



Improving maternal and child health outcomes through a community involvement strategy in Kabula location, Bungoma County, Kenya

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ABSTRACT

Background: Maternal, fetal and neonatal mortality are higher in low-income compared to high-income countries due to weak health systems including poor access and utilization of health services. Despite enormous recent improvements in maternal, neonatal and under five children health indicators, more rapid progress is needed to meet the targets including the Sustainable Development Goal 3(SDG). In Kenya these indicators are still high and comprehensive systems are needed to attain these goals.

Objective: To facilitate innovative partnerships in health care provision and to assess trends in access, utilization and quality of Maternal and Child Health care through the health systems approach using community owned initiatives including use of community owned resource persons (CORPs), establishment of Community Based Organisations (CBOs) and Income Generating Activities(IGAs).

Study site: This was implemented in Kabula location, Bungoma County, Kenya between January 2016 and April 2019.
Study population: Pregnant women, newborns and under-five children living in Kabula location identified by Community Owned Resource Persons (CORPs).

Methods: A prospective study to show trends in maternal, neonatal and infant outcomes through the implementation of community owned initiatives.

Findings: General, under five and antenatal clinic attendance increased four fold in 2016,2017 and 2018. There was a 76% full immunization coverage with 97% BCG and 84% Polio coverage respectively among children studied. There was an 87% facility delivery rate among the pregnant women enrolled in the study.

Conclusions: Trends in Maternal and under-five health indicators in Kabula showed improvements over the study period following the implementation of the community owned initiatives and community participation.

Recommendations: The community owned initiatives as implemented in this study is useful in primary care and universal health coverage programs in health care delivery systems in LMICs.

1. Introduction

Despite decades of independence, most countries in sub-Saharan Africa are characterized by underperforming health systems in terms of low funding, operational and management inefficiency, poor quality of health services, inequities in distribution of the health workforce, and low capacity for planning, budgeting, and governance [1]. Efforts to improve the

performance of these health systems are complicated by contextual factors such as intricate political landscape, unstable economic environment and rapid population growth. Some of the consequences of the weak health system include rising disease burden including non-communicable diseases, new and re-emerging epidemics. Specifically, most countries in sub-Saharan Africa, with the exception of Rwanda, Ethiopia, Malawi, Cape Verde and Tanzania did not meet MDG goals 4 and 5 because of weak

Abbreviations: CBO, Community Based Organisation; CHW, Community health worker; CORPS, Community owned Resource persons; EHC, Enhanced health care; HIV/AIDS, Human Immunodeficiency Virus/Acute Immunodeficiency disease; IGA, Income Generating Activities; KACOHELI, Kabula Community Health Link Initiative; KDHS, Kenya demographic Health Survey; KPSA, Kenya Population Situation Analysis; MDG, Millenium development goals; MNCH, Maternal Newborn Child health; NACOSTI, national Commission for Science technology and Innovation; SARAM, service availability and readiness assessment mapping; SDG, sustainable development goals; SHW, Skilled health worker; UNICEF, United Nations Childrens Education Fund; WHO, World Health Organisation.

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health systems [2]. Building health systems that are responsive to health needs of populations requires innovative application of technologies and human resources with the capacity to conduct research and use evidence to inform health policy making and practice.

Health systems research (HSR), is an evolving field of study that “is interdisciplinary in nature and aims to provide policy and practice relevant information that improves the health system as a whole by addressing the goals of equity, efficiency, effectiveness, and sustainability, ultimately leading to improved health status” [3]. The high maternal and child morbidity and mortality in Africa is testament to non-responsive health systems that perpetuate inequalities due to ineffective and unsustainable interventions.

Studies and reports from low and high income countries indicate that maternal, fetal and neonatal mortality are 10 to 100 fold higher in many low-income compared to high-income countries. The reasons for these discrepancies are many, but include the facts that many women and newborns receive little prenatal care and most deliver outside of health facilities that can provide lifesaving treatment for the mother, fetus and newborn.

In low-income settings, maternal mortality rates range from 150 to more than 1000 per 100,000 live births [2] while rates of stillbirth and neonatal mortality generally range from 20 to 40 per 1000 births [4]. Intrapartum stillbirth, or those stillbirths that occur during labor and delivery, are an important indicator of the quality of obstetric care [4,5]. While in high-income countries, intrapartum stillbirths have nearly been eliminated, in low-resource settings, up to half of all stillbirths occur in the intrapartum period.

It is widely accepted that 15% of all pregnancies have direct and indirect medical or obstetric complications that greatly increase the risk of mortality or severe morbidity for the mother and newborn. These complications include haemorrhage, hypertension, unsafe abortions and obstructed labour [2]. Indirect causes include malaria, anaemia, tuberculosis and HIV/AIDS. Universal access to high quality facility care substantially reduces mortality and morbidity from these conditions [6]. Poor quality of antenatal care result in failure to detect and manage these high risk pregnancies in low- and middle-income countries. This poor access to antenatal care and the obstetric complications contributes to high early neonatal deaths including still births. In high-income countries, access to prenatal care is nearly universal.

In the neonatal period prematurity, infections and asphyxia account for about 80% of all deaths worldwide with most of these occurring in developing countries. The contributing factors to asphyxia, preterm births and neonatal sepsis are predominantly antenatal and intra-partum. Four in ten under-five deaths occur during the first month of life. Among children who survive beyond the first month, pneumonia, diarrhea and malaria are the leading killers with infectious diseases accounting for over two thirds of these deaths. Many of these deaths occur in children already weakened by under-nutrition. Worldwide, more than one-third of all under-five deaths are associated to malnutrition [7,8].

In developing countries, a significant proportion of deliveries occur outside health facilities and by unskilled birth attendants. In most health facilities, there is lack of equipment and drugs for basic obstetric, neonatal and child health care. In sub-Saharan Africa only between 20 and 70% of all births occur in health facilities, 5–15% of all newborns are resuscitated by a skilled health worker trained in neonatal resuscitation at time of birth and between 10 and 15% of these babies are born in facilities with resuscitation equipment. Facility delivery is known to be the single most effective intervention for preventing maternal and neonatal morbidity and mortality. However, this is only true if there is quality care provided at the facility. In Kenya, about 60% of deliveries occur in health facilities and only 7% of newborns are resuscitated by skilled health workers trained on neonatal resuscitation and only 22% are born in health facilities with appropriate resuscitation equipment [9].

Maternal and neonatal mortality are unacceptably high in Sub-Saharan Africa compared to Western Europe and Northern America. This inequality is supported by the fact in Sub-Saharan Africa only three countries met their targets for MDG 4, 5 and 6 [2]. The question is, why have a few countries succeeded yet they share similar socio-economic contexts with those that have not met their targets?. Since 2000, most countries have focused on interventions that aim to increase health facility delivery and neonatal and

early childhood services – high impact interventions for MNCH. Evidence is emerging that during the same period health sector reforms in most Sub-Saharan countries, including Kenya, stalled and health systems have remained weak as characterized by inadequate funding.

One emerging challenge to achieving and sustaining desired targets for maternal and child health is neglect of the gap between the community and primary care health facilities, failure to espouse a systems/holistic approach as well as the continuum of the Three Delays Model [10]. In Kenya, the government acknowledged the importance of community-based interventions that stimulate demand for reproductive services by decentralizing the health planning and administrative functions to the district in 1984. However, there was no blue print or coordinated strategy to address the gap between the then level 1 and level 2 of the service delivery system. Although evidence is generally weak on maternal health indicators, information from KDHS 2003 showed that maternal, neonatal and child health indicators had either stalled or were worsening – primarily due to poor quality of care at health facility level (supply) and poor physical, financial and psychological access (demand) to reproductive health services. In 2006, the government formally recognized the importance of closing the gap (interface) between the community and front line facilities by launching the Community Health Strategy. Weak leadership as demonstrated by underfunding, uncoordinated and piecemeal implementation of the strategy has failed to appreciably improve the proportion of pregnant women who deliver at health facilities and by skilled attendants. Indeed some of the promising interventions have largely been small scale and unsustainable limiting the opportunities for replication and scale up.

This study addressed these poor indicators in maternal and child health at community and dispensary level by applying the concept of community ownership and participation in the provision of health care at levels 1 and 2 of the health care system in Kenya using the community owned resource persons (CORPS). The strategy used was the establishment of income generating activities (IGAs) by the communities and the establishment of a community run community based organization (CBO). To ensure consistency in the field activities and to focus on maternal and child health outcomes, an Enhanced Health care (EHC) package was provided as a guide to be used by the CORPS and SHWs in the community and dispensary during the provision of health care services during the study period.

The objectives of the study were:

1. To facilitate partnerships for innovative approaches (IGAs and CBOs) to incentivize CORPs (Community owned resource persons) including CHWs and Community Midwives (CMWs) to effectively participate in increasing access and utilization of health services by pregnant women and children in Kabula dispensary.
2. To describe the trends in maternal, newborn and child health indicators during the study period

The study was implemented using the Enhanced Health Care package (EHC) which consisted of the following:

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- Early identification and surveillance of the pregnant woman and newborn babies by the CORPs.
 - Recognition and management of pregnancy-related complications, particularly pre-eclampsia, haemorrhage, premature rupture of membranes and infection at the dispensary.
 - Recognition and treatment of underlying or concurrent illness in pregnancy – malaria, anaemia, infection among others at the dispensary.
 - Preventive measures through administration of tetanus toxoid, de-worming, iron and folic acid supplementation, intermittent preventive treatment of malaria in pregnancy (IPT), prenatal vitamins provision and use of Long Lasting Insecticides Treated Nets (LLITNs).
 - Developing a birth and emergency preparedness plan with the assistance of the CORPs.
 - Immunization of all young infants and under-five children born during the study period including Vitamin A administration at 6 months of age and yearly at the dispensary.
 - Obtaining weights for all newborns, infants, under five children and pregnant mothers in the community and health facilities by CORPS and dispensary skilled health workers.
 - Malaria diagnosis using the rapid diagnostic tests (RDTs) in the dispensary.
 - Haemoglobin estimation using the haemocue at the dispensary.
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2. Materials and methods

This was a prospective study carried out over a 4 year period between 2015 and 2018. The first year (2015) was used to collect baseline data and the subsequent 3 years (2016–2018) were used for the implementation of the EHC package. Endline data was collected in 2019. The EHC was a guide for the CORPs and the Skilled health workers in Kabula dispensary, the referral facility for the community, on what to do at the community level and at the dispensary. This was part of a larger prospective quasi-experimental comparative study conducted in 6 dispensaries and locations in 6 counties in Kenya with 2 intervention locations and 4 control locations, the protocol has been published elsewhere [11,12,13]. Kabula location was one of the 6 study sites in the larger study and it was one of the two independent intervention sites.

The community leadership was approached and provided with the intentions of the study including the objectives. They were encouraged to set up a health committee in the location on maternal and child health with the objective of raising funds for the health of mothers and their newborns. They were also requested to identify CORPs in the location that could be trained on the identification and referral of pregnant women to the Kabula dispensary for antenatal care and delivery. These were trained using the WHO training guidelines for community health workers on maternal and the young infants that includes identification of danger signs. The CORPS were to be paid through the IGA and CBO to be formed. They were trained on how to set up IGAs and the operations of a CBO.

The dispensary staff were encouraged to work with the location health committee on the implementation of the proposed project. The nurses and the community health workers were trained on BeMONC and CeMONC as provided for in the WHO guidelines and the Kenya Ministry of Health guidelines for maternal and newborn care and were encouraged to use the EHC package in course of their work as a guide to health care provision for the duration of the study.

In this location and dispensary we worked with the community Health Units, village elders, Assistant chiefs and the Chief in collaboration with the CORPs to establish income generating units (IGAs) and/or community based organizations (CBOs). The IGAs/CBO were set up by the communities themselves and run through governance structures established by themselves.

The funds from these IGAs/CBOs were used to incentivize the volunteer CORPs to identify pregnant women and their newborns and refer them to the local dispensary (Kabula). The primary care health facility (Kabula dispensary) committee worked with these CBOs and IGAs to assist in the funding of some activities including referral costs from the community to the primary care health facility and to the county referral facilities. They also employed an additional nurse for the facility to complement those employed by the County Government. These IGAs/CBOs were used to address the transport and birth plans requirements of the pregnant women, their newborns and infants born during the life of the project.

There were 5 community units (CU) with IGAs established and they registered a CBO they named KaCoHeLI (Kabula Community Health Link Initiative). They opened an account where all the proceeds were deposited. The account was managed by the Location Health committee chaired by the Chief. In the Kenya Health strategy, the community unit is the lowest health care unit in the community (level 1 of the health care system) that has upto 50 CHWs that refers to the dispensary (level 2).

KACOHELI is formed by 5 Community Health Units (C U s) which have 32 community village committees and 49 CHVs. Most of the villages have one 1 CHV but bigger villages have up 3 CHVs covering the villages. The community units meet at least once every month. Each CU has a scheduled meeting day of the month which they plan affairs for the community unit.

The KACOHELI is composed of Chairpersons of each of the 5 community units, 3 Community Representatives (Women leader, persons with disability, youth leader), 2 Kabula Facility Representatives (Clinical officer i/c and Nursing officer i/c), the Chief of the location and the Public Health officer. KACOHELI meetings are held once every month after the community units hold their meetings.

2.1. Conceptual framework

This study was part of a larger study on an innovative approach to the implementation of the WHO health systems pillars (1) in the implementation of health care in populations. This study utilised a holistic approach to health care that included community participation, ownership and involvement (11). This approach had an in-built sustainability plan since it was community driven and owned.

2.2. Study population

The study population was all pregnant women and children aged under five years living within the catchment population of Kabula dispensary which was Kabula location headed by the Chief. There were no similar interventions in this population during the entire period of this study.

2.3. Primary outcomes

Improved maternal, neonatal and child health outcomes:

1. Increased ANC attendance especially beyond ANC 4.
2. Increased childhood immunisation coverage.
3. Increased facility based deliveries.
4. Increased facility utilisation by pregnant women and children.

2.4. Secondary outcomes

1. Reduced maternal mortality.
2. Reduced neonatal mortality.

2.5. Ethical considerations

The proposal was approved by the Institutional Research and Ethics Committee of the Moi University (IREC/2014/75 approval No 0001178) and by the Bungoma County Health Management Teams (CHMT).

Verbal consent was obtained by their CORPS from all women enrolled into the study through their CBO leadership to participate. The IREC guidelines on confidentiality and on research were followed.

2.6. Limitations

This study has one major limitation of comparability. Although we intended to compare six communities living in six distinct counties in Kenya, this was not possible because these communities were in remote locations with poor health facility access and utilization which led to a lot of missing data in the 4 control sites. This made it difficult to make comparisons and therefore we were not able to make any statistical analysis but decided to look only at trends in indicators in the Kabula intervention site.

The other limitation was the period of implementation which was three years (2016–2018) which was due to the fact that this was a 5 year project and the first year was for baseline data collection and the fifth year was for endline data collection. We needed between five and ten years of implementation period to study trends over a longer period.

3. Results

The results of the community driven initiative of the health system are shown in the tables and figures below.

Table 1
General facility attendance

	2015 (baseline)	2016 actual	2017 actual	2018 actual
Facility general attendance (all outpatients)	6000	14,037	13,244	20,027

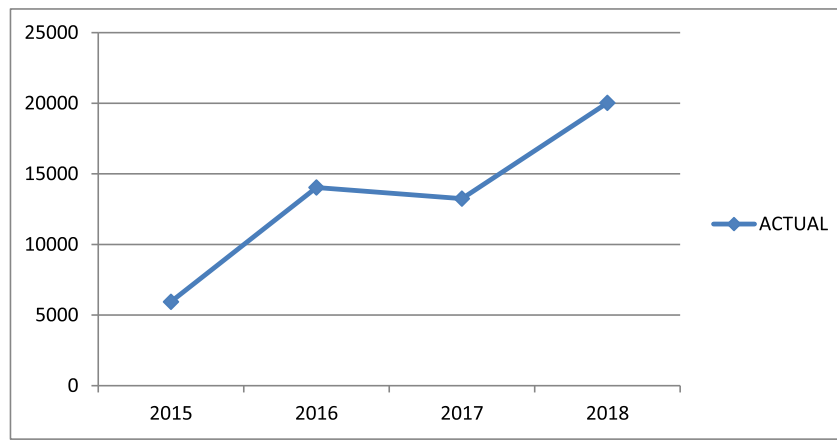


Fig. 1. Trends in general outpatient clinic attendance at Kabula dispensary over the study period.

Table 1 and Figs. 1, 2a and b show the trends in the general attendance at the outpatient clinics of the dispensary over the study period. There was more than 3 fold increase in the attendance in the outpatient of the facility.

Table 2 shows the trend in the under-five clinic attendance over the study period. There was a 4 fold increase in the under-five clinic attendance.

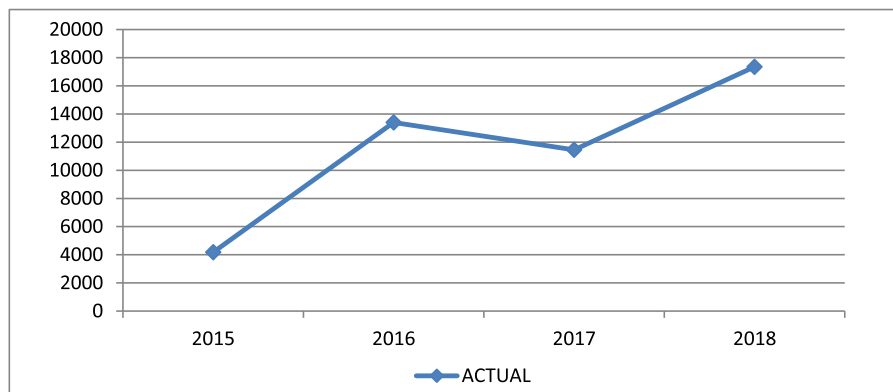
Table 3, Fig. 3a and b shows the trend in ANC clinic attendance over the study period. There was a more than two fold increase in ANC attendance by 2017 and 2018.

Table 4a and 4b shows trends in the maternal, newborn and child health care indicators over the study period and Fig. 4a, b, c and d show the trends

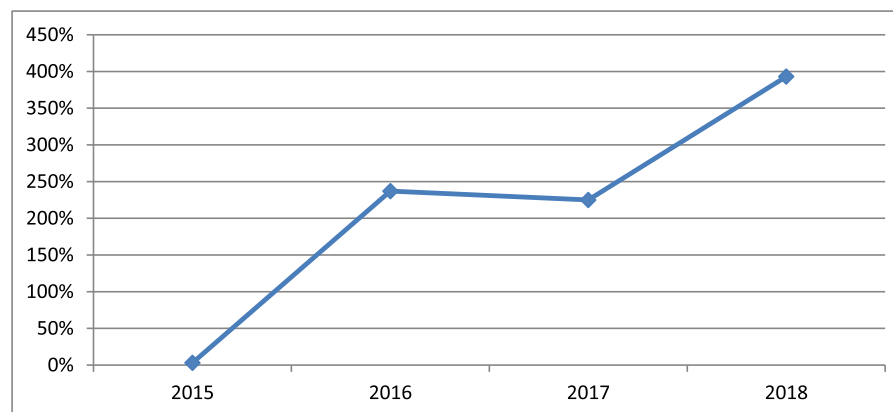
in ANC attendance for ANC 1,2,3,4 and above 4 as per WHO guidelines and recommendations.

4. Discussion

This study was conducted as an innovation within the context of the Health Systems as described by WHO using 6 pillars [1] with the objective of linking communities and the primary care facilities. The overall goal was to improve access and utilization of the health care system by communities and to enhance the referral system in the health care delivery system.



(a)



(b)

Fig. 2. a. Trends in Under five clinic attendance at Kabula dispensary over the study period. b. Percentage increase of Under 5 Attendance.

Table 2
Underfive outpatient attendance

	2015 baseline	2016 actual	2017 actual	2018 actual
Under five outpatient attendance (all outpatients)	4000	13,402	11,456	17,351

Table 3
ANC clinic attendance

	2015 baseline	2016 actual	2017 actual	2018 actual
ANC clinic attendance	498	635	1783	2676

Most African countries did not meet the MDGs on reducing child mortality, improving maternal health and combating infectious disease (MDGs4, 5 and 6) partially due to insufficient support for rapid scale-up of proven interventions and critically needed investments in basic healthcare systems. In most African countries the basic health infrastructure, human resources, equipment and supplies are inadequate to provide essential maternal, child and reproductive health services, and to control and treat infectious diseases [14].

This study as implemented has shown improving trends in maternal, child and health care services over the study period through the community participation and ownership initiatives.

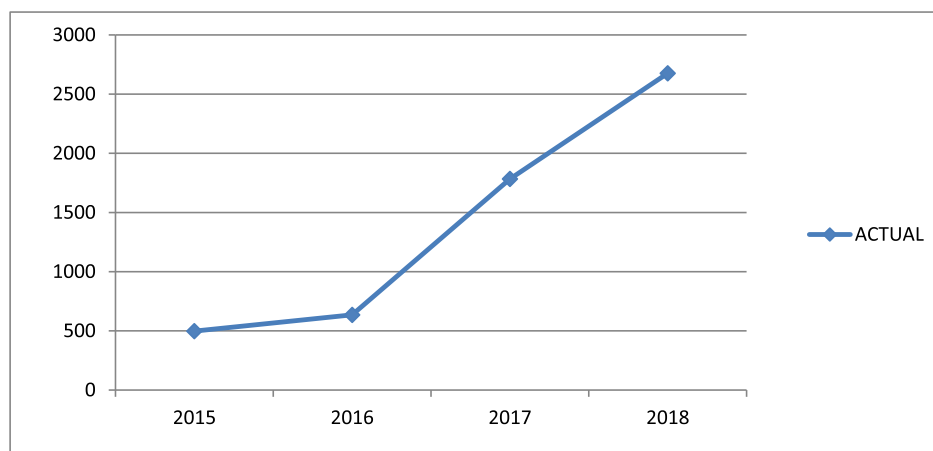
Table 4a
Trends in Outcomes among pregnant women in Kabula

	2015	2016	2017	2018
ANC attendance 4+ (denominator is the facility attendance at baseline)	28%	27%	34%	55%
Facility deliveries (denominator is the facility deliveries at baseline)	61%	68%	79%	87%
Home deliveries	39%	32%	21%	13%

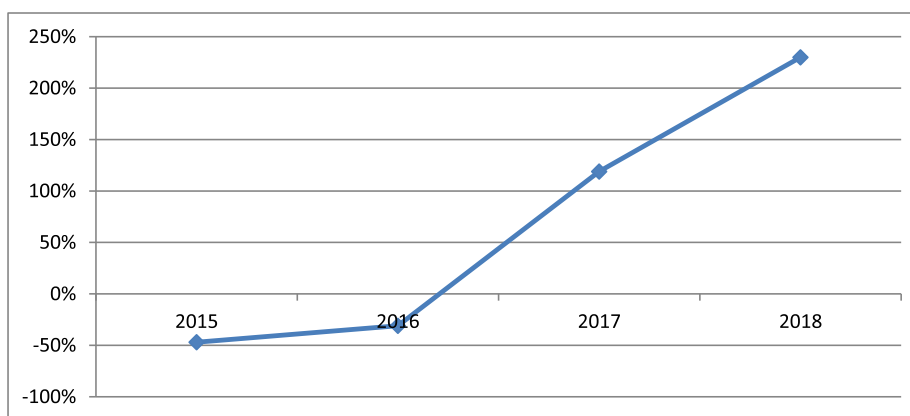
Table 4b
Trends in Outcomes among children in Kabula.

	2015 Baseline national	2016	2017	2018
Low birth weight and premature babies born at Kabula dispensary (LBW currently is about Neonatal mortality per 1000 (recorded during delivery at Kabula dispensary)	18%	4%	1%	4%
Fully immunized at 9 months (denominator is the facility target)	20	1%	1%	1%
BCG vaccination coverage	55%	54%	76%	76%
	88%	89%	97%	97%

There was a fourfold increase in the general outpatient clinic facility attendance and underfive clinic attendance in 2018 from 2015 and a fivefold increase in ANC attendance in 2018 from 2015 which was higher than the

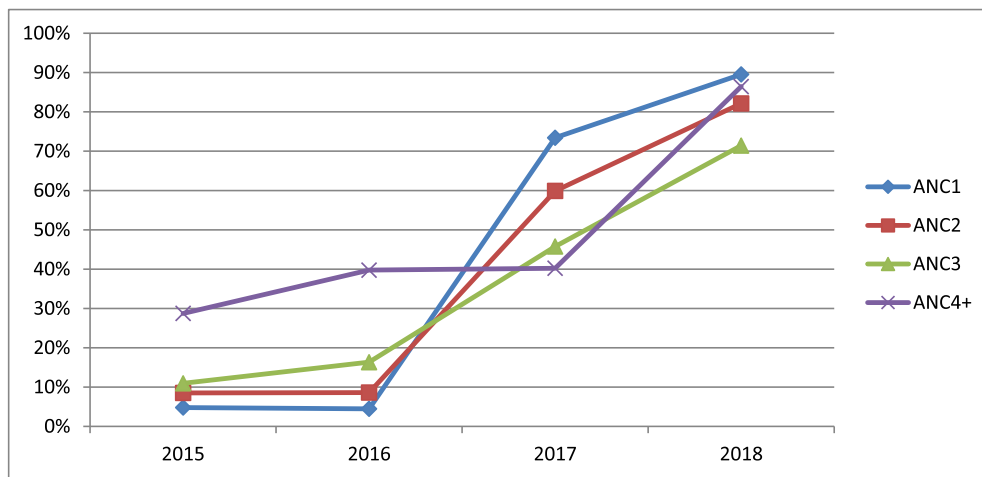


(a)

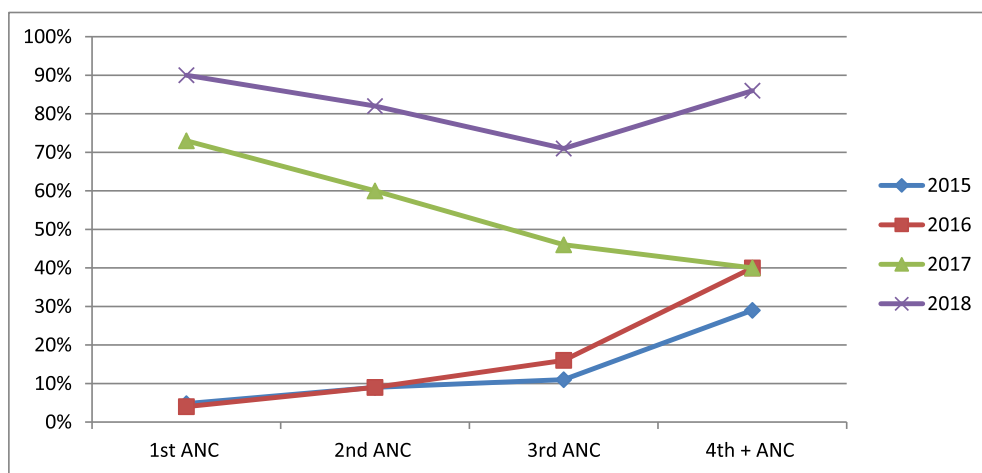


(b)

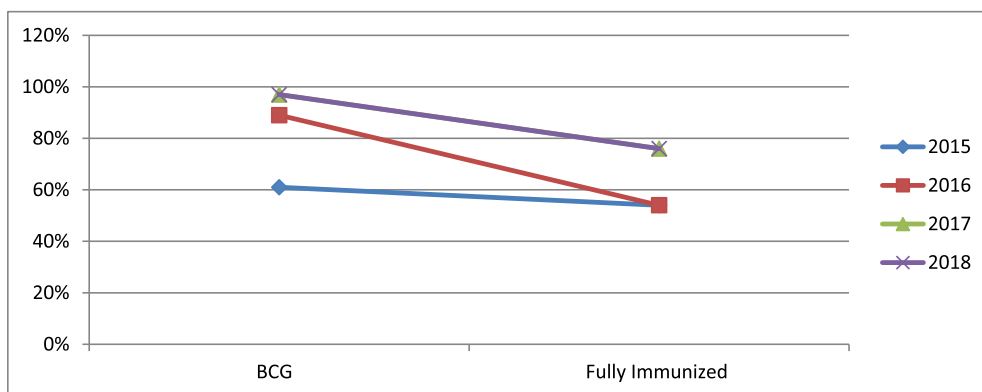
Fig. 3. a. Trend in actual ANC Attendance. b. Percentage increase of ANC Attendance.



(a)



(b)



(c)

Fig. 4. a. trend in ANC attendance over the study period. b. Trends in visits attended by pregnant women as per gestation over the study period. c. Trends in immunization coverage 2016, 2017, 2018 (BCG coverage and fully immunized at 9 months,)

projections anticipated in annual workplans. This is an indication that the implementation of the health system in the facility by the community itself through the use of CORPs contributed to the improvements.

These improvements were also evident in an increasing trend in immunization coverage, facility deliveries and reducing home deliveries. The

facility deliveries among the women in the study area and the deliveries by skilled health workers at 87% in 2018 were higher than reported in the 2014 KDHS of 59% for Bungoma County and 61% for Kenya.

The findings of this study on maternal indicators are similar to those found in a study that used the systems approach in maternal health care,

Savings Mothers Giving Life (SMGL) project in Uganda and Zambia [15] and in Kenya using the same approach by the authors of this study [13].

Though this was a community driven study with limited assistance by the study team, which was mainly training and guidance, there is a semblance in its conduct to the application of the WHO pillars of the health system by the community.

Leadership and Governance have been observed the world over as an important need for the success of any health care system. In this study the leadership and governance was implemented by the community with support of the County Government through the introduction of a clinical officer in Kabula dispensary as the team leader with 3 nurses. This model therefore provided the requisite leadership and governance as provided for by the WHO health systems provisions. This leadership role was therefore played by the Bungoma Health Management Teams at County and Sub-County level with the implementation of the day to day community activities run by the community through its community units. The dispensary played the facility care provision role in partnership with the community health committee and the community units. This demonstrates the importance of partnerships in the provision of primary health care services in the delivery of universal health coverage.

Healthcare financing is a major hindrance to adequate and satisfactory health care delivery in any country and has been cited as one of the major challenges in developing countries in health care delivery. This component of the health systems pillars was fulfilled in the Kabula community and facility through the establishment of IGAs and the CBO with an account opened in the name of KACOHელი.

Service delivery is a complex sub-system for both developed and developing countries. A functional system should aim to provide safe and quality, feasible, affordable and accessible healthcare. Many countries have tried several health service delivery models and hospital reforms without much success and even the most developed countries are still grappling with achieving optimal health care systems. In this study this was fulfilled by introducing a clinical officer in the dispensary by the community in consultation with the County Government. The community engaged the services of one more nurse to make 3 nurses at the facility. Normally dispensaries are run by one to three nurses. This model of introducing a clinical officer enabled comprehensive health and clinical care services to be offered in the dispensary and therefore reducing the rate of referrals. The clinical officer provides clinical services that includes minor surgeries and treatment of all ailments for all ages and sex which the nurses are not mandated and trained to do. In addition, there was a laboratory technician to assist in supporting the clinical officer in diagnosis for common diseases. This reduced the rate of referrals to the health centres and county hospitals (levels 3 or 4) for basic diagnostic services.

Medical products, vaccines and technologies are a necessity in a health care system without which utilization slows or is poor and therefore must be procured and made available in health facilities. The facility fees and drug needs of the members of community were met through this IGAs and CBO, KACOHელი.

Health Infrastructure is a crucial sub-system as most health systems in Sub-Saharan Africa are dilapidated and new infrastructure is poorly maintained. A well-functioning health system ensures equitable access to healthcare by ensuring physical infrastructure is available within the required distance, transport infrastructure ensures speedy access and referrals and ICT infrastructure supports timely procurement of supplies and equipment and facilitates effective management of resources. The dispensary had challenges of access from certain villages and the community availed a motorcycle ambulance service from amongst its members which was put in place with the partnership of Save the Children program. A tricycle Ambulance was later donated by the study to this community.

Health management information system (HMIS) is key in a health care delivery system and has to be functional for a successful system of health care. Kabula dispensary had an HMIS system in operation courtesy of the County Government which enabled the community in keeping their health records online for easy follow up of cases.

Human resources are an essential component of a health system and a major shortcoming in sub-Saharan Africa where a deficit of over one

million health workers is estimated to exist and Kenya is no exception (WHO 2006). There is a direct linear relationship between the density of human resources in health to maternal and child survival. In Kenya the health human resources to population ratio is 13/10,000 populations compared with the WHO figure of 23/10,000 population threshold (WHO, Global Atlas of Health Work force, 2010). Kabula dispensary had adequate human resources for health for a level 2 facility that included a clinical officer, 3 nurses and a laboratory technician. These personnel were trained yearly by the research team mainly on BeMONC and CeMONC as approved by the Ministry of Health in Kenya (Basic Paediatric protocols 2016; National Guidelines 2014).

The findings of this study provide the evidence that community participation and ownership in the provision of health care has an important role in the success of any health care delivery systems. It also shows that the community needs to be involved in the plans for universal health coverage and is a pillar in its success as it forms the level 1 of the health system who are the primary beneficiaries of any health care service.

5. Conclusions

Trends observed in this study include

1. Increase in fully immunized coverage to over 76% in 2018 from 54% in 2015.
2. Increase in ANC attendance of more than 4 visits per pregnancy to over 55% from 28%
3. High facility deliveries of greater than 87% from 61%
4. A reduction in intended home deliveries to 13% from 39%.

5.1. Recommendations

The community driven health systems approach with the use of CORPs, IGAs and CBOs as applied in this study should be emulated in programs that aim at achieving universal health coverage as the main stakeholder of such programs is the community and their participation is key in the success of such programs. Larger studies over longer evaluation periods need to be done to corroborate the findings in this study.

Authors' contributions

All the authors participated in the development and writing of the manuscript. FOE led the process of manuscript development and writing, EOW provided the guidance and review of the obstetric related issues, AM provided the statistical details and support, DA provided the behavioural aspects, JT provided the community and referral strategy aspects and MN provided the demographic and health systems aspects. All the authors provided edits and reviewed the whole manuscript to its final version as submitted.

Authors' information

This is provided in the author section above.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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