Threats Related to Maternal Mortality in Kenya: A Systematic Review

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ABSTRACT: *Given the high level of MMR in Kenya, this systematic review set out to systematically review studies on hazard quotients for maternal mortality in Kenya. The end goal of the review was to identify relevant empirical evidence that were included in the final study synthesis and answered the set research question and objectives. The addressed research question was 'which are the elements of danger for maternal mortality in Kenya?' Objectives of the study were to assess the socio-demographic risk factors for maternal mortality in Kenya and to determine the hospital based threats for maternal mortality in Kenya. Formulation of research question was guided by the population, exposure and outcomes (PEO) format. A qualitative systematic review design was adopted. The population under review was pregnant women and sample of the study included was 7. PubMed and Google Scholar were the databases used to access the included studies. CASP 2018 was used to appraise the selected/included studies. A qualitative synthesis was used by the study to present the results from the selected studies narratively. Study findings showed that individual level key risks for maternal mortality in Kenya included age, distance to healthcare centres, anaemia and labour complications. The results also showed that nurses' attitude and mistreatment were among risk factors for ANC non-attendance and adverse health outcomes among pregnant women in Kenya. The study concludes that socio-demographic and hospital based risk factors affect MMR in Kenya and urgent steps have to be taken if SDG 3 is to be attained by the 2030 end date.*

KEYWORDS: threats, maternal mortality, Kenya, systematic review

INTRODUCTION

Sustainable Development Goals (SDGs) are a group of seventeen linked international goals intended to be a common plan for prosperity and peace for people and planet earn from now onwards (United Nations, 2017). These SDGs as formulated by the United Nations General Assembly (UN-GA) are meant to be attained by end of year 2030 and are known as Agenda 2030 (United Nations, 2015). These SDGs were formulated after the time lapsed for achieving the Millennium Development Goals in 2015 (Schleicher, et al., 2018, p.43-47). Key targets for achieving each goal as well as indicators for the SDGs achievement were identified in 2017 (United Nations, 2017).

Among the 17 SDGs, SDG 3 (good health and well-being) aims to ensure healthy lives and promote well-being for all at all ages (UNDP, 2020). SDG 3 has 13 targets and 28 indicators to measure progress toward targets among them being reduction of maternal mortality (Ritchie, et al., 2018). With regards to SDG 3, great achievements have been made reducing some risk factors for maternal mortality (UNICEF, 2020; Osgood-Zimmerman, et al., 2018, p.41-47).

WHO, (2021) holds that the main measures for talking about maternal mortality rates are the maternal mortality ratio and maternal mortality rates all sharing MMR like abbreviation. A 44% reduction in MMR had been recorded by the year 2017 since 1990; however, each passing day see 808 die as a result of pregnancy or child birth related reasons. According to the United Nations Population Fund (UNPF) 2017 report, in about each passing 120 seconds, child birth and pregnancy complications cause the death of a woman in the world.

This creates the need for urgent improvement in public health practices if the lives of pregnant women are to be saved and safeguarded. Lee and Thacker (2011, p.636-640) observed that the purpose of public health practice is to prevent disease or injury and to improve the health of communities through such activities as disease surveillance, program evaluation, and outbreak investigation. Alongside improvement in public health practices, it is necessary for public health policy makers to know risk factors of maternal mortalities it is to be successfully managed. A study by Conde-Agudelo, et al. (2005, p.242-249) showed that complications throughout pregnancy as well as child birth were the leading risk factors of maternal mortalities among girls aged 15 years especially in developing nations. On their part, Upadhyay, et al. (2014, p.92) and Morgan and Eastwood, (2014, p.51) argued that number of prior births, social isolation and disadvantages, lack of access to skilled medical care during child birth, obstacles to hospital access for delivery as well as deplorable healthcare facility infrastructure increased maternal mortalities during pregnancies and child birth.

Khan, et al. (1066-1074) and Zimmermann, et al. (2012) established that main direct risk factor for maternal mortalities during pregnancies and child birth in poor nations are haemorrhage, sepsis, obstructed labour and hypertensive disorders. In India, Geneviève, et al. (2020, p.1) in their study established that the MMR in 9 states stood at 383/100 000 live child births. The study showed that age, lack of a health scheme, being part of a scheduled tribe group or caste were great risk factors for MMR in the country with pregnancy complications as well as medical comorbidities being the strongest MMR risk factors.

In Nigeria, a retrospective study by Yakasai and Gaya, (2011, p.305-309) revealed that the main MMR risk factors in the nation were primaparity, eclampsia, malaria, anaemia and haemorrhage. In Tanzania, a study by Illah, et al. (2013, p.123) showed that out of 26,427 pregnant women, 64 died and their deaths were caused by direct obstetric maternal factors with haemorrhage accounting for 28% of the recorded maternal mortalities followed by puerperal sepsis and eclampsia. Additional risk factors were found to include obstructed labour and abortion.

In the Kenya Demographic and Health Survey (2008-2009) reported that over ninety percent of pregnant women received antenatal care from a skilled healthcare provider with most of these women staying in towns and cities and being well educated. KNBS, (2010) reported that due to the requirement that pregnant women visiting and using antenatal care must pay a fee in public healthcare centres, out of 83% that visit, only 47% adhere to the recommended four visits for the antenatal care. Delivery charges were however removed in 2013 after the governments roll out of free maternity services for pregnant women in public hospitals (Yego, et al., 2014, p.2). However, maternal mortalities still remain a problem in Kenya especially in rural and peri urban settings creating the need for this study to conduct a systematic review on risk factors for maternal mortalities in Kenya.

Purpose of the Study

The purpose of this study is to conduct a systematic review on the risk factors to maternal mortality in Kenya in order to provide relevant details to the government of Kenya as well as the international

communities on existing barriers to the attainment of SDG 3 by Kenya in order to pave way for governments all over the world to come up with measures for managing the identified risk factors and enhance the achievement of reduced maternal mortality and attainment of SDG 3 by 2030.

Research Question

The following question was answered by the study;

-Which are the risk factors for maternal mortality in Kenya?

Objectives of the Study

These objectives were addressed by the present study;

-To assess the socio-demographic risk factors for maternal mortality in Kenya

-To determine the hospital based risk factors for maternal mortality in Kenya

Aim of the Study

The aim of a systematic review was to identify relevant empirical evidence that were included in the final study synthesis and answered the set research question and objectives

Rational of the Study

The study relied on the population, exposure and outcomes (PEO) format for the formulation of the research question for this study (Levine, Loannidis, Haines and Guyatt, 2014). Based on this format and the formulated research question the population of this study are the pregnant women in Kenya, exposure is the risk factors which include but are not limited to healthcare related risk factors while outcomes represents the maternal mortality in the selected country. PEO allowed the researcher to clearly establish the study outcomes, exposures and population hence its selection. It further is in line with the reviewed empirical studies in the background of the study such as Geneviève, et al. (2020, p.1) and Illah, et al. (2013, p.123) all which being exposed to certain experiences resulted in adverse health outcomes in a chosen population.

METHODOLOGY

Systematic Review
The qualitative systematic review was used to conduct this study. Here, other scholars' qualitative works in different areas focusing on similar topics as the current study were brought together to aid in data collection (Seer, 2015, p.36). This was necessary in order to enhance study findings and their chances and or ability to inform practice and policy (Pearson, *et al.,* 2015, p.121-131).
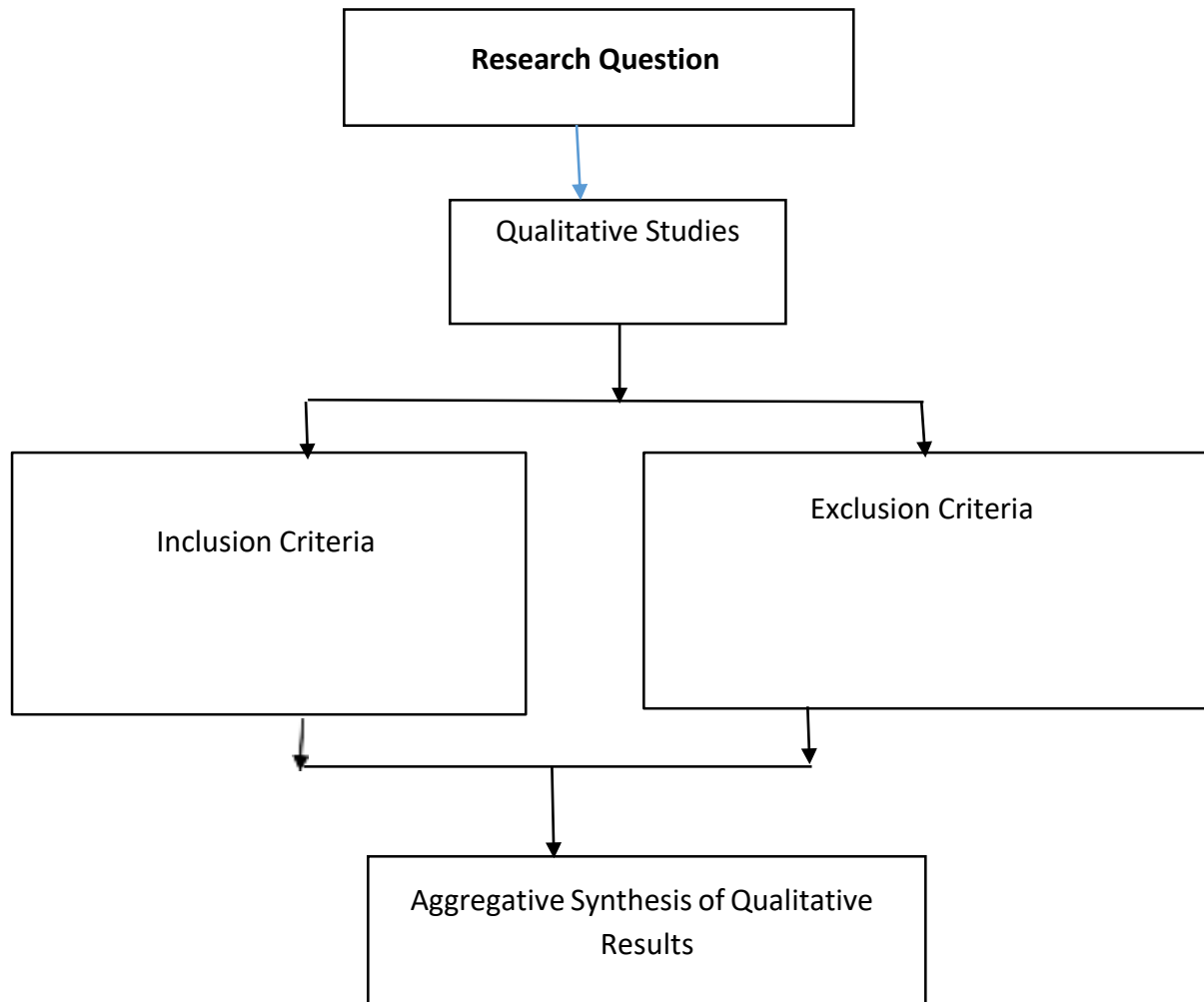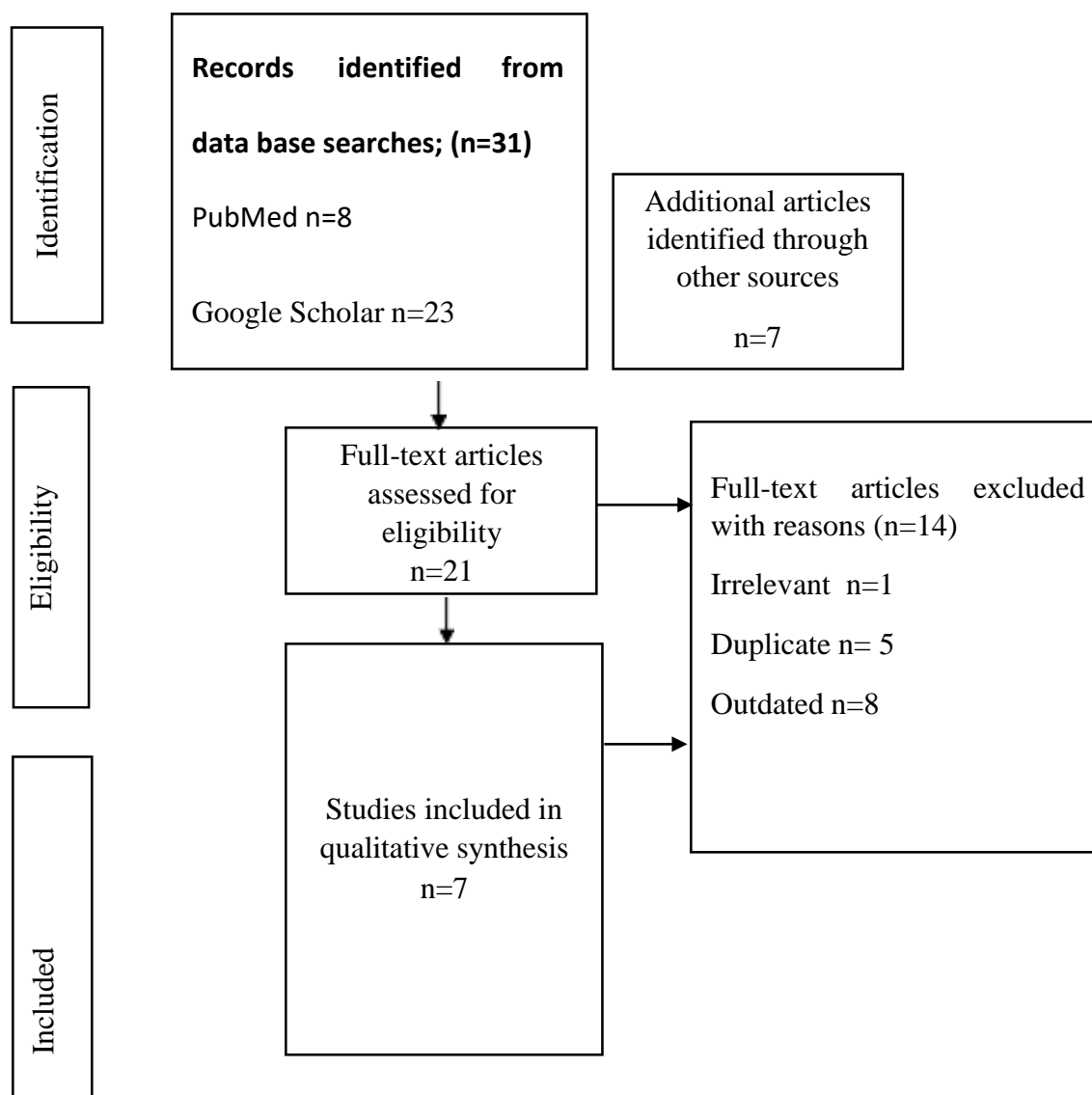
Figure 1: Sequential Methodology for Systematic Review

Schematic Representation of the Methodology

The process followed by the study to arrive at the final number of selected studies for inclusion is as schematically represented in figure 2 below.

Identification

Records identified from data base searches; (n=31)

PubMed n=8

Google Scholar n=23

Additional articles identified through other sources

n=7

Eligibility

Full-text articles assessed for eligibility
n=21

Full-text articles excluded with reasons (n=14)

Irrelevant n=1

Duplicate n= 5

Outdated n=8

Included

Studies included in qualitative synthesis
n=7

Figur : 2 PRISMA flow diagram of studies' screening and selection

Search Strategy

Preliminary Search

To validate the research question under investigation and map available evidence, I first conducted a preliminary literature search. This was mainly done to ensure that no other systematic review on the investigated study topic has been done yet specifically in Kenya. The search involved two studies with less methodological variability and from multiple sources (Google Scholar and PubMed) which may have been as a result of differences in among others the demographics characteristics of respondents (Gehad, et al., 2019, p.1-9; Gross, et al., 2018). Key words used in the preliminary search were 'risk factors' and

'maternal mortality' as well as a combination of the key words in a sentence for instance 'risk factors for maternal mortalities'. Through the preliminary search I was able to ascertain that adequate studies exist to conduct this review. Through this search it was clear that a systematic review was yet to be conducted in Kenya on the risk factors for maternal mortality hence validating the need for the review.

Actual Search Strategy

The search strategy was formulated as guided by the research question formulated through PEO (Gehad, et al., 2019, p.1-9). The first database used in the search strategy was PubMed while the other was Google Scholar as this aided in retrieving relevant studies to the study question. The search strategies were formed to have free-text terms and other relevant subject indexing that helped in retrieving eligible studies. This was done with the aid of the aid of an expert (university supervisor and IT specialist). The final search terms were 'risk factors and maternal mortality' and 'risk factors for maternal mortalities' (Gehad, et al., 2019, p.1-9).

Protocol Writing: PEO informed the development of the review protocol. The following data bases were searched; PubMed, Google Scholar, Scopus, Cochrane and EMBACE. The employed quality appraisal instrument was CASP. For eligibility, studies were required to have been conducted in Kenya, featured pregnant women as the target populace, assessed risk factors for maternal mortalities, were current (2013-2021) and used qualitative, quantitative as well as mixed methods.

Title and abstract screening: Screening of abstracts and titles was done with the help of two peers who worked independently (Gehad, et al., 2019, p.1-9). This helped me to remove found duplicates and enhanced review quality.

Full text downloading and screening: PubMed and Google Scholar was used to access and download the needed studied for this review. After downloading, three reviewers were employed to assist in screening the downloaded studies independently according to established inclusion and exclusion criteria and eligibility criteria and providing a final list with reasons for exclusions (Gehad, et al., 2019, p.1-9).

Databases and on-line platforms: The study relied mainly on PubMed and Google Scholar data bases for searching and accessing required studies. Random web searches were also used to access relevant literature to aid in the systematic review (Shea et al., 2017).

Inclusion and Exclusion Criteria

In order to select which study to include or exclude in this study, abstract, title and full text screening as mentioned above was conducted. This process was instrumental in the selection of relevant studies from the search outcomes. In the first round, the screening of titles and abstracts helped in the exclusion of search results that did not fit in the set eligibility criteria. Studies not excluded were taken through full text screening process and only those conducted in Kenya, featured pregnant women as the target populace, assessed risk factors for maternal mortalities, were current (2013-2021) and used qualitative, quantitative as well as mixed methods included in the study. All studies that did not meet the inclusion criteria were eliminated from the study specifically duplicated studies, unrelated one, lacking full texts/abstract-only studies. This process was aided by three colleagues who were experts in the investigated topic (Gehad, et al., 2019, p.1-9).

Table 1: Criteria for inclusion and exclusion of studies Criteria

Criteria	Inclusion	Exclusion
Time period	2013-2021	<2012
Language	English	Non-English languages
Setting	Healthcare centers	Studies done outside healthcare settings
Location	Kenya	Other countries
Aim	Risk factors for maternal mortality	Literature does not cover risk factors for maternal mortality

Methods of Critical Appraisal

Critical appraisal for the selected studies for this review was done through the critical appraisal skills program (CASP) 2018. For a systematic review on "risk factors for maternal mortality in Kenya', methods of critical appraisal used for the selected 7 studies included methodology, topic, aims and findings and their validity.

Data Synthesis

After the selection of the studies, I carried out a narrative synthesis in order to synthesize the outcomes and or findings from the selected studies. Due to the dissimilar nature of the studied selected, a narrative synthesis was deemed fit by the researcher. The initial step in the synthesis involved a pre-synthesis which was done in the form of a thematic analysis which involved searching for studies, recording and presenting findings in figures and tables. This was followed by result discussions and structuring into themes derived from research question and objectives. After this, the findings were summarized in a narrative synthesis.

FINDINGS

Literature search from the two data bases (PubMed and Google Scholar) yielded 38 studies of which 19 full-text studies were screened for eligibility, 34 excluded for various reasons and only 7 included in my review. The data synthesis was done based on themes derived from the two objectives namely to assess the socio-demographic risk factors for maternal mortality in Kenya and to determine the hospital based risk factors for maternal mortality in Kenya. In the following sub-sections, I present results on the risk factors for maternal mortality in Kenya based on the mentioned 4 studies are presented as follows.

Maternal Mortality Rates

Outcomes of the study by Gitobu et al. (2018, p.1-5) established that a negligible decline in maternal mortality ratio was recorded in the studied 77 hospitals. Their study also observed that this decline was from 258.3/100,000 live deliveries to 237.1/100,000 live child births a decline of only 21.2/100,000 live births. In Yego, et al. (2013, p.1), the synthesis outcome shows that seven years preceding the year 2011, maternal mortality ratio in Kenya generally stood at 426/100,000 live-births while that of neonatal mortality rate (<7 days) stood at 68/1000 live births. According

to the study, slightly over half (51%) of the reported neonatal deaths were of youthful mothers aged 15–24 years and 64% of the recorded maternal mortalities were of women between aged 25-45 years. The results implied that age was a risk factor for neonatal mortalities in Kenya. In the period between the year 2016 and 2019, a study by Odhiambo and Sartorius, (2021, p.1) showed that in Kenya, infant mortalities as well as neonatal mortality rates stood at 18.7 and 6.9 per 1000 live deliveries.

Socio-Demographic Risk Factors for Maternal Mortality in Kenya

According to Gitobu et al. (2018, p.3-5), two years post free maternity health care services (FMHCS) initiation, a noticeable rise in four months maternal mortality rates was reported in the investigated hospitals (slope = 3.49, p = 0.01) an indication that the FMHCS and policyhad dismal effect on facility-related maternal death ratios in Kenya. The same negligible effect was also recorded for neonatal mortality. In their study, Yego, et al. (2014, p.1-9) revealed that demographic variables namely maternal age, education level, history of prevailing conditions and reproductive and obstetric variables, maternal history of drugs and substance abuse, over five prior deliveries, a history of pre-existing ailments   were found to be risk factors for maternal mortality in Kenya. The risk factors for maternal mortality were further found by the study to include maternal admission factors such as admission from comorbid complications, eclampsia, non-normal blood pressure, tachycardia and being referred to MTRH. All these risk factors were shown to be precisely and notably associated with maternal mortality in Kenyan healthcare centres.

Yego, et al. (2013, p.1-8) showed that age was a risk factor for neonatal mortality in Kenya. Their study also showed that indirect complications caused most of the reported maternal mortalities. In cases with explicit obstetric complications related with child birth, the main risk factor for the recorded maternal mortalities was found to be eclampsia with pre-mature rupture of membranes being the main determinant of early neonatal mortalities. The findings lastly highlighted that asphyxia as well as pre-term births were the foremost determinants of untimely neonatal mortalities. Odhiambo and Sartorius, (2021, p.1) on their part held that iron supplements use, maternal anemia levels, utilization of LLINs, use of folate supplements had a positive relationship with positive and desirable pregnancy outcomes among pregnant women. At the same time, using IPT2, antenatal care was found to have negative but negligible relationship with adverse pregnancy outcomes

Hospital Based Risk Factors for Maternal Mortality in Kenya

A research by Hirai, et al. (2020, p.1) established that the unavailability of transport, poor treatment by birth attendants, gender of birth attendants, overworking, inadequate equipment and supplies, incompetent antenatal care personnel, undertraining, and understaffing affected patient care during antenatal and postnatal visits by pregnant and delivering women. A study by Mason, et al. (2015, p.1) revealed that risk factors for hospital deliveries in Kenya included health care personnel's' attitudes, long durations of waiting in the clinics as well as HIV testing and associated cost. Oluoch-Aridi, et al. (2021, p.1) established in their study that a person centred care from antenatal care personnel such as responsive, respectful communication and supportive were found to encourage hospital deliveries among women while mistreatments such as mediocre

reception, long wait times, insults, physical abuse, lack of confidentiality and privacy, disrespectful communication, neglect, abandonment and deplorable healthcare environs made pregnant women shy away from hospital deliveries in peri-urban settings in Nairobi city county. The four studies used in this synthesis as well as their critical appraisal are as shown in table 2;

Table 2: Inclusion Table

Author/Year	Studytitle	Aim	Study design	Methods	Main findings	Critical appraisal
Hirai, *et al*.(2020)	The impact of supply- side and demand- side interventionsns on use of antenatal and maternal services in western Kenya: a qualitative study	None	Qualitative	Purposive sampling Pre- and post-intervention assessment sconducted Thematic analysis	Barriers to care that included poverty and poor treatment by nurses	Appropriate design Valid findings
Mason, *etal*. (2015)	Barriersand	The aim ofthis cohort	Qualitative	conformed to RATS	Barriers to attending a	Appropriate design

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				guidelines 8 focus group discussions Formative research Thematic analysis	health facility for ANC included staff attitudesand HIV testing	Valid findings
facilitatorsto antenatal and delivery care in western Kenya: a qualitative study		was to monitor the safety of medications used during pregnancy				
Oluoch-Aridi, *et al*. L. (2021)	Exploring women's childbirth experiences and perceptions of delivery care in peri-urban settings in Nairobi, Kenya	To extend the literature by exploring the facility-based childbirth experiencesof women living in peri-urban settings in Kenya	Qualitative	In-depth interviews Thematic analysis	Negative ANC experience included mistreated, non-dignifiedcare, lack of respectful communication, lack of supportive care and poorfacility environment	Appropriateate design Valid findings
Odhiambo and Sartorius, (2021)	Joint spatio-temporal modeling of adverse pregnancy outcomes sharing common risk factors at sub-county level in Kenya	To quantify and map the underlying risk of multiple adverse pregnancy outcomes in Kenya atsub county level usingashared component space-time modelling framework	Mixed method	Shared component model with spatial-temporal interactions was used for synthesis	Increased total numberof adverse outcomes in pregnancy The stillbirth and neonatal death rates were recorded	Appropriate design Valid findings
Yego, *et al.* (2013)	A retrospective analysisof maternal and neonatal mortality	To measure the incidence of maternal and neonatal mortality in women	Case control study	A sample of 450 recently admitted women A retrospective	Between2004 and 2011, the overall maternal mortality ratio was 426 per 100,000	Appropriate design Valid findings

	at a teaching and referral hospital in Kenya	who gave birth at MTRH and describe clinical characteristics and circumstances associated with maternal and early neonatal deaths following deliveriesat MTRH.		analysis	live births Age, labour, indirect complications, direct obstetric complications were found to be some ofthe MMR risk factors	
Yego, *et al.* (2014)	Risk factors for maternal mortality in a Tertiary Hospital in Kenya: a case control study	To identify risk factors associated with maternal mortality ina tertiary level hospital in Kenya	Case control	Manual review of records Logistic regressio nanalysis	MMR risk factors included history of underlying medical conditions, doctor attendance at birth and having an elevated pulse on admission	Appropriate design Valid findings
Gitobu, *et al*. (2018)	The effect of Kenya's free maternal health care policy on the utilization of health facility delivery services and maternal and neonatal mortality	To provide a brief overview of this policy's effect on health facility delivery service utilization and maternal mortality ratio and neonatal mortality	Time series analysis	Mothers who had delivered inthe selected hospitals were included Used single-stage cluster sampling and simple random sampling Tabulated	A statistically significant increase in the numberof facility- based deliveries was identified with no significant changes in MMR	Appropriate design Valid findings

	in public health facilities	rate in Kenyan public health facilities		questionnaires were used		

DISCUSSIONS

Summary of Findings and Discussions

Maternal Mortality in Kenya

My systematic review findings revealed that maternal mortality is a problem still facing Kenya and hinders the achievement of SDG 3 as the first timeline for the attainment of this goal was 2020 and yet the problem of maternal mortality still persists in Kenya. This means that the country must strive to achieve and or attain this goal by 2030 which is the end date for SDGs attainment. According to the findings, Kenya has experienced a negligible downswing in maternal mortality ratio as within 77 hospitals, the decline was only from 258.3/100,000 live deliveries to 237.1/100,000 live child births a decline of only 21.2/100,000 live births Gitobu et al., 2018, p.1-5). The synthesis further revealed that seven years preceding the year 2011, maternal mortality ratio in Kenya generally stood at 426/100,000 live-births (Yego, et al., 2013, p.1). According to the study, slightly over half (51%) of the reported neonatal deaths were of youthful mothers aged 15–24 years and 64% of the recorded maternal mortalities were of women between aged 25-45 years.

These outcomes show that Kenya still has a long way to attained SDG 3 and urgent measures are needed to manage and end maternal mortalities in Kenya and this can only be done if the risk factors for maternal mortalities are identified an issue the present systematic review has addressed. Other reports have also noted that developing nations carry the biggest burden of maternal mortality globally as this figure stands at 500/100,000 live-births which while in developed nations maternal mortality ratios stand at 16/100,000 live deliveries with the global figure of maternal mortality ratio standing at 210/100,000 live child births (WHO, UNICEF, UNFPA, 2010). Implication of these findings is that Kenya as a developing nation might not be able to achieve SDG 3 by 2030 or will struggle more to attain this goal by 2030 end date as compared to developed nations.

Socio-Demographic Risk Factors for Maternal Mortality in Kenya

This systematic review further yielded that various risk factors exist that drive maternal mortalities in Kenya. For instance, two years post FMHCS initiation and uptake by pregnant women in Kenya, a noticeable rise in four months maternal mortality rates was reported in the investigated hospitals an indication that the FMHCS and policy had dismal effect on facility-related maternal death ratios (Gitobu et al., 2018, p.3-5). The review also revealed that demographic variables namely maternal age, education level, history of prevailing conditions and

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reproductive and obstetric variables, maternal history of drugs and substance abuse, over five prior deliveries, a history of pre-existing ailments, admission from comorbid complications, eclampsia, non-normal blood pressure, tachycardia and being referred to MTRH were risk factors for maternal mortality in Kenya (Yego, et al., 2014, p.1-9). All these risk factors were shown to be statistically and significant associated with maternal mortality in Kenyan healthcare centres.

The review also showed that age, indirect complications and explicit obstetric complications related with child birth such as eclampsia with pre-mature rupture of membranes being the main determinant of early neonatal mortalities (Yego, et al., 2013, p.1-8). Odhiambo and Sartorius, (2021, p.1) revealed that iron supplements use, maternal anaemia levels, utilization of LLINs, use of folate supplements had a positive relationship with positive and desirable pregnancy outcomes among pregnant women. At the same time, using IPT2, antenatal care were found to have negative but negligible relationship with adverse pregnancy outcomes.

The findings of this systematic review reveal that in Kenya, protective factors against maternal mortalities include among others use of folate supplements. However, more maternal mortalities arose as a result of myriad of risk factors which included but were not limited to maternal age, maternal health as well as cost of delivery in healthcare settings. My results are in line with those of Illah, et al. (2013, p.1) in Tanzania who revealed that main risk factor for maternal mortality in the nation were eclampsia, puerperal sepsis, and haemorrhage which are patient related. Lastly, their study also supports those of the present study by revealing that age too is a strung predictor of maternal mortalities. In Nepal, a study by Christian et al. (2008, p.161-172) also established that maternal age as well as parity were some of the risk factors contributing to recorded maternal mortalities in the nation. Therefore, these socio-demographic factors are universal in the developing world and require a joint effort to eliminate by the international partners.

Socio-Demographic Risk Factors for Maternal Mortality in Kenya

The synthesis also focused on hospital based risk factors for maternal mortality in Kenya and from Hirai, et al. (2020, p.1), Mason, et al. (2015, p.1) and Oluoch-Aridi, et al. (2021, p.1) revealed that the hospital based risk factors for maternal mortalities included poor treatment by birth attendants, gender of birth attendants, inadequate equipment and supplies, incompetent antenatal care personnel, undertraining, understaffing, health care personnel's' attitudes, long durations of waiting in the clinics, HIV testing and associated cost, insults, physical abuse, lack of confidentiality and privacy, disrespectful communication, neglect, abandonment and deplorable healthcare environs made pregnant women shy away from hospital deliveries in Kenya. These studies only looked at antenatal care uptake among pregnant women and their risk factors and did not specifically look at hospital based risk factors for maternal mortalities an area that requires further investigation.

The review however showed that within the health care environs, there exists various risk factors that might cause maternal mortalities too. In Tanzania, a study by Bwana, et al. (2019, p.1) on patterns and causes of hospital maternal mortality in Tanzania revealed that hospital- based maternal mortality were mainly as a result of obstetric haemorrhage, eclampsia, anaemia, maternal

sepsis and cardiovascular complications. Just like Kenyan studies, this study avoids implicating hospitals in maternal mortalities despite negligence by healthcare personnel, under-equipped hospitals, understaffing, incompetent and poorly trained healthcare personnel being capable of causing maternal mortalities.

Strengths and Limitations of the Review

The review has identified numerous risk factors for maternal mortalities in Kenya and these include but are not limited to maternal health related factors. However, the studies differed in design and methodologies used, had different findings. Studies on hospital based risk factors for maternal mortality were found to be extremely lacking as risk factors identified did not highlight a single hospital based risk factors that resulted in maternal mortality in Kenya or other regions including developed nations. Eligibility of studies were done by only three people, included studies were only full text articles specifically from Google Scholar and PubMed. These limitations may have cause the researcher to miss key studies that may have been appropriate for inclusion in the review.

Implications of the Study

The study reveals that maternal mortality rate in Kenya is still very high contributing to the high global figure for maternal mortality rates in developing nations. This figure is further made worse with the established risk factors which are both socio-demographic and hospital based. This therefore means that globally, attainment of SDG 3 by 2030 particularly in developing nation may not be realised.

Key issues for attaining SDG 3 in Kenya is found to be mainly socio demographic factors such as distance to healthcare, healthcare delivery cost, fear of mandatory HIV tests, healthcare personnel issues and specifically maternal health issues. However, in the researchers' view, lack of information and or data on how factors within the hospital environment causes maternal mortalities still remains to be the biggest obstacle to SDG 3 attainment by end date as assuming that no maternal deaths arises from hospital related variables as incompetent staffs or negligence by death attendants hinders the possibility of implementation of appropriate measures to manage such risk factors and enhance the speed at which SDG 3 is attained.

Recommendations

The international community may be able to aid Kenya in attaining SDG 3 by;

Helping the Kenyan government in funding the healthcare sector specifically by focusing on maternal health as by having such funds, more antenatal and postnatal healthcare will be able to be established and adequately staffed which would improve accessibility and use of such services to women in marginalised areas in Kenya who lack of travel long distances to access such services

The international community also need to conduct a review on hospital based maternal and infant mortalities in Kenya as no data exists to this extent despite more often than not several hospitals have been shown with women giving birth outside, in the corridors and without assistance some

dying due to lack of adequate facilities and personnel and in the waiting area. By having this data, more informed concerted efforts by the internal community and the Kenyan government may by jointly taken to reduce maternal and infant mortalities and improve chances of attaining SDG 3 by 2030.

CONCLUSION

The systematic review focused on the risk factors for maternal mortality in Kenya. This review concluded that there are numerous risk factors for maternal mortality in Kenya and these include specifically socio-demographic risk factors such as age, education as well as maternal ill health. The study also concludes that though there exists hospital related risk factors for maternal utilization of hospitals for child deliveries, no link has yet been established between the said hospital based risk factors and maternal mortality in Kenya.

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