



# **Effectiveness of Community Based Interventions in Reducing Maternal Mortality in Sub-Saharan Africa: A Systematic Review**

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Author OO initiated the research idea and developed the introduction and literature part of the work while author JM searched for relevant literatures and carried out a systematic review of the literatures. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

**Background & Aim:** Maternal mortality ratio for sub-Saharan Africa in 2010 was estimated to be about 600 per 100,000 live births, which is approximately higher than what is obtainable in advanced countries. To this end, several community-based interventions have been put in place by governments and developmental partners in the region to address the situation. This review aimed to seek evidence from existing literature on the level of effectiveness of these interventions in improving maternal health outcomes in the region. The literature search process resulted in retrieval of six full text studies that were written in English, published between 2000 and 2019 and were focused on intervention based at the community level which resulted in the reduction of maternal deaths in some sub-Saharan African countries. The Critical Appraisal Skills Programme (CASP) tool was used to critically review retrieved literature.

**Findings:** Findings from the articles reviewed show that community based interventions with direct reduction on maternal mortality were implemented in Ethiopia and Nigeria and were effective since

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maternal mortality declined by 64% and 43.5% respectively. Other community based interventions did not directly address reduction in maternal mortality but rather addressed leading causes of maternal mortality such as home and unskilled birth attendance, low Ante-Natal Care (ANC) & Post-Natal Care (PNC) services utilization, Eclampsia, delay in accessing care and Postpartum Hemorrhage (PPH). Such interventions were implemented in Nigeria, Zambia, Tanzania and the Democratic Republic of Congo and were proved to be effective in reducing maternal mortality.

**Conclusions and Recommendations:** Based on the literatures reviewed, it was concluded that community based interventions were effective in reducing maternal mortality in Sub-Saharan Africa. The following recommendations were made based on gaps observed in the implementation of some interventions. Introduction of emergency transport scheme in countries where they do not exist as despite the existence of maternity waiting homes and dedicated maternity ambulances in Zambia, many expectant mothers still had difficulty reaching the health facilities in time to deliver, Engagement and training of more health workers so as to avoid human resources challenges that may be associated with increased demand for health facility deliveries.

*Keywords: Maternal mortality; interventions; Sub-Saharan Africa.*

## 1. INTRODUCTION

The United Nations Sustainable Development Goal three is targeted at the reduction of maternal deaths to about seventy maternal deaths per hundred thousand live births by 2030 [1]. This suggest that 342,900 (confidence interval 302,100-394,300) women died globally in 2008, and that 6 nations, namely; Nigeria, Ethiopia, Tanzania, Kenya, Zimbabwe and Uganda contributed to more than fifty percent of these deaths [2]. According to [3], Africa's maternal mortality ratio is doubled that of South Asia. [4], reported that a higher number of these mortalities take place between the 3<sup>rd</sup> trimester and the 1<sup>st</sup> week postpartum. High mortality has been reported on the 1<sup>st</sup> and 2<sup>nd</sup> day following delivery [4].

In 2015, the World Health Organization estimated that 303,000 women died from complications resulting from pregnancy, mostly occurring in Sub-Saharan Africa [5]. In contrast to women in North America and Western Europe, the risk of death in women is two hundred times higher for women residing in countries with low socio-economic status. According to [6] report, about ninety-nine percent of maternal deaths was recorded in the fifty-three nations classified as low income countries from their gross national per capita income averaging US\$900 or even less, and more than sixty percent are in Sub-Saharan Africa.

Different studies have linked the high ratio of maternal deaths across nations in the Sub Saharan region to several determinants.

According to [7,8], women living in Sub Saharan Africa do not have essential maternal reproductive health services within their reach and quality of obstetric care is below the required minimal standards. The World Health Organization reports that, eight hundred and thirty women across the world die each day from pregnancy related complication and during delivery, and a great percentage occurs in Sub-Saharan Africa [9]. Despite global efforts towards addressing these problems of maternal deaths, unskilled delivery remains a major gap in many African countries [9].

According to [10], two- third of maternal mortality are as a result of high death rate of women from pregnancy and it related complication, inadequate access to skilled health care, non-availability of medical consumables and essential medicines and social factors (education, women empowerment, religion and social economic status). This further buttresses, [6] reported that poor quality, access and unavailable quality of care in most situation, as a major determinant.

Therefore, the World Health Organization in the past had advocated for more focused intervention with strong evidence of integration with other component of care packages (post-delivery care and reproductive health) that are widely distributed, these are seen to be more effective towards the reduction of maternal mortality [6,11]. More recently studies have shown that interventions at the community level is contributory towards reducing maternal mortality, these interventions may include, supplements and vitamins distribution to pregnant women, training for community health

extension workers to recognize danger signs in pregnancy with related risks for early referral for adequate care [10,12]. Women whose pregnancy begin with identifiable risk factors, such as malaria, anemia or malnutrition are at a greater risk, thus, community intervention focused at eliminating these indirect causes of maternal deaths are essential.

Following the Alma-Ata declaration, it was acknowledged that involvement of community was vital in the delivery of services at the grassroots level [13]. Getting communities to participate has been advocated in the promotion and improvement of newborn and maternal health outcomes. Several trials have equally studied the role women play in health. One of such trial is the Makwanpur trial, Nepal, which piloted a learning cycle through women groups, which identified, classified a challenge, choose, and implemented relevant programs with evaluations of their outcome, this trial reported eighty-eight percent decrease in maternal deaths and a thirty percent decrease in newborn deaths, although the same approach in similar trials have shown less positive impact on newborn and maternal outcomes [14,15]. Other studies showed that if interventions like skilled and aseptic delivery, immunization of women against tetanus, putting newborn babies to breast milk within the first one hour of birth, placing babies to mother's skin following delivery, aseptic cord care and basic newborn care are provided at full coverage, forty-one to seventy-two neonatal mortalities could be prevented. Half of these interventions are community based [16]. Developing intervention packages and the use of community based approach will significantly contribute to the overall reduction of morbidities and mortality; these packages should be supplemented by strengthening health systems locally.

### 1.1 Objectives

The general purpose of the study is to systematically review how effective community level interventions are in reducing maternal mortality in Sub-Saharan Africa. Its specific objectives are;

- (i) To highlight the types of community level interventions in Sub-Saharan African countries.

- (ii) To examine effectiveness of community-level interventions on maternal health outcomes in Sub Saharan Africa.

## 2. LITERATURE REVIEW

### 2.1 Maternal Mortality

Maternal death or maternal mortality is defined by the World Health Organization (WHO) as "the 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 but not from accidental or incidental causes.

#### 2.1.1 Causes of maternal mortality

Women die as a result of complications during and following pregnancy and childbirth. Most of these complications develop during pregnancy and most are 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. The major complications that account for nearly 75% of all maternal deaths are [4]:

- Severe bleeding (mostly bleeding after childbirth)-postpartum hemorrhage
- Infections (usually after childbirth)
- High blood pressure during pregnancy (pre-eclampsia and eclampsia)
- Complications from delivery
- Unsafe abortion.

The remainder are caused by or associated with infections such as malaria or related to chronic conditions like cardiac diseases or diabetes.

#### 2.1.2 Prevention of maternal mortality

According to UNFPA, Four elements are essential to maternal death prevention, they are;

**Prenatal care**, it is recommended that expectant mothers receive at least four antenatal visits to check and monitor the health of mother and fetus.

**Skilled birth attendance** with emergency backup such as doctors, nurses and midwives who have the skills to manage normal deliveries and recognize the onset of complications.

**Emergency obstetric care** to address the major causes of maternal death which are hemorrhage, sepsis, unsafe abortion, hypertensive disorders and obstructed labour.

**Postnatal care** which is the six weeks following delivery, during this time, bleeding, sepsis and hypertensive disorders can occur, and newborns are extremely vulnerable in the immediate aftermath of birth. Therefore, follow-up visits by a health worker to assess the health of both mother and child in the postnatal period are strongly recommended.

Therefore, any intervention that increased access to and/or uptake of the above elements has invariably reduced maternal deaths.

## **2.2 Community-Based Interventions**

A community-based intervention refers to actions taken and implemented at the community level to address social, economic or health problems. A community-based intervention is therefore an intentional action to promote changes that can be expressed in different ways depending on the needs of the community.

### **2.3 Community-Based Interventions in Some Sub-Saharan African Countries**

#### **2.3.1 Community-based maternal and child health project on 4+ antenatal care in the Democratic Republic of Congo**

This intervention was implemented 2014 to 2017 with the aim of supporting pregnant women to attend at least four Ante-Natal Care (ANC) visits in health facilities and was based on addressing the three delay model in seeking healthcare. The intervention was implemented in three phases, the first phase included awareness creation to increase and promote Maternal and Child Health (MCH) services utilization through educational programs. This addressed the first delay of seeking ANC from health facilities. In addition, promotional activities for reproductive-aged women through radio broadcasting and signboards were used to increase program awareness. The second phase of the program addressed the second delay of reaching the health facility to receive ANC by pregnant women during the pregnancy. Therefore, a secondary hospital was provided with an ambulance, motor cycles were also provided to 23 health centers to address the delay of reaching health facilities to access care. Finally, the third phase of the

intervention aimed to ensure that patients received adequate and appropriate treatment focused on ANC at health facilities. To this end, training for the capacity-building of 76 health workers was conducted as well as supply of health facilities with essential medicines [17].

#### **2.3.2 Women's group community participatory intervention in Malawi**

In Malawi, women's groups were implemented in Mchinji District from 2005 to 2010 with the aim of empowering women to take control of the maternal health issues that affect them. This intervention adopted a participatory learning and action cycle which comprise four phases and a series of 20 monthly meetings. In Phase 1, the groups identified and prioritised maternal and neonatal health issues affecting women in their respective communities. In Phase 2, they identified feasible strategies for addressing the listed priority problems and went on to implement the strategies in Phase 3. Phase 4 involved evaluating the first three phases. Local facilitators were identified and trained to support the groups in their respective communities. The women's group activities were driven by maternal and neonatal priority issues that women identified in their individual groups [18]. Therefore, family planning was not the main focus of the women's groups, but the topic was addressed by some groups within the broader context of maternal health (i.e. when groups identified high parity or closely spaced pregnancies as a factor contributing to maternal mortality).

#### **2.3.3 Saving Mothers, Giving Life (SMGL) intervention in Uganda and Zambia**

This community-based intervention aimed to reduce maternal mortality by addressing all 3 delays across 4, and after scale-up, 18 districts in Zambia from 2012 to 2017. In addressing the gaps and limitations highlighted at baseline related to the first delay. SMGL implemented a sensitization of "Safe Motherhood" campaign from 2012 to 2014. The goal of the campaign was to increase demand for MNH services in SMGL's original 4 learning districts. Safe motherhood messages were spread through trained community leaders (chiefs, civil leaders, and headmen), SMAG members, clinicians (nurses, midwives, and clinical officers) and mass media. Key messages centered on the importance of early antenatal care (ANC), health facility deliveries and involvement of male

partners in MNH services. To address second-delay challenges associated with accessing care easily, SMGL and the Ministry of Health (MOH) provided ambulances, motorcycles, and other emergency vehicles; renovated maternity waiting homes (MWHs); and increased EmONC capacity of existing health facilities. To improve quality of care which addressed the third delay, SMGL trained clinicians, provided mentorship opportunities, and procured essential equipment [19].

#### **2.3.4 Community-based distribution of misoprostol tablets to mothers in the third stage of labor for the prevention of postpartum haemorrhage in Nigeria**

In October 2012, the Sokoto State government funded and procured 56,832 doses of misoprostol from the Nigeria office of Marie Stopes International. This was the first recorded instance of government financing of misoprostol use for community distribution in Nigeria. In 2014, the Sokoto State government procured an additional 56,000 doses of misoprostol. To preemptively ensure that misoprostol was used only for PPH prevention, and to gain the support of male heads of households, community leaders insisted in the creation of a volunteer community drug keeper (CDK). The introduction of CDK, a "satisfice" decision, made misoprostol acceptable to traditional leaders for community-based distribution. The CDK, almost always a man, was chosen by the WDC on account of being trustworthy, reliable, and available twenty four hours a day, to release medicines on demand. CDK were also required to be able read, write and keep simple records. The agreed-upon criterion to dispense misoprostol was verbal notification by a family member or the community-based health volunteer (CBHV) that a woman was in labor. Notwithstanding the risks of likely additional delays in delivering misoprostol by the added CDK layer, it was determined that it was better to have a distribution on demand program, with its flaws, than none at all [20].

#### **2.3.5 Emergency Transport Scheme (ETS) in Nigeria**

ETS was mainly a community based intervention whose implementation strategy for reducing maternal mortality was training National Union of Road Transport Workers (NURTW) on identification of danger signs in pregnancy. ETS drivers were trained to identify danger signs in

pregnancy for quick transportation to health care facility [21].

### **3. METHODOLOGY**

#### **3.1 Introduction**

This section focused on the method used to gather and screen articles for selection of the best sources. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement was employed for the review of selected literatures. The search process, data collection process and appraisal of selected articles are discussed in this section.

#### **3.2 Search Strategy**

The objective of the literature search was to carry out a standard, exhaustive and reproducible search of existing evidence to identify studies relevant to the study topic. Several keywords and phrases were used to search Google Scholar. The reference lists were also searched for related studies which would be included if eligible. Titles of retrieved articles were first screened, and then followed by screening abstracts and lastly the full texts were evaluated for eligibility. The search strategy is the core of the systematic review since it organizes the structure of key terms used in literature search for retrieval of accurate findings [22]. Therefore, the search strategy allowed the identification of studies and other scientific sources that focused on effectiveness of community level programs in addressing maternal deaths in Sub-Saharan Africa. According to [23], a study depends on methodology and the research design to produce significant and correct conclusions. Therefore, studies including qualitative research, quantitative research, observational studies, mixed methods studies and literature reviews were used in gathering, synthesizing and interpreting data that was believed to provide answers to the research question.

##### **3.2.1 Keyword generation**

Keywords are words or phrases that have an excellent description of the study topic [24]. Databases relevant to the study topic were allocated by using the following search terms: maternal mortality in Sub-Saharan Africa, programs for decreasing maternal deaths, community based interventions for reducing maternal mortality in Sub-Saharan Africa, efficacy of community level programs in

decreasing maternal deaths in Sub-Saharan Africa. The keywords used in the search were extracted from the study topic words.

### **3.3 Search Activity**

Key words generated were used to search for literature on different databases such as google scholar, medline, science direct and and NCBI (PubMed). 37 articles were retrieved from the search activity.

### **3.4 Inclusion Criteria**

Research papers were selected if they were quantitative or qualitative and report on entity that is associated with both maternal healthcare outcomes and community intervention in any sub Saharan African country and published between 2000 and 2019. The selection from 2000-2019 was considered bearing in mind that countries have been working under the broad framework of MDGs & SDGs and as such, Community based interventions have largely been made in many countries during the time frame.

Other criteria included;

1. Study design: Studies (cohort, cross sectional, longitudinal and case- control) that assessed .the impact of interventions for reducing maternal mortality will be eligible for inclusion.
2. Status of publication: Published paper.
3. Language of choice: Research work published in English Language.
4. Year of publications: Papers published or reported up to December 31, 2019
5. Study location: Studies conducted in Africa regardless of the study setting (community-based or institution based).
6. Study outcome.

### **3.5 Exclusion Criteria**

Studies and papers published before 2000 and in any other language than English were excluded. Research titles that did not speak to healthcare interventions at community or health facility level and maternal mortality were also excluded. Qualitative studies and study paper that did not indicate factors linked to maternal mortality were excluded as well.

### **3.6 Results of the Search Activity**

After the inclusion and exclusion criteria, 9 articles were selected for review. The selected

articles described and analyzed the effectiveness of community level programs in decreasing maternal deaths in sub-saharan Africa [4,17,19,20,25,26,27,28,29,30]. The summary of the selected articles is presented in the Table 1.

## **4. FINDINGS AND DISCUSSION**

### **4.1 Results of Interventions**

According to [27], a total of 38,312 births were registered during the Comprehensive Emergency Obstetrics Care (CEmOC) and Basic Emergency Obstetrics Care (BEmOC) interventions in Ethiopia. The Maternal Mortality Ratio (MMR) decreased by sixty-four percent, from four hundred and seventy-seven to two hundred and nineteen deaths per hundred thousand live births. The reduction in MMR was elevated for the districts with Comprehensive Emergency Obstetrics Care (CEmOC) in Dirashe (67%) and Arba Minch Zuria (63%) than in Bonke district with Basic Emergency Obstetrics Care (BEmOC) recording only (32%) decline. The intervention also improved Ante-Natal Care (ANC) visits. The results indicated that each woman recorded an average of 2.6 of antenatal care visits.

As reported in a study by [25], The Safe Motherhood Action Groups (SMAGs), a community level intervention was piloted in 4 poorest districts in Zambia (Mungwi, Luwingu, Samfya and Chiengi. Results showed that there was no variation between baseline (65%) and endline (66%) on the average district coverage for IPTp2 given to mothers during their last pregnancy. The number of mothers documented to have confirmed trained SMAG in their communities significantly increased from forty-seven percent at midline to seventy percent at end line. Also, the number of women who benefited from birth preparedness jingles from a SMAG also increased notably by eighteen percent between midline and end line surveys.

In a study by [28] on decreasing maternal deaths in a low resource setting in Nigeria which was focused on an intervention that was implemented in Enugu State University Teaching Hospital (ESUTH), results from a six-year intervention indicate that there was a 43.5% decrease in Maternal Mortality Ratio (488 vs. 864/100 000 live births. The case fatality rate for Post- Partum Hemorrhage (PPH) decreased by 82% (from 13.6% to 2.5%). There was about 30% decline in prevalence of PPH (from 2.17% to. 1.50%).

**Table 1. Summary of selected articles for the study**

<b>S/N</b>	<b>Author (s)</b>	<b>Title</b>	<b>Study location</b>	<b>Study design and methods of data collection</b>	<b>Study aim</b>	<b>Study analysis</b>	<b>Key findings or themes</b>	<b>Main conclusion or argument</b>
1.	Jacobs, et al, 2018	Assessment of a community-level program to improve women and newborn health service coverage in the most rural and remote districts of Zambia	Zambia	Quantitative design  cross-sectional surveys	To evaluate the effect of a community level program aimed at improving coverage of selected maternal and neonatal health.	Logistic regression and chi-square test	Increased in Skilled birth attendance (from 40% to 50%), Post-natal care attendance increased from 28% to 45%	Increased coverage for maternal and newborn service strengthened community participation and outcomes in remote areas and districts.
2.	Lindtjørn, et al, 2017	Decreasing Maternal Deaths in Ethiopia: Results of an Intervention Programme	Ethiopia	quantitative design  cross-sectional community surveys	To examine the effect of an intervention programme aimed at improving health outcome for women in Ethiopia.	Descriptive statistics and Chi-square test.	A decline by 64% of Maternal Mortality Ratio during the intervention period from 477 to 219 deaths per 100,000 live births	A scale reduction in maternal deaths is possible if result driven programme are implemented.
3.	Krut, et al, 2014	'Big Push' To decrease Maternal deaths In Uganda And Zambia	Zambia & Uganda	Quantitative design  Structured interviews	To assess the impact of the big push program aimed at decreasing maternal deaths in Zambia & Uganda	Descriptive statistics	Training for 4,004 community health workers in Uganda and 1,010 community members in Zambia on health promotion, facility delivery and birth preparedness, Eleven out of 149 facilities in Uganda and sixty-eight out of 124 facilities in Zambia were upgraded to provide basic emergency obstetric	Real time evaluation of a complex program is possible and outcomes can be measured early during implementation.

S/N	Author (s)	Title	Study location	Study design and methods of data collection	Study aim	Study analysis	Key findings or themes	Main conclusion or argument
							and new born care. These led to a decline in MMR of the two countries	
4.	Ezugwu, et al, 2014	Decreasing maternal deaths in a low resource setting in Nigeria	Nigeria	Quantitative design  A retrospective review of all maternal deaths between 1st January, 2005 and 31st December, 2010 was carried out.	To evaluate the effect of Enugu State University Teaching Hospital, Nigeria adoption of evidence based guidelines on maternal deaths reduction.	Descriptive statistics and Chi-square test	The study reported MMR of 645/100 000 live births from 9150 live births and 59 maternal deaths during the study period.	Administration of Implementation of evidence based intervention is possible in low resource settings and could contribute to a reduction in the maternal mortality
5.	Eto, 2016	Government Initiatives, Policy on decreasing Maternal Mortality in Nigeria	Nigeria	Quantitative design Record of beneficiaries from program implementation (NURTW & Transcind)	To examine the effects of Government policy and initiative of Emergent Transport Scheme (ETS) on reducing maternal mortality	Descriptive statistics	By 2013, a total of 19,811 women utilized the ETS program in emergency situations: 9,529 in Katsina, 4,564 in Yobe and 5,718 in Zamfara states.	Government policies and initiatives are viable in reducing maternal mortality
6.	Moshi, et al, 2018	Effectiveness of Community-level Continuous Training on Promoting Positive Healthy Behaviors among Expecting Couples in Rukwa, Tanzania	Tanzania	Mixed methods design  quasi-experimental and observational	To assess impacts of program focused on on promoting positive health among expecting couples.	Descriptive and thematic analysis	A significant increase in deliveries assisted by skilled birth attendants (from 34.1% to 51.4%) was reported, a significant increase in early antenatal booking (from 18.7% to 56.9%), and an increase in male involvement.	The study concluded that the challenge of low birth preparedness, male involvement, and use of maternal health services in Rukwa Region can be addressed.



S/N	Author (s)	Title	Study location	Study design and methods of data collection	Study aim	Study analysis	Key findings or themes	Main conclusion or argument
7	Ngoma-Hazemba, et.al, 2019	Community Perspectives of a 3-Delays Model Intervention: A Qualitative Evaluation of Saving Mothers, Giving Life	Zambia	Qualitative design  Structured interviews	To examine the effect of Saving Mothers, Giving Life intervention using the 3-delays model	Thematic and qualitative analysis	Targeted population receptive to maternal health messages, provision of maternal waiting homes and training of health workers for quality of maternal health care services at facilities	While SMGL's health systems strengthening approach aimed to reduce challenges related to the 3 delays, participants still reported significant barriers accessing maternal and newborn health care
8	Lee, et al 2019	Community-based maternal and child health project on 4+ antenatal care	Democratic Republic of Congo	Quantitative design  Structured interviews	To identify the intervention effect of the maternal and child health care (MCH) project on the use of four or more (4+) ANC services.	Descriptive and thematic analysis	Increase in number of pregnant women who attended at least 4 ANC visit by 2.280 times as compared to baseline	The intervention effectively increased the 4+ ANC utilization by reproductive-aged women
9	Orobaton, et.al 2017	Implementing at-scale, community-based distribution of misoprostol tablets to mothers in the third stage of labor for the prevention of postpartum haemorrhage	Nigeria	Quantitative design Descriptive statistics	To examine the effect of misoprostol tablets in preventing postpartum haemorrhage	Descriptive statistics	Out of 70,982 women who received misoprostol from April 2013 to December 2014, only 33 women (<1%) reported that heavy bleeding persisted and were promptly referred	Life -saving misoprostol could be distributed at scale to reduce PPH and improve maternal outcomes.

The result of a study by [17] on Government Initiative and Policy on reducing Maternal deaths in Nigeria which focused on Emergency Transport Scheme (ETS) intervention in some Northern States showed that, eight hundred and fifty-one women were transported to health facilities through the scheme within its first year (2009-2010) in the selected states; three hundred and twenty three in Katsina, three hundred and four in Yobe and two hundred and twenty four in Zamfara. By 2013, the number of communities increased to 2,398. As well, a total of 19,811 women had been transported in emergency situations: 9,529 in Katsina, 4,564 in Yobe and 5,718 in Zamfara states. Besides Katsina, Yobe and Zamfara [30]. Other Northern states in Nigeria have in recent times successfully implemented ETS, these include, Kebbi, Jigawa, Niger, Bauchi, Gombe, Kaduna and Kano states (NURTW, Programs 2015).

The result of a study by [29] on Community-Based Continuous Training (CBCT) impact on Promoting Positive Healthy Behaviors, the use of maternal services by women and participation of male partners in Rukwa, Tanzania showed a spike in deliveries assisted by trained skilled health workers (from 34.1% to 51.4%), an increase in early antenatal clinic visit (from 18.7% to 56.9%), and an increase in male partner participation.

The Community-based maternal and child health project on 4+ antenatal care in Kenge district of the Democratic Republic of Congo showed that the intervention effectively increased the 4+ ANC utilization by reproductive-aged women in Kenge by 2.280 times from baseline. The 4+

ANC services are expected to reduce maternal deaths. Therefore, the intervention contributed to reducing maternal mortality in Kenge.

The community-based distribution of misoprostol tablets to mothers in the third stage of labor for the prevention of postpartum haemorrhage in Sokoto State, Nigeria proved effective as 70,982 women or 22% of expected births received misoprostol from April 2013 to December 2014 out of which only 33 women (<1%) reported that heavy bleeding persisted after misoprostol use and were promptly referred.

The Saving Mothers, Giving Life (SMGL) intervention in Zambia which was based on a 3-delay model was also effective as participants were receptive to SMGL's messages related to early antenatal care, health facility-based deliveries, and involving male partners in pregnancy and childbirth therefore addressing the first delay. The second delay associated with accessing care in facilities was also addressed by the intervention as there were improvements, such as refurbished maternity waiting homes and dedicated maternity ambulances but many still had difficulty reaching the health facilities in time to deliver. Clinician training was conducted which addressed the third delay associated with quality of care in the facility, but the increased demand for health facility deliveries led to human resource challenges, which affected perceived quality of care.

Results from various interventions aimed at reducing maternal mortality in Sub-Saharan Africa are presented in the Table 2.

**Table 2. Summary of the results of various interventions**

S/N	Intervention	Country	Results
1	Safe Motherhood Action Groups (SMAGs)	Zambia	Increase in the number of communities with trained SMAG from 47% to 70% the number of women that accessed birth preparedness messages from a SMAG increased by eighteen percent 10% increase in Skilled Birth Attendance Post-Natal Care increased by 17%
2	Eclampsia and post-delivery bleeding evidence based management options and protocols	Nigeria	43.5% decrease in the Maternal Mortality Ratio Decrease in the case fatality rate for eclampsia by eighty percent case fatality rate for Post-delivery bleeding declined by 82% 30% declined in prevalence of PPH
3	Emergency Transport Scheme (ETS) intervention	Nigeria	19,811 women benefited from the ETS program

S/N	Intervention	Country	Results
4	Community-Based Continuous Training (CBCT)	Tanzania	51% increase in skilled assisted deliveries (from 34.1% to 51.4%) Increase early antenatal clinic visits (from 18.7% to 56.9%) increase in the proportion of male partner participation
5	CEmOC & BEmOC	Ethiopia	MMR declined by 64% Decline in home delivery by 20.4% Increase in proportion of women who attended at least 4 ANC visits in all districts where the intervention was carried out.- 28.4% in Dirashe, 11.5% in Arba Minch and 16.5% in Bonke
6	Big Push' To decrease Maternal deaths In Uganda And Zambia	Uganda & Zambia	Upgrade some health facilities to provide basic emergency obstetric and new born care. These led to a decline in MMR of the two countries
7	Community-based maternal and child health project on 4+ antenatal care	Democratic Republic of Congo	Increase in number of pregnant women who attended at least 4 ANC visit by 2.280 times as compared to baseline
8	community-based distribution of misoprostol tablets to mothers in the third stage of labor for the prevention of postpartum haemorrhage	Nigeria	Out of 70,982 women who received misoprostol from April 2013 to December 2014, only 33 women (<1%) reported that heavy bleeding persisted and were promptly referred
9	Saving Mothers, Giving Life	Zambia	Targeted population receptive to maternal health messages, provision of maternal waiting homes and training of health workers for quality of maternal health care services at facilities

## 5. CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusion

The results from the literature reviewed revealed that there were interventions with direct reductions on maternal mortality while others reduced maternal mortality as a result of increased access/utilization of maternal health services such as ANC, SBA and PNC. Interventions with direct reduction on maternal mortality were implemented in Ethiopia and Nigeria and proved effective as maternal deaths declined in the intervention areas by 64% and 43.5% respectively. Other interventions that reduced maternal mortality as a result of increased access/uptake of maternal health services were also effective. For instance, in DR Congo, such an intervention increased ANC 4<sup>th</sup> visit by 2 times thereby reducing complications that leads to deaths. In Tanzania, an intervention also increased ANC attendance and skilled birth deliveries. After an intervention in Nigeria that involved distribution of misoprostol tablets to mothers in the third stage of labor for the

prevention of postpartum haemorrhage, only less than 1% of the women who received misoprostol reported who received misoprostol and was promptly referred. Therefore, the interventions were effective in reducing maternal mortality in Sub-Saharan Africa.

### 5.2 Recommendations

Based on the literature reviewed and gaps identified in the implementation of some interventions, the following recommendations were made

- Introduction of emergency transport scheme in countries where they do not exist as despite their existence of maternity waiting homes and dedicated maternity ambulances in Zambia, many expectant mothers still had difficulty reaching the health facilities in time to deliver.
- Engagement and training of more health workers so as to avoid human resources challenges that may be associated with increased demand for health facility deliveries as was the case in Zambia.

- Encourage women to belong to groups where they learn about maternal health issues affecting them.
- Encourage male involvement in maternal health issues as it increases maternal health care utilization.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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