, morbidity history, utilization of health services, sexual behavior, and opportunity, ability, and motivation related to health behavior concerning the promoted PCP products. In total, 1,487 and 1,585 PLWHA were interviewed for the baseline and endline surveys, respectively.

More than two-thirds of the respondents were females and more than 40 percent were aged 30-39 years. The background characteristics of respondents at baseline and endline surveys were different for marital status, level of education, and socio economic status at control and intervention sites.

Data shows that the PCP project has reached the majority of beneficiaries in the intervention sites. About 78 percent received the PCP kit; and among those more than 95 percent received the kit with soap, WuhaAgar, condoms, water containers and de-worming agents. Insecticide treated nets (ITNs) were not distributed among 87 percent of the respondents at the intervention sites. The PCP project has significantly increased condom availability and consistent condom use among respondents in the

intervention sites. Female respondents were significantly more likely to report consistent condom use as a result of the program intervention than male respondents. The proportion of respondents at endline who ever treated their drinking water using WuhaAgar and who drank WuhaAgar treated water during all the days of the week prior to the endline survey was significantly higher in the intervention sites than the control sites. Male and female respondents in the intervention site were 4.9 times more likely to drink WuhAgar treated water consistently compared to male and female respondents in the control sites, showing the effectiveness of the program towards consistent use of the product. Regular use of soap for hand washing was significantly higher in the intervention sites compared to control sites at baseline and endline indicating the insignificance of the PCP program towards improving regular use of soap for hand washing. A significantly higher proportion of respondents at endline were ever told by health providers to use a de-worming agent every six months compared to respondents in the control sites. Increased utilization of a de-worming agent every six months was also observed related to the program. The program did not show significant increase in utilization of ITN or hand washing with soap.

There is a need to scale up the project interventions specifically the promotion of WuhaAgar, water vessel and De-worming agent to address the health status of people living with HIV/AIDS living in all regions. There is also a need to promote behavioral change for effective utilization of program interventions in future project initiatives. Reviewing the project implementation and designing appropriate strategy is recommended to achieve the desired outcome for hand washing with soap and ITN use.

I. BACKGROUND

Sub-Saharan Africa accounts for only 11 to 12 percent of the world's population (UNAIDS, 2008; PRB, 2007). However this area contains the largest number of people living with HIV/AIDS (PLWHA) (67 percent), the majority of all new HIV infections (70 percent), and the greatest number of deaths related to AIDS (75 percent). In Ethiopia alone, it is estimated that more than one million people are living with HIV. In 2009, there were an estimated 44,750 deaths related to AIDS, 84,190 pregnancies among HIV-positive women, 14,140 HIV-positive births to women living with the virus, and 336,160 PLWHA requiring antiretroviral therapy (ART) (FMoH, 2007).

In developing countries such as Ethiopia, opportunistic infections are the leading causes of morbidity and mortality among PLWHA—ART alone is insufficient for a healthy life. Diarrhea, one of the most common opportunistic infections, affects 90 percent of PLWHA and results in significant morbidity and mortality, particularly among children with HIV and AIDS (Katabira, 1999). The World Health Organization estimates that 85 to 90 percent of diarrheal illnesses in developing countries can be attributed to unsafe water and inadequate sanitation and hygiene practices. Improvement of hygiene is a key approach to reducing diarrheal disease by promoting practices such as hand-washing with soap, water treatment and safe storage of drinking water. Introducing household-based safe water systems (SWS), such as treating the water with sodium hypochlorite solution and safe water storage, can also reduce diarrheal disease including among PLWHA (Quick et al., 2002, Lule et al., 2005).

Other basic preventive care interventions can also reduce illness, prolong life, and prevent HIV transmission for PLWHA in Africa. Utilization of de-worming agents on a daily basis was found to be associated with reduced morbidity and mortality, and had beneficial effects on CD4 cell count and viral load among PLWHA in rural Uganda (Mermin et al., 2004). Insecticide treated nets reduce the risk of malaria infection, which is associated with reductions in CD4 cell counts (Mermin et al., 2006b). Oral rehydration salts (ORS) combat dehydration among the general population including PLWHA. Finally, the provision of condoms to HIV-discordant couples has been associated with a more than 80 percent reduction in HIV transmission (Allen et al., 2003) and is highly likely to prevent HIV re-infection among PLWHA.

While there is some evidence from Uganda that some preventive care package items do yield beneficial health outcomes for PLWHA (Colindress et al., 2007), the outcome of using the preventive care items among PLWHA in the Ethiopian context is unknown. This report evaluates the outcome of a three-year preventive care package project for PLWHA in Ethiopia funded by the United States Agency for International Development (USAID)/President's Emergency Plan for AIDS Relief (PEPFAR). The evaluation was based on findings from baseline and endline surveys conducted by the Population Council.

II. PREVENTIVE CARE PACKAGE PROJECT FOR PLWHA IN ETHIOPIA

USAID/Ethiopia awarded the Preventive Care Package project to Population Services International/Ethiopia (PSI/E) in 2008, which was implemented in partnership with IntraHealth International and Population Council. The goal of the project was to reduce morbidity and mortality due to opportunistic infections among adults and children living with HIV/AIDS in Ethiopia. The project was multi-faceted and included the delivery of products and services, facilitating trainings and behavior change communication (BCC), all of which target the most common opportunistic infections among PLWHA. The project has four major components: 1) refining and developing a PCP; 2) bundling and distributing PCP elements for adult and pediatric cases 3) supporting utilization and adherence of preventive PCP elements through behavior change interventions at facilities and in the community; and 4) evaluating the outcome of the project.

The PCP kit was developed through a coordinated development process led by PSI/E, program partners, and stakeholders (Federal and Regional HIV/AIDS Prevention and Control Office and Regional health bureaus). The PCP kit was further modified and finalized by technical working group from PSI/E, program partners and stakeholders.

The project targeted the distribution of 215,000 PCP kits to clients receiving ART, pre-ART and PMTCT services in Tigray, Amhara SNNPR, Oromia regional states and Addis Ababa City Administration. The PCP kit elements include:

- Six bottles of Water Guard (Wuha Agar)and 24 sachets of PUR
- One 20 liter safe water storage vessel,
- Two long lasting insecticide treated bed nets (only in specified malaria areas),
- Four bars of soap,
- Four dose of de-worming tablets,
- 100 condoms
- An educational booklet that references correct procedures for utilizing each commodity.

About 211,000 PCP kits of the 215,000 PCP kits produced by PSI/E were distributed during the project period in Tigray, Amhara, Oromiya, SNNP regions and Addis Ababa Administrative City through 197 selected health facilities. The target health facilities were selected in consultation with respective regional health bureaus and selection was primarily based on the size of registered PLWHA in the facility. In addition, 505 health service providers and 745 community agents selected from the 197 health facilities were trained on preventive PCP and customer service. Different BCC activities were conducted through public mass media, printed media, and interpersonal communications to increase PCP uptake and utilization.

III. RESEARCH DESIGN & METHODOLOGY

Data collection and design

The objective of this study is to examine changes associated with the PCP project for PLWHA. The study is quasi experimental by design. Two cross-sectional surveys were undertaken – the first at baseline just before project implementation and the second at endline four months before project completion. The baseline survey was conducted between May and August 2009 from respondents in 38 health facilities in four regions (Amhara, Oromiya, the Southern Nations Nationalities and Peoples Region (SNNPR); and Tigray) and 7 facilities in Addis Ababa City Administration. The endline survey was undertaken from January to mid-March 2011 from respondents in the same facilities.

The list of facilities where the project was implemented in the first year of the project served as a sampling frame for the intervention sites. The list of facilities where the project was planned to be implemented in the third year of the project served as a sampling frame for the control sites. Respondents were selected in two stages. First, 33 health facilities from the intervention sites where the project was implemented in the first year and 12 health facilities from the control sites where the project was to be implemented in the third year were selected for inclusion in the study based on probability proportional to size of ever-enrolled HIV-positive clients. Facilities with at least 100 ever-enrolled HIV-positive clients were eligible for selection at baseline and the same health facilities selected at baseline were used for the endline survey. Second, clients within the catchment area of the facilities were selected systematically with equal allocation of respondents and sampling without replacement (34 respondents from each of 38 intervention and control sites in the four regions and 44 from Addis Ababa sites). This selection was based on the consecutive appearance of clients at the health facility, and the sampling interval varied according to the average daily client flow in each facility.

The survey questionnaire included questions on demographic characteristics; utilization of project items such as condoms, WuhaAgar, ITNs, and safe water systems, as well as hygiene practices. The instrument also included questions related to perception, behavior, opportunity, ability and motivational factors to use PCP items in the kit. Opportunity, ability and motivation constructs were measured through likert scale type four point ranging from ‘1’ for “strongly disagree” to ‘4’ for “strongly agree.” The questionnaire was drafted in English, translated into Amharic, and pretested in Addis Ababa. In cases where the respondent did not speak Amharic, interviewers used other regional languages; Tigrigna and Oromiffa. Interviewers had a minimum 12^{th} grade education and previous experience with data collection. Interviewers and supervisors took part in a four-day training provided by Population Council staff just prior to the baseline and endline surveys.

All respondents at baseline and endline provided their informed consent to participate in the study. The study received ethical approval from the Ethiopian Public Health Association ethical review board in Ethiopia.

Target groups

The target groups for the survey were female PLWHA aged 15-49 and male PLWHA aged 15-59 who were enrolled as clients in selected health facilities at the time of survey. The eligibility of females and males in the specified age range was defined to maintain compatibility and comparison with other major surveys like the Ethiopian Demographic and Health Survey (EDHS).

Sample size and selection

The sample size was determined using the following formula and assumptions:

$$n = \frac{D\left(z_{1-\alpha}\sqrt{2\bar{P}\left(1-\bar{P}\right)} + z_{1-\beta}\sqrt{P_1\left(1-P_1\right)+P_2\left(1-P_2\right)}\right)^2}{\left(P_1-P_2\right)^2};$$

Where *n* is the minimum sample size per group, α= 0.05 (one-tailed test of significance), β= 0.20 (or 1-β power = 0.80), D= design effect=1.5, P_1 is the assumed proportion for baseline group, P_2 is the assumed proportion for endline group, and $\bar{P}$ is the average of the two proportions. The sample is calculated for an aggregate of the four regions and for Addis Ababa separately assuming differences in the behaviors promoted by the project. It is also assumed that the intervention will result in an 8 percent increase in WuhaAgar utilization. P_1 is assumed 0.5 for respondents from the four regions in order to achieve optimal sample size and 7 percent for Addis Ababa based on a survey in Uganda (Colindress et al., 2007). The sample size was calculated to be 884 for the four regions and 301 for Addis Ababa, and 408 from control sites which include a 20 percent adjustment for non-response. The sample size of respondents from each health facility was determined to be 34 for the regional sites and 43 for Addis Ababa.

Indicators as measure of change

The most important variables to measure changes associated with the project were identified during the preparation of the questionnaire (Table 1).

Table 1: Objectives, indicators and variables for evaluating the PCP project

PCP product	Objective	Indicator	Variable
Condom	To promote consistent use of condom	Increased availability of condom	• Condom available at the household currently • Availability of condom within walking distance
		Increased consistent condom use	• Ever use of condom • Consistent condom use in the last month/last year
WuhaAgar	To increase consistent use of WuhaAgar treated drinking water and safe storage system & reduce incidence of diarrhea	Increased availability utilization of piped safe water vessel	• Availability of piped safe water vessel at household • Utilization of safe water vessel
		Increased availability and utilization of WuhaAgar	• Currently have WuhaAgar at household • Ever used WuhaAgar • Drank WuhaAgar treated water every day in the last week • Ever bought WuhaAgar • Agree that WuhaAgar makes water free of germs and safe to drink
Soap	To increase soap use to wash hands at critical times and reduce other opportunistic infections	Increased availability and utilization of soap	• Availability of soap at household currently • Regular use of soap before eating and after eating food • Regular use of soap after using toilet • Regular use of soap before preparing food • Regular use of soap after changing baby diaper
De-worming drug	To increase use of de-worming drug to every six months and prevent parasitic infections	Increased availability and utilization of de-worming drug	• Received information by health care provider to use de-worming drug every six months • Use de-worming drug every six months
ITN	To increase consistent use of ITNs and reduce malaria infection in malaria prone areas of the project	Increased availability and utilization of ITN	• Availability of ITN at household currently • Use of ITN during all nights in last year

Data analysis

The data was entered in Microsoft Access and converted to SPSS for analysis. Separate results are presented for Addis Ababa and the four regions. Data were weighted by the number of registered PLWHA in the selected health facilities to adjust for unequal probability of selection, and results are presented based on the weighted data except for the sample size. Respondents from Addis Ababa were analyzed separately. based on the assumption that the preventive care practice of respondents from regions varies from urban Addis Ababa. In order to control the effect of the project, comparison was made between intervention and control sites for selected variables to evaluate the project. For Addis Ababa comparison was made between baseline and endline results.

Respondents were read a series of assets that households may own and asked if their household possessed that item. Principle components analysis was used to determine the socioeconomic status of the respondent.

Factor analysis was used for each of the opportunity, ability and motivation measures using scale items, to determine which items contributed to a single factor. Rotated loading was examined to determine if any sub-factors existed within the proposed item for each construct. Items loading a single factor were retained and reliability analysis was conducted for these items. Scales were considered reliable if they had a Chronbach's alpha of 0.70 or higher and items were dropped to improve the alpha (PSI, 2005). A minimum of three items were required to create a multi-item scale composite variable. The composite variable is the sum of each of the individual variable item scores by the total number of variable items for that scale.

Means were used to find levels of indicators and behavioral determinants for monitoring the project, and logistic regression modeling was used to identify which behavioral determinants and population characteristics are predictors of a promoted behavior.

Limitations of the study

Our sample was limited to PLWHA who are government health facility beneficiaries and did not include PLWHAs served by private health facilities and those who unaware of their status. This may result in a bias towards respondents who attend government health facilities hence may not be representative of all PLWHA in Ethiopia.

IV. RESULTS

A. Sample characteristics

Data was collected from a total of 3,072 survey participants. Response rates were high, 98 percent for Addis Ababa, and 96 percent for the four major regions (Amhara, Oromiya, SNNP and Tigray).

A total of 1,487 respondents were interviewed at baseline survey, of which 19 percent were from Addis Ababa city Administration, 37 percent from Amhara, 29 percent from Oromiya, 8 percent from SNNP, and 7 percent from Tigray regions. Similarly, endline survey captured 1,585 respondents with similar proportions as the baseline survey in the five regions.

The majority of the respondents were female (68 percent in the four regions; 71 percent in Addis Ababa). Respondents who started ART increased from 83 percent at baseline to 88 percent at endline in the four regions, while it remained stagnant in Addis Ababa (88 percent). The majority of respondents were aged 25- 39 years (69 percent from four regions; 62 percent from Addis Ababa). Respondents in the intervention sites were more likely to be never married, divorced or widowed compared to the control sites ($p<0.05$). Respondents in the control sites were less educated and more impoverished compared to respondents in the intervention sites at baseline and endline.

Since there was no control site in Addis Ababa, characteristics of baseline and endline respondents' were compared (Table 2). There were no significant differences among baseline and endline respondents for most of the socio-demographic variables. Respondents' marital status, educational status, and socioeconomic status in the intervention sites appeared to be significantly different from the control sites at both baseline and endline survey. A greater proportion of respondents in the intervention sites had never been married (18 percent) compared to respondents in the control sites (13 percent). Respondents at the endline survey were more likely to be illiterate (18 percent) compared to respondents at baseline (11 percent), while a high proportion respondents at baseline were poor (38 percent) compared to respondents at endline (24 percent).

Table 2: Sample characteristics in control and intervention areas, 2009-2011

Variables	Categories	The Four Regions				Addis Ababa	
		Baseline Study (2009)		Endline Study (2011)		Baseline (2009)	Endline (2011)
		Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	(n=289)	(n=300)
Treatment Status	Pre-ART	16.8	16.6	11.6	11.9	12.2	12.1
	On-ART	83.2	83.4	88.4	88.3	87.8	87.9
Sex of Respondent	Male	34.3	27.4 *	31.9	33.6	29.5	28.7
	Female	65.7	72.6	68.1	66.4	70.5	71.3
Age group	15-24	8.4	10.1	9.8	9.3	10.1	5.7
	25-29	28.8	23.6	25.1	23.8	19.4	14.3
	30-39	40.4	42.7	46.1	46.6	45.4	44.8
	40-44	11.1	13.6	10.5	11.5	12.2	15.2
	45+	11.4	10.0	8.5	8.8	12.9	20.0
Mean age		33.1	33.1	33.0	33.8	34.4**	36.6
Marital status	Never married	15.4	5.1 ***	11.2	5.7 ***	17.7	12.8***
	Married	32.2	34.1	41.4	44.6	29.5	39.9
	Widowed	18.2	24.1	17.4	19.3	24.7	18.8
	Divorced	23.9	27.1	25.6	29.6	16.7	26.2
	Cohabiting	8.8	7.6	3.7	0.0	9.0	1.6
	Separated	1.6	1.9	0.8	0.8	2.4	0.6
Highest schooling completed	Illiterate	21.6	34.5 **	19.5	42.4 **	10.7	17.8**
	Grade 1-6	31.6	32.9	25.6	30.2	36.3	21.7
	Grade 7-8	19.9	13.0	21.6	11.9	19.7	24.5
	Grade 9-10	13.7	12.8	17.8	9.0	10.4	13.1
	Grade 11-12	9.1	4.6	8.3	2.8	17.3	17.2
	Grade 12+	4.1	2.2	7.2	3.7	5.6	5.7
Socio economic status	Poor	43.5	54.2***	34.0	47.7***	37.8	24.2***
	Medium	28.0	14.5	26.1	12.7	54.4	56.5
	Rich	28.5	31.3	39.9	39.6	7.7	19.4
Migration	Resident	37.3	32.2	38.8	45.4	38.9	33.7
	Migrant	62.7	67.8	61.2	54.6	61.1	66.3

* Significant at 0.05; ** significant at 0.01; significant at 0.001

B. Sex disaggregated characteristics of respondents

ART initiation was gender biased in the four regions, favoring males (92 percent) compared to females (86 percent) at endline (Table 3). The mean age for male respondents was 37 years and for females it was 31 years (t-test, $p<0.05$). Female were less likely to be single, divorced or widowed compared to male respondents. Females were also more likely to be illiterate and less likely to have more than 9 years of education compared to males.

Table 3: Characteristics of respondents by sex, 2009-2011

Variables	Categories	The Four Regions				Addis Ababa			
		Baseline		Endline		Baseline		Endline	
		Male (n=391)	Female (n=807)	Male (n=418)	Female (n=867)	Male (n=73)	Female (n=216)	Male (n=88)	Female (n=212)
Treatment Status	Pre-ART	13.6	18.2	7.7	13.6**	10.6	13.3	13.3	11.6
	On-ART	86.4	81.8	92.3	86.4	89.4	86.7	86.7	88.4
Age group	15-24	2.1	12.0**	3.8	11.8**	6.0	11.8**	5.6	5.4
	25-29	18.6	31.3	10.9	29.9	2.4	26.5	2.2	19.2
	30-39	42.8	40.2	46.3	46.8	66.7	36.3	32.2	50.0
	40-44	18.9	8.6	20.3	7.3	7.1	14.1	22.2	12.5
	45+	17.6	7.9	18.8	4.2	17.8	11.3	37.8	12.9
Marital status	Single	14.4	11.2**	13.5	7.6***	16.7	18.2**	18.7	10.3**
	Married	47.9	25.6	66.0	31.1	64.3	15.3	60.4	31.3
	Widowed	8.6	25.4	7.0	23.2	3.6	33.0	7.7	23.7
	Divorced	15.4	29.5	13.0	33.4	14.2	17.7	11.0	32.6
	Cohabiting	12.8	6.2	0.0	3.9	1.2	12.4	1.1	1.8
	Separated	0.9	2.1	0.5	0.8	0.0	3.4	1.1	0.3
Education	Illiterate	14.1	31.1**	17.6	30.7**	3.5	13.8**	12.2	20.1**
	Grade 1-6	32.5	31.8	25.8	27.6	28.2	39.9	18.9	22.8
	Grade 7-8	17.5	17.9	18.1	18.9	15.3	21.7	20.0	26.3
	Grade 9-10	20.2	10.1	21.2	12.2	11.8	9.4	12.2	13.4
	Grade 11-12	15.7	8.8	17.3	10.6	41.2	15.2	36.7	17.4
Socioeconomic status	Poor	45.8	47.3	37.1	38.7	36.5	38.3	29.1	22.3
	Medium	27.7	21.9	21.7	22.2	56.4	53.7	48.8	59.4
	Rich	26.5	30.8	41.2	39.1	7.1	8.0	22.1	18.3
Migration	Resident	28.3	39.2**	34.9	43.6**	64.7	59.6	63.7	67.4
	Migrant	71.7	60.8	65.1	56.4	35.3	40.4	36.3	32.6

* Significant at 0.05; ** significant at 0.01; significant at 0.001

C. Exposure to and utilization of PCP project items

One of the most important goals of the PCP project was to increase exposure and utilization of items in the PCP, through provision of information/education and the care items to PLWHA.

Exposure to PCP project items at baseline and endline was assessed among respondents in the intervention and control sites (Table 4). A significantly higher proportion of respondents in the four regions received information/education at endline (87 percent in intervention sites, 58 percent in the control sites) compared to respondents who received information/education at baseline (36 percent in intervention sites, 26 percent in the control sites). The main sources of information/education for the four regions were government health facilities (75 percent at baseline, 87 percent at endline) followed by radio (18 percent at baseline, 20 percent at endline) and television (12 percent at baseline, 14 percent at endline). At endline, a significantly higher proportion of respondents received information from government health facilities on the importance of PCP use in the intervention sites (93 percent) compared to respondents in the control sites (77 percent). A significantly higher proportion of respondents in Addis Ababa received information from the radio on the importance of PCP items at endline (35 percent) compared to respondents who received the information at baseline (19 percent).

A very small proportion (2 percent) of the respondents in the intervention sites and the control sites received the PCP items at baseline; this is probably from sources outside of the project (Table 4). At endline, 78 percent of respondents in the intervention sites received the PCP, while only one percent received PCP in the control sites. Similarly, 64 percent of the respondents in Addis Ababa (intervention site) received the PCP at endline compared to less than 1 percent who received the PCP at baseline. This shows that there was no significant contamination in the control sites or at baseline, and that the project package was well implemented in the intervention sites.

The survey showed that almost all of the respondents who received the PCP intervention in the four regions and Addis Ababa also received WuhaAgar, 98 percent received water container/vessel, and 97 percent received condoms or soap.

Table 4: Exposure to PCP items and source of information, 2009-2011

	The Four Regions				Addis Ababa	
	Baseline		Endline			
	Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	Baseline (n=381)	End line (n=402)
Received Information/Education on PCP	35.5	26.1	86.9***	58.4	45.5	90.8***
Source of Information						
Government health facility	74.8	65.3	93.0**	77.0	79.4	77.9
Radio	14.1	24.2*	12.6	23.5*	19.1	35.2**
Television	8.6	3.2	8.2	9.3	24.4	33.0
PLWHA Association	11.0	5.3	4.8	19.0	16.8	12.7
Private health facility	8.3	8.4	2.6	6.2	12.2	6.0*
NGO	7.6	7.4	2.2	5.3	13.7	4.9**
Pamphlets/Leaflets	2.1	6.3	1.5	1.3	3.8	10.9*
News letter	2.1	2.1	1.0	0.0	8.4	10.6
Billboard	0.0	0.0	1.6	0.0	0.0	4.2**
Received PCP Kit	2.0	1.9	78.0***	1.3	0.4	64.3***
Contents of the PCP Kit						
WuhaAgar	93.8	0.0	99.0	60.0	0.0	99.5
Water Container	25.0	0.0	98.6	0.0	0.0	98.0
Soap	25.0	0.0	96.8	80.0	0.0	98.0
Condom	25.0	0.0	96.7	80.0	100.0	97.0
De-worming medication	0.0	0.0	94.3	0.0	0.0	88.1
PUR	0.0	0.0	91.0	20.0	0.0	89.1
IEC Material	18.8	0.0	88.1	0.0	0.0	81.1
ITN (among residents of 2000 meter below sea level)	0.0	0.0	13.0	0.0	-	-

* Significant at 0.05; ** significant at 0.01; ***significant at 0.001

In more than 93 percent of the cases in the four regions and more than 87 percent of the cases in Addis Ababa, the providers (government health facility workers) of the PCP explained why the PCP items are given and how/when to use each of the items. Information, education, communication (IEC) materials were given along with the PCP components to more than 91 percent of the respondents (Table 5).

Table 5: Information on PCP kits received by respondents in intervention sites at endline, 2011

	Explained why given		Explained How/when to use		Received IEC material	
	Four Regions	Addis Ababa	Four Regions	Addis Ababa	Four Regions	Addis Ababa
Type PCP Kit						
Soap	92.8	89.2	92.3	89.0	87.7	70.7
WuhaAgar	97.9	93.0	97.7	93.0	92.8	85.9
PUR	95.3	87.1	95.0	87.1	90.4	74.0
Condom	96.5	92.8	96.1	92.8	89.7	84.2
Water Container	96.9	89.3	96.8	89.2	92.9	84.0
De-worming agent	97.1	89.2	96.8	89.3	92.8	84.0
IEC Material	96.1	90.8	96.4	90.8	91.8	90.5

D. Availability, utilization and effect of project on consistent condom use

Availability and utilization of condoms

There was no significant difference in the proportion of respondents who ever had sex, number of sexual partners, ever use of condoms, and consistent condom use between intervention and control sites at baseline survey (Table 6). However, at endline the proportion of respondents who ever use condoms, who have condoms at their household, and who consistently use condoms in the four regions significantly increased in the intervention sites compared to respondents in the control sites. The increase was observed for both male and female respondents, and thus shows that the PCP project has significantly increased condom availability and consistent condom use among respondents in the intervention sites in the four regions. The endline survey in the four regions showed that more female respondents in the control sites (11 percent) had more than one sexual partner compared to females in the intervention sites (7 percent); this requires further investigation.

In Addis Ababa, a significantly higher proportion of respondents were found to have condoms in their households at endline compared to respondents at baseline. However consistent condom use at the endline among male respondents was significantly lower than consistent condom use among males at baseline survey. This shows that condom availability in the household is not always associated with consistent condom use, especially among male respondents. On the other hand, consistent condom use at the endline survey was not significantly different from baseline survey among females and overall respondents of the survey. In the intervention sites, consistent condom use increased from 68 percent at baseline to 73 percent at endline, while it deceased from 59 percent at baseline to 48 percent at endline in the control site. This indicates that the program has prevented consistent condom use from declining.

According to the data (not shown), the most preferred source of condoms at endline survey was health facilities (42 percent), followed by groceries/shops (33 percent) and pharmacies (17 percent). The condom types most widely used were Sensation (32 percent), Hiwot Trust (30 percent) and unbranded (9 percent). Preferred source of condom at endline was not different from baseline for respondents in the four region and Addis Ababa..

Table 6: Sexual practice and condom use by sex, 2009-2011

	Baseline (Four Regions)		Endline (Four Regions)		Addis Ababa	
	Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	Baseline (n=289)	Endline (n=300)
Had sex in the last one year	46.9	49.0	54.3	48.3	48.0	46.7
Have more than 1 regular/non regular partner in the past one year						
-Male	14.0	11.6	16.9	10.0	10.9	15.8**
-Female	5.7	7.8	6.9	10.6*	2.5	9.2
-All	9.4	9.4	5.9	10.4	5.9	12.4
Ever used condom	50.5	44.4	53.3**	38.4	53.0	53.7
Currently have condoms at household						
-Male	48.2	47.0	68.1***	38.5	45.8	52.9
-Female	27.5	25.4	49.2***	18.6	23.1	47.4***
-All	37.5	29.0	58.4***	24.9	28.9	49.0***
Consistent condom use last month/last year						
-Male	71.7	62.0	71.1***	52.4	87.3***	62.1
-Female	65.2	57.3	74.5***	43.7	64.2	73.0
-All	68.1	59.1	73.0***	47.6	74.1	68.7

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001

Effect of project on consistent condom use

Multivariate logistic regression analysis was used to identify the effect of the project interventions on the likelihood of consistent condom use by adjusting for socio demographic variables. Age, marital status, educational status, socio economic status and site were entered into the logistic regression model as predictors of consistent condom use (Table 7).

In the male model, the intervention and educational status of respondents were significant predictors of consistent condom use at baseline. Male respondents in the intervention site were 2.1 times more likely to use condom consistently at baseline compared to male respondents in the control site. However, at endline consistent condom use between male respondents in intervention and control sites was not significant. This suggests that the intervention was not effective in promoting consistent condom use among male respondents, rather implies that male respondents in the intervention sites were less likely to use condom at the end of the project period.

On the other hand, female respondent in the intervention site were 3.2 time more likely to use condom consistently compared to female respondents in the control site, suggesting that consistent condom use was effective as a result of the intervention among female respondents

At endline , respondents in the older age group were more likely to use condoms consistently compared to the reference and the youngest age group 15-24 in both male and female models. Female respondents who have completed some level of education were also more likely to use condoms consistently compared to illiterate female respondents at endline.

Table 7: Predictors of consistent condom use by sex and time of survey among respondents who had sex in one year before the survey

Variables	Categories	Male				Female			
		Baseline		Endline		Baseline		Endline	
		OR	p-value	OR	p-value	OR	p-value	OR	p-value
Site	Intervention	2.10	0.029	1.46	0.211	1.39	0.229	3.16	0.000
	Control (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
Age group	15-24 (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	25-29	1.94	0.557	4.62	0.074	2.36	0.008	2.62	0.007
	30-39	1.00	0.997	4.20	0.079	1.88	0.069	2.03	0.061
	40-44	1.40	0.759	7.63	0.011	2.36	0.019	2.10	0.050
	45+	1.69	0.643	6.19	0.025	0.06	0.023	2.31	0.345
Marital status	Never married (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Married	0.77	0.677	0.34	0.040	1.50	0.329	1.67	0.329
	Widowed/separated/ divorced	0.82	0.792	0.50	0.345	1.23	0.629	1.26	0.672
	Cohabiting	0.63	0.523	0.22	0.566	1.57	0.335	1.11	0.873
Educational status	Illiterate (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Grade 1-6	5.91	0.000	1.44	0.355	1.34	0.355	2.29	0.003
	Grade 7-8	3.42	0.016	1.62	0.294	0.84	0.620	2.61	0.004
	Grade 9-10	6.74	0.000	5.63	0.000	0.71	0.390	6.01	0.000
	Grade 11-12	3.99	0.020	1.61	0.314	1.10	0.844	7.39	0.006
	Above Grade 12	4.73	0.016	1.23	0.671	0.37	0.140	1.06	0.917
Socio economic status	Poor	1.33	0.460	0.51	0.022	0.98	0.935	0.48	0.006
	Medium	0.64	0.232	0.81	0.517	1.29	0.403	0.97	0.905
	Rich (Ref)	1.00	-	1.00	-	1.00	-	1.00	-

E. Availability, utilization and effect of project on consistent WuhaAgar use

Availability and use of WuhaAgar

Table 8 shows availability and usage of safe water systems among PLWHA. At baseline, none of the respondents in the intervention and control sites had the promoted water vessels in their households, which is evidence of the absence of contamination in the project. Availability of safe storage systems in the household and use of the storage for treating water was significantly higher in the intervention sites (76 percent) compared to the control sites (none of the respondents). More than 61 percent of respondents in Addis Ababa used the safe water storage vessel at endline compared to none at baseline. Behavioral change, measured by treating water using WuhaAgar, showed a difference from baseline to endline. In the absence of significant difference between intervention and control sites in treating drinking water using WuhaAgar at baseline; the proportion of respondents who ever treated water using WuhaAgar (80 percent in intervention sites versus 61 percent in control sites) and who drank WuhaAgar treated water during all the days of the last week at endline (63 percent in intervention sites versus 23 percent at control sites)was significantly higher in the intervention sites compared to the control sites. This behavior holds for both males and females. This finding shows that the project has increased ever and current use of WuhaAgar among both male and female respondents. A significantly higher proportion of respondents in Addis Ababa had heard of WuhaAgar, ever used it, and were currently using the product at endline (96 percent

heard, 70 percent ever used, and 60 percent currently using) compared to baseline (82 percent heard, 8 percent ever used, and 3 percent currently using).

Table 8: Availability of WuhaAgar and consistent use of WuhaAgar-treated water for drinking all the days in the week prior to the survey, 2009-2011

	Baseline (Four Regions)		Endline (Four Regions)		Addis Ababa	
	Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	Baseline (n=289)	Endline (n=300)
Currently have piped safe water Vessel	0.0	0.0	79.0***	0.0	0.0	68.6
Currently using the safe water vessel	0.0	0.0	76.0***	0.0	0.0	61.4
Heard about WuhaAgar/PUR						
-Male	85.3	80.0	95.0	87.8	84.7	90.6
-Female	81.2	74.2	99.2	89.9	80.3	98.7**
-All	82.6	75.7	97.7	89.2	81.6	96.4**
Ever used WuhaAgar/PUR						
-Male	41.8	33.7	77.0***	43.1	7.1	47.1***
-Female	38.3	18.9	79.1***	44.7	8.1	78.1***
-All	47.8	30.3	80.2***	49.6	7.8	69.6***
Currently have WuhaAgar at household						
-Male	31.1	24.0	60.6***	22.3	3.5	47.8
-Female	29.6**	12.7	65.7***	23.4	3.0	65.2
-All	30.0**	16.0	61.1***	23.1	3.2	60.2***
Ever bought WuhaAgar						
-Male	13.0	13.0	18.8	11.5	4.7	25.0***
-Female	9.7	8.6	18.2	15.6	4.5	46.0***
-All	10.9	9.8	18.4	14.2	4.6	40.4***
Drank WuhaAgar treated water every day in last week						
-Male	23.0	19.2	59.2***	19.1	3.5	37.6
-Female	25.1	12.1	62.5***	22.6	2.0	54.3
-All	24.3	14.4	60.8***	20.6	2.1	49.5**
Agree that WuhaAgar makes water free of germs and safer to drink	70.5	97.0**	89.5	92.6	55.0	10.1***

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001

Effect of project on consistent use of drinking WuhaAgar treated water

Table 9 shows gender disaggregated predictors of consistent use of WuhaAgar treated drinking water (defined by use of WuhaAgar-treated drinking water during all the days of the week prior to the survey). Age, marital status, educational status, socio economic status and program intervention were entered into the logistic regression model as predictors of use of WuhaAgar treated water.

Both male and female logistic regression models showed a significant difference in consistent use of WuhaAgar treated water as the result of the program intervention. In the male model, there was no significant difference in consistent use of WuhaAgar treated water between intervention and control sites at baseline. However, respondents in the intervention site were 4.9 times more likely to use WuhaAgar treated water compared to respondents in the control sites, implying the effectiveness of the intervention.

In the female logistic regression model, a significant difference in consistent use of WuhaAgar treated water was observed both at baseline and endline. At baseline, respondents in the intervention sites were

1.7 times more likely to use WuhaAgar treated water compared respondents in the control sites, while the likelihood of using WuhaAgar treated water increased to 4.9 times after the program intervention, showing the contribution of the program for increased use of WuhaAgar.

Table 9: Predictors of consistently drinking WuhaAgar-treated water by sex and time of survey

Variables	Categories	Male				Female			
		Baseline		Endline		Baseline		Endline	
		OR	p-value	OR	p-value	OR	p-value	OR	p-value
Site	Intervention	1.34	0.355	4.91	0.000	1.71	0.016	4.87	0.000
	Control (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
Age group	15-24 (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	25-29	7.29	0.246	0.92	0.898	1.30	0.374	0.65	1.047
	30-39	3.85	0.431	0.82	0.729	1.15	0.651	0.66	1.066
	40-44	4.76	0.358	0.57	0.310	0.97	0.910	0.48	0.776
	45+	5.10	0.343	0.64	0.430	0.84	0.671	0.16	0.322
Marital status	Never married (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Married	2.73	0.048	1.50	0.185	0.83	0.511	1.16	1.939
	Widowed/separated/divorced	2.69	0.074	0.75	0.415	0.64	0.079	0.71	1.156
	Cohabiting	6.31	0.002	0.00	1.000	1.03	0.941	0.31	0.691
Educational status	Illiterate (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Grade 1-6	0.41	0.022	0.74	0.351	0.82	0.395	1.13	1.609
	Grade 7-8	0.64	0.294	0.58	0.125	0.89	0.658	1.04	1.531
	Grade 9-10	0.81	0.622	1.03	0.923	0.86	0.635	2.90	4.767
	Grade 11-12	0.20	0.007	1.21	0.645	1.24	0.524	0.89	1.510
	Above Grade 12	0.25	0.036	0.95	0.886	0.42	0.272	0.73	1.467
Socio economic status	Poor	0.70	0.287	0.81	0.394	0.94	0.774	0.78	1.076
	Medium	0.59	0.123	1.55	0.085	0.68	0.104	0.81	1.120
	Rich (Ref)	1.00	-	1.00	-	1.00	-	1.00	-

Hand washing using soap at critical times

The vast majority of respondents at baseline and endline had soap in their households (Table 10). At baseline, there was no significant difference in the availability of soap at respondents' households between the intervention sites (90 percent) and control sites (89 percent). However, a significantly higher proportion of respondents in the intervention sites (97 percent) had soap in their household compared to those in the control sites (91 percent) at endline. The increased availability of soap in respondents' household in the intervention sites at endline was not related to regular use of soap for hand washing. This is evidenced by the absence of significant difference in regular use of soap for hand washing in the intervention sites at baseline and endline.

Washing hands using soap before and after eating food, after using the toilet, and before preparing food were found to be significantly higher in the intervention sites compared to the control sites at both baseline and endline surveys. Hand washing using soap at critical times was not significantly improved by the project except before feeding children. A significant increase in using soap to wash hands after

using the toilet was observed at endline (80 percent) compared to baseline (64 percent) among the Addis Ababa respondents.

Table 10: Hand washing using soap at critical times, 2009-2011

	Baseline		Endline		Addis Ababa	
	Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	Baseline (n=289)	Endline (n=300)
Currently have soap at household	90.1	88.6	96.8***	91.4	92.6	97.6**
Regular users of soap to wash hands	74.3***	54.5	76.1***	61.2	74.3	88.7***
Users of soap to wash hands						
Before eating food	58.9*	51.4	62.0**	45.6	71.0	71.8
After eating food	53.2***	38.4	55.6***	43.9	49.8	57.8
After using toilet	57.3*	47.3	79.9***	63.1	64.2	79.9***
Before preparing food	38.9***	24.3	43.2***	28.9	49.1	52.4
Before feeding children	3.9	3.8	7.2*	3.6	2.9	3.6
After changing baby diaper	1.7	1.6	3.0	2.8	2.2	1.3

* Significant at 0.05; ** significant at 0.01;*** significant at 0.001

F. De-worming drug utilization

A higher proportion of respondents in the intervention sites (37 percent at baseline, 89 percent at endline) received a de-worming drug from government health facilities compared to respondents in control sites (9 percent at baseline, 33 percent at endline) (Table 11). However, the high proportion of respondents receiving a de-worming agent in the intervention sites was not necessarily due to the project intervention. Use of a de-worming agent every six months was significantly higher at endline in the intervention sites (98 percent) compared to the control site (89 percent), in the absence of significant difference between respondents in the intervention and control sites at baseline. A significantly higher proportion of respondents at endline were ever told by health providers to use a de-worming agent every six months compared to respondents in the control sites. This demonstrates the project's contribution to the increased utilization of a de-worming agent every six months and the role of health care providers to communicate the information. In Addis Ababa, a significantly higher proportion of respondents at endline had received a de-worming agent from government health facilities (97 percent versus 82 percent), used de-worming agent every six months (70 percent versus 25 percent), and were ever told by health providers to use a de-worming agent every six months (50 percent versus 36 months) compared to baseline respondents.

Table 11: De-worming agent use at baseline (2009) and endline (2011) by survey site

	Baseline		Endline		Addis Ababa	
	Intervention (n=817)	Control (n=381)	Intervention (n=883)	Control (n=402)	Baseline (n=289)	Endline (n=300)
Got de-worming from government HF	36.9***	9.0	88.5**	32.9	82.3	97.4***
Use de-worming agent every 6 month	90.8	89.7	98.3***	89.2	25.1	69.5**
Ever told by health provider to use de-Worming agent every six months	15.0*	10.1	66.7***	9.1	36.2	49.5**

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001

G. Availability, use of ITN and effect of project on year round ITN utilization

Table 12 shows respondents' knowledge about ITNs, their availability in the household and consistent use of ITN in the last year in the four regions. Only respondents who lived in areas 2000 meters below sea level were included for this analysis. Ninety-eight percent of respondents at baseline and 99 percent of respondents at endline were aware of ITNs, and there were no significant differences in ITN knowledge between intervention and control sites. ITN availability was significantly higher in the intervention sites (60 percent at baseline, 70 percent at endline) compared to control sites (43 percent at baseline, 66 percent at endline) showing that increased availability of ITNs in the intervention sites was accompanied by a similar increase in availability of ITNs in the control sites. The increased availability of ITNs in the control sites may be attributed to other interventions by the Ethiopian government. At baseline, year round use of ITNs was significantly higher in the control sites (70 percent) compared to intervention sites (62 percent); however there was no significant difference at endline. This finding suggests that the project made some contributions in the intervention sites for ITN use in the last year.

Table 12: ITN use in malaria endemic areas (altitude 2000 meters below sea level), 2011

	Baseline		Endline	
	Intervention (n=279)	**Control (n=160)**	**Intervention (n=306)**	**Control (n=164)**
Know ITNs	98.2	97.9	98.9	99.3
ITN available at home	60.4**	43.4	70.0**	66.0
Used ITN all the nights in the last year	62.1	69.8**	74.3	74.2
Get ITNs from Health Facility	10.5	10.2	31.5**	13.8

* Significant at 0.05; ** significant at 0.01

Effect of the project on year round ITN utilization

Table 13 shows multivariate results for predictors of year round utilization of ITN. Age group, marital status, educational status, and socio economic status were entered in to the logistic regression model as predictors of consistent use of ITNs.

The multivariate logistic regression model for male showed that respondents in the intervention sites were about 60 percent less likely use ITN as compared to respondents in the control site both before and after the program intervention. This implies that the program intervention did not bring about improvement in ITN utilization among male respondents. This could be due to other strong interventions in the control sites that might canceled out the visibility of the program intervention.

Similarly, ITN utilization was not improved due to the program intervention among female respondents. Other important predictors of year round ITN utilization were marital status and educational status. Married male and female respondents were more likely to use ITN compared to never-married male and female respondents at endline. Further female respondents with some level of education were less likely to use ITN compared to illiterate female respondents.

Table 13: Predictors of year round ITN utilization in malaria endemic areas by sex and time of survey

Variables	Categories	Male				Female			
		Baseline		Endline		Baseline		Endline	
		OR	p-value	OR	p-value	OR	p-value	OR	p-value
Site	Intervention	0.42	0.005	0.43	0.001	0.86	0.443	0.82	0.256
	Control (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
Age group	15-24 (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	25-29	3.50	0.447	0.65	0.549	2.12	0.021	0.60	0.051
	30-39	2.42	0.591	0.19	0.019	2.39	0.009	0.83	0.463
	40-44	2.80	0.527	0.20	0.019	1.88	0.059	0.59	0.046
	45+	2.31	0.613	0.24	0.041	0.72	0.486	0.53	0.103
Marital status	Never married (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Married	6.05	0.006	8.29	0.000	1.77	0.064	2.46	0.003
	Widowed/separated/ divorced	2.26	0.256	5.39	0.009	1.00	0.996	1.18	0.588
	Cohabiting	3.61	0.086	0.00	1.000	1.22	0.627	0.29	0.085
Educational status	Illiterate (Ref)	1.00	-	1.00	-	1.00	-	1.00	-
	Grade 1-6	0.40	0.027	0.54	0.083	0.72	0.108	0.54	0.002
	Grade 7-8	0.95	0.905	1.37	0.401	0.53	0.018	0.54	0.005
	Grade 9-10	0.45	0.084	0.61	0.188	0.26	0.001	0.66	0.092
	Grade 11-12	0.40	0.102	1.07	0.886	0.44	0.027	0.29	0.001
	Above Grade 12	0.30	0.060	1.02	0.967	0.24	0.090	0.76	0.489
Socio economic status	Poor	0.42	0.013	0.72	0.237	0.77	0.211	0.86	0.392
	Medium	0.69	0.287	0.82	0.499	0.70	0.123	0.62	0.013
	Rich (Ref)	1.00	-	1.00	-	1.00	-	1.00	-

H. Opportunity, ability and motivation to practice PCP components

Factors affecting behavioral change are modeled into three components for the purpose of this study. These components are opportunity to practice intended behaviors (includes availability and social norm), ability to perform intended behavior (includes knowledge, self-efficacy and social support), and motivational factors (includes attitude, belief, and outcome expectation). In addition to comparing change in behavior related to PCP implementation, we also looked at changes in these factors that are highly likely to affect behavior in the long term. Reliability and principal component analyses were used to identify variables to reliably measure these factors. A Cronbach's alpha of 0.70 or above is accepted and the analysis is based on this criteria. All factors are measured using a Likert scale ranging from 1 to 4; 1 for strongly disagree, 2 for disagree, 3 for agree and 4 for strongly disagree.

Condom use

Ability of respondents to use condom significantly increased among respondents in the intervention sites compared to respondents in the control sites at endline. At endline respondents in the intervention sites acquired significantly higher levels of knowledge about condoms' ability to prevent HIV re-infection, STIs, and their use as a family planning method compared to respondents in the control site. Respondents at intervention sites also developed significantly higher levels of self efficacy to correctly and consistently use condoms during the intervention period. Significantly greater levels of social support from friends, sexual partner/spouse was observed at both intervention and control sites at endline. Similarly, analyses of motivational factors showed a significant increase in outcome expectation among respondents in the

intervention sites. They expect condoms to be an effective tool to prevent HIV re-infection and STIs. Further, erroneous beliefs that free condoms break easily/are poor in quality and that condoms decrease sexual pleasure, intimacy or emotional closeness decreased in the intervention sites towards the end of the project period, while this was not the case in the control sites. The change in the knowledge, self efficacy and outcome expectation could be attributed to the PCP project. On the other hand the contribution of the PCP project towards improving negative attitudes about condoms and receiving social support to use condoms was not noticeable. Detailed analysis is shown in Table 14 below.

Table 14: Mean score on opportunity, ability and motivation of condom use

	Four Regions				Addis Ababa	
	Intervention sites		Control sites			
	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)
Ability						
Knowledge on condom use	**3.37**	**3.45*** **	**3.31**	**3.23**	***3.56***	***3.52***
Condoms can be used to prevent HIV re-infection	3.43	3.51**	3.27	3.32	3.69	3.56 *
Condoms can be used to prevent STI	3.36	3.50***	3.28	3.26	3.64	3.57
Condoms are not effective in preventing HIV re-infection (R)	3.03	3.21***	3.23	2.97***	3.29	3.25
Condoms should be used consistently and correctly to prevent STIs	3.42	3.43	3.29	3.20	3.50	3.57
Condoms can be used as a family planning method	3.47	3.59***	3.45	3.41	3.72	3.62 *
Social support	**2.58**	**3.00*** **	**2.29**	**2.62****	***2.79***	***2.86***
My friend and I encourage each other to use condoms correctly and consistently	2.49	2.86***	2.26	2.45*	2.98	3.04
Most of my friends approve the use of condoms	2.59	2.90***	2.41	2.69***	2.89	2.92
Most of my friends encourage consistent and correct use of condoms	2.54	2.88***	2.35	2.69***	2.74	2.90
There is someone that I can talk when I have questions or concerns about condoms	2.70	3.39***	2.82	3.04**	2.58	3.22 ***
My partners/spouse supported me to use condoms	2.51	2.91***	2.15	2.35*	2.86	2.72
Most of my community support for making decisions about my sex life	2.51	2.75***	1.89	2.38***	2.62	2.29 **
Self efficacy	**3.21**	**3.41****	**3.01**	**3.02**	***3.52***	***3.40***
I am confident that I can correctly use condoms	3.09	3.42**	2.97	2.92	3.43	3.39
I am confident that I can consistently use a condom with my regular partner and causal partner	3.14	3.39**	2.98	2.97	3.50	3.36
I can refuse to have sex with a new partner if we don`t have a condom even if I want to have sex	3.28	3.40**	3.09	3.15	3.51	3.42
Motivation						
Outcome expectation	**3.17**	**3.25***	**3.10**	**3.15**	***3.15***	***3.40 ****
Condoms are effective in preventing HIV infection	3.34	3.42*	3.25	3.24	3.49	3.59
Condoms are effective in preventing STIs	3.34	3.45**	3.27	3.24	3.40	3.51 **
If one uses condoms correctly and consistently they don't have to worry about contracting HIV	2.79	2.86	2.72	3.00***	2.50	3.11 **
Attitude	**3.05**	**3.15****	**2.99**	**2.83****	***3.39***	***3.18***
Using a condom all the time is difficult for me (R)	2.98	3.12**	2.82	2.63**	1.76	1.85
The idea of using condoms does not appeal to me (R)	3.00	3.08	3.05	2.72***	1.63	1.79
Condoms are uncomfortable (R)	3.12	3.20	2.97	2.86	1.59	1.72
Condoms break easily (R)	2.96	3.10**	3.04	2.98	1.62	2.04 **
Belief, condom strength	**2.13**	**1.96****	**2.11**	**2.09**	***1.85***	***1.82***
Free condoms mostly break easily	1.86	1.67**	1.76	1.93**	1.74	1.64
Condoms given for free are of poor quality	1.86	1.65*	1.78	1.88	1.72	1.59 *
Condoms in general are not safe	2.09	1.84**	2.12	2.04	1.98	1.87
Using two condoms at the same time is better than using just one	2.44	2.42	2.54	2.43	2.23	2.50 *
Most people who use condoms are promiscuous	2.08	1.73**	1.97	2.06	1.70	1.64
Condoms decrease sexual pleasure	2.29	2.22	2.30	2.14*	1.75	1.99 *
Condoms decreases intimacy or emotional closeness	2.26	2.14*	2.20	2.21	1.76	1.73

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001; (R) indicates reversed items

WuhaAgar/PUR use

Opportunities related to WuhaAgar use behaviors expressed in terms of availability and social norms have brought about a significant positive change both in intervention and control sites. Ability factors expressed in terms of self efficacy to treat drinking water using WuhaAgar and social support/encouragement received from friends and neighborhood showed positive significant change at both intervention and control sites. However, the rate of increase for all these positive changes was higher in the intervention sites compared to the control sites (Table 15).

Table 15: Mean scores on opportunity, ability and motivation of WuhaAgar/PUR use

	The Four Regions				Addis Ababa	
	Intervention sites		Control sites			
	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)
Opportunity						
Availability of WuhaAgar/PUR	**2.09**	**2.68****	**1.66**	**2.13****	***1.67***	***2.85 *****
It is difficult to find WuhaAgar/ PUR around here.(R)	2.49	2.10**	2.92	2.38**	2.92	1.92 **
I have easy access to organization when I want to get WuhaAgar/ PUR	2.21	2.58**	1.65	2.26**	1.43	2.65 **
I know where to obtain WuhaAgar/PUR	1.58	2.55**	1.33	1.53**	1.55	2.70 **
Social norms	**2.17**	**2.83****	**1.65**	**2.21****	***1.58***	***2.76 *****
Majority of PLWHA always use WuhaAgar to treat their drinking water	2.26	3.00**	1.71	2.26**	1.58	3.02 **
It is customary to treat drinking water among PLWHA	1.83	2.66**	1.43	1.96**	1.43	2.58 **
Most people in the community often take precaution to drink safe water	2.37	2.81**	1.89	2.31**	1.96	2.76 **
Most of my friends take action to treat their drinking water to make it safer	2.09	2.78**	1.68	2.28**	1.63	2.68 **
Ability						
Self efficiency	**2.98**	**3.30*****	**2.69**	**2.95****	***2.73***	***3.26 *****
I can treat the water that I drink whenever I need to	2.87	3.35**	2.37	2.91**	2.13	3.43 **
I am easily able to treat my water to make it safer to drink	3.02	3.42**	2.66	2.98**	2.76	3.50 **
Treating my water with WuhaAgar/PUR is not easy to do	2.34	2.03**	2.29	2.17**	2.26	2.24
I know how to make water safe for drinking	3.09	3.41**	2.64	3.00	3.03	3.31 **
Social support	**1.94**	**2.49****	**1.67**	**2.21****	***1.35***	***2.71 *****
I can get WuhaAgar/PUR from my PLHWA association	1.90	2.48**	1.56	1.93**	1.33	2.72 **
People in my neighborhood have taught me how to treat my water	1.90	2.42**	1.68	2.19**	1.27	2.45 **
My friends encourage me to use WuhaAgar/PUR	1.93	2.51**	1.75	2.28**	1.40	2.66 **
Fellow PLWHA have shown me how to use WuhaAgar/PUR	1.98	2.56**	1.69	2.39**	1.37	2.74 **
Motivation						
Outcome expectation	**3.45**	**3.44**	**3.29**	**3.25**	*3.22*	*3.40* **
Treating water with WuhaAgar/PUR is the safest way to protect my family from water-borne diseases.	3.36	3.40	3.22	3.15	2.80	3.30 **
WuhaAgar/PUR is effective in making water safe for drinking	3.47	3.49	3.30	3.31	3.34	3.47 *
Treating water with WuhaAgar/PUR gets rid of contaminants that can harm my health	3.49	3.44	3.33	3.30	3.39	3.45

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001; (R) indicates reversed items

ITN use

ITN use was an expected and normal standard behavior/social norm among respondents in the intervention sites and control sites, and this behavior significantly increased at endline in both intervention and control sites. On the other hand, self efficacy to use ITNs did not significantly change in the intervention sites and the rate of increase was less than the rate of increase in control sites. Contrary to the intervention sites, self efficacy in the control sites significantly increased at endline compared to baseline. The outcome expectation that ITNs protect against malaria were significantly reduced in the

intervention sites during the intervention period. This requires further investigation as to why PLWHA lost positive expectation. .Generally, there is no intervention related change in behavior to use ITN (Table 16).

Table 16: Mean score on opportunity, ability and motivation of ITN use, 2011

	Intervention sites		Control sites	
	Baseline (mean)	**End line (mean)**	**Baseline (mean)**	**End line (mean)**
Opportunity				
Social norm	**2.83**	**3.20****	**2.21**	**3.04****
Using ITN daily is normal among PLWHA	2.77	3.13**	2.08	2.90**
Majority of PLWHA know how to take precautions to avoid malaria	2.86	3.24**	2.20	3.06**
Most of my friends and neighbors use mosquito nets	2.85	3.24**	2.36	3.14**
Ability				
Self efficacy	**3.50**	**3.49**	**3.37**	**3.69****
I know how to use a bed net.	3.43	3.52	3.28	3.66**
Hanging a bed net is easy for me to do	3.46	3.44	3.30	3.66**
It is my responsibility to make sure I sleep under a bed net	3.60	3.51	3.54	3.72**
Social support	**2.37**	**2.66****	**2.00**	**2.62****
People in my neighborhood have told me how to use bed nets	2.33	2.62**	2.04	2.57**
People in my neighborhood have encouraged me to use bed nets	2.35	2.66**	1.97	2.62**
My friends have counseled me on how to use bed nets	2.41	2.71**	2.00	2.68**
Motivation				
Outcome expectation	**3.50**	**3.35****	**3.46**	**3.54**
The best protection against malaria is the use of ITN	3.56	3.43**	3.58	3.56
Using a bed net provides restful sleep for PLWHA	3.52	3.42**	3.42	3.65**
When I sleep under ITNs, I do not to have worry about getting malaria	3.45	3.16**	3.45	3.48
ITNs will kill mosquitoes, when they touch them	3.56	3.42**	3.46	3.58
ITNs will not protect me from malaria even if I use them (R)	1.60	1.68	1.65	1.56

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001; (R) indicates reversed items

De-worming agent use

Opportunity of receiving de-worming agent significantly increased from a mean of 2.77 to 2.91 among intervention sites, while it significantly decreased in control sites. Ability and motivational factors to use de-worming agents also significantly increased in the intervention sites, while significantly decreasing in the control sites towards the end of the project period. This shows the project contribution towards using de-worming agents (Table 17).

Table 17: Mean score on opportunity, ability and motivation of de-worming agent use

	The Four Regions				Addis Ababa	
	Intervention sites		Control sites			
	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)	Baseline (mean)	End line (mean)
Opportunity						
Availability	**2.88**	**2.72****	**3.09**	**2.62****	***2.97***	***2.84 ****
I know a place where I can obtain de-worming agents	3.18	2.98**	3.37	2.71**	3.48	3.06 **
It is hard to find de-worming agents when I need them (R)	2.21	2.32*	2.10	2.31**	2.00	2.21 *
De-worming agents are always available in an outlet within walking distance of my home	2.59	2.47*	2.99	2.43**	2.32	2.66 **
Social norms	**2.67**	**3.04****	**2.40**	**2.51***	***2.94***	***3.03***
Taking de-worming agent every six months is normal among PLWHA	2.33	2.87**	1.83	1.95*	2.55	2.93 **
It is not common for PLWHA to take de-worming agents every six months (R)	2.72	2.24**	2.94	2.71**	2.33	2.22
It is acceptable for PLWHA to take more precaution to avoid parasites	3.46	3.47	3.34	3.27	3.65	3.41 **
Ability						
Knowledge	**3.19**	**3.32****	**3.20**	**2.78****	***3.22***	***3.32***
De-worming can help prevent parasites	3.43	3.43	3.46	3.11**	3.55	3.48
Everybody should take a de-worming drug every six months for life	2.79	3.01**	2.72	2.20**	2.74	3.05 **
Preventing parasites will help me to live a longer and healthier life	3.41	3.49**	3.40	3.08**	3.42	3.42
Motivation						
Outcome expectation	**3.16**	**3.38****	**3.17**	**3.01****	***3.38***	***3.42***
Taking a de-worming agent every six months is effective in preventing parasites among PLWHA	3.27	3.47**	2.83	2.57**	3.29	3.47 *
Taking a de-worming agent every six months cannot protect people from parasites (R)	1.96	1.68**	1.72	1.76	1.69	1.65
De-worming has nothing to do with improving my health status	1.75	1.64**	1.68	1.78*	1.57	1.59
Intention	**2.96**	**3.32****	**3.30**	**2.77****	***2.86***	***3.31 *****
I intend to use a de-worming agent every six months for the rest of my life	2.99	3.46**	3.26	2.83**	3.02	3.48 **
I intend to start using de-worming agents (if not yet started using)	2.99	3.39**	3.30	2.99**	2.82	3.29 **
I intend to convince my friends who are HIV-positive to use de-worming agents every six months	2.83	3.21**	3.17	2.53**	2.73	3.25 **

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001; (R) indicates reversed items

I. Outcome/impact of preventive care package project

Morbidity history and hospitalization

The expected outcome of the PCP project is to decrease incidence of HIV-related opportunistic infections among the target groups. The overall analysis shows a significance reduction in prevalence of morbidity in the three months before the endline survey as reported by respondents. Incidence of diarrhea, acute febrile illness, and respiratory infection significantly decreased in the intervention sites suggesting the contribution of the project intervention to the reduction of morbidity levels (Figure 1, Table 18). Visits to health facilities were significantly reduced in the intervention sites, while there was no significant difference in the level of hospitalization among respondents in the intervention sites and control sites.

Diarrhea

There was a significant reduction in diarrhea episodes, from 18 percent at baseline to 9 percent at endline in the intervention sites ($\chi 2$ test, $p<0.01$, odds ratio (OR) = 0.47). This suggests that 53 percent of the respondents in the intervention sites were protected from diarrhea. Although there was a significant decrease in episodes of diarrhea in the control sites, ($\chi 2$ test, $p<0.01$, OR 0.64), the 36 percent protection may be due to other national interventions. The 17 percent difference in protection is likely to be directly attributed to the PCP project. The frequency and mean incidence of diarrhea episodes among those who acquired diarrhea was also significantly reduced.

Respiratory infections

Respiratory infections significantly reduced in the intervention sites from a prevalence of 17 percent at baseline to 6 percent at endline, ($\chi 2$ test, $p<0.01$, OR=0.31). There was no significant change between endline and baseline respiratory infection in the control sites. The reduction of respiratory infection among respondents in the control sites was achieved in the absence of significant difference between respondents in the intervention sites and control sites at baseline, which implies a 69 percent protection against respiratory infection is attributable to the PCP project. Similarly, the frequency of respiratory infection episodes significantly decreased in the intervention sites over the course of the project. This reduction of respiratory infection could be as a result of increased immunity due to reduction of diarrhea incidence.

Malaria

Malarial infection among respondents residing in malaria prone areas during the three months prior to the survey did not show significant reduction in the intervention sites compared to control sites. The mean number of malaria incidence also remained insignificant between the intervention and control sites at both endline and baseline surveys. In general, the PCP project contribution to reduction of malaria-related morbidity was not noticeable.

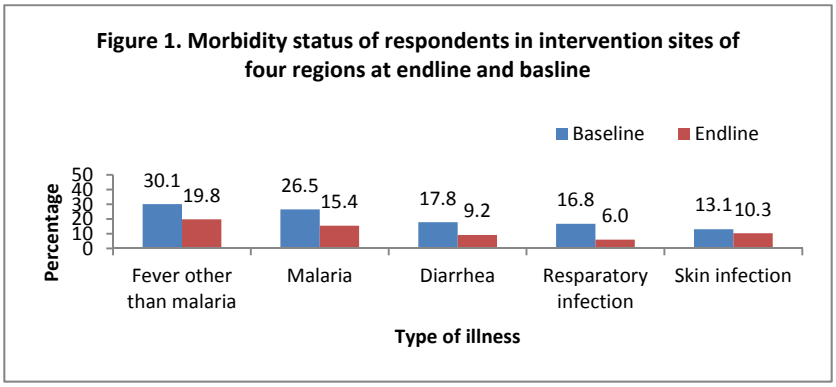

Figure 1. Morbidity status of respondents in intervention sites of four regions at endline and basline

Febrile illnesses other than malaria

There was a significant reduction in febrile illness from 30 percent at baseline to 20 percent at

endline in the intervention sites ($\chi 2$ test, $p<0.01$, OR=0.57). This implies that the project produced a protection rate of more than 43 percent against febrile illnesses, as there was a significant increase in the incidence of febrile illness among respondents in the control sites from 21percent at baseline to 28 percent at endline ($\chi 2$ test, $p<0.05$, OR=.45).

Skin diseases

There was a comparable 3 percentage point reduction in skin disease among respondents in intervention and control sites at endline compared to baseline. This reduction is statistically insignificant between baseline and endline surveys among respondents in the intervention and control sites ($\chi 2$ test, $p > 0.05$). This might be a result of absence of specific intervention that is strong enough to reduce skin diseases as part of the PCP intervention.

Table 18 Morbidity history of respondents at baseline and endline surveys, 2009-2011

	The Four Regions				Addis Ababa	
	Baseline		Endline			
	Intervention	Control	Intervention	Control	Baseline	End line
Diarrhea	17.8	19.6	9.2	13.4*	17.7*	11.1
Have diarrhea more than once last three months	53.1**	38.4	42.5	48.1	62.2**	28.6
Mean frequency of diarrhea	2.11**	1.63	1.93	1.97	3.8	1.7
Respiratory Infection	16.8	15.9	6.0	12.5***	20.5*	13.3
Mean number of respiratory infections	1.7	1.6	1.4	1.5	1.8***	1.2
Fever other than malaria	30.1***	21.3	19.8	28.2**	34.6	32.5
Mean number of fever condition	2.9*	2.7	3.0	2.7		
Skin Disease	13.1	13.4	10.3	10.9	21.9	18.8
Malaria	21.1	19.4	14.4	17.7	-	-
Mean number of malaria incidence	1.8	1.8	1.9	1.8	-	-

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001

Visits to health facilities

Visits to health facilities have significantly decreased from 34 percent at baseline to 17 percent at endline among respondents in the intervention sites ($\chi 2$ test, $p<0.01$, OR=0.40), implying a protection rate of 60 percent (Table 19). There was also a reduction in visits to the health facility among respondents in the control sites, from 35 percent to 27 percent ($\chi 2$ test, $p<0.05$, OR=0.68) during the implementation period and this has produced a protection rate of 32 percent. The difference in protection rate (28 percent) between respondents in the intervention sites and the control sites can be attributed to the PCP project intervention. Rate of hospitalization also decreased from 12 percent to 9 percent among respondents in the intervention sites; however this reduction is not statistically significant. There was an increase in mean hospital stay at time of hospital admission from 13.8 days to 22.2 days among those in the intervention sites (t-test, $p<0.05$).

Table 19: Morbidity and hospitalization status of respondents at baseline and endline surveys, 2009-2011

	The Four Regions				Addis Ababa	
	Intervention sites		Control sites			
	Baseline	End line	Baseline	End line	Baseline	End line
	(n=817)	(n=883)	(n=381)	(n=402)	(n=389)	(n=300)
Diarrhea	17.8	9.2**	19.6	13.4*	17.7	11.1*
No of Episodes						
One	46.2	56.6	62.5	51.9	37.3	73.5**
Two	24.8	22.4	20.8	32.7	15.2	2.9
Three or more	29.0	21.1	16.7	15.4	47.1	23.5
Respiratory Infection	16.8	6.0**	13.7	12.5	20.5	13.3*
No of Episodes						
One	50.7	65.4	56.9	60.4	40.4	85.4**
Two	23.5	23.1	25.9	18.8	36.8	7.3
Three or more	25.7	11.5	17.2	20.8	22.8	7.3
Malaria	26.5	15.4 **	18.8	18.3	-	-
No of Episodes						
One	54.1	74.5**	56.2	46.7	-	-
Two	23.0	6.4	28.1	25.8	-	-
Three or more	23.0	19.1	15.6	22.6	-	-
Fever other than malaria	30.1	19.8**	21.3	28.2*	34.6	32.5
No of Episodes						
One	22.4	20.2	39.7	22.9	16.3	46.0**
Two	23.2	23.6	15.4	25.7	9.2	4.0
Three or more	54.5	56.2	44.9	51.4	74.5	50.0
Skin Disease	13.1	10.3	13.4	10.9	21.9	18.8
No of Episodes						
One	54.0	65.9	64.7	57.1	38.7	69.5
Two	21.5	14.3	21.6	14.3	27.4	18.6
Three or more	21.5	19.8	13.7	28.6	33.9	11.9
Visit to health facility in last 3 Months	33.8	16.9**	35.0	26.8*	35.1	24.5**
Hospitalization in last 3 months	11.8	9.3	6.2	7.8	7.0	7.8

* Significant at 0.05; ** significant at 0.01; *** significant at 0.001

V. CONCLUSION AND RECOMMENDATIONS

A significantly higher proportion of respondents in the four regions received information/education about PCP at endline (87 percent in intervention sites, 58 percent in the control sites) compared to respondents who received information/education at baseline (36 percent in intervention sites, 26 percent in the control sites). The vast majority of respondents in the intervention sites were exposed to PCP kits containing soap, condoms, WuhaAgar/PUR, water container, de-worming medication and IEC material over the course of the project period. More than 78 percent of the respondents received the PCP kits through the project in the intervention sites, while only one percent received the kits in the control sites.

A significantly higher proportion of beneficiaries in the intervention sites were having the PCP items (condoms, WuhaAgar, soap and de-worming agent) in their household compared to respondents in the control sites. Availability and utilization of condoms, WuhaAgar, and de-worming agents were significantly higher among respondents in the intervention sites compared to respondents in the control site and this was as a result of the project intervention. Consistent condom use and regular use of WuhaAgar treated water for drinking were significantly higher for both male and female respondents as a result of the project intervention. However, utilization of soap for washing hands at critical times and of ITNs to prevent malaria did not show significant increases as a result of the PCP project intervention.

Multivariate logistic regression analysis demonstrated that the intervention was not effective in promoting consistent condom use among male respondents. On the other hand, female respondent in the intervention site were 3.2 time more likely to use condom consistently compared to female respondents in the control site, suggesting that consistent condom use was effective as a result of the intervention among female respondents. At endline, male and female respondents in the intervention site were 4.9 times more likely to use WuhaAgar treated water compared to respondents in the control sites, implying the effectiveness of WuhaAgar intervention in increasing utilization. ITN utilization was not improved due to the program intervention among male and female respondents.

The PCP project has resulted in decreasing incidence of opportunistic infections; thus, decreasing morbidity from these opportunistic infections. The overall analysis shows a significant decrease in prevalence of morbidity as reported by study participants. Incidence of diarrheal diseases, respiratory infection, and febrile illnesses other than malaria were significantly reduced. However, there was no significant reduction in morbidity related to skin and malaria infection due to the PCP project. Frequency (episodes) of diarrhea, febrile illness other than malaria and respiratory infection was also significantly decreased.

Based on the findings of the evaluation, the following recommendations are suggested for further consideration.

1. The project has resulted in significant reduction in morbidity from common opportunistic infections, mainly diarrhea, respiratory infection and febrile illnesses other than malaria. Therefore there is a need to scale up the project interventions to reach PLWHA living in all regions.

2. A considerable behavioral change to use the PCP items was observed as assessed by opportunity, ability and motivational factors. This indicates the need to strongly promote behavioral change for effective utilization of program interventions in future project initiatives.

3. Using soap for washing hands and year round ITN utilization in malaria prone areas were not well addressed by the project. There is a need to review the current implementation strategy or change the strategy to promote use of these items.

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VII. APPENDIX

Table A1: Reliability analysis, condom use

Items	Cronbach's alpha	No of items	Questionnaire number of selected items
Opportunity			
Social norms	0.56	3	v1022, v1023, v1025a
Ability			
Knowledge on condom use	0.78	5	v1026, v1027, v1028, v1029, v1030
Social support	0.84	6	v1031, v1032, v1033, v1034, v1035, v1036
Self efficacy	0.86	3	v1037, v1038, v1039
Motivation			
Outcome expectation	0.74	3	v1040, v1041, v1042
Attitude	0.73	4	v1043, v1044, v1047, v1048
Belief, condom strength	0.73	7	v1049, v1050, v1051, v1052, v1053, v1054, v1055
Belief, decision making	0.53	3	v1056, v1057, v1058
Fear	0.54	3	v1059, v1060, v1061

Table A2: Reliability analysis, WuhaAgar use

Items	Cronbach's alpha	No of items	Questionnaire number of selected items
Opportunity			
Availability	0.84	6	v1139, v1140, v1141, v1141a, v1141b, v1141c
Social norm	0.87	5	v1142, v1143, v1144, v1145, v1145a
Ability			
Knowledge	0.64	5	v1146, v1147, v1148, v1149, v1149a
Self efficiency	0.74	5	v1150, v1151, v1152, v1153, v1153a
Social support	0.89	4	v1154, v1155, v1156, v1157
Motivation			
Attitude	0.54	3	v1158, v1160, v1162
Intention	0.67	4	v1163, v1164, v1165, v1165b
Threat	0.56	3	v1166, v1168, v1169a
Outcome expectation	0.83	5	v1170, v1171, v1172, v1172a, v1172b

Table A3: Reliability analysis, ITN use in malaria endemic areas

Items	Cronbach's alpha	No of items	Questionnaire number of selected items
Opportunity			
Social norm	0.78	6	v1216, v1217, v1218, v1218a, v1218b, v1218c
Ability			
Knowledge	0.49	8	v1219, v1221, v1222, v1223, v1224, v1224a, v1224b, v1224c
Self efficiency	0.76	5	v1225, v1226, v1227, v1227a, v1227b
Social support	0.92	4	v1228, v1229, v1230, v1230a
Motivation			
Threat	0.64	6	v1231, v1232, v1233a, v1233b, v1233d, v1233e
Outcome expectation	0.78	7	v1234, v1235, v1236, v1237, v1238, v1238a, v1238b
Belief	0.64	4	v1241, v1241a, v1241b, v1241c

Table A4: Reliability analysis, ORS use

Items	Cronbach's alpha	No of items	Questionnaire number of selected items
Opportunity			
Availability	0.80	4	v1411, v1412, v1413, v1413a
Ability			
Knowledge	0.72	4	v1414, v1416, v1416a, v1416b
Social support	0.86	4	v1417, v1418, v1419, v1419a
Self efficiency	0.74	4	v1420, v1421, v1422, v1422a
Motivation			
Outcome expectation	0.69	3	v1423, v1425, v1425a
Attitude	0.62	4	v1426, v1427, v1428, v1428a
Intention	0.67	4	v1429, v1430, v1431, v1431a

Table A5: Reliability analysis, de-worming use

Items	Cronbach's alpha	No of items	Questionnaire number of selected items
Opportunity			
Availability	0.82	5	v1510, v1511, v1512, v1512a, v1512b
Social norm	0.78	5	v1513, v1514, v1515, v1515a, v1515b
Ability			
Knowledge	0.72	5	v1516, v1517, v1518, v1518a, v1518b
Motivation			
Outcome expectation	0.77	5	v1519, v1520, v1521, v1521a, v1521b
Intention	0.85	4	v1522, v1523, v1524, v1524a