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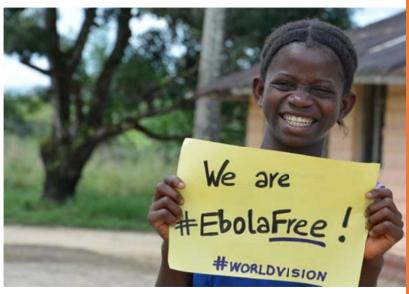of PUBLIC HEALTH

World Vision

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An Exploratory Study to Examine the Effectiveness of Community Based Ebola Virus Disease Prevention and Management Strategies in Bo District, Sierra Leone

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Acronyms

ADP	Area Development Program
CHW	Community Health Worker
CVA	Citizen Voice and Action
ETU	Ebola Treatment Unit
EVD	Ebola Virus Disease
FGD	Focus Group Discussion
HDI	Human Development Index
HH	Household
HSR	Human Subjects Research
IPC	Infection, Prevention and Control
IRB	Institutional Review Board
JHSPH	Johns Hopkins Bloomberg School of Public Health
KII	Key Informant Interview
NGO	Non-Governmental Organization
PHU	Peripheral Health Unit
SP	Sponsored Children
WHO	World Health Organization
WV	World Vision

1. Executive Summary

The unprecedented Ebola Virus Disease (EVD) outbreak in West Africa was first reported in Sierra Leone in March 2014 and rapidly spread, revealing the failures of the region's chronically fractured and under-resourced healthcare system. In August 2014, the World Health Organization (WHO) declared the outbreak a "public health emergency of international concern". Due to a lack of early-warning systems, Ebola spread rapidly and the country's health system lacked the capacity to address the overwhelming number of Cases. By March 2016, the WHO had documented a total of 14,124 cases of Ebola, including 3,955 deaths, in Sierra Leone – more than any other country.[1]

Sierra Leone remains among the least developed countries in the world, ranking 181 out of 187 countries in the 2015 Human Development Index (HDI). Despite rich resource endowments and abundant land, the under-five mortality rate (120 per 1,000 live-births) and maternal mortality ratios (857 per 100,000 live-births) are among the highest in the world. The majority (56.0%) of the population resides on less than one USD a day and relies on subsistence agriculture and 35 percent are undernourished.[13]

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Sierra Leone's fragile healthcare system is a result of a civil war that ended in 2002, which severely damaged the health infrastructure and created a cohort of young adults with little or no education.[2] Furthermore, at 59% Sierra Leone has one of the highest adult (>15 years) illiteracy rates in the world. Consequently, there was a severe shortage of healthcare workers as well as weak transportation infrastructure making it difficult to transport samples to laboratories and patients to health centers. The Ebola epidemic highlighted these shortages. Experts have identified other similar factors responsible for factors were ascribed to the persistence of the EVD outbreak in West Africa including lack of emergency response models in limited resources settings and trust in the health system at the community level, spread of misinformation, weak epidemic preparedness and early alert systems, poor governance and corruption, deeply embedded cultural practices conducive to transmission, and lack of healthcare staff in both urban and rural settings.[3-5]

Interventions targeting the complex nature of the Ebola outbreak had varying successes. For instance, studies demonstrate the critical role of isolation of Ebola patients and safe burials in controlling spread of the disease.[6] Initially, top down approaches, particularly quarantine and body collection, were ineffective. Designed and implemented without buy-in and input from community leaders, they failed to address key infrastructure constraints and were cultural insensitivity. This resulted in general distrust among community members, and, ultimately, underutilization, and underuse of these interventions.[7]

However, with the help of community healthcare workers (CHWs), social mobilization campaigns brought about awareness and led to buy-in from the community, which then increased the use and effectiveness of these interventions.[8] Therefore, in addition to the critical need to strengthen existing healthcare systems and integrating cultural beliefs and practices into all facets of the response, studies demonstrate that community-based approaches to prevention and care can reduce Ebola transmission.[8] Non-governmental organizations (NGOs) that had secured the trust of

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communities emerged as critical players in terms of changing knowledge, attitudes and behaviors around Ebola and, ultimately, accepting/adopting the lifesaving interventions required to control the outbreak. Having gained access to communities, NGOs were posed to deliver a wide range of health services including identifying new infections in Ebola-affected communities, providing clinical care to the critically ill in Ebola Treatment Units (ETUs), advocating for and employing survivors to assist with the response, and reopening district hospitals and health centers.[17]

However, NGOs also faced many challenges in implementing community-based interventions largely due to a lack of leadership, general distrust of the Sierra Leonean Government, donor restrictions in spending, and lack of fluidity between the need to build healthcare capacity while responding to an acute health crisis.[17] Nevertheless, fears and misconceptions surrounding Ebola proved to be an even greater obstacle in controlling the outbreak. Studies show that fears and misperceptions, related to lack of trust in the Ebola response system, may have delayed care-seeking during the country's Ebola outbreak.[18] Consequently, it has been proven that using cultural insiders and leaders to address people's misperceptions and demonstrate accountability to the public can also enhance trust and encourage health system use.[18] Moreover, studies also demonstrate that much of the decline in the epidemic curve was driven by interventions that targeted critical behavior change within local communities rather than by international efforts that came after the epidemic had turned.[19] Therefore, NGOs undoubtedly played a vital role in in community-based interventions were extremely vital in preventing Ebola cases and changing the curve of the epidemic during the outbreak.

World Vision International (WVI) was one of such NGOs that made a difference during the Ebola outbreak. Since the 1950s, WVI has been assisting millions of people each year in a quest to end poverty, fight hunger, and transform lives throughout the world. As a Christian relief, development and advocacy organization, WVI is dedicated to working with children, families and communities to overcome poverty and injustice. In the past year, WVI has helped over four million children in nearly 100 countries.

During the Ebola crisis, World Vision Sierra Leone contributed to helping change the beliefs about Sierra Leone's health system. World Vision was actively engaged in implementing preventive activities and case management in 25 of its Area Development Programs (ADPs), which included 25 Chiefdoms in Bo, Bonthe, Pujehun, and Kono in Sierra Leone. Its Ebola response strategy was designed to work in close collaboration with the Government of Sierra Leone to reach a population of 1.6 million through the establishment and mobilization of an extensive network of community providers established, including teachers, paramount chiefs, and faith healers, over a twenty-year period. The overall aim of the initiative was to prevent the transmission and spread of Ebola among the 59,000 children and their families across the country supported by sponsorships from WVI.

In an effort to assuage the fears and expectations of community members and ensure the intervention was responsive to their needs and expectations, World Vision Sierra Leone adopted an integrated and multi-sector response tailored to the needs and priorities of the communities it served. While the extent of the strategy implementation was not fully documented, these community leaders were also supplied with essential medical commodities, such as hand-washing kits and protective equipment for the health care workers. Figure 1 below illustrates the multi-dimensional strategies implemented by World Vision in Sierra Leone during the Ebola crisis.

A review of district level EVD records indicated that not a single Ebola-related fatality was documented among the 59,000 sponsored children or family members supported by World Vision during the outbreak. Although the Ebola outbreak was successfully contained, the processes were not formally documented nor the impact of impact of World Vision's effort was not formally documented or assessed. The remainder of this report is based on findings from a study commissioned to bridge this knowledge-to-practice gap by capturing community members' perceptions of the effectiveness of specific strategies employed by World Vision in order to increase the evidence of what works in responding to similar outbreaks throughout the West Africa and beyond.

Figure 1: World Vision International's Intervention Strategies for Ebola Infection, Prevention, and Control

Health

- Conducted *trainings on Infection, Prevention and Control* for 1,020 health workers and 950 CHWs
- *Household visits by CHWs* on behaviors to prevent Ebola 7,000 *hygiene kits* to 200 schools
- 5.4M *PPE* items delivered to communities
- Equipped schools, churches and mosques with *safety kits* with buckets, soap, chlorine and thermometers
- Trained 1,600 individuals on the conduct of *safe and dignified burials*
- 36,533 safe and dignified burials by trained burial workers
- Manage 12 inter-agency *Ebola-Response Command and Control Centers*

Education, Child protection, Advocacy

- Organize forums to facilitate *community dialogue* around fears, misconceptions and myths around Ebola
- Establish effective by-laws through paramount chiefs to protect communities from EVD
- 3,000 members of local *Mothers' Clubs* and *Community Welfare Committees* trained in child protection legislation, parenting and psychosocial first aid skills
- 1,100 children surveyed for *Children's Ebola Recovery Assessment*
- 500 citizens mobilized to advocate for health services
- Established *CVA* program to improve communication mechanisms and citizen participation in order to enhance government accountability and transparency

Community Engagement & Leadership

- Trained 566 *Savings Groups* Agricultural training for 50 *Women's Groups* resulting in the cultivation of 450+ acres of vegetables
- Provided 13,430 farming households with 307 metric tons of *rice, vegetable oil and yellow split peas*
- In collaboration with the World Food Program, provided *food assistance* for 274,338 vulnerable community members
- Assisted 42,000 small business traders with *small loans and grants* (80% of which were women-led)

Livelihood & Security

- 130 *Channels of Hope Workshops* for community leaders (ministers, Imams, and paramount chiefs) (n=2,147) on EVD prevention and management
- *Mobilized religious and village leaders* to address and mitigate false information and fears around EVD
- *Trained pastors* on how to advocate for the adoption of Ebola prevention measures within their congregations
- *Engaged religious leaders* for safe and dignified burial practices

2. Study Design and Objectives

Aim and Objectives

The study aimed to determine the effectiveness of World Vision's community-based intervention strategies implemented on EVD knowledge, preventive and treatment care-seeking practices of community members. The study will also explore differences between households containing children sponsored by World Vision and containing a documented case of Ebola and those without. It is our hope that the findings will be used to inform the design of future policies and programs to respond to emergencies and disease outbreaks, particularly in countries characterized by weakened and fragile health systems, such as Sierra Leone. In pursuit of the aim identified above, the study sought to achieve three specific objectives:

1. Assess the knowledge, attitudes, and perceptions of Ebola (specifically transmission and risk, symptoms, infection control, treatment and prevention) as well as determine health-care seeking behaviors household- and community- levels) in Bo Area Development Program (ADP);

2. Compare and contrast help-seeking behavior and engagement with treatment comparing households with and without at least one documented case of Ebola; and

3. Determine household- and community- level perceptions of and engagement with strategies employed by World Vision during the Ebola outbreak.

Given the exploratory and descriptive nature of the research, the study utilized both qualitative (i.e. key informant interviews; in-depth interviews) and quantitative methods, specifically a survey of heads of households identified via case-control sampling (i.e. based on the outcome). Based on recommendations from researchers with intimate knowledge of the Ebola outbreak and expertise in the field of epidemiology, a case-control strategy was used to calculate sample size and identify households for inclusion. Cases were defined as households reporting a confirmed or suspected Ebola case in the family during the outbreak as recorded in the district case registers. Controls were defined based on geographically-clustered houses surrounding the case household. (Matched 1:5 - within 20-30 meters from case household).

All case households were purposively selected in Bumpe ADP in Bo District (Table 1), and five control households within close proximity were selected for each case household. Data was collected over a period of four months (March to June 2016) by local researchers trained by faculty from the Johns Hopkins University. Data collectors utilized standardized data collection forms developed by Johns Hopkins Researchers and organized according to the study's core evaluation elements: (1) EVD knowledge, prevention and treatment; (2) care-seeking behaviors; and (3) perceptions of community engagement interventions. Since Ebola is a low prevalence disease, the expected cumulative incidence rate in Sierra Leone was 142 to 231 cases per 100,000 persons. Based on EVD registers, the highest number of EVD cases (n=42) and deaths were recorded in Bumpe ADP (n=32) (Table 1).

Table 1: Characteristics of Ebola-Impacted Area Development Programs, by District

District	ADP	Population	No. of Villages	No. of Sponsorships	No. of EVD Cases	No. of EVD Deaths
Bo	Serabu	27,155	60	2,409	19	11
	Lugbu	21,715	46	2,122	0	0
	Tikonko	56,199	110	5,559	15	10
	Bagbo	35,250	73	2,177	2	1
	Bumpe	25,657	151	2,264	42	32
Pujehun	Gallines Peri	42,787	122	2,033	0	0
	Kpaka Krim	17,049	56	2,238	0	0
Kono	Nimikoro	49,070	130	2,734	24	24
	Gorama	17,264	51	1,834	1	0
Bonthe	Bum	21,896	92	1,330	0	0
	Ngoyilla	29,128	157	1,050	0	0
	Jong	35,576	84	2,545	1	1

Source: District Level EVD Registers, as reported by World Vision Sierra Leone

Field Research Team

The research team from the Johns Hopkins Bloomberg School of Public Health was comprised of four members: two faculty with experience on outbreak epidemiology, one faculty with extensive community research experience and a student clinician from the Department of Epidemiology. The study design and survey instruments, which included the household survey, Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), were based on previous experience and validated reports and instruments, specifically the UNICEF *Knowledge, Attitudes and Practice (KAP) Report*[12] and the *Real-Time Assessment Report*[13]. Standard procedures were employed to translate and field test the instruments in Sierra Leone. In Sierra Leone, the research team comprised of the World Vision technical team: Allieu Bengura, Michael Belmoh, and Raymond Owusu.

The Senior Leadership Teams at WVI in Washington, D.C. and Sierra Leone were trained by a Johns Hopkins faculty member on field implementation procedures, quality control, and research compliance. Subsequently the field research survey team, comprised of clinicians from health facilities, WV technical and program staff, and other NGO personnel were trained for four days in Sierra Leone, on data collection procedures and also received technical support and research oversight by the Senior Leadership Team of World Vision Sierra Leone.

The **Sierra Leone field research team** was comprised of two teams of five and ten enumerators for qualitative and household data collection respectively. Enumerators for the household survey were comprised of three teams of three surveyors to conduct the household surveys. For the qualitative survey, five enumerators were selected to conduct the FGDs and KIIs. A supervisor was assigned to each team, and schedules for filed implementation were determined.

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Structured interviews (quantitative) were conducted with the head of household to obtain information on Ebola awareness, sources, knowledge on prevention and treatment, perception of and participation in community engagement strategies, reported numbers and profile of Ebola cases in the family, reports of sponsored children and perception of World Vision's Ebola prevention and management strategies at the community, household and school levels.

The qualitative component included FGDs and KIIs with multiple stakeholders from the community to obtain information about knowledge and preventive measures, behaviors, sources of information, challenges and value of health information and interventions provided at the community level by leaders and program staff, and other health system efforts to prevent and manage EVD. FGDs and KIIs were conducted on male and female community members, parents of sponsored children, functional or active CHWs, religious leaders (imams and pastors), school teachers, traditional healers, community chiefs and WV staff and volunteers.

Forty-two (42) Ebola case households (HH) were sampled in the seven villages in Bumpe ADP in Sierra Leone's Bo District. The sample size was calculated at a 95% confidence level. Cases (households) were defined as households reporting a confirmed or suspected Ebola case in the family during the outbreak. For each EVD case household identified, five control households within a distance of twenty to thirty meters from the case household were selected counter-clockwise. Thus, control households were defined as geographically-clustered houses around a case household. Participants were also informed that only household heads aged 18 years and above would be interviewed after their consent were obtained. Factoring ten percent non-response and ten percent refusal, the expected sample size was 33 case and 168 control households, with a maximum sample size of 252 persons.

All heads of households (aged 18 years and above) were interviewed for the study. If the heads of household were absent or did not consent, the next closest household was selected for the study. A total of 210 households were estimated initially, however only 41 cases were identified and therefore only 205 case households were required (*Table 2*). The final survey sample was comprised of 133

households (Case HHs: 26; Controls: 107) as some households had multiple Ebola cases, and adequate controls could not be obtained. The final sample represented all seven EVD-affected communities in Bo ADP.

All data collectors were required to complete a minimum of five days of training (*Days 1-4: Classroom based; Day 5: Field Pre-Testing*). Johns Hopkins researchers trained data collectors on the use of the standardized data collection forms used in the study as well as interview techniques. Participants' competencies were assessed using standardized pre- and post- test evaluation forms. used in the study prior to start of data collection.

Data was obtained through face-to-face interviews using a closed-ended questionnaire for the household survey as well as open-ended interview guides and recruitment transcripts for the interviews and focus group discussions. The research was considered Human Subjects Research exempt by the Institutional Review Board (IRB) at the Johns Hopkins Bloomberg School of Public Health as the Hopkins team was tasked to analyze secondary data with no identifiers. The research team in Sierra Leone obtained Human Subjects Research training certification and also obtained IRB approval from the Ministry of Health in Sierra Leone.

Table 2: Geographical Distribution of Ebola Case Information and World Vision Sponsorship in Bumpe Area Development Program, Bo District

Village	Section	Household Composition			EVD Cases	EVD Deaths
		Males	**Females**	**Children Sponsored by WVI**		
Monghere	Bumpe	66	58	11	5	3
Kpetema	Kpetema	865	816	221	5	4
Yonnie		286	245	70	3	1
Mbaomahun	Taninahun	67	82	56	20	12
Cameroon		25	21	104	5	3
Taninahun Banta		426	222	237	1	1
Fulawahun		22	43	69	2	2
Total		**1,757**	**1,487**	**768**	**41**	**26**

Source: World Vision, Sierra Leone

Data Management and Analysis

The data was collected using the Open Data Kit and generated into Microsoft Excel in Sierra Leone, transferred to STATA (Version 14.0), and reformatted, cleaned and verified. New variables were generated for the analysis of the indicators at Johns Hopkins. The data was formatted as wide data, using "hh_id" and "metainstanceid" variables, the data was reshaped to long data and descriptive analysis was performed.

Tables 3-16 report descriptive analysis for cases and controls; these tables used the "case-control" variable. The level of statistical significance between cases and controls in the study areas was compared using unpaired t-tests [15].

$$t = \frac{\bar{x} - \bar{y}}{(s_x^2 / n_x + s_y^2 / n_y)^{1/2}}, where \ \sigma_x \neq \sigma_y \ and \ \sigma_x \ and \ \sigma_y \ are \ unknown$$

To determine differences between child sponsored and non-sponsored children households, the 52 households that reported child sponsorship were classified using a sponsored household variable. The level of statistical significance between sponsored and unsponsored households with more than six observations was analyzed using Wilcoxon test [16].

$$z = \frac{T - E(T)}{\sqrt{Var(T)}}, \ where \ T = \sum_{i=1}^{n1} R_{1i}, \ E(T) = \frac{n_1(n+1)}{2}, \ Var(T) = \frac{n_1 n_2 s^2}{n}$$

#

where s is the standard deviation of the combined ranks, r_i, for both groups

3. Quantitative Results

Sociodemographic Characteristics of Study Population

A total of 133 households were included in the study. Twenty-six (26) of which had a documented case of Ebola. Males comprised seventy-three percent (72.9%) of respondents and nearly 80% (78.2%) were married and currently residing with their spouses. More than sixty percent (63.2%) had received no formal education. In terms of religion, the majority (76.7%) practiced Islam (Table 3).

Table 3: Sociodemographic Characteristics of Heads of Households

Characteristics	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Sex							
Male	18	69.2	79	73.8	97	72.9	0.639
Female	8	30.8	28	26.2	36	27.1	
Mean Age [in years]	26	40.9	107	44.2	133	43.6	0.298
Marital Status							
Single/never married	2	7.7	1	0.9	3	2.3	
Legally married and living with spouse	18	69.2	86	80.4	104	78.2	0.220
Married, but separated by work	-	-	5	4.7	5	3.8	
Cohabitating	2	7.7	1	0.9	3	2.3	
Separated	-	-	3	2.8	3	2.3	
Divorced	-	-	2	1.9	2	1.5	
Widowed	4	15.4	9	8.4	13	9.8	
Educational Attainment							
Primary	5	19.2	18	16.8	23	17.3	
Secondary	5	19.2	12	11.2	17	12.8	
High school	1	3.8	3	2.8	4	3.0	
College/University	1	3.8	1	0.9	2	1.6	
No formal education	13	50.0	71	66.4	84	63.2	0.123
Other[a]	1	3.8	2	1.9	3	2.3	
Religion							
Christian	8	30.8	23	21.5	31	23.3	0.319
Islam	18	69.2	84	78.5	102	76.7	0.319
Length of Residence in Sierra Leone							
Less than six months	-	-	1	0.9	1	0.8	
Over a year	26	100.0	106	99.1	132	99.2	0.624
Household Indicators							
Mean number of people usually living and eating in the household	26	8.2	107	7.4	133	7.5	0.501
Mean number of people who lived and ate in the household the prior day	26	10.2	107	7.9	133	8.4	0.072
Mean number of people in household who were employed in the last 12 mo.	26	0.2	107	0.2	133	0.2	0.912

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30

(a)   Arabic education and mechanic (labor)
– Indicates zero observations

Agriculture was the main source of income (70.7%), followed by business or trading (17.3%). The main sources of lighting were batteries (46.6%), palm oil or lantern. Approximately 60 percent (60.9%) of households used a traditional pit latrine (60.9%) and slightly more than one-third (36.8%) practiced open defecation.   Communities were extremely poor, reporting an average of 2.1 household assets (refrigerator, stove / gas cooker, sewing machine, iron, radio, television, DVD player / VCR, and other (Satellite phone, Cell phone, Bicycle, Motorcycle, Car, or Tractor / Thresher)).   Overall, cases and controls indicated similar economic levels. However, the proportion of case households with access to safe drinking water was statistically significantly higher than compared to controls (76.0% vs. 37.7%; p<0.05) (Table 4). This may have resulted from efforts to increase access to safe water for households reporting EVD cases throughout the outbreak.

In the *2013 Sierra Leone Demographic and Health Survey (DHS)*, the wealth index was used to indicate inequalities in household and health characteristics. In Bo District, the wealth quintiles for lowest, second, middle, fourth, and highest were 15.9%, 20.8%, 22.2%, 22.8%, and 18.3% with a GINI Coefficient of 0.28[20]. The mean assets are reflective of what has been found in the DHS, reflecting the poor status of these communities.

Table 4: Economic Characteristics of Sampled Households (N=133)

Economic Characteristics	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Primary source of income							
Agriculture	18	69.2	76	71.0	94	70.7	0.858
Rearing animals	1	3.8	1	0.9	2	1.5	
Service/salaried	1	3.8	3	2.8	4	3.0	
Business/trading	6	23.1	17	15.9	23	17.3	
Labor (daily wages)	-	-	7	6.5	7	5.3	
Other[(a)]	-	-	3	2.8	3	2.3	
Main source of lighting							
Generator	2	7.7	-	-	2	1.5	
Batteries	10	38.5	52	48.6	62	46.6	0.356
Kerosene or oil lamp	2	7.7	2	1.9	4	3.0	
Candles	-	-	1	0.9	1	0.8	
Other[(b)]	12	46.2	43	40.2	55	41.4	0.583
No source of lighting	-	-	9	8.4	9	6.8	
Access to safe drinking water	19	76.0	40	37.7	59	45.0	***0.000***
Type of toilet							
Private flush toilet	1	3.8	-	-	1	0.8	
Shared flush toilet	2	7.7	-	-	2	1.5	
Traditional pit latrine	16	61.5	65	60.7	81	60.9	0.941
Open defecation	7	26.9	42	39.3	49	36.8	
Mean number of assets per household	26	2.3	107	2.0	133	2.1	0.171

Notes:

p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
(a) Other includes carpenter, driver, and tailor
(b) Other includes Chinese lantern, locally made lights, palm oil, and torch light
(c) Safe drinking water includes piped, public tap, ground water (hand pump), covered well water, rainwater, and protected springs. Unsafe drinking water includes opened well water, tank water, surface water, and unprotected springs.
− Indicates zero observations

Knowledge and Perceptions on Ebola

All heads of households were familiar with Ebola, most of them first learned of Ebola from the radio or television (55.6%), followed by a family member, friend or neighbor. Overall, respondents acquired information about Ebola from radio or television and from people within their community and some also reported receiving information from WV staff or health personnel. No statistically significant difference was detected between case and control households in terms of information sources. However, a statistically significantly higher proportion of cases reported receiving information from CHWs or other community providers compared to controls (50.0% versus 21.5%; p<0.05). Compared to controls, a significantly higher proportion of cases (46.2% versus 24.3%; p<0.05) indicated that they trusted WV staff.

Table 5: Source and Trust of Information on Ebola

Economic Characteristics	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Ever heard of Ebola	26	100.0	107	100.0	133	100.0	
First learned of Ebola							
Family member	7	26.9	10	9.3	17	12.8	
Friend or neighbor	3	11.5	21	19.6	24	18.0	
World Vision volunteer	1	3.8	-	-	1	0.8	
Radio or TV	12	46.2	62	57.9	74	55.6	0.281
Source of information on Ebola							
Relatives and friends	6	23.1	21	19.6	27	20.3	
World Vision staff	2	7.7	5	4.7	7	5.3	
World Vision volunteer	7	26.9	13	12.1	20	15.0	
Health and medical professionals	11	42.3	47	43.9	58	43.6	0.883
Government, Ministry of Health and Ministry of Social Welfare	15	57.7	49	45.8	64	48.1	0.280
The media (radio, TV)	13	50.0	56	52.3	69	51.9	0.832
CHW or other community providers	13	50.0	23	21.5	36	27.1	*0.003*
Trusted source of information on Ebola							
World Vision staff	12	46.2	26	24.3	38	28.6	*0.027*
World Vision volunteer	13	50.0	32	29.9	45	33.8	0.053
CHW or other community provider	22	84.6	73	68.2	95	71.4	0.098
Community leader	9	34.6	25	23.4	34	25.6	
No one	-	-	25	23.4	25	18.8	

Notes: p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
− Indicates zero observations

The overwhelming majority (85.2%) of respondents identified bats, monkeys, chimpanzees, and other wild animals were the cause of Ebola followed by the Ebola virus (50.8%). Statistically significant differences were observed between cases and controls in terms of their beliefs as to how Ebola is transmitted. Among case households, 65.4% believed touching the blood of an infected person transmits Ebola versus 43.0% of controls (*p<0.05*). A statistically significantly higher proportion of case households identified contact with urine (53.8% vs. 27.1%; p<0.05) and feces (42.3% vs. 21.5%; p<0.05) of an infected person as a means of transmission, as compared to controls. Differences in beliefs were likely due to the presences of an Ebola-infected individual in their households and their subsequent understanding of transmission mechanisms.

The majority of respondents believed the signs and symptoms of Ebola were fever (89.5%), diarrhea (80.5%), and vomiting (91.0%). Significant differences were detected between cases and controls in terms of their identification of the following signs and symptoms: weakness (65.4% vs. 34.6%; p<0.05) and all other symptoms (53.8% and 28.0%; p < 0.05). Moreover, these findings were likely a result of having an Ebola-infected person in their households.

Table 6: Knowledge of Cause, Mode of Transmission, Signs and Symptoms of Ebola

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Perceived cause of Ebola							
Virus	15	65.2	47	47.5	62	50.8	0.127
Bats, monkeys, chimpanzees, wild animals	19	82.6	85	85.9	104	85.2	0.695
Other[a]	1	4.3	12	12.1	13	10.7	
Unknown	3	11.5	8	7.5	11	8.3	
Transmission Mechanisms							
Preparing or eating bush meat as a meal	21	80.8	76	71.0	97	72.9	0.320
Direct contact with an infected person via:							
Saliva	11	42.3	26	24.3	37	27.8	*0.067*
Blood	17	65.4	46	43.0	63	47.4	*0.041*
Urine	14	53.8	22	20.6	36	27.1	*0.001*
Feces	11	42.3	23	21.5	34	25.6	*0.029*
Handshaking	14	53.8	46	43.0	60	45.1	0.322
Sexual intercourse	9	34.6	25	23.4	34	25.6	
Other	13	50.0	47	43.9	60	45.1	0.580
Participation in burial ceremonies	15	57.7	49	45.8	64	48.1	0.280
Signs and symptoms							
Fever	25	96.2	94	87.9	119	89.5	0.219
Severe headache	10	38.5	36	33.6	46	34.6	0.646
Weakness	17	65.4	37	34.6	54	40.6	*0.004*
Diarrhea (with or without blood)	24	92.3	83	77.6	107	80.5	0.090
Vomiting (with or without blood)	24	92.3	97	90.7	121	91.0	0.794
Rash	6	23.1	29	27.1	35	26.3	
Bleeding (internal or external)	6	23.1	18	16.8	24	18.0	
Other[b]	14	53.8	30	28.0	44	33.1	*0.012*

Notes:

p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas

p-value not calculated because the total number of observations is less than 30

(a) Other causes of EVD include an infected person, dirt, God, or through physical contact

(b) Another sign and symptom of EVD includes red eye

Prevention and Treatment

General misunderstanding about the modes of transmission was observed among both case and control households. Most respondents believed Ebola transmission could be prevented by avoid touching a sick person (93.2%) or attending funerals or burial rituals (100.0%). All but three respondents believed someone suspected of Ebola or had Ebola-like symptoms should be isolated or sent to the ETU and for about or exactly 21 days (68.4%). Respondents believed someone infected with Ebola, who was not displaying any signs or symptoms can transmit Ebola (61.7%) and the person could reduce likelihood of transmission by immediately going to a health center (97.7%). Overall, both case and control household heads shared the misconceptions and beliefs and attitudes regarding transmission of Ebola.

Table 7: Knowledge, Attitudes, and Practices regarding Ebola Transmission

Statements regarding Ebola Transmission	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Avoid touching a sick person	25	96.2	99	92.5	124	93.2	0.512
Avoid attending funerals or burial rituals	26	100.0	107	100.0	133	100.0	
Suspected Ebola person or one with Ebola-like symptoms should be isolated or sent to ETU	26	100.0	104	97.2	130	97.7	0.392
Duration of Isolation							
Less than 21 days	3	11.5	15	14.0	18	13.5	
21 days	17	65.4	74	69.2	91	68.4	0.713
More than 21 days	6	23.1	18	16.8	24	18.0	
Ebola-infected person without signs or symptoms can transmit Ebola	17	65.4	65	60.7	82	61.7	0.666
Reduction in transmission risk if persons potentially exposed to Ebola visits a health center within one day	25	96.2	105	98.1	130	97.7	0.546

Notes:

p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas

p-value not calculated because the total number of observations is less than 30

A significant difference between cases and controls was their belief of visiting health workers who enquired about Ebola were there to protect them; all respondents in case households believed health providers were there to protect them compared to 86.0% of controls (*p<0.05*). The respondents identified community members (47.4%), CHWs (68.5%), and the government (59.4%) as the most influential people in stopping the spread of Ebola. Other people who were influential in stopping the spread of Ebola included NGOs and law enforcement officers. Case households (42.3%) significantly differed in their beliefs that these individuals were influential in containing Ebola compared to 20.6% of controls (*p < 0.05*).

All respondents believed a person diagnosed with Ebola should be taken to the health center or ETU, and that their likelihood of survival is better or higher (99.2%), and they would receive better care than at home (74.4%). Few believed traditional healers (3.8%) and spiritual healers (3.0%) could cure or treat Ebola. There was a significant difference between cases (96.2%) and controls (100.0%) in their belief that high-risk Ebola communities should be prevented from contacting other communities (*p<0.05*).

Table 8: Beliefs and Attitudes relating to Care and Treatment of Ebola

Statements regarding Care and Treatment of Ebola	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Health workers function is to protect communities from Ebola	26	100.0	92	86.0	118	88.7	*0.043*
Most influential person in stopping the spread of Ebola							
Community members	16	61.5	47	43.9	63	47.4	0.108
Community Health Workers	20	76.9	71	66.4	91	68.4	0.302
Government/Health Ministry/County Health Team	19	73.1	60	56.1	79	59.4	0.115
Ebola survivors	7	26.9	14	13.1	21	15.8	
Village chiefs, elders and other community leaders	11	42.3	38	35.5	49	36.8	0.523
Only God	9	34.6	26	24.3	35	26.3	0.287
Other[a]	11	42.3	22	20.6	33	24.8	*0.021*
Traditional healers can cure or treat Ebola	1	3.8	4	3.7	5	3.8	
Spiritual healers can cure or treat Ebola	1	3.8	3	2.8	4	3.0	
Potential cases should be taken to health center or ETU	26	100.0	107	100.0	133	100.0	
Increased likelihood of survival for potential case if he/she sought care at ETU	26	100.0	106	99.1	132	99.2	0.624
Advantages of ETUs							
Receive better care than at home	21	80.8	78	72.9	99	74.4	0.413
Receive nutritious food and water	8	30.8	22	20.6	30	22.6	0.267
Safe environment	9	34.6	32	29.9	41	30.8	0.644
Receive medication for Ebola and other diseases	14	53.8	40	37.4	54	40.6	0.127
Other[b]	9	34.6	22	20.6	31	23.3	0.130
High-risk communities should be banned from interacting with other communities	25	96.2	107	100.0	132	99.2	*0.042*

Notes:
p-value for unpaired t-test results comparing level of statistical significance between cases and controls in the study areas
p-value not calculated because the total number of observations are less than 30
(a) Other includes Kposowa Foundation and other NGOs, MSF, prayers, and law enforcement officer
(b) Other includes receive treatment, better chance of recovery if they report early, household members will be quarantined, either they survive or die, will be cured of they seek early care, will be cured, we only pray for them, and will be treated
– Indicates zero observations

There was a significant difference between case and control households in terms of immediate actions following contact with an individual suspected of being infected with Ebola. Compared to case households, a statistically significantly higher proportion of control households noted that they would immediately wash their hands following contact (53.8% versus 78.5%; *p<0.05*). Less than ten percent (8.3%) of all households noted that they would call the emergency hotline. Three-quarters of all participants would avoid all physical contact and bodily fluids of a family member suspected of having Ebola and around one-third would contact a community healer (35.3%) or CHW (30.1%). In the case of someone suspected of Ebola, most respondents (75.2%) would keep the person away from those living in the household.

Significant differences between cases and controls in how they would care for someone were not touching the person or their bodily fluids (76.9% vs. 46.7%) or the things that the person has touched such as soiled clothes (69.2% vs. 39.3%; *p<0.05*). The difference between the cases and controls are likely a result of understanding how Ebola is transmitted. Almost all (97.7%) of respondents reported that they would contact the burial team to bury the body in anticipating how they would handle the deceased body of the person suspected of Ebola.

Table 9: Anticipated Behaviors towards Potential Ebola Infected Family Members

Anticipated Behaviors	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Recommendation first step following direct contact with persons with potential Ebola							
Don't tell anyone	-	-	1	0.9	1	0.8	
Wash hands	14	53.8	84	78.5	98	73.7	***0.010***
Call the Ebola hotline number	5	19.2	6	5.6	11	8.3	
Contact community leader/chief	1	3.8	7	6.5	8	6.0	
Go to the health facility or ETU	2	7.7	6	5.6	8	6.0	
Contact CHW	1	3.8	1	0.9	2	1.5	
Other	3	11.5	1	0.9	4	3.0	
Don't know	-	-	1	0.9	1	0.8	
Action taken if family member is suspected of Ebola							
Nothing	-	-	1	0.9	1	0.8	
Help care for the person at home	1	3.8	5	4.7	6	4.5	
Check his temperature by touching his body	1	3.8	1	0.9	2	1.5	
Avoid all physical contact and bodily fluids with him/her	22	84.6	78	72.9	100	75.2	0.218
Call the Ebola hotline	21	80.8	70	65.4	91	68.4	0.133
Transport him to ETU or health facility	5	19.2	23	21.5	28	21.1	
Contact community leader	12	46.2	35	32.7	47	35.3	0.201
Contact CHW	11	42.3	29	27.1	40	30.1	0.131
Contact Imam	-	-	2	1.9	2	1.5	
Inform friends and family	1	3.8	2	1.9	3	2.3	
Avoid direct contact with potential case for							

Anticipated Behaviors	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
1-7 days	1	3.8	-	-	1	0.8	
8-14 days	-	-	-	-	-	-	
15-21 days	3	11.5	4	3.7	7	5.3	
Keep them at home	1	3.8	-	-	1	0.8	
Other[a]	2	7.7	4	3.7	6	4.5	
Don't know/not sure	-	-	1	0.9	1	0.8	
Care of suspected Ebola person							
Keep the person away from others	22	84.6	96	89.7	118	88.7	0.464
Do not touch the person or their body fluids	20	76.9	50	46.7	70	52.6	***0.005***
Do not touch things the person has touched	18	69.2	42	39.3	60	45.1	***0.006***
Use protective equipment (e.g., gloves)	7	26.9	14	13.1	21	15.8	
Frequently wash hands	8	30.8	20	18.7	28	21.1	
Provide sick person with food, water, and other fluids	-	-	23	21.5	23	17.3	
Handling deceased body of suspected case							
Wash the body	-	-	1	0.9	1	0.8	
Contact and wait for burial team	26	100.0	104	97.2	130	97.7	0.392
Other[b]	-	-	6	5.6	6	4.5	

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
(a) Other includes "inform immediate family members", "send a person away", "contact related persons", and "will stay away from infected person"
(b) Other includes close the door, inform elders, remove the body, run away from the corpse, totally avoid the house, and] door on the corpse
– Indicates zero observations

Ebola Survivors

There was a significant difference between cases and controls in whether they knew someone who survived Ebola (84.6% vs. 59.8%) (*p<0.05*). Generally, the respondents had similar beliefs of survivors being able to contract Ebola again (17.3%) and infecting others by physically contact such as touching or hugging (17.3%). Nineteen percent of case households believed child survivors put classmates at risk, compared to five percent of controls. In their attitudes toward survivors, the respondents generally were favorable in buying from survivors (94.7%) and welcoming them into their communities (97.0%). In the attitude of accepting an orphaned survivor to live in their households, cases were more significantly favorable towards this at 100.0% in contrast to controls at 83.2% (*p < 0.05*).

Table 10: Knowledge, Perceptions, and Attitude towards Ebola Survivors

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Knows an Ebola survivor	22	84.6	64	59.8	86	64.7	***0.017***
Ebola survivors can contract Ebola again	4	15.4	19	17.8	23	17.3	

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Ebola survivors can infect others by physical contact (e.g., touching and hugging)	5	19.2	18	16.8	23	17.3	
Child survivors can put classmates at risk	5	19.2	5	4.7	10	7.5	
Buy from Ebola survivors	25	96.2	101	94.4	126	94.7	0.721
Welcome survivors into community	26	100.0	103	96.3	129	97.0	0.320
Accept a surviving orphan to live in household	26	100.0	89	83.2	115	86.5	*0.024*

Notes:

p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas

p-value not calculated because the total number of observations is less than 30

Reporting Suspected Cases of Ebola

In households with a documented case of Ebola, on average, one to two members died from Ebola. A higher proportion of females (56.8%) were reported to have EVD than male family members (43.2%). The mean age of family member infected with Ebola was 37 years old. The most common relationships of the head of household to the family member infected with Ebola were daughter (16.2%), sister (16.2%), son (13.5%), and husband (10.8%).

Table 11: Record of Ebola Cases in Households – Household Demographics

Characteristic	Households (N=37)	
	n	%
Number of deceased Ebola cases in household		
One	9	24.3
Two	9	24.3
Four	1	2.7
Six	1	2.7
Sex		
Male	16	43.2
Female	21	56.8
Age (mean +/- SD)	37	37.4$^{\neq}$
Relationship of Ebola Case to Respondent		
First wife	1	2.7
Husband	4	10.8
Son	5	13.5
Daughter	6	16.2
Grandson	1	2.7
Granddaughter	1	2.7
Mother	2	5.4
Father	1	2.7
Brother	3	8.1
Sister	6	16.2
Brother-in-law	1	2.7
Other female relative	3	8.1

Non-related male	1	2.7	
Adopted, foster, or step-child	1	2.7	
Mother-in-law	1	2.7	

≠ Age mean=37.4 with St. Dev 22.6

Self-Reported Protective Behaviors and Care-Seeking

The overwhelming majority of respondents (87.2%) reported practicing good hand and personal hygiene (i.e. thoroughly washing with soap and water often) in order to protect family members from contracting Ebola. Other commonly reported behaviors included: avoiding contact with people suspected of having Ebola (57.9%) and avoiding any contact with other people (53.4%). Case households were statistically significantly more likely to send a family member to an Ebola Treatment Unit or health care facility (92.3% versus 60.9%; p <0.05).

Although the responses were limited, the most frequently identified barriers to seeking care for a family member suspected of Ebola was fear of contracting EVD from infected persons (19.4%), followed by the fear of stigma (16.1%) and the cost of transport (12.9%). It is important to note that only control households (20.7%) identified fear of contracting EVD and the cost of transport (13.8%) as barriers. Upon presenting Ebola symptoms, on average, nearly half (48.1%) of respondents waited less than one day to seek care. Less than ten percent (8.0%) delayed care by three or more days. Almost half (42.3%) of case households reported the travel time to the nearest ETU or health care facility was between two and 12 hours.

Table 12: Reported Behaviors and Practices of Household Heads to Protect Family Members from Ebola

Behavior / Practice	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Actions taken to protect family members from Ebola							
Wash hands with soap and water often	24	92.3	92	86.0	116	87.2	0.390
Wash hands with chlorine water often	12	46.2	29	27.1	41	30.8	0.060
Try to avoid crowded places	14	53.8	43	40.2	57	42.9	0.210
Try to avoid physical contact with people suspected of Ebola	17	65.4	60	56.1	77	57.9	0.392
Avoid physical contact with everyone	15	57.7	56	52.3	71	53.4	0.627
Not participate in burial ceremonies that involve handling of deceased body	13	50.0	48	44.9	61	45.9	0.640
Family member went to ETU or health facility	24	92.3	57	53.3	81	60.9	***0.000***
Reasons for not seeking care							
Transport is too expensive	-	-	4	13.8	4	12.9	
Too far and no transport	1	50.0	-	-	1	3.2	
Don't trust the staff	1	50.0	2	6.9	3	9.7	
Fear of stigma	1	50.0	4	13.8	5	16.1	
Risk of transmission from infected patients	-	-	6	20.7	6	19.4	

Early care seeking to ETU or health facility						
Less than a day	9	37.5	30	52.6	39	48.1
1-2 days	12	50.0	23	40.4	35	43.2
3-6 days	3	12.5	4	7.0	7	8.6
Travel time to nearest ETU or health facility						
Less than 30 minutes	6	23.1	-	-	6	23.1
30 minutes to 2 hours	9	34.6	-	-	9	34.6
2 hours to 12 hours	11	42.3	-	-	11	42.3

Report of Visits and Services from World Vision Staff and Volunteers

Sixty-five percent of the case households indicated that they were visited by the World Vision staff or volunteers, with most reporting visits twice a day (29.4%) or once a week (29.4%). Transport, food supply, cash voucher, were mentioned by both case and control households, importance of psychosocial support was also reported, which was a critical aspect during the Ebola outbreak (Table 13).

Table 13: Frequency and Description of Services Provided by World Vision Staff and/or Volunteers

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Sick family member visited by WV staff and/or volunteer	17	65.4	-	-	17	65.4	
Number of visits by CHWs or WV staff / volunteers							
Twice per day	5	29.4	-	-	5	29.4	
Daily	2	11.8	-	-	2	11.8	
Every two days	1	5.9	-	-	1	5.9	
Two times per week	1	5.9	-	-	1	5.9	
Weekly	5	29.4	-	-	5	29.4	
Twice per month	2	11.8	-	-	2	11.8	
Other[a]	1	5.9	-	-	1	5.9	
Support provided by WV when family member was suspected of Ebola							
Transport to ETU or community care center	16	61.5	30	28.3	46	82.1	*0.000*
Direct cash support	3	11.5	-	-	3	11.5	
Cash equivalent voucher	4	15.4	-	-	4	15.4	
Food supplies	8	30.8	10	9.3	18	50.0	
Prayer and spiritual counseling	-	-	-	-	-	-	
Psychosocial support	4	15.4	4	3.7	8	26.7	
Other[b]	2	7.7	19	17.7	21	46.7	
Attended funeral of Ebola victim	5	19.2	4	3.7	9	6.8	

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
(a) Other includes not remembering how often
(b) There is no explanation for other in the database
– Indicates zero observations

Approximately sixty percent (63.2%) of respondents correctly identified the Ebola hotline number and nearly all (96.4%) respondents reported utilizing it at least once. The likelihood of a household visit from World Vision staff or a CHW during the outbreak was significantly higher among case households (88.5%), as compared to control households (57.0%). Nearly all respondents (96.0%) received information about the causes and methods of prevention. Significant differences were also evident between cases and controls about services for hand-washing supplies (78.3% vs. 41.0%) and sponsored children (65.2% vs. 36.1%) ($p < 0.05$).

There was a significant difference in participation in Ebola prevention community activities between cases and controls (73.1% vs. 43.9%) ($p<0.05$). Nearly all respondents (94.0%) reported participating in awareness-raising activities. A significantly greater proportion of case households possessed knowledge of the Ebola Response Command and Control Centre, as compared to controls (80.8% vs. 55.1%) ($p<0.05$). Overall, a greater proportion of cases participated in World Vision or community activities by participating in Ebola awareness activities, training, safe burials, etc. A greater proportion of case participated in savings groups, Women's Groups, the Citizen Voice and Action Program, etc., as compared to control households (Table 14).

Table 14: Knowledge and Use of Ebola Hotline Number and Other Community-Based Services Provided by World Vision

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Ebola Hotline Number							
Knowledge of Ebola hotline number	23	88.5	61	57.0	84	63.2	0.288
Previously used Ebola hotline number	22	95.7	59	96.7	81	96.4	0.054
WV staff or CHW visited during outbreak	23	88.5	61	57.0	84	63.2	***0.003***
Information or services received							
Causes of Ebola and how to prevent it	22	95.7	59	96.7	81	96.4	0.817
Information on ETUs	16	69.6	35	57.4	51	60.7	0.314
Posters and pamphlets on Ebola	12	52.2	18	29.5	30	35.7	0.054
Hand-washing supplies	18	78.3	25	41.0	43	51.2	***0.002***
Other activities[a]	15	65.2	22	36.1	37	44.0	***0.016***
Participation in community-level prevention activities	19	73.1	48	44.9	67	50.4	***0.010***
Types of participation							
Raising awareness	18	94.7	45	93.8	63	94.0	0.880
Participating in EVD preventive activities	10	52.6	16	33.3	26	38.8	
Attending meetings about Ebola	7	36.8	18	37.5	25	37.3	
Other[b]	8	42.1	17	35.4	25	37.3	
Participation in burial or SMART training	7	26.9	5	4.7	12	9.0	
Participation in child nutrition and mortality survey	2	7.7	-	-	2	1.5	
Knowledge of Ebola Response Command and Control Centre	21	80.8	59	55.1	80	60.2	***0.016***
Participation in any Ebola Response	4	15.4	9	8.4	13	9.8	

Command and Control Centre activities						
Participation in a savings group	9	34.6	20	18.7	29	21.8	0.234
Family member participated in Ebola prevention community activity	5	19.2	15	14.0	20	15.0	
Participation of children in a savings group	4	15.4	5	4.7	9	6.8	
Participation in women's groups that received support for vegetable production	5	19.2	13	12.1	18	13.5	
Participation in a survey on Children's Ebola Recovery Assessment	2	7.7	-	-	2	1.5	
Participation in a training program to support orphans	5	19.2	2	1.9	7	5.3	
Participation in any Citizen Voice and Action program activities	3	11.5	6	5.6	9	6.8	

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
(a) Other includes checking the welfare of sponsored children, food aid for sponsored children, and advice on children
(b) Other includes cleaning of the community, did not taking part in any activity, giving advice to my colleagues, not engaging in any community activities, having responsibility to fill rubber troughs, introducing to in-laws, not allowing strangers, serving as guide for any strangers, giving advice or guidance, serving as guard, and counseling
− Indicates zero observations

Overall, cases received more World Vision services than controls. Significant differences between cases and controls were in receipt of food during the 21-day quarantine time (53.8% vs. 15.9%) and information on how to address fears about Ebola (80.8% vs. 48.6%) ($p<0.05$). The main reason reported for the value of information received, was that it provided options on how to address fears about Ebola and mitigated false information that Ebola was a sin or curse. The respondents (21.1%) found training on community welfare committees helpful. All family members found the trainings provided by World Vision helpful. Though a higher proportion mentioned participation in the channels of hope program in the case households this was not significant. Religious leaders provided respondents with information about prevention (70.7%) and treatment (46.6%). The respondents did not know many religious leaders who participated in a burial of an Ebola victim.

Table 15: Specific Services Received from World Vision and Role of Religious Leaders

Services	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Seeds, rice, vegetable oil, or yellow split peas	11	42.3	14	13.1	25	18.8	
Food or cash vouchers	13	50.0	15	14.0	28	21.1	
Any food during the 21-day quarantine period	14	53.8	17	15.9	31	23.3	*0.000*
Small loans or grants	5	19.2	-	-	5	3.8	
Enriched corn or soy blend cereal for a malnourished child	10	38.5	7	6.5	17	12.8	
Radio programming	5	19.2	3	2.8	8	6.0	
Information on addressing fears about Ebola	21	80.8	52	48.6	73	54.9	*0.003*
Information on WV's Channels of Hope program	10	38.5	23	21.5	33	24.8	0.073
Reasons why it was helpful							

Services	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Mitigated false information that Ebola was a sin or curse	8	80.0	17	73.9	25	75.8	
Assisted with safe burials	1	10.0	2	8.7	3	9.1	
Psychosocial support for Ebola victims	1	10.0	3	13.0	4	12.1	
Other	-	-	1	4.3	1	3.0	
Information received by religious leader about Ebola							
None	3	11.5	21	19.6	24	18.0	
Mitigated false information that Ebola was a sin or curse	9	34.6	18	16.8	27	20.3	
Information on prevention	20	76.9	74	69.2	94	70.7	0.439
Information on treatment	14	53.8	48	44.9	62	46.6	0.414
Psychosocial support for Ebola	9	34.6	22	20.6	31	23.3	0.130
Other	6	23.1	6	5.6	12	9.0	
Knows a religious leader who participated in a burial of an Ebola victim	2	8.3	1	0.9	3	2.3	
Received training related to							
Mother's clubs	6	25.0	5	4.6	11	8.3	
Community welfare committees	8	33.3	20	18.3	28	21.1	
Child protection, legislation	8	33.3	8	7.3	16	12.0	
Parenting or psychosocial support	9	37.5	13	11.9	22	16.5	
First aid skills	8	33.3	11	10.1	19	14.3	
Family member found training useful	14	100.0	30	100.0	44	100.0	

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
– Indicates zero observations

World Vision Child Sponsorship

Of the households included in this study, a significantly higher proportion case households were sponsored by world vision, as compared to control households (57.7% versus 34.6%; p-value<0.05). Most case households contained two sponsored children (53.4%), as compared to households which contained one (51.4%). Although a higher proportion of sponsored households received educational supplies and household visits from World Vision staff or CHWs compared to control households, this difference was not significantly different. The types of services that case and control households reported receiving from World Vision staff were similar. Ninety-percent (90.0%) received information about Ebola and 75.0% received other services. All sponsored children in case households attended program activities compared to 88.5% of sponsored children in control households. The difference in proportions, however, was not significantly significant.

Table 16: Demographics of Households Sponsored by World Vision

Knowledge Area	Cases (n=26)		Controls (n=107)		Total (N=133)		p-value
	n	%	n	%	N	%	
Children in household are sponsored by WV	15	57.7	37	34.6	52	39.1	*0.030*
Number of sponsored children in household							
One	3	20.0	19	51.4	22	42.3	
Two	8	53.3	10	27.0	18	34.6	
Three	3	20.0	6	16.2	9	17.3	
More than three	1	6.7	1	2.7	2	3.8	
Mean number of children sponsored per household	15	2.1	37	1.8	52	1.9	0.239
Services received by sponsored children							
Educational supplies	13	86.7	27	73.0	40	76.9	0.298
Other[a]	13	86.7	31	83.8	44	84.6	0.799
Visited by WV staff or CHW during outbreak	14	93.3	26	70.3	40	76.9	0.076
Frequency of visits by WV staff							
Weekly	3	21.4	9	34.6	12	30.0	
Bi-weekly	6	42.9	4	15.4	10	25.0	
Monthly	5	35.7	11	42.3	16	40.0	
Other	-	-	2	7.7	2	5.0	
Services provided by WV staff							
Information on Ebola prevention	13	92.9	23	88.5	36	90.0	0.668
Other[b]	11	78.6	19	73.1	30	75.0	0.711
WV staff ensured sponsored children attended program activities	14	100.0	23	88.5	37	92.5	0.196

Notes:
p-value for unpaired t-test results comparing level of statistical significance between case and control in the study areas
p-value not calculated because the total number of observations is less than 30
(a) Other includes just registered, rice, and school club program
(b) Other includes no supply yet, child is a new sponsor, materials, and advice on how to focus on studies
– Indicates zero observations

Comparison of Households with World Vision Sponsored and Non-Sponsored Children

Data analysis of households with sponsored and non-sponsored children by World Vision was completed and the information is provided in Appendix 2 in Tables 20-29. There was a significant difference in the proportion of male-headed households with sponsored and non-sponsored children; 53% of sponsored households were male-headed compared to 91% of non-sponsored households ($p<0.05$).

Significant differences included the main source of lighting as batteries with 20.0% of sponsored households in contrast to 63.6% of non-sponsored households ($p<0.05$). A smaller proportion of sponsored households (26.7%) learned about Ebola by radio or television compared to non-sponsored households (72.7%) ($p<0.05$). The most influential people in stopping the spread of Ebola is people within the community (80.0% sponsored vs. 36.4% non-sponsored) and CHWs (93.3% sponsored vs.

54.5% non-sponsored) (*p<0.05*). A significant difference between sponsored and non-sponsored households is the anticipated behavior in how they will care for a person suspected of Ebola; 93.3% of sponsored households would not touch the person or their bodily fluids compared to 54.5% of non-sponsored households (*p<0.05*). Though the proportion of case households reporting higher knowledge of Ebola, receipt and participation in services, visits from WV staff and CHWs were higher than the control households, few were significant due to very low sample size.

4. Qualitative Results

Sample Characteristics

The qualitative assessment utilized KIIs and FGDs to assess community knowledge, attitudes and practices (KAPs) surrounding Ebola as well as the perceived effectiveness, value, and acceptance of community engagement strategies initiated by World Vision. Data were collected from a total of 23 key informants and 19 focus groups across eight communities in Area Development Programs (ADPs) and Bo District.

Participants included religious leaders (pastors and imams) (n=12), chiefs (n=7), teachers (n=3) as well as World Vision program staff (n=1). Persons below the age of 18 years as well as those that were not present during the outbreak were excluded from the study. To be eligible to participate, the respondent had to be, at minimum, 18 years of age, demonstrate familiarity with their communities, and have maintained residence in one of the target communities for more than 12 months (i.e. since March 2015, at minimum).

In terms of community members, key informants were comprised of men and women who are familiar with their communities and had continuously lived there over the past year and during the Ebola crisis. All participants were willing and able to openly discuss the Ebola situation and provide their views on community level efforts to address the epidemic.

Table 17: Profile of Key Informants (N=23)

Participant(s)	n	Villages Represented
Religious Leaders - Pastors	5	Baomahun, Kpetema, Mongere, Taninahun, Yonni
Religious Leader - Imams	7	Baomahun, Fulawahun, Kamalo, Kpetema, Mongere, Taninahun, Yonni
Teachers	3	Taninahun, Kpetema, Mongere, Yonni
Chiefs	7	Baomahun, Fulawahun, Idrissa, Kamalo, Mongere, Taninahun, Yonni

Table 18: Profile of Focus Group Discussants (N=19)

Participant(s)	n	Villages Represented
Traditional Healers	1	Kpetema
Community Members, Male	5	Kamalo, Mongere, Taninahun, Yonni
Community Members, Female	4	Baomahun, Mongere, Taninahun, Yonni
Parents of sponsored children	5	Baomahun, Kepetema, Mongere, Taninahun, Yonni
Community Health Workers (Active)	4	Baomahun, Mongere, Taninahun, Yonni

Both the key informant interviews and focus group discussions were audio-recorded and detailed notes were also taken. Transcripts were translated to English by the local research team and sent to Johns Hopkins researchers for review. Coding of the transcripts was completed by researchers located both in Liberia and Baltimore, Maryland, U.S. Categories for data coding were identified based on the reading of sample transcripts by each member of the coding team in order to identify key factors related to the

evolution of Ebola prevention, care, and treatment. Nine major themes and were used to code and organize the data (Table 19). Each theme was further categorized into multiple sub-themes and codes and can be found in the coding guide (Annex 3) used by the research team as a reference when analyzing transcripts.

Table 19: List of Major Categories used in the Analysis of Qualitative Data

Interview Characteristics	World Vision Staff
Knowledge of Ebola	Religious Leaders
Sources of Information and Care / Services	School Teachers
Care Experience	Miscellaneous
Community Action	

Key Qualitative Findings

Awareness and Knowledge of Ebola

Origin of the Ebola Outbreak

All respondents reported that they had ever heard of Ebola, as illustrated in Table 5. All but two reported that the Ebola outbreak originated in Liberia and/or Guinea and entered through Kailahun District in Sierra Leone's Eastern Province. This is illustrated in the quotations below.

Focus group participants and key informants identified multiple sources of information regarding Ebola. The most frequently cited source was radio programming, followed by interpersonal communication between family and friends, visits by health care workers, and religious venues (i.e. churches and mosques). This method of hearing "rumors" from both a family or community member and then later on the radio or at a religious venue was discussed by many participants.

I was in Bo [District] when Ebola first started. I heard it there. I told my relatives about it when I returned…I told them that it is fever and frequent stools…that the virus had started to kill people in Kailahun. **~ Female community member, Taninahun Village**

I can't tell the exact time now, and I don't even know when Ebola break out, but what I can remember very well is that, Ebola came from Kailahun. **~ Imam, Mongere Village**

[I heard through a] radio program about a new disease by the name of Ebola… [They said] it entered the country through Kailahun and is killing people. **~ Parent, Yonni Village**

We heard about Ebola through a radio announcement that originated from Kailahun. Also, information reached us from people in bigger towns explaining how someone can contract the sickness. **~ Parent, Taninahun Village**

Sources of Information Regarding Ebola

In reflecting upon their sources of information regarding Ebola, several participants identified educational and awareness efforts as critical to putting an end to the outbreak. For example, during a focus group discussion conducted in Taninahun Village, a male participant remarked: "Yes it [*education*] helped, because had it not been for the knowledge that we received the Ebola would have killed a lot more people." Similarly, a chief from Mbaomahun Village remarked: "There were radio messages, town criers, and other public announcements about Ebola made it very effective and educational in changing knowledge and practices about Ebola."

The radio was by far the most popular and the preferred choice for information regarding Ebola among participants. Furthermore, the majority mentioned first hearing of Ebola through radio programming. They described how public messages were continuously in multiple languages that provided comprehensive information, including on high-risk behaviors and the steps to take to further prevent transmission. For example, a CHW in Mongere Village remarked: "What we know about Ebola in this town and the way it came about Ebola we learned through the radio: "Ebola is real and we should not forget this'. They aired this message through the radio...always." Similarly, a key informant (male) from the Yonni Village commented: "Before [*the radio*] we didn't know whether Ebola was contracted through person-to-person contact, but the radio explained all of this to us and the high risk [*of transmission*] if in contact [*with someone*] within the 21 days [*of infection*]. The radio also told us different categories of Ebola and how to prevent it." The quotations in the box below further support these findings.

> *Radio were everywhere…anytime you tuned in all you heard was about Ebola. It helped greatly in changing behavior and knowledge. The most interesting thing about the native man is that whatever he hears from the radio, whether correct or not, he understands it as the truth.* **~ Pastor, Bumpe Village**
>
> *Radio programs were most effective… whatever the layman hears on the radio—even if it is wrong—he will say 'the radio said it' and, for them, the radio is always right.* **~ Pastor, Bumpe Village**
>
> *Radio programming, the establishment of emergency hotlines, like 117, and social mobilization play a critical role in controlling the outbreak. There were lots of public service announcements transmitted through the radio and they were very effective in combating Ebola.* **~ Imam, Kamalo Village**

The quotations above also highlight the role of radio programming in promoting rumors and misinformation, which triggered not only fear, but also promoted high-risk behavior among listeners. Do Nearly all of the religious leaders (pastors and imams) were able to recite the Ebola hotline number and knew to call immediately if there was a suspected case or death of an Ebola infected person. This proportion dropped to roughly 70 percent for teachers and chiefs.

> *The MOHS gave us the number: 117…world vision CHWs had different numbers that they too were calling to expedite movement.* **~ Imam, Taninahun Village**
>
> *They used to call 117, because it was the most effective means of communication. The CHWs always take you to either the nearby health center or the treatment center as they deem it fit.* **~ Chief, Kamalo Village**

Several respondents also remarked on the effectiveness of mobile telephones as a means of providing information relating to Ebola. A religious leader from Fulawahun noted: "Phone calls, radio discussions, and for areas where there were no signals people were informing authorities or the community health workers for the attention of appropriate authorities."

Community Organizing and Leadership

Community Leaders

Participants acknowledged that, in addition to individual prevention efforts, prevention requires a community wide response that engages community leaders from the onset. Furthermore, community members must remain committed and on task and should encourage others to be consistent in their messaging. For example, in a focus group composed of males from Taninahun Village, a participant noted: "We mounted check points and manned them for 24 hours, because when diagnosed with Ebola, some people may escape to your town…was one of the team leaders to ensure that no stranger or infested person entered into this town."

They were also in charge of organizing community meetings to inform individuals of the Ebola treatment center and the advantages of early treatment. Several participants also recalled how community leaders conducted household visits and distributed informational materials to households in their communities.

> *Some of us meet and distribute people to go and talk to other people in their homes, ask them how they are doing. If they are not doing well, they will try very hard to do call for them. We don't gather like before but to sit down one, one with distances. From there, they will disseminate the message to their neighbors in their respective homes.* **~ Parent, Mongere Village**

More than half of the participants, particularly community members, remarked on the critical role of by-laws implemented by village chiefs and community leaders in stopping the spread of the virus. A male from Taninahun Village remarked: "The chiefs and the community leaders make by laws that no strangers will be accommodated here without their knowledge, and if you do you'll pay a heavy fine…these were most effective." Similarly, a female community member from Mongere Village, remarked: "They made strong laws against accommodation of strangers that if anyone accommodates a stranger without the knowledge of the chief and he got the information from another person he will pay heavy fine.

Community members also commonly referred to survivors as leaders and commented on their ability to engage community members and help them to trust the health system. During a focus group discussion

with women from Taninahun Village, a participant reflected: "Our survivors were really educating us, because they survived it and we trust them. Engaging all community members was another action again they took."

Religious Leaders

Nearly all respondents reflected on how religious leaders (Christians and Muslims) used their churches and mosques as mechanisms for educating the public on Ebola, promoting behavior change as well as encouraging support for Ebola patients and survivors.

> *Symptoms of Ebola are high body temperature, severe headache, reddish eyes, vomiting, and frequent stools.*
> **~ Parents, Mongere Village**
>
> *Ebola starts with a high body temperature. Some people had reddish eyes, frequent stools, and vomiting.*
> **~ Male Community Member, Taninahun Village**
>
> *I saw red eyes, rash, migraine, vomiting with blood and very high fever.*
> **~ Chief, Mbaomahun Village**
>
> *It shows signs and symptoms such as fever, pain, headache and bleeding.*
> **~ Chief, Taninahun Village**

Both Pastors and Imams received training on infection prevention and control measures as well as on how to take action to raise awareness amongst their communities. During an interview, a CHW from Taninahun Village commented: "Religious leaders, particularly Pastors, were trained by World Vision and other organizations on infection prevention and control as well as on how to raise awareness and sensitize their communities on Ebola disease prevention and control." This equipped them with the knowledge and skills required to raise awareness of and challenge the stigma associated with Ebola. Participants from several villages, including Kpetama and Taninahun, offered examples of religious leaders facilitating their own prevention efforts in order to reinforce and reiterate the efforts of CHWs.

Regardless of age, sex, location, and religion, in reflecting upon the role of religious leaders, all participants identified pastors and Imams as credible sources of prevention information and expressed gratitude for their transformational role in combatting Ebola. During a focus group discussion in Kpetama Village, a Chief remarked:

> *[Religious leaders] were highly involved. World Vision gave them special training to talk to their people in their various places of worship, especially the Pastors. They even participated in trainings conducted by other organizations and held outside of this Chiefdom. They also worked with community health workers to spread messages from town to town.* **~ Chief, Kpetma Village**

Similarly, in Yonni Village, a parent of a World Vision sponsored child commented:

> *Pastors and Imams were seriously involved in this Ebola business. Some were fasting and praying until the situation reversed itself. In this town, every sermon at both churches and mosques were all about Ebola daily. We trust the men of God, because we believe they do not make compromises in order to say what the people want to hear.* **~ Parent, Yonni Village**

It is also important to note the extraordinary unity demonstrated by Imams and Pastors in providing hope and prevention and treatment messages to communities. In an unprecedented display of cooperation, interfaith Pastors and Imams spoke to each other's congregations about how to stop the spread of the deadly virus. A Chief from Fulawahun Village remarked:

> *Religious leaders were interchanging days of worship to talk to us…the Christians would go to the mosque on Fridays and Muslims [would go] to church on Sundays…We trust and respect our religious leaders…they gave us words of hope and encouragement.* **~ Chief, Fulawahun Village**

Similarly, during a focus group discussion, a woman from Monegre Village remarked: "The team work displayed by Christians and the Muslims who were working for the community was important, but, on the whole, I can say it was the prayer and the mercy of Allah". Additional examples of interfaith cooperation can be found in the box on the right.

Community Health Workers

Despite an initial lack of trust, participants expressed confidence and trust in community health workers, particularly as time went on. Participants described an initial breakdown of trust between communities and CHWs. Many felt as though CHWs were forcing them to accept treatment. A Pastor from Mbaomahun Village commented: "CHWs were advising people over the radio to wash their hands and go to the hospital when sick; or else they will take you to the hospital forcefully."

It was also common for communities to fear CHWs, as they believed that the virus was spread by CHWs through contact, exchanging of injections, etc. Several CHWs also reported being afraid of patients and discussed how many patients commented that many people did not believe that Ebola was a 'real disease', but, rather was made up by the government.

However, nearly all participants reported that over time and with the help of community leaders (e.g. Pastors, Imams, Chiefs, etc.), relationships were rebuilt and communities regained trust in the health system again. To help CHWs overcome fear and regain confidence in their provision of treatment, both the government and NGOs increased organized trainings and provided CHWs with the equipment necessary to perform their jobs safely. They also increased efforts to sensitize communities and welcome CHWs into their homes.

The CHWs were there, we used to transfer all cases to them, especially the visible Ebola symptoms they were trained they knew what to do. ~ **Imam, Kpetma Village**

We received visit from our health workers in Serabu, they rang bell for us to meet at the barry, so they told us that we should report any sickness to the Nurses in this village are responsible to check us, if they are not able or above them, they will write a note of referral to them at Serabu before anybody should visit them. So, the nurses came and advise us not to think bad about them because they are here to make sure the Virus not reach us in this village and advise us that if anybody feel sick should visit the health center for medication because there is no sufficient medicine in this health center but they should write a note of referral to them, but if go there without the paper they will not attend to you but to return you back. So, that is what I know. ~ **Parent, Taninahun Village**

One of the CHWs were our brothers and sisters and we trust them now; whatever information they were giving us was effective and helped changed our ways of thinking and behavior. ~ **Pastor, Mbaomahun Village**

They began to give us update information…they respected and trusted us, and took us to the health facility or made calls when there was need. They called 117 because it was the most effective way of communication. They also helped us to organize meetings, spread Ebola messages, look for people that have the Ebola signs and symptoms and also engaged in distributing posters and fliers. ~ **Chief, Kamalo Village**

They were working with the community people and serving as intermediary between the them and the other health workers at the health centers and the hospitals. ~ **CHW, Kpetma Village**

Perceived Causes of Ebola

Contaminated Bush Meat

Both focus groups and key informant interviews mentioned different mechanisms of contracting Ebola. The most common being: direct contact with blood or body fluids of a person who is sick with or has died from Ebola, objects (e.g., needles, syringes) that have been contaminated with Ebola, and undercooked and contaminated bush meat. Monkeys and bats were most frequently mentioned as the hosts of the virus and cause of Ebola. For example, in a focus group discussion with women from Taninahun, a respondent recounted: "[*The doctors*] said it started with animals in the bush, therefore, we must be careful of what we eat. The first thing is monkey and baboon. We were told to stop eating every bush meat, because they carry the virus and they transmit it to humans. We stopped eating both [*monkey and baboon*] until Ebola ended."

Physical Contact / Social Actions

Respondents also strongly indicated that Ebola is spread through skin-to-skin contact including kissing, hugging, shaking hands, and sexual intercourse. Other mentioned transmission methods included contact with bodily fluids of affected individuals, and most mentioned the importance of avoiding contact with people who displayed recognized signs and symptoms (e.g. diarrhea, red eyes, vomiting).

Recognition of Signs and Symptoms of Ebola

Recognition of Ebola symptoms was also high, as exemplified by the quotations on the right. The majority of respondents cited multiple (3-5 on average) signs and symptoms associated with Ebola. The most frequently reported were fever, headache, diarrhea, red eyes, and vomiting. Others commonly cited include, but were not limited to, the following: heavy bleeding, skin rash, weakness, body aches, and the swelling of limbs. No differences by gender, race, age, religion or region were observed.

Participants also explained the criteria they used to identify suspected Ebola cases, which ranged from simple to detailed. The quotations found in the box below demonstrate the variability in levels of knowledge and understanding of the

Symptoms of Ebola are high body temperature, severe headache, reddish eyes, vomiting, and frequent stools.
~ Parents, Mongere Village

Ebola starts with a high body temperature. Some people had reddish eyes, frequent stools, and vomiting.
~ Male Community Member, Taninahun Village

I saw red eyes, rash, migraine, vomiting with blood and very high fever.
~ Chief, Mbaomahun Village

It shows signs and symptoms such as fever, pain, headache and bleeding.
~ Chief, Taninahun Village

disease.

> *They said there was no cure…patients were showing signs and symptoms similar to other common illnesses here [in Sierra Leone], like malaria and typhoid and the death rate was rising sharply.*
> **~ Imam, Taninahun Village**
>
> *Because all the signs and symptoms existed before...Many, many people have had diarrhea and survived…fevers existed in the past as did headaches…That is why most of us [CHWs] did not believe [it was Ebola].* **~ CHW, Taninahun Village**
>
> *Initially, we didn't believe [the severity of] Ebola because all the clinical symptoms had been present in the past.*
> **~ CHW, Taninahun Village**

Others discussed how it can be particularly challenging to distinguish between Ebola and other commonly occurring diseases, such as the flu, Malaria and Typhoid, as the early signs and symptoms can closely mimic several signs and symptoms (e.g. fever, red eyes, and headache).

> *Another way to discover that someone has Ebola is [to look for] a certain type of fever, reddish eye, and water pouring from the nose along with frequent stools are conditions of Ebola. You must call for him to be carried to [the health] center.* **~ Parent, Mongere Village**
>
> *If a person falls seriously ill over about two days and you see her experiencing frequent stools and vomiting...Also, if blood pours out from certain parts of her body, like her eyes or nostrils, or she vomits blood, you know that he has Ebola.* **~ Male Community Member, Mongere Village**
>
> *What proves that someone has Ebola? When they vomit…Their limbs swell and there is blood all over their bodies…it even runs through their eyes…This is how you know they have Ebola.* **~ CHW, Mongere**
>
> *First, you start to run a fever, [your] body aches…[you start] vomiting and passing watery stool….then you start [experiencing] skin rashes and your eyes turn red …These are signs of a suspected case.* **~ Parent, Yonni Village**
>
> *What really indicates that someone has Ebola is vomiting, frequent stools, swelling of the body…this means that she has Ebola and you should not visit her, but stay far away…[You should] isolate her. So, those are the signs and symptoms that can make someone know that, she has Ebola.* **~ Parents, Mongere Village**

Care-Seeking and Perceptions of Health Facilities

Qualitative data suggests that, at the beginning of the outbreak, people disliked going to the Ebola treatment centers. Non-attendance at the Ebola centers can be attributed to several different reasons, which are discussed below.

Misinformation and Mistrust of the Health System

As illustrated by the quotations included above, the depiction of Ebola (overtly negative messaging, misinformation, etc.) early in the response led to significant mistrust and fear among communities as well as first responders in Sierra Leone as well as other impacted countries (i.e. Liberia, Guinea). This led to behaviors that encouraged transmission and, thus, the risk of infection. Intense fear prevented countless individuals from not only seeking care, but also from notifying officials about potential cases. Individuals also failed to seek care at Ebola treatment centers due to their belief that the disease was deadly and incurable. instead, individuals hid from authorities and relied on traditional healers or informal caregivers (i.e. family and friends). Such a high lack of trust, combined with overtly negative messaging about Ebola (i.e. serious, highly contagious and incurable disease), made it nearly impossible to control the outbreak. This is illustrated in the quotations below and further discussed in the sub-headings of this section.

> *It was fear, because initially the disease, according to the health workers, had no cure. The community felt it pointless to report a disease that does not have a cure. Also, in truth, when ten health workers take ten people away and only one returns, a health worker becomes untrustworthy…*
> **~ Parent, Yonni Village**
>
> *The disease had no cure, people were dying indiscriminately and do not have trust in doctors and nurses or the health workers.* **~ Imam, Kamalo Village**
>
> *They fear to be admitted in the hospital, because Ebola admission means quarantine and when once you're quarantine, you're taken away from your family and nobody will be there to feed or cater for them if you're the breadwinner. And people fear again that they might die if proven positive for Ebola, because the government said there was no cure for the disease.* **~ Chief, Yonni Village**
>
> *Lack of trust in the medical personnel, ignorance, political ideology that the government has come with the Ebola to kill people that don't support them, and the method of sensitization that there is no cure for Ebola. Good communication, engaging community members, calling the hotline.*
> **~ Chief, Taninahun Village**

'I did not believe Ebola was real'

As previously noted, the data suggests that participants avoided treatment centers at the start of the outbreak due to disbelief as to the existence of Ebola. During a focus group discussion conducted in Taninahun Village, a community health worker remarked: "Initially there were misunderstandings…many denied the existence of the disease [*Ebola*]." For example, participants noted several reasons for this, including government conspiracy. An Imam that participated in a focus group discussion in Mongere Village participants also remarked on government participation in prevention efforts: "People really thought Ebola did not exist and they [*government officials*] were just kidnapping people in the Southern and Eastern parts of the country." Similarly, a Chief from in Mbaomahun Village noted, "Some thought that if they attend a treatment center, they will be injected with the virus, as the government was responsible for the increased deaths – not Ebola, which in their minds did not exist." Religious leaders also touched on the different strategies used to encourage community members to practice preventative behaviors and attend the clinic. For example, a Pastor from Mongere Village

noted: "We [*pastors*] were advised, especially women who were lactating or pregnant, to go for routine vaccinations. I was organizing meetings, spreading the message about Ebola hoping that the people that didn't believe in its existence would at least believe something is killing their peers as soon as they touched it…"

Highly Contagious, Deadly and Incurable

Individuals also failed to seek care at Ebola treatment units due to their belief that it was deadly and incurable. An imam from Kamalo noted: The disease had no cure, people were dying indiscriminately and do not have trust in doctors and nurses or the health workers. In a focus group discussion with females from Taninahun Village, a participant shared:

> *The reason why we hesitated to go to the health center was because of the information we were getting from our relatives that lived out of this community. They told us that if a child with fever is taken to hospital, he/she will be considered as an Ebola case so the child will not be treated. But we thank God for our community; our nurses did not do that here. The child's temperature will be measured and treated accordingly. The child will be treated if it's malaria or referred if it is Ebola. the information we heard were fearful.* **~ Female Community Member, Taninahun Village**
>
> *The reason why people were not accessing the health centers was that, anytime they took people along to the Ebola treatment centers they were not bringing them back and there was no cure for the disease according to the health workers; and they fear that even with other illnesses if they report they'll be taken as Ebola suspects which means no coming back home....* **~ Pastor, Mbaomahun Village**

Similarly, an Imam from Yonni Village commented: "Well I told you that people were afraid to be diagnosed with Ebola, so they were afraid to go to the health centers, because there was no cure for the virus." There were even reports of individuals escaping from treatment centers out of fear that they would never see their families again. A male community member from Tanihuhan Village noted: "One of my friend's Daddy had Ebola…he also ran away, because there was this idea that if the health workers take you away, you won't return again…but he was caught and taken to the treatment center where he was cured and returned safely to his family…". Furthermore, Ebola survivors also were faced with stigma, shame, etc. from communities, which undermined their ability to recover.

4. Findings and Recommendations

Key Findings

This study fills a critical knowledge-to-practice gap by providing an in-depth analysis of the community's perspective of the health system during the Ebola crisis in Sierra Leone, with a specific focus on the factors (facilitating and impeding) that impact behavior change. The study also shed new the light on barriers preventing communities from trusting and using the Ebola response system during the height of the outbreak and reinforced the importance of community-based interventions (bottom up) in fostering behavior change. The remainder of this section highlights key findings of the research. All of which underscore the importance of improving the capacity of all health systems, particularly those characterized by fragile and dysfunctional health systems, to detect, evaluate, and respond to public health emergencies.

Appropriately Tailored Messaging Required from the Onset

Compared to control households, a statistically significantly higher proportion of case households received information from community providers (including CHWs) (50.0% versus 21.5%; $p<0.05$). However, a significantly higher proportion of case households indicated that they trusted World Vision staff (46.2% versus 24.3%; $p<0.05$). In terms of the qualitative data, the overwhelming majority of respondents (i.e. key informants and focus group discussants) identified World Vision's strategies as effective in terms of countering rumors and, ultimately, transforming public opinion and behaviors related to Ebola. This is in large part due to their unique position of trust and influence in communities throughout Bo District.

> *Let them use their own brothers and sisters in the community whom they trust most to disseminate the information, like what World Vision usually does, who use the locals/community volunteers in every community to talk to their people…***~ Pastor, Kpetema Village**
>
> *Because they are our brothers even though they were also working with the government, and because of this reason I can say World Vision was most trust worthy, because they are an independent body.*
> **~ Chief, Mbaomagun VIllage**
>
> *World Vision [was most effective], because they had been with us before Ebola.*
> **~ Pastor, Taninahun Village**
>
> *We trust World Vision most, because most of them are our brothers or relatives they cannot plan against us…***~ Chief, Kpetema Village**
>
> *But of all the numerous information that I received I trusted S.K. Foryoh and World Vision the most.*
> **~ Chief, Mbaomahun VIllage**

In terms of receipt of information, the main reason reported for the value of information received was that it provided options on how to address fears about Ebola and mitigate false information that Ebola was a sin or curse. Case households were significant more likely to receive this information (80.8%), as compared to control households (48.6%) ($p<0.05$).

Prioritization of a "Bottom-Up" Approach, Including the Engagement of Community Leaders from the Onset

In accordance with a "bottom-up" approach, World Vision acted as an outside agent and empowered community leaders to be instruments of change. The training sessions for religious leaders were critical in terms of helping them to determine which response strategies were most appropriate and ensure that they were effective in terms of encouraging health care seeking behavior among their communities. They equipped them with the knowledge and skills required to raise awareness of and challenge the stigma associated with Ebola. Participants from several villages, including Kpetama and Taninahun, offered examples of religious leaders facilitating their own prevention efforts in order to reinforce and reiterate the efforts of community health workers.

Initially our imams didn't believe the existence of the outbreaks, but as times goes by their awareness started building through sensitization programs being conducted by different organizations. They started engaging the congregation on Ebola sensitization programs. At the end of each prayer session members peacefully find their way home without any hand shaking practice as was done before.
~ Female Community Member, Yonni Village

Where our pastors and Imams only engaged in prayer intersections or where they also involved in other programs. They were engaged in prayer session, emphasizes on hand washing practices, banned hand shaking practices. **~ CHW, Taninuhan Village**

They were training together with the CHWs, meeting frequently to brainstorm and spreading the Ebola message to other communities…They increased the awareness rate and the community people started going to the health centers and stopped hunting animals especially monkeys.
~ Pastor, Mbaomahun Village

Yes [religious leaders] were highly involved; World Vision was giving them special training to talk to their people in their various places of worship, especially the Pastors. They were even taking trainings outside this chiefdom, conducted by other religious bodies or NGOs. They were directly working with the community health workers in the community spreading the message from town to town.
~ Chief, Kpetema Village

Perhaps in part due to World Vision's efforts to organize and build the capacity of religious leaders, sermons (i.e. Friday prayer and Sunday church services) emerged as key opportunities for spreading messages about prevention. Roughly 70 percent (70.7%) of respondents reported receiving information on prevention from religious leaders. The qualitative data further supports these findings, as nearly all respondents reflected on how religious leaders used their churches and mosques as mechanisms for

educating the public on Ebola, promoting behavior change as well as encouraging support for Ebola patients and survivors.

There was no normal services/prayers like on Fridays, but when we meet I used to tell them about trying times in every age that they should always pray and obey the Ebola laws asserted by the government and the community by-laws. **~ Imam, Fulawahun Village**

We were all doing the sensitization tour in the villages telling them to stop and limit their movement and practice personal hygiene, because cleanliness is next to Godliness. You cannot attend funerals that does not concern you to some greater extend, don't touch or go near a corpse, isolate a sick person, but I've told you all this and even the military they kept warning me of all these rules, and I was expected to tell my congregation all of this which I was doing. **~ Pastor, Kpetema VIllage**

Those [at greatest risk of infection] do not observe the laws of Ebola, like going to funerals eating bats, denying that the disease doesn't exist, etc. **~ Pastor, Yonni Village**

Both Christians and Muslims were very active in the fight of this Ebola, in fact there were groups called chrislag and islag formed by the two religious groups also giving health education on Ebola. **~ Chief, Mongere Village**

I was listening to the advices from religious leaders, organize community meetings and information they received from medical people. **~ Chief, Taninahun Village**

Although not illustrated in the quantitative data, key informants and focus group discussants commonly reflected on the critical role that religious leaders played in stopping the outbreak and reestablishing trust with the health system. The depiction of Ebola (overtly negative messaging, misinformation, etc.) early in the response led to significant mistrust and fear among communities as well as first responders in Sierra Leone as well as other impacted countries (i.e. Liberia, Guinea). This led to behaviors that encouraged transmission and, thus, the risk of infection. Intense fear prevented countless individuals from not only seeking care, but also from notifying officials about potential cases. Individuals also failed to seek care at Ebola treatment centers due to their belief that the disease was deadly and incurable. Instead, individuals hid from authorities and relied on traditional healers or informal caregivers (i.e. family and friends). Such a high lack of trust, combined with overtly negative messaging, made it nearly impossible to control the outbreak. It was not until the efforts fully engaged community leaders, specifically pastors and imams, that the outbreak began to slow. For example, a Chief from Yoni noted: "It was when the pastors and the imams in the community engaged them at congregational level and their brothers at world vision or the community chiefs [that we saw a change]."

By-Laws Vital to Controlling the Outbreak

The most influential people in stopping the spread of Ebola were identified as people within the community (80.0% sponsored vs. 36.4% non-sponsored) and CHWs (93.3% sponsored vs. 54.5% non-sponsored) ($p<0.05$). Participants commonly acknowledged that prevention requires a community wide

response that engages community leaders from the onset. More than half of the participants, particularly community members, remarked on the critical role of by-laws.

> *By-laws [were the most effective] ... [For example,] strangers are not allowed [in our villages] … No one can shake hands, you do not touch a sick [person], you don't burry a corpse, you don't wash the dead…*~ **Community Health Worker, Yoni Village**
>
> *What really saved us is when we obeyed the by-laws. We obeyed the laws strongly in this town. Some days they told us not to go anywhere for several days. We stayed at home with our relatives…We obeyed the laws. So, we think we are safe from Ebola because of obeying the laws.*
> ~ **Male Community Member, Mongere Village**
>
> *The by-laws, like not eating bush meat or accommodating strangers, were most helpful.*
> ~ **Teacher, Yonni Villge**

Survivors Key in Rebuilding Trust with the Health System

Community members also commonly referred to survivors as leaders and commented on their ability to engage community members and help them to trust the health system. A parent from Mongere Village noted: "The survivors, they were the people that makes us believed that Ebola is real, and people were dying of it, but God help them to survive. So, they were the ones that strength[en] us…to [make us] believe that someone can survive if only he/she report it early. So, we believed it and we abide[d] by it."

Interaction with Patients Impacted Knowledge of Transmission Mechanisms

The quantitative findings also revealed differences in terms of one's beliefs and understanding of modes of transmission depending on whether or not s/he resided in a household with an Ebola patient. Compared to controls (43.0%), a higher proportion of cases (65.4%) believed touching the blood of an infected person transmits the Ebola ($p<0.05$). A statistically significantly higher proportion of cases also identified contact with urine (53.8% vs. 27.1%; $p<0.05$) and feces (42.3% vs. 21.5%; $p<0.05$) of an infected person as a means of transmitting Ebola. The same trend was observed in terms of behaviors associated with caring for an Ebola patient. For example, 76.9% of cases indicated that they would not touch him or her. This proportion dropped to less than half (46.7%) among controls. Similarly, 69.2% of cases indicated that they would not touch something that an Ebola patient has touched (e.g. soiled clothes), versus only 39.9% of controls ($p<0.05$).

Case households were statistically significantly more likely to send a family member to an Ebola Treatment Unit or health care facility (92.3% versus 60.9%; $p <0.05$). In terms of the qualitative findings, several respondents commented on how after the bylaws it was required that potential cases attended a clinic or hospital. For example, a teacher in Taninahun remarked: "During the Ebola outbreak there was by laws with regards to this that one must attend clinic or hospital; all traditional healers were banned."

Awareness and Trust of World Vision Staff is Widespread

Sixty-five percent of the case households indicated that they were visited by the World Vision staff or volunteers, with most reporting visits twice a day (29.4%) or once a week (29.4%). Qualitative data further reinforces these findings. For example, a chief from Yoni noted: "So many NGOs were coming here, but I cannot remember all of them except World Vision and also the community volunteers from World Vision were conducting trainings for us." Similarly, an imam from Kpetama Village remarked: "World Vision staffs were visiting us more frequently than all other NGOs."

In terms of services, transport, food supply, cash voucher, were also mentioned by both case and control households. However, cases were more likely to receive such services. Significant differences between cases and controls were in receipt of food during the 21-day quarantine time (53.8% vs. 15.9%). More than one-quarter of key informants described receiving little to no services during the outbreak. For example, a male from Yonni Village noted: "Since the Ebola come to this town World Vision has never assisted us in any way. We the survivors asked in one meeting why we are not given any assistance in this part of the country as survivors like our colleagues? The answer was that we have world vision here as our own NGO they are supposed to supply us and not them, but since we come World Vision has not given us anything except empty promises." Conversely, a parent from Mongere noted: "World Vision is helping three of my children and they are all students. They recently supplied them rice even though it is not much but we say thanks to God because we eat it a day and we survived that day."

Sponsorship and Trainings Helpful to those with Access

There was a significant difference in participation in Ebola prevention community activities between cases and controls (73.1% vs. 43.9%) (*p<0.05*). Nearly all respondents (94.0%) reported participating in awareness-raising activities. Overall, a greater proportion of cases also participated in Ebola awareness activities, training, safe burials, etc. A greater proportion of cases participated in savings groups, Women's Groups, the Citizen Voice and Action program, etc., as compared to control households. Roughly one-third of key informants indicated that they were unaware of anyone who participated in any of the abovementioned activities organized by World Vision. About one quarter of all respondents (21.1%) found training on community welfare committees helpful.

Zero Deaths of Sponsored Children

Of the households included in this study, a significantly higher proportion case households were sponsored by World Vision, as compared to control households (57.7% versus 34.6%; p<0.05). In terms of the qualitative findings, several key informants remarked on the fact that no sponsored children had died during the outbreak. For example, a parent from Mongere Village noted: "None of the sponsored children did not contract the Ebola Virus in this of our own community we say thanks to God because they really received medicine from World Vision."

In closing, it is important to note that the findings illustrated in this have implications for the not only the 2014 Ebola outbreak in West Africa, and but other future health emergencies impacting countries characterized by weakened health care systems. Closing the gap between emergency response and health systems will likely mitigate the need for such a large-scale, international response in future health crises.

5. Conclusions

This study fills a critical knowledge-to-practice gap by providing an in-depth analysis of the community's perspective of the health system during the Ebola crisis in Sierra Leone with a specific focus on the factors (facilitating and impeding) that impact health-seeking behaviors. The findings have implications for not only the 2014 Ebola outbreak in West Africa, but other future health emergencies impacting countries with weak health care systems.

It is widely accepted that that the response to the 2014 Ebola crisis failed due to the state of health care systems in West Africa, which are often described as fragile and dysfunctional. The study findings reinforce the importance of improving the capacity of these systems to detect, evaluate, and respond to public health emergencies. If the health systems of Sierra Leone, Guinea, Liberia, etc. had sufficient capacity in terms of technical skills and resources prior to the Ebola outbreak, then perhaps a large-scale international response may not have been necessary.

Thus, moving forward, it is important to emphasize the critical role that effective communication plays in gaining the population's trust in the health care system during a public health emergency. Like Yamanis (2016), the study found that of all the intervention strategies implemented by World Vision, those based in the community were critical to the decline of the outbreak and even more effective than the international efforts initiated after the epidemic began to lose speed. Thus, an adequate health system response requires that coordination mechanisms are in place prior to the outbreak that are capable of effectively communicating response strategies among stakeholders operating at all levels (international, national and local). In low-income countries, this will prove particularly challenging given its limited economic resources and human resource deficits.

The findings from this study also reinforce the notion that trust in a health system is essential to its use, particularly in countries characterized by fragile and dysfunctional health systems. The community's level of trust in the health care system is directly related to widespread fear and misconceptions surrounding Ebola due to poor communication and ineffective messaging from the onset of the outbreak. Similar to needing to know "what works" in terms of preventing and responding to a public health emergency, the field also needs to improve its understanding of the impact of the relationship between the community and public institutions (i.e. health care facilities, workers, etc.) on care-seeking / utilization.

In reflecting upon the study's findings, particularly strategies employed by WVI, it is critical that the key lessons learned be shared with other NGOs, governments, engaged charged with responding to future public health emergencies. and implications for future programming be considered when designing future efforts to control an outbreak.

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Key Findings and Lessons Learned for Community Engagement and Social Mobilization for Ebola Prevention and Management

- The encounters with WV staff and CHWs was instrumental in accessing critical information and service utilization for suspected Ebola cases, and subsequent psychosocial and developmental support to households affected by Ebola
- Invest in trusted local community members; CHWs, religious and village leaders to facilitate community engagement and establish trust
- Design effective strategies for early authentic communication to provide key messages, to mitigate false assumptions, provide key actions to be undertaken at the household and community level
- Explore and build capacity of existing community resources to establish context specific community systems to address emergencies and liaise with district health systems and other development entities ensuring quality and effective universal coverage of interventions
- Create effective user friendly community based monitoring systems for surveillance, ensuring equity and quality
- Ensure integration of services, health, education, food security and livelihoods to ensure effective community participation
- Capacity building, learning and organizational strengthening must be included as an ongoing process for health systems in order to ensure they are prepared to respond to future emergencies
- Implementing an effective response from the onset of an outbreak is critical to gaining citizens' trust and ensuring their continued engagement with and utilization of the health systems

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Study Limitations

There are several limitations to this study. The retrospective design more than a year after the disease was 'under control' poses inherent recall bias of incidents and reported care seeking behaviors. Real time assessments would have been more effective on actual behaviors practices during the epidemic, as communities with Ebola cases would be more knowledgeable about the disease cause, prevention etc. We consulted with leading outbreak epidemiologists to develop a case control study design however the sample size was too small to make meaningful inferences between knowledge and behaviors of case and

control households, and the interviews were conducted with the heads of households and not the cases. Existing Ebola registers were used to identify the case households, and, in some instances, it was difficult to acquire five control households in close proximity to the case households. We had limited information on the implementation intensity of various community and school based strategies employed by WV, to determine the effectiveness of these on knowledge and behaviors.

With the available sample, it was not feasible to perform multilevel modeling with regressions to determine the effectiveness of the interventions. Nonparametric tests are based on fewer assumptions, because they do not assume that the outcome is approximately normally distributed. When the disease is rare or undetectable, the sample size is small and the distribution is unknown. It cannot be assumed to be approximately normally distributed; therefore, nonparametric tests are appropriate in this context. With outcomes, such as the ones used in this study, nonparametric tests are advantageous as they may be the only way to analyze the data. However, the cost of fewer assumptions means the nonparametric test is less powerful than a parametric test. The school based interventions, were likely to have produced better outcomes, in terms of trust of messages, mobilization and utilization of services based on the authenticity and trust of teachers by students, but this was not adequately explored or documented.

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Appendices

Appendix 1: Profile of Field Survey Teams

Name of Participants	Institution
Adon T. Levi	IPAM University of Sierra Leone
Cornelius Martin	Associate consultant, DALAN
Joyce Foday	MOHS
Lucy Tommy	Private Researcher
Hawanatu Turay	FBC USL
Agatha Ada Levi	Njala University
Kadiatu Sillah	Graduate, Njala University
Racheal Kamanda	Njala University
Mambu Idrissa	School of Clinical Sciences, Njala University
David Yovuwa	Private Researcher
John M. Mattia	FBC USL
Sahr Emmanuel Borbor	Njala University
Prince J. S. Walters	Private Researcher
Hamid E. Kamara	Graduate, School of Clinical Sciences, Njala University
Ansu Abdulai	Senior Teacher, Christ the King College

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Appendix 2: Tables for World Vision Sponsored and Non-Sponsored Children

Table 200: Sociodemographic Characteristics of Households - Sponsored vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Sex							
Male	8	53.3	10	90.9	18	69.2	*0.044*
Female	7	46.7	1	9.1	8	30.8	
Mean age	15	39.1	11	43.5	26	40.9	0.466
Marital status							
Single/never married	-	-	2	18.2	2	7.7	
Legally married and living with spouse	11	73.3	7	63.6	18	69.2	0.604
Cohabiting	1	6.7	1	9.1	2	7.7	
Widowed	3	20.0	1	9.1	4	15.4	
Educational attainment							
Primary	2	13.3	3	27.3	5	19.2	
Secondary	4	26.7	1	9.1	5	19.2	
High school	1	6.7	-	-	1	3.8	
University	1	6.7	-	-	1	3.8	
No formal education	6	40.0	7	63.6	13	50.0	0.243
Other[a]	1	6.7	-	-	1	3.8	
Religion							
Christian	8	53.3	-	-	8	30.8	
Islam	7	46.7	11	100.0	18	69.2	*0.004*
Length of residence							
Over a year	15	100.0	11	100.0	26	100.0	
Household (HH) indicators							
Mean number of people usually living and eating in HH	15	7.4	11	9.2	26	8.2	0.495
Mean number of people who lived and ate in HH	15	9.4	11	11.3	26	10.2	0.375
Mean number of people in HH who were employed in the past 12 months	15	0.3	11	0.0	26	0.2	0.069

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

(a) Arabic education and mechanic (labor)

− Indicates zero observations

In the sponsored and non-sponsored households, there was a significant difference in the proportion of males (53% vs. 91%) ($p < 0.05$); there was an insufficient amount of females to calculate the p-value using the Wilcoxon test. Another significant finding was 47% of sponsored households identified as Muslims compared to 100% of non-sponsored households ($p < 0.05$).

Table 211: Economic Characteristics of Sampled Health of Households – Sponsored vs. Non-Sponsored

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Primary source of income							
Agriculture	11	73.3	7	63.6	18	69.2	0.604
Rearing animals	-	-	1	9.1	1	3.8	
Service/salaried	1	6.7	-	-	1	3.8	
Business/trading	3	20.0	3	27.3	6	23.1	0.670
Main source of lighting							
Generator	2	13.3	-	-	2	7.7	
Batteries	3	20.0	7	63.6	10	38.5	***0.027***
Kerosene or oil lamp	1	6.7	1	9.1	2	7.7	
Other[a]	9	60.0	3	27.3	12	46.2	0.105
Safe source of drinking water	12	85.7	7	63.6	19	76.0	0.209
Main kind of toilet facility							
Private flush toilet	1	6.7	-	-	1	3.8	
Shared flush toilet	-	-	2	18.2	2	7.7	
Traditional pit latrine	10	66.7	6	54.5	16	61.5	0.538
Open defecation	4	26.7	3	27.3	7	26.9	0.973
Mean number of assets per household	15	2.3	11	2.4	26	2.3	0.854

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

(a) Other includes Chinese lantern, locally made lights, palm oil, and torch light

– Indicates zero observations

There was a significant difference in the 20% of sponsored and 64% of non-sponsored households having batteries as their main source of lighting ($p < 0.05$).

Table 222: Source of Information on Ebola - Sponsored vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Ever heard of Ebola	15	100.0	11	100.0	26	100.0	
First learned of Ebola							
Family member	5	33.3	2	18.2	7	26.9	0.399
Friend or neighbor	2	13.3	1	9.1	3	11.5	
World Vision volunteer	1	6.7	-	-	1	3.8	
Radio or television	4	26.7	8	72.7	12	46.2	***0.022***
Source of information about Ebola							
Relatives and friends	4	26.7	2	18.2	6	23.1	0.619
World Vision staff	2	13.3	-	-	2	7.7	
World Vision volunteer	6	40.0	1	9.1	7	26.9	
Health and medical professionals	7	46.7	4	36.4	11	42.3	0.606
Government, Ministry of Health and Ministry of Social Welfare	9	60.0	6	54.5	15	57.7	0.785
The media (radio, TV)	7	46.7	6	54.5	13	50.0	0.697
CHW or other community providers	8	53.3	5	45.5	13	50.0	0.697
Trustful source of information about Ebola							
World Vision staff	8	53.3	4	36.4	12	46.2	0.400
World Vision volunteer	10	66.7	3	27.3	13	50.0	0.052
CHW or other community provider	13	86.7	9	81.8	22	84.6	0.740
Community leader	7	46.7	2	18.2	9	34.6	0.139
No one	-	-	-	-	-	-	

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

− Indicates zero observations

Most non-sponsored households (73%) first learned of Ebola from the radio or TV compared to 27% of sponsored households ($p < 0.05$). Other findings were not significant.

Table 233: Knowledge of Cause, Mode of Transmission, and Signs and Symptoms of EVD - Sponsored vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	n	%
Cause							
Virus	11	73.3	4	50.0	15	65.2	0.274
Bats, monkeys, chimpanzees, and other wild animals	13	86.7	6	75.0	19	82.6	0.492
Other[a]	1	6.7	-	-	1	4.3	
I don't know/not sure	-	-	3	27.3	3	11.5	
Mode of transmission							
Preparing or eating bush meat as a meal	14	93.3	7	63.6	21	80.8	0.063
Touching the saliva of an infected person	9	60.0	2	18.2	11	42.3	
Touching the blood of an infected person	10	66.7	7	63.6	17	65.4	0.875
Touching urine of an infected person	9	60.0	5	45.5	14	53.8	0.471
Touching feces of an infected person	9	60.0	2	18.2	11	42.3	
Shaking hands with an infected person	8	53.3	6	54.5	14	53.8	0.952
Having sex with an infected person	7	46.7	2	18.2	9	34.6	0.139
Other physical contact with an infected person	9	60.0	4	36.4	13	50.0	0.243
Participating in burial ceremonies that involve handling of a dead body	11	73.3	4	36.4	15	57.7	0.065
Signs and symptoms							
Fever	15	100.0	10	90.9	25	96.2	0.243
Severe headache	6	40.0	4	36.4	10	38.5	0.854
Weakness	10	66.7	7	63.6	17	65.4	0.875
Diarrhea (with or without blood)	13	86.7	11	100.0	24	92.3	0.216
Vomiting (with or without blood)	13	86.7	11	100.0	24	92.3	0.216
Rash	4	26.7	2	18.2	6	23.1	0.619
Bleeding (internal or external)	4	26.7	2	18.2	6	23.1	0.619
Other[b]	10	66.7	4	36.4	14	53.8	0.133

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

(a) Other causes of EVD include an infected person, dirt, God and through physical contact

(b) Another sign and symptom of EVD includes red eye

− Indicates zero observations

There were no significant findings for sponsored and non-sponsored households in their knowledge of the causes, modes of transmission, and signs and symptoms of Ebola.

Table 244: Perceptions on Ebola Transmission & Beliefs and Attitudes - Sponsored vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	n
Avoid touching a sick person	14	93.3	11	100.0	25	96.2	0.392
Avoid attending funeral or burial rituals	15	100.0	11	100.0	26	100.0	
Suspected case should be isolated or sent to ETU	15	100.0	11	100.0	26	100.0	
Length of isolation							
Less than 21 days	2	13.3	1	9.1	3	11.5	
About or exactly 21 days	11	73.3	6	54.5	17	65.4	0.329
Longer than 21 days	2	13.3	4	36.4	6	23.1	0.177
Infected person without signs or symptoms can transmit Ebola	11	73.3	6	54.5	17	65.4	0.329
Suspected case reduces likelihood of transmission by immediately (within 1 day) going to a health center	15	100.0	10	90.9	25	96.2	0.243

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

− Indicates zero observations

There were no significant findings between sponsored and non-sponsored households in their perceptions, beliefs and attitudes of Ebola.

Table 25: Beliefs and Attitudes Concerning Prevention, Care, and Treatment of EVD - Sponsored vs. Non-Sponsored

Beliefs and Attitudes	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Health workers who enquire about Ebola protect me from Ebola	15	100.0	11	100.0	26	100.0	
Most influential person in stopping spread of Ebola							
Community	12	80.0	4	36.4	16	61.5	*0.027*
CHW	14	93.3	6	54.5	20	76.9	*0.023*
The government/Health Ministry/County Health team	11	73.3	8	72.7	19	73.1	0.973
Survivors of Ebola	7	46.7	-	-	7	26.9	
Village chiefs, elders and other community leaders	10	66.7	1	9.1	11	42.3	
Only God	2	13.3	7	63.6	9	34.6	
Other[a]	10	66.7	1	9.1	11	42.3	
Traditional healers can cure or treat Ebola	-	-	1	9.1	1	3.8	
Spiritual healers can cure or treat Ebola	1	6.7	-	-	1	3.8	
Diagnosed Ebola person should be taken to health center or ETU	15	100.0	11	100.0	26	100.0	
Improved survival for person with Ebola-like symptoms ETU services were sought	15	100.0	11	100.0	26	100.0	
Outcome of person with Ebola-like symptoms after going to ETU							
Receive better care than at home	11	73.3	10	90.9	21	80.8	0.271
Receive nutritious food and water	2	13.3	6	54.5	8	30.8	
Be safe	4	26.7	5	45.5	9	34.6	0.329
Receive medication for Ebola and other diseases	8	53.3	6	54.5	14	53.8	0.952
Other[b]	9	60.0	-	-	9	34.6	
High risk Ebola communities should be prevented from contacting other communities	15	100.0	10	90.9	25	96.2	0.243

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

(a) Other includes Kposowa Foundation and other NGOs, MSF, prayers, and law enforcement officer

(b) Other includes "For Ebola treatment", "High chance of recovery if early report", "It's either they survive or die", "They will be cured if taken earlier", and "They will be treated"

− Indicates zero observations

In their belief of the most influential person in stopping the spread of Ebola, sponsored households differed significantly with 93% believing CHWs had the greatest impact followed by 80% people within the community. In comparison, only 55% of non-sponsored households believed CHWs were influential followed by 36% people within the community ($p < 0.05$). Most non-sponsored households (73%) believed the government was the most influential in containing Ebola.

Table 26: Reported Behavior Concerning Suspected Ebola Person - Sponsored vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
First action after physical contact with suspected Ebola person							
Wash hands	12	80.0	2	18.2	14	53.8	
Call the Ebola hotline number	1	6.7	4	36.4	5	19.2	
Contact community leader/chief	-	-	1	9.1	1	3.8	
Go to the health facility or ETU	-	-	2	18.2	2	7.7	
Contact CHW	-	-	1	9.1	1	3.8	
Other	2	13.3	1	9.1	3	11.5	
Action taken if family member is suspected Ebola person							
Help care for the person at home	1	6.7	-	-	1	3.8	
Check their temperature by touching their body	1	6.7	-	-	1	3.8	
Avoid all physical contact and bodily fluids of that person	14	93.3	8	72.7	22	84.6	0.158
Call the Ebola hotline	12	80.0	9	81.8	21	80.8	0.909
Take the person to the health facility/ETU	3	20.0	2	18.2	5	19.2	
Contact community healer	8	53.3	4	36.4	12	46.2	0.400
Contact CHW	7	46.7	4	36.4	11	42.3	0.606
Tell friends and family	1	6.7	-	-	1	3.8	
Stay away from them for 1-7 days	-	-	1	9.1	1	3.8	
Stay away from them for 8-14 days	-	-	-	-	-	-	
Stay away from them for 15-21 days	2	13.3	1	9.1	3	11.5	
Keep them at home	1	6.7	-	-	1	3.8	
Other[a]	2	13.3	-	-	2	7.7	
Care of suspected Ebola person							
Keep the person away from others	12	80.0	10	90.9	22	84.6	0.455
Do not touch the person or their body fluids	14	93.3	6	54.5	20	76.9	*0.023*
Do not touch things the person has touched (e.g. soiled clothes)	12	80.0	6	54.5	18	69.2	0.173
Use protective barriers (e.g. gloves)	7	46.7	-	-	7	26.9	
Frequently wash hands	6	40.0	2	18.2	8	30.8	0.243
Handling deceased body of suspected Ebola person							
Contact and wait for the burial team to bury the body	15	100.0	11	100.0	26	100.0	

Notes:
p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas
p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

In the care of someone suspected of Ebola, 93% of sponsored households did not touch the person or their body fluids compared to 55% of non-sponsored households.

Table 27: Knowledge of and Perception and Attitude Toward Ebola Survivors - Sponsored Vs. Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Knowledge of Ebola survivor	14	93.3	8	72.7	22	84.6	0.158
Ebola survivors can contract Ebola again	4	26.7	-	-	4	15.4	
Ebola survivors can infect others by physical contact (e.g., touching and hugging)	4	26.7	1	9.1	5	19.2	
Child survivors can put classmates at risk	3	20.0	2	18.2	5	19.2	
Buy from Ebola survivors	14	93.3	11	100.0	25	96.2	0.392
Welcome survivors in community	15	100.0	11	100.0	26	100.0	
Accept a surviving orphan to live in HH	15	100.0	11	100.0	26	100.0	

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

− Indicates zero observation

There were no significant findings between sponsored and non-sponsored households in their knowledge of and perception toward Ebola survivors.

Table 28:Reported Behavior for Protecting Family Members - Sponsored vs Non-Sponsored Households

Characteristics	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Actions taken to protect family members from Ebola							
Wash hands with soap and water more often	14	93.3	10	90.9	24	92.3	0.822
Wash hands with chlorine water often	6	40.0	6	54.5	12	46.2	0.471
Try to avoid crowded places	8	53.3	6	54.5	14	53.8	0.952
Try to avoid physical contact with people suspected of Ebola	11	73.3	6	54.5	17	65.4	0.329
Avoid physical contact with everyone	11	73.3	4	36.4	15	57.7	0.065
Not participate in burial ceremonies that involve the handling	10	66.7	3	27.3	13	50.0	0.052
Family member went to ETU or health facility	13	86.7	11	100.0	24	92.3	0.216
Reasons for not seeking care							
Too far, no transport	1	50.0	-	-	1	50.0	
Didn't trust the staff	1	50.0	-	-	1	50.0	
Afraid of stigma, people will think I have Ebola	1	50.0	-	-	1	50.0	
Timely Care-seeking at ETU or health facility							
Less than a day	6	46.2	3	27.3	9	37.5	0.351
1-2 days	5	38.5	7	63.6	12	50.0	0.229
3-4 days	2	15.4	-	-	2	8.3	
5-6 days	-	-	1	9.1	1	4.2	
Travel time ETU							
Less than 30 minutes	3	20.0	3	27.3	6	23.1	0.670
From 30 minutes to 2 hours	7	46.7	2	18.2	9	34.6	
More than 2 hours to less than half a day	5	33.3	6	54.5	11	42.3	0.289
Sick Family member was visited by WV	11	73.3	6	54.5	17	65.4	0.329
Frequency of visits by WV staff or volunteers or CHW							
Twice a day	4	36.4	1	16.7	5	29.4	
Once a day	2	18.2	-	-	2	11.8	
Every two days	1	9.1	-	-	1	5.9	
Twice a week	1	9.1	-	-	1	5.9	
Once a week	2	18.2	3	50.0	5	29.4	
Twice a month	1	9.1	1	16.7	2	11.8	
Other	-	-	1	16.7	1	5.9	
Types of support received by WV when family member had Ebola							
Transportation to ETU or community care center	11	73.3	5	45.5	16	61.5	0.157
Direct cash support	3	20.0	-	-	3	11.5	
Cash equivalent voucher	4	26.7	-	-	4	15.4	
Food supplies	4	26.7	4	36.4	8	30.8	0.604
Psychosocial support	3	20.0	1	9.1	4	15.4	
Other[b]	2	13.3	-	-	2	7.7	
Attended funeral for Ebola victim	3	20.0	2	18.2	5	19.2	0.909

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as $2 * normprob(-abs(`z'))$ where `z' is the statistic

(a) Cannot remember how often

(b) There is no explanation for other in the database

– Indicates zero observations

There were no significant findings between sponsored and non-sponsored households in their reported behavior to protect family members.

Table 29: Knowledge and Use of Ebola Hotline Number, and World Vision/Community Services - Sponsored vs. Non-Sponsored Households

Knowledge or Behavior Statement	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Knowledge of Ebola hotline number	14	93.3	10	90.9	24	92.3	0.822
Previously used Ebola hotline number	3	20.0	3	27.3	6	23.1	0.670
WV staff or CHW visited during Ebola outbreak	14	93.3	9	81.8	23	88.5	0.373
Information or services received							
Information about the causes of Ebola and how to prevent it	13	92.9	9	100.0	22	95.7	0.423
Information on Ebola treatment centers	10	71.4	6	66.7	16	69.6	0.813
Posters/pamphlets on Ebola	9	64.3	3	33.3	12	52.2	0.156
Handwashing supplies	11	78.6	7	77.8	18	78.3	0.965
Other[a]	10	71.4	5	55.6	15	65.2	0.446
Participation in Ebola prevention community activity	11	73.3	8	72.7	19	73.1	0.973
Types of participation							
Spreading awareness	10	90.9	8	100.0	18	94.7	0.394
Demonstrating prevention actions	8	72.7	2	25.0	10	52.6	
Attending meetings about Ebola	6	54.5	1	12.5	7	36.8	
Other[b]	6	54.5	2	25.0	8	42.1	0.210
Participation in burial or SMART training	5	33.3	2	18.2	7	26.9	0.399
Participation in child nutrition and mortality survey	2	13.3	-	-	2	7.7	
Knowledge of the Ebola Response Command and Control Centre	12	80.0	9	81.8	21	80.8	0.909
Participation in any Ebola response Command and Control Centre activities	4	26.7	-	-	4	15.4	
Participation in a savings group	8	53.3	1	9.1	9	34.6	
Family member also participated in a savings group	4	26.7	1	9.1	5	19.2	
Participation of children in a savings group	4	26.7	-	-	4	15.4	
Participation in women's groups that received support for vegetable production	5	33.3	-	-	5	19.2	
Participation in survey on Children's Ebola Recovery Assessment	2	13.3	-	-	2	7.7	
Participation in training program to support orphans	2	13.3	3	27.3	5	19.2	0.382
Participation in Citizen Voice and Action program activities during the Ebola crisis	3	20.0	-	-	3	11.5	

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as $2 * normprob(-abs(\text{`z'}))$ where `z' is the statistic

(a) Other includes "Checking the welfare of sponsored children", "Food aid for sponsored children", "Monitored the welfare of sponsored child" and "They gave us advice pertaining"

(b) Other includes "Giving advice to my colleagues", "I was responsible to fill the rubber", "Not to allow strangers" and "Served as guide for any stranger".

− Indicates zero observations

There were no significant findings between sponsored and non-sponsored households in their knowledge and use of the Ebola hotline number and usage of World Vision and community services.

Table 29: Specific World Vision Services Received - Sponsored vs. Non-Sponsored Households Table

Services	Sponsored (n=15)		Non-Sponsored (n=11)		Total (N=26)		P-value Wilcoxon
	n	%	n	%	N	%	
Seeds, rice, vegetable oil, or yellow split peas	5	33.3	6	54.5	11	42.3	0.289
Food or cash vouchers	9	60.0	4	36.4	13	50.0	0.243
Any food during the 21 day quarantine time	7	46.7	7	63.6	14	53.8	0.400
Small loans or grants	4	26.7	1	9.1	5	19.2	
Enriched corn or soy blend cereal for a malnourished child	6	40.0	4	36.4	10	38.5	0.854
Radio	4	26.7	1	9.1	5	19.2	
Information on how to address fears about Ebola	13	86.7	8	72.7	21	80.8	0.382
Information about WV's Channels of Hope program	8	53.3	2	18.2	10	38.5	0.074
Reasons why information was helpful							
Mitigated false information that Ebola was a sin or curse	7	87.5	1	50.0	8	80.0	
Assisted with safe burials	1	12.5	-	-	1	10.0	
Psychosocial support for Ebola victims	-	-	1	50.0	1	10.0	
Information given by religious leaders on Ebola							
No information from religious leader	2	13.3	1	9.1	3	11.5	
Mitigated false information that Ebola was a sin or curse	8	53.3	1	9.1	9	34.6	
Information on prevention	10	66.7	10	90.9	20	76.9	0.155
Information on treatment	10	66.7	4	36.4	14	53.8	0.133
Psychosocial support for Ebola	7	46.7	2	18.2	9	34.6	0.139
Other (e.g., assigned with safe burials)	4	26.7	2	18.2	6	23.1	0.850
Knows a religious leader who participated in a burial of an Ebola victim	2	13.3	-	-	2	7.7	
Received training for:							
Mother's clubs	6	40.0	-	-	6	23.1	
Community welfare committees	8	53.3	1	9.1	9	34.6	
Child protection, legislation	6	40.0	2	18.2	8	30.8	0.243
Parenting or psychosocial support	10	66.7	1	9.1	11	42.3	
First aid skills	8	53.3	-	-	8	30.8	
Family member found training useful	11	100.0	3	100.0	14	100.0	

Notes:

p-value reports Wilcoxon results comparing level of statistical significance between case and control in the study areas

p-value is calculated as 2 * normprob(-abs(`z')) where `z' is the statistic

– Indicates zero observations

There were no significant findings between sponsored and non-sponsored households in the specific World Vision services that they received.