

Improving immunisation coverage in Ethiopia: a formative evaluation in pastoral communities

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About this formative study

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Executive summary

Background

In Ethiopia, about 15 million people practice pastoralism. The pastoral areas are characterized by meager basic development infrastructures and social services. Although Ethiopia registered significant improvement in the health sector over the last decade, the expansion of Health Extension Program (HEP) based on static health posts could not adequately address the needs of the pastoral communities due to physical remoteness, dispersed settlements in large geographic areas, constant mobility, and low demand to health services. With the aim of empowering the community and addressing the demand side barriers in the health system, Ethiopia introduced a broad-based community mobilization platform called Health Development Army (HDA) in 2011/2012. The HDA implemented in the agrarian communities involved organization of women into networks based on geographic proximity. It has been shown to increase awareness, health seeking behavior, service utilization, and reduction in harmful traditional practices.

Since an HDA model has not been developed or tried in the pastoral context, there is limited evidence of its feasibility and effectiveness in the pastoral context. The government has been seeking evidence for decision-making in the development of pastoral community engagement strategy. To understand the processes and factors that are associated with successful implementation of HDA networks within the pastoral context, we subjected the HDA model to formative evaluation. We hypothesized that HDA has great potential for higher impact in pastoral context where, unlike the providers of formal health services, the network members move along with their communities ensuring continued engagement mitigating the dispersed settlement and mobility factors. The project was implemented in Borena zone in the Oromia Regional State of Ethiopia with the objectives of organizing women into networks of HDA, and evaluating the implementation process and its contribution to improvement of immunization.

Intervention

HDA comprises: 1) one-to-five women networks with a leader; 2) Development Groups (DGs) organized in 20-30 households clustered in one-to-five networks with a team leader; 3) Health Extension Workers (HEWs); and 4) a command post. The following activities were undertaken in two kebeles: stakeholder engagement campaign; created 326 one-to-five networks within 64 development groups; trained network leaders on HEP with a focus on immunization; prepared kebele plans with breakdown by development groups and one-to-five networks; meetings of networks to educate, influence and persuade fellow network members; review meetings; and provision of immunization.

Evaluation methods

The primary formative evaluation questions were: Can networks be created based on geographic proximity in the pastoral context? What is the level of acceptance to enroll in HDA networks and participate in meetings? What factors affect the regularity of network meetings? Did peer role models influence community members to adopt immunization? Has immunization coverage improved?

To answer these questions, the formative evaluation incorporated quantitative and qualitative methods. The qualitative component employed Community Focus Group Discussions (CFGDs) and key informant interviews (KII). A total of 45 key informant interviews representing different stakeholders and 8 CFGDs were conducted and digitally recorded upon verbal consent. The quantitative component employed pre- and post-intervention household surveys to determine outcome indicators. All households at baseline (December 2016) and households with under five children at end line (June 2017) were surveyed using structured questionnaires upon verbal consent. Adequate training and supervision were provided to ensure the collection of quality data.

Key findings

Population characteristics: More than half of the study households (56.1%) were agro-pastoralists, while over a third (38.1%) were pastoralists. About a quarter (24%) of the households were headed by women. Majority of the women respondents were married (65.1%) and never attended school (90%).

Relevance of the intervention: The intervention demonstrates high relevance to the low immunization coverage in the pastoral areas. Investing in HDA that can address demand-side barriers such as lifestyle and socio-economic status, parental knowledge and attitude, and social influence to improve immunization coverage is relevant to the needs of the pastoral community. According to all stakeholders, it served as platform for information dissemination and communication, supporting and influencing each other, raising awareness and generating demand, linking the community with the health system, and improving immunization coverage.

Acceptability and take-up of HDA: HDA was widely acceptable by all stakeholders including the community. Majority (96.3%) of the targeted pastoral women were organized into networks. There were no lifestyle, cultural or social barriers preventing women from organizing in the HDA. Outreach immunization services were critical in the context of large geographic area and dispersed settlement, and HDA's participation in community mobilization had resulted in increased immunization. The percent of fully vaccinated one-year-old children increased by almost 100% from 26.6% at baseline to 52.4% at end line. Despite the high acceptability, the attendance level in the scheduled network meetings was low with only 9.3% attending all scheduled meetings and 14.5% attending most of the scheduled meetings. This was due to severe drought (82.8%), and women's occupation with family responsibility (71%) and livestock caring (68.1%).

Adoptions made to the implemented HDA: The implemented intervention differed from what was originally planned in the following key areas:

- The original network organization was based on geography and neighborhood, while the implemented intervention was based on "abba olla". With this approach, when families move from one settlement area to another within their village, they move along with their respective "abba ollas" keeping the networks intact. Another reason for this approach was the critical role of "abba olla" in support and decision-making.
- Originally, it was planned to establish the command post under the kebele administration council; however, the command post in the implemented

intervention integrated the traditional leadership structure to maximize community mobilization.

- The original plan was to elect leaders by the network members. However, similar to the command post that integrated the traditional leaders, the involvement of “abba ollas” was critical at the development group level. Thus, the elected team leaders work under the leadership of the respective “abba olla”.
- A biweekly one-to-five network meeting was preferred than weekly meetings that were originally planned due to the overburden of women. Similarly, the planned biweekly meeting of HDA leaders was changed into a monthly meeting.
- Originally, it was planned to organized women in a group of 6 women – one leader and 5 members; however, the number of women in the network depends on the number of women within the “abba ollas”. Thus, flexibility was adopted where the number of network members could be between 4-6 women.
- Written report by leaders was originally planned but due to the low literacy rate in the pastoral area it was not possible to submit written reports by the network leaders. Reporting their activities orally was the adoption made.

Conclusion

The critical elements in the successful implementation of the intervention includes: engagement and participation of different stakeholders at different levels of the project; equipping network leaders with adequate knowledge and skills; the participation of traditional leaders in support and supervision of networks; timely identification of challenges and consideration of inputs from stakeholders into the intervention design; the ownership of the intervention by the public sector (implementing agency of the project) facilitating linkage with the health system; the sense of community ownership and empowerment created; and the parallel strengthening of outreach services improving the supply-side barriers. The timeliness of the project responding to the government and community needs, and the fact that the networks served as a platform to address other social issues were additional factors that contributed to its success.

Having developed a pastoral HDA model, which has been shown to be feasible to implement, relevant to the pastoral context, widely acceptable by all stakeholders, and improved significantly immunization coverage, it will be important to undertake full impact evaluation with the objectives of determining its impact on immunization coverage and health status of children, its cost-efficiency, and sustainability.

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Abbreviations and acronyms

ANC	Antenatal Care
CFGDs	Community Focus Group Discussions
CNHDE	Center for National Health Development in Ethiopia
DGs	Development Groups
FMOH	Federal Ministry of Health
HDA	Health Development Army
HEP	Health Extension Program
HEWs	Health Extension Workers
KII	key informant interviews
MDGs	Millennium Development Goals
MRC	Medical Research Council
NGOs	Non-Governmental Organizations
ORHB	Oromia Regional Health Bureau
PHCU	Primary Health Care Unit
PNC	Postnatal Care
TT	Tetanus Toxoid
SNNPR	South Nations and Nationalities People Region
WHO	World Health Organization

1. Introduction

Pastoralism is a livelihood that is extensively practiced across the world constituting about 25% of the globe's population. In Ethiopia, about 15 million people practice pastoralism, and are found in Somali, Afar, Oromia, South Nations and Nationalities People (SNNP), Benshangul, Gambela and Tigray Regional States (FMOFA, 2008). The pastoral environment in Ethiopia is arid and semi-arid, and covers 61% of the land area of the country. The pastoral areas are subject to interplay of fluctuating and interacting features of rainfall, drought, and epidemic disease (Schelling et al., 2005; Smith, Timms and Rafel, 1979; MMWR, 2001). Due to a long period of neglect and marginalization, basic development infrastructures and social services are very meager (WHO, 2005).

Over the last decade, Ethiopia registered significant improvement in the health sector and achieved Millennium Development Goals (MDGs) in relation to maternal and child health indicators. These achievements are as a result of the nationwide implementation of Health Extension Program (HEP) by the Federal Ministry of Health (FMOH) (FMOH, 2005; Teklehaimanot, 2013). HEP is a community based primary health care program implemented at kebele level (sub-division of a district of about 5,000 people) each with a health post and 2-3 Health Extension Workers (HEWs) [FMOH, 2005]. To cover about 15,000 kebeles in the country, over 38,000 HEWs have been deployed across the country (Teklehaimanot, 2013). Immunization is one of the health service packages delivered through HEP (FMOH, 2005).

Despite its impact nationally, the health post based static HEP service could not adequately meet the demand of the pastoral communities (Fentaw, 2013; Zinsstag, Ould Taleb and Craig, 2006). The pastoralists are disproportionately affected with the highest burden of maternal and child mortality, which is due to lack of equity and quality of service resulting from both demand and supply side challenges (WISP, 2008). Access to and utilization of immunization service in pastoral areas are lower than those among sedentarized communities (FMOH, 2008; Fentaw, 2013; Mohamud, 2014). Moreover, vaccination coverage of livestock is usually higher than that of children and women. Physical remoteness, dispersed settlements in large geographic areas, constant mobility, inadequate human resources, weak infrastructure, transportation and communication services, and poor quality of services are among the key supply-side barriers affecting immunization service (WISP; AU, 2010; Amooti-Kaguna and Nuwaha, 2000). The key factor contributing to poor service demand is lack of awareness and understanding of health matters, risk factors and modern health services. This stems from inadequate exposure to channels of behavioral communication services (due to constant mobility and low socio-economic status), low status of women, deep-rooted backward mind-set and harmful traditional practices, and low educational attainment.

Community engagement approach has been shown to be effective for health promotion and demand creation in multiple settings. Ethiopia introduced a broad-based community mobilization platform called Health Development Army (HDA) in 2011/2012 with the aim of empowering the community and addressing the demand side barriers in the health system (FMOH, 2016). It is a community engagement approach through the organization of women into networks based on geographic proximity, which facilitates frequent and regular meeting. HDA creates a platform for the network members to support and influence each other in promoting healthy behavior. HDA has been implemented in the

sedentarized communities and shown to increase awareness, health seeking behavior, service utilization, and reduction in harmful traditional practices (FMOH, 2016). However, there is limited evidence of its feasibility and effectiveness in the pastoral context since an HDA model has not been developed or tried in the pastoral context (FMOH, 2016). The pastoral context including the mobile lifestyle, cultural and social factors, physical remoteness, and dispersed settlement could potentially affect the implementation of such community engagement approaches.

The government has been seeking evidence for decision-making in the development of pastoral community engagement strategy to address the low demand to health services including immunization and improve the health status of the community. The research project addressed one of the priority areas of the government and was conducted at the right time. As a result, the engagement and buy-in by policy makers and other stakeholders including the community was strong, and all stakeholders were involved in the conceptualization, design and implementation of the research project, which ensures ownership and uptake of the outcome of the evaluation study for policy change.

Once an appropriate pastoral HDA model is developed, it will be implemented in all pastoral regions. We anticipate that about 15 million pastoralist people in the country will benefit from the intervention (AU, 2010). The regional and zonal health departments along with the kebele (village) administration are responsible for implementing and managing the intervention. UNICEF, World Health Organization (WHO), Clinton Health Initiative, IFHP and others are key partners in the provision of equipment and supplies, and training of human resources.

The proposed intervention, which was designed based on the HDA model being implemented in the agrarian communities of Ethiopia, was subjected to formative evaluation to understand the processes and factors that are associated with successful implementation of HDA networks within the pastoral context. In the agrarian communities, HDAs with the support of local leaders work and HEWs to implement the health extension packages, and are also engaged in other developmental and social sectors including agriculture and education, which creates a community-based platform for inter-sectoral collaboration (FMOH, 2016). The organizational structure of the HDA in a given kebele (village) involves grouping 20-30 households who reside in the same sub-locality into development teams, and then, each team is organized into one-to-five networks of six households living in the same neighborhood (FMOH, 2016). The sub-localities and neighborhoods can easily be defined in the context of a settled community. The systematic organization of households into networks based on their geographic proximity facilitates easy arrangement for regular planned and social event meetings among network members to pursue a shared interest. The one-to-five networks attend regular meeting every week, while the network and development team leaders meet every two weeks. However, due to the constant movement of the pastoral community and strong clan system, organizing households based on sub-localities and neighborhoods may not be practical in the pastoral context. How to organize pastoral communities into networks that are able to meet regularly and discuss about immunization or other health issues given their lifestyle is a critical information gap to the ministry of health in Ethiopia and other countries with pastoral population. As the immunization programs in the pastoral areas try to improve the immunization services and promote the health of children and mothers, they are faced with difficulties on how to

organize and create better communication to engage the pastoral communities to advance their health. However, it is uncertain whether pastoral women would be allowed by their husbands and/or parents to become members of the network and meet regularly given the cultural context and gender inequalities in pastoral societies. This method of using role model women, which is an innovative way of educating other women and guardians to increase immunization coverage, has not been explored in pastoral communities.

With the aim of improving immunization coverage, we implemented and subjected the HDA model to formative evaluation in Borena zone in the Oromia Regional State of Ethiopia. The specific objectives of the project include:

- To organize pastoral women into networks of HDA
- To evaluate the implementation process of HDA and improve its organization
- To improve immunization coverage
- To bring about sufficient behavioral change among the community

Some of the research questions include:

- Is organizing and creating networks based on geographic proximity applicable in the pastoral context? If not, what is the best approach?
- What are the contextual factors that affect participation?
- Are women allowed by their husbands to participate in regular and frequent meetings?
- What proportion of the targeted women accepted to be part of the HDA networks?
- Does the mobile lifestyle affect the regularity of network meetings?
- Can it bring behavioral change on immunization?
- Can it improve immunization coverage?

2. Background and context

The health system service in Borena zone is part of the national health program in the country. In 2004, the Federal Ministry of Health (FMOH) introduced Health Extension Program (HEP), a strategy for scaling-up an institutionalized package of basic and essential health services at community level to address the disproportionately low access to health services in rural areas (FMOH, 2005; Teklehaimanot, 2013). Primary Health Care Unit (PHCU) with 5 health posts linked to a referral health center serves as HEP implementation framework. The most basic health post structure staffed with 2-3 HEWs is available in each kebele of about 5,000 people. The HEP service package comprises 17 essential health services including maternal, neonatal and child health services. HEP focuses on promotional and preventive interventions with limited basic curative services. Despite its availability in each kebele, HEP's impact has been limited due to the large number of people per HEW and multi-tasking (17 service packages). In particular, the intensity of promotional and preventive services could not achieve the required health awareness and skills. The deterrent impact of these challenges is higher in the pastoral context due to dispersed settlement, constant movement and weak infrastructure.

Social and environmental context determines the lifestyle, behavior and health of the population, and local health issues are best addressed by engaging the community to

bring their own perspectives, concerns and understandings of lifestyle and health issues to the health program. The proposed project aims to address mainly the demand side barriers by implementing a community engagement approach appropriate for pastoral context. It is a movement designed to systematically engage women to spread knowledge and actions to every single household with the aim of building and maintaining their own health in a sustainable manner. Mothers and guardians play an important role in their child's health because they are the ones to care and look after their children. By targeting mothers, programs using local model women leaders have had success in improving health in children. Women in the community also play a key role in educating their peers who are responsible for looking after infants and children. The women will be engaged in planning, implementation and evaluation of health service. We hypothesize that such community engagement approach has great potential for higher impact in pastoral context where, unlike the providers of formal health services, the community members who lead the community engagement activities move along with their communities ensuring continued engagement mitigating the dispersed settlement and mobility factors. HDA is better positioned for the unique pastoral context to achieve health awareness and skills with continuous and intensive interaction of network members and improve immunization coverage.

The study was conducted in Borena zone, Oromia region. Borena zone covers about 48,773 square km of surface area with a population of 1,328,402 people (FMOFA, 2008). SNNPR at North and East, Guji and Somali zones at West, and Kenya at South bound the Borena zone. Administratively, the zone is divided into two urban and 15 rural woredas. Three woredas are agrarian, eight woredas are pastoralist and four are agro-pastoralist.

The Borena have traditionally associated cyclical weather patterns and societal shifts with the cycles of their 'gada' political system. At the head of the 'gada' system is the position of 'abba gada' that transfers between clans every eight years, and at the community level there is the 'abba olla' (the father of the encampment). The traditional institutions are key for social support and security, natural resources management, and conflict resolution (Derera, 2015). The Borena have a strong value system that includes a deep connection to and respect for animals and the land. Some communities practice traditional livestock husbandry while others live a semi-agrarian farming lifestyle near waterholes and riverbanks. The percent of children fully vaccinated in 2011 was extremely low in the mainly pastoral regions of Somali (16.6%), Afar (8.6%), Gambela (15.5%), and in the pastoral Borona zone of Oromia (15.6%) compared to other regions such as Tigray (58.9%) (FMOH, 2008).

3. Intervention description, intervention logic, monitoring plan and the theory of change

3.1 Intervention

Health Development Army (HDA) comprises: 1) one-to-five women networks with a leader; 2) Development Groups (DGs) clustered in one-to-five networks with a team leader; 3) HEWs; and 4) a command post. The 1-to-5 networks (5 members and 1 leader) are organized based on geographic proximity at the base. A woman from a household with good performance in implementing the health extension packages or a

model in other social sectors leads the network. Model women practice healthy behavior, which enable them to influence fellow network members, and to counter negative opinions and respond to their questions and concerns. The DGs are organized in 20-30 households clustered in 1-to-5 networks. Generally, a group of 1-to-5 networks (4-5) are organized into a DG. Each DG elects a team leader from among their members. All team leaders (about 30-40 per kebele) are linked and supported by HEWs within the kebele. The HEWs provide a supervisory role over the HDA. A kebele command post is responsible for organizing and guiding the DGs at the top. The command post comprises the kebele council, women's affairs, and women's association, and the chairman of the kebele council is the head of the command post. The kebele command post is linked to and supported by similar structures at higher levels.

3.1.1 Key activities

Stakeholder engagement campaign: Creation of awareness and understanding of the intervention with clear responsibilities and duties among the stakeholders including the community was conducted through a stakeholder engagement. Key stakeholders include zonal, district and kebele health authorities, kebele administration and traditional leaders and non-governmental organizations working in the project area.

Establish command post at kebele: Existing command posts, which are already supporting other development activities such as agriculture, were revitalized to add HDA into their list of responsibilities.

Organize women into development groups and one-to-five networks: All women of reproductive age group were registered to develop a complete list of potential candidates. The women were organized into development groups and one-to-five networks. The Kebele Administration, traditional leaders and HEWs, who understand social ties and behavior patterns among individuals in the community, were involved in creating the development groups and one-to-five networks. A total of 326 one-to-five networks were created who then were organized into 64 development groups in the two kebeles. The leaders for each one-to-five networks and development groups were selected by their respective members based on their role and performance in social services including in implementing the health extension packages. Thus, 326 one-to-five leaders and 64 development leaders were identified.

Provide training to network leaders: The leaders of one-to-five networks and development groups were trained on immunization as well as other HEP packages in line with the government policy to ensure integration and sustainability. The training was provided by health workers who are the focal persons for maternal and child health including immunization services at the zonal and district health offices as well as HEWs working in the respective health posts.

Prepare kebele plan with breakdown by development groups and one-to-five networks: The HEWs in collaboration with the Kebele Administration, zonal and district health offices, and other stakeholders developed kebele level implementation plan. The ownership of these plans lies with the health system. The kebele level implementation plan included organization of women into HDA, expected number of meetings (one-to-five networks, development groups and review meetings of HEWs), new outreach service locations, total number of outreach services, frequency and schedule of each

outreach service, number of pregnant women and births. The kebele plan also included target for coverage of immunization and other health services. The target for immunization was set at 80%.

The kebele plan was then distributed among the leaders of the development groups. Based on the kebele plan and target, each development group prepared its implementation plan. The development group level plan included number of one-to-five networks, expected number of meetings (one-to-five networks and development groups), frequency and schedule of outreach service in their locality, number of pregnant women and births. The plan also included the target number of women and children for immunization, which was generated based on the kebele level coverage target, and the number of women and children who had not received or completed immunization within their group. Specific information about the immunization status of women and children came from the one-to-five networks within the development group.

The one-to-five networks conducted a two-day meeting at the beginning to discuss and agree upon collective and individual work plan with time line based on their development group's plan, and the leaders assisted each network member to prepare its plan. All members were engaged in micro planning (including schedule, location and frequency of out reach services), implementation and monitoring of the program. The implementation plan of the one-to-five networks included the number of meetings. It also included individual and collective target based on target women and children within the respective networks. Each woman member had individual plan for herself and her child(ren) with the objective of completing immunization, then the individual plans were compiled to make up the network plan.

Conduct weekly meetings of one-to-five networks: The one-to-five network leaders educate, influence and persuade five fellow network members by organizing weekly regular meetings and during other social events such as coffee ceremonies. The following are some of the responsibilities of the one-to-five network members during the meetings: i) leaders provide education and counseling to network members; ii) peer-to-peer counseling and sharing individual experiences; create and update community vital events registers to list all infants and record their vaccination dates; leaders provide practical evidence such as individual success stories, benefit of immunization, and number of people adopted the intervention; iii) evaluate individual and group performance; motivate mothers when a child fell behind in his/her immunization schedule; iv) develop individual and group plan for the following week. The network leaders prepare report and submit to the development leaders. An important assumption in performing these activities is that the network leaders are able to read and write.

Conduct review meetings: The development group leaders organize and conduct meetings with leaders of one-to-five networks every month, follow-up, support and evaluate implementation progress within their group. Following the these meetings, the group leaders bring monthly report on the performance of their team members and discuss the achievement, challenges and solutions with HEWs and kebele administration during regular monthly meetings. These review meetings serve as monitoring and evaluation of performance against the planned activities and against the targets set in the plan. The meetings also serve as venues for sharing best practices with a focus on reviewing dropouts. Migration of families, which affect the achievement of planned

activities and access to immunization, has been one of the challenges in the assessment of the implementation plan. Since migration of families was temporary, the review and assessment of implementation plans was conducted based on the plans of the original networks and teams. Based on the review meetings, opinion and kebele leaders exert additional influence on community member behavior via their personal contact to encourage mothers with a child who fell behind in his/her immunization schedule. Moreover, the group leaders receive feedback and technical support from HEWs during these meetings.

Provide vaccines and supplies: The additional activities in the implementation of the intervention includes provision of supplies and equipment necessary for static and outreach services to improve the supply-side aspect, with special focus on cold chain management to ensure potency of vaccines and improve quality of service. HEWs ensure that the health post is open for the public daily and provide health services as appropriate at the health post, outreach and/or household level.

3.2 Monitoring system

The monitoring of the intervention involved determining the extent and fidelity of the implementation including organization of women into networks, conduct of scheduled meetings of one-to-five networks and development group leaders, level of traditional leaders participation, and regularity and completeness of reports submitted. It also involved identification of factors that influenced (facilitated or hindered) the implementation of the intervention as planned, documentation of adoptions made, and the depth and breadth of implementation. A mix of qualitative and quantitative data generated from routine reports and survey was used to assess and track the indicators (

Table 1).

The data from the routine reports was generated from the different levels of the implementing agency as well as the research team. The research team including the field coordinator of the project were responsible to report information regarding the following indicators: number of stakeholders engaged, number of women enrolled in the networks, number of network leaders trained, number of one-to-five networks organized, number of HEWs' review meetings conducted, and number of supportive supervision conducted by various stakeholders. The main source of data for tracking most of the indicators was routine data from HEWs. HEWs were responsible to record and report the number of women enrolled, number of network leaders identified and trained, and number of one-to-five networks organized when the intervention was initially implemented. During the intervention period, HEWs were responsible to follow-up and report information on the following indicators: number of meetings conducted (one-to-five networks, development teams and HEWs' review meetings), number of network members migrated, number of network members who attended regular meetings, number of active and supportive "abba ollas", and number of reports submitted. They also identified the reasons preventing network members from attending meetings and any adoption made. They were also responsible to report if static service had been established in their health posts, number of outreach services conducted, and number of clients who received vaccination during outreach services.

Table 1: Indicators used for tracking the progress of the intervention

INDICATOR	TYPE	SOURCE
Number of stakeholders engaged	Quantitative	Research team
Number of women enrolled in HDA	Quantitative	Field coordinator/HEWs
Percent of women enrolled in HDA	Quantitative	Field coordinator/HEWs/survey
Number of women trained	Quantitative	Field coordinator/HEWs
Number of 1-5 networks organized	Quantitative	Field coordinator/HEWs
Number of bi-weekly meeting conducted by 1-5 networks	Quantitative	HEWs
Number of monthly meetings conducted by development groups	Quantitative	HEWs
Percent of network members who attend meetings regularly	Quantitative	HEWs/Survey
Number of "Aba Ollas" who are active and supportive	Quantitative	HEWs
Number of reports submitted	Quantitative	HEWs
Number of HEWs review meetings conducted	Quantitative	Field coordinator/HEWs
Factors affecting network meetings	Qualitative	HEWs/Survey
Factors affecting up-take of vaccination	Qualitative	HEWs/Survey
Factors facilitating the intervention	Qualitative	HEWs/Survey
Adoptions made in the design of the intervention	Qualitative	HEWs/Survey
Number (%) of network members migrated for over a month	Quantitative	HEWs/Survey
Number of static services established	Quantitative	HEWs
Number of outreach services established	Quantitative	HEWs
Number of outreach services conducted	Quantitative	HEWs
Number of children and women who received vaccination during outreach services	Quantitative	HEWs
Number of supportive supervision conducted by project team	Quantitative	Research team
Number of supportive supervision conducted by health center, district and/or zonal health staff	Quantitative	Field coordinator/HEWs

The data from the survey included both quantitative and qualitative data. The quantitative data was collected during the follow-up household survey using structured questions. The indicators assessed through the household survey included percent of beneficiary women enrolled in HDA, percent of network members who attended scheduled meetings, and number (percent) of network members who migrated for over a month. The qualitative method, which involved key informant interviews and focus group discussions, was used to collect in-depth data on participants and contextual factors. Qualitative data was collected over the course of the project – as part of a continuous cycle to guide corrections to intervention improvement, and specifically, the following indicators were assessed through this method: factors that hindered and facilitated the implementation of the intervention (enrollment and meeting attendance), and adoptions made and/or adoptions proposed in the design of the intervention.

Both the implementation and monitoring processes involved all stakeholders including the community. The information was communicated and discussed with relevant

stakeholders to identify lessons learned, determine whether targets were met, solve the challenges, and make plans to improve the intervention. The participatory monitoring approach ensured that challenges were addressed through local knowledge optimizing the success of implementation.

3.3 Theory of change and assumptions

The theory behind the use of HDA is based on the diffusion theory where interpersonal contacts through social systems and networks provide information and influence opinion and judgment among community members. Adoption of behavioral skill does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt than others. Innovators and early adopters who embrace change opportunities after training serve as intermediary change agents, while opinion and community leaders exert influence on community member behavior via their personal contact. This approach is particularly innovative in a mobile community setting where the influencers and community members move together ensuring sustained engagement.

The network leaders, comprised of innovators and early adopters, are expected to adopt the intervention following the training because they do not need to see the evidence that the intervention works. In the next step of the intervention, each network leader becomes responsible to educate, influence and persuade five women in their network. Network members who are considered “early majority” are expected to adopt the intervention before the average person. This increases the number of women who has adopted the intervention in the community, and the network leaders use the information on the number of women who have tried and adopted the intervention to appeal the “late majority” and “laggards”. This component of the intervention is mainly conducted through weekly network meetings. The meetings could be organized during traditional ceremonies or other social events. The other component of the intervention is a monthly review meeting of team leaders with HEWs and kebele administration. The team leaders bring monthly report on the performance of their group and discuss the achievement, challenges and solutions with HEWs and kebele administration. These review meetings serve as monitoring and evaluation of performance against the planned activities and as venues for sharing best practices. Moreover, the team leaders receive feedback and technical support from HEWs during these meetings. The meetings are held at central location of the kebeles, typically at the health posts or kebele administration offices.

These HDA activities aim to achieve the following intermediate outcomes: bring about sufficient behavioral change among the community; produce peer role models that influence other women with practical evidence; and establish a system for identification of target children and drop-outs.

For the outcome ‘to bring about sufficient behavioral change among the community to improve immunization’, the assumptions are:

- The peer-to-peer counseling and experience sharing on immunization through frequent and regular meetings can produce sufficient behavioral change leading to improved immunization,
- The network meetings continue when the community moves away from their kebeles ensuring continuity in behavioral communication activities
- Target women are correctly identified and women with children are included in the network

For the outcome 'to produce peer role models that influence other women with practical evidence', the assumptions are:

- Similar to any community characteristics, the pastoral community has 'innovators' and 'early adopters' who accept the intervention following theoretical training without the need to see practical evidence on the benefit of the intervention.
- The innovators and early adopters are correctly identified and volunteer to serve as leaders of the networks
- The availability of peer role models as leaders of the networks influences the other network members to have their children vaccinated. Moreover, network leaders can use individual success stories as practical evidence to influence 'early majority' section of the community, and information on the number of people who adopted the intervention to appeal the 'late majority' and 'laggards' section of the community.

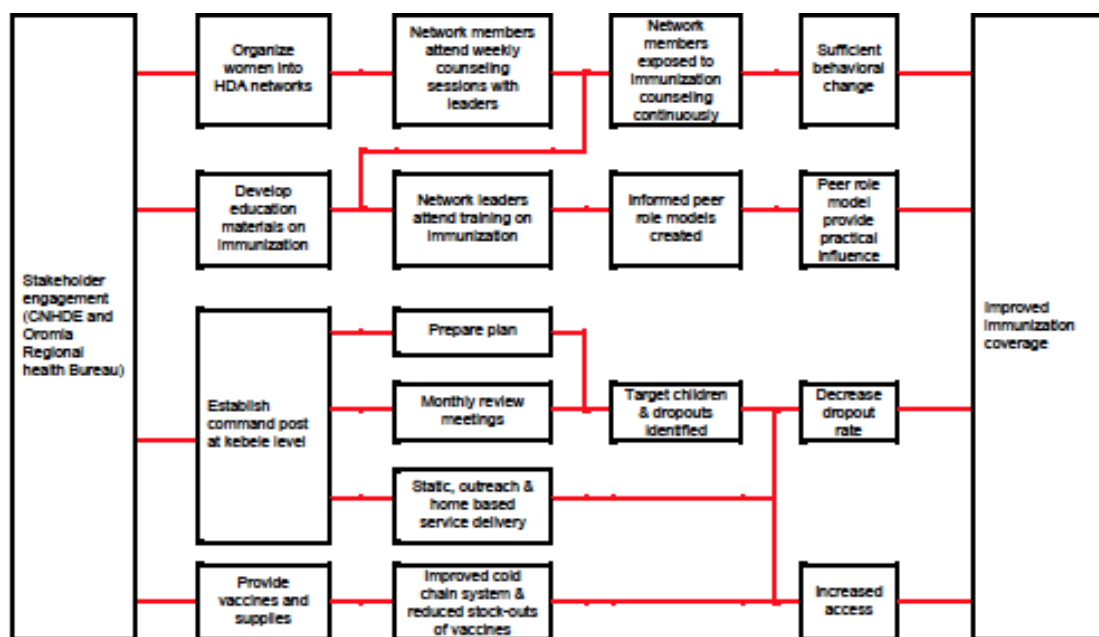
For the outcome 'to establish a system for identification of target children and drop-outs' the following assumptions must be met:

- Network members who have target children and who recently gave birth report timely to the network leader who in turn reports to team leaders. Team leaders should then report to the Health Extension Workers in the health post who can provide the immunization service.
- Network members and leaders review individual and group performance in adhering immunization schedule and report any dropouts timely through the above channel.

The primary impact of HDA is to improve immunization coverage. To achieve this impact, the following four preconditions are required: community members attain sufficient knowledge and behavioral change on immunization; availability of adequate number of peer role models to influence other community members with practical evidence; target children and dropouts are identified; and reliable access to immunization service is available. Access to immunization service is an important assumption that should be met to achieve the impact. The Oromia Regional Health Bureau (ORHB), which is the implementing agency of the intervention, is responsible for service availability in the health posts. To improve access and continuity of immunization as per the vaccination schedule, the health post staff in consultation with the leaders of development groups plan and conduct outreach immunization services.

Figure 1 shows the theory of change for improving immunization coverage through the HDA model.

Figure 1: Theory of Change for improving immunization coverage through networks of Health Development Army



4. Formative study evaluation questions and primary outcomes

4.1 Evaluation questions

The primary formative evaluation questions were:

Creating networks: Is organizing and creating networks based on geographic proximity applicable in the pastoral context? Is the right community members enrolled in the network? Are women allowed by their husbands to participate in regular and frequent meetings? What proportion of the targeted women accepted to be part of the HDA networks?

Participation in network meetings: Does the mobile lifestyle affect the regularity of network meetings? Were contextual barriers to participate identified and addressed? What proportion of the HDA network members attend the scheduled meetings regularly?

Conduct of network meetings: Was sufficient, easy to understand and reliable information provided for discussion? Does the process and organization of meetings allow all participants to express their views and values freely and equally? Did peer role models influence community members to adopt immunization?

Community input: Did community inputs in the process of participation influence decision that can be seen in the intervention?

Impact of the program: How has the behavior on immunization changed? Has immunization coverage improved?

4.2 Primary outcomes

The primary outcomes included:

- Enroll representative target women in the networks
- All enrolled women attend weekly meetings regularly
- Develop culturally and contextually appropriate HDA model
- Bring about sufficient behavioral change among the community
- Improve immunization coverage among pastoral communities of Borena

Outcome 1: Improve immunization coverage among pastoral communities of Borona zone

Indicator: Immunization coverage

Population: One-year-old children within households enrolled in the network

Target: 80% of children vaccinated with appropriate vaccines

Outcome 2: Bring about sufficient behavioral change among the community

Indicator: Level of knowledge and behavior on immunization

Population: Women enrolled in the network

Target: 90% of women enrolled in the network will have developed sufficient knowledge and behavioral change

Outcome 3: Produce peer role models to influence other community members with practical evidence

Indicator: Percent of network leaders who adopt the program and become role models

Population: Network leaders

Target: 100% of leaders adopt and become role models

Outcome 4: Establish a system for identification of target children and dropouts

Indicator: Dropout rate (pentavalent 1 to pentavalent 3 dropout rate)

Population: One-year-old children within enrolled households who started immunization

Target: <10%

5. Evaluation design and methods

5.1 Study Design

The intervention with the proposed implementation structure and process was subjected to formative evaluation to enhance the likelihood of success in the pastoral context. The research methodology to determine the primary and secondary indicators incorporated quantitative and qualitative evaluation using a case-study approach in order to allow for a thorough examination of the underlying context in which intervention is implemented. Specifically, we employed pre- and post-intervention household surveys to determine the effect of intervention on behavior and coverage of immunization. The qualitative component was used to understand the processes and factors that are associated with successful implementation of the HDA networks within the pastoral settings. Qualitative data was collected through Community Focus Group Discussions (CFGDs) and key informant interviews (KII).

Household survey: The household survey involved collection of quantitative data at household level. The main study population for the quantitative survey was women of reproductive age group. However, all households were surveyed at baseline to determine the socio-economic and demographic characteristics of the population. The purpose of the quantitative survey was to determine outcome indicators including the immunization coverage for the various antigens, the dropout rates, and the knowledge and behavior of the community on immunization.

KIIs and CFGDs: The study involved collecting data on the extent and fidelity of the implementation, factors that influence (facilitated or hindered) the implementation, adoptions made, and the depth and breadth of implementation. The aim was to understand the processes and factors that are associated with successful implementation of the HDA networks within the pastoral settings. It also aimed to assess whether the core components of the proposed HDA networks were faithfully transported to the real-world setting (i.e, determining how closely the actual implementation is to the original intervention and implementation plans) and identify the adaptations of the implemented networks to the local context. Informants shared their experiences as to how the HDA network model for pastoral setting was adapted to the local context; the sequencing, timing and rationale behind the network implementation; and explained and enriched the results of the quantitative evaluation stemming from the household survey. In addition, the qualitative evaluation investigated the barriers and facilitators related to the successful and un-successful intervention components. Since the information generated through the CFGDs and KIIs was collected over the implementation period of the intervention, the revised intervention design incorporated suggestions provided by participants based on their experience in implementation of the intervention.

5.2 Sampling

Household survey: For the outcome indicator of immunization coverage (fully immunized), our target is to cover 80% of children with immunization. Considering baseline immunization coverage of 15.6% in the pastoral areas of Oromia region, the sample size requirement to detect a change from 15.6% to 80% is small. To enable us detect the presence of a smaller change in immunization coverage, we aim to include all under five children within the two kebeles and interview all women of reproductive age group who had a live birth during the previous five years. For the baseline household survey, all households were surveyed in order to collect socio-economic information. During the endline survey, only households with under five children were surveyed.

Key Informant Interviews: The key informant interviews involved collection of in-depth data from individuals who are knowledgeable about the program. Key informants were selected through targeted sampling from appropriate target groups covering different stakeholders such as the community, government, and non-governmental organizations (NGOs) at different levels of the health system (regional, zonal, district and village levels). A total of 45 key informant interviews were carried out, which included 26 participants from the community and 19 participants from governmental and non-governmental stakeholders (Table 2). The community level key informants and their number were: 10 HDA network members, 4 one-to-five network leaders, 4 HDA team leaders, 4 village health committee members (if available or formed), and 4 traditional community leaders. The governmental and non-governmental key informants included 2

kebele administration leaders, 4 HEWs, 6 referral health center staff (2 health center directors, 2 family health nurses, and 2 HEW-supervisors from the respective referral health centers of the two target villages), 2 heads of district health office, 1 zonal health department head, and 4 representatives of other stakeholders (NGOs).

Table 2: Type of key informants and number of interviews for each key informant

Key informant	Number
Community level informants	
HDA network members	10
HDA one-to-five network leaders	4
HDA team leaders	4
Village health committee members	4
Traditional/opinion leaders	4
Sub-total	26
Government and non-governmental stakeholders	
Kebele administration leaders	2
Health Extension Workers	4
Health center directors	2
Family health nurse	2
HEW-supervisors	2
District health office head	2
Zonal health office head	1
Non-governmental stakeholders	4
Sub-total	19
Total	45

Community Focus Group Discussions: Participants of the focus group discussion were selected from the community. The number of participants in each CFGD ranged between 8-10 members. The following were among the participants of the CFGDs: Women (particularly, HDA network members who got immunized their children, HDA one-to-five leaders and team leaders), traditional healers, traditional or opinion leaders, and religious leaders. Originally, it was proposed to include HEWs as participants. However after the conduct of one CFGD, which showed limited participation of the women participants, it was decided to exclude HEWs from the remaining CFGDs. A series of 8 CFGDs were conducted in the two kebeles. Women participation was not affected by the presence of traditional leaders.

5.3 Survey instruments and protocols

The household survey was conducted using structured questionnaires programed in ODK and collected through the use of smart phone. For the baseline survey, two modules, one targeting household head (household module) and the second targeting women of reproductive age group (women module), were used. For the end line survey, only the women module was used. The baseline data collection was undertaken in December 2016, while the end line survey was conducted in June 2017. Fieldworkers comprising 10 enumerators and 2 supervisors were trained for six days on the content of the questionnaires and using the ODK smartphone. The training included two-day fieldwork in another kebele and each enumerator administered the questionnaire in 10

households. The research team provided support to the fieldworkers during the fieldwork. The challenges encountered by each enumerator was identified and discussed in one-day additional training. The data submitted by the fieldworkers during the training fieldwork was uploaded and reviewed by the research team, and feedback was given to the fieldworkers. Moreover, based on the fieldworkers' comments and fieldwork, the questionnaire was revised and finalized. One of the enumerators was dropped from the team for lagging behind in comprehending the ODK smartphone application. Thus, 9 enumerators supported by 2 supervisors conducted the data collection. All participants gave an oral informed consent for participation. For females between the ages of 15-17, parents or guardians gave proxy informed consent in addition to their assent. The research team also provided technical support through out the fieldwork. Using the ODK smartphones, the enumerators collected socio-demographic data from all households, and after identifying women age 15-49, they administered the women questionnaire to each eligible woman. The same enumerators and supervisors administered the baseline and end line household surveys.

The KIs and CFGDs were conducted using guiding questions. Four people were hired to undertake the interviews. Two groups, each with 2 people (one interviewer and one assistant) conducted the study. They were selected based on their experience, language (fluency in Oromiffaa and English), and willingness to travel and stay in the villages. The research team provided one-day orientation training to the data collection team.

All in-depth interviews and CFGDs were digitally recorded upon verbal consent, and the assistants took notes. The notes were summarized into bulleted points ensuring accurate statements are noted. All participants of the CFGDs were compensated for their participation. The CFGD participants were compensated for their time and travel based on what government and other stakeholders pay community members during meetings and training sessions organized at the community level. Thus, each participant was paid about \$10. In addition they were provided with lunch and bottle water.

5.4 Quality Control

Control measures were in place to ensure data quality during collection and processing. Adequate training was provided to ensure the collection of quality data. Supervision by supervisors and support by the research team through frequent visit to the enumerators while they administer the questionnaire and cross-checks in some randomly selected households were the main quality control approaches employed. The structured questionnaire programmed in ODK mobile phones contained a series of range and logic checks to detect and prevent data errors. Thus, most of potential errors that could have occurred were prevented. Data submitted each day for the first 3 days was uploaded every evening and reviewed the same day to provide daily feedback to the fieldworkers.

5.5 Data analysis

The quantitative data was exported from CommCare into excel form, and then imported into STATA-12 (Stata Corp LP, 2013. College Station, TX, USA) statistical software for cleaning and analysis. The analysis involved descriptive analysis including description of the population in terms of socio-demographic variables and estimation of coverage of immunization by various factors. The analysis to determine the change in immunization

coverage from baseline to end line involved descriptive analysis and multivariate logistic regression using combined baseline and end line data. The audio records were first transcribed into Oromiffaa, and then translated into English. The analyses of the qualitative data involved reviewing the data to pick out key themes and coding. Topics and issues emerging from the data were identified through familiarization with transcripts and documents. Pertinent excerpts that illustrate emerging themes were coded and summarized. These were organized around the key areas – highlighting contextual and operations-related challenges and successes for achieving the indicator results.

5.6 Ethical Issues

Official approval to conduct the study was obtained from The Oromia Regional Health Bureau. Study participants were included in the study only if they gave informed oral consent. The consent request in Oromiffaa (local language) was read entirely to the participants. Details about the study and its benefits and potential risks were explained. Network leaders were selected with community involvement, and all women in the study villages were included in the network if they gave informed consent. There was no risk associated with this process. Similarly, the training sessions and meetings possessed no risk for the participants. There were no invasive procedures during the training sessions and meetings. We managed our data with the utmost respect for the participants' privacy and dignity. Confidentiality was ensured at all steps in the data management process. All information collected from participants remained confidential and was shared only by the study team. Network leaders attending training were reimbursed for transport and lunch.

6. Analysis and findings from the formative evaluation

6.1 Study population characteristics

6.1.1 Household characteristics

To understand the socio-economic and demographic characteristics of the study population, all households in the two villages were surveyed prior to the implementation of the intervention. A total of 1,850 households were surveyed and their background characteristics are presented in

Table 3. More than half of the study participants (56.1%) are agro-pastoralists, while over a third (38.1%) are pastoralists. Almost all participants (99.7%) belonged to Oromo ethnic group. By religious affiliation, about 94% of them stated that they are followers of traditional religion. About a quarter (24%) of the households are headed by women. The average household size is 4.7 persons.

Over half (51.9%) of households are within one hour walking distance from the nearest health facility, while 15.3% of households walk for more than two hour to reach to the nearest health facility. Comparatively, over two-thirds (68%) of households are located within one-hour walking distance to the nearest school, while only 4.2% are required to walk for more than two hours to the nearest school. Access to electricity in the area is very low with only 0.3% of households having access to electricity.

Table 3: Characteristics of study households

Background characteristics	Category	Number	Percent
Occupation of household head	Agro-pastoral	1,037	56.1
	Pastoral	703	38.0
	Farmer	32	1.7
	Unemployed	59	3.2
	Other	17	0.9
Religion of household head	Traditional	1,736	93.9
	Islam	50	2.7
	Protestant	48	2.6
	Catholic	9	0.5
	Orthodox	5	0.3
Ethnicity of household head	Oromo	1,843	99.7
	Konso	4	0.2
	Burji	1	0.1
Sex of household head	Male	1,403	76.3
	Female	435	23.7
Household size	1-3	578	31.5
	4-6	971	52.9
	7+	288	15.7
Distance from home to nearest health facility	<30 minutes	293	15.9
	30-59 minutes	666	36.0
	1-2 hours	606	32.8
	>2 hours	283	15.3
Distance from home to nearest school	<30 minutes	500	27.1
	30-59 minutes	756	40.9
	1-2 hours	514	27.8
	>2 hours	78	4.2
Access to electricity	Have access	5	0.3
Total		1,848	100.0

6.1.2 Population by sex and age

Within the 1,850 study households, 8,427 people were registered. The population distribution by sex and five-year age groups is presented in

Table 4. The number of females was slightly higher than the males. The age structure of the household population in the study area shows a population with a large number of children under age 15 years accounting for nearly half (48%) of the total study population.

Table 4: Percent distribution of household population by sex and five year age groups

Variables	Number	Percent
Sex		
Female	4284	50.9
Male	4139	49.1
Age		
<5	1061	12.6
5-9	1573	18.7
10-14	1412	16.8
15-19	834	9.9
20-29	1039	12.3
30-39	823	9.8
40-49	447	5.3
50-59	487	5.8
60+	751	8.9
Total	8,427	100.0

6.2 Background characteristics of women (direct beneficiaries)

A total of 1,565 women of reproductive age were interviewed at baseline and their characteristics are presented in

Table 5. Majority (60.2%) of the women respondents were wives, while 29.4% were daughters of the household head. Majority (65.1%) of respondents were married. The women's age at first marriage was 15 years or less in 17.3% of respondents who had ever married. Among currently married women, 6% reported that they had co-wives. Access to education of women was very low with about 90% stating that they never attended school.

Table 5: Percent distribution of women age 15-49 years by socio-demographic characteristics

Women characteristics	Number	Percent
Women's relationship to HH head		
Head	156	10.0
Wife	942	60.2
Daughter	460	29.4
Other	7	0.5
Women's age (years)		
15-19	378	24.2
20-29	542	34.6
30-39	444	28.4
40-49	201	12.8
Women's marital status		
Married	1019	65.1
Never married	441	28.2
Other	105	6.7
Women's age at first marriage		
By 15 years	194	17.3
At later age	930	82.7
Co-wives status		
Has co-wives	61	6.0
No co-wives	957	93.9
Number of births		
0	671	42.9
1	317	20.3
2	175	11.2
3	108	6.9
4	118	7.5
5+	176	11.3
Women's education		
No education	1420	90.7
Elementary or higher	145	9.3
Total	1565	100.0

6.3 Relevance of the intervention

The intervention demonstrates high relevance to the immunization coverage context of the pastoral. In study area, the immunization coverage among women and children was very low. Based on the quantitative baseline survey, only 10.3% percent of mothers with a live birth in the five years preceding the survey had received at least two doses of tetanus toxoid (TT) injections. Similarly, the percent of fully vaccinated children age 12-23 months was 26.6%. Investing in HDA that may improve immunization coverage is relevant to the needs of the pastoral community.

The health service delivery, including immunization, is affected by demand-side and supply side factors. The people are highly mobile and the community members are not

accessing services at fixed points. The demand side factors stated by study participants in the study area include numerous factors categorized under three groups:

- a) Lifestyle and socio-economic status - such as mobility, dispersed settlement, mothers' preoccupation with household responsibilities, difficulty to walk long distance carrying children, lack of family support, immunization time often coincides with work time, and lack of transportation. Some also stated that women do not have the power to make decision to take child for health service.

"Due to lack of water, mothers give priority to fetching water rather than immunization" — CFGD mother

"It's difficult to carry several children to the vaccination center" CFGD mother

- b) Parental knowledge and attitude – some of the barriers under this category include lack of knowledge on type and importance of vaccines, lack of knowledge on place and schedule of immunization, fear of side effects, and trust in immunization and vaccinators.

"Immunization makes the children prone to fever and pain after injection" — CFGD mother

- c) Social influence – influence from older generation, rumors and negative information, and side effects were some of the factors stated by participants.

"Since most people reached adulthood with out receiving any vaccination, they don't see the importance of vaccination" community key informant

These factors, which directly affect immunization service provision, highlight the relevance of a community engagement intervention to increase awareness and generate demand. HDA targeted these demand-side barriers, which are the main causes of low immunization coverage. Health providers and beneficiaries confirmed the relevance of the community engagement through the women networks, which serves as platform for information dissemination and communication, supporting and influencing each other, raising awareness and generating demand, linking the community with the health system, and improving immunization coverage. Participants were in general agreement that not only did HDA raise their awareness on immunization but also strengthened their culture of supporting each other and created a support system in the community including to the weak and disabled people. Others mentioned that it enabled members to participate in other community based health activities such as construction of latrines and water management.

"We used to give priority to other things rather than immunization but now our priority is vaccinating our children." — CFGD mother

"We take HDA members' children with our kids for immunization when the HDA members are not at home." — CFGD HDA network leader member

"HDA leaders taught us how to use water treating chemicals at household level." — CFGD HDA network member

6.4 Acceptability and take-up of HDA

The health development army network was highly acceptable among the health workers at all levels of the health system including health managers at the regional, zonal and district health offices, and health service providers working in public health facilities. They noted that pastoral mothers need to be engaged and empowered as they are the sole caregivers that would bring children for immunization. Discussions, especially, with HEWs also suggested high acceptance of HDA. Due to the large geographic area and dispersed settlement, outreach immunization services are critical in the pastoral context. Having women as HDA members who are the direct beneficiaries involved in planning, organizing and mobilizing the final beneficiaries during outreach campaigns had resulted in more children receiving immunization.

HDA was widely acceptable by the community, traditional leaders, and governmental and non-governmental stakeholders. In particular, majority of the targeted pastoral women accepted HDA and were organized into networks. Based on the quantitative follow-up household survey of 968 women of reproductive age group who were the intended direct beneficiaries of the intervention, 97.3% reported that they heard about health development army (Table 6). Majority (96.3%) of these direct beneficiaries also accepted the intervention and became member of the HDA network with different roles as follows: 81.9% were member of the one-to-five networks, 9.9% were leaders of the one-to-five networks, while 4.5% were team leaders of the development groups. There were no lifestyle, cultural or social barriers preventing women from organizing in the HDA networks, which resulted in a very high acceptance and enrollment rate of the direct beneficiaries.

The take-up rate of the intervention, specifically immunization, among the intended final beneficiaries of children increased over the intervention period. The percent of fully vaccinated one-year-old children increased by almost 100% from 26.6% at baseline to 52.4% following the implementation of the intervention (

Table 7). The pre/post intervention doubling of vaccination rates could not be explained by other factors such as secular trends in the supply of immunization services in the area or other parts of the country. Doubling of vaccination rates over 6-month period is not attainable in the context of the existing immunization services provision in the country, and given the severe drought that occurred in Borena zone it was expected to decrease rather than show an increase in vaccination coverage.

The qualitative data also confirmed the high acceptability of the HDA and immunization. All participants were in agreement that HDA was acceptable by the community because it has benefited them in various ways not only in immunization and health but beyond.

“HDA is well accepted among the community and everyone supports us.” —
CFGD HDA member

“Their idea of organizing strong women with week is correct and has many benefits” — CFGD HDA member

“The community's attitude towards immunization has changed, people used to hide their children not to vaccinate them but now they are seeking immunization.”
— CFGD HDA leader

“Our children has become healthy and happy after they got the vaccination.” —
CFGD HDA member

Table 6: Percent distribution of intended direct beneficiaries by knowledge, acceptance, and meeting attendance in HDA networks and reasons for non-attendance

Factors	Category	No. of women	Percent
Heard about HDA	No	26	2.7
	Yes	942	97.3
Enrolled in HDA	No	36	3.7
	Yes	932	96.3
Role in HDA	Network member	800	82.6
	1-to-5 network leader	92	9.5
	Team leader	40	4.1
	None member	36	3.7
HDA meeting attendance	All meetings	95	9.8
	Most meetings	143	14.8
	Some meetings	342	35.3
	Few meetings	249	25.7
	Never	139	14.8
Reasons for non-attendance	Mobility due to drought	781	82.9
	Family responsibility	669	71.0
	Caring for animals	640	67.9
	Husband not supportive	27	2.9
Total		968	

Despite the high acceptability, both the survey and qualitative data showed challenges in take-up of the intervention. Although majority (85.9%) of the women reported that they

ever participated in network meetings, the attendance level in the scheduled bi-weekly meetings of the one-to-five networks and the monthly meetings of the leaders was low. Among the direct beneficiaries only 9.3% attended all scheduled meetings and 14.5% attended most of the scheduled meetings (Table 6). The most frequently stated reasons for the low meeting attendance rate were unusually increased mobility due to severe drought during the intervention period (82.8%), and women were occupied with family responsibility (71%) and caring for domestic animals (68.1%). Very few women (2.4%) stated that they were not able to attend the meetings due to lack of permission from their husbands. The survey also showed that the uptake of immunization among one-year children was affected by distance, mobility and level of meeting attendance of their mothers.

Table 7: Percent of one-year old children who were fully vaccinated during pre- and post-intervention period by background characteristics

Characteristics	Category	Pre-intervention (n=213)	Post-intervention (n=292)
Distance to health facility	<30 min	42.9	60
	30-59 min	22.3	56.7
	1-2 hrs	25.8	53.3
	>2 hrs	24.1	37.5
Recent mobility (> 1 month)	No	28.5	56.7
	Yes	5	23.7
HDA meeting attendance	All/most		69.4
	Some		51.5
	Few/never		39.6
Total		26.6	52.4

Some participants of the qualitative research stated that although they recognized the importance of HDA, they confirmed the networks were not very active in participation. In addition to the challenges reported in the household survey, inadequate support from kebele leaders was raised in the discussions.

“Kebele leaders are not supporting and evaluating HDA, thus functional HDAs are not differentiated with non functional HDAs.” — CFGD HDA leader

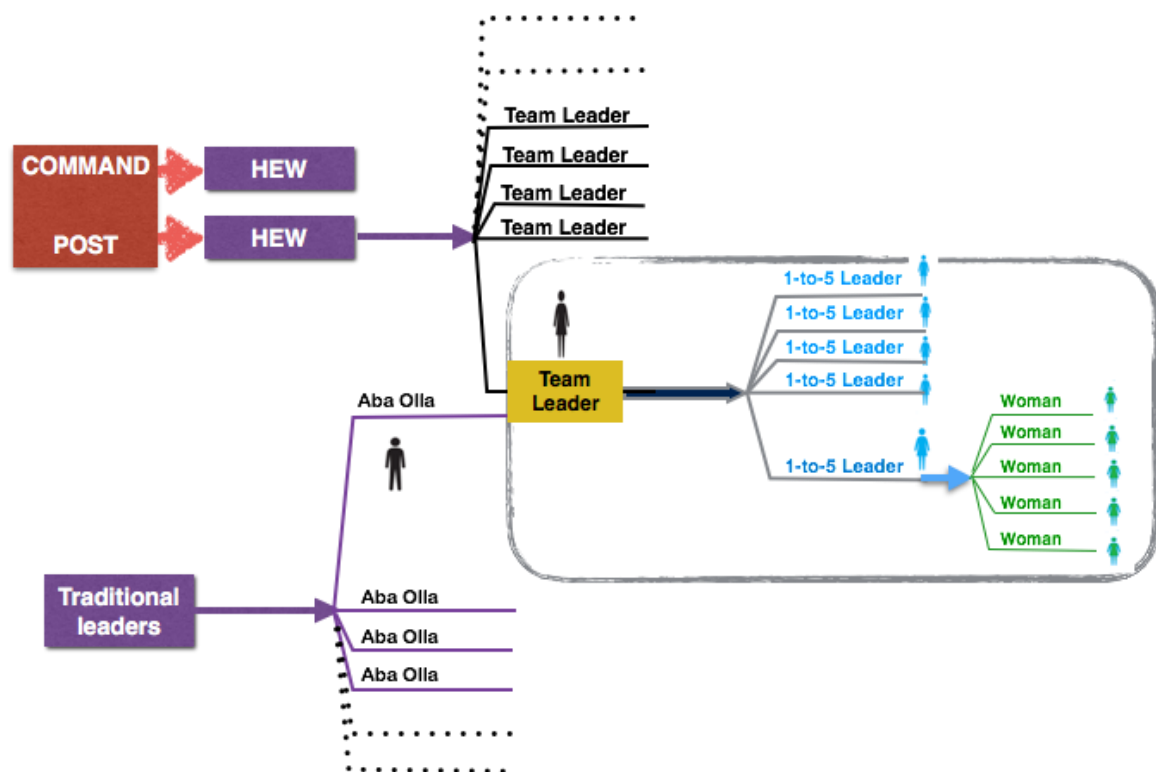
6.5 Adoptions made to the implemented HDA

The implemented intervention differed from what was originally planned. The key adoptions made are summarized in Table 8, and described below.

1. The network organization approach originally planned was based on geography and neighborhood, however, “abba olla” (the father of the encampment - traditional community organization system) based organization was more appropriate than geographic proximity in the pastoral context. This approach also provides geographic proximity within the “abba olla” since the families under an “abba olla” usually settle in the same area in proximity to each other. Pastoral families, not only do migrate outside their village for search of water and grazing lands, but also move within their village from one settlement area to another settlement area along with their respective “abba ollas”. When the area settled by families under an “abba olla” becomes dirty due to the open defecation practices and large number of livestock, the families decide to move to a clean area within the village given the vast geographic area and communal ownership of land. Due to the frequent location change within the village, any group of families can’t be identified by the name of a sub-location but by the name of the “abba olla”. This is the key reason for “abba olla” based network organization, while the support and decision provided by “abba olla” is another reason due to their critical role in traditional leadership.

2. Originally, it was planned to establish the command post within the kebele administration council; however, a community leadership without the involvement of the traditional leaders was not practical in the pastoral context. Thus, the leadership at kebele level integrated the traditional leadership structure, which is critical for community mobilization.
3. The original plan was to elect development team leaders by the network members. However, similar to the kebele level leadership that integrated the traditional leaders, the involvement of “abba ollas” was critical, without their support and blessing no activity could be undertaken. The number of development teams and leaders ranged from one to three depending on the number of families, specifically the number of target women under the “abba ollas”. Thus, the team leaders elected by the network members work under the leadership of the respective “abba olla”. The revised organizational structure of the network is presented in Figure 2.

Figure 2: Organizational structure of the Health Development Army



4. Biweekly one-to-five network meetings was preferred than what was originally planned weekly meetings because women in the pastoral area are overburdened by household and other responsibilities to be able attend meetings every week.
5. Similarly, the planned biweekly meeting of HDA leaders was changed into a monthly meeting.
6. Originally, it was planned to organized women in a group of 6 women – one leader and 5 members; however, the number of women in the network depends on the number of women within the “abba ollas”. Thus, flexibility was adopted where the number of network members could be between 4-6 women. With the geographic based organization practiced in the agrarian communities, women from two geographic sub-locations that are in close proximity could be organized in the same

one-to-five networks. However, with the “abba olla” based organization adopted in the pastoral context, it was not possible to establish one-to-five networks across “abba ollas” that are in close proximity because one or the other “abba olla” could move to another location within the village affecting the geographic proximity.

7. Written report by leaders was originally planned but due to the low literacy rate in the pastoral area it was not possible to submit written reports by the network leaders. Reporting their activities orally was the adoption made. The one-to-five networks meet every two weeks. The leaders of the one-to-five networks bring information orally about their network members to a monthly meeting with their respective development team leaders. Then, the development team leaders report their team’s activities orally to HEWs during a monthly meeting. However, this adoption had critical limitations including incompleteness and reliability of the oral reports due to recall challenges. Considering these limitations, the use of oral reports is not the best alternative to written reports. Written reports could be applicable in the coming few years given the increasing school enrollment in the area. One of the suggestions given was to have HDA coordinator in each sub-village (called zones in the pastoral area) who would support, coordinate the activities of networks and prepare reports for submission to the HEWs. It was not possible to implement the proposed alternative of using HDA coordinator because it was not budgeted. Given the vast geographic areas of the kebeles in the pastoral areas, the support and coordination activities rendered by HEWs to the HDA networks has been limited, Thus, the HDA coordinators will play a critical role in supporting the program including the reporting component of the program. The existing country level reporting structure and the proposed reporting structure for the pastoral context is shown in Figure 3.

Figure 3: HDA reporting structure in the country and in the project area

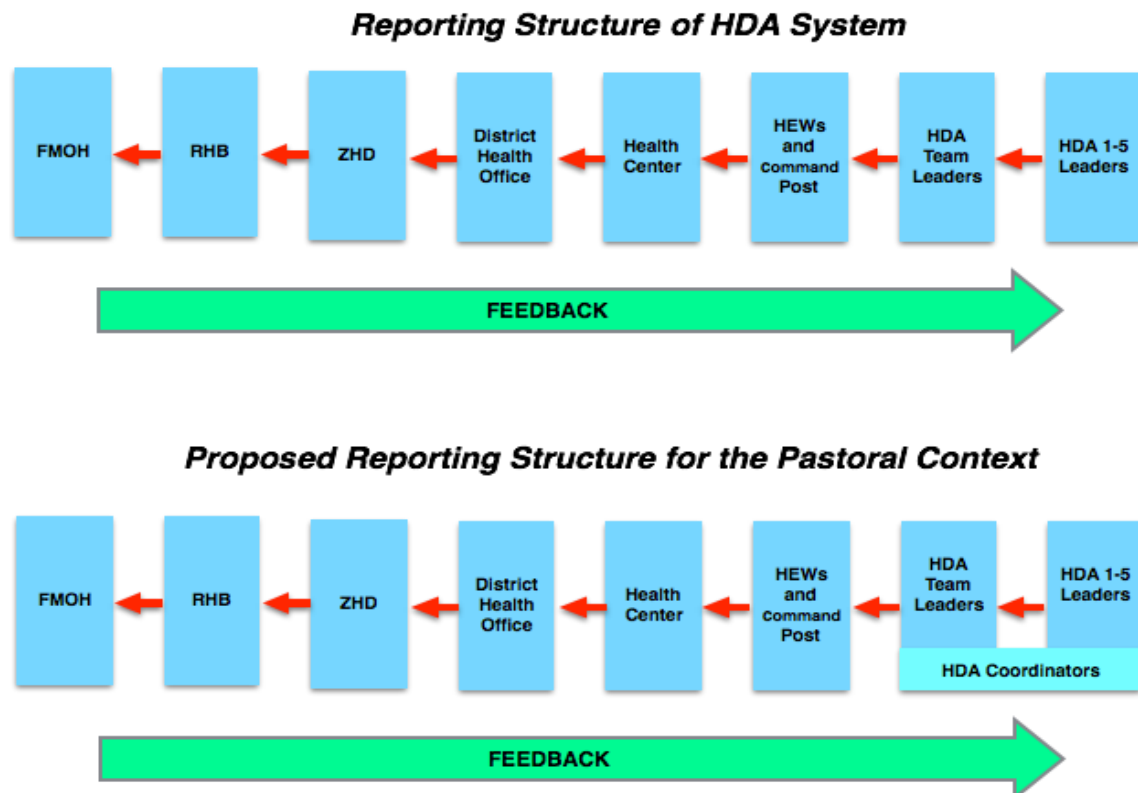


Table 8: Key modifications adopted in the actual implementation of the intervention relative to the planned intervention

	Area	Planned (original) model	Pastoral (adopted) model
1	Network organization	Based on geographic proximity	Based on “abba Olla”
2	Leadership at kebele level	Command post	Command post + traditional leaders
3	Leadership at development team level	Team leaders	Team leaders and abba ollas
4	Team leaders (gender)	Women (model) selected by members	Mix of women (model) selected by members and men
5	Meeting frequency of 1-to-5 networks	Every week	Every two weeks
6	Meeting of team leaders with 1-to-5 leaders	Twice per month	Once per month
7	Number of women in 1-to-5 networks	1 leader and 5 members	1 leader and 4-6 members
8	Report by leaders of 1-to-5 networks	Written report twice per month	Impossible due to high illiteracy rate
9	Report by leaders of 1-to-5 networks	Written report monthly	Impossible due to high illiteracy rate
10	Technical support and supervision	Responsibility of HEWs	Responsibility of HEWs but require the support of additional sub-village HDA coordinators

6.6 Constraints that can prevent HDA implementation in a desired manner

Regular seasonal movement of people is the unique characteristic of the pastoral population in which the intervention was tested. However, when the movement of people unusually increases both in duration (moving for longer duration away from their village) and number of people (larger number of people moving away) during cyclical droughts, the continuity of network meetings and the intensity of exposure to health messages and peer-to-peer influence will be affected. This is the only factor that could limit the achievement of the desired impact.

The other key challenges can be addressed or alternative options could be used, for example, the level of education of network leaders who were expected to report their activities could be addressed by using HDA coordinators.

6.7 Analysis of assumptions

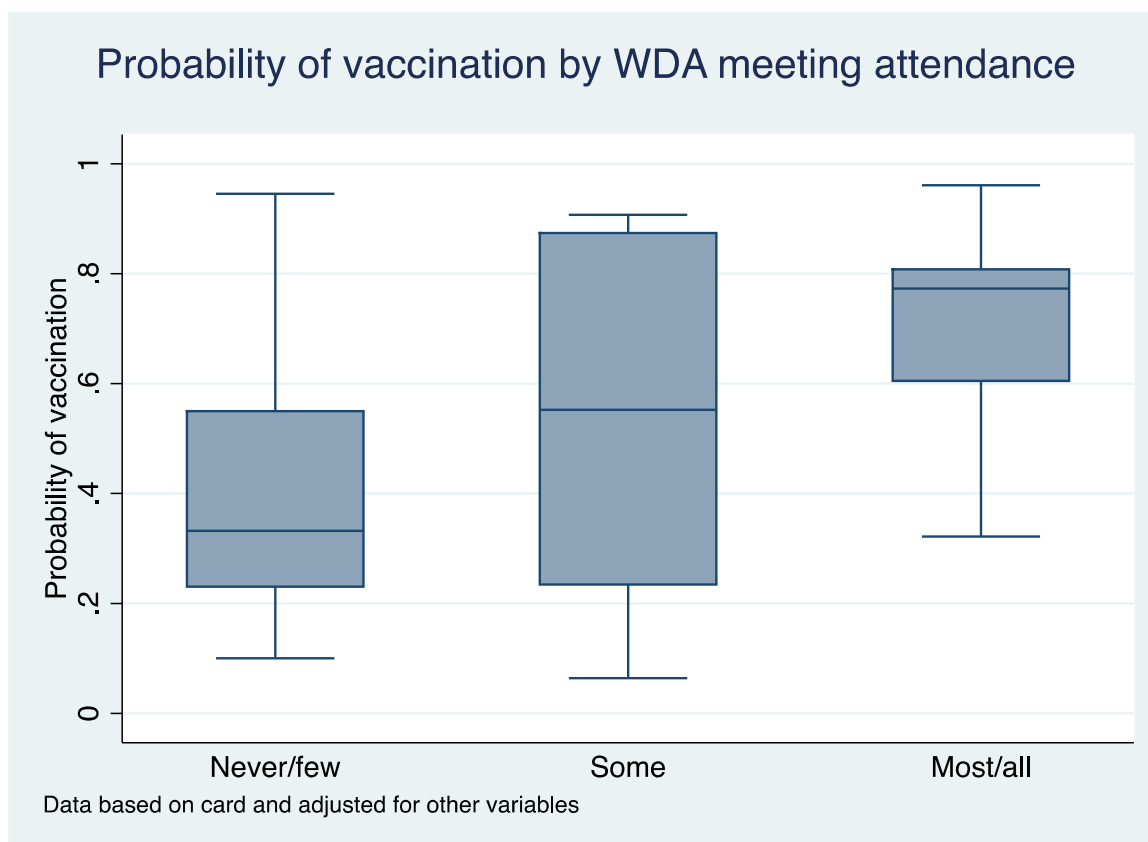
Two of the three key assumptions for the outcome ‘to bring about sufficient behavioral change among the community leading to improved immunization’ have been realized.

1. One of the assumptions, which was peer-to-peer counseling and experience sharing on immunization through frequent and regular meetings can produce sufficient behavioral change leading to improved immunization, has been realized as shown by both the quantitative and qualitative data analysis. Based on the quantitative data analysis, the up-take of immunization among the final beneficiaries varied by the level of meeting attendance and exposure to peer-to-peer counseling of their mothers (

Figure 4). The immunization coverage among one-year children of mothers who participated all or most of the HDA network meetings was the highest (69.4%) compared to the coverage among children of mothers who participated some of the meetings (51.5%) and few or none of the meetings (39.6%). Multivariate logistic regression also showed significant difference in immunization coverage of children by the level of mothers' exposure to peer-to-peer counseling. The regression model was adjusted for distance to health facility (categorized into <30 min, 30-59 min, 1-2 hrs and > 2 hrs), recent mobility, 4+ visits of antenatal care (ANC), gender of child, delivery place (health facility and home), and postnatal care (PNC). In order to account for self-selection of the intended beneficiaries, the multivariate regression analysis tried to control for various socio-economic factors including educational level, marital status, maternal age, etc.; distance and recent mobility; and more importantly service utilization (ANC, delivery and PNC) among others. To the extent that the evaluation design could allow, we have controlled for factors that might have contributed to self-selection and that were associated with improved immunization. In particular, the inclusion of other maternal and child health outcome variables such as ANC, health facility delivery and PNC as independent variables in the regression could account for potential self-selection. It is true that there might be other unmeasured characteristics that might contribute to self-selection, but it would require study designs such as quasi-experiment to account for such potential self-selection.

2. The second assumption, which was "target women are correctly identified and women with children are included in the network", was also realized. As stated above, most of the women with children aged one year (96.3%) were enrolled in the HDA networks.

Figure 4: Probability of vaccination among one-year children by HDA meeting attendance of mothers



3. The third assumption, which was that the network meetings continue when the community moves away from their kebeles ensuring continuity in behavioral communication activities, was not realized. The quantitative data showed that one of the key challenges hindering attendance of the scheduled network meetings was mobility exacerbated by drought. This was also confirmed by the qualitative data. One of the key reasons stated by participants was that it was impossible to continue the meetings when they moved away from their village because it could be either the network leaders or some of the member who move away from the village. When the networks split, the effect is on both the women who remained behind and those who moved away. This required reorganization of the 1-to-5 networks and development teams in both sides based on the existing women. At the kebele level, HEWs have been reorganizing the remaining members within their development teams.

Based on HEWs' report, from the total 326 networks organized, 23 (7.1%) one-to-five networks were reconstituted due to the temporary migration of their leaders. HEWs have been reorganizing the networks through election of new temporary network leaders. Some members were reorganized into other existing networks. This approach insured the continuity of scheduled network meetings at the kebele level, and thus delivering the study objectives. However, based on the follow-up household survey, the percentage of one-to-five network leaders that migrated was 14% (Table 9). Thus, 14% of one-to-five networks should have been reconstituted, which is more than what was reported by HEWs. The

difference could be due to the fact that the HEWs' report was based on all women enrolled in the network, while the result of the survey was based on women with under-five children. Although, 12.3% of members of the one-to-five networks reported migration, their respective leaders and remaining members continued without the need to be reconstituted.

Table 9: Percent of HDA network members who migrated for over a month by their role

Role in HDA	Number of women	Number migrated	Percent migrated
Network member	799	98	12.3
1-to-5 network leader	92	13	14.1
Team leader	40	6	15.0
None member	36	4	11.1
Total	967	121	12.5

Reorganization of women who migrated was not done due to inadequate planning and preparation activities. The HDA model still requires temporary reconstitution and regrouping of members when network members partially migrate. To ensure independent reorganization by the members themselves, we intend to establish and strengthen the following activities: 1) identify members and leaders who plan to migrate and establish where they plan to migrate; 2) create temporary networks prior to their migration based on when and where they plan to migrate; and 3) empower and entrust all network members to take the responsibility of identifying women who migrated with them and initiate creation of temporary networks of these women. The third item is, in particular, important considering that families may later change where they migrate and even migrate to a second area.

4. Similar to any community characteristics, the assumption that the pastoral community has 'innovators' and 'early adopters' who accept the intervention following theoretical training without the need to see practical evidence on the benefit of the intervention has been realized. Based on the intervention plan, training was given to development team and one-to-five leaders who were selected by community leaders and network members. Both the qualitative and quantitative data showed that the network leaders accepted the intervention and had their children vaccinated following the training. These also proved that the innovators and early adopters were correctly identified. Although the regularity of the network meetings was not as planned due to contextual challenges, the trained leaders practically volunteered to serve as leaders of the networks.
5. The other assumption was that the availability of peer role models as leaders of the networks influences the other network members to have their children vaccinated. Although training was given only to development team and one-to-five leaders, the up-take of immunization increased not only among children of the leaders but also among children of network members showing the influence of the leaders on the members to have their children vaccinated. The immunization coverage among one-year children of mothers who participated all or most of the HDA network meetings was the highest (69.4%) compared to the

coverage among children of mothers who participated some of the meetings (51.5%) and few or none of the meetings (39.6%).

6. One of the assumptions in relation to improving immunization coverage, was reliable access to immunization service would be available at the health posts as well as outreach sites. Establishing static immunization service was not realized but outreach service has been strengthened with involvement of the district health offices and health centers ensuring the availability of vaccines based on the scheduled outreach services. The health post staff in consultation with the leaders of development groups plan and conduct outreach immunization services.

Since regular static immunization services were not established in the two health posts (one in each project village), the immunization service provided at the health posts was also scheduled monthly outreach service. Monthly outreach services were also scheduled in additional seven localities (sub-villages) resulting in nine scheduled monthly outreach services in both villages. Although the total expected number of monthly outreach services was 54 (9 locations over 6 months), a total of 46 outreach services were conducted over the 6-month intervention period due to lack of transportation and over burdened health workers. Health workers from the nearest health centers brought the necessary supplies for the outreach services and provide the service along with the HEWs. Overall, about 90% of vaccinations were received in outreach services (75% at the health posts, while 15% at the sub-localities). About 10% were received in static health facilities including health centers and hospitals outside the project areas. Two factors contributed to the strengthening of the outreach services: 1) due to the engagement of the health centers in the project, they increased their support ensuring regularity of outreach services. The performance in the provision of outreach services in the project area (46 outreaches out of the 54 expected number of outreach services) was better than other areas in the zone. 2) the main factor was improved mobilization through the HDA networks. Prior to this project, the number of children and mothers who came for immunization during outreach services was low due to lack of mobilization. Thus, the strengthening of the outreach services was due to both the supply and demand side improvements. However, based on the data we have, it would not be possible to disentangle the contribution of the outreach service improvement and HDA activities. This would require a comparison village with similar support in terms of ensuring regularity of outreach services but not involvement of HDA.

7. Implications of formative study findings

7.1 Implications for the intervention

The changes in the implemented intervention were listed in the previous section. The structure of the intervention and the specific activities are the same. These changes do not have an implication to the concept of the theory of change and the theory of change has not been revised.

7.2 Implications for further research

Having developed a pastoral HDA model, which has been shown to be feasible to implement, relevant to the pastoral context, widely acceptable by all stakeholders, and improved significantly immunization coverage, it will be important to undertake full impact evaluation with the objectives of determining its impact on immunization coverage and health status of children, its cost-efficiency, and sustainability.

The proposed evaluation questions will include:

1. What is the impact of HDA in improving immunization coverage?
2. What is the impact of HDA in reducing immunization dropout rate?
3. What is the impact of HDA in improving the health status of children?
4. How cost-efficient is HDA in empowering the community and improving immunization coverage?
5. What are the main incentives for network members to stay in the HDA network?
6. How well can HDA empower the local communities?

Primary outcome

- 1.1. Increased immunization coverage of the various antigens among one-year-old children
- 2.1. Decreased dropout rate of the various antigens among one-year-old children
- 3.1. Decreased child morbidity and mortality
- 4.1. Level of cost-efficiency
- 5.1. Low dropout rate of membership and list of key incentives for retention
- 6.1. Increased level of community awareness of child immunization
- 6.2. Increased community capacity to make effective choices

8. Major challenges and lessons learnt

8.1 Challenges

Table 10: Challenges in implementation of HDA

Area	Challenges	Adopted solutions
Organizing women into one-to-five networks	Refusing of organizing young with old people by expecting the old people are weak to work effectively	Educate youngster to support the older people since they were their mother and care givers
	Disagreement during the work implementation due to benefit (only leaders were trained and received payment)	Educated them and created awareness. Those who did not accept were referred to 'abba olla' who they advised and corrected the issue
	Some women moved back after the women were organized	Re-arranged or established as new in a more acceptable and strong organizing system
Meeting of network members	Support from husbands and family	Used traditional leaders to engage such cases
	Drought (when collecting the provided crops)	Postpone the meeting days and conduct on a convenient day within a time table
	Mobility of some members	To continue the meeting with the existing members and elect a temporary leader.
	Domestic and family responsibility	Adjusting meeting times
Health workforce	One HEW was pregnant and gave birth during the intervention	The remaining HEWs covered the work and other assignments
	Shortage of time due to work overload	Set schedule to integrate by similarity eg. vaccination with conference which used to discuss on all health package implementations
Static service at health posts	Absence of electric power, functional refrigerator, kerosene	Request for all resources from the higher level and focused on outreach services
	Absence of registration book & tally sheet	Developed modified form for registration books and tally sheet
Outreach services	Transport	Using foot, or paying for motorcycle taxi service from their pocket
Others	Instability	Postponed the implementation of the project

Table 11: Challenges in undertaking evaluation of HDA

Areas	Challenges	Solutions adopted
Designing evaluations	Hardship environment of pastoralist area	Taking long time to reach & performed the activities
	Competing priorities	Identify convenient time
	No acceptance asking about their cattle (not willing to tell the number of their cattle)	Tried to convince them as it is help them & has no any bad effects on their resources
Monitoring community engagement strategies	Hardship environment of pastoralist area	Integrating with other program
	Logistic & budget problems	Use available resources
	Competing priorities (drought)	Effectively use them during ration distribution
Using smartphone for data collection	Charging of smartphones	Using power Bank during the data collection; Turn-off power when not in use; turn-off mobile data service during data collection; not using camera and other apps; supervisors collect phones and take them to town every day for overnight charging
	Lack of mobile data service to submit data from smartphones to server	Collect mobile phones at the end of the day and take them to town where is wi-fi and submit the data. This was in fact helpful in saving battery.
	Weak internet connection to upload and monitor submitted data daily during data collection	Continued data collection & submit when connection is available. Sometimes manual upload was used when possible.
Finding target households and children during data collection	There were unknown number of households that migrated away from the villages at the time of the survey for search of livestock feed and water	No unknown household in the villages. Because each team development leaders & HDAs knows their own catchment areas HH and not all family members move at once
	Even if households were staying at the villages, it was difficult for enumerators to find some of the target women and children during household visits since women are usually responsible to looking after the animals for feeding and drinking	Neighbors help them or took appointment & went when they become available usually early in the morning and in the late afternoon.
Others	Some want payment due to shortage of food & want to move for food search	Convince as this project is for their health benefits.
	Lose of immunization card, especially when they move from place to place	Encouraged them to keep it in safe place

8.2 Lessons learnt

- There was high participation of pastoral women in HDA networks, and there were no lifestyle, cultural or social barriers preventing women from organizing in the HDA networks. However, the attendance level in the scheduled bi-weekly meetings of the one-to-five networks and the monthly meetings of the leaders was low. The main challenges were the severe drought and women's occupation with family and livestock responsibility. Lack of permission from their husbands to attend meetings was reported by very few women.
- The following elements are critical for the successful implementation of the intervention: engagement and participation of different stakeholders at different levels of the project; equipping network leaders with adequate knowledge and skills; participation of traditional leaders in support and supervision of networks; timely identification of challenges and consideration of inputs from stakeholders into the intervention design; the ownership of the intervention by the public sector (implementing agency of the project) facilitating linkage with the health system; creating a sense of community ownership and empowerment; and ensuring service availability through outreach services. The timeliness of the project responding to government and community needs, and the fact that HDA served as a platform to address other social issues were additional factors that contributed to its success.
- In communities with strong traditional leadership systems, it is critical to first engage and convince the traditional leaders who if convinced would ensure a successful implementation of community engagement interventions. This approach creates community level consensus (that includes husbands) ensuring women's right to participate in such community engagement activities.
- In addition to cultural context, considering the educational level of the community is critical in the design of interventions. The expected roles and responsibilities of community members in community engagement intervention should be determined based on their educational level.
- When the community has other major problems and competing priorities, it is difficult to engage the community and introduce new health interventions. The communities are not interested to listen to other issues at times of severe drought where they would be busy to ensure that their cattle are fed and got water to drink.
- Technology – when designing interventions and/or evaluation methods that incorporate new technologies such as the use of mobile phones, it is critical to assess the reliability of the service and availability of electricity for charging the mobile phones. After identifying the potential risk, preparing alternative approaches ahead is important to mitigate such challenges.
- What may not be sensitive question in some communities could be sensitive in other communities. In the pastoral areas, asking question regarding the number of cattle they own is sensitive.

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