High-risk Pregnancy Referral Cards Project

Assessing effectiveness of using high-risk pregnancy referral cards in identification and referral of at-risk pregnancies to primary health care facilities

Bomet County Baseline Report

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Background:

The WHO classifies any death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management as a maternal death (WHO, UNICEF, UNDFPA, 2019). Global statistics on maternal mortality, approximated that 295,000 women died from preventable causes related to pregnancy and childbirth in 2017(WHO, UNICEF, UNDFPA, 2019) (Fig. 1 below). About 99% of all global maternal deaths occur in developing countries in which maternal mortality is higher in settings with women living in rural areas and poor communities. More than half of these deaths occur in Sub –Saharan Africa. The global maternal mortality ratio (MMR) is estimated at 211 maternal deaths per 100 000 live births which represents a 38% reduction since 2000. MMR in sub Saharan Africa still remains high at 542 maternal deaths per 100 000 live births.

At the time of adoption of the Sustainable Development Goals, the maternal mortality ratio in developing countries was 239 per 100 000 live births versus 12 per 100 000 live births in developed countries. As at 2017, the lifetime risk of maternal death in high-income countries such as Europe and North America is 1 in 4,800, compared to 1 in 56 in least developed countries, an indication that a substantial proportion of maternal deaths are preventable. Figure 1 below shows the global distribution of maternal deaths using the 2017 statistics:
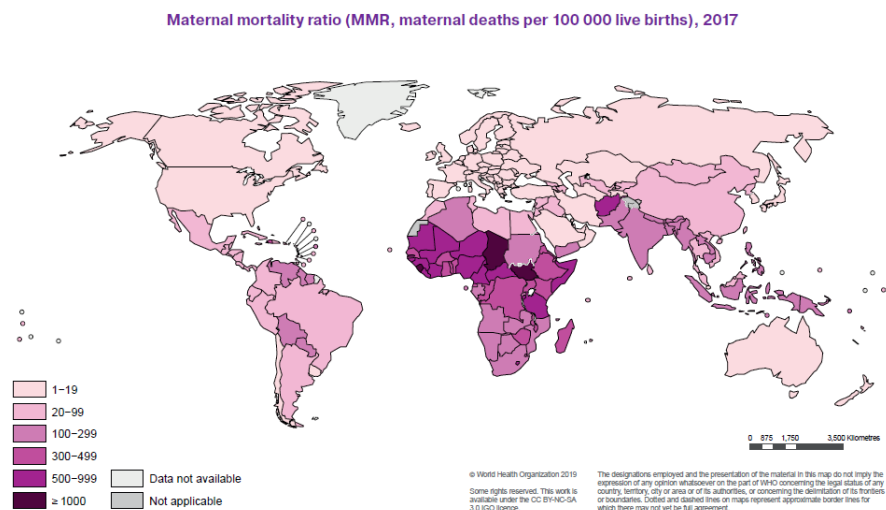

Figure 1: Global Maternal Mortality Ratio, 2015

Kenya is among the countries with the highest maternal mortality ratio in Africa (UNFPA 2016, 2016). Recent statistics indicate that maternal mortality ratio in Kenya has fallen from 315·7 deaths per 100 000 in 1990 to 257·6 deaths per 100 000 in 2016 (Achoki *et al.*, 2019). Despite the national decline in maternal mortality, the numbers are still high compared to other neighboring countries. More regional disparities exist within country. Reports by UNFPA showed that about 15 counties accounted for 98% of the country's maternal mortalities (UNFPA, 2016).

More efforts are required to address existing gaps in strategies aimed at tackling maternal mortality. Through the use of simple, clear and concise job aids, at the community level by community health volunteers (CHVs) and increasing the knowledge amongst both the community members and birth assistants, better health seeking behavior can be embedded at the lowest levels for better maternal health outcomes.

Problem statement:

It is estimated globally that about 30% of women die from medical complications that arise during pregnancy and after delivery. These are preventable and manageable if detected in time and attended to by skilled health workers. A gross proportion of these cases are found in Sub-Saharan Africa to which Kenya contributes. As a build-up on the momentum generated by the fifth Millennium Development Goal (MDG 5), a transformative new agenda for maternal health was laid out as part of the Sustainable Development Goals (SDGs) to reduce the global MMR to less than 70 per 100,000 live births by 2030 (United Nations, 2015).

Advocacy campaigns and other health system improvement measures aimed at mitigating the rate of maternal deaths have been established. However, despite the existing political support and an enabling policy environment for maternal health, inadequate access to quality maternal health services, including ante-natal, delivery, and post-natal services continues to be a challenge. Many women still live long distances from health facilities and face other barriers to accessing quality care. Deaths of women from pregnancy related causes in Kenya remains unacceptably high and at the current rate, Kenya falls short of achieving its mortality reduction target.

Early detection and timely referral of at-risk pregnancies enables proper management and is key in reducing maternal mortality. Lack of awareness on the risk factors and early signs of at-risk pregnancies among women of reproductive age is a risk in itself and poses a challenge to achieving this. Equipping the community with knowledge on identifying at-risk pregnancies can be achieved by strengthening the first level of contact of individuals, the family, and community with the national health system and leveraging on already existing platforms. The community health strategy in Kenya is one such platform that can be used to deliver this knowledge.

In a bid to contribute to addressing this gap, Philips scientists have developed the High-Risk Pregnancy (HRP) referral cards, a job aid meant to support lay and professional healthcare workers in recognizing and explaining the signs of high-risk pregnancies so that women of reproductive age and CHVs can identify them early and make timely referrals to health facilities. It also aims to raise awareness on healthy pregnancy habits and importance of regular antenatal check-ups and safe delivery at healthcare care facilities. We hypothesize that use of the cards will also improve the identification of at-risk pregnancies, promote timely referrals and increase utilization of ANC services at primary health care facilities, result in better maternal outcomes and in turn contribute to reducing maternal mortality. An evaluation of the effectiveness of the cards is required.

REVIEW OF LITERATURE:

❖ **High-risk pregnancies**

Maternal deaths are caused by complications during pregnancy or after childbirth most of which are, if detected in time, preventable or treatable. Other complications may exist before pregnancy but are worsened during pregnancy, especially if not managed as part of the woman's care. Determining the specific medical causes of maternal deaths is a challenge given that some of the births take place at home and go undocumented. A pregnancy is considered at-risk if there are medical conditions that may affect maternal or fetal health or life of the mother, fetus or both. High-risk pregnancies account for nearly 75% of maternal deaths due to risk factors such as pre-existing health conditions (hypertension, diabetes), overweight and obesity, multiple births, young maternal death, pre-eclampsia and infectious diseases (Say *et al.*, 2006).

❖ **Management of High-risk pregnancies**

It is particularly important that skilled health professionals attend all births, as timely detection and management of at-risk pregnancies can make the difference between life and death for both the mother and the baby. Other factors that prevent women from receiving or seeking care during pregnancy and childbirth include poverty, distance, lack of information, inadequate services and cultural practices. To improve maternal health, barriers that limit access to quality maternal health services must be identified and addressed at all levels of the health system.

❖ **Barriers to proper referrals**

Geographical and financial accessibility are well-documented reasons for abstaining or delaying obstetric referral at the community level. The decision for or against referrals often depends on the balance between effort, resources needed and subsequent treatment and the perceived benefit of the treatment in hospital (Thaddeus and Maine, 1994). Other reasons that hospital care is avoided include poor interpersonal skills and attitudes and incompetence of health workers, stigmatization and discrimination and especially to rural women who are afraid of unfamiliar environment and deeply rooted in tradition and mostly use traditional birth attendants (Kowalewski, Jahn and Kimatta, 2006).

Efforts to strengthen the health referral system through utilization of community health volunteers (CHVs) have been made through various interventions in majority of the low-income regions. In

Kenya, the community health strategy remains a key component to the attainment of Universal Health Coverage that will lead to reduction of maternal mortality in an effort to attaining SDG 3. Currently the community health strategy stipulates that high-risk pregnancies identified at the community level be referred to the nearest immediate primary health care facility (Government of Kenya, 2014). Community health volunteers work closely with the primary health care facilities however most referrals are made based on severity. The CHVs often miss out on detecting early signs of high-risk pregnancies, a gap that we hope to address by equipping the CHVs with the necessary knowledge to detect high-risk pregnancies at an early stage and make referrals in good time to allow for timely interventions.

❖ **Use of IEC and job aids**

Job aids are cost effective instruments used on the job, in several fields including health, to improve human performance by enhancing the knowledge and/or skills of performers (Kim and Suzuki, 1990). There are three main types of job aids in healthcare namely: reminders including process flowcharts; picture aids; and pocket manuals most of which have been digitized recently (Knebel *et al.*, 2000). They enhance performance by reducing errors caused by poor recall and faulty decision making, promoting compliance with standards, and reducing costs of training and retraining (Edson and Koniz-booher, 2004). Studies have also shown improvement in client performance after use of job aids. Although job aids have been introduced to community health workers in a large number of international health projects, the literature available on the actual use by such workers is very limited. We envision that use of visual teaching/job aids will enable CHVs to easily share their health messages and for the women to remember the content by the use of graphics.

The high-risk pregnancy referral card is a basic teaching/job aid concept designed to identify at-risk pregnancies at the earliest possible and facilitate timely referrals from the community level to the health facility. The cards are also designed to raise awareness among the community as regards healthy and unhealthy habits in pregnancy.

The High-Risk Pregnancy referral cards comprise of a portable and durable set of cards which double up as a teaching aid, showing a range of high-risk symptoms during pregnancy. The

pictures represented on each card have been tested in health centers in Africa, and local-language versions of the cards specifically designed for communities in the selected study sites.

The cards (Figure 2 below) are intended to aid in to identifying high-risk pregnancies for earlier referral to healthcare facilities and to educate & raise awareness on practices for healthy pregnancies. The cards were initially designed to be used in disadvantaged or fragile socio-cultural communities, such as those affected by war and violence, and with limited access to healthcare. However, we hypothesize that it will be of great benefit even in stable environments where maternal and neonatal mortality is still high.

Figure 2: High Risk Pregnancy (HRP) referral cards

METHODS:

Research Objectives

❖ **Primary objective:**

The primary objective of the study is to assess the effectiveness of the use of HRP cards in identifying and referring at-risk pregnancies at community and primary health care level.

❖ **Secondary objective(s):**

The secondary objectives of this study are:

- To determine the proportion of at-risk pregnancies correctly identified using the high-risk pregnancy referral cards at facility and community level.
- To determine the effect of the use of high-risk pregnancy referral cards on awareness of healthy pregnancy among community health volunteers and women of reproductive age.
- To determine the association between use of high-risk pregnancy referral cards and high-risk pregnancy referrals to primary health care workers by community health volunteers
- To determine the association between the use of high-risk pregnancy referral cards and utilization of ante natal care services at primary health care level
- To determine the association between use of high-risk pregnancy referral cards and maternal and neonatal outcomes.

Study Design

The study adopted a pre and post-test clustered quasi-experimental design utilizing both quantitative and qualitative data collection methods.

❖ **Study site**

The study is being conducted in Bomet and Siaya counties in Kenya.

Bomet county was selected due to the interplay of socio-cultural and environmental factors in the communities, a high presence of pastoral communities, birth assistants, few health facilities, high illiteracy and poverty levels. At the time, the county also registered poor maternal and child health indicators. Two sub counties were selected from the county, Sotik and Bomet Central.

The selection of the sub counties was conducted by the County Health Management Team (CHMT) in collaboration with the research team and was based on the sub-county maternal mortality indicators, presence of functional community units, absence of similar parallel donor activities in the research sub-counties and the physical distance between the sub counties.

Ethical Approval

Sub-county selection was conducted after obtaining ethical approval from AMREF ESRC and NACOSTI.

Project preparations

Prior to commencement of the project, National engagement meetings were held with the division of community health and division of reproductive health at the Ministry of health to get a buy in. The project objectives were presented and approval to proceed obtained.

Figure 3: Bomet County Health Management Team and HRP project stakeholders

Figure 4: CHMT members HRP cards Training

County level engagement meetings were held with the county health management teams. Identification of specific sub counties and community units to involve in the study were decided by the CHMT.

Study Description

The study comprises of three main phases, a baseline survey, an implementation phase and an end line survey. This report details the baseline survey.

❖ **Baseline household survey**

After selection of the community units, community health assistants and community health volunteers from both the intervention and comparison sub counties, a listing of all households visited by the CHVs was developed. The women of reproductive age in these households were visited by field staff and asked for consent to participate in the survey. A baseline questionnaire to collect demographic details, details of their knowledge on healthy and at-risk pregnancies, contact with CHVs among other relevant questions was administered.

We also conducted a baseline data abstraction exercise from the facilities for the last complete quarter prior to the study. The data was abstracted from records from the public health facilities to which the area CHVs are linked. We abstracted the data from the Ministry of Health tools; MOH 100, MOH 514, MOH 513. The main indicators collected include:

- Data on number of pregnant women, pregnant women referred for ANC and ANC defaulters referred.
- Data on number of deliveries, deliveries by skilled attendants, underage pregnancies and maternal deaths, and neonatal deaths.
- Data on referrals of high-risk pregnancies from MOH 100 referral forms.
- Data on number of community dialogue days, community action days and CHV monthly meetings held.

BASELINE SURVEY RESULTS:

Demographic characteristics

A total of 3,104 participants, all women of reproductive age, were recruited and interviewed. Participants were selected from two sub-counties, Sotik and Bomet Central as the control and intervention sub-counties respectively. The age range of participants was between 18 and 49 years with a median age of 30 years (CI 95% 29 – 30, IQR 24 – 36). Only 261 (8%) were above 45 years. The age profile of participants from the two sub counties was different with Bomet central having significantly more women below 25 years old and Sotik with more women between 25-35 years old.

Overall, almost all the participants (99%) had received some form of schooling. Out of the 28 women who had no formal schooling only 8 were below 35 years of age. More than half of the participants (58%), 1,814 women had attended primary school, 16% had completed secondary school and only 2% had received graduate training. The association between education and sub-county showed a difference in levels of education between the two sub counties.

More than two thirds of the women were married and living with their husbands with 82% living in nuclear families. Very few women, 1% and 2% were either divorced or widowed respectively. Single women made up only 23% of the participants with 90% of these living alone. There was no difference in the family composition between the two sub counties. See table 1 below for more details.

Table 1: Participant demographic characteristics

Characteristic	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants n (%) N = 3104	Chi square x^2	P-value
Age					
<25 years	361 (23)	509 (33)	870 (28)		
25-35 years	668 (43)	610 (39)	1278 (41)	35.83	P<0.001
35 - 44 years	385 (25)	310 (20)	695 (22)		
>45 years	129 (8)	132 (8)	261 (8)		
Education					
No formal schooling	12 (1)	16 (1)	28 (1)		
Primary incomplete	362 (23)	460 (30)	822 (26)		
Primary complete	494 (32)	498 (32)	992 (32)		
Secondary incomplete	254 (16)	203 (13)	457 (15)	20.57	0.002
Secondary complete	250 (16)	240 (15)	490 (16)		
Tertiary	133 (9)	115 (7)	248 (8)		
Graduate	38 (2)	29 (2)	67 (2)		
Family composition					
Alone	114 (7)	105 (7)	219 (7)		
Nuclear	1221 (79)	1240 (79)	2461 (79)	0.56	0.755
Extended	208 (13)	216 (13)	424 (14)		
Occupation					
Employed	91 (6)	70 (4)	161 (5)		
Self employed	536 (35)	821 (53)	1357 (44)	156.61	P<0.001
Unemployed	859 (56)	626 (40)	1485 (48)		
Casual	47 (3)	3 (0)	50 (2)		
Marital status					
Single	316 (20)	400 (26)	716 (23)		
Married-living with husband	1098 (71)	1074 (69)	2172 (70)		
Married not living with husband	90 (6)	38 (2)	128(4)	36.01	P<0.001
Divorced	9 (1)	21 (1)	30 (1)		
Widowed	30 (2)	28 (2)	58 (2)		

Half of the women interviewed had given birth to between one and three children. About 291 women, representing 9% of the participants in Bomet had more than six children. There was no difference in the number of children the participants had in the intervention and control sub-counties. When asked about their income, 70% of the women reported a family monthly income between 0-10,000 shillings. Eight percent of the women did not know their family income, see figure 5 below. The distribution of income was homogenous between the two sub counties.
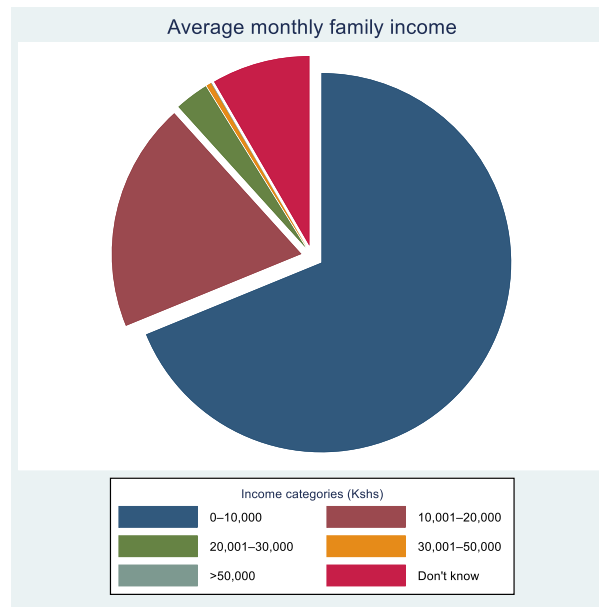
Figure 5: Chart of monthly family income

When asked about their religion, nearly all the participants in Bomet (99%) were of the Christian faith. Looking at impairment, 1% of the participants reported having a form of disability, either a physical disability, visual disability or hearing disability. There was no difference in the religion and disability profile of participants in the two sub counties. Details are shown in table 2 below.

Table 2: Participant demographic characteristics (cont...)

Characteristic	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants (%) N = 3104	Chi square	P value
Number of children					
No children	135 (9)	160 (10)	295 (6)		
1-3 children	784 (51)	777 (50)	1561 (50)	2.93	0.403
4-9 children	612 (40)	607 (39)	1219 (39)		
>10 children	12 (1)	17 (1)	29 (1)		
Family income					
0–10,000	1096 (71)	1040 (67)	2136 (69)		
10,001–20,000	271 (18)	334 (21)	605 (19)		
20,001–30,000	40 (3)	29 (3)	89 (3)	9.91	0.078
30,001–50,000	6 (0)	7 (0)	13 (0)		
>50,000	0 (0)	1 (0	1 (0)		
Don't know	130 (8)	130 (8)	260 (8)		
Religion					
Christian	1529 (99)	1541 (99)	3070 (99)		
Islam	1 (0)	0 (0)	1 (0)	2.43	0.297
Others		13 (1)	20 (1)		
Disability					
Hearing disability	0 (0)	1 (0.06)	1 (0.03)	6.16	0.013
Visual disability	3 (0.2)	6 (0.3)	9 (0.2)		

Physical disability	4 (0.3)	12 (1)	16 (0.5)
Mental disability	0 (0)	1 (0.06)	1 (0.03)
No disability	1536 (99)	1541 (99)	3077 (99)

Access to health care indicators

According to 91% (2,824) of the participants from Bomet, the nearest health facility was a government dispensary. About 4% of the participants lived near either a government health center or a government level 4 facility. Only 1% could easily access a government level 5 facility when considering distance to health facility. A negligible number of the participants (7), had only a private hospital as the nearest health facility to their homes. There were significantly more women living near a government dispensary in the intervention county. However, in comparison, more women in the control sub county, Sotik, lived near Level 4 and 5 facilities.
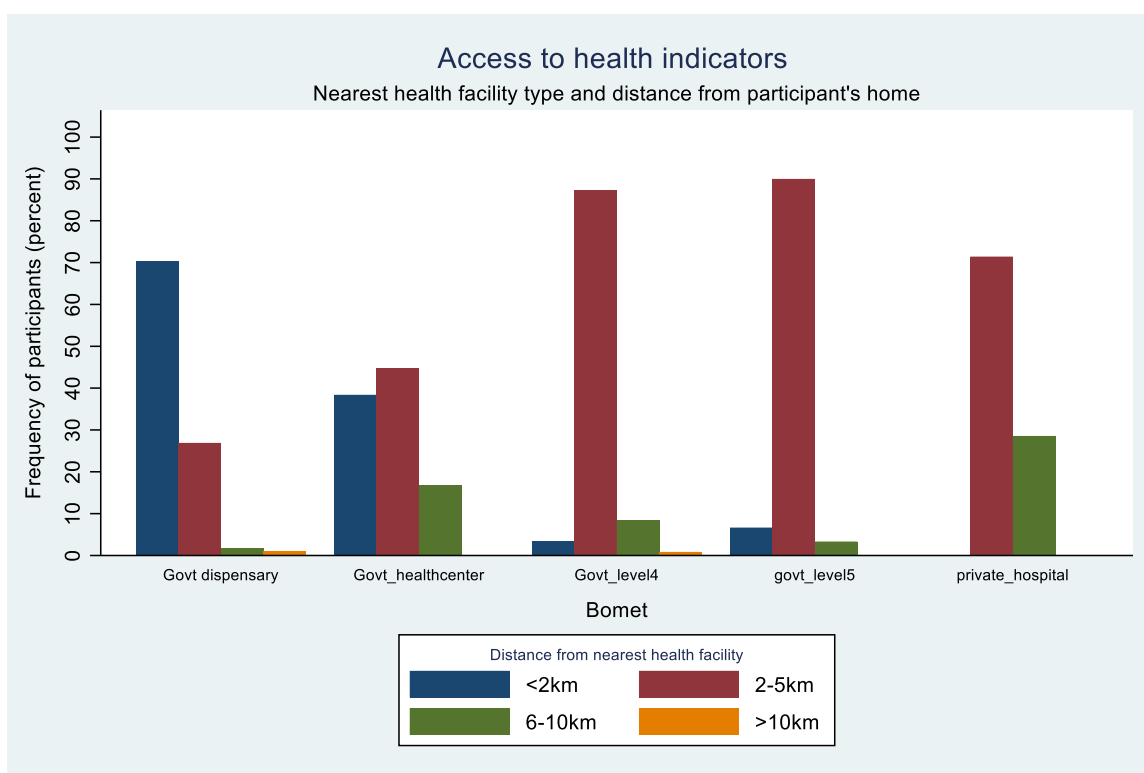
Figure 6: Graph showing distance from participant's home to nearest health facility

In addition to the type of facility, participants also reported the distances covered to the nearest health facility. Out of the 2,824 participants who resided near a government dispensary, 1,986 (70%) reported living less than 2 kilometers from the health facility, 760 (27%) lived 2-5 kilometers away and only 1% had to cover more than 10 kilometers to get to the dispensary. All

other named health facility types were less than 10 kilometers away from the participants' homes. Significantly more women in Sotik had to cover longer distances to get to a health facility. Details of the distance and type of nearest health facility and used are shown in figure 6 above.

About nine in every ten women who lived 2 kilometers from the nearest health facility walked to the facility with the remaining 10% using motorbikes. Motorbikes were the most popular means of transport for those who lived more than 2 kilometers from the nearest health facility. Figure 7 above shows the preferred means of transport by distance from the health facility.

Figure 7: Graph showing transport means used for each distance category

Table 3: Description of some access to health indicators

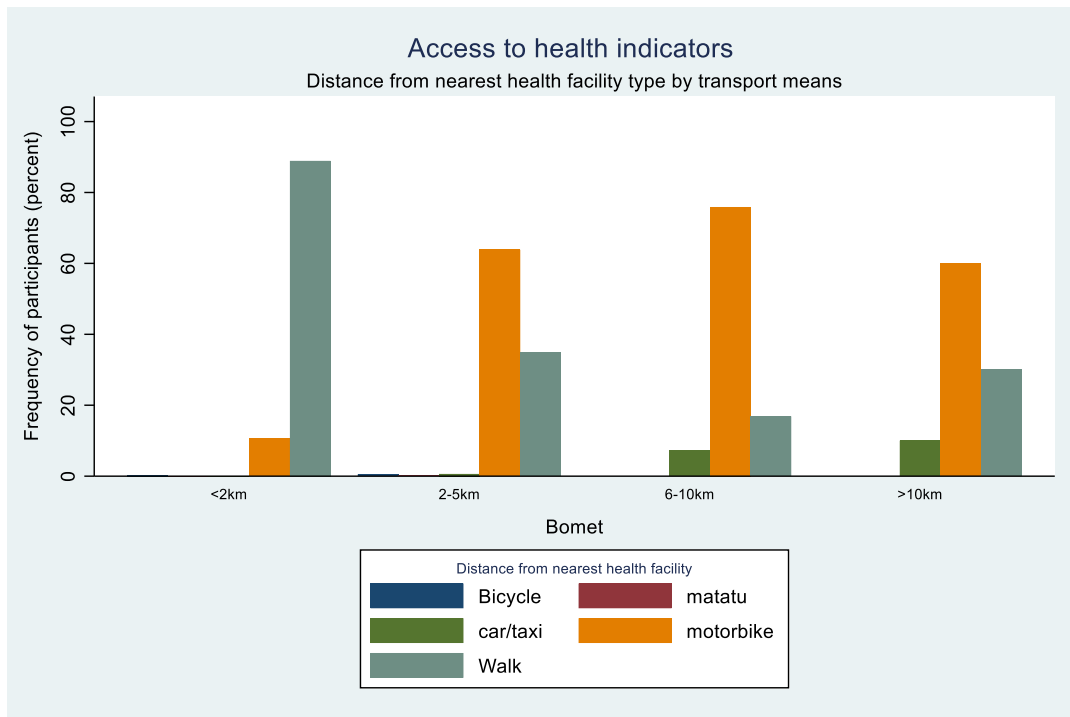| Characteristic	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants N (%) = 3104	Chi square	P value
Nearest health facility					
Gov't Dispensary	1292 (84)	1532 (98)	2824 (91)		
Gov't health center	100 (6)	25 (2)	125 (4)		
Gov't level 4	116 (8)	2 (0)	118 (4)	205.14	P<0.001
Gov't level 5	29 (2)	1 (0)	30 (1)		
Private hospital	6 (0)	1 (0)	7 (0)		
Distance to nearest HF					
<2km	798 (52)	1242 (80)	2040 (66)		
2-5km	649 (42)	302 (19)	951 (30)	283 84	P<0.001
6-10km	76 (5)	7 (0)	83 (3)		
>10km	20 (1)	10 (1	30 (1)		
Transport to nearest HF					
Bicycle	11 (1)	0 (0)	11 (0)		
Matatu	2 (0)	1 (0)	3 (0)		
Car/taxi	12 (1)	4 (0)	16 (1)	130.80	P<0.001
Motorbike	583 (38)	323 (21)	906 (29)		
Walk	935 (61)	1233 (79)	2168 (70)		

Knowledge of community health volunteers (CHVs) and maternal healthcare utilization

We sought to establish the participants' level of knowledge concerning CHVs work in the community. Three in every five participants (61%) interviewed had heard about community health volunteers in general. About 63% of those who knew about CHVs also knew their specific area CHV. Overall, 1,904 participants (61%) did not know their area CHV. The odds of having heard about CHVs and knowing the area CHV were greater among participants from Sotik compared to Bomet central. Participants who knew their area CHV were asked when they last received a visit from the CHV. About 30% (367) of them had been visited by their area CHV not more than a month prior to the study. Majority of the participants had been visited within the last one year.

Six percent of the participants were pregnant at baseline, approximately half of whom were in the third trimester and a fifth in the first trimester. Only 68% of the participants who were pregnant had attended ANC during their pregnancy at the time of interview. Majority reported accessing ANC services at a government health center. The main reason for attending ANC during their current pregnancy was for checkup (75%), for a follow up visit (50%) or due to illness (12%). None of the participants attended ANC due to advice received from a CHV, a TBA or a family member. More than half of the women who had not attended ANC during their current pregnancy

reported being healthy as the main reason. About 12% thought it was unnecessary, 4% reported the health facility as being too far and 9% were scared to go for ANC.

Table 4: Knowledge of CHVs and maternal healthcare utilization

Characteristic	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants (%) N = 3104	Chi square X^2	P value
Heard of CHVs					
No	487 (32)	717(46)	1204 (39)		
Yes	1056 (68)	844 (54)	1900 (61)	26.77	P<0.001
Know area CHV					
No	335 (32)	365 (43)	700 (37)		
Yes	721 (68)	479 (57)	1200 (63)	26.77	P<0.001
Pregnancy status					
Not pregnant	1447 (94)	1484 (95)	2931 (94)		
Currently Pregnant	96 (6	77 (5)	173 (6)	2.45	0.118
Attended ANC (current pregnancy)					
No	27 (29)	29 (38)	56 (32)		
Yes	69 (72)	48 (62	117 (68)	1.76	0.183
Previous pregnancy					
No	151 (10)	179 (11)	330 (11)		
Yes	1392 (90)	1382 (89)	2774 (89)	2.31	0.129
Attended ANC (Previous pregnancy)					
No	11 (1)	44 (3)	55 (2)		
Yes	1381 (99)	1338 (97)	2719 (98)	20.44	P<0.001
Place of last delivery					
Home	242 (17)	337 (24)	579 (21)		
Health Centre	216 (16)	422 (31)	638 (23)		
Sub County Hospital	435 (31)	147 (11)	582 (21)		
Private/Mission	380 (27)	337 (24)	717 (26)		
County Referral	117 (8)	135 (10)	252 (9)		
Miscarriage	2 (0)	4 (0)	6 (0)	229.11	P<0.001
Previous complications					
No	1188 (84	1194 (85)	2382 (85)		
Yes	219 (16)	204 (15	432 (15)	0.52	0.472

A total of 2,719 (89%) participants had previously been pregnant with 98% of them having attended ANC at least once during their pregnancy. 70% of these women reported having attended ANC clinic visits at least 4 times during their pregnancy. The major reason for the visits was first ANC checkup and scheduled follow up visits. The distribution of women who were pregnant, had attended ANC or had previously been pregnant was similar in the two sub counties (see X^2 P-values in table 4).

Despite living near health facilities, 21% of the women who had previously been pregnant delivered at home. This represented 542 women living near a government dispensary, 22 living near a government health center and 15 living either near a government level 4, level 5 or a private hospital. The proportion of women who delivered at home was greater in the intervention sub county, Bomet Central. The pie chart below (figure 8) shows a comparison of the nearest health facilities and the facilities the women had delivered during their last pregnancy.
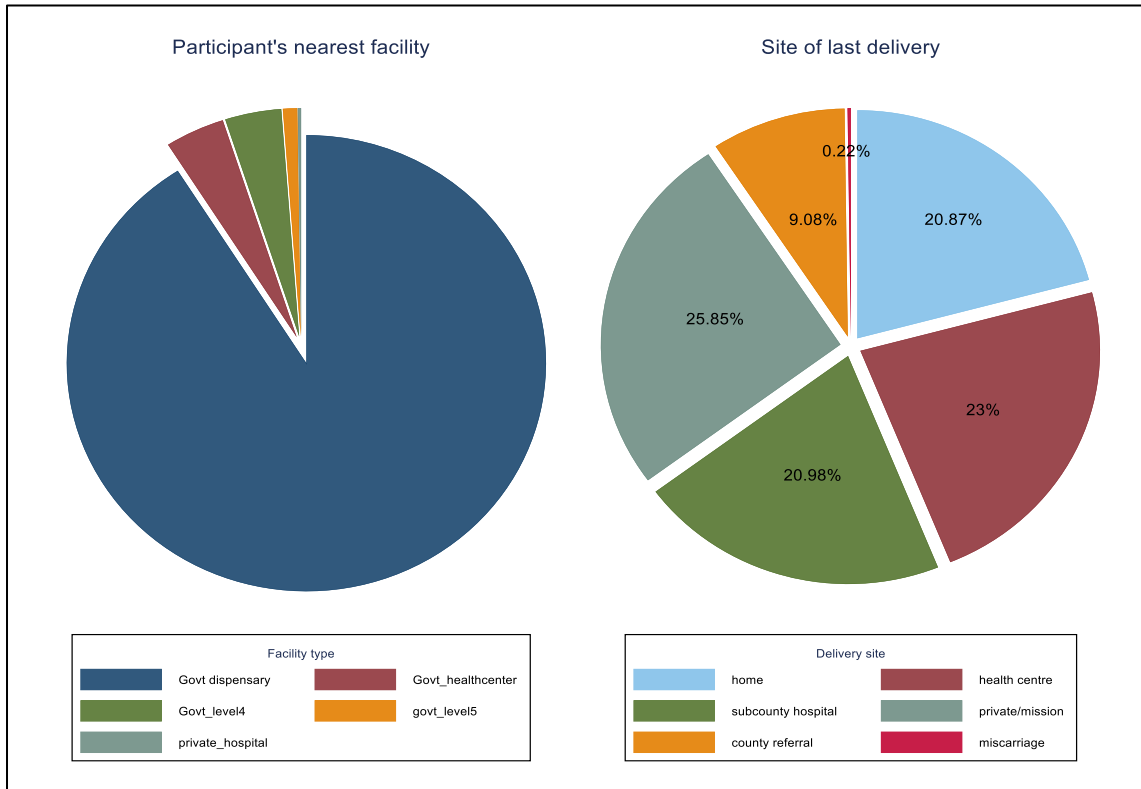

Figure 8: Charts comparing nearest health facility and facility of last delivery

Half of the women who delivered at home were assisted by a relative or friend. 130(22%) of them were assisted by a TBA; a similar number delivered themselves with no assistance while 6% managed to get help from a health worker in the home.

Table 5: Assistance during home delivery

Home Delivery Assistance	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants N =579	Chi square X^2	P value
Relative/Friend	130 (54)	158 (47)	288 (50)		
TBA	52 (21)	78 (23)	130 (22)	3.06	0.382
Self-delivery	15 (6)	22 (7	124 (21)		
Health worker	45 (19)	79 (23	37 (6)		

Of all the participants who had previously been pregnant, 423 (15%) had experienced complications during their pregnancies. Majority (121, 28%) mentioned high blood pressure as the main complication. About 15% of them suffered miscarriages from the complications. Approximately 80% of those who had complications visited a health facility as the first reaction to the complications while 2.3% visited a traditional birth attendant for assistance.

We asked participants if they had previously received any advice on complications in pregnancy; Almost half of the participants (45%) confirmed having been advised on complications in pregnancy with 86% of them having received the advice from a health worker and 2% (22) of the women from a traditional birth attendant.

Table 6: Source of advice on complications in pregnancy

Advised on complications in pregnancy:	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants n (%) = 1399	Chi square X^2	P value
Nurse at the health facility	639 (83)	569 (90)	1208 (86)	12.03	P<0.001
Advised by the CHV	5 (1)	4 (1	9 (1)	0.002	0.961
Advised by my family and	135 (18)	75 (12)	210 (15)	9.06	0.003
Advised by the TBA	13 (2)	9 (1	22 (2)	0.17	0.680
Heard from the media	31 (4)	31 (4)	62 (4)	0.59	0.442
Read about it	46 (6)	46 (7)	92 (7)	0.90	0.343
Other (specified)	22 (3)	6 (1)	28(2)	6.54	0.011

Knowledge on healthy habits in Pregnancy, Risks/ Complications

About seven in every ten women (70%) interviewed had received advice on healthy habits in pregnancy at least once. The trend of those who gave advice on healthy habits in pregnancy was similar to those who gave advice on complications in pregnancy. Majority of the participants (86%) got advice on healthy habits in pregnancy from a health worker specifically a nurse. Family

members advised 14% of the women with the remaining small number from the media or reading about it.

We sought to find out the types of healthy habits the women were aware of. The four main habits which stood out were healthy eating, washing hands avoiding carrying heavy weights and giving birth at a health facility with the help of a midwife. The least mentioned habits were attending ANC, using proper latrines, good hygiene and taking all prescribed medicine. The proportion of women who knew about healthy habits in pregnancy was higher in Sotik compared to Bomet Central. Details of the other habits are presented in table 7 below.

Table 7: Known healthy habits in pregnancy

Healthy habits in pregnancy	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants N (%) = 3104	Chi square X^2	P value
Healthy eating	1143(74)	1204 (77)	2,347 (76)	3.92	0.05
Sleep under a mosquito net	317 (21	235 (15)	329 (11)	15.99	<0.001
Drink clean water	226 (15)	103 (7)	552 (18)	53.05	<0.001
Do not carry heavy weights	918 (59	682 (44)	692 (22)	77.60	<0.001
Attend ANC	511 (33	345 (22	50 (2)	47.15	<0.001
Good hygiene	454 (29)	238 (15)	102 (3)	90.02	<0.001
Wash hands	61 (4)	41 (3)	1600 (52)	4.29	0.04
Use a proper latrine	18 (1)	32 (2)	51 (2)	3.82	0.05
Give birth at a HC with a midwife	51 (3)	93 (6)	856 (28)	12.34	P<0.001
Take all prescribed medicine	48 (3)	33 (2)	81 (3)	3.03	0.08
Attend health education group talks	15 (1)	36 (2)	144 (5)	8.54	0.003

Knowledge on healthy habits in pregnancy was rated on a scale where respondents who mentioned less than four healthy habits in pregnancy were considered to have little knowledge whereas respondents who could mention between 5 to 8 healthy habits were considered to have average knowledge. Participants who could state more than 8 healthy habits in pregnancy were considered to have adequate knowledge. See figure 9 below.
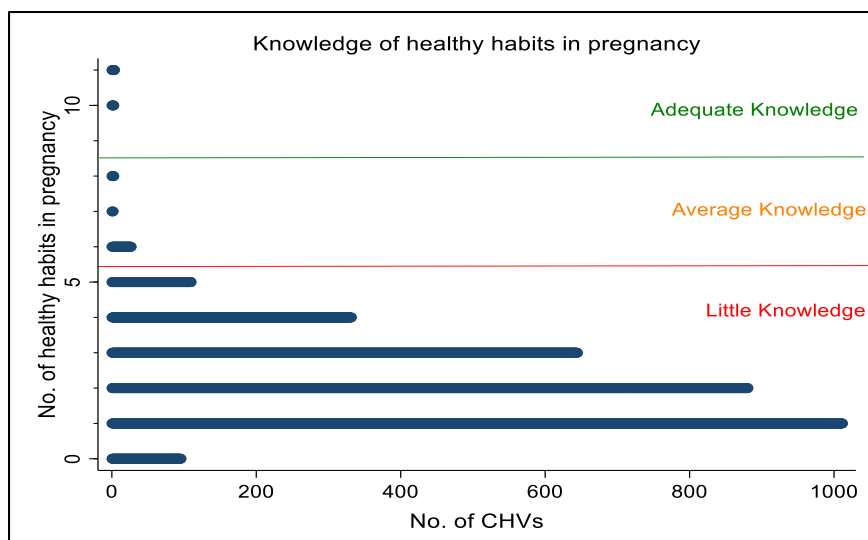
Figure 9: *Knowledge of healthy habits in pregnancy*

We queried the participants' knowledge on signs of risks or complications in pregnancy. 1,901 (61%) participants were aware of at least one risk or danger sign in pregnancy.

Table 8: *Known risks/ danger signs in pregnancy*

Characteristic	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants N (%) =3104	Chi Square X^2	P value
Shortness (<160cm)	37 (0)	37 (4)	74 (4)	0.17	0.674
Pelvic malformation	44 (4)	19 (2)	63 (3)	9.95	0.005
Chronic diseases	206 (20)	55 (6)	261 (14)	85.39	<0.001
Malnourishment	63 (6)	49 (5)	112 (6)	0.70	0.400
Short interval between pregnancies	40 (4)	26 (3)	66 (3)	1.85	0.174
High multigravida	27 (3)	11 (1)	38 (2)	5.41	0.002
Previous uterine scar	6 (1)	29 (3)	35 (2)	17.76	<0.001
Previous labor complication	40 (4)	51 (6)	91 (5)	2.73	0.099
Fever	313 (31)	229 (25)	542 (29)	8.72	0.003
Vomiting	384 (39)	301 (33)	685 (36)	5.77	0.016
Diarrhea	52 (5)	29 (3)	81 (4)	4.73	0.030
Anemia	297 (30)	122 (13)	419 (22)	73.67	<0.001
Edema/Pre-eclampsia	81 (8)	36 (4)	117 (6)	14.17	<0.001
Eclampsia	69 (7)	16 (1)	85 (4)	29.55	<0.001
Premature onset of labor	57 (6)	65 (7)	122 (6)	1.68	0.195
Premature rupture of membranes	90 (9)	66 (7)	156 (8)	1.91	0.167
Vaginal bleeding	447 (45)	257 (28)	704 (37)	55.24	<0.001
No fetal movement	83 (8	113 (12)	196 (10)	8,84	0.003
Twins	6 (1)	13 (1)	19 (1)	3.33	0.068
Fetal mal presentation	55 (6	86 (10)	141 (7)	10.94	0.001
Prolonged labor	99 (10)	76 (8)	175 (9)	1.35	0.245

Harmful habits during pregnancy	51 (5)	21 (2)	72 (4)	10.20	0.001
Young age	5 (1)	12 (1)	17 (1)	3.63	0.057

Out of the twenty-three risks/danger signs, vaginal bleeding, vomiting, fever and anemia in respective order were the most mentioned risks. Knowledge about risks in pregnancy was significantly higher among women from Sotik sub-county. Details of the other risks mentioned are presented in table 8 above. Knowledge on risks and danger signs in pregnancy was rated on a scale where respondents who mentioned less than seven risks in pregnancy were considered to have little knowledge whereas respondents who could mention between 7 to 14 risk signs were considered to have average knowledge. Participants who could state more than 15 risk signs in pregnancy were considered to have adequate knowledge, see figure 10 below.
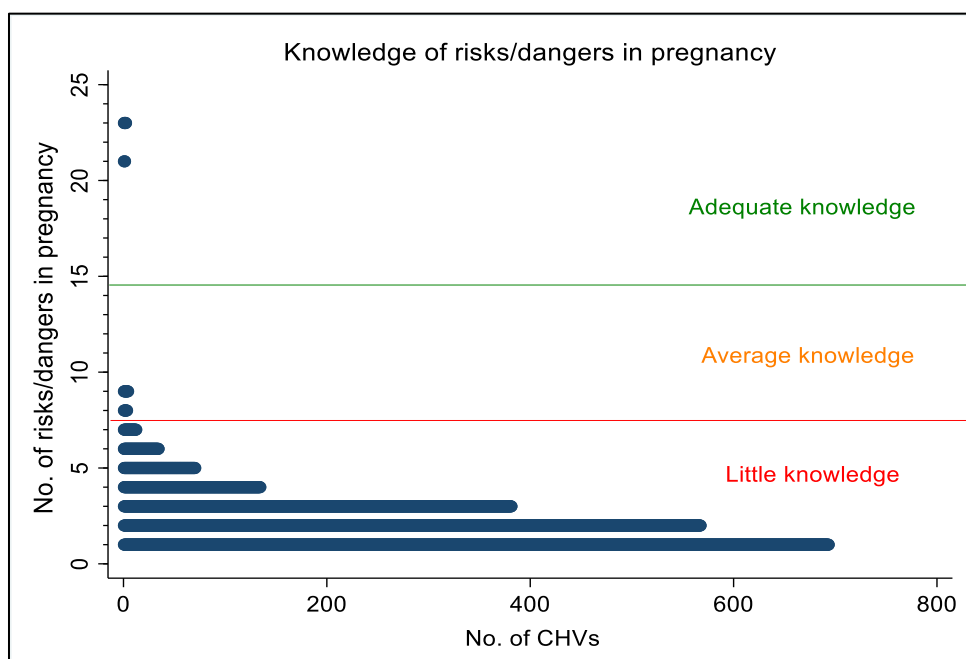
Figure 10: Knowledge of risks and danger signs in pregnancy

About 97% of the respondents indicated that they would go to a health facility for assistance upon experiencing any of the risks mentioned above.

We sought to find out about maternal deaths through verbal autopsy. About 39% of the participants in Bomet indicated knowing at least one woman who had died during pregnancy or delivery. Table 9 below lists some of the causes of death listed by the women.

Table 9: Known Causes of maternal death

Causes of maternal death	Sotik Participants n (%)	Bomet Central Participants n (%)	Total Participants N (%) =3104	Chi Square X^2	P value
Pregnancy complications	417 (68)	426 (70)	843 (69)	0.60	0.440
Illness	58 (9)	25 (4)	83 (6)	13.79	<0.001
Long distance to health facility	16 (3)	36 (6)	52 (4)	8.02	0.004
Negligence at health facility	31 (5)	55 (9)	86 (7)	7.41	0.006
Other Cause	157 (26)	88 (15)	245 (20)	23.61	<0.001
Accidents	15 (2)	8 (1)	23 (2)	2.11	0.146

"Complications in pregnancy" was identified by seven in ten of the respondents as the main cause of maternal deaths. About 7% of them felt that the deaths occurred as a result of negligence by health workers at the facility. Illness as a cause of maternal death was more common in Sotik sub county. One in five women could not pinpoint the specific cause of death.

Factors associated with Knowledge of healthy habits and risks and risk factors in pregnancy

We sought to show the association between knowledge of healthy habits/risks in pregnancy and the independent variables in the study. Using ordered logistic regression, we determined the association between knowledge of risks in pregnancy and exposure variables, results are presented in table 10 below.

Table 10: Factors associated with knowledge of risks and danger signs in pregnancy

Exposure		Crude odds ratio	P value	Adjusted odds ratio	P value
Age	**<25 yrs.**	1			
	25-34 yrs.	3.46	0.22	2.85	0.056
	35-44 yrs.	4.45	0.007	3.83	0.018
	>45 yrs.	6.32	0.002	5.96	0.004
Education*	**Education level**	1.52	0.005	1.32	0.128
Occupation	**Employed**	1			
	Self-employed	0.45	0.025	0.95	0.904
	Unemployed	0.12	<0.001	0.33	0.050
	Casual	0.37	0.356	1.06	0.962
Income*	**0–10,000**	2.31	<0.001	1.70	0.007

*variables preventing model from converging. Used as continuous variables instead.

There was a crude association between knowledge on risks in pregnancy and age, education level, and employment status. Associations between age for participants above 45 years and income remained statistically significant after adjusting for other variables.

We conducted a similar analysis for the associations between independent variables and knowledge of healthy habits in pregnancy, results presented in table 11 below.

Table 11: *Factors associated with knowledge of healthy habits in pregnancy*

Exposure		Crude odds ratio	P value	Adjusted odds ratio	P value
Sub county	**Sotik**	1		1	
	Bomet Central	0.39	<0.001	0.48	<0.001
Age	**<25 yrs.**	1		1	
	25-34 yrs.	2.92	<0.001	1.90	0.017
	35-44 yrs.	2.30	0.004	1.46	0.222
	>45 yrs.	2.17	0.040	1.64	0.214
Education*		1.51	<0.001	1.20	0.131
Occupation	**Employed**	1		1	
	Self-employed	0.34	<0.001	0.69	0.271
	Unemployed	0.25	<0.001	0.60	0.150
	Casual	0.59	0.362	1.05	0.932
Income*		1.94	<0.001	1.63	0.001
Heard of CHVs	**No**	1		1	
	Yes	2.83	<0.001	1.98	0.002
Advice on complications	**No**	1		1	
	Yes	2.28	<0.001	1.45	0.058
Received healthy advice	**No**	1			
	Yes	3.85	<0.001	2.28	0.004

We detected a crude association between knowledge on healthy habits and the participant's sub county, age, education level, employment status, income level, knowledge of CHVs and having received advice on healthy habits in pregnancy. Upon adjusting for all confounders, significant associations between knowledge of healthy habits in pregnancy and the participant's sub county, income, and having heard of CHVs remained.

SUMMARY:

The baseline survey was conducted in Bomet county in October 2019. Respondents were drawn from eight community units, four from each of two sub counties, Sotik and Bomet central. A total of 3,104 women aged between 18 and 49 years were recruited and interviewed.

❖ **Demographic characteristics**

The median age of respondents was 30 years. About 99% of them had received some form of schooling with only 32% having completed primary school and only half of these proceeding to complete secondary school. Majority of the women were married and living with their husbands in nuclear families. A quarter of the respondents got married below the age of 18 years. The number of children per woman ranged from 1 to14 children with a mean of 3 children per woman. Participants reported an average family size of 6 members.

About half of the respondents had a of source of income with only 5% with formal employment. 99% of the respondents were Christian. One percent of the participants had a form of disability, mainly physical disability.

❖ **Access to healthcare indicators**

Government dispensaries were the most easily accessible for majority of the respondents (91%). About 97% of the women covered less than 5km to the nearest health facility and reported walking as the most preferred means to get to the facilities. A third of them preferred using motorbikes.

❖ **Knowledge of community health services**

Three out of five women interviewed knew about community health volunteers. Out of these, 63% knew their area CHV and three quarters had been visited within the last quarter of the year. The most common reason for the CHV visits to households was routine follow up visits.

❖ **Pregnancy and ANC attendance**

About 6% (173) of the respondents were pregnant at the time of interview. Out of those pregnant, only 117 had attended at least one ANC visit at a government health centre for a check-up. None of the women had been advised to attend ANC clinic by either a CHV or a TBA at the time of the

study. Reasons given for not attending ANC included fear, long distance to the health facility while others thought it was unnecessary.

About nine in every ten women had previously been pregnant with 70% of them reporting having completed at least four ANC visits before delivery. Government dispensaries and health centres were the preferred facilities for ANC visits. Out of all the women who had previously been pregnant, 579 (21%) delivered at home at least once despite living near government health facilities. The proportion of women who delivered at home was greater in Bomet Central sub-county. TBAs were responsible for 22% of home deliveries.

At baseline, less than half of the respondents had previously received advice on complications in pregnancy. However, pregnancy complications had been experienced by 15% of women who had previously been pregnant. Surprisingly, compared to women who delivered at home, women who delivered at a health facility reported more pregnancy complications. A small proportion, 2.4%, of women who experienced complications in pregnancy sought assistance from a TBA.

❖ **Knowledge on healthy habits and risks/complications in pregnancy**

We sought to know the level of knowledge of health habits and risks in pregnancy among the participants. Out of the all women interviewed, 2121 (68%) had received advice on healthy habits in pregnancy. Majority reported receiving advice from a health worker specifically nurses.

Knowledge of healthy habits and knowledge of risks in pregnancy was rated on a scale; little knowledge, average knowledge and adequate knowledge. About 95% of the respondents were categorized as having little knowledge on healthy habits in pregnancy that is less than five healthy habits in pregnancy. Only five women were rated as having adequate knowledge on healthy habits in pregnancy at baseline. The most commonly mentioned healthy habits were healthy eating, washing hands, avoiding carrying heavy weights and giving birth at a health facility with the help of a midwife. The least mentioned healthy habits were attending ANC, using a proper latrine, good hygiene and taking all prescribed medicine.

Out of all the women interviewed, 1,901 (61%) knew at least one risk or danger sign in pregnancy. Participants were asked to list all the signs of risk and danger in pregnancy. These were compared to the list of twenty-three signs in the High-Risk Pregnancy cards. Almost 98% of the respondents were categorised as having little knowledge on risks and danger signs in pregnancy defined as

knowing less than six risks in pregnancy. Only 2% of the women had average to adequate knowledge on risk sand danger signs in pregnancy. The four most mentioned risks and danger signs from the list were vaginal bleeding, vomiting, fever and anemia in pregnancy in respective order. Almost all participants indicated that they would visit a health facility if they had a complication in pregnancy.

Upon investigating the public perception on maternal mortality, we revealed that two in five women knew at least one woman who had died during pregnancy or childbirth. About 70% of these women thought pregnancy complications were the main cause of maternal mortality. A few, 7%, felt that maternal mortality was due to on negligence at the health facilities.

❖ **Factors associated with Knowledge of healthy habits and risks in pregnancy**

We sought to determine some of the factors associated with knowledge of healthy habits and risks in pregnancy. An interplay between factors such as the age of the women, their education level, employment status, monthly income, their awareness of CHVs determined their knowledge of healthy habits and risks in pregnancy.

Overall, at baseline, 39% of women from Sotik and Bomet Central did not know about CHVs and majority had little knowledge on healthy habits in pregnancy as well as risks and danger signs in pregnancy.

NEXT STEPS:

Implementation

As soon as the baseline surveys were completed, the implementation phase began. The CHAs, CHVs and the primary health care workers from Bomet Central the intervention sub-county, were trained on the use the high-risk pregnancy cards. All participants were given a refresher training on in addition to the usual iCCM training, identifying healthy pregnancies and high-risk pregnancies using the cards as a guide as well as a module on Hybrid Maternal Infant and Young Child Nutrition (MIYCN). Reorientation sessions for the traditional birth attendants (TBAs) to birth companions within their area of jurisdiction were conducted with about 20 TBAs.

Upon successful completion of the trainings, CHAs, CHVs and TBAs were issued each with a set of the HRP cards to carry alongside their usual tools in the field during their household visits as

stipulated in the community strategy. The cards help healthcare workers 'speak' with pregnant women and women of reproductive age to make them aware of risky conditions that might be fatal in pregnancy. CHVs were instructed to note down any referrals of at-risk pregnancies that occur as a result of the knowledge gained from the HRP cards on their normal CHV referral forms (MOH 100) which are used to refer women to the health facility.

The CHAs, CHVs and the primary health care workers from sub counties selected for the comparison arm will receive only the standard iCCM training that is provided to lay and professional health workers according to the community strategy. After the refresher training, CHAs and CHVs in the comparison/control arm sub counties were asked to continue with their usual activities which are stipulated in the community strategy.

Study implementation will last for a period of 11 months.

Monitoring and evaluation

Continuous monitoring and evaluation of the study is conducted by Kenya Red Cross Society project staff. This includes attending a sample of review meetings, community dialogue days and ensuring all high-risk pregnancy related referrals are captured in the MOH 100 referral books in addition to routine M&E activities.

End line Survey

An end line survey will be conducted as soon as study implementation is finalized. During the end line surveys, in-depth interviews and focus group discussions will be held with the CHAs, CHVs, PHC providers and women of reproductive age from both the intervention and comparison/control sub counties.

We will also conduct an end line data abstraction exercise from the facilities for the last complete quarter. The data will be extracted from records from the Ministry of health facilities to which the area CHVs are linked. We will abstract the data from the Ministry of Health tools; MOH 100, MOH 514, MOH 513. The main indicators to be collected include:

- Data on number of pregnant women, pregnant women referred for ANC and ANC defaulters referred.

- Data on number of deliveries, deliveries by skilled attendants, underage pregnancies and maternal deaths, and neonatal deaths.
- Data on referrals of high-risk pregnancies from MOH 100 referral forms
- Data on number of community dialogue days, community action days and CHV monthly meetings held.

All quantitative data will be analyzed and summarized in tables and/or graphs to support the interpretation of the overall results. The qualitative data will be transcribed and analyzed based on a priori themes and sub themes.

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