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A scoping review of maternal and newborn health interventions and

programs in Nigeria.

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Abstract

Objective

To systematically scope and map research regarding interventions, programs, or strategies to improve maternal and newborn health (MNH) in Nigeria.

Design: Scoping review

Data sources and eligibility criteria

Systematic searches were conducted in PubMed, Embase, Scopus, together with a search of the grey literature. Publications presenting interventions and programs to improve maternal or newborn health or both in Nigeria were included.

Data extraction and analysis

The data extracted included source and year of publication, geographical setting, study design, target population(s), type of intervention/program, duration of implementation, reported outcomes, and any reported facilitators or barriers. Data analysis involved descriptive numerical summaries and content analysis. We further summarised the evidence using a novel model combining the WHO recommendations for MNH, the continuum of care and the social determinants of health frameworks to identify gaps where further research and action may be needed.

Results

A total of 80 publications were included in this review. Most interventions (71%) were aligned with WHO recommendations, and half (n=40) targeted the pregnancy and childbirth stages of the continuum of care. Most of the programs (n=74) examined the proximal social determinants of maternal health related to health system factors within health facilities, with only a few interventions aimed at distal social determinants such as socio-cultural norms. An integrated approach to intervention implementation and funding constraints were among factors reported as facilitators and barriers, respectively.

Conclusion

Using a novel model, most MNH interventions in Nigeria were aligned with the WHO recommendations and focused on the proximal social determinants of health within health facilities. We determined a paucity of research on interventions targeting distal social determinants and community-based approaches, with limited attention to pre-pregnancy interventions. To accelerate progress towards the SDG MNH targets, greater focus on implementing interventions and measuring context-specific challenges beyond the health facility is required.

Article summary

Strengths and limitations of this study

- A comprehensive search strategy was used including three (3) large databases (PubMed, Embase and Scopus) and the grey literature.
- The review employed a unique approach to map the evidence and identify gaps in maternal and newborn health (MNH) research and action in Nigeria- using an integrated model combining the WHO recommendations for MNH, the continuum of care model for maternal health and the social determinants of health.
- We recognise there may be publication bias, as not all interventions/programs for MNH in Nigeria may have been published and captured in the study.

ore true only

Introduction

More women and newborns die in Nigeria than in most countries worldwide. The World Health Organisation (WHO) estimates the maternal mortality ratio (MMR) to be over 800 maternal deaths per 100,000 live births with a neonatal mortality rate of 33 per 1000 live births^{1,2} in 2019. These figures contrast with corresponding figures from the UK and the USA which are around 10 to 18 deaths per 100,000 live births, respectively, with neonatal mortality rates below 12 deaths per 1000 live births^{2,3}. Maternal and newborn health outcomes are intricately linked; hence, maternal deaths significantly affect newborn survival and development^{4–6}. Thus, the Sustainable Development Goal (SDG) 3 calls for all countries to reduce maternal mortality ratios to less than 70 per 100 000 live births and neonatal mortality to less than 12 deaths per 1,000 live births by 2030^{2,7}. However, if current trends continue, Nigeria will fall far short of these targets despite existing efforts and resource allocations⁸. Of note, the global maternal and newborn health community has recently intensified efforts on innovative indicators to measure progress in maternal and newborn health towards achieving the SDG targets^{9–11}.

Most maternal deaths in Nigeria are reportedly due to preventable obstetric causes⁶. Furthermore, complications of preterm birth, intrapartum events, and infections account for over 80% of newborn deaths and stillbirths^{2,6,12}. Underlying these conditions, socioeconomic, cultural, political, and environmental factors contribute to the persistently high and inequitable burden of maternal and neonatal mortality in Nigeria⁷. The highest rates of deaths and morbidity occur among the poor, rural communities, where many challenges to improve maternal and newborn health remain^{8,13}. In addition, some religious and sociocultural norms adversely influence health-seeking behaviour and expose women to discriminatory practices which pose serious health risks^{8,13}. Addressing these underlying social conditions and inequities will not only facilitate efforts to improve maternal and neonatal mortality and morbidity and perhaps improve other dimensions of health and well-being.

Beyond the clinical causes and social determinants that underpin maternal and newborn morbidity and mortality, evidence shows that coordinated strategies across the reproductive, maternal, newborn, child and adolescent health continuum of care improves the general wellbeing of young women and mothers and the development of newborns^{4,6}. Thus, the WHO recommends the "essential packages of interventions for low and middle-income settings" should be provided across the continuum of care to improve maternal and newborn health^{5,14–}¹⁶. Such interventions include family planning, appropriate antenatal care, immediate thermal care for newborns and early initiation of exclusive breastfeeding amongst others. Furthermore, increasing evidence suggests that addressing maternal health inequities through action on the social determinants of health can significantly improve maternal and newborn health outcomes¹⁷.

It is not entirely clear why, despite laudable efforts to improve the situation in Nigeria, the burden of maternal and newborn mortality and morbidity persists⁸. Understanding the evidence and gaps for maternal and neonatal health interventions and programs will help to identify areas to focus new MNH measurement tools and direct future resource allocations.

This study aims to systematically scope and map the published literature on interventions, programs, or strategies implemented to improve maternal and newborn health in Nigeria. By integrating and applying existing key frameworks in maternal and newborn health^{17–20}, this study identifies evidence gaps that require further research and highlights areas where action is needed. The following objectives were formulated following an initial exploratory search:

a) Outline the types of interventions for maternal and newborn health in Nigeria and their characteristics.

- b) Describe the nature and range of evidence.
- c) Elaborate the study settings and target populations.
- d) Examine reported evidence of outcomes or effectiveness or impact.
- e) Identify reported facilitators and barriers of effective implementation of interventions.

Methods

The review was conducted according to the methodological guidance for scoping reviews provided by the Joanna Briggs Institute (JBI) manual for evidence synthesis²¹. The main research question guiding the review was: what is the evidence available for maternal and newborn health interventions in Nigeria? An intervention was defined as "a single or a combination of program elements or strategies designed to produce behavioural changes or improve health status, outcomes, or both among individuals or an entire population"²². We focused on research studies evaluating the effectiveness of interventions on outcomes related to maternal and newborn health.

Search strategy

A preliminary database search was undertaken to identify keywords and index terms for articles related to the review topic and refine the search strategy. Thereafter, the definitive search of search of PubMed, Embase (via OVID), and Scopus (via OVID) was conducted by NN between June and July 2020 to identify relevant publications. The searches were updated in May 2021 by rerunning the searches and through email alerts. The search expressions in PubMed including keywords and MeSH terms used were: "Maternal Health" OR "Infant, Newborn" OR "Infant Health" AND "Nigeria" AND (intervention OR program OR strategy). No filter was used to restrict results. Similar search terms were used for the other databases. This was supplemented by a web-based search of the grey literature, and a Google scholar search using similar terms, including a directed search of relevant key organisations websites. Cited references were examined by browsing the reference lists of studies to identify additional eligible studies.

Eligibility criteria and selection of sources of evidence

Table 1 outlines the inclusion and exclusion criteria and the sources of evidence. The results from the searches were screened in an iterative process by two authors (NN and AKA). First, the sources were screened based on the information presented in the title and abstract. Next, full-text articles were assessed to determine their eligibility for inclusion using the criteria in Table 1. Discrepancies regarding eligibility were resolved by consensus and discussion with a third author (PA).

Data charting and summary

The included literature was reviewed using a data extraction form developed through an iterative process to identify the data elements critical to answering the review question and objectives. The form was piloted with 10% of the included studies to ensure consistency and revised, as necessary.

The extracted data included authors, year of publication, geographical setting, study design, target population(s), type and description of intervention, duration of implementation, reported outcomes, and any facilitators or barriers.

The first author (NN) charted the data, and the second author (AKA) reviewed the data. Any disagreements between the reviewers were resolved by a consensus involving the third author (PA) whenever necessary. In line with the scoping review methodology, a formal assessment

of the methodological quality of the included studies was not undertaken, as the intention was to provide a broad overview of the existing literature related to the review question²¹. Data extracted across the included sources of evidence was summarised using figures, tables, and summaries.

To further map and summarize the evidence, we used an integrated model developed from the World Health Organisation (WHO) recommended interventions for maternal and newborn health^{4,18,20}, the continuum of care approach for maternal health¹⁹ and the social determinants of health framework^{17,23}.

Patient and public involvement

No patient was involved in this study.

Table 1: Inclusion and Exclusion criteria

Criteria	Inclusion	Exclusion			
Type of studies	Any existing literature including journal articles, systematic reviews, grey literature, and evaluation reports.	conference proceedings, study protocols, editorials, cost effectiveness studies, modelling studies or commentaries on MNH interventions.			
Setting	Nigeria; International/multi- country studies including Nigeria.	studies with topics not reporting on MNH interventions in Nigeria.			
Time period	No time limits set				
Language	Studies in English	Studies not in English			
Focus of study	Studies focused on maternal and newborn health (MNH) interventions/programs.	Studies without an intervention/program for MNH or outcomes not focused on MNH, Studies where intervention/program focused only on child health and did not include newborns.			

Results

Overview of the literature search

The systematic literature search resulted in 827 publications after removing the duplicates. A total of 79 full texts were assessed, of which 52 were included in the review. An additional 28 articles were retrieved from citations, and the full texts were assessed and included in the review. A total of 80 publications were included in the final review^{24–103}. A PRISMA flow diagram in Figure 1 summarises the search results and screening processes for this study.

Characteristics of included literature.

The characteristics of the included sources of evidence are summarised in Table 2, and the details of each publication are presented in Supplementary Table S1. Figures 2 and 3 show the integrated model developed to further map the MNH interventions and programs in the included studies and the results of mapping are summarised below.

Intervention and programs along the continuum of care for maternal and newborn health.

Half (n=40) of the interventions targeted pregnancy, childbirth, or both. Only four interventions were targeted at the pre-pregnancy stage and involved family planning or contraception services^{46,50–52}. Nine interventions focused on the postpartum period for mothers, newborns, or both, and involved postpartum family planning^{44,79}, promoting early breastfeeding^{38,39}, neonatal resuscitation³⁴, keeping the baby warm⁶⁹, immunisation^{73,95} and a combination of essential newborn interventions⁴³. Just over one-third (34%, n=27) of the programs spanned all stages of the continuum of care.

Alignment with WHO recommendations for improving maternal and newborn health.

Most of the publications reviewed (71%, n=57) reported interventions aligned with the WHO recommendations. The rest studies (29%, n=23) aimed to improve quality or standard of maternal and newborn health services mainly through capacity building of health providers, improving access through community health insurance schemes, providing free MNH services, emergency loans, conditional cash transfers, and outreach services.

Mapping interventions to the social determinants of health framework for maternal health

Nearly all interventions (93%, n=74) focused on the proximal social determinants of health. These include health system factors such as demand, access, quality, and utilization of maternal and newborn health services (n=38), improving maternal health knowledge and behaviour

(n=18), and improving the health status of mothers and newborns by addressing obstetric and/or newborn complications and diseases (n=18). Only six studies had interventions targeted at distal social determinants of health, including public policies, gender dynamics, or socio-cultural norms^{45,75,78,92,97,99}.

Types of studies, year of publication and lead author/institution.

Of the literature included, 71 publications were journal articles, and nine were program evaluation reports. The publication year ranged from 1982 to 2020, with most sources (n =64) published between 2010 and 2018 (Figure 4). The publications included in this review employed many study types/designs. One-quarter of the reviewed studies involved a process, outcome, or impact evaluation (n=21), followed by quasi-experimental designs (n=16), pre-or post-intervention designs (n=15), and post-intervention analysis (n=13). Nearly one-third (30%, n=24) of the reviewed studies reported having a comparison group, including eight (8) randomized control trials. Only six (6) sources used qualitative methods, and the remaining 74 were quantitative, two of which used a mixed-methods design^{79,83}. Over half (60%, n=48) of the reviewed articles had the lead author or institution based in Nigeria. Study duration varied as follows: less than a year (n=10), one year to 5 years (n=53), and greater than five years (n=13).

Geographical region, setting and site of intervention.

Based on Nigeria's six geopolitical regions, over half (51%, n=41) of the studies reported interventions in a single region, and 21 studies reported interventions across two or more regions. About a third (n=28) of the studies were conducted in the northern regions and 21 studies in the southern regions. Thirteen studies (16%) involved settings in both the northern and southern regions. Six studies reported national coverage, including one study involving all 36 states of Nigeria and the Federal Capital Territory (FCT)⁷⁵. Two studies reported multi-country sites, including Nigeria^{88,100}.

There were fewer community-based interventions or programs (39%, n=31) compared to those in health facilities (46%, n=37). The health facilities included ranged from primary care clinics to referral hospitals. A small portion (15%, n=12) of the studies reported both community and health facility program sites. More studies (47.5%, n=38) were conducted in a rural setting compared to an urban environment (34%, n=27), with approximately 19% (n=15) involving both rural and urban settings.

Target populations.

Most interventions in the literature reviewed (79%, n=63) were targeted mainly at pregnant women, mothers, and women of childbearing age, described as 15 to 49 years of age, with one specifically focused on young adolescent females⁴². Eleven interventions focused on health care providers, including community health workers and midwives^{25,34,35,58,60,87,88,91,97,100}. Four interventions involved community members, including the male members of the community, husbands, or both^{45,89,92,99}. Two interventions specifically targeted policymakers^{48,75}.

Reported outcomes, effectiveness, or impact.

The interventions outlined in the reviewed literature sought to address a wide range of outcomes. Nearly half (45%, n=33) had outcomes related to improving the demand, access, coverage, quality, and utilisation of essential maternal and newborn health services, interventions, or both. Other outcomes include reducing maternal or newborn deaths or both ^{24,26,68,69,72,78,102,27,32,34,49,60,62,64,67}; improving knowledge of preventive practices and self-management^{30,38,93,95,39,50,51,55,65,71,73,74}; improving community participation in maternal and newborn health including male members of the community^{28,45,92,99}; capacity building of the health workforce^{44,77,79,86,88}; and the prevention and management of pregnancy or newborn related diseases and complications, or both ^{31,35,37,40,41,57,61,66,96,103}.

Reported barriers and facilitators.

Not all included studies reported facilitators and/or barriers of implementing the interventions. Forty-six studies (n=46) reported factors that facilitate or positively influence the intervention or program. The most common facilitators reported were community engagement and participation $(50\%, n=23)^{24,25,53,54,63,65,77,85,91,92,98,100,27,101,102,28,31,39,41,42,45,51}$. Others included an integrated approach to implementation of interventions^{31,48,85,89,98}; communication of adequate (and culturally appropriate) knowledge about the program or intervention^{54,65,69,103} and demand creation activities^{52,53}.

Forty-two studies (n=42) reported barriers, with funding limitations posing the main challenge to implementation reported in 11 studies^{25,27,94,33,53,78,80,82,86,91,92}. Nine studies reported negative attitudes and perceptions regarding the intervention, the health system, or both as a barrier^{36,39,48,53,64,71,79,82,83}.

Table 2: General characteristics of included sources of evidence.

Characteristics	Number of studies (%), n=80	References
Study Design		
Systematic Review	1 (1.25)	45
RCT	8 (10)	22,34,76,78,80,91,92,99
Quasi-experimental	16 (20)	32,46,50,59–61,68,70–72,77,85,93,97,98
Cohort/longitudinal	6 (7.5)	33,47,49,53,57,65
Post-intervention/program evaluation	13 (16.25)	21,24,28-30,39,48,56,79,84,87,90,94
Pre-post/before after studies	15 (18.75)	20,35,36,51,52,55,58,62,63,67,69,75,83,88,89
Process/outcome/impact evaluation	21 (26.25)	23,26,27,31,37,38,40-42,44,54,64,66,73,74,81,82,86,95
Type of study		
Qualitative	7 (8.75)	21,24,44,81,87,88,90
Quantitative	71 (88.75)	20,22,23,25-27,30-42,45-74,76-78,80,82-86,89,91-99
Mixed Methods	2 (2.5)	75,79
Control or Comparison group/unit		
Yes	24(30)	22,25–27,32–36,57,72,76–78,80,81,83,85,91–93,97–99
No	56(70)	20,21,23,24,28-31,37-56,58-71,73-75,79,82,84,86-90,
Setting		
rural	38(47.5)	22,23,27,29,34,35,38-42,46,49,51,53,56,57,59,67,69,70
		74,77,81,83,85,86,88,89,92,93,95–99
urban	27(33.75)	21,28,30–33,36,47,48,52,54,58,61–
rural and urban	15(18 75)	20,24-26,37,43-45,50,55,60,65,66,71,79
Site of Intervention	13(10.75)	
Community	31(38.75)	22,24–27,29,34,35,38,41,46,47,49,51,53,59,61,67,69–
Community	51(50.75)	71,77,81,83,86,88,91,95–97
Health facility	37(46.25)	21,23,28,30-33,36,37,39,40,42,48,50,52,54-58,60,62-
		64,66,68,74–76,78–80,82,84,88,90,92,99
Community and health facility	12(15)	20,43–45,65,73,85,87,89,93,94,98
Geographical Region		
North West	22(27.5)	20,21,24,26,27,29,32,34,43,44,60,61,66,67,74,81,87–89,
North Central	5(6.25)	33,52,80,85,90
North East	3(3.75)	23,46,54
South West	8(10)	22,35,36,62,70,76,91,92
South East	4(5)	28,53,56,64
South South	9(11.25)	51,57,59,69,78,79,94,95,97
Multiple: Northern regions	8(10)	25,38,41,42,50,72,75,98
Multiple: North and South regions	9(11.25)	31,39,40,47,49,58,73,82,86
Country-wide: all geographic regions	10(12.5)	30,37,45,48,55,63,65,71,77,83
Multi-country: Nigeria included	2(2.5)	84,96
Lead author/Institution base		
Nigeria	48(60)	21,23,26–28,30,33,35,36,38–43,45,46,49,50,53–56,58– 64,66,67,69–71,74,77,79,81,87–95
International	32(40)	20,22,24,25,29,31,34,37,44,47,48,51,65,68,72,73,75,76,

Discussion

It is promising to see increasing research on maternal and neonatal health programs in Nigeria. Following a systematic search of literature on existing interventions and programs in Nigeria, this study used a novel approach to identify gaps for research and action on MNH interventions and programs in Nigeria. We developed an integrated model combining the WHO recommendations for maternal and newborn health with the continuum of care and the social determinants of health frameworks. This approach can provide researchers and policy makers a rigorous method to examine and assess gaps in MNH interventions and service delivery and identify country-specific priorities to focus attention.

Our findings show that the interventions in a large majority of studies in this review (71%), aligned with the WHO recommendations for maternal and newborn health. Most interventions targeted the pregnancy and childbirth stages of the continuum of care. This is likely related to evidence showing that the most important causes of maternal and newborn deaths occur during these periods^{7,104}. Only a few studies focused on the pre-pregnancy stage and the provision of family planning services. This area requires further attention, as studies have shown that providing reproductive health services, mainly contraceptive services, can help with further reductions in maternal and newborn mortality^{7,17,104}.

Accordingly, most studies examined the proximal social determinants of health, such as access to and availability of relevant health services within health facilities, with only a few investigating programmes aimed at the more distal social determinants of health, such as gender, cultural and religious norms, and public policies. Although these proximal social determinants remain essential and have not been adequately addressed, it is now understood that distal determinants significantly influence maternal health and its outcomes^{17,104}. Furthermore, increasing evidence suggests actions to improve these distal social determinants can improve maternal and newborn health outcomes¹⁷. This highlights the need for further research on how social interventions affect maternal and neonatal health outcomes in Nigeria to inform program development and implementation.

Of the 80 publications reviewed, over 80% reported achieving the interventions' intended outcomes. Many of the programs investigated interventions related to WHO recommendations, with a focus on women and their engagement with health facilities. This study also highlights existing programs have focused on measuring coverage of evidence-based MNH interventions in health facilities, with limited attention to community-based interventions. Importantly, the

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research does not clearly show whether these interventions were chosen to align with countrylevel priorities. Consequently, to accelerate progress towards the SDG goals of ending preventable maternal and newborn deaths, a broader lens to identify and measure critical and context-specific factors beyond the health facility is required. Country level researchers may be better posed to understand and highlight country-level priorities for MNH research. Of note, international collaborators led over a third of the research in this review. Going forward, we implore global health institutions to actively improve local research capacity and funding towards understanding country-level MNH priorities as articulated by the African Academy of Science^{105,106}.

Factors that facilitated achieving intended outcomes involved engagement with the communities and integration of multiple interventions. This result supports the call for the application of integrated packages of effective health interventions across the continuum of care, re-emphasized by the strategic plans to achieve SDG 3^{19,104}. In addition, these findings highlight the role of participatory mechanisms to engage families (including men) and communities in improving maternal and newborn health¹⁷. Two key barriers to interventions achieving their intended health outcomes were funding limitations and negative attitudes and perceptions. This may be related to the need for public engagement to address participants' critical concerns and the need for more integrated interventions.

The search strategy was limited to PubMed, Embase and Scopus databases; thus, publications in excluded databases might be missing in this review. Nevertheless, we conducted a grey literature search alongside these databases to cover other relevant resources. Although we carefully considered the search terms used in our strategy, we recognize that there may be publication bias, as not all interventions/programs for maternal and newborn health will have been published.

A broad range of study designs were employed in the studies included in this review. However, most employed quantitative approaches with only a small fraction using qualitative and mixed methods approaches. Given the nature of MNH interventions and the complexity of the challenges facing women and newborns, multidisciplinary research and mixed methods approaches are needed to add depth to understanding the contextual nuances of maternal and newborn health. This helps to uncover unknown and emerging factors which potentially informs better use of limited resources. An important domain to consider within the spectrum of factors that can influence maternal and newborn health outcomes is the quality of services.

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received by women and children¹⁰⁷, especially if the suffer mistreatment^{108,109}. Country level researchers may be better posed to understand and highlight country-level priorities for MNH research. Of note, international collaborators led over a third of the research in this review. Going forward, we implore global health institutions to actively improve local research capacity and funding towards understanding country-level MNH priorities as articulated by the African Academy of Science^{105,106}.

Conclusion

Using a novel model combining WHO recommendations for maternal and newborn health, the continuum of care and the social determinants of health frameworks, most MNH interventions were aligned with the WHO recommendations and focused on the proximal social determinants of health. These were related largely to health system factors within health facilities. In addition, the model showed only a few programs targeted the more distal social determinants of maternal health such as religious and cultural barriers and MNH policies and highlights the relative neglect of non-facility-based interventions. The evidence evaluating MNH outcomes was mostly quantitative and with only a few benefiting from qualitative and mixed methods approaches, thus limiting the exploration of contextual factors that influence maternal and newborn health outcomes. Therefore, efforts to improve maternal and newborn health in Nigeria and other similar contexts may need to focus greater attention on implementing MNH interventions and measuring context-specific challenges beyond the health facility. This may help to accelerate progress towards the SDG goal of ending preventable maternal and newborn deaths.

Author contributions:

The conception and design of the research was by NN, AKA and PA. Data collection and analysis and interpretation of results were conducted by NN, AKA and PA. The first draft of the manuscript was written by NN, and all authors contributed to subsequent revisions. All authors read and approved the final manuscript.

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HEALTH	TE	WHO IN Health Systems: Availability of services (FP, ANC, postnatal care, <u>EMOC</u> , blood, referral). Acceptability to community. Accessibility: distance, fees, related costs, medicines, and supplies. Quality of care: staff skills, technical competence.	TERVENTI Family Planning	ONS FOR MATER Management of unintended pregnancy. Maternal health screening. Tetanus immunization. External cephalic version. Induction of labour. Antibiotics for preterm labour Corticosteroids for respiratory distress. Magnesium Sulphate for eclampsia	Induction of labour for prolonged pregnancy PPH prevention Active management of third stage of labour Management of PPH Caesarean section and prophylactic antibiotics	BORN HEALTH Family Planning, Immediate thermal care Neonatal resuscitation by professional worker. Kangaroo Mother Care for preterm/small babies. CPAP. Presumptive antibiotic for newborns at risk. Extra support for feeding small/preterm babies.	Immunization
ERNAL	RMEDIA	Community context: Awareness of care. Perceived severity and cause, Rural/urban residence, Social capital.	Home Visits				
S OF MAT	INTE	Family and Peer Influence: Family structure and decision making. Marital relationship/Spousal communication. Income/Access to resources. Support networks.	Male involvement interventions for MNH Companion of choice during labor and childbirth Participatory learning/action with women's groups Community <u>organised</u> transport schemes				
ETERMINANT		Biological context: age, parity, health conditions, nutrition, pregnancy history. Behavioural: self-efficacy, knowledge, harmful practices, pre/intra/post care.	Prevention and management of STI and HIV. Folic Acid supplementation	Birth and emergency preparedness Counselling on FP Prevent/manage HIV Prevent/manage malaria Prevent pre-celampsia Smoking cessation		Prevent/treat anaemia Detect/manage sepsis Screen/initiate/continue ARVs for HIV. Hygiene cord and skin care Initiation of exclusive breastfeeding. Case management of infections.	Exclusive breastfeeding Complimentary feeding after 6mths. Vitamin A supplementation. Prevent/manage infections. Management of severe acute malnutrition. Comprehensive care of infants exposed to HIV
DCIAL D	ML	Governance/Policies: Education, health finance/infrastructure, Occupation, Laws (gender equity, anti- violence, Social protection.	Laws to expand access to family planning and safe abortion. Policies to enhance access to education and lived opportunities. Public policy to provide funding and infrastructure for maternal health. Laws against marital rape, sexual and physical violence, FGM.				
S	UCTU	Culture and social values: Women's status, Gender Norms, Religion Health Beliefs, Social Cohesion	Prohibition of early or forced marriages. Right to own and inherit property. Social protection mechanisms, rational health insurance schemes.				
	STR		Adolescent Pre- pregnancy	Pregnancy	Childbirth	Postnatal (mother/newborn)	Infancy/ childhood
		CONTINUUM OF CARE APPROACH					

Figure 2: Integrated model of the WHO recommendations, continuum of care approach and social determinants of maternal health.

648x410mm (72 x 72 DPI)

	INTERMEDIATE	WHO INTERVENTIONS FOR MATERNAL AND NEWBORN HEALTH						
DETERMINANTS OF MATERNAL HEALTH		Health Systems:	42,46-49,55	20,28,32,37,4	24,31,58,61,6	24,30,31,39,75,78	69,75,91	21,23,77,82,84,
		Availability of services (FP, ANC,		9,50,52,56,60	2,68,81,83,86			87,90,98,25,43-
		postnatal care, <u>EMoC</u> , blood, referral).		,63,64,78,80,				45,54,66,72,73
		Accessibility to community.		83,86,96,97				
		costs medicines and supplies						
		Ouality of care; staff skills, technical						
		competence.						
		Community context:						67
		Awareness of care.						
		Perceived severity and cause.						
		Rural/urban residence.						
		Social capital.						05
		Family and Peer Influence:		81	81			95
		Family structure and decision making. Marital relationship/Spousal						
		communication						
		Income/Access to resources						
		Support networks.						
		Biological context:	22,70	26,36,51,53,7		29,34,35,53,65	33	
		age, parity, health conditions, nutrition,		6,80,89,92,99				
		pregnancy history.						
		Behavioural: self-efficacy, knowledge,						
		harmful practices, pre/intra/post care.						
		Covernance/Policies:	71 74 79 85 94					
5		Education health finance/infrastructure	- Topologia (1) - 10 - 10 - 10 - 10 - 10 - 10 - 10 -					
CIAI	FRUCTURAL	Occupation Laws (gender equity, anti-						
		violence, Social protection,						
20		Culture and social values:	41,88,93					
		Women's status, Gender Norms, Religion						
		Health Beliefs, Social Cohesion						
			Adolescent	Pregnancy	Childbirth	Postnatal	Infancy/	Across
	Š		Pre-			(mother/newborn)	childhood	Continuus
			CONTINU	UNOECA		OACH.		Continuum
			CONTINU	UNI OF CA	KE APPRO	JACH		

Figure 3: Mapping of interventions to the WHO recommendations, continuum of care approach and social determinants of health

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Authors/ Publication Year & Lead author Institution	Geographical location/ setting/site	Study design and Objective(s)	Type of Intervention	Stage in continuum of care & Target Population(s)	Reported Outcomes (or effectiveness/impact)	Intended outcomes achieved (Yes/No)	Barriers/challenges and/or Facilitators
Sloan et al ²⁰ (2018) International	Kano, Katsina and Kaduna (NW) urban and rural community and health facility	Program evaluation (before-after analysis): To evaluate the MNH program impact on reducing women's, neonatal and perinatal	Integrated maternal and neonatal health program: multiple interventions to address delays in accessing care, provide emergency obstetric care and manage	Pregnancy and childbirth Pregnant women and newborns	Statistically significant declines in Maternal mortality, Stillbirth, Neonatal mortality and Perinatal mortality rates.	Yes: Improvements in maternal and newborn survival observed.	Facilitators: Promoting local ownership
Oguntunde et al ²¹ (2018) Nigeria	Jigawa, Kaduna and Kano (NW) urban health facility	mortaitty and stillbirth Post intervention analysis (qualitative study): To assess the Facility Health Committees established in three states in northern Nigeria as a platform to improve the quality of maternal and	Facility Health committees	Across the continuum of care Facility health committee members: facility health providers facility clients including pregnant women.	Committee members, health providers, and facility clients all agree that the committees have a tangible positive effect on the provision of maternal and child health services and quality of care.	Yes: Facility health committees appear to have a positive influence on quality of maternal and child health services in the selected facilities.	Barriers: Inadequate funding. Facilitators: Gaining trust and support of community members.

Table S1: Data extraction tool and characteristics of included studies.

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		child health services.					
Eluwa et al ³² (2018) Nigeria	Kano (NW) urban health facility	Quasi- experimental design: To assess the effect of centering pregnancy group (CPG) antenatal care on the untake of	Centering Pregnancy-group prenatal care program	Pregnancy Pregnant women 15–49 years of age and newborns.	Statistically significant improvement in proportion of women attending ANC at least once in the 2nd and 3rd trimester in intervention versus control group. More women in the	Yes: Intervention had a positive effect on the use of antenatal services, facility delivery and postnatal	Barriers: lack of in health system, strong influence socio-cultural be and practices.
		antenatal care (ANC), facility delivery and immunization rates for infants in Kano state.		evie	intervention group had a health facility delivery, were more likely to immunize babies at 6 and 14 weeks and more likely to use postnatal health services.	services.	
Abegunde et al ⁴³ (2015) Nigeria	Sokoto (NW). urban and rural community and health facility	Program evaluation- outcome: To assess the impact of interventions implemented between 2012 and 2013.	Integrated management of (MNCH)/FP/repro ductive health	Across the continuum of care women, newborns and children under 5yrs of age	None of the nine indicators associated with the continuum of maternal, neonatal, and child care satisfied the recommended 90% coverage target for achieving MDGs 4	No: The majority of the LGAs did not meet intended targets and require intensified program/ intervention.	Barriers: Low qu data for planning program.

TZ 1 (154	D 1:000	D		A1	A · · · · · 1	X 7	
Kabo et al $^{-1}$	Bauchi State	Program	Standards-Based	Across the	An increase in the	Yes:	
(2016)	(NE)	evaluation-	Management and	continuum of	percentage of SBM-R	Intervention	
	urban	process and	Recognition	care	standards for MNH	helped health	
Nigeria	health facility	outcome:	(SBM-R) program	Health service	achieved was	facilities	
		To assess		providers	observed for 3 years	achieve more	
		whether			in succession after the	compliance	
		increased			implementation of	with MNH	
		compliance			SBM-R at all 23	quality of care	
		with set			facilities. In addition,	performance	
		performance			a decline in MMR and	standards, the	
		standards was 🌽			NMR observed, along	use of	
		associated with	4		with an increase in the	evidence-	
		improved			active management of	based delivery	
		maternal and			third stage of labor	practices	
		neonatal			and a decline in the	increased,	
		outcomes			incidence of	leading to	
					postpartum	decreases in	
					haemorrhage.	maternal and	
					C C	neonatal	
						mortality.	
Singh et al ⁶⁵	All geopolitical	Observational	skin to skin	Postnatal	Only about 10% of	No: Coverage	Facilitators:
(2017).	zones (NE, NW,	(Retrospective	contact	(newborn)	mothers reported	of SSC	availability of skilled
	NC, SS, SE,	cohort			babies receiving	remained low	workers are health
International	SW)	analysis):		newborns	(skin-skin contact)	despite known	facilities, equitable
	urban and rural	To assess the			SSC. Newborns who	benefits for	diffusion of maternal
	community and	level of practice			were perceived to be	newborns	health knowledge.
	health facility	of SSC in			large at birth were	without	8
		Nigeria and			significantly more	complications.	
		determine			likely to experience	•ompn•unonsi	
		whether it is			SSC than smaller		
		associated with			newborns.		
		early initiation					
		of breastfeeding					
		i.e within the					
		first hour of life					
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	Osun (SW)	RCT:	mhealth/SMS	Pregnancy	An increase in	Yes: Positive	Barriers: financi
(2018)	urban	To determine	based health		facility-based delivery	impact of SMS	constraints, low
	health facility	the impact of an	promotion	Pregnant	seen in the	intervention on	of literacy amor
International		SMS based	intervention	women	intervention group.	facility-based	recipients.
		intervention on			Most participants in	delivery.	
		maternal health			the intervention group		
		seeking			expressed support for		
		behaviour.			the use of text		
					message for maternal		
					health promotion		
Okereke et	Jigawa (NW)	Post	Clinical mentoring	Across the	Clinical mentoring	Yes:	Barriers: Financ
al ⁸⁷ (2015)	urban	intervention	for health workers	continuum of	improved service	Stakeholders	costs of recruiting
	community and	assessment		care	delivery within the	report that the	clinical mentors
Nigeria	health facility	(qualitative):			health facilities.	introduction of	insufficient time
		To assess the		health workers	Significant	clinical	health providers
		potential of		health service	improvements in the	mentoring into	
		clinical		providers	professional capacity	the Jigawa	Facilitators:
		mentoring to			of mentored health	State health	promoting local
		improve			workers were	system gave	ownership and
		maternal,			observed. Best	rise to an	sustainability.
		newborn and			practices were	improved	
		child health			introduced with the	capacity of the	
		service			support of the clinical	mentored	
		delivery, as well			mentors such as the	health care	
		as the			use of magnesium	workers to	
		successes/challe			sulphate and	deliver better	
		nges associated			misoprostol for the	quality	
		with the			management of	maternal,	
		implementation			eclampsia and post-	newborn and	
					partum haemorrhage	child health	
					respectively.	services	

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Findley et	Katsina	Ouaci	Integrated	Across the	There was significant	Ves. The	Facilitators
r_{198} (2015)	Katsilla, Zomforo (NW)	Quasi-	Motornol	Actoss the	improvement in	improvemente	Integration of
di (2013)	and Voha (NE)	dosign	Nawborn and		naprovement m	hatwaan 2000	integration
International	and robe (NE)	Te avaluate ar	Child Health	care	health in diastars	between 2009	interventions,
		To evaluate an	Child Health	Warran of	nearth indicators	and 2015	improved quality of
	community and	integrated	(IMINCH)	women of	assessed. These	demonstrate	services at facilities,
	nearth facility	maternal,	program	childbearing	include women with	the measurable	community
		newborn, and		age 15-49	standing permission	impact on	engagement.
		child health		years	from their husband to	maternal	
		(MINCH)			go to the health	nealth	
		program to			centre; health care	outcomes of	
		Improve			utilization; delivery	the program	
		maternal health	6		with a skilled birth	through local	
		outcomes in			attendant, knowledge	communities	
		Northern			of maternal danger	and primary	
		Nigeria			signs and having at	health care	
					least 1 antenatal care	services.	
					(ANC) visit.		
Leight et al ⁹⁹	Jigawa (NW)	Cluster	Community 🧹	Pregnancy	Only about half of	No:	Barriers: low level of
(2018)	rural	randomized	Resource Person		women who received	Introduction	penetration of birth
	health facility	control trial:	(CoRP) led	Women of	the birth kits, used the	and the use of	kits, challenges with
International		To examine the	distribution of safe	childbearing	kits.	birth kits was	insecurity, low level
		association	birth kits to	age 15-49 yrs	There were no	not associated	of use of birth kits.
		between birth	pregnant women	-	significant	with	
		care receipt and			associations between	reductions in	Facilitators: adequate
		use on maternal			birth kit use and	maternal or	education about the
		and neonatal			facility-based	neonatal	intervention.
		health outcomes			delivery, completion	morbidity,	
		in Jigawa,			of 4 or more ANC	which may	
		Nigeria.			visits, skilled birth	have been	
		-			attendance and post-	shaped by the	
					natal care. Women	mechanisms	
					more likely to report	through which	
					prolonged labour and	women	
					postpartum bleeding.	accessed and	
						utilise the kits	

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Alexander et	Oyo (SW)	RCT:	CleanCook	Pregnancy	Improved birth	Yes:	Facilitators:
al^{22} (2018)	rural	To compare	ethanol Stoves		outcomes (mean birth	Transition	Adequate education
	community	pregnancy	[plus training on	Pregnant	weight, average	from	on the use of
International		outcomes in	how to use the	women	gestational age at	traditional	intervention.
		women exposed	stove and prevent		birth) were higher in	biomass/	
		to household air	the dangers of		ethanol stove users.	kerosene fuel	
		pollution from	smoke exposure].		Perinatal mortality	to ethanol	
		wood and			(stillbirths and	among	
		kerosene fuel			neonatal deaths) was	pregnant	
		stoves to			twice as high in	women	
		women who			controls compared to	reduced	
		received ethanol			ethanol stove users.	adverse	
		CleanCook				pregnancy	
		stoves.				outcomes.	
Abegunde et	Bauchi (NE)	Program	Integrated	Across the	Maternal, newborn	No: For	Barriers: Inadequate
al^{23} (2015)	rural	evaluation	MNCH/FP/RH	continuum of	and child health	several of the	financing, inadequate
	health facility	(outcome):	program	care	indicators in the	indicators, a	essential human
Nigeria		To estimate the			continuum of care	modest	resources for
		impact of the		Women of	neither reached the	improvement	implementation.
		MNCH/FP/RH		childbearing	national average nor	from baseline	_
		interventions		age 15-49	attained the 90%	was found	Facilitators:
		implemented in		years	globally	following the	Involvement of
		Bauchi State			recommended	program.	community members
		and to evaluate			coverage level.		in implementation.
		the progress					
		towards the					
		achievement of					
		MDGs 4 and 5.					
Cannon et	Sokoto (NW)	Post	Drugs/medication:	Childbirth/Post	Community-based	Yes.	Barriers: Stocks outs,
al ²⁴ (2017)	urban and rural	intervention	Use of	natal newborn	distribution of		shortage of staff,
	community	assessment	Misoprostol and		Misoprostol and		socio-cultural
International		(qualitative):	Chlorhexidine gel	Mothers and	Chlorhexidine		barriers, myths and
		To assess the		husbands	intervention was		fears about the
		perceived		health workers	successful with		medication.
		successes and		health service	overwhelming		
		benefits of			support for the use of		

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		using Misoprostol and Chlorhexidine as reported by different types of key stakeholders.		providers policy makers	the two drugs among users, their spouses and members of drug distribution system		Facilitators: Early advocacy with government and broader stakeholder engagement.
Findley et al ²⁵ (2013) International	Katsina, Yobe, Zamfara (NE and NW) urban and rural community	Program evaluation (quasi- experimental design): Examine the extent to which the intervention program has facilitated improvements in key behaviours and outcomes	Integrated maternal, newborn, and child health program	Across the continuum of care Women of childbearing age 15-49 years	Between baseline and follow-up, the rates of anti-tetanus vaccination and early breast feeding increased. Also, more newborns were checked by trained health workers. Women were performing more of the critical newborn care activities at follow-up, relied less on TBAs for health advice, and more on trained health workers. Infant and child mortality declined.	Yes: In the context of ongoing improvements to the primary health care system, the participatory and community- based interventions focusing on improved newborn and infant care were effective at changing infant care practices and outcomes in the intervention communities	Facilitators: Integrated approach of program, quality improvement at facilities, community participation and support.

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Ishola et al ²⁶	Kano and	Program	ACCESS/Materna	Pregnancy	Mothers who received	Yes: VHCs	
(2017)	Zamfara (NW)	evaluation	l and Child Health		counselling had better	have	
	urban and rural	(outcome):	Integrated	Pregnant	knowledge of BPCR	substantially	
Nigeria	community	To characterize	Program (MCHIP)	women/mother	compared to women	increased	
-	-	the effects of	-		who did not. Mothers	knowledge of	
		volunteer			who received	BPCR and	
		household			counselling had	danger signs	
		counsellors			greater odds of	among	
		(VHCs) upon			recognising danger	women.	
		improving			signs during delivery		
		knowledge of			and post-partum.		
		birth	6				
		preparedness					
		and					
		complication					
		readiness					
		(BPCR)		1			
Orobaton et	Sokoto state	Program	Community	Pregnancy	Up to 95% coverage	Yes: The	Facilitators:
al ²⁷ (2016)	(NW)	evaluation	distribution of SP		of SP1 doses in the	intervention is	Authentic community
	rural	(process and	for Malaria-In-	Pregnant	intervention LGAs	a feasible,	ownership, integrated
International	community	outcome):	Pregnancy	women	compared to 26% in	safe, and	approach of program,
		To evaluate the			the counterfactual	affordable way	community
		community		•	LGAs. The mean	to scale up the	involvement, peer
		distributed SP			number of SP doses in	delivery of	influence.
		program.			the intervention LGAs	high impact	
					was 2.1; 0.4 in the	IPTp-SP	
					counterfactual.	interventions	
					Measurable SP3+	in low	
					coverage was 45% in	resource	
					the intervention and	malaria	
					0% in the	endemic	
					counterfactual.	settings, where	
					Increased doses of	few women	
					IPTp-SP were	access	
					associated with	facility-based	
					increases in newborn		

					head circumference and lower odds of stillbirth.	maternal health services	
Ezugwu et al ²⁸ (2014) Nigeria	Enugu (SE) urban health facility	Post intervention assessment (retrospective review of program data): Evaluating the impact of the adoption of this evidence-based guidelines on maternal mortality reduction.	Promotion of Evidence based management of obstetric complications	Pregnancy and childbirth Pregnant women	There was a significant reduction in case fatality rate for both eclampsia (15.8% vs. 2.7%; P = 0.024, odds ratio = 5.84) and Postpartum haemorrhage $(13.6\% \text{ vs. } 2.5\% \text{ P value} =$ 0.023, odds ratio = 5.5). There was 43.5% reduction in the MMR with the intervention (488 vs. $864/100\ 000\ \text{live}$ births P = 0.039 , odds ratio = 1.77).	Yes: Implementatio n of evidence- based guidelines/ intervention is possible in low resource settings and contributes to a significant reduction in the maternal deaths.	
Orobaton et al ²⁹ (2015) Nigeria	Sokoto (NW) rural community	Post program evaluation (retrospective analysis of program data): To evaluate the impact of scaling up the use of	Drugs/medication: Chlorhexidine digluconate 7.1% gel plus misoprostol tablets	Childbirth and Postnatal (newborn). Mothers and newborns	Of newborns that received the intervention (gel), 99.97% survived past 28 days.	Yes: Community led efforts to scale up the use of a single dose application of chlorhexidine digluconate	Barriers: Inadequate financing/heavy reliance on donor funding, problems with supply/availability of commodities.

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		chlorhexidine digluconate 7.1% gel using a community- based distribution system				7.1% gel and instructions on the hygienic care of the cord after application led to high rates of newborn survival.	Facilitators: Community ownership and active involvement of men, evidence-based advocacy to government and community leaders.
Disu et al ³⁰ (2015) Nigeria	All six geopolitical zones urban health facility	Post intervention assessment (cross sectional study): To evaluate the post-training neonatal resuscitation activities among doctors, nurses and midwives across Nigeria	Neonatal Resuscitation training	Postnatal (newborn) Health workers	Over a five-year period (2008 to 2012), a total of 727 health workers were trained. At baseline, delivery attendance rates were 11 per doctor and 9 per nurse/midwife. These rates increased to 30 per doctor and 47 per nurse in 2012. Over 90% of doctors and nurses successfully used bag and mask to help babies breathe in the post-training period. Over the years, most of the doctors and nurses/midwives trained other birth attendants in these	Yes: Neonatal resuscitation training in Nigeria is well-subscribe d, successful and the frequency and scope of step-down trainings are good.	

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	D			Q: :C: (1 /:		[]
Oyo and Bauchi	Program	Safe MotherHood	Childbirth and	Significant reductions	Yes: The	
(SW, NE)	evaluation	Project: Life	Postnatal	in postpartum	upgrading of	
urban	(outcome):	saving skills	(mother and	haemorrhage and in	skills together	
health facility	To describe	training for	newborn).	prolonged labour; and	with provision	
	selected	midwives and		a decline in	of	
	MotherCare	interpersonal	Professional	intrapartum stillbirths,	supplies and a	
	demonstration	communication	midwives	postpartum sepsis and	supportive	
	projects in the	skills for all		broken-down	management	
	first 5 years	providers		episiotomies was	policy	
	between 1989			observed. Midwives	ultimately	
	and 1993 in			performed more than	saved lives	
	Bolivia,	4		half of all vacuum	through an	
	Guatemala,			extractions. Some	enhanced	
	Indonesia and			reductions in maternal	delivery	
	Nigeria			death were seen.	environment.	
Nassarawa and	Prospective	Mentor Mothers	Postnatal	Exposure to MM	Yes: Closely	Facilitators:
FCT (NC)	matched cohort	program	(newborn)	support was	supervised,	supportive
urban	study:			associated with higher	organized MM	supervision and
health facility	Investigate the		Mothers and	odds of timely EID	support	quality of interactions
	impact of a		newborns	presentation among	significantly	between clients and
	structured peer			infants, compared	improved	mentors.
	support			with routine PS	presentation	
	intervention on			(adjusted odds ratios	for EID among	
	EID			= 3.7,95%	HIV-exposed	
	presentation and			confidence interval:	infants and	
	secondarily on			2.8 to 5.0).	uptake of EID	
	HIV-free				testing in a	
	survival among				rural Nigerian	
	HIV-exposed				setting.	
	infants.					
	Oyo and Bauchi (SW, NE) urban health facility Nassarawa and FCT (NC) urban health facility	Oyo and Bauchi (SW, NE)Program evaluation (outcome):urban(outcome):health facilityTo describe selected MotherCare demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and NigeriaNassarawa and FCT (NC) urban health facilityProspective matched cohort study: Investigate the impact of a 	Oyo and Bauchi (SW, NE) urbanProgram evaluation (outcome):Safe MotherHood Project: Life saving skills training for midwives and interpersonal communication skills for all providershealth facilityTo describe selected MotherCare demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and NigeriaSafe MotherHood Project: Life saving skills training for midwives and interpersonal communication skills for all providersNassarawa and FCT (NC) urban health facilityProspective matched cohort study: Investigate the impact of a structured peer support intervention on EID presentation and secondarily on HIV-free survival among HIV-exposed infants.Mentor Mothers	Oyo and Bauchi (SW, NE)Program evaluation (outcome):Safe MotherHood Project: Life saving skills training for midwives and interpersonal communication selectedChildbirth and Postnatal (mother and newborn).health facilityTo describe selected MotherCare demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and NigeriaSafe MotherHood Project: Life saving skills (mother and newborn).Nassarawa and FCT (NC) urban health facilityProspective matched cohort study: Investigate the impact of a structured peer support intervention on EID presentation and secondarily on HIV-free survival among HIV-exposed infants.Mentor Mothers projectsPostnatal (mother and newborn).	Oyo and Bauchi (SW, NE) urban health facilityProgram evaluation (outcome): To describe selected demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and FCT (NC) urbanSafe MotherHood Projective midwives and interpersonal communication skills for all providersChildbirth and Postnatal (mother and newborn).Significant reductions in postpartum haemorrhage and in prolonged labour; and a decline in intrapartum stillbirths, postpartum sepsis and broken-down episiotomies was observed. Midwives performed more than half of all vacuum extractions. Some reductions in maternal death were seen.Nassarawa and FCT (NC) urban health facilityProspective matched cohort study: Investigate the improved for a structured peer support intervention on EID presentation and secondarily on HIV-free survival among HIV-exposed infants.Mentor Mothers programPostnatal (mothers and newborn)Exposure to MM support satisfies associated with higher odds of timely EID presentation and secondarily on HIV-rece survival among HIV-exposed infants.Postnatal (newborn)Significant reductions in postpartum prostpartum prostpartum stillbirths, postpartum secondarily on HIV-exposed infants.	Oyo and Bauchi (SW, NE) urban health facilityProgram evaluation (outcome): training for midwives and interpersonal demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and Nassarawa and FCT (NC) urban health facilitySafe MotherHood Project in the skills for all providersChildbirth and Postnatal (mother and newborn).Significant reductions in postpartum haemorrhage and in prologed labour; and a decline in intrapartum stillbirths, postpartum sepsis and broken-down episiotomies was observed. Midwives performed more than half of all vacuum extractions. Some reductions in maternal delivery delivery envionment.Yes: The upgrading of skills together mother and newborn).Nassarawa and FCT (NC) urban health facilityProspective matched cohort study: Investigate the impact of a structured peer support intervention on EID mesentation and secondarily on HIV-free survival among HIV-exposed infants.Mentor Mothers prospart prospartPostnatal (newborn)Significant reductions in postpartum heith facilityVes: The upgrading of skills together matched cohort study:Nassarawa and health facilityProspective matched cohort study:Mentor Mothers programPostnatal (newborn)Significant reductions intervention on extractions in maternal deliveryYes: Closely support significantly infants, compared with routine PS (adjusted odds ratios = 3.7, 95% confidence interval: 2.8 to 5.0).Significantly infants and uptake of EID uptake of EID testing in a t

Qureshi et	Sokoto (NW)	Randomised	Counselling on	Postnatal	After counselling, the	Yes:	
al^{34} (2011).	rural	community	EBF by	(mothers and	proportion of mothers	Counselling	
	community	trial:	community	newborn).	with intention to EBF	served as a	
International		To assess the	volunteers	·	(a knowledge	useful strategy	
		impact of		Nursing	score>50%) increased	for promoting	
		community		mothers	significantly and	the duration of	
		volunteers to			women who were	EBF for six	
		promote			exclusively	months and for	
		exclusive			breastfeeding	developing	
		breastfeeding.			increased. This	support	
		U			increase was	systems for	
					associated with	nursing	
					maternal age,	mothers.	
		4			maternal education		
					and women who were		
					already exclusively		
				4	breastfeeding. A		
					significant proportion		
				C/	of women agreed		
					EBF was beneficial to		
					the child.		
Davies-	Osun (SW)	Pre/post	Training of	Postnatal	Significant increase in	Yes: The	Barriers: Negative
Adetugbo et	rural	intervention	community	(mothers and	early initiation of	results suggest	attitudes towards
al ³⁵ (1997)	community	assessment:	extension health	newborn)	breastfeeding by	that the	EBF.
		To evaluate the	workers on		mothers who	training	
Nigeria		impact of	promoting	Pregnant	delivered at perinatal	enhanced the	Facilitators:
		training	breastfeeding	women	facilities staffed by	health workers'	Community
		community			ISBFP-trained PHC	knowledge	participation and
		extension health			workers. 32% of the	about EBF and	linkages, training
		workers on			deliveries in	attitudes	conducted in loca
		breastfeeding			intervention area	towards	language.
		knowledge and			reported early	breastfeeding,	
		practice among			initiation of breast-	and that these	
		mothers in rural			feeding (within 30min	workers have	
		communities			of delivery) compared	had a positive	
					with only 6% in the	impact on at	

Ojofeitimi et al ³⁶ (1982) Nigeria	Oyo (SW) urban health facility	Pre/post intervention assessment: To investigate the effect of regular nutritional counselling and fear mechanism techniques to motivate pregnant women to	Nutritional counselling using fear-based mechanism/ techniques	Pregnancy Pregnant women	control area. In all instances, trained PHC workers had better knowledge of and attitudes towards breastfeeding and made the correct recommendations on all aspects of breastfeeding than untrained controls. The experimental group had a significant pattern of monthly weight gain ($P < 0.02$) and heavier babies ($P < 0.01$) than the control group.	least one aspect of breastfeeding behaviour in the community: mothers' timely initiation of breastfeeding. Yes: Nutritional counselling served to correct erroneous assumptions and aversions about food.	
Danmusa et al ³⁷ (2014)	All six geopolitical zones	Program evaluation (process):	Magnesium sulphate for the treatment of pre-	Pregnancy Pregnant	A significant drop in the case fatality rate due to eclampsia from	Yes: Reductions in deaths due to	Barriers: High frequency of home births resistance to
International	urban and rural health facility	To describe the findings of program evaluation, including the challenges encountered while	eclampsia and eclampsia	women	20.9% before the start of services to 2.3% after was observed in the lead state, Kano. A significant case fatality drop(from 15.1% to 2.7%) across the six state	eclampsia, and states have collectively made significant progress towards the full integration	change from health providers, inadequate number of trained staff for implementation, poor quality of services.

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		implementing the projects, the successes achieved, and existing opportunities for future scaling up of the services across the country.	>		hospitals lends local legitimacy to the use of the drug to treat pre-eclampsia and eclampsia.	of the use of magnesium sulfate into the Nigerian healthcare system.	Facilitators: Advocacy to stakeholders, community involvement, supportive national health policies, enhanced monitoring.
Maternal, Newborn and Child Health Programme ³⁸ (2017) Nigeria	Jigawa, Kaduna, Kano, Katsina, Yobe, Zamfara (NW and NE) rural community	Program process and outcome evaluation: Evaluation of a program to increase access and uptake to Reproductive, Maternal, Newborn and Child Health (RMNCH) services for hard-to-reach communities	Integrated MNCH outreach services: increasing demand and access to MNCH services in hard-to-reach communities	Across the continuum of care. Women and young married adolescents.	271 hard-to-reach communities accessed with integrated RMNCH outreach services.	Yes: Prior to intervention, the outreach teams were not meeting the full needs for maternal and child health in communities. The program has ensured a continuum of care for MNCH services, even in the most rural locations.	Facilitators: Community engagement, community needs assessment, support from states and national governments.

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Maternal and	Kogi, Ebonyi	Post program	Provision of key	Postnatal	ENC defined as	Yes: MCSP's	Facilitators:
Child	(NC and SE)	outcome	newborn	(newborn)	provision of skin-to-	newborn	Incorporation into
Survival	rural	evaluation:	interventions:		skin contact after	health	local authority's
Program ³⁹	health facility	To reduce	neonatal	newborns	birth, clean cord care	strategies have	strategy health plan,
(2018)		newborn	resuscitation,		with or without CHX,	promoted the	demand creation
		mortality	KMC etc		and early initiation of	scale up of	activities, staff
Nigeria		through the			breastfeeding -within	high impact	retention.
		implementation			30 minutes of birth	interventions	
		of key newborn			increased from about	that address	
		interventions.			26% to 92%. Over	the three major	
					90% of asphyxiated	causes of	
					babies in intervention	newborn	
					states received	morbidity and	
					successful neonatal	mortality in	
					resuscitation. Uptake	Nigeria.	
					and use of CHX	-	
					increased from 0% at		
					baseline to about		
					92%.		
Maternal and	Kogi, (NC and	Post program	Integrated Post-	Postnatal	PPFP services were	Yes: Trends	Facilitators:
Child	SE)	outcome	Partum Family	(mothers)	initiated in 233 health	show	Availability of
Survival	rural	evaluation:	Planning		facilities, with 637	contraceptive	competent health
Program ⁴⁰	health facility	To increase	Intervention	Postpartum	health care workers	access for	providers, effective
(2018)		voluntary		women	empowered to provide	voluntary post-	provision of health
		family planning			PPFP services. This	partum family	information to
Nigeria		uptake among			increased the pool of	planning has	women.
		postpartum			competent service	increased in	
		women			providers for both	both states,	
		delivering in			post-partum FP and	despite initial	
		health facilities			long-acting reversible	low	
		in Kogi and			contraceptives	contraceptive	
		Ebonyi states			(LARC). There was	use prevalence	
					improved strategic	with an	
					planning for family	estimated 25k	
					planning in both	pregnancies	
					states.	averted.	
					planning in both states.	pregnancies averted.	

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Maternal,	Jigawa, Kano,	Program	Male Support	Across the	Over 1500 support	Yes.	Facilitators: Active
Newborn	Kaduna,	outcome	Groups	continuum of	groups established		community/stakeho
and Child	Katsina, Yobe,	evaluation:	1	care	and supported. Over		er engagement,
Health	Zamfara (NW.	To improve			4.000 interpersonal		community
Programme ⁴¹	NE)	health message		Males in	communication		ownership.
(2017)	rural	delivery to men		intervention	sessions held.		o mionomp.
(=017)	community	and encourage		states			
Nigeria	community	their active role		States.			
1.190114		in women and					
		child health					
Maternal	ligawa Kano	Program	Integrated	Pre-pregnancy	851 health care	Yes	Facilitators: Dema
Newborn	Kaduna	outcome	Competency	rie prognancy	providers have been	105.	creation activities
and Child	Katsina Yobe	evaluation.	Based Training for	Women of	trained in the		good commodity
Health	Zamfara (NW	To assess	healthworkers	childbearing	integrated nackage of		supply chain
Programme ⁴²	NE)	outcome of an	neutrivorkers	age	reproductive		supply chain.
(2016)	rural	intervention		ugo	maternal newborn		
(2010)	health facility	increasing the		6	and child health		
Nigeria	noulli fuotility	uptake of long-			(RMNCH) including		
ingonia		acting			LARC services		
		reversible					
		contraception					
		services in					
		primary Health					
		centres through					
		Competency-					
		based Training.					
Mckaig et	Kano (NW)	Program	Scale-up of	Across the	Significant increases	Yes: The	Barriers: Negative
al ⁴⁴ (2009)	urban and rural	outcome	postpartum family	continuum of	in number of FP	approach	religious/commur
	community and	evaluation	planning	care	clients and method	systematically	attitudes towards
International	health facility	(qualitative	F8		use per site following	increases	MNCH services.
		study):		policymakers.	the implementation of	MNCH/FP	
		To examine		health care	the program.	integration and	Facilitators: Servi
		integrated		providers.		had a positive	integration.
		MNCH/FP		community		effect on	community linkag
		services as a		members.		service use,	······································
		means towards				particularly	

		meeting the family planning and reproductive health needs of women in the postpartum period				FP, even in a very conservative environment.	
Kana et al ⁴⁵ (2015) Nigeria	countrywide urban and rural health facility and community	Systematic review: To describe and indirectly measure the effect of the Maternal, Newborn and Child Health (MNCH) interventions implemented in Nigeria from 1990 to 2014	Interventions for maternal and child health	Across the continuum of care mothers, newborns, under-five children.	The national MMR shows a consistent reduction (Annual Percentage Change (APC) = -3.10% , 95% CI: -5.20 to -1.00 %) with marked decrease in the slope observed in the period with a cluster of published studies (2004–2014).	Yes: The development of MNCH policies, implementatio n and publication of interventions corresponds with the downward trend of maternal and child mortality in Nigeria	
Abdul-Hadi et al ⁴⁶ (2013) Nigeria	Gombe (NE) rural community	Intervention assessment (quasi- experimental design): To demonstrate effectiveness of Community Based Distribution of Injectable Contraceptives Using	Community based distribution (CBD)of injectable contraceptives using community health extension workers	Pre-pregnancy	The CBD mean couple years of protection (CYP) for injectables- depomedroxy- progesterone acetate (DMPA) and norethisterone enantate was higher (27.72 & 18.16 respectively) than the facility CYP (7.21 & 5.08 respectively) (p	Yes: Community based distribution of contraceptives was successful.	

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		Community Health Extension Workers.			< 0.05) with no injection related complications. The CBD's mean CYP for all methods was also found to be four times higher (11.65) than that generated in health facilities (2.86) (p < 0.05		
Speizer et al ⁴⁷ (2014)	Kaduna, Abuja- FCT, Kwara, Ovo and Edo	Longitudinal evaluation of program/interve	Family planning demand creation and supply side	Pre-pregnancy Women of	Outreach by community health or family planning	Yes: Multi- level targeted demand	Facilitators: community engagement.
International	(NC, NW, SS and SW) urban community	ntion: To examine the role of demand generation activities undertaken as part of the Urban RH Initiative programs- seeking to increase modern contraceptive use by 20 percentage points in targeted urban areas, particularly among the urban poor	interventions.	childbearing age 15-49 years	workers as well as local radio programs was significantly associated with increased use of modern contraceptive methods. Television programs had a significant effect on modern contraceptive use. Program slogans and materials distributed across the cities were also significantly associated with modern method use.	generation activities contributed to increasing modern contraceptive use in urban areas, leading to improved access to maternal and reproductive health services.	

Hotchkiss et	Countrywide	Post program	Expansion of the	Pre-pregnancy	Proportion of women	Yes: The	Facilitators: social
al^{48} (2011)	urban and rural	evaluation-cross	private	The pregnancy	who report obtaining	expansion of	marketing of
ui (2011)	health facility	sectional study:	commercial sector	Women of	the contracentive	the private	intervention to create
International	neurin ruenity	To investigate	in the provision of	childbearing	supplies from the	commercial	demand
International		whether the	contracentive	age 15-49	commercial private	sector supply	demand.
		expansion of	supplies	vears	sector increased by 69	of	
		the role of	supplies	years	percent over the 1999	contracentives	
		nrivate			to 2008 period. In	decreased	
		providers in the			Nigeria the private	inequities in	
		provision of			commercial sector	the use of	
		modern			became the most	modern	
		contracentive			important source of	contracentives	
		supplies is			contraceptive supplies	in Nigeria	
		associated with			to women in poorest	III I IIgeria.	
		increased			wealth quintile group		
		horizontal			In addition women in		
		inequity in			hetter off wealth		
		modern			quintiles also became		
		contraceptive			increasingly reliant on		
		use			the private		
		450.			commercial sector.		
Favemi et al49	Bauchi, Gombe,	Longitudinal	Community Based	Pregnancy	Increase in the	Yes: A	Barriers: Inadequate
(2011)	Plateau, Edo.	evaluation of	Delivery (CBD) of		proportion of	community-	financial support for
(_011)	Ogun (NC, NE,	program/interve	non-prescriptive	Women of	community members	based	program, poor
Nigeria	SS. SW)	ntion:	family planning	childbearing	who had utilised FP	distribution	support from spouses
1 i Berra	rural	To improve	services and the	age 15-49	commodities at all.	approach	of participating
	community	maternal	treatment of minor	vears	from 28% at baseline	played a	women.
	J	mortality	ailments	J	to 49%, and an	critical role in	misconceptions of
		reduction			increase in the	enhancing	community members
		through			proportion of current	access to	about family
		increasing			contraceptive users	Reproductive	planning.
		contraceptive			from 16% at baseline	Health and	1 0
		uptake in 10			to 37%. An increase	Family	Facilitators:
		rural local			in knowledge of	Planning	Advocacy and
		government			common family	information	community
		areas (LGAs)in			planning methods.	and services in	engagement,

		five Nigerian			including male and	the project	involvement of r
		states.			female condoms,	communities.	in implementation
					injectables and pills.		demand creation
							activities, regula
							monitoring and
							evaluation.
Ogu et al ⁵⁰	Kaduna, Kano,	Pre/Post-	Capacity-building	Pregnancy	458 trained private	Yes: Building	Facilitators: deta
(2012)	Adamawa,	intervention	workshops for		medical doctors and	the capacity of	community need
	Bauchi, Borno,	(quasi-	health workers to	Women of	839 nurses and	private	assessment,
Nigeria	Taraba, and	experimental):	improve post-	childbearing	midwives across 430	medical	community
	Katsina, Niger	To investigate	abortion care.	age 15-49	private clinics treated	providers	engagement,
	(NC, NE,NW)	the	6	years	a total of 17,009	reduced	culturally approp
	rural and urban	effectiveness of			women over the 10	maternal	health education
	health facility	an intervention			years of the project	morbidity and	
		designed to			(about 2,100 women	mortality	
		improve the			annually). Not a	associated	
		capacity of			single case of	with induced	
		private medical			abortion-related	abortion in	
		doctors to offer			maternal mortality	northern	
		quality abortion			was recorded, with	Nigeria.	
		and			only 33 women		
		postabortion			experiencing mild		
		care to women		4	complications, while		
		in northern			none suffered major		
		Nigeria			complications of		
		_			abortion care. At the		
					same time, there was		
					a reduction in		
					treatment cost and a		
					doubling of the		
					contraceptive uptake		
					by the women		

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Mens et al (2011)	Edo(SS)	Pre/Post-	Peer led nealth	Pregnancy	The peer education	Yes: The
(2011)	rural	intervention	education	XX C	campaign had a	knowledge of
	community	evaluation:	campaign to	Women of	significant impact in	women of
International		Explore peer to	address malaria in	childbearing	raising the level of	childbearing
		peer education	pregnancy.	age 15-49	knowledge among the	age on malaria
		as a tool in		years	women.	in pregnancy
		raising				and its
		knowledge of				preventive
		MIP among				measures
		women of				increased.
		childbearing				
		age and				
		preventive				
		practices.				
McNabb et	Abuja-FCT and	Pre/post	An m-health	Pregnancy	Overall, the	Yes:
al ⁵² (2015)	Nassarawa (NC)	intervention	technology		intervention was	Introduction of
	urban	assessment:	intervention for	Pregnant	associated with higher	a low-cost
International	health facility	To determine if	CHEWs/HCWs to	women	quality of ANC	mobile case
		introducing the	provide higher-		scores, with these	management
		mobile app: 1)	quality ANC		improvements	and decision
		improved the	services		observed in multiple	support
		quality of ANC			domains of care,	application led
		services			including health	to behaviour
		provided, and 2)			counselling, technical	changes and
		improved client			services provided and	improved the
		satisfaction			quality of health	quality of
		with ANC			education A	services
		services			significant	provided by a
		provided			improvement in	lower-level
		provided			overall client	cadre of
					satisfaction was	healthcare
					observed	workers
					00501700.	WUIKEIS.
<u>L</u>				1		

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Anyaehie et al ⁵³ (2011)	Imo (SE) rural	Longitudinal evaluation of	Roll Back Malaria Campaign:	Pregnancy and postnatal	There was a sustained but insignificant rise	No: Although ITN has a	
	community	program/interve	increased	(mother and	in asymptomatic	capacity to	
Nigeria		ntion:	availability of	newborn)	malaria parasitaemia	reduce	
		To assess the	ITNs for free		post-distribution of	mosquito bites	
		impact of free	distribution to	pregnant	ITNs. Out of the 990	and malaria	
		distribution of	pregnant women	women/nursin	subjects recruited,	prevalence,	
		ITN to pregnant	and children under	g mothers and	470 tested positive	our study	
		and nursing	at antenatal,	newborns	with asymptomatic	showed a non-	
		mothers in a	postnatal and		malaria parasitemia.	significant	
		rural	immunization			increase in	
		community in	clinics			prevalence of	
		Nigeria, using				malaria after 6	
		asymptomatic				months use in	
		malaria				a rural	
		parasitaemia as				agrarian	
		the main				Nigerian	
		outcome				community.	
		measure				This suggests	
						ITN	
						intervention	
						must be	
						complemented	
						with	
						awareness	
						campaigns and	
						other vector	
						control	
					_	strategies.	

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Chabikuli et	71 health	Pre/post	a referral-based,	Pregnancy	Attendance at family	Yes: Family	Barriers: Low
al ⁵⁵ (2009)	facilities across	evaluation of	co-located family		planning clinics and	planning_	utilisation of
	Nigeria	program:	planning-HIV	Women of	mean couple year of	HIV integratio	intervention due to
Nigeria	urban and rural	To measure	integration model	childbearing	protection increased	n using the	user fees, long
C		changes in		age 15-49	significantly	referral model	waiting times.
		service		years	following integration	improved	C
		utilization of a			of services.	family	Facilitators:
		model 📐			Attendance by men at	planning	decentralisation of
		integrating			family planning	service	services, integration
		family planning			clinics was	utilization by	of programs.
		with HIV			significantly higher	clients	1 0
		counselling and	<u> </u>		among clients referred	accessing HIV	
		testing (HCT),			from HIV clinics.	C	
		antiretroviral				services due to	
		therapy (ART)				increased	
		and prevention				referrals.	
		of mother-to-					
		child					
		transmission					
		(PMTCT) in the					
		Nigerian public					
		health facilities.					
Kalu et al ⁵⁶	Ebonyi (SE)	Post-	Provision of post-	Pregnancy	About a third of the	No: There is	
(2012)	urban	intervention	abortion care and		PAC care providers	poor	
	health facility	evaluation:	effective linkage	Health service	had formal training	integration	
Nigeria		To review the	to other post	providers	for the	between	
		implementation	abortion services		implementation of the	emergency	
		of Post			PAC services. The	post abortion	
		Abortion Care			commonest	care and other	
		and effective			intervention offered	reproductive	
		linkage to other			the patients was	health services	
		post abortion			Manual Vacuum	in the centre,	
		services in			Aspiration (MVA).	resulting in	
		Ebonyi State			Only 15% of the	high rates of	
		University			caregivers were	maternal	
		Teaching			satisfied with the	mortality	

		Hospital, Abakaliki, Nigeria			linkage between PAC and the Family Planning services.	related to abortion complications.	
Joseph et al ⁵⁷ (2011) International	Edo (SS) urban health facility	Cohort study: To assess adverse pregnancy outcomes in HIV infected women who received highly active antiretroviral therapy (HAART) from early pregnancy compared with untreated- maternal HIV infection.	Administration of highly active antiretroviral therapy (HAART) from early pregnancy	Pregnancy Pregnant women	Intrauterine growth restriction (IUGR), pre-term birth and caesarean delivery were significantly higher among women with untreated-HIV infection in pregnancy compared with women who received HAART from early pregnancy.	Yes: Provision of HAART significantly reduces adverse pregnancy outcomes.	
Okeibunor et al ⁹⁷ (2011) International	Akwa Ibom (SS) rural community	Before and After analysis (quasi- experimental design): To determine the degree to which community- directed interventions can improve access to malaria	A community directed intervention (CDI) to improve effective access to malaria prevention.	Pregnancy Pregnant women	More women slept under an ITN during pregnancy in the treatment areas. The effects of the CDI programme were largest for IPTp adherence, increasing the fraction of pregnant women taking at least two SP doses during pregnancy by 35% relative to the control areas.	Yes: Inclusion of community- based programmes with supply- side interventions substantially increased effective access to malaria prevention, and increase access to	Barriers: Limited availability of intervention (ITNs). Facilitators: training and involvement of community members as volunteers.

		prevention in pregnancy				formal health care access- particularly ANC.	
Ojengbede et al ⁵⁸ (2010) Nigeria	Kano, Katsina, Oyo (NW, SW) urban health facility	Pre/post intervention evaluation: To examine the impact of the NASG on PPH at four referral facilities in Nigeria	Provision of non- pneumatic anti- shock garment (NASG) for PPH.	Childbirth Pregnant women	Mean measured blood loss decreased by 80% between pre- intervention and post- intervention phases. Mortality decreased from 18% pre- intervention to 6% in the NASG phase (RR = 0.31, 95% CI 0.15– 0.64, p = 0.0007).	Yes: The use of the NASG as part of standard management of PPH and hypovolemic shock at four referral facilities in Nigeria was associated with a significant reduction in blood loss and maternal mortality.	Facilitators: Frequer training, monitoring and evaluation.
Chiwuzie et al ⁵⁹ (1997) Nigeria	Edo (SS) rural community	Program evaluation (quasi- experimental design): To evaluate a community intervention designed to increase access to emergency obstetric care	Emergency loan funds to improve access to obstetric care	Pregnancy Women of childbearing age 15-49 years community leaders health workers	Of the 13 clans contacted, 12 successfully launched loan funds. In the 1st year of the operation, 83% of loans requested by women/families were granted and 93% loans were repaid in full. In addition to being used for transport, loans were	Yes: The loan fund improved access and reduced delay in reaching care.	Facilitators: community involvement, quality improvement of health facilities.

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		qualitative methods used			used to help pay for drugs, blood and hospital fees.		
Tukur et al ⁶⁰	Kano (NW)	Evaluation of	Training on the	Pregnancy	1,045 patients with	Yes:	Barriers: health
(2012)	urban and rural	program (quasi-	use of MgSO4 for	6 7	severe preeclampsia	Introduction of	workers resistance to
	health facility	experimental):	severe pre-	Pregnant	and eclampsia were	MgSO4 in	change.
Nigeria		To evaluate	eclampsia and	women	treated. The case	low-resource	C
C		whether a new	eclampsia in low-		fatality rate for severe	settings led to	
		low-cost	resource settings		pre- eclampsia and	improved	
		strategy for the	, in the second s		eclampsia fell from	maternal and	
		introduction of			20.9 % (95 % CI	fetal outcomes	
		magnesium			18.7–23.2) to 2.3 %	in patients	
		sulphate			(95 % CI 1.5–3.5).	presenting	
		(MgSO4) for			The perinatal	with severe	
		preeclampsia			mortality rate was	pre-eclampsia	
		and eclampsia		4	12.3% compared to	and eclampsia.	
		in low- resource			35.3 % in a centre		
		areas will result		\mathbf{C}	using diazepam.		
		in improved					
		maternal and					
		perinatal			1		
		outcomes.					
Prata et al ⁶¹	Kaduna (NW)	Before -after	Birth preparedness	Pregnancy/chil	Community	Yes:	Barriers: poor
(2012)	urban	analysis (quasi-	and the prevention	dbirth	mobilization efforts	Community	diffusion/
	community	experimental):	of postpartum		using TBAs and	mobilization	understanding of
International		To demonstrate	haemorrhage	Pregnant	CORPs reached most	had a	health messages led
		the role of	through	women	women with	significant	to reluctance to
		community	prophylactic use		information about	impact on the	participate in
		mobilization	of misoprostol in		postpartum	successful	intervention.
		efforts and	home births.		haemorrhage and	distribution	
		examine the			misoprostol (88%).	and uptake of	Facilitators:
		safety and			Availability of	a potentially	community
		feasibility of			misoprostol at the	life-saving	participation, use of
		misoprostol			community level gave	health	culturally appropriate
		distribution for			over 70% of enrolled	intervention.	terms to disseminate

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					women protection		information about
		hirths in Nigeria			against postpartum		intervention
					haemorrhage Many		
					women demonstrated		
					an understanding of		
					the threshold for		
					nostpartum		
					haemorrhage the rick		
					of death from this		
					disease and the role		
					of misoprostol in		
					or misoprosion m		
			6		treating it		
Uunvinho ot	Ogun (SW)	Dro/post	Clinical/practica	Childhirth	Overall menogement	Voc: Critorio	Barriara: Insufficiant
$a1^{62}$ (2008)	Ugun (SW)	evaluation of	guidelines for		of complications such	hased clinical	supply of acceptial
.11 (2008)	hoalth facility	bospital based	guidennes for	Dragnant	obstatria	oudit was	commodition low
Nigorio	nearin facility	intervention:	optiliai management of	woman	bomorrhogo	foosible and	morale of the staff
Nigeria		To ovelueto the	obstatria	women	aclampsia obstructed		morale of the staff.
		10 evaluate the	acomplications	\sim	labour and conital	acceptable	
		based audits in	complications		laboul, and genital	strategy for	
		improving the			significantly Clinical	management	
		auglity of			significantity. Chinical	of life	
		hospital based			and urgant attention	threatening	
		obstatria aara			by sonior medical	obstatria	
		obsterne care			stoff also improved	obstellic	
		Enderel Medical			stari also improved	complications.	
		Contro			significantly after		
		Centre,			intervention.		
		Abeokula,					
		Nigeria.					

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Okonofua et	Kano, Lagos,	Pre/Post-	Health worker	Pregnancy	The post intervention	Yes: An	Barriers: Difficulties
al^{63} (2013)	CrossRivers,	intervention	training to		case fatality rate of	intervention to	in supply of
	Plateau, Borno	(Multi-center)	improve	Pregnant	3.2 % was	build the	commodities.
Nigeria	and Enugu	study:	management of	women	significantly less than	capacity of	
	(NW, SW, SS,	To investigate	pre-eclampsia		the pre-intervention	care-providers	Facilitators: training
	NE, SE)	the			rate of 15.1 % (p <	to use an	and retraining of
	urban	effectiveness of			0.001). The overall	evidence-	health providers,
	health facility	an intervention			maternal and perinatal	based protocol	monitoring, advocac
		aimed at			mortality ratios and	for the	to policy makers.
		improving the			rates respectively in	treatment of	
		case			the hospitals declined	eclampsia in	
		management of	6		from 1199.2 to 954	Nigeria was	
		eclampsia			per 100,000 deliveries	successful in	
					and 141.5 to 129.8 per	reducing	
					1000 births,	associated case	
					respectively (p >	fatality rate,	
					0.05).	maternal and	
						perinatal	
						mortality.	
Igwegbe et	Anambra (SE)	Impact	Improve quality of	Pregnancy	There was a	Yes: The	
al ⁶⁴ (2012)	urban	evaluation:	health services		progressive reduction	resolution by	
	health facility	To evaluate the	through	Pregnant	in MMR and relative	the staff and	
Nigeria		impact of the	SERVICOM.	women	risk of maternal	management	
		introduction of			mortality, with a	to change	
		the Service			corresponding	attitudes and	
		Compact with			increase in live births.	service	
		all Nigerians			The presentation–	delivery	
		(SERVICOM)			intervention interval	according to	
		contract on			improved	the tenets of	
		maternal health			significantly from	SERVICOM	
		at Nnamdi			2006. This measure	led to a	
		Azikiwe			significantly reduced	gradual and	
		University			type 3 delays from	consistent	
		Teaching			2006, and	improvement	
		Hospital,			consequently	in all service	
		Nnewi, Nigeria.			improved maternal	points within	

		K _O ,			mortality. Overall, MMR of 1098 per 100 000 live births in 2004 declined to 691 per 100,000 in 2010.	the hospital. This measure significantly reduced the delays to treatment and led to reductions in maternal mortality.	
Galadanci et al ⁶⁶ (2011) Nigeria	Kano and Kaduna (NW) rural health facility	Program evaluation (process and outcome): To assess the 2- year results of an ongoing total quality assurance project in 10 Nigerian hospitals in a rural setting, and their impact on the MMR and fetal mortality ratio (FMR) in these hospitals from 2008 to 2009.	Quality assurance project to improve maternal and neonatal mortality.	Across the continuum of care Pregnant women	The mean maternal mortality ratio (MMR) was reduced from 1790 per 100,000 births in the first half of 2008 to 940 per 100 000 births in the second half of 2009. The average fetal mortality ratio (FMR) decreased slightly from 84.9 to 83.5 per 1000 births.	Yes: Continuous monitoring of quality assurance in maternity units raised the awareness of the quality of obstetric performance and improved the quality of care provided, thereby improving MMR and FMR.	

Gummi et	Kebbi (NW)	Pre-nost	Community	Across the	A post_intervention	No: Increased	Barriers: Needing
$a1^{67}$ (1997)	rural	intervention	education	continuum of	mini survey showed	awareness of	husband's permission
ui (1997)	community	assessment.	intervention to	care	knowledge gains of	the signs of	to participate higher
	community	To assess the	increase	eare	over 30% among	obstetric	costs of emergency
		effect of	knowledge and	Women of	women and	complications	obstetric services
		community	utilisation of	childbearing	men/community's	and the need	obsterne services.
		education	health facilities	age	awareness of the	for prompt	
		interventions to	nearth raenties	husbands	causes of maternal	treatment	
		encourage		community	death nature of	among	
		utilization of		leaders	obstructed labour	community	
		emergency		ioudoris	signs of pre-	women and	
		obstetric			eclampsia, need for	men did not	
		facilities			prompt treatment, and	result in	
					importance of	greater	
					delaying marriage.	utilization of	
					The increase was	emergency	
					greatest on the need	obstetric	
					for prompt care for	services at the	
				C_{1}	women with obstetric	facilities	
					complications. The	studied.	
					case fatality rate		
					declined from 38 % in		
				-	1991 to 5% in 1995.		
					However, utilization		
					of emergency		
					obstetric services did		
					not increase, and a		
					decline was seen in		
					referrals and number		
					of women treated for		
					obstetric		
					complications.		

Miller et al^{68} (2009)	Katsina (NW) urban	Intervention	Non-pneumatic anti-shock	Childbirth	Mean measured blood loss in the	Yes: The NASG showed	Barriers: Limited access to services.
International	health facility	(quasi- experimental): To determine whether the non-pneumatic anti-shock garment (NASG) can improve maternal outcomes.	garment (NASG) for obstetric haemorrhage.	Pregnant women	intervention phase was 73.5 ± 93.9 mL, compared with 340.4 ± 248.2 mL pre- intervention (P<0.001). Maternal mortality was lower in the intervention phase than in the pre- intervention phase (7 [8.1%]) vs 21 [25.3%]) (RR 0.32; 95% CL 0 14 –0 72)	potential for reducing blood loss and maternal mortality caused by obstetric haemorrhage- related shock.	
Odusanya et al ⁶⁹ (2003) Nigeria	Edo (SS) rural community	Pre-post program evaluation: To compare vaccination coverage obtained at the baseline and post- intervention.	Privately financed immunization program to increase immunization coverage in a rural community	Postnatal (newborn) newborns children up to 2 years of age	Two years after the program was started, immunization coverage rates were 94% for BCG, 88% for DTP (third dose), and 82% for measles. 84% percent of children were fully immunized against all six diseases, compared with 43% at the commencement (p<0.0001). Hepatitis- B coverage (three doses) was 58%.	Yes: The vaccination program has significantly improved vaccination coverage.	

ar" (2013) Nigeria	rural community	evaluation	intorvontion on		1		
Nigeria	community			N T 1	spraying increased	control	
Nigeria	-	(quasi-	malaria prevention	Nursing	from 14.7% to 58.2%	significantly	
		experimental):	practices among	mothers	(P < 0.001) and use of	improved in	
		To determine	nursing mothers in		window and door nets	rural areas, as	
		the effect of	rural communities		increased from 48.3%	the caregivers	
		malaria			to 74.8% (P < 0.001).	were	
		education			The proportion of	adequately	
		programme on			those with ITN use	empowered	
		the uptake of			increased from 50.8%	through	
		insecticide-			to 87.4% (P < 0.001)	appropriate	
		treated nets	6		while those with	health	
		(ITN) among			practice of	education	
		nursing mothers			maintaining clean	intervention.	
		in rural			environment also		
		communities in			increased from 40.4%		
		Nigeria.			to 54.5% ($P < 0.001$).		
				\mathbf{A} .	There were no		
					significant changes in		
					all the practice of		
					malaria prevention		
					methods in the control		
				-	group.		
Okonofua et	Whole country:	Intervention	Free maternal and	Across the	By December 2009,	Yes:	Barriers: Challenges
al^{50} (2011)	36 states plus	evaluation	child health	continuum of	nine States (and FCT)	Advocacy has	implementing free
	FCT	(quasi-	(MCH) services in	care	(24.4%) were	been	services, insufficient
Nigeria	rural and urban	experimental:	Nigeria		practicing	successful in	data to monitor and
	community	To determine		Policy makers	comprehensive free	building the	evaluate program.
		the outcome of			maternal and child	commitment	
		an advocacy			health policy in	of high-level	Facilitators:
		program aimed			Nigeria, while 14	government	commitment of
		at implementing			states (37.8%) offered	officials in	policy makers to the
		a policy of free			partially free services.	addressing	issue, stakeholder
		maternal and			This represents an	maternal and	engagement, demand
		child health			increase of eight	child health in	creation activities,
					states (53.3%) over	Nigeria.	
					· · · · · · · · · · · · · · · · · · ·		

		(MCH) services in Nigeria.			the 15 states that offered free services before the advocacy activities began. Data from one state indicated an increase in ANC utilisation and attendance for delivery and post- natal care.		culture of accountability.
Findley et al ⁷² (2013) International	Katsina, Zamfara and Yobe (NE, NW) rural community	Intervention evaluation quasi- experimental	Community Based Maternal, Newborn and Child Health Service Delivery.	Across the continuum of care Women of childbearing age (15-49yrs)	Anti-tetanus vaccination rates and early breast-feeding rates increased. Compared to the control communities, more than twice as many women in intervention communities knew to watch for specific newborn danger signs and significantly fewer mothers did nothing when their child was sick. The largest changes in care for sick children were seen in the use of medications across intervention areas, leading to improved home care for fever and coughs.	Yes: The community- based approach to promoting improved newborn and sick childcare through community volunteers and CHWs resulted in improved newborn and sick childcare.	Facilitators: Group learning and communication model used as part of program strategy.

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Pathfinder	Kano, Lagos,	Intervention	Maternal Health	Across the	MCHIC members,	Yes	Barriers:
International	Borno (NW,	evaluation	Care Improvement	continuum of	facility health		Political constraints
73	SW)	(process and	Initiative:	care	workers, male		inadequate
(2011)	rural	outcome):	Capacity building		motivators, young		infrastructure,
	community and	To improve	and Health system	Health workers	mother peer		cultural and religiou
International	health facility	health system	strengthening	Community	educators, CHWs and		perceptions and
		and community		and political	TBAs were trained in		practices, poor
		structures to		leaders.	various maternal		monitoring and
		enable			health care concepts		evaluation.
		sustainable			and advocacy. There		
		change in the			was an observed		Facilitators:
		quality and			increase in		community
		coordination of			community service		involvement.
		maternal health			uptake for skilled		
		(MH) service			birth attendants.		
		delivery, and to					
		shape MH care-					
		seeking					
		behavior among					
		key					
		populations.					
Galadanci et	Kano (NW)	Impact	Free Maternity	Across the	Since the introduction	No: Despite	Barriers: Inadequate
al ⁷⁴ (2010)	rural and urban	evaluation:	Health Service	continuum of	of free maternity	eight years of	funding, poor stock
	health facility	To demonstrate	Policy at	care	services in 2001,	free maternity	of commodities,
Nigeria		the impact of	Secondary		ANC attendance and	services in	inadequate
C		introduction of	Facilities	Women of	facility deliveries.	Kano State,	infrastructure and
		free maternity		childbearing	Only 50% of women	there is still	staff retention.
		services in		age (15-49yrs)	in the State utilize	low utilization	
		Kano state			antenatal clinic.	of maternity	
						services.	
Charurat et	Kano, Zamfara	Pre/Post	Postpartum	Postnatal	With this postpartum	No: The	Barriers: stock outs
al ⁷⁵ (2010)	and Katsina	intervention	Systematic	(mothers and	systematic screening	initiative	of commodities,
	(NW, NE)	evaluation	Screening	newborn)	checklist, clients	increased	needing husband's
International	urban	(mixed			attending	screening for	permission, long
	health facility	methodology):		Post-partum	immunization,	postpartum	distances, women's
		To determine		women	newborn care and	services and	

		the effectiveness of systematic screening to increase the use of FP and PPFP services in selected MCHIP- supported sites in Northern			paediatric/sick baby services were more likely to be screened for FP, postnatal care and immunisation services. In response to high unmet need for FP, the majority (73%) of trained providers knew at least three family	overall quality of counselling/ knowledge of providers. It however did not result in an increase in FP uptake.	lack of information about services.
		Nigeria.	beer /	ev.e	pranning methods that are suitable for postpartum women, and all of them were providing family planning counselling to pregnant or postpartum women. While family planning referral increase dramatically, only few women (15%) said they would go for referrals		
Okoli et al ⁷⁷ (2014) Nigeria	FCT, Nassarawa, Ogun, Kaduna, Zamfara, Bauchi, Anambra, Ebonyi, Bayelsa (NC, SW, NW, NE, SE, SS)	Program evaluation (quasi- experimental design): To describe the use and effect of a Conditional Cash Transfer	Conditional Cash Transfer (CCT) for maternal and child health	Across the continuum of care Women of childbearing age (15-49yrs)	The CCT intervention is associated with a statistically significant increase in the monthly number of women attending four or more ANC visits ($p < 0.01$; 95% confidence interval 7.38 to 22.85). A	Yes: CCT intervention showed significant effects on service uptake, although results for several outcomes of	Barriers: loss of CC beneficiaries to follow up, limited capacity of facilities to meet additional work required. Facilitators: Collaborations with other organisations.
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	rural	programme to			statistically	interest were	building trust and
	community	encourage use			significant increase	inconclusive.	promoting utilisatio
		of critical			was also observed in		through prompt
		MNCH services			the monthly number		delivery of
		among rural			of women receiving		intervention.
		women in			two or more Tetanus		
		Nigeria			toxoid doses during		
					pregnancy (p < 0.01;		
					95% CI 9.23 to		
					34.08). Changes for		
					other outcomes		
			6		(number of women		
					attending first ANC		
					visit; number of		
					deliveries with skilled		
					attendance; number of		
					neonates receiving		
				N.	OPV at birth) were		
					not found to be		
					statistically		
					significant.		
Liu et al ⁷⁸	Akwa Ibom (SS)	Pragmatic	Conditional Cash	Pregnancy and	Women offered the	Yes: CCTs	Barriers: Challenge
(2019)	urban	randomised	Transfer (CCT) to	postnatal	CCT programme were	improved the	with accessing
	health facility	control trial:	improve utilisation	(mother and	more likely to give	likelihood of	funds/cash, needing
International		To implement	of health services	newborn)	birth at the facility	HIV-positive	to obtaining partner
		and evaluate a	for PMTCT		compared to women	women giving	permission, lack of
		conditional cash		Pregnant	in standard care. For	birth at a	integrated
		transfer (CCT)		women	EID testing there was	facility, of	information system
		programme for			an absolute difference	nevirapine	across facilities,
		preventing			of 12.8% between	being	requirements to
		mother-to-child			those offered the CCT	administered	participate and
		transmission			intervention and those	to their	dealing with a new
		(PMTCT) in			in standard care. Over	newborn, and	HIV diagnosis.
		Akwa Ibom,			86% of the facility-	ot undergoing	
		Nigeria.			delivered newborns	EID testing in	Facilitators: Positiv
					received nevirapine,		encouragement,

					and ITT and PP estimates were like those for facility deliveries.	Akwa Ibom, Nigeria.	regular reminders and counselling of participants.
Edu et al ⁷⁹ (2017) Nigeria	Cross Rivers (SS) rural and urban health facility	Program evaluation using a mixed method design: To evaluate the effect of a free maternal health care program on the health care- seeking behaviours of pregnant women in Cross River State, Nigeria.	Free Maternal Health Care Program at primary and secondary health facilities	Across the continuum of care Women of childbearing age (15-49yrs)	Results of quantitative data show increase in the percentage of women accessing maternal health services. Qualitative results showed that women perceived that there have been increases in the number of women who utilize Antenatal care, delivery and Post-Partum Care at health facilities, following the removal of direct cost of maternal health services.	Yes: Intervention led to an increase in the number of women who utilise health facilities for their care.	
Noguchi et al ⁸⁰ (2020) International	Nassarawa State (NC) urban health facility	Pragmatic, cluster randomized, controlled trial: To investigate the impact of G- ANC on various maternal newborn health- related outcomes- IPTp	Grouped Antenatal Care for MIP interventions	Pregnancy Pregnant women	Mean number of IPTp doses received was higher for intervention versus control arm. Reported use of ITN the previous night was similarly high in both arms for mothers in Nigeria (over 92%). Reported ITN use for	Yes: G-ANC may support uptake of important MIP interventions, particularly IPTp coverage and IPTp-SP uptake.	

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		uptake and insecticide- treated nets (ITN) use.			infants (but not mothers) was higher in the intervention versus control arm in Nigeria.		
Oguntunde et al ⁸¹ (2018) Nigeria	Kaduna and Jigawa (NW) rural community	Program outcome evaluation: To assess the perceptions of stakeholders and beneficiaries of ETS in two states in northern Nigeria, comparing two models of ETS [stand alone or part of an integrated package of MNH interventions].	Emergency Transport Schemes (ETS	Pregnancy and childbirth. Pregnant women husbands community members community health workers health service providers	Demand creation activities – especially working with traditional birth attendants and religious leaders – provided a strong linkage between the ETS and families of women in need of emergency transport services. Community members perceived the ETS model that included demand- generating activities as being more reliable and responsive to women's needs.	Yes: ETS remained a key solution to lack of transport as a barrier to utilizing maternal and newborn health services in emergency situations in many rural and hard-to-reach communities.	Barriers: Security challenges, need f husband's permission, poor f conditions, driver reluctance to atter to non-emergencia Facilitators: Dedication of driv in the scheme, integrated approact of program, community awareness.

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Lalonde & Grellier ⁸²	Edo, Anambra,	Program impact	FIGO Saving Mothers and	Across the	Magnesium sulfate	Yes.	Barriers: Limited
(2012)	(SE SS NW)	An assessment	Newborns	care	hospitals by Kaduna		civil unrest
(2012)	(SE, SS, IVV)	of FIGO Saving	Initiave: training	care	State Government		civii uniest.
International	urban health facility	of FIGO Saving Mothers and Newborns Initiative 2006– 2011	Initiave: training in emergency obstetric and newborn care (EmONC)	Mothers and newborns	State Government. Efforts led to the cost of magnesium sulfate reduced by manufacturers. And at least 4 obstetric protocols introduced. Significant reduction (approx. 28%) in maternal mortality		Facilitators: community participation and ownership.
			200		due to eclampsia at the project site.		
Okeke et al ⁸⁶ (2017) International	Enugu, Kwara and Kano (SE, NC, NE) rural community	Program evaluation- outcome: To assess the outcomes of the implementation of the Nigeria Midwives Service Scheme	Midwives Service Scheme (MSS)	Pregnancy and childbirth. Pregnant women Midwives	A slight increase of the use of antenatal care was observed, with no measurable impact on skilled birth attendance. Findings report important design, implementation and operational challenges that likely	No: Program achieved only a modest impact on the use of antenatal care and no measurable impact on skilled birth attendance.	Barriers: Problems with the design of program, geographical challenges, limited awareness of clinic services and poor quality of services.
					contributed to the program's lack of impact.		

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Ameh et al ⁸⁴	Multi-country:	Post program	standardised	Across the	99.7% of healthcare	Yes: Short in-	Barriers: Problems
(2016)	Nigeria included	evaluation:	EmONC training	continuum of	providers improved	service	with intervention
	urban	To evaluate the	package	care	their overall score for	EmOC&NC	design.
International	health facility	effectiveness of			knowledge and for	training was	
		Healthcare		Healthcare	skill. There were	associated	
		provider		providers	significant	with improved	
		training in		_	improvements in	knowledge and	
		Emergency			knowledge and skills	skills for	
		Obstetric and			for each cadre of	all cadres of	
		Newborn Care			healthcare provider	healthcare	
		(EmOC&NC)			(p < 0.05), with the	providers	
			4		largest change seen	working in	
					for recognition and	maternity	
					management of	wards.	
					obstetric		
					haemorrhage.		
Brals et al ⁸⁵	Kwara (NC)	Interrupted time	Kwara State	Across the	Insurance coverage	Yes:	Barriers: Long
(2017)	rural	series- (quasi-	Health Insurance	continuum of	reached up to 70.2%	Voluntary	distance from
	community and	experimental	program- a	care	in four years in the	health	facilities.
International	health facility	design):	community-based		program area. An	insurance	
		To evaluate the	health insurance	Households	increase in hospital	combined with	Facilitators:
		effect of the	scheme		deliveries was	quality	Integrated approach
		introduction of			observed in the	healthcare	improvement in
		a multifaceted			program area during	services was	quality of services.
		voluntary health			the 4-year follow-up	highly	
		insurance			period. Even women	effective	
		programme on			who did not enrol in	in increasing	
		hospital			health insurance but	hospital	
		deliveries in			who could make use	deliveries in	
		rural Nigeria			of the upgraded care,	rural Nigeria,	
					delivered more often	by improving	
					in a hospital during	access to	
					the follow-up period	healthcare for	
					than women living in	insured and	
		1		1	the control area.	uninsured	

		~				women in the program area.	
Okeke et al ⁸³ (2016) International	Whole country- Nigeria rural community	Pre/post program evaluation: To examine the effects of the Midwives Service Scheme (MSS), a public sector program in Nigeria that increased the supply of skilled midwives in rural communities on pregnancy and birth outcomes.	Midwives Service Scheme (MSS)	Pregnancy and childbirth Women of childbearing age	The main measured effect of the scheme was a 7.3 percentage point increase in antenatal care use in program clinics and a 5-percentage point increase in overall use of antenatal care, both within the first year of the program. We found no statistically significant effect of the scheme on skilled birth attendance or on maternal delivery complications.	No: Minimal improvements seen following the program, highlighting that scaling up supply of midwives may not be sufficient on its own to improve maternal and newborn health.	Barriers: Challenges with retention of midwives in scheme, poor quality of services, low perceived need for services, lack of transportation facilities.

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Oguntunde et	Kaduna and	Pre/post	Men's support	Across the	Perceptions of the	Yes: In the	Barriers: Financial
al ⁸⁸ (2019)	Katsina (NW)	intervention	group intervention	continuum of	male support groups	northern	cost of associated
	rural	evaluation	to increase male	care	were overwhelmingly	Nigeria	services.
Nigeria	community	(qualitative):	involvement in		positive. Participants	context,	Facilitators:
-		To examine an	women's health	Married men.	internalized important	educating men	Community of
		intervention that			messages they	about danger	inclusion, positive
		educated			learned, which	signs of	perceived benefits of
		married men in			influenced their	pregnancy,	participation.
		northern			decisions related to	labour,	
		Nigeria about			the health of their	delivery,	
		health issues			wives and children.	newborn, and	
		related to			Some take it upon	child health	
		pregnancy,			themselves to educate	was crucial to	
		labour, delivery,			others in their	improving	
		and the			communities about	maternal and	
		postpartum			what they learned,	newborn	
		period, as well		4	and many say they see	health	
		as newborn and			changes at the	outcomes. The	
		child health,			community level,	intervention	
		through			with more utilization	was successful	
		participation in			of maternal, newborn,	such that the	
		male support			and child health	effect of the	
		groups.			services.	intervention	
						went beyond	
						participants to	
						the	
						community.	
Adaji et al ⁸⁹	Kaduna (NW)	Pre/post	Centering	Pregnancy	Mothers who could	Yes: Group	Barriers: Limited
(2019)	rural	intervention	Pregnancy Model-		mention at least five	prenatal care	health service
	community and	assessment:	group prenatal	Pregnant	out of eight danger	was acceptable	providers for
Nigeria	health facility	To assess	care program	women	signs of pregnancy	to women and	implementation.
		women's			increased	utilised.	
		experience of			significantly.		Facilitators: positive
		group prenatal			Commitment to birth		peer group dynamics
		care in a rural			preparedness plans		and social networks.
					was high The		

		Nigerian community.			mothers enjoyed the group sessions and shared the lessons they learned with others.		
Onwujekwe et al ⁹⁰ (2019)	FCT (NC) urban health facility	Post program assessment (Qualitative): To examine the implementation of the NHIS- MCH project and identify barriers and facilitators for implementation, adaptation and scale up.	Free maternal and child health program	Across the continuum of care Pregnant women	The program enrolled about 1.5 million pregnant women and children during the period of implementation in the country. The respondents perceived the program as pro-poor, efficient, and effective, and led to marked improvement in the functionality of the facilities, availability of services and reduced out-of-pocket expenditure, which led to increased demand and utilization of MCH services.	Yes: The NHIS-MDG FMCHP had positive impact on the target population though it was not sustained following the conclusion of the MDG program in 2015.	Barriers: Inadequate stakeholder consultation, alleged corrupt practices, human resources challenges, infrastructural challenges, issues with counterpart funding and public financing. Facilitators: Problems with project design.

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Brown et al ⁹¹	Oyo (SW)	Cluster	Community Nurse	Postnatal	Cell phone	Yes: cell	
(2016)	urban	randomized	led	(infant)	reminder/recall was	phone	
	community	control trial:	Reminder/Recall		associated with the	reminder/recal	
Nigeria		To evaluate the	(R/R) system	Mothers and	highest immunization	l was effective	
-		effect of	Alone and in	infants.	completion rates	in improving	
		reminder/recall	combination with		among the children in	immunization	
		system and	Primary Health		the study.	completion	
		Primary Health	care immunization			rates.	
		Care	providers' training				
		Immunization					
		Providers'					
		Training	6				
		(PHCIPT)					
		intervention on					
		routine					
		immunization					
		completion					
		among infants.					
Asa et al ⁹²	Osun (SW)	Open	Intermittent	Pregnancy	33 (22.6%) and 52	Yes: The IPT	Facilitators:
(2008)	rural	randomised	Preventive		(37.1%) women in the	regime with	acceptability of
	health facility	control trial:	Therapy in	Pregnant	study and control	sulphadoxine-	intervention among
Nigeria		To evaluate the	Pregnancy IPT-p	women	groups, respectively,	pyrimethamine	target populations.
		efficacy of	for malaria using	-	had anaemia. With	is an effective,	
		intermittent	sulphadoxine-		multivariate analysis,	practicable	
		preventive	pyrimethamine		the difference in the	strategy to	
		treatment of	(SP)		incidence of anaemia	decrease risk	
		malaria using			in the two groups	of anaemia in	
		sulphadoxine-			remained significant	women of low	
		pyrimethamine			(p = 0.01; odds ratio =	parity residing	
		(SP) in the			0.5; 95% confidence	in areas	
		prevention of			interval = $0.29 - 0.85$).	endemic for	
		anaemia in				malaria.	
		women of low					
		parity in a low					
		socio-economic,					

		malaria endemic setting.					
Walker et al ⁹³ (2018) Nigeria	Katsina (NW) rural community and health facility	Post intervention evaluation (quasi- experimental design): To assess the impact of Muslim opinion leaders' training of healthcare providers on the uptake of MNCH services in Northern Nigeria	Muslim Opinion Leaders' led training of health workers	Across the continuum of care Healthcare providers	The result indicates a significant difference both in perception and in practices between healthcare providers in intervention and control facilities, with respect to MNCH uptake. Access to services was higher in intervention facilities than in control facilities, with routine immunisation (including polio) recording highest hospital visits followed by other MNCH services related to pregnancy/child development. Family planning and hospital delivery were the least accessed	Yes: The healthcare providers who received trainings on Islamic precepts related to MNCH were able to spend greater amount of time with clients, providing counselling on Islam and MNCH. This led to improvements in MNCH.	

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Ehigiegba et al ⁹⁴ (2012)	Rivers (SS) urban	Post program evaluation:	Community Health Insurance	Across the continuum of	Service utilisation increased	Yes: CHIS encouraged	Facilitators: active community
Nigeria	health facility	implementation of a PMTCT	promote the utilisation of	Pregnant	deliveries increased from about 20 to 120	book early for	integration/
		program in a	MNCH services	women.	per month. New	improved	activities.
		semi-urban			infections were less	utilisation of	
		cottage hospital,			than 2% in the period	VCT and other	
		with a			compared to 29%	PMICI	
		bealth insurance			prior to the CHIS.	services.	
		scheme.					
Adeleye et	Edo (SS)	Program	Ekialodor safe	Across the	A useful	Yes: Through	Facilitators: delivery
al ⁹⁵ (2011)	rural	process and	motherhood	continuum of	communication	small-group	of intervention in line
NT: ·	community	outcome	program:	care	intervention was	health talks,	with local
Nigeria		evaluation:	communication	Committee	developed that	the male	governance and
		10 describe the	intervention to	elders	noreased the	Ekiadolor	customs
		and	male engagement	voung adult	male engagement in	Southern	
		implementation	in maternal health	males	maternal health.	Nigeria.	
		process of the				became	
		Ékialodor safe			1	motivated to	
		motherhood				act as change	
		program and to				agents and	
		analyze how it				encouraged	
		improved				other men to	
		in the				assist with	
		community				health in their	
		community.				community.	

Haver et al ⁹⁶	Akwa Ibom (SS)	Program	CHW-led IPTp	Pregnancy	The effects of the CDI	Yes: The	Barriers: poor access
(2015)	rural	evaluation:	provision,		program were largest	health	to underserved areas
	community	To describe	insecticide-treated	Community	for IPTp adherence,	promotion and	and absence of
International		outcomes,	net distribution as	health workers	increasing the	distribution of	political will and
		commonalities	part of a		proportion of	commodities	commitment.
		and lessons	community-		pregnant women	afforded by	
		learned from	directed		taking at least two	these	Facilitators:
		country	intervention for		sulfadoxine-	community	community
		programs in	malaria control		pyrimethamine doses	based .	engagement
		which tasks in			during pregnancy by	strategies	
		health			five times in the CDI	yielded greater	
		promotion and	6		communities	uptake of	
		distribution of			times in the control	then would	
		were			group for whom IPTp	have been	
		intentionally			was available only at	achieved	
		shifted from			prenatal care	through	
		skilled			(P < 0.001)	facility-based	
		providers to		\mathbf{C}	(services alone.	
		CHWs to					
		advance MNH					
		strategies			1		

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Search strategy and terms

PubMed search terms: 1st June, 2020.

(((("Maternal Health"[Mesh]) OR "Infant, Newborn"[Mesh]) OR "Infant Health"[Mesh]) AND "Nigeria"[Mesh]) AND (("intervention" OR "program" OR "strategy"))

Embase search strategy: 11th July, 2020

- 1. "Maternal Health".mp. or maternal welfare/
- 2. "Infant, newborn".mp. or newborn/
- 3. "infant health".mp. or child health/
- 4. newborn care/ or "Newborn Health".mp.
- 5. 1 or 2 or 3 or 4

6. Nigeria.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

7. ("intervention" or "program" or "strategy").mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

8. 5 and 6 and 7

Scopus search terms: 22nd July, 2020.

{maternal health} AND {newborn health} AND "Nigeria" AND "intervention" OR "program*".

Websites of key organisations searched on Google 22nd July 2020.

Jhpiego

USAID/Maternal and Child Survival Program

Maternal Newborn Child Health (MNCH2) program

World Health Organisation

United Nations Children's Fund

Bill and Melinda Gates Foundation

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4,5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6,7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Supplementary file 2
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6,7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe	N/A



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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
sources of evidence§		the methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6,7
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 2, 10
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Supplementary file 1
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-11
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	12, 13
Limitations	20	Discuss the limitations of the scoping review process.	13
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	13
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. <u>doi: 10.7326/M18-0850</u>.



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A scoping review of maternal and newborn health interventions and programs in Nigeria.

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A scoping review of maternal and newborn health interventions and

programs in Nigeria.

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Word count: 3,537.

Keywords: maternal health, newborn health, neonatal health, interventions, programs, MNH,

RMNCAH, maternal morbidity and mortality, newborn morbidity and mortality, maternal

and newborn health measurement, SDGs, Nigeria.

Abstract

Objective

To systematically scope and map research regarding interventions, programs, or strategies to improve maternal and newborn health (MNH) in Nigeria.

Design: Scoping review

Data sources and eligibility criteria

Systematic searches were conducted from 1st June to 22nd July 2020 in PubMed, Embase, Scopus, together with a search of the grey literature. Publications presenting interventions and programs to improve maternal or newborn health or both in Nigeria were included.

Data extraction and analysis

The data extracted included source and year of publication, geographical setting, study design, target population(s), type of intervention/program, reported outcomes, and any reported facilitators or barriers. Data analysis involved descriptive numerical summaries and qualitative content analysis. We summarised the evidence using a framework combining WHO recommendations for MNH, the continuum of care, and the social determinants of health frameworks to identify gaps where further research and action may be needed.

Results

A total of 80 publications were included in this review. Most interventions (71%) were aligned with WHO recommendations, and half (n=40) targeted the pregnancy and childbirth stages of the continuum of care. Most of the programs (n=74) examined the intermediate social determinants of maternal health related to health system factors within health facilities, with only a few interventions aimed at structural social determinants. An integrated approach to implementation and funding constraints were among factors reported as facilitators and barriers, respectively.

Conclusion

Using an integrated framework, we found most MNH interventions in Nigeria were aligned with the WHO recommendations and focused on the intermediate social determinants of health within health facilities. We determined a paucity of research on interventions targeting the structural social determinants and community-based approaches, and limited attention to pre-pregnancy interventions. To accelerate progress towards the SDG MNH targets, greater focus on implementing interventions and measuring context-specific challenges beyond the health facility is required.

Article summary

Strengths and limitations of this study

- A comprehensive search strategy was used including three (3) large databases (PubMed, Embase and Scopus) as well as grey literature.
- The review employed a unique framework to map the evidence and identify gaps in maternal and newborn health (MNH) research and action in Nigeria- using an integrated framework combining the WHO recommendations for MNH, the continuum of care model for maternal health and the social determinants of health.
- We recognise there may be publication bias, as not all interventions/programs for MNH in Nigeria may have been published and captured in the study.

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Introduction

Nigeria has the second highest estimated maternal deaths globally, and accounts for one of the highest neonatal mortality rates in Africa^{1,2}. The World Health Organisation (WHO) estimates the maternal mortality ratio (MMR) to be over 800 maternal deaths per 100,000 live births with a neonatal mortality rate of 33 per 1000 live births^{1,3} in 2019. These figures contrast with corresponding figures from the UK and the USA which are around 10 to 18 deaths per 100,000 live births, respectively, with neonatal mortality rates below 4 deaths per 1000 live births^{1,2}. Maternal and newborn health outcomes are intricately linked; maternal deaths significantly affect newborn survival and development^{4–6}. The Sustainable Development Goal (SDG) 3 calls for all countries to reduce maternal mortality ratios to less than 70 per 100 000 live births and neonatal mortality to less than 12 deaths per 1,000 live births by 2030^{1,7}. However, if current trends continue, Nigeria will fall far short of these targets despite existing efforts and resource allocations⁸. Of note, the global maternal and newborn health community has recently intensified efforts on innovative indicators to measure progress in maternal and newborn health towards achieving the SDG targets^{9–11}.

Most maternal deaths in Nigeria are reportedly due to preventable obstetric causes⁶. Furthermore, complications of preterm birth, intrapartum events, and infections account for over 80% of newborn deaths and stillbirths^{1,6,12}. Underlying these conditions, socioeconomic, cultural, political, and environmental factors contribute to the persistently high and inequitable burden of maternal and neonatal mortality in Nigeria⁷. The highest rates of deaths and morbidity occur among the poor, rural communities, where many challenges to improve maternal and newborn health remain^{8,13}. In addition. some religious and sociocultural norms adversely influence health-seeking behaviour and expose women to discriminatory practices which pose serious health risks^{8,13}. Addressing these underlying social conditions and inequities will not only facilitate efforts to improve maternal and neonatal mortality and morbidity but may improve other dimensions of health and well-being.

Beyond the clinical causes and social determinants that underpin maternal and newborn morbidity and mortality, evidence shows that coordinated strategies across the reproductive, maternal, newborn, child and adolescent health continuum of care improves the general well-being of young women and mothers and the development of newborns^{4,6}. Thus, the WHO recommends the "essential packages of interventions for low and middle-income settings" should be provided across the continuum of care to improve maternal and newborn health^{5,14–}

¹⁶. Such interventions include family planning, appropriate antenatal care, immediate thermal care for newborns and early initiation of exclusive breastfeeding amongst others. Furthermore, increasing evidence suggests that addressing maternal health inequities through action on the social determinants of health can significantly improve maternal and newborn health outcomes¹⁷.

It is not entirely clear why, despite laudable efforts to improve the situation in Nigeria, the burden of maternal and newborn mortality and morbidity persists⁸. Understanding the evidence and gaps for maternal and neonatal health interventions and programs will help to identify areas to focus new MNH measurement tools and direct future resource allocations.

This study aims to systematically scope and map the published literature on interventions, programs, or strategies implemented to improve maternal and newborn health in Nigeria. By integrating and applying existing key frameworks in maternal and newborn health^{17–20}, this study identifies evidence gaps that require further research and highlights areas where action is needed. The following objectives were formulated following an initial exploratory search:

a) Outline the types of interventions for maternal and newborn health in Nigeria and their characteristics.

- b) Describe the nature and range of evidence.
- c) Elaborate the study settings and target populations.
- d) Examine reported evidence of outcomes or effectiveness or impact.
- e) Identify reported facilitators and barriers of effective implementation of interventions.

Methods

The review was conducted according to the methodological guidance for scoping reviews provided by the Joanna Briggs Institute (JBI) manual for evidence synthesis²¹. The main research question guiding the review was: what is the evidence available for maternal and newborn health interventions in Nigeria? An intervention was defined as "a single or a combination of program elements or strategies designed to produce behavioural changes or improve health status, outcomes, or both among individuals or an entire population"²². We focused on research studies evaluating the effectiveness of interventions on outcomes related to maternal and newborn health.

Search strategy

A preliminary database search was undertaken to identify keywords and index terms for articles related to the review topic and refine the search strategy. Thereafter, the definitive search of search of PubMed, Embase (via OVID), and Scopus (via OVID) was conducted by NN between June and July 2020 to identify relevant publications. The searches were updated in May 2021 by rerunning the searches and through email alerts. The search expressions in PubMed including keywords and MeSH terms used were: "Maternal Health" OR "Infant, Newborn" OR "Infant Health" AND "Nigeria" AND (intervention OR program OR strategy). No filter was used to restrict results. Similar search terms were used for the other databases. A summary of the search strategy for each database is provided (Supplementary File 1). This was supplemented by a web-based search of the grey literature, and a Google scholar search using similar terms, including a directed search of relevant key organisations websites. Cited references were examined by browsing the reference lists of studies to identify additional eligible studies.

Eligibility criteria and selection of sources of evidence

Table 1 outlines the inclusion and exclusion criteria and the sources of evidence. The results from the searches were screened in an iterative process by two authors (NN and AKA). First, the sources were screened based on the information presented in the title and abstract. Next, full-text articles were assessed to determine their eligibility for inclusion using the criteria in Table 1. Discrepancies regarding eligibility were resolved by consensus and discussion with a third author (PA).

Data charting and summary

The included literature was reviewed using a data extraction form developed through an iterative process to identify the data elements critical to answering the review question and objectives. The form was piloted with 10% of the included studies to ensure consistency and revised, as necessary.

The extracted data included authors, year of publication, geographical setting, study design, target population(s), type and description of intervention, duration of implementation, reported outcomes, and any facilitators or barriers.

The first author (NN) charted the data, and the second author (AKA) reviewed the data. Any disagreements between the reviewers were resolved by a consensus involving the third author

(PA) whenever necessary. In line with the scoping review methodology, a formal assessment of the methodological quality of the included studies was not undertaken, as the intention was to provide a broad overview of the existing literature related to the review question²¹. Data extracted across the included sources of evidence was summarised using figures, tables, and summaries.

To map and summarize the evidence, we used an integrated model developed from the World Health Organisation (WHO) recommended interventions for maternal and newborn health^{4,18,20}, the continuum of care approach for maternal health¹⁹ and the social determinants of health framework^{17,23} (Figure 1). The model combines WHO's consensus recommendations of both clinical and non-clinical interventions for maternal and newborn health as outlined in the guidelines issued in 2011 and 2017 and presents these interventions across the continuum of care for maternal, newborn and child health. We assessed whether interventions described in the included studies were in line with any of the WHO recommended interventions outlined in the model. The model also adapts the social determinants of health framework to highlight interventions aimed at addressing structural factors (such as the ability of women to access health services) which influence maternal health.

Patient and public involvement

Patients and public were not involved in the design, conduct or reporting of this study.

Ethics approval statement

Due to the nature of the study (scoping review), the study did not involve human participants.

Table 1: Inclusion and Exclusion criteria

Criteria	Inclusion	Exclusion
Type of studies	Any existing literature including journal articles, systematic reviews, grey literature, and evaluation reports.	conference proceedings, study protocols, editorials, cost effectiveness studies, modelling studies or commentaries on MNH interventions.
Setting	Nigeria; International/multi- country studies including Nigeria.	studies with topics not reporting on MNH interventions in Nigeria.
Time period	No time limits set	
Language	Studies in English	Studies not in English
Focus of study	Studies focused on maternal and newborn health (MNH) interventions/programs.	Studies without an intervention/program for MNH or outcomes not focused on MNH, Studies where intervention/program focused only on child health and did not include newborns.

Results

Overview of the literature search

The systematic literature search resulted in 827 publications after removing duplicates. A total of 79 full texts were assessed, of which 52 were included in the review. An additional 28 articles were retrieved from citations, and the full texts were assessed and included in the review. A total of 80 publications were included in the final review^{24–103}. A PRISMA flow diagram in Figure 2 summarises the search results and screening processes for this study.

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Characteristics of included literature.

The characteristics of the included sources of evidence are summarised in Table 2, and the details of each publication are presented in Supplementary file 2: Table S2. Figure 3 shows the results of mapping the studies to the integrated framework developed in this study. The results are summarized below:

Intervention and programs along the continuum of care for maternal and newborn health.

Half (n=40) of the interventions targeted pregnancy, childbirth, or both. Only four interventions targeted the pre-pregnancy stage and involved family planning or contraception services^{46,50–52}. Nine interventions focused on the postpartum period for mothers, newborns, or both, and involved postpartum family planning^{44,79}, promoting early breastfeeding^{38,39}, neonatal resuscitation³⁴, keeping the baby warm⁶⁹, immunisation^{73,95} and a combination of essential newborn interventions⁴³. Just over one-third (34%, n=27) of the programs spanned all stages of the continuum of care.

Alignment with WHO recommendations for improving maternal and newborn health.

Most of the publications reviewed (71%, n=57) reported interventions aligned with the recommendations outlined in Figure 2 based on the WHO 2011 and 2017 guidelines for maternal and newborn health. The remaining studies (29%, n=23) aimed to improve quality or standard of maternal and newborn health services mainly through capacity building of health providers, improving access through community health insurance schemes, providing free MNH services, emergency loans, conditional cash transfers, and outreach services. These were not specifically listed as priority interventions in 2011 and 2017 guidelines, albeit may be stated elsewhere in other WHO guidance.

Mapping interventions to the social determinants of health framework for maternal health

Nearly all interventions (93%, n=74) focused on the intermediate social determinants of health. These include health system factors such as demand, access, quality, and utilization of maternal and newborn health services (n=38), improving maternal health knowledge and behaviour (n=18), and improving the health status of mothers and newborns by addressing obstetric and/or newborn complications and diseases (n=18). Only six studies had interventions targeted at structural social determinants of health, including public policies, gender dynamics, or socio-cultural norms^{45,75,78,92,97,99}.

Types of studies, year of publication and lead author/institution.

Of the literature included, 71 publications were journal articles, and nine were program evaluation reports. The publication year ranged from 1982 to 2020, with most sources (n =64) published between 2010 and 2018 (Figure 4). The publications included in this review employed many study types/designs. One-quarter of the reviewed studies involved a process, outcome, or impact evaluation (n=21), followed by quasi-experimental designs (n=16), pre-or

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post-intervention designs (n=15), and post-intervention analysis (n=13). Nearly one-third (30%, n=24) of the reviewed studies reported having a comparison group, including eight (8) randomized control trials. Only six (6) sources used qualitative methods, and the remaining 74 were quantitative, two of which used a mixed-methods design^{79,83}. Over half (60%, n=48) of the reviewed articles had the lead author or institution based in Nigeria. Study duration varied as follows: less than a year (n=10), one year to 5 years (n=53), and greater than five years (n=13).

Geographical region, setting and site of intervention.

Based on Nigeria's six geopolitical regions, over half (51%, n=41) of the studies reported interventions in a single region, and 21 studies reported interventions across two or more regions. About a third (n=28) of the studies were conducted in the northern regions and 21 studies in the southern regions. Thirteen studies (16%) involved settings in both the northern and southern regions. Six studies reported national coverage, including one study involving all 36 states of Nigeria and the Federal Capital Territory (FCT)⁷⁵. Two studies reported multi-country sites, including Nigeria^{88,100}.

There were fewer community-based interventions or programs (39%, n=31) compared to those in health facilities (46%, n=37). The health facilities included ranged from primary care clinics to referral hospitals. A small portion (15%, n=12) of the studies reported both community and health facility program sites. More studies (47.5%, n=38) were conducted in a rural setting compared to an urban environment (34%, n=27), with approximately 19% (n=15) involving both rural and urban settings.

Target populations.

Most interventions in the literature reviewed (79%, n=63) were targeted mainly at pregnant women, mothers, and women of childbearing age, described as 15 to 49 years of age, with one specifically focused on young adolescent females⁴². Eleven interventions focused on health care providers, including community health workers and midwives^{25,34,35,58,60,87,88,91,97,100}. Four interventions involved community members, including the male members of the community, husbands, or both^{45,89,92,99}. Two interventions specifically targeted policymakers^{48,75}.

Reported outcomes, effectiveness, or impact.

The interventions outlined in the reviewed literature sought to address a wide range of outcomes. Nearly half (45%, n=33) had outcomes related to improving the demand, access, coverage, quality, and utilisation of essential maternal and newborn health services, interventions, or both. Other outcomes include reducing maternal or newborn deaths or both ^{24,26,27,32,34,49,60,62,64,67–69,72,78,102}; improving knowledge of preventive practices and self-management^{30,38,39,50,51,55,65,71,73,74,93,95}; improving community participation in maternal and newborn health including male members of the community^{28,45,92,99}; capacity building of the health workforce^{44,77,79,86,88}; and the prevention and management of pregnancy or newborn related diseases and complications, or both ^{31,35,37,40,41,57,61,66,96,103}.

Reported barriers and facilitators.

Not all included studies reported facilitators and/or barriers of implementing the interventions. Forty-six studies (n=46) reported factors that facilitate or positively influence the intervention or program. The most common facilitators reported were community engagement and participation $(50\%, n=23)^{24,25,27,28,31,39,41,42,45,51,53,54,63,65,77,85,91,92,98,100-102}$. Others included an integrated approach to implementation of interventions^{31,48,85,89,98}; communication of adequate (and culturally appropriate) knowledge about the program or intervention^{54,65,69,103} and demand creation activities^{52,53}.

Forty-two studies (n=42) reported barriers, with funding limitations posing the main challenge to implementation reported in 11 studies^{25,27,33,53,78,80,82,86,91,92,94}. Nine studies reported negative attitudes and perceptions regarding the intervention, the health system, or both as a barrier^{36,39,48,53,64,71,79,82,83}.

Table 2: General characteristics of included sources of evidence.

Characteristics	Number of studies (%), n=80	References
Study Design		
Systematic Review	1 (1.25)	49
RCT	8 (10)	26,38,80,82,84,95,96,103
Quasi-experimental	16 (20)	36,50,54,63-65,72,74-76,81,89,97,101,102
Cohort/longitudinal	6 (7.5)	37,51,53,57,61,69
Post-intervention/program evaluation	13 (16.25)	25,28,32-34,43,52,60,83,88,91,94,98
Pre-post/before after studies	15 (18.75)	24,39,40,55,56,59,62,66,67,71,73,79,87,92,93
Process/outcome/impact evaluation	21 (26.25)	27,30,31,35,41,42,44-46,48,58,68,70,77,78,85,86,90,99,100
Type of study		
Qualitative	7 (8.75)	25,28,48,85,91,92,94
Quantitative	71 (88.75)	24,26,27,29–31,34–46,49–78,80–82,84,86–90,93,95–103
Mixed Methods	2 (2.5)	79,83
Control or Comparison group/unit		
Yes	24(30)	26,29–31,36–40,61,76,80–82,84,85,87,89,95–97,101–103
No	56(70)	24,25,27,28,32-35,41-60,62-75,77-79,83,86,88,90-94,98-100
Setting		
rural	38(47.5)	26,27,31,33,38,39,42-46,50,53,55,57,60,61,63,71,73,74,76-
		78,81,85,87,89,90,92,93,96,97,99–103
urban	27(33.75)	25,32,34-37,40,51,52,56,58,62,65-
		68,79,80,82,84,86,88,91,94,95,98
rural and urban	15(18.75)	24,28-30,41,47-49,54,59,64,69,70,75,83
Site of Intervention		
Community	31(38.75)	26,28–31,33,38,39,42,45,50,51,53,55,57,63,65,71,73– 75,81,85,87,90,92,95,99,101
Health facility	27(46.25)	25 27 32 34–37 40 41 43 44 46 52 54 56 58–62 64 66–
Health facility	37(40.23)	68,70,72,78–80,82–84,86,88,92,94,96,103
Community and health facility	12(15)	24,47-49,69,77,89,91,93,97,98,102
Geographical Region		
North West	22(27.5)	24,25,28,30,31,33,36,38,47,48,64,65,70,71,78,85,91–93,97,103
North Central	5(6.25)	37,56,84,89,94
North East	3(3.75)	27,50,58
South West	8(10)	26,39,40,66,74,80,95,96
South East	4(5)	32,57,60,68
South South	9(11.25)	55,61,63,73,82,83,98,99,101
Multiple: Northern regions	8(10)	29,42,45,46,54,76,79,102
Multiple: North and South regions	9(11.25)	35,43,44,51,53,62,77,86,90
Country-wide: all geographic regions	10(12.5)	34,41,49,52,59,67,69,75,81,87
Multi-country: Nigeria included	2(2.5)	88,100
Lead author/Institution base	_(2.0)	
Nigeria	48(60)	25,27,30-32,34,37,39,40,42-47,49,50,53,54,57-60,62-64,66-
		68,70,71,73–75,78,81,83,85,91–99
International	32(40)	24,26,28,29,33,35,38,41,48,51,52,55,69,72,76,77,79,80,82,84,86-
		90,100,102,103

Discussion

It is promising to see increasing research on maternal and neonatal health programs in Nigeria. Following a systematic search of literature on existing interventions and programs in Nigeria, this study used a novel framework to identify gaps for research and action on MNH interventions and programs in Nigeria. We developed an integrated model combining the WHO recommendations for maternal and newborn health with the continuum of care and the social determinants of health frameworks. This approach can provide researchers and policy makers a rigorous method to examine and assess gaps in MNH interventions and service delivery and identify country-specific priorities to focus attention.

Our findings show that the interventions in a large majority of studies in this review (71%), aligned with the WHO recommendations for maternal and newborn health. Most interventions targeted the pregnancy and childbirth stages of the continuum of care. This is likely related to evidence showing that the critical causes of maternal and newborn deaths occur during these periods^{7,104}. Only a few studies focused on the pre-pregnancy stage and the provision of family planning services. This area requires further attention, as studies have shown that providing reproductive health services, mainly contraceptive services, can help with further reductions in maternal and newborn mortality^{7,17,104}.

Accordingly, most studies examined the intermediate social determinants of health, such as access to and availability of relevant health services within health facilities, with only a few investigating programmes aimed at the more structural social determinants of health, such as gender, cultural and religious norms, and public policies. Although these proximal social determinants remain essential, growing evidence emphasises the significant role of distal determinants influencing maternal health and its outcomes^{17,104}. Furthermore, increasing evidence suggests actions to improve these distal social determinants can improve maternal and newborn health outcomes¹⁷. This highlights the need for further research on how social interventions affect maternal and neonatal health outcomes in Nigeria to inform program development and implementation.

Of the 80 publications reviewed, over 80% reported achieving the interventions' intended outcomes. Many of the programs investigated interventions related to WHO recommendations, with a focus on women and their engagement with health facilities. Our review also highlights the focus of existing programs on measuring coverage of evidence-based MNH interventions in health facilities, with limited attention to community-based

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interventions. Importantly, the research synthesised does not clearly show whether these interventions were chosen to align with country-level priorities. Consequently, to accelerate progress towards the SDG goals of ending preventable maternal and newborn deaths, a broader lens to identify and measure critical and context-specific factors beyond the health facility is required. Country level researchers may be better posed to understand and highlight country-level priorities for MNH research. Of note, international collaborators led over a third of the research in this review. Going forward, we implore global health institutions to actively improve local research capacity and funding as articulated by the African Academy of Science^{105,106}.

Factors that facilitated achieving intended outcomes involved engagement with the communities and integration of multiple interventions. This result supports the call for the application of integrated packages of effective health interventions across the continuum of care, re-emphasized by the strategic plans to achieve SDG 3^{19,104}. In addition, these findings highlight the role of participatory mechanisms to engage families (including men) and communities in improving maternal and newborn health¹⁷. Two key barriers to interventions achieving their intended health outcomes were funding limitations and negative attitudes and perceptions. This may be related to the need for public engagement to address participants' critical concerns and the need for more integrated interventions.

The search strategy was limited to PubMed, Embase and Scopus databases; thus, publications in excluded databases might be missing in this review. Nevertheless, we conducted a grey literature search alongside these databases to cover other relevant resources. Although we carefully considered the search terms used in our strategy, we recognize that there may be publication bias, as not all interventions/programs for maternal and newborn health will have been published.

A broad range of study designs were employed in the studies included in this review. However, most employed quantitative approaches with only a small fraction using qualitative and mixed methods approaches. Given the nature of MNH interventions and the complexity of the challenges facing women and newborns, multidisciplinary research and mixed methods approaches are needed to add depth to understanding the contextual nuances of maternal and newborn health. This helps to uncover unknown and emerging factors which potentially informs better use of limited resources. An important domain to consider within the spectrum of factors that can influence maternal and newborn health outcomes is the quality of services received by women and children¹⁰⁷, especially if they suffer mistreatment^{108,109}.

Conclusion

Using a novel framework combining WHO recommendations for maternal and newborn health, the continuum of care and the social determinants of health frameworks, most MNH interventions were aligned with the WHO recommendations and focused on the proximal social determinants of health. These were related largely to health system factors within health facilities. In addition, our findings show only a few programs targeting the structural social determinants of maternal health such as religious and cultural barriers and MNH policies and highlights the relative neglect of non-facility-based interventions. The evidence evaluating MNH outcomes was mostly quantitative and with only a few benefiting from qualitative and mixed methods approaches, thus limiting the exploration of contextual factors that influence maternal and newborn health outcomes. Therefore, efforts to improve maternal and newborn health in Nigeria and other similar contexts may need to focus greater attention on implementing MNH interventions and measuring context-specific challenges beyond the health facility. This may help to accelerate progress towards the SDG goal of ending preventable maternal and newborn deaths.

Figure 1: Integrated framework of the WHO recommendations, continuum of care approach and social determinants of maternal health.

Figure 2: Flow chart of the selection process of sources of evidence.

Figure 3: Mapping of interventions to the WHO recommendations, continuum of care approach and social determinants of health.

Figure 4: Number of publications per year.

Contributorship statement:

The conception and design of the research was by NN, AKA and PA. Data collection and analysis and interpretation of results were conducted by NN, AKA and PA. The first draft of the manuscript was written by NN, and all authors contributed to subsequent revisions. All authors read and approved the final manuscript.

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HEALTH	HEALTH TE	Health Systems: Availability of services (FP, ANC, postmatia Care, EMoC, blood, referral). Acceptability to community. Accessibility: distance, fees, related costs, medicines, and supplies. Quality of care: staff skills, technical competence.	Family Planning	Anagement of unintended pregnancy. Maternal health screening. Tetnaus immunization. External cephalic version. Induction of labour. Antibiotics for preterm labour Corticosteroids for respiratory distress. Magnesium Sulphate for eclampsia	MATERNAL A Induction of labour for prolonged pregnancy PPH prevention Active management of third stage of labour Management of PPH Caesarean section and prophylactic antibiotics	The second secon	ALTH Immunization		
ERNAL	RMEDIA	Community context: Awareness of care. Perceived severity and cause, Rural/urban residence, Social capital.			Home Visit	ŝ			
S OF MAT	OF MATI INTER	Family and Peer Influence: Family structure and decision making. Marital relationship/Spousal communication. Income/Access to resources. Support networks.	Male involvement interventions for MNH Companion of choice during labor and childbirth Participatory learning/action with women wis groups Community organised transport schemes						
ETERMINANT		Biological context: age, parity, health conditions, nutrition, pregnancy history. Behavioural: self-efficacy, knowledge, harmful practices, pre/intra/post care.	Prevention and management of STI and HIV. Folic Acid supplementation	Birth and emergency preparedness Counselling on FP Prevent/manage HIV Prevent/manage malaria Prevent pre-celampsia Smoking cessation		Prevent/treat anaemia Detect/manage sepsis Screen/initiate/continue ARVs for HIV. Hygiene cord and skin care Initiation of exclusive breastfeeding. Case management of infections.	Exclusive breastfeeding Complimentary feeding after fomths. Vitamin A supplementation. Prevent/manage infections. Management of severe acute malnutrition. Comprehensive care of infants exposed to HIV		
DCIAL D	SOCIAL D	Governance/Policies: Education, health finance/infrastructure, Occupation, Laws (gender equity, anti- violence, Social protection.	Laws to expand access to family planning and safe abortion. Policies to enhance access to education and lived opportunities. Public policy to provide funding and infrastructure for maternal health. Laws against marital rape, sexual and physical violence, FGM.						
S		Culture and social values: Women's status, Gender Norms, Religion Health Beliefs, Social Cohesion		Social prote	Prohibition of early or forced marriages. Right to own and inherit property. tection mechanisms, national health insurance schemes.				
	STR		Adolescent Pre- pregnancy	Pregnancy	Childbirth	Postnatal (mother/newborn)	Infancy/ childhood		
			CO	NTINUUM OF CAF	RE APPROACH				

Figure 1: Integrated framework of the WHO recommendations, continuum of care approach and social determinants of maternal health.

244x153mm (300 x 300 DPI)

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grey literature search:

n=274

Records excluded

n=748

Full Text articles excluded

with reasons n=27

No intervention/program for

maternal/newborn health

Full text not accessible (11)

No results reported (3)

Modelling study (1)

MNH (8)

(4)

Not focused on

Additional records retrieved

from citation search included

N=28



Số		pregnancy CONTINU	UM OF CA	RE APPR	(mother/newborn)	childhood	Continuum			
IRI		Adolescent	Pregnancy	Childbirth	Postnatal	Infancy/	Across			
SUCTI	Women's status, Gender Norms, Religion Health Beliefs, Social Cohesion			,-						
ŏ Ĕ	Culture and social values:	41,88,93								
AL	Occupation, Laws (gender equity, anti-									
3	Education, health finance/infrastructure,			71,7	•,• •,•••,• •					
DE	Covernance/Policies			71.7	4.79.85.94					
LE I	harmful practices, pre/intra/post care.									
N.	pregnancy history. Behavioural: self-efficacy, knowledge									
IN	age, parity, health conditions, nutrition,		6,80,89,92,99							
N	Biological context:	22,70	26,36,51,53,7		29,34,35,53,65	33				
IS	Income/Access to resources. Support networks									
OF	communication.									
MLN	Family structure and decision making. Marital relationshin/Spousal									
ER AT	Family and Peer Influence:		81	81			95			
ER N	Social capital.									
NA)	Perceived severity and cause.									
E H	Awareness of care.									
IE A	competence.						67			
	Quality of care: staff skills, technical									
Ħ	costs, medicines, and supplies.									
	Acceptability to community.		83,86,96,97							
	postnatal care, EMoC, blood, referral).		,63,64,78,80,	2,00,01,00,00			45,54,66,72,73			
	Availability of services (FP_ANC	42,40-49,55	9 50 52 56 60	2 68 81 83 86	24,30,31,39,73,78	09,75,91	87 90 98 25 43-			
	WHO RECOMMENDED	INTERVEN	TIONS FO	R MATER	NAL AND NEWE	ORN HEA	LTH			

Figure 3: Mapping of interventions to the WHO recommendations, continuum of care approach and social determinants of health.

246x166mm (300 x 300 DPI)



Figure 4: Number of publications per year.

64x38mm (300 x 300 DPI)

Supplementary File 1: Search strategy and terms

PubMed search terms: 1st June, 2020.

(((("Maternal Health"[Mesh]) OR "Infant, Newborn"[Mesh]) OR "Infant Health"[Mesh]) AND "Nigeria"[Mesh]) AND (("intervention" OR "program" OR "strategy"))

Embase search strategy: 11th July, 2020

- 1. "Maternal Health".mp. or maternal welfare/
- 2. "Infant, newborn".mp. or newborn/
- 3. "infant health".mp. or child health/
- 4. newborn care/ or "Newborn Health".mp.
- 5. 1 or 2 or 3 or 4

6. Nigeria.mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

7. ("intervention" or "program" or "strategy").mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

8. 5 and 6 and 7

Scopus search terms: 22nd July, 2020.

{maternal health} AND {newborn health} AND "Nigeria" AND "intervention" OR "program*".

Websites of key organisations searched on Google 22nd July 2020.

Jhpiego

USAID/Maternal and Child Survival Program

Maternal Newborn Child Health (MNCH2) program

World Health Organisation

United Nations Children's Fund

Bill and Melinda Gates Foundation

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Authors/ Publication Year & Lead author Institution	Geographical location/ setting/site	Study design and Objective(s)	Type of Intervention*	Stage in continuum of care & Target Population(s)	Reported Outcomes (or effectiveness/impact)	Intended outcomes achieved (Yes/No)	Barriers/challenges and/or Facilitators
Sloan et al ²⁴ (2018) International	Kano, Katsina and Kaduna (NW) urban and rural community and health facility	Program evaluation (before-after analysis): To evaluate the MNH program impact on reducing women's, neonatal and perinatal mortality, and stillbirth	Integrated maternal and neonatal health program: multiple interventions to address delays in accessing care, provide emergency obstetric care and manage complications*.	Pregnancy and childbirth Pregnant women and newborns	Statistically significant declines in Maternal mortality, Stillbirth, Neonatal mortality, and Perinatal mortality rates.	Yes: Improvements in maternal and newborn survival observed.	Facilitators: Promoting local ownership
Oguntunde et al ²⁵ (2018) Nigeria	Jigawa, Kaduna and Kano (NW) urban health facility	Post intervention analysis (qualitative study): To assess the Facility Health Committees established in three states in northern Nigeria as a platform to improve the quality of maternal and child health services.	Facility Health committees.*	Across the continuum of care Facility health committee members: facility health providers facility clients including pregnant women.	Committee members, health providers, and facility clients all agree that the committees have a tangible positive effect on the provision of maternal and child health services and quality of care.	Yes: Facility health committees appear to have a positive influence on quality of maternal and child health services in the selected facilities.	Barriers: Inadequate funding. Facilitators: Gaining trust and support of community members.

Supplementary File 2: Table S2: Data extraction tool and characteristics of included studies.

		- ~	~ .	_			
Alexander et	Oyo (SW)	RCT:	CleanCook	Pregnancy	Improved birth	Yes: Transition	Facilitators:
al ²⁶ (2018)	rural	To compare	ethanol Stoves		outcomes (mean birth	from traditional	Adequate education
	community	pregnancy	[plus training on	Pregnant	weight, average	biomass/	on the use of
International		outcomes in	how to use the	women	gestational age at	kerosene fuel to	intervention.
		women exposed	stove and prevent		birth) were higher in	ethanol among	
		to household air	the dangers of		ethanol stove users.	pregnant women	
		pollution from	smoke exposure].		Perinatal mortality	reduced adverse	
		wood and	-		(stillbirths and	pregnancy	
		kerosene fuel			neonatal deaths) was	outcomes.	
		stoves to women			twice as high in		
		who received			controls compared to		
		ethanol			ethanol stove users.		
		CleanCook					
		stoves.	20				
Abegunde et	Bauchi (NE)	Program	Integrated	Across the	Maternal, newborn	No: For several of	Barriers: Inadequate
al ²⁷ (2015)	rural	evaluation	MNCH/FP/RH	continuum of	and child health	the indicators, a	financing, inadequate
	health facility	(outcome):	program. *	care	indicators in the	modest	essential human
Nigeria		To estimate the			continuum of care	improvement	resources for
		impact of the		Women of	neither reached the	from baseline was	implementation.
		MNCH/FP/RH		childbearing	national average nor	found following	-
		interventions		age (15-49	attained the 90%	the program.	Facilitators:
		implemented in		years).	globally		Involvement of
		Bauchi State and			recommended		community members
		to evaluate the			coverage level.		in implementation.
		progress towards					•
		the achievement					
		of MDGs 4 and 5.					
Cannon et al ²⁸	Sokoto (NW)	Post intervention	Drugs/medication	Childbirth/Post	Community-based	Yes.	Barriers: Stocks outs,
(2017)	urban and rural	assessment	Use of	natal newborn	distribution of		shortage of staff,
	community	(qualitative):	Misoprostol and		Misoprostol and		socio-cultural
International		To assess the	Chlorhexidine	Mothers and	Chlorhexidine		barriers, myths, and
		perceived	gel. *	husbands	intervention was		fears about the
		successes and		health workers	successful with		medication.
		benefits of using		health service	overwhelming support		
		Misoprostol and		providers	for the use of the two		Facilitators: Early
		Chlorhexidine as		policy makers	drugs among users		advocacy with

		reported by different types of key stakeholders.			their spouses, and members of drug distribution system		government and broader stakeholder engagement.
Findley et al ²⁹ (2013) International	Katsina, Yobe, Zamfara (NE and NW) urban and rural community	Program evaluation (quasi- experimental design): Examine the extent to which the intervention program has facilitated improvements in key behaviours and outcomes	Integrated maternal, newborn, and child health program*	Across the continuum of care Women of childbearing age 15-49 years.	Between baseline and follow-up, the rates of anti-tetanus vaccination and early breast feeding increased. Also, more newborns were checked by trained health workers. Women were performing more of the critical newborn care activities at follow-up, relied less on TBAs for health advice, and more on trained health workers. Infant and child mortality declined.	Yes: In the context of ongoing improvements to the primary health care system, the participatory and community-based interventions focusing on improved newborn and infant care were effective at changing infant care practices and outcomes in the intervention communities	Facilitators: Integrated approach of program, quality improvement at facilities, communi participation and support.
Ishola et al ³⁰ (2017) Nigeria	Kano and Zamfara (NW) urban and rural community	Program evaluation (outcome): To characterize the effects of volunteer household counsellors (VHCs) upon improving	ACCESS/Materna l and Child Health Integrated Program (MCHIP)*	Pregnancy Pregnant women/mother	Mothers who received counselling had better knowledge of BPCR compared to women who did not. Mothers who received counselling had greater odds of recognising danger	Yes: VHCs have substantially increased knowledge of BPCR and danger signs among women.	

		readiness (BPCR)					
Orobaton et al ³¹ (2016) International	Sokoto state (NW) rural community	Program evaluation (process and outcome): To evaluate the community distributed SP program.	Community distribution of SP for Malaria-In- Pregnancy*	Pregnancy Pregnant women	Up to 95% coverage of SP1 doses in the intervention LGAs compared to 26% in the counterfactual LGAs. Measurable SP3+ coverage was 45% in the intervention and 0% in the counterfactual. Increased doses of IPTp-SP were associated with increases in newborn head circumference and lower odds of stillbirth.	Yes: Scale up and delivery of high impact IPTp-SP interventions in low resource malaria endemic settings, where few women access facility-based maternal health services	Facilitators: Authentic community ownership, inte approach of pro community involvement, pe influence.
Ezugwu et al ³² (2014) Nigeria	Enugu (SE) urban health facility	Post intervention assessment (retrospective review of program data): Evaluating the impact of the adoption of this evidence-based guidelines on maternal	Promotion of Evidence based management of obstetric complications	Pregnancy and childbirth Pregnant women	There was a significant reduction in case fatality rate for both eclampsia (15.8% vs. 2.7%; P = 0.024, odds ratio = 5.84) and Postpartum haemorrhage $(13.6\% \text{ vs. } 2.5\% \text{ P value} =$ 0.023, odds ratio = 5.5). There was $43.5%reduction in the MMR$	Yes: Implementation of evidence-based guidelines/ intervention is possible in low resource settings and contributes to a significant reduction in the maternal deaths.	

		mortality reduction.			with the intervention (488 vs. $864/100\ 000$ live births P = 0.039, odds ratio = 1.77).		
Orobaton et al ³³ (2015) Nigeria	Sokoto (NW) rural community	Post program evaluation (retrospective analysis of program data): To evaluate the impact of scaling up the use of chlorhexidine digluconate 7.1% gel using a community-based distribution system	Drugs/medication : Chlorhexidine digluconate 7.1% gel plus misoprostol tablets*	Childbirth and Postnatal (newborn). Mothers and newborns	Of newborns that received the intervention (gel), 99.97% survived past 28 days.	Yes: Community led efforts to scale up the use of a single dose application of chlorhexidine digluconate 7.1% gel and instructions on the hygienic care of the cord after application led to high rates of newborn survival.	Barriers: Inadequate financing/heavy reliance on donor funding, problems with supply/availability of commodities. Facilitators: Community ownership and active involvement of men, evidence-based advocacy to government and community leaders.
Disu et al ³⁴ (2015)	All six geopolitical zones	Post intervention assessment (cross sectional study):	Capacity Building: Neonatal	Postnatal (newborn)	Over a five-year period (2008 to 2012), a total of 727 health	Yes: Neonatal resuscitation training in Nigeria	¥
Nigeria	urban health facility	To evaluate the post-training neonatal resuscitation activities among doctors, nurses, and midwives across Nigeria	Resuscitation training	Health workers	workers were trained. At baseline, delivery attendance rates were 11 per doctor and 9 per nurse/midwife. These rates increased to 30 per doctor and 47 per nurse in 2012. Over 90% of doctors and nurses successfully used bag and mask to help	is well-subscribed, successful and the frequency and scope of step-down trainings are good.	

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					babies breathe in the post-training period.		
Kwast ³⁵ (1996) International	Oyo and Bauchi (SW, NE) urban	Program evaluation (outcome):	Safe MotherHood Project: Lifesaving skills	Childbirth and Postnatal (mother and	Significant reductions in postpartum haemorrhage and in	Yes: The upgrading of skills together	
	health facility	To describe selected	training for midwives and	newborn).	prolonged labour; and a decline in	with provision of supplies and a	
		MotherCare demonstration	interpersonal communication	Professional midwives	intrapartum stillbirths, postpartum sepsis and	supportive management	
		projects in the first 5 years	skills for all providers*		broken-down episiotomies was	policy ultimately saved lives	
		between 1989 and 1993 in Bolivia.	5		observed. Midwives performed more than	through an enhanced delivery	
		Guatemala,	2		half of all vacuum	environment.	
		Nigeria			reductions in maternal		
D1 136				D	death were seen.	XY X X	
Eluwa et al 30 (2018)	Kano (NW) urban	Quasi- experimental	Centering Pregnancy-group	Pregnancy	Statistically significant	Yes: Intervention had a positive	Barriers: lack of trust in health system.
()	health facility	design:	(CPG) prenatal	Pregnant	improvement in	effect on the use	strong influence of
Nigeria		To assess the	care program	women 15–49	proportion of women	of antenatal	socio-cultural beliefs
		effect of centering		years of age	attending ANC at least	services, facility	and practices.
		(CPG) antenatal		and new borns.	3rd trimester in	postnatal services.	
		care on the uptake			intervention versus	1	
		of antenatal care			control group. More		
		(ANC), facility			women in the		
		immunization			a health facility		
		rates for infants in			delivery, were more		
		Kano state.			likely to immunize		
					babies at 6 and 14		
					weeks and more likely		
					services		

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al ³⁷ (2017)	Nassarawa and FCT (NC) urban	Prospective matched cohort study:	Mentor Mothers program*	Postnatal (newborn)	Exposure to MM support was associated with higher	Yes: Closely supervised, organized MM	Facilitators: supportive supervision and
Nigeria	health facility	Investigate the impact of a structured peer support intervention on EID presentation and secondarily on HIV-free survival among HIV-exposed infants.		Mothers and newborns	odds of timely EID presentation among infants, compared with routine PS (adjusted odds ratios = 3.7, 95% confidence interval: 2.8 to 5.0).	support significantly improved presentation for EID among HIV- exposed infants and uptake of EID testing in a rural Nigerian setting.	quality of interactions between clients and mentors.
Qureshi et al ³⁸ (2011).	Sokoto (NW) rural	Randomised community trial:	Counselling on EBF by	Postnatal (mothers and	After counselling, the proportion of mothers	Yes: Counselling served as a useful	
International	community	To assess the impact of community volunteers to promote exclusive breastfeeding.	community volunteers*	newborn). Nursing mothers	with intention to EBF (a knowledge score>50%) increased significantly and women who were exclusively breastfeeding increased. A significant proportion of women agreed EBF was beneficial to the child.	strategy for promoting the duration of EBF for six months and for developing support systems for nursing mothers.	
Davies- Adetugbo et al ³⁹ (1997)	Osun (SW) rural community	Pre/post intervention assessment: To evaluate the	Training of community extension health workers on	Postnatal (mothers and newborn)	Significant increase in early initiation of breastfeeding by mothers who	Yes: The results suggest that the training enhanced the health	Barriers: Negative attitudes towards EBF.
Nigeria		impact of training community extension health	promoting breastfeeding*	Pregnant women	delivered at perinatal facilities staffed by ISBFP-trained PHC workers 32% of the	workers' knowledge about EBF and attitudes towards	Facilitators: Community participation and linkages trainings

	1	-	1	1		1	•
		breastfeeding			deliveries in	breastfeeding, and	conducted in local
		knowledge and			intervention area	that these workers	language.
		practice among			reported early	have had a	
		mothers in rural			initiation of breast-	positive impact on	
		communities			feeding (within 30min	at least one aspect	
					of delivery) compared	of breastfeeding	
					with only 6% in the	behaviour in the	
					control area. In all	community:	
					instances, trained PHC	mothers' timely	
					workers had better	initiation of	
					knowledge of and	breastfeeding	
					attitudes towards	oreastreetanig.	
					breastfeeding and		
					made the correct		
					recommendations on		
					all aspects of		
					breastfeeding than		
					untrained controls		
Oiofoitimi at	$O_{\rm VO}(\rm SW)$	Dro/post	Nutritional	Prognancy	The experimental	Vos: Nutritional	
140 (1082)	Uy0 (SW)	intervention	Nutritional	riegnancy	aroup had a	acumalling	
al (1962)	uivali boolth fooility		counsening.	Descenant	gloup had a	counsening	
Nicorio	nearth facility	To investigate the		Pregnant	significant patient of	served to correct	
INIgena		10 investigate the		women	$(\mathbf{P} < 0.02) \text{ and } \mathbf{b} \text{ assure}$		
		effect of regular			(P < 0.02) and heavier	assumptions and	
		nutritional			babies ($P < 0.01$) than	aversions about	
		counselling and			the control group.	food.	
		tear mechanism					
		techniques to					
		motivate pregnant					
		women to					
		consume foods.					
Danmusa et al ⁴¹	All six	Program	Magnesium	Pregnancy	A significant drop in	Yes: Reductions	Barriers: High
(2014)	geopolitical	evaluation	sulphate for the		the case fatality rate	in deaths due to	frequency of hom
	zones	(process):	treatment of pre-	Pregnant	due to eclampsia from	eclampsia, and	births, resistance
International	urban and rural	To describe the	eclampsia and	women	20.9% before the start	states have	change from heal
	health facility	findings of	eclampsia*		of services to 2.3%	collectively made	providers, inadeq
	-	program	_	1	ofter was observed in	significant	number of trained

		evaluation, including the challenges encountered while implementing the projects, the successes achieved, and existing opportunities for future scaling up of the services across the			the lead state, Kano. A significant case fatality drop (from 15.1% to 2.7%) across the six state hospitals lends local legitimacy to the use of the drug to treat pre-eclampsia and eclampsia.	progress towards the full integration of the use of magnesium sulfate into the Nigerian healthcare system.	staff for implementation, p quality of services Facilitators: Advocacy to stakeholders, community involvement, supportive nationa health policies, enhanced monitoring.
Maternal, Newborn and Child Health Programme ⁴² (2017) Nigeria	Jigawa, Kaduna, Kano, Katsina, Yobe, Zamfara (NW and NE) rural community	Program process and outcome evaluation: Evaluation of a program to increase access and uptake to Reproductive, Maternal, Newborn and Child Health (RMNCH) services for hard- to-reach communities	Integrated MNCH outreach services: increasing demand and access to MNCH services in hard- to-reach communities*	Across the continuum of care. Women and young married adolescents.	271 hard-to-reach communities accessed with integrated RMNCH outreach services.	Yes: Prior to intervention, the outreach teams were not meeting the full needs for maternal and child health in communities. The program has ensured a continuum of care for MNCH services, even in the most rural locations.	Facilitators: Community engagement, community needs assessment, suppo from states and national governments.
Maternal and Child Survival Program ⁴³ (2018) Nigeria	Kogi, Ebonyi (NC and SE) rural health facility	Post program outcome evaluation: To reduce newborn mortality through the	Provision of key newborn interventions: neonatal resuscitation, KMC etc*	Postnatal (newborn) newborns	ENC defined as provision of skin-to- skin contact after birth, clean cord care with or without CHX, and early initiation of breastfeeding -within	Yes: MCSP's newborn health strategies have promoted the scale up of high impact interventions that	Facilitators: Incorporation into local authority's strategy health pla demand creation activities, staff retention.

		implementation of key newborn interventions.			30 minutes of birth increased from about 26% to 92%. Over 90% of asphyxiated babies in intervention states received successful neonatal resuscitation. Uptake and use of CHX	address the three major causes of newborn morbidity and mortality in Nigeria.	
Maternal and Child Survival Program ⁴⁴ (2018) Nigeria	Kogi, (NC and SE) rural health facility	Post program outcome evaluation: To increase voluntary family planning uptake among postpartum women delivering in health facilities in Kogi and Ebonyi states	Integrated Post- Partum Family Planning Intervention*	Postnatal (mothers) Postpartum women	PPFP services were initiated in 233 health facilities, with 637 health care workers empowered to provide PPFP services. This increased the pool of competent service providers for both post-partum FP and long-acting reversible contraceptives (LARC). There was improved strategic planning for family planning in both states.	Yes: Trends show contraceptive access for voluntary post- partum family planning has increased in both states, despite initial low contraceptive use prevalence with an estimated 25k pregnancies averted.	Facilitators: Availability of competent health providers, effective provision of health information to women.
Maternal, Newborn and Child Health Programme ⁴⁵ (2017) Nigeria	Jigawa, Kano, Kaduna, Katsina, Yobe, Zamfara (NW, NE) rural community	Program outcome evaluation: To improve health message delivery to men and encourage their active role in	Male Support Groups*	Across the continuum of care Males in intervention states.	Over 1500 support groups established and supported. Over 4,000 interpersonal communication sessions held.	Yes.	Facilitators: Active community/stakeho er engagement, community ownership.

		women and child health.					
Maternal, Newborn and Child Health Programme ⁴⁶ (2016) Nigeria	Jigawa, Kano, Kaduna, Katsina, Yobe, Zamfara (NW, NE) rural health facility	Program outcome evaluation: To assess outcome of an intervention increasing the uptake of long- acting reversible contraception services in primary Health centres through Competency- based Training.	Integrated Competency Based Training for health workers	Pre-pregnancy Women of childbearing age	851 health care providers have been trained in the integrated package of reproductive, maternal, newborn and child health (RMNCH), including LARC services.	Yes.	Facilitators: Demand creation activities, good commodity supply chain.
Abegunde et al ⁴⁷ (2015) Nigeria	Sokoto (NW). urban and rural community and health facility	Program evaluation- outcome: To assess the impact of interventions implemented between 2012 and 2013.	Integrated management of (MNCH)/FP/repr oductive health*	Across the continuum of care women, newborns and children under 5yrs of age	None of the nine indicators associated with the continuum of maternal, neonatal, and childcare satisfied the recommended 90% coverage target for achieving MDGs 4 and 5.	No: The majority of the LGAs did not meet intended targets and require intensified program/ intervention.	Barriers: Low quality data for planning the program.
Mckaig et al ⁴⁸ (2009) International	Kano (NW) urban and rural community and health facility	Program outcome evaluation (qualitative study): To examine integrated MNCH/FP services as a means towards meeting the family planning	Scale-up of postpartum family planning*	Across the continuum of care policymakers, health care providers, community members.	Significant increases in number of FP clients and method use per site following the implementation of the program.	Yes: The approach systematically increases MNCH/FP integration and had a positive effect on service use, particularly FP, even in a very	Barriers: Negative religious/community attitudes towards MNCH services. Facilitators: Service integration, community linkages

		and reproductive health needs of women in the postpartum period.				conservative environment.	
Kana et al ⁴⁹ (2015) Nigeria	countrywide urban and rural health facility and community	Systematic review: To describe and indirectly measure the effect of the Maternal, Newborn and Child Health (MNCH) interventions implemented in Nigeria from 1990 to 2014	Interventions for maternal and child health	Across the continuum of care mothers, newborns, under-five children.	The national MMR shows a consistent reduction (Annual Percentage Change (APC) = -3.10% , 95% CI: -5.20 to -1.00%) with marked decrease in the slope observed in the period with a cluster of published studies (2004–2014).	Yes: The development of MNCH policies, implementation and publication of interventions corresponds with the downward trend of maternal and child mortality in Nigeria	
Abdul-Hadi et al ⁵⁰ (2013) Nigeria	Gombe (NE) rural community	Intervention assessment (quasi- experimental design): To demonstrate effectiveness of Community Based Distribution of Injectable Contraceptives Using Community Health Extension Workers.	Community based distribution (CBD)of injectable contraceptives using community health extension workers*	Pre-pregnancy	The CBD mean couple years of protection (CYP) for injectables- depomedroxy- progesterone acetate (DMPA) and norethisterone enantate was higher (27.72 & 18.16 respectively) than the facility CYP (7.21 & 5.08 respectively) (p < 0.05) with no injection related complications. The CBD's mean CYP for all methods was also found to be four	Yes: Community based distribution of contraceptives was successful.	
		For peer reviev	v only - http://bmjope	12 n.bmj.com/site/abo	out/guidelines.xhtml		

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					times higher (11.65) than that generated in health facilities (2.86) (p < 0.05)		
Speizer et al ⁵¹ (2014) International	Kaduna, Abuja- FCT, Kwara, Oyo and Edo (NC, NW, SS and SW) urban community	Longitudinal evaluation of program/intervent ion: To examine the role of demand generation activities undertaken as part of the Urban RH Initiative programs- seeking to increase modern contraceptive use by 20 percentage points in targeted urban areas, particularly among the urban poor	Family planning demand creation and supply side interventions.*	Pre-pregnancy Women of childbearing age (15-49 years)	Outreach by community health or family planning workers as well as local radio programs was significantly associated with increased use of modern contraceptive methods. Television programs had a significant effect on modern contraceptive use. Program slogans and materials distributed across the cities were also significantly associated with modern method use.	Yes: Multi-level targeted demand generation activities contributed to increasing modern contraceptive use in urban areas, leading to improved access to maternal and reproductive health services.	Facilitators: community engagement.
Hotchkiss et al ⁵² (2011) International	Countrywide urban and rural health facility	Post program evaluation-cross sectional study: To investigate whether the expansion of the role of private providers in the provision of modern	Expansion of the private commercial sector in the provision of contraceptive supplies	Pre-pregnancy Women of childbearing age (15-49 years).	Proportion of women who report obtaining the contraceptive supplies from the commercial private sector increased by 69 percent over the 1999 to 2008 period. In Nigeria, the private commercial sector became the most	Yes: The expansion of the private commercial sector supply of contraceptives decreased inequities in the use of modern contraceptives in Nigeria	Facilitators: social marketing of intervention to cre demand.

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		supplies is associated with increased horizontal inequity in modern contraceptive use.			important source of contraceptive supplies to women in poorest wealth quintile group. In addition, women in better off wealth quintiles also became increasingly reliant on the private commercial sector.		
Fayemi et al ⁵³ (2011) Nigeria	Bauchi, Gombe, Plateau, Edo, Ogun (NC, NE, SS, SW) rural community	Longitudinal evaluation of program/ intervention: To improve maternal mortality reduction through increasing contraceptive uptake in 10 rural local government areas (LGAs)in five Nigerian states.	Community Based Delivery (CBD) of non- prescriptive family planning services and the treatment of minor ailments*	Pregnancy Women of childbearing age (15-49 years).	Increase in the proportion of community members who had utilised FP commodities at all, from 28% at baseline to 49%, and an increase in the proportion of current contraceptive users from 16% at baseline to 37%. An increase in knowledge of common family planning methods, including male and female condoms, injectables and pills.	Yes: A community-based distribution approach played a critical role in enhancing access to Reproductive Health and Family Planning information and services in the project communities.	Barriers: Inadequat financial support for program, poor support from spous of participating women, misconceptions of community member about family planning. Facilitators: Advocacy and community engagement, involvement of mai in implementation, demand creation activities, regular monitoring, and evaluation.
		For peer review	w only - http://bmjope	14 en.bmj.com/site/ab	out/guidelines.xhtml		

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Ogu et al ⁵⁴	Kaduna, Kano,	Pre/Post-	Capacity-building	Pregnancy	458 trained private	Yes: Building the	Facilitators: detailed
(2012)	Adamawa,	intervention	workshops for		medical doctors and	capacity of	community needs
	Bauchi, Borno,	(quasi-	health workers to	Women of	839 nurses and	private medical	assessment,
Nigeria	Taraba, and	experimental):	improve post-	childbearing	midwives across 430	providers reduced	community
	Katsina, Niger	To investigate the	abortion care.	age (15-49	private clinics treated	maternal	engagement,
	(NC, NE, NW)	effectiveness of		years).	a total of 17,009	morbidity and	culturally appropriate
	rural and urban	an intervention			women over the 10	mortality	health education.
	health facility	designed to			years of the project	associated with	
		improve the			(about 2,100 women	induced abortion	
		capacity of			annually). Not a single	in northern	
		private medical			case of abortion-	Nigeria.	
		doctors to offer			related maternal		
		quality abortion			mortality was		
		and postabortion			recorded, with only 33		
		care to women in			women experiencing		
		northern Nigeria			mild complications,		
					while none suffered		
					of abortion cara. At		
					the same time, there		
					was a reduction in		
					treatment cost and a		
					doubling of the		
				4	contraceptive uptake		
					by the women.		
		1	I	1	1 V		L

Mens et al ⁵⁵ (2011) International	Edo (SS) rural community	Pre/Post- intervention evaluation: Explore peer to peer education as a tool in raising knowledge of MIP among women of childbearing age and preventive practices.	Peer led health education campaign to address malaria in pregnancy*.	Pregnancy Women of childbearing age: 15-49 years	The peer education campaign had a significant impact in raising the level of knowledge among the women.	Yes: The knowledge of women of childbearing age on malaria in pregnancy and its preventive measures increased.	
McNabb et al ⁵⁶ (2015) International	Abuja-FCT and Nassarawa (NC) urban health facility	Pre/post intervention assessment: To determine if introducing the mobile app: 1) improved the quality of ANC services provided, and 2) improved client satisfaction with ANC services provided	An m-health technology intervention for CHEWs/HCWs to provide higher- quality ANC services*	Pregnancy Pregnant women	Overall, the intervention was associated with higher quality of ANC scores, with these improvements observed in multiple domains of care, including health counselling, technical services provided, and quality of health education. A significant improvement in overall client satisfaction was observed.	Yes: Introduction of a low-cost mobile case management and decision support application led to behaviour changes and improved the quality of services provided by a lower-level cadre of healthcare workers.	
		For peer review	w only - http://bmjope	16 n.bmj.com/site/abo	put/guidelines.xhtml		

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l evaluat munity program ion: To asse impact distribu ITN to and nur mothers commu Nigeria asympt malaria parasita the mai measur	ion of Campaign: increased availability iss the of free distribution pregnant sin a rural nity in , using omatic memia as	postnatal (mother and newborn) ee n to pregnant yomen women/nursing en mothers and itenatal, newborns nd ion	but insignificant rise in asymptomatic malaria parasitaemia post-distribution of ITNs. Out of the 990 subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	ITN has a capacity to reduce mosquito bites and malaria prevalence, our study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
imunity programion: To asse impact distribu ITN to and num mothers commu Nigeria asympt malaria parasita the mai measur	n/intervent increased availability ITNs for fr distribution pregnant and childre under at an postnatal ar immunizati clinics*	(mother and newborn) eee n to pregnant yomen women/nursing en mothers and itenatal, newborns nd ion	in asymptomatic malaria parasitaemia post-distribution of ITNs. Out of the 990 subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	capacity to reduce mosquito bites and malaria prevalence, our study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
ion: To asse impact distribu ITN to and nur mothers commu Nigeria asympt malaria parasita the mai	availability ITNs for fr distribution pregnant s in a rural nity in , using omatic aremia as	v of newborn) ee pregnant vomen women/nursing en mothers and itenatal, newborns nd	malaria parasitaemia post-distribution of ITNs. Out of the 990 subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	mosquito bites and malaria prevalence, our study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
To asse impact distribu ITN to and nur mothers commu Nigeria asympt malaria parasita the mai measur	ess the of free distribution of pregnant wand childre under at an postnatal ar immunization, using omatic distribution of pregnant wand childre under at an postnatal ar immunization of pregnant wand childre under at an	ree pregnant vomen/nursing mothers and newborns nd	post-distribution of ITNs. Out of the 990 subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	and malaria prevalence, our study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
impact distribu ITN to and nur mother commu Nigeria asympt malaria parasita the mai measur	of free tion of pregnant sing s in a rural nity in , using omatic distributior pregnant w and childre under at an postnatal ai immunizati clinics*	n to pregnant yomen women/nursing m mothers and itenatal, newborns nd ion	ITNs. Out of the 990 subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	prevalence, our study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
distribu ITN to and nur mother commu Nigeria asympt malaria parasita the mai measur	attion of pregnant w pregnant sing a rural nity in , using omatic memia as	vomen women/nursing en mothers and itenatal, newborns nd ion	g subjects recruited, 470 tested positive with asymptomatic malaria parasitaemia.	study showed a non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
ITN to and nur mothers commu Nigeria asympt malaria parasita the mai measur	pregnant sing s in a rural nity in , using omatic aemia as	en mothers and itenatal, newborns nd ion	tested positive with asymptomatic malaria parasitaemia.	non-significant increase in prevalence of malaria after 6 months use in a rural agrarian	
and nur mother commu Nigeria asympt malaria parasita the mai measur	s in a rural nity in , using omatic aemia as	itenatal, newborns nd ion	asymptomatic malaria parasitaemia.	increase in prevalence of malaria after 6 months use in a rural agrarian	
mothers commu Nigeria asympt malaria parasita the mai measur	s in a rural nity in , using omatic hemia as	nd ion	parasitaemia.	prevalence of malaria after 6 months use in a rural agrarian	
commu Nigeria asympt malaria parasita the mai measur	nity in immunizati , using clinics* omatic	ion		malaria after 6 months use in a rural agrarian	
Nigeria asympt malaria parasita the mai measur	, using clinics* omatic			months use in a rural agrarian	
asympt malaria parasita the mai measur	omatic nemia as			rural agrarian	
malaria parasita the mai measur	iemia as			8	
parasita the mai measur	emia as			Nigerian	
the mai				community. This	
measur	n outcome			suggests ITN	
measur	e			intervention must	
				be complemented	
				with awareness	
				campaigns and	
				other vector	
				control strategies.	
chi State Program	n Standards-	Based Across the	An increase in the	Yes: Intervention	
) evaluat	ion- Manageme	ent and continuum of	percentage of SBM-R	helped health	
n process	and Recognitio	n care	standards for MNH	facilities achieve	
th facility outcom	e: (SBM-R)	Health service	achieved was	more compliance	
To asse	ss whether program	providers	observed for 3 years	with MNH quality	
increase	ed		in succession after the	of care	
complia	ance with		implementation of	performance	
set perf	ormance		SBM-R at all 23	standards, the use	
standar	ds was		facilities. In addition,	of evidence-based	
associa	ted with		a decline in MMR and	delivery practices	
improv	ed		NMR observed, along	increased, leading	
materna	al and		with an increase in the	to decreases in	
neonata	ıl		active management of	maternal and	
outcom	es		third stage of labour		
c)) urtl	hi State Program evaluat 1 process h facility outcom To asse increase complia set perf standar associa improv materna neonata outcom	hi State Program evaluation- evaluation- Manageme process and Recognitio outcome: (SBM-R) To assess whether increased compliance with set performance standards was associated with improved maternal and neonatal outcomes	hi StateProgram evaluation- process and outcome: To assess whether increased compliance with set performance standards was associated with improved maternal and neonatal outcomesStandards-Based Management and Recognition (SBM-R) programAcross the continuum of care Health service providers	hi StateProgram evaluation- process and outcome: To assess whether increased compliance with set performance standards was associated with improved maternal and neonatal outcomesStandards-Based Management and Recognition (SBM-R) programAcross the continuum of care providersAn increase in the percentage of SBM-R standards for MNH achieved was observed for 3 years in succession after the implementation of SBM-R at all 23 facilities. In addition, a decline in MMR and NMR observed, along with an increase in the active management of third stage of labour	hi StateProgram evaluation- n h facilityStandards-Based Management and Recognition (SBM-R) process and h facilityAcross the continuum of care providersAn increase in the percentage of SBM-R standards for MNH achieved was in succession after the improved standards was associated with improved maternal and neonatal outcomesStandards-Based Management and Recognition (SBM-R) programAcross the continuum of care providersAn increase in the percentage of SBM-R standards for MNH achieved was observed for 3 years in succession after the improved maternal and neonatal outcomesManagement and Recognition (SBM-R) programAcross the continuum of care providersAn increase in the percentage of SBM-R standards for MNH achieved was in succession after the implementation of SBM-R at all 23 facilities. In addition, a decline in MMR and delivery practices in creased, leading with an increase in the active management of third stage of labourCampaigns and other vector control strategies.

					and a decline in the incidence of postpartum haemorrhage.	neonatal mortality.	
Chabikuli et al ⁵⁹ (2009) Nigeria	71 health facilities across Nigeria urban and rural	Pre/post evaluation of program: To measure changes in service utilization of a model integrating family planning with HIV counselling and testing (HCT),	a referral-based, co-located family planning–HIV integration model	Pregnancy Women of childbearing age: 15-49 years	Attendance at family planning clinics and mean couple year of protection increased significantly following integration of services. Attendance by men at family planning clinics was significantly higher among clients referred	Yes: Family planning– HIV integration u sing the referral model improved family planning service utilization by clients accessing HIV services due to increased	Barriers: Low utilisation of intervention due to user fees, long waiting times. Facilitators: decentralisation of services, integratio of programs.
		antiretroviral therapy (ART) and prevention of mother-to-child transmission (PMTCT) in the Nigerian public health facilities.		PLien	from HIV clinics.	referrals.	
Kalu et al ⁶⁰ (2012)	Ebonyi (SE) urban health facility	Post-intervention evaluation: To review the	Provision of post- abortion care and effective linkage	Pregnancy Health service	About a third of the PAC care providers had formal training for	No: There is poor integration between	
Nigeria		implementation of Post Abortion Care and effective linkage to other post abortion services in Ebonyi State University Teaching	to other post abortion services*	providers	the implementation of the PAC services. The commonest intervention offered the patients was Manual Vacuum Aspiration (MVA). Only 15% of the	emergency post abortion care and other reproductive health services in the centre, resulting in high rates of maternal mortality related	

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3 4 5 6 7			Abakaliki, Nigeria			satisfied with the linkage between PAC and the Family Planning services.	to abortion complications.	
9 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	Joseph et al ⁶¹ (2011) International	Edo (SS) urban health facility	Cohort study: To assess adverse pregnancy outcomes in HIV infected women who received highly active antiretroviral therapy (HAART) from early pregnancy compared with untreated- maternal HIV infection.	Administration of highly active antiretroviral therapy (HAART) from early pregnancy*	Pregnancy Pregnant women	Intrauterine growth restriction (IUGR), pre-term birth and caesarean delivery were significantly higher among women with untreated-HIV infection in pregnancy compared with women who received HAART from early pregnancy.	Yes: Provision of HAART significantly reduces adverse pregnancy outcomes.	
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	Ojengbede et al ⁶² (2010) Nigeria	Kano, Katsina, Oyo (NW, SW) urban health facility	Pre/post intervention evaluation: To examine the impact of the NASG on PPH at four referral facilities in Nigeria	Provision of non- pneumatic anti- shock garment (NASG) for PPH.*	Childbirth Pregnant women	Mean measured blood loss decreased by 80% between pre- intervention and post- intervention phases. Mortality decreased from 18% pre- intervention to 6% in the NASG phase (RR = 0.31 , 95% CI 0.15– 0.64, p = 0.0007).	Yes: The use of the NASG as part of standard management of PPH and hypovolemic shock at four referral facilities in Nigeria was associated with a significant reduction in blood loss and maternal mortality.	Facilitators: Frequent training, monitoring and evaluation.
Cl .:: 163	$\mathbf{E} = 1 \cdot (\mathbf{C} \mathbf{C})$	D	E	D	Of the 12 share	V The lase	E	
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Chiwuzie et al $^{\circ\circ}$	Edo(SS)	Program	Emergency Ioan	Pregnancy	Of the 13 clans	Yes: The loan	Facilitators:	
(1997)		evaluation (quasi-	runds to improve	Woman of	contacted, 12	rund improved	community	
Nicorio	community	experimental design):	access to obstetric	women of	successfully faunched	access and	involvement, quanty	
Nigeria		design):	care	childbearing	Ioan runds. In the 1st	reduced delay in	improvement of	
		To evaluate a		age: 15-49	year of the operation,	reaching care.	nealth facilities.	
		community		years	85% of loans			
		intervention		community	requested by			
		designed to		leaders	women/families were			
		increase access to		health workers	granted and 93% loans			
		emergency			were repaid in full. In			
		obstetric care			addition to being used			
		qualitative			for transport, loans			
		methods used			were used to help pay			
					for drugs, blood, and			
T 1 164					hospital fees.	** * 1 1	N 1 1 1	
Tukur et al ⁰⁴	Kano (NW)	Evaluation of	Training on the	Pregnancy	1,045 patients with	Yes: Introduction	Barriers: health	
(2012)	urban and rural	program (quasi-	use of MgSO4 for		severe preeclampsia	of MgSO4 in low-	workers resistance to	
	health facility	experimental):	severe pre-	Pregnant	and eclampsia were	resource settings	change.	
Nigeria		To evaluate	eclampsia and	women	treated. The case	led to improved		
		whether a new	eclampsia in low-		fatality rate for severe	maternal and		
		low-cost strategy	resource settings*		pre- eclampsia and	foetal outcomes in		
		for the			eclampsia fell from	patients		
		introduction of			20.9 % (95 % Cl	presenting with		
		magnesium			18.7–23.2) to 2.3 %	severe pre-		
		sulphate			(95 % CI 1.5–3.5).	eclampsia and		
		(MgSO4) for			The perinatal	eclampsia.		
		preeclampsia and			mortality rate was			
		eclampsia in low-			12.3% compared to			
		resource areas			35.3 % in a centre			
		will result in			using diazepam.			
		improved						
		maternal and						
		perinatal						
		outcomes.						

Prata et al ⁶⁵	Kaduna (NW)	Before -after	Birth	Pregnancy/chil	Community	Yes: Community	Barriers: poor
(2012)	urban	analysis (quasi-	preparedness and	dbirth	mobilization efforts	mobilization had	diffusion/
	community	experimental):	the prevention of		using TBAs, and	a significant	understanding of
International		To demonstrate	postpartum	Pregnant	CORPs reached most	impact on the	health messages led
		the role of	haemorrhage	women	women with	successful	to reluctance to
		community	through		information about	distribution and	participate in
		mobilization	prophylactic use		postpartum	uptake of a	intervention.
		efforts and	of misoprostol in		haemorrhage and	potentially life-	
		examine the	home births*.		misoprostol (88%).	saving health	Facilitators:
		safety and			Availability of	intervention.	community
		feasibility of			misoprostol at the		participation, use of
		misoprostol			community level gave		culturally appropria
		distribution for			over 70% of enrolled		terms to disseminate
		use in home births			women protection		information about
		in Nigeria			against postpartum		intervention.
					haemorrhage. Many		
					women demonstrated		
					an understanding of		
					the threshold for		
					postpartum		
					haemorrhage, the risk		
					of death from this		
					disease, and the role		
					of misoprostol in		
					preventing and		
			~	~	treating it.	~	
Hunyinbo et	Ogun (SW)	Pre/post	Clinical/practice	Childbirth	Overall, management	Yes: Criteria-	Barriers: Insufficien
aloo	urban	evaluation of	guidelines for	_	of complications such	based clinical	supply of essential
(2008)	health facility	hospital-based	optimal	Pregnant	obstetric	audit was feasible	commodities, low
		intervention:	management of	women	haemorrhage,	and acceptable	morale of the staff.
Nigeria		To evaluate the	obstetric		eclampsia, obstructed	strategy for	
		use of criteria-	complications*		labour, and genital	improving	
		based audits in			sepsis improved	management of	
		improving the			significantly. Clinical	life-threatening	
		quality of			monitoring, drug use,	obstetric	
		hospital-based			and urgent attention	complications.	
				21			
		F					
		For peer review	w only - http://bmjope	n.pmj.com/site/abo	out/guidelines.xhtml		

Okonofua et al^{67} (2013)H C F FNigeriaa	Kano, Lagos,			1			
S u h	Plateau, Borno and Enugu (NW, SW, SS, NE, SE) urban health facility	Pre/Post- intervention (multi-centre) study: To investigate the effectiveness of an intervention aimed at improving the case management of eclampsia	Health worker training to improve management of pre-eclampsia	Pregnancy Pregnant women	The post intervention case fatality rate of 3.2 % was significantly less than the pre- intervention rate of 15.1 % (p < 0.001). The overall maternal and perinatal mortality ratios and rates respectively in the hospitals declined from 1199.2 to 954 per 100,000 deliveries and 141.5 to 129.8 per 1000 births, respectively (p > 0.05).	Yes: An intervention to build the capacity of care-providers to use an evidence-based protocol for the treatment of eclampsia in Nigeria was successful in reducing associated case fatality rate, maternal and perinatal mortality.	Barriers: Difficu in supply of commodities. Facilitators: trair and retraining of health providers, monitoring, advocacy to poli makers.
Igwegbe et al ⁶⁸ A (2012) u h Nigeria	Anambra (SE) urban health facility	Impact evaluation: To evaluate the impact of the introduction of the Service Compact with all Nigerians (SERVICOM) contract on maternal health at Nnamdi Azikiwe University	Improve quality of health services through SERVICOM.	Pregnancy Pregnant women	There was a progressive reduction in MMR and relative risk of maternal mortality, with a corresponding increase in live births. The presentation– intervention interval improved significantly from 2006. This measure significantly reduced type 3 delays	Yes: The resolution by the staff and management to change attitudes and service delivery according to the tenets of SERVICOM led to a gradual and consistent improvement in	

		Teaching Hospital, Nnewi, Nigeria.			from 2006, and consequently improved maternal mortality. Overall, MMR of 1098 per 100 000 live births in 2004 declined to 691 per 100,000 in 2010.	all service points within the hospital. This measure significantly reduced the delays to treatment and led to reductions in maternal mortality.	
Singh et al ⁶⁹ 2017). nternational	All geopolitical zones (NE, NW, NC, SS, SE, SW) urban and rural community and health facility	Observational (Retrospective cohort analysis): To assess the level of practice of SSC in Nigeria and determine whether it is associated with early initiation of breastfeeding i.e., within the first hour of life	skin to skin contact*	Postnatal (newborn) newborns	Only about 10% of mothers reported babies receiving (skin- skin contact) SSC. Newborns who were perceived to be large at birth were significantly more likely to experience SSC than smaller newborns.	No: Coverage of SSC remained low despite known benefits for newborns without complications.	Facilitators: availability of skilled workers are health facilities, equitable diffusion of maternal health knowledge.
Galadanci et 1 ⁷⁰ (2011) Vigeria	Kano and Kaduna (NW) rural health facility	Program evaluation (process and outcome): To assess the 2- year results of an ongoing total quality assurance project in 10 Nigerian hospitals in a rural setting,	Quality assurance project to improve maternal and neonatal mortality.	Across the continuum of care Pregnant women	The mean maternal mortality ratio (MMR) was reduced from 1790 per 100,000 births in the first half of 2008 to 940 per 100 000 births in the second half of 2009. The average foetal mortality ratio (FMR) decreased slightly	Yes: Continuous monitoring of quality assurance in maternity units raised the awareness of the quality of obstetric performance and improved the quality of care provided thereby	

		on the MMR and foetal mortality ratio (FMR) in these hospitals from 2008 to 2009.			from 84.9 to 83.5 per 1000 births.	improving MMR and FMR.	
Gummi et al ⁷¹ (1997)	Kebbi (NW) rural community	Pre-post intervention assessment: To assess the effect of community education interventions to encourage utilization of emergency obstetric facilities	Community education intervention to increase knowledge and utilisation of health facilities*	Across the continuum of care Women of childbearing age husbands community leaders	A post-intervention mini survey showed knowledge gains of over 30% on awareness of the causes of maternal death, nature of obstructed labour, signs of pre- eclampsia, need for prompt treatment, and importance of delaying marriage. The increase was greatest on the need for prompt care for women with obstetric complications. The case fatality rate declined from 38 % in 1991 to 5% in 1995.	No: Increased awareness of the signs of obstetric complications and the need for prompt treatment among community women and men did not result in greater utilization of emergency obstetric services at the facilities studied.	Barriers: Needing husband's permissio to participate, highe costs of emergency obstetric services.
Miller et al ⁷² (2009) International	Katsina (NW) urban health facility	Intervention assessment (quasi- experimental): To determine whether the non- pneumatic anti- shock garment (NASG) can	Non-pneumatic anti-shock garment (NASG) for obstetric haemorrhage*	Childbirth Pregnant women	Mean measured blood loss in the intervention phase was 73.5± 93.9mL, compared with 340.4±248.2 mL pre-intervention (P<0.001). Maternal mortality was lower in the intervention phase	Yes: The NASG showed potential for reducing blood loss and maternal mortality caused by obstetric haemorrhage- related shock	Barriers: Limited access to services.

		improve maternal outcomes.			than in the pre- intervention phase (7 [8.1%]) vs 21 [25.3%]) (RR 0.32; 95% CI, 0.14 –0.72).		
Odusanya et al ⁷³ (2003) Nigeria	Edo (SS) rural community	Pre-post program evaluation: To compare vaccination coverage obtained at the baseline and post- intervention.	Privately financed immunization program to increase immunization coverage in a rural community*	Postnatal (newborn) newborns children up to 2 years of age	Two years after the program was started, immunization coverage rates were 94% for BCG, 88% for DTP (third dose), and 82% for measles. 84% percent of children were fully immunized against all six diseases, compared with 43% at the commencement (p<0.0001). Hepatitis- B coverage (three doses) was 58%.	Yes: The vaccination program has significantly improved vaccination coverage.	
Amoran et al ⁷⁴ (2013) Nigeria	Ogun (SW) rural community	Intervention evaluation (quasi- experimental): To determine the effect of malaria education programme on the uptake of insecticide-treated nets (ITN) among nursing mothers in rural communities in	Health education intervention on malaria prevention practices among nursing mothers in rural communities*	Pregnancy Nursing mothers	Knowledge of indoor spraying increased from 14.7% to 58.2% (P < 0.001) and use of window and door nets increased from 48.3% to 74.8% (P < 0.001). The proportion of those with ITN use increased from 50.8% to 87.4% (P < 0.001) while those with practice of maintaining clean	Yes: Malaria control significantly improved in rural areas, as the caregivers were adequately empowered through appropriate health education intervention.	

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2								
3 4 5 6 7 8 9 10 11 12	Okonofus at	Whole country:	Intervention	Erze meternel and	A gross the	environment also increased from 40.4% to 54.5% (P < 0.001). There were no significant changes in all the practice of malaria prevention methods in the control group.	Vas: Advocacy	Parriers: Challenges
13	0K01101Ua et	Whole could y.	avaluation (quasi	child health	continuum of	by December 2009,	hes been	implementing free
14 15	ai (2011)	FCT	experimental:	(MCH) services	care	(24.4%) were	successful in	services insufficient
16	Nigeria	rural and urban	To determine the	in Nigeria	care	practicing	building the	data to monitor and
17	1.180114	community	outcome of an	in rugerin	Policy makers	comprehensive free	commitment of	evaluate program.
18		5	advocacy		5	maternal and child	high-level	1 8
19			program aimed at			health policy in	government	Facilitators:
20			implementing a			Nigeria, while 14	officials in	commitment of
21			policy of free			states (37.8%) offered	addressing	policy makers to the
22			maternal and			partially free services.	maternal and	issue, stakeholder
23			child health			This represents an	child health in	engagement, demand
25			(MCH) services			increase of eight states $(52, 20)$ even the 15	Nigeria.	creation activities,
26			in Nigeria.			(53.3%) over the 15		culture of
27						states that offered free		accountability.
28						advocacy activities		
29						began Data from one		
30 21						state indicated an		
37						increase in ANC		
33						utilisation and		
34						attendance for		
35						delivery and post-		
36						natal care.		
37								
38 20								
39 40								
41								

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Findley et al ⁷⁶	Katsina, Zamfara	Intervention	Community	Across the	Anti-tetanus	Yes: The	Facilitators: Group
(2013)	and Yobe (NE,	evaluation	Based Maternal,	continuum of	vaccination rates and	community-based	learning and
	NW)	quasi-	Newborn and	care	early breast-feeding	approach to	communication
International	rural	experimental	Child Health		rates increased.	promoting	model used as part of
	community	•	Service	Women of	Compared to the	improved	program strategy.
			Delivery*.	childbearing	control communities,	newborn and sick	
			-	age (15-49yrs)	more than twice as	childcare through	
					many women in	community	
					intervention	volunteers and	
					communities knew to	CHWs resulted in	
					watch for specific	improved	
					newborn danger signs	newborn and sick	
					and significantly	childcare.	
					fewer mothers did		
					nothing when their		
					child was sick. The		
					largest changes in care		
					for sick children were		
					seen in the use of		
					medications across		
					intervention areas,		
					leading to improved		
					home care for fever		
D (1 C 1	17 1	T ()		A (1	and coughs.	X7	D '
Pathfinder	Kano, Lagos,	Intervention	Maternal Health	Across the	MCHIC members,	Yes	Barriers:
(2011)	Borno (NW,	evaluation	Lare	continuum of	facility nearth		Political constraints,
(2011)	SW)	(process and	Improvement	care	workers, male		infractructure
International	Tural	To improve health	Consoity building	Ugalth workers	motivators, young		cultural and raligious
International	bealth facility	system and	and Health system	Community	CHW_s and $TBAs$		perceptions and
	ficaliti facility	community	strengthening	and political	were trained in		practices poor
		structures to	strengthening	leaders	various maternal		monitoring and
		enable sustainable		icaders.	health care concepts		evaluation
		change in the			and advocacy. There		e variation.
		quality and			was an observed		
		coordination of			increase in community		
	1						1
				27			
		For poor roviou	wonly-http://bmicpo	n hmi com/sito/aha	ut/auidelines.vhtml		
		For peer review	v only - http://bhijope	n.omj.com/site/abc	July guidennes.xhtml		

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		maternal health (MH) service delivery, and to shape MH care- seeking behaviour among key populations.			service uptake for skilled birth attendants.		Facilitators: community involvement.
Galadanci et al ⁷⁸ (2010) Nigeria	Kano (NW) rural and urban health facility	Impact evaluation: To demonstrate the impact of introduction of free maternity services in Kano state	Free Maternity Health Service Policy at Secondary Facilities	Across the continuum of care Women of childbearing age (15-49yrs)	Since the introduction of free maternity services in 2001, ANC attendance and facility deliveries. Only 50% of women in the State utilize antenatal clinic.	No: Despite eight years of free maternity services in Kano State, there is still low utilization of maternity services.	Barriers: Inadequate funding, poor stock of commodities, inadequate infrastructure, and staff retention.
Charurat et al ⁷⁹ (2010) International	Kano, Zamfara and Katsina (NW, NE) urban health facility	Pre/Post intervention evaluation (mixed methodology): To determine the effectiveness of systematic screening to increase the use of FP and PPFP services in selected MCHIP- supported sites in Northern Nigeria.	Postpartum Systematic Screening*	Postnatal (mothers and newborn) Post-partum women	With this postpartum systematic screening checklist, clients attending immunization, newborn care and paediatric/sick baby services were more likely to be screened for FP, postnatal care and immunisation services. In response to high unmet need for FP, the majority (73%) of trained providers knew at least three family planning methods that are suitable for postpartum women,	No: The initiative increased screening for postpartum services and overall quality of counselling/ knowledge of providers. It however did not result in an increase in FP uptake.	Barriers: stock outs of commodities, needing husband's permission, long distances, women's lack of information about services.

		<i>K</i> Or			providing family planning counselling to pregnant or postpartum women. While family planning referral increase dramatically, only few women (15%) said they would go for referrals same day.		
Omole et al ⁸⁰ (2018) International	Osun (SW) urban health facility	RCT: To determine the impact of an SMS based intervention on maternal health seeking behaviour.	mhealth/SMS based health promotion intervention*	Pregnancy Pregnant women	An increase in facility-based delivery seen in the intervention group. Most participants in the intervention group expressed support for the use of text message for maternal health promotion	Yes: Positive impact of SMS intervention on facility-based delivery.	Barriers: financial constraints, low level of literacy among recipients.
Okoli et al ⁸¹ (2014) Nigeria	FCT, Nassarawa, Ogun, Kaduna, Zamfara, Bauchi, Anambra, Ebonyi, Bayelsa (NC, SW, NW, NE, SE, SS) rural community	Program evaluation (quasi- experimental design): To describe the use and effect of a Conditional Cash Transfer (CCT) programme to encourage use of critical MNCH services among rural women in Nigeria	Conditional Cash Transfer (CCT) for maternal and child health	Across the continuum of care Women of childbearing age (15-49yrs)	The CCT intervention is associated with a statistically significant increase in the monthly number of women attending four or more ANC visits (p < 0.01; 95% confidence interval 7.38 to 22.85). A statistically significant increase was also observed in the monthly number of women receiving two	Yes: CCT intervention showed significant effects on service uptake, although results for several outcomes of interest were inconclusive.	Barriers: loss of CCT beneficiaries to follow up, limited capacity of facilities to meet additional work required. Facilitators: Collaborations with other organisations, building trust and promoting utilisation through prompt delivery of intervention.

678995%89934.499314.110111111121213141516161616121213171812121812121319111415101214151112141412121414131414151414151615161716161716171718161618161116191616161016161610161616161716161716161618161616191616161016161610161616101616161016161611161616121616161316161614161616151616161616161617161616181616161916<	regnancy (p < 0.01; 5% CI 9.23 to 4.08). Changes for her outcomes number of women tending first ANC sit; number of eliveries with skilled tendance; number of eonates receiving PV at birth) were ot found to be atistically ginificant. //omen offered the ore likely to give rth at the facility int at the facility int tat he facility int tat he facility int tat he facility int absolute difference i 12.8% between ose offered the CCT tervention and those standard care. Over is standard care. Over is timates were like ose for facility eliveries.
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Edu at a183	Cross Divers	Ducanom	Erea Matamal	A areas the	Deculta of quantitativa	Voc Intervention
(2017)	(SS)	riogram	Hoolth Coro	Across the	data show increase in	led to an increase
(2017)	(CC)	evaluation using a	Drogram at		the percentage of	in the number of
Nicorio	rurai and urban	design:	Program at	Care Warnan of	the percentage of	
Nigeria	health facility	design:	primary and	women of	women accessing	women who
		To evaluate the	secondary nealth	childbearing	maternal health	utilise health
		effect of a free	Tacilities	age (15-49yrs)	services. Qualitative	facilities for their
		maternal health			results showed that	care.
		care program on			women perceived that	
		the health care-			there have been	
		seeking			increases in the	
		behaviours of			number of women	
		pregnant women			who utilize Antenatal	
		in Cross River			care, delivery, and	
		State, Nigeria.			Post-Partum Care at	
					health facilities,	
					following the removal	
					of direct cost of	
				O .	maternal health	
					services.	
Noguchi et al ⁸⁴	Nassarawa State	Pragmatic, cluster	Grouped	Pregnancy	Mean number of IPTp	Yes: G-ANC may
(2020)	(NC)	randomized,	Antenatal Care		doses received was	support uptake of
	urban	controlled trial:	for MIP	Pregnant	higher for intervention	important MIP
International	health facility	To investigate the	interventions*	women	versus control arm.	interventions,
		impact of G-ANC			Reported use of ITN	particularly IPTp
		on various			the previous night was	coverage and
		maternal newborn			similarly high in both	IPTp-SP uptake.
		health-related			arms for mothers in	
		outcomes- IPTp			Nigeria (over 92%).	
		uptake and			Reported ITN use for	
		insecticide-treated			infants (but not	
		nets (ITN) use.			mothers) was higher	
					in the intervention	
					versus control arm in	
					Nigeria.	

Oguntunde et	Kaduna and	Program outcome	Emergency	Pregnancy and	Demand creation	Yes: ETS	Barriers: Security
al^{85} (2018)	Jigawa (NW)	evaluation:	Transport	childbirth.	activities – especially	remained a key	challenges, need for
	rural	To assess the	Schemes (ETS)*	Pregnant	working with	solution to lack of	husband's
Nigeria	community	perceptions of		women	traditional birth	transport as a	permission, poor
U	2	stakeholders and		husbands	attendants and	barrier to utilizing	road conditions,
		beneficiaries of		community	religious leaders –	maternal and	driver's reluctance to
		ETS in two states		members	provided a strong	newborn health	attend to non-
		in northern		community	linkage between the	services in	emergencies.
		Nigeria,		health workers	ETS and families of	emergency	C C
		comparing two		health service	women in need of	situations in many	Facilitators:
		models of ETS		providers	emergency transport	rural and hard-to-	Dedication of drivers
		[stand alone or		-	services. Community	reach	in the scheme,
		part of an			members perceived	communities.	integrated approach
		integrated			the ETS model that		of program,
		package of MNH			included demand-		community
		interventions].			generating activities		awareness.
					as being more reliable		
					and responsive to		
					women's needs.		
Lalonde &	Edo, Anambra,	Program impact	FIGO Saving	Across the	Magnesium sulfate	Yes.	Barriers: Limited
Grellier ⁸⁶	and Kaduna (SE,	evaluation:	Mothers and	continuum of	supplied to all State		financial resources,
(2012)	SS, NW)	An assessment of	Newborns	care	hospitals by Kaduna		civil unrest.
	urban	FIGO Saving	Initiative: training		State Government.		
International	health facility	Mothers and	in emergency	Mothers and	Efforts led to the cost		Facilitators:
		Newborns	obstetric and	newborns	of magnesium sulfate		community
		Initiative 2006–	newborn care		reduced by		participation and
		2011	(EmONC)		manufacturers. And at		ownership.
					least 4 obstetric		
					protocols introduced.		
					Significant reduction		
					(approx. 28%) in		
					maternal mortality due		
					to eclampsia at the		
					project site.		

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fulti-country:	outcome: To assess the outcomes of the implementation of the Nigeria Midwives Service Scheme	Scheme (MISS)"	Pregnant women Midwives	care was observed, with no measurable impact on skilled birth attendance. Findings report important design, implementation and operational challenges that likely contributed to the	modest impact on the use of antenatal care and no measurable impact on skilled birth attendance.	program, geographical challenges, limited awareness of clinic services and poor quality of services.
fulti-country:	To assess the outcomes of the implementation of the Nigeria Midwives Service Scheme		Pregnant women Midwives	with no measurable impact on skilled birth attendance. Findings report important design, implementation and operational challenges that likely contributed to the	the use of antenatal care and no measurable impact on skilled birth attendance.	geographical challenges, limited awareness of clinic services and poor quality of services.
ommunity fulti-country:	outcomes of the implementation of the Nigeria Midwives Service Scheme		women Midwives	impact on skilled birth attendance. Findings report important design, implementation and operational challenges that likely contributed to the	antenatal care and no measurable impact on skilled birth attendance.	challenges, limited awareness of clinic services and poor quality of services.
fulti-country:	implementation of the Nigeria Midwives Service Scheme		Midwives	attendance. Findings report important design, implementation and operational challenges that likely contributed to the	no measurable impact on skilled birth attendance.	awareness of clinic services and poor quality of services.
fulti-country:	the Nigeria Midwives Service Scheme			Findings report important design, implementation and operational challenges that likely contributed to the	impact on skilled birth attendance.	services and poor quality of services.
fulti-country:	Midwives Service Scheme			important design, implementation and operational challenges that likely contributed to the	birth attendance.	quality of services.
fulti-country:	Scheme	5		implementation and operational challenges that likely contributed to the		
fulti-country:	Or			operational challenges that likely contributed to the		
fulti-country:	K	5-		challenges that likely		
fulti-country:		5		contributed to the		
fulti-country:						
fulti-country:				program's lack of		
11111-('())1111TV'	Dest mesonem	aton dondica d	A areas the	1mpact.	Voor Chort in	Domiona, Duchlana
ligeria included	Post program	Standardised	Across the	99.7% of neatthcare	i es: Snort in-	barriers: Problems
rban	To evaluate the	package	continuum of	their overall score for	Service EmOC&NC	design
ealth facility	effectiveness of	раскаде	Care	knowledge and for	training was	design.
cultif fuelinty	healthcare		Healthcare	skill There were	associated with	
	provider training		providers	significant	improved	
	in Emergency			improvements in	knowledge and	
	Obstetric and			knowledge and skills	skills for	
	Newborn Care			for each cadre of	all cadres of	
	(EmOC&NC)			healthcare provider	healthcare	
				(p<0.05), with the	providers working	
				largest change seen	in maternity	
				for recognition and	wards.	
				management of		
				obstetric beomorrhogo		
				naemorrnage.		
e	alth facility	alth facility effectiveness of healthcare provider training in Emergency Obstetric and Newborn Care (EmOC&NC)	alth facility effectiveness of healthcare provider training in Emergency Obstetric and Newborn Care (EmOC&NC)	alth facility effectiveness of healthcare provider training in Emergency Obstetric and Newborn Care (EmOC&NC)	alth facility effectiveness of healthcare provider training in Emergency Obstetric and Newborn Care (EmOC&NC) (Em	alth facility effectiveness of healthcare provider training in Emergency Obstetric and Newborn Care (EmOC&NC) Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare providers Healthcare (p<0.05), with the largest change seen for recognition and management of obstetric haemorrhage.

2								
3	Brals et al ⁸⁹	Kwara (NC)	Interrupted time	Kwara State	Across the	Insurance coverage	Yes: Voluntary	Barriers: Long
4	(2017)	rural	series- (quasi-	Health Insurance	continuum of	reached up to 70.2%	health insurance	distance from
5		community and	experimental	program- a	care	in four years in the	combined with	facilities.
6	International	health facility	design):	community-based		program area. An	quality healthcare	
/			To evaluate the	health insurance	Households	increase in hospital	services was	Facilitators:
8			effect of the	scheme		deliveries was	highly effective	Integrated approach,
9			introduction of a			observed in the	in increasing	improvement in
10			multifaceted			program area during	hospital deliveries	quality of services.
11			voluntary health			the 4-year follow-up	in rural Nigeria.	1
12			insurance			period. Even women	by improving	
14			programme on			who did not enrol in	access to	
15			hospital deliveries			health insurance but	healthcare for	
16			in rural Nigeria			who could make use	insured and	
17						of the upgraded care.	uninsured women	
18						delivered more often	in the program	
19						in a hospital during	area.	
20						the follow-up period		
21						than women living in		
22						the control area.		
23	Okeke et al ⁹⁰	Whole country-	Pre/post program	Midwives Service	Pregnancy and	The main measured	No [.] Minimal	Barriers: Challenges
24	(2016)	Nigeria	evaluation.	Scheme (MSS)*	childbirth	effect of the scheme	improvements	with retention of
25	(2010)	rural	To examine the	Seneme (1055)		was a 7 3 percentage	seen following the	midwives in scheme
26	International	community	effects of the		Women of	point increase in	program.	poor quality of
27	International	Community	Midwives Service		childbearing	antenatal care use in	highlighting that	services low
28			Scheme (MSS) a		age	program clinics and a	scaling up supply	perceived need for
29			public sector		uge	5-percentage point	of midwives may	services lack of
30			program in			increase in overall use	not be sufficient	transportation
31			Nigeria that			of antenatal care both	on its own to	facilities
32 22			increased the			within the first year of	improve maternal	raemues.
33 24			supply of skilled			the program We	and newborn	
54 25			midwives in rural			found no statistically	hoalth	
35			annumities on			significant affact of	neatur.	
30			communities on			the scheme on skilled		
38			birth outcomes			hirth attandance or on		
39			birth outcomes.			motormal delivery		
40								
41						complications.		
42								
43					34			
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Okereke et al ⁹¹	Jigawa (NW)	Post intervention	Clinical	Across the	Clinical mentoring	Yes: Stakeholders	Barriers: Financial
(2015)	urban	assessment	mentoring for	continuum of	improved service	report that the	costs of recruiting
	community and	(qualitative):	health workers	care	delivery within the	introduction of	clinical mentors,
Nigeria	health facility	To assess the			health facilities.	clinical mentoring	insufficient time for
		potential of		health workers	Significant	into the Jigawa	health providers.
		clinical mentoring		health service	improvements in the	State health	
		to improve		providers	professional capacity	system gave rise	Facilitators:
		maternal,			of mentored health	to an improved	promoting local
		newborn and			workers were	capacity of the	ownership and
		child health			observed. Best	mentored health	sustainability.
		service delivery,			practices were	care workers to	
		as well as the			introduced with the	deliver better	
		successes/challen			support of the clinical	quality maternal,	
		ges associated			mentors such as the	newborn and	
		with the			use of magnesium	child health	
		implementation			sulphate and	services	
					misoprostol for the		
					management of		
					eclampsia and post-		
					partum haemorrhage		
					respectively.		
Oguntunde et	Kaduna and	Pre/post	Men's support	Across the	Perceptions of the	Yes: In the	Barriers: Financial
al^{92} (2019)	Katsina (NW)	intervention	group	continuum of	male support groups	northern Nigeria	cost of associated
	rural	evaluation	intervention to	care	were overwhelmingly	context, educating	services.
Nigeria	community	(qualitative):	increase male		positive. Participants	men about danger	Facilitators:
		To examine an	involvement in	Married men.	internalized important	signs of	Inclusion of the
		intervention that	women's health*		messages they	pregnancy,	community, positive
		educated married			learned, which	labour, delivery,	perceived benefits o
		men in northern			influenced their	newborn, and	participation.
		Nigeria about			decisions related to	child health was	
		health issues			the health of their	crucial to	
		related to			wives and children.	improving	
		pregnancy,			Some take it upon	maternal and	
		labour, delivery,			themselves to educate	newborn health	
		and the			ouners in their	outcomes. The	
		postpartum			communities about	intervention was	<u> </u>
				35			
		Earbaarterda	wonly http://hmiana	n hmi com /sita /sh	aut/auidalinas.vhtml		
		For peer reviev	w only - http://bmJope	n.pmj.com/site/abo	out/guidelines.xhtml		

					improvement in the functionality of the facilities, availability		Facilitators: Problems with project design.
al ⁷⁴ (2019)	health facility	assessment (Qualitative): To examine the implementation of the NHIS-MCH project and identify barriers and facilitators for implementation, adaptation and scale up.	program	continuum of care Pregnant women	about 1.5 million pregnant women and children during the period of implementation in the country. The respondents perceived the program as pro-poor, efficient, and effective, and led to marked	NHIS-MDG FMCHP had positive impact on the target population though it was not sustained following the conclusion of the MDG program in 2015.	stakeholder consultation, alleg corrupt practices, human resources challenges, infrastructural challenges, issues with counterpart funding and public financing.
Onwujekwe et	FCT (NC)	women's experience of group prenatal care in a rural Nigerian community.	program* Free maternal and	Across the	increased significantly. Commitment to birth preparedness plans was high. The mothers enjoyed the group sessions and shared the lessons they learned with others. The program enrolled about 1.5 million	utilised. Yes: The	Facilitators: posit peer group dynan and social networ Barriers: Inadequ
Adaji et al ⁹³ (2019) Nigeria	Kaduna (NW) rural community and health facility	participation in male support groups. Pre/post intervention assessment: To assess	Centering Pregnancy Model- group prenatal care	Pregnancy Pregnant women	 more utilization of maternal, newborn, and child health services. Mothers who could mention at least five out of eight danger signs of pregnancy 	participants to the community. Yes: Group prenatal care was acceptable to women and	Barriers: Limited health service providers for implementation.
		newborn and child health, through			many say they see changes at the community level, with	that the effect of the intervention went beyond	

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					of services and reduced out-of-pocket expenditure, which led to increased demand and utilization of MCH services.		
Brown et al ⁹⁵ (2016) Nigeria	Oyo (SW) urban community	Cluster randomized control trial: To evaluate the effect of reminder/recall system and Primary Health Care Immunization Providers' Training (PHCIPT) intervention on routine immunization completion among infants.	Community Nurse led Reminder/Recall (R/R) system Alone and in combination with Primary Health care immunization providers' training	Postnatal (infant) Mothers and infants.	Cell phone reminder/recall was associated with the highest immunization completion rates among the children in the study.	Yes: cell phone reminder/recall was effective in improving immunization completion rates.	
Asa et al ⁹⁶ (2008) Nigeria	Osun (SW) rural health facility	Open randomised control trial: To evaluate the efficacy of intermittent preventive treatment of malaria using sulphadoxine- pyrimethamine (SP) in the	Intermittent Preventive Therapy in Pregnancy IPT-p for malaria using sulphadoxine- pyrimethamine (SP)	Pregnancy Pregnant women	33 (22.6%) and 52 (37.1%) women in the study and control groups, respectively, had anaemia. With multivariate analysis, the difference in the incidence of anaemia in the two groups remained significant ($p = 0.01$; odds ratio =	Yes: The IPT regime with sulphadoxine- pyrimethamine is an effective, practicable strategy to decrease risk of anaemia in women of low parity residing in	Facilitators: acceptability of intervention amon target populations

		prevention of			0.5; 95% confidence	areas endemic for	
		anaemia in			interval = $0.29 - 0.85$).	malaria.	
		women of low					
		parity in a low					
		socio-economic,					
		malaria endemic					
		setting.					
Walker et al ⁹⁷	Katsina (NW)	Post intervention	Muslim Opinion	Across the	The result indicates a	Yes: The	
(2018)	rural	evaluation (quasi-	Leaders' led	continuum of	significant difference	healthcare	
	community and	experimental	training of health	care	both in perception and	providers who	
Nigeria	health facility	design):	workers		in practices between	received trainings	
		To assess the		Healthcare	healthcare providers	on Islamic	
		impact of Muslim		providers	in intervention and	precepts related to	
		opinion leaders'			control facilities, with	MNCH were able	
		training of			respect to MNCH	to spend greater	
		healthcare			uptake. Access to	amount of time	
		providers on the			services was higher in	with clients,	
		uptake of MNCH			intervention facilities	providing	
		services in			than in control	counselling on	
		Northern Nigeria			facilities, with routine	Islam and	
					immunisation	MNCH. This led	
					(including polio)	to improvements	
					recording highest	in MNCH.	
					hospital visits		
					followed by other		
					MNCH services		
					related to		
					pregnancy/child		
					development. Family		
					planning and hospital		
					delivery were the least		
					accessed services.		

Ehigiegba et al ⁹⁸ (2012) Nigeria	Rivers (SS) urban community and health facility	Post program evaluation: To assess the implementation of a PMTCT program in a semi-urban cottage hospital, with a community	Community Health Insurance Scheme to promote the utilisation of MNCH services	Across the continuum of care Pregnant women.	Service utilisation increased significantly. Average deliveries increased from about 20 to 120 per month. New infections were less than 2% in the period compared to 29%	Yes: CHIS encouraged women to book early for ANC, which improved utilisation of VCT and other PMTCT services.	Facilitators: active community engagement, integration/ coordination of activities.
		health insurance			prior to the CHIS.		
Adeleye et al ⁹⁹	Edo (SS)	Program process	Ekialodor safe	Across the	A useful	Yes: Through	Facilitators: delivery
(2011)	rural	and outcome	motherhood	continuum of	communication	small-group	of intervention in line
Nicorio	community	evaluation:	program:	care	intervention was	health talks, the	with local
Nigeria		development and	intervention to	Community	increased the	Fkiadolor	governance and
		implementation	increase positive	elders	possibility of positive	Southern Nigeria.	customs
		process of the	male engagement	young adult	male engagement in	became motivated	
		Ekialodor safe	in maternal health	males	maternal health.	to act as change	
		motherhood				agents and	
		program and to				encouraged other	
		analyze how it				men to assist with	
		improved				maternal health in	
		maternal health in				their community.	
Hover at $a1^{100}$	Alwe Ihom (SS)	Drogram	CHW lad IDTp	Dragnanov	The offects of the CDL	Vac: The health	Derriera: poor occos
(2015)	AKWa IDOIII (SS)	evaluation:	provision	Fleghancy	program were largest	promotion and	to underserved areas
(2013)	community	To describe	insecticide-treated	Community	for IPTp adherence	distribution of	and absence of
International	community	outcomes.	net distribution as	health workers	increasing the	commodities	political will and
		commonalities	part of a		proportion of pregnant	afforded by these	commitment.
		and lessons	community-		women taking at least	community based	
		learned from	directed		two sulfadoxine-	strategies yielded	Facilitators:
		country programs	intervention for		pyrimethamine doses	greater uptake of	community
		in which tasks in	malaria control*		during pregnancy by	interventions than	engagement
		health promotion			tive times in the CDI	would have been	
		and distribution of			communities	achieved through	

Okeibunor et al ¹⁰¹ (2011)Akwa Ibom (SS) rural communityBefore and After analysis (quasi- experimental design): To determine the officeted intervention in pregnancyA community pregnant malaria prevention.More women slept under an ITN during pregnancy in the under an ITN during pregnancy in the treatment areas. The effects of the CDI programme were largest for IPTp adherence, increasing the fraction of malaria prevention in prevention in pregnancyMore women slept under an ITN during pregnancy in the substantiallyBarriers: Lin availability of interventions community to adherence, increasing the fraction of pregnant women taking at least two SP doses during prevention, and increase access to malaria prevention in pregnancy y 53% relative to the control areas.More women slept under an ITN during pregnancy with substantially a substantially as volunteer of mal health increase access to malaria prevention in prevention in prevention in presonant (NE)Before and After analysis (quasi- experimental design: To evaluate an community and health facilityMore women slept under an ITN during pregnancy with satustantially adherence, increasing the fraction of matersateBarriers: Lin availability of maticators availability of matersateBarriers: Lin availability of matersate and involver community at health facilityMore women slept adherence, increasing the fraction of matersateWest Inclusion of community and health facilityBarriers: Lin availability of matersateBarriers: Lin availability of matersateFindley et al ¹⁰²			commodities were intentionally shifted from skilled providers to CHWs to advance MNH strategies			compared with three times in the control group, for whom IPTp was available only at prenatal care (P<0.001)	facility-based services alone.	
Findley et alKatsina, Zamfara (NW) and YobeQuasi- experimental design:Integrated Maternal, Child HealthAcross the continuum of careThere was significant improvement in nearly all maternal healthYes: The improvement in nearly improvementsFacilitators: Integration of integration of interventionInternational(NE) rural community and health facilityTo evaluate an integratedNewborn and Child HealthCareThere was significant improvement in nearly all maternal healthYes: The improvement in nearly all maternal healthFacilitators: Integration of interventionNewborn and community and health facilityTo evaluate an integratedChild Health program*Women of childbearing age: 15-49These include women with standingYes: The improvementsFacilitators: Integration of improved qu services at facilitation; 	Okeibunor et al ¹⁰¹ (2011) International	Akwa Ibom (SS) rural community	Before and After analysis (quasi- experimental design): To determine the degree to which community- directed interventions can improve access to malaria prevention in pregnancy	A community directed intervention (CDI) to improve effective access to malaria prevention.	Pregnancy Pregnant women	More women slept under an ITN during pregnancy in the treatment areas. The effects of the CDI programme were largest for IPTp adherence, increasing the fraction of pregnant women taking at least two SP doses during pregnancy by 35% relative to the control areas.	Yes: Inclusion of community-based programmes with supply-side interventions substantially increased effective access to malaria prevention, and increase access to formal health care access- particularly ANC.	Barriers: Limited availability of intervention (ITNs Facilitators: training and involvement of community memb as volunteers.
outcomes in birth attendant, health care Northern Nigeria knowledge of services. maternal danger signs services.	Findley et al ¹⁰² (2015) International	Katsina, Zamfara (NW) and Yobe (NE) rural community and health facility	Quasi- experimental design: To evaluate an integrated maternal, newborn, and child health (MNCH) program to improve maternal health outcomes in Northern Nigeria	Integrated Maternal, Newborn and Child Health (IMNCH) program*	Across the continuum of care Women of childbearing age: 15-49 years	There was significant improvement in nearly all maternal health indicators assessed. These include women with standing permission from their husband to go to the health centre; health care utilization; delivery with a skilled birth attendant, knowledge of maternal danger signs	Yes: The improvements between 2009 and 2013 demonstrate the measurable impact on maternal health outcomes of the program through local communities and primary health care services.	Facilitators: Integration of interventions, improved quality services at facilitie community engagement.

				antenatal care (ANC) visit.		
ligawa (NW)	Cluster	Community	Pregnancy	Only about half of	No: Introduction	Barriers: low level of
rural	randomized	Resource Person		women who received	and the use of	penetration of birth
nealth facility	control trial:	(CoRP) led	Women of	the birth kits, used the	birth kits was not	kits, challenges with
	To examine the	distribution of	childbearing	kits.	associated with	insecurity, low level
	association	safe birth kits to	age: 15-49	There were no	reductions in	of use of birth kits.
	between birth care	pregnant women*	years	significant	maternal or	
	receipt and use on			associations between	neonatal	Facilitators: adequate
	maternal and			birth kit use and	morbidity, which	education about the
	neonatal health			facility-based	may have been	intervention.
	outcomes in			delivery, completion	shaped by the	
	Jigawa, Nigeria.			of 4 or more ANC	mechanisms	
				visits, skilled birth	through which	
				attendance and post-	women accessed	
			\mathbf{Q} ,	natal care. women	and utilise the	
				more likely to report	KIUS.	
				prototiged labour allo		
	igawa (NW) ural lealth facility	igawa (NW) ural ealth facility Cluster randomized control trial: To examine the association between birth care receipt and use on maternal and neonatal health outcomes in Jigawa, Nigeria.	igawa (NW) ural ealth facility Cluster randomized control trial: To examine the association between birth care receipt and use on maternal and neonatal health outcomes in Jigawa, Nigeria. Community Resource Person (CoRP) led distribution of safe birth kits to pregnant women*	igawa (NW) ural ealth facility Cluster randomized control trial: To examine the association between birth care receipt and use on maternal and neonatal health outcomes in Jigawa, Nigeria. Community Resource Person (CoRP) led distribution of safe birth kits to pregnant women* years Pregnancy Women of childbearing age: 15-49 years	igawa (NW) ural ealth facility Cluster randomized ealth facility Cluster randomized control trial: CoRP) led To examine the association between birth care receipt and use on maternal and neonatal health outcomes in Jigawa, Nigeria. Community Resource Person (CoRP) led distribution of safe birth kits to pregnant women* Pregnancy Women of childbearing age: 15-49 years Significant associations between birth kit use and facility-based delivery, completion of 4 or more ANC visits, skilled birth attendance and post- natal care. Women more likely to report prolonged labour and postpartum bleeding.	igawa (NW) Cluster randomized randomized control trial: To examine the association between birth care receipt and use on maternal and neonatal health outcomes in Jigawa, Nigeria. Vigeria.

* Interventions aligned with WHO 2011
and 2017 guidelines used in study.
NC: North-Central region
NW: North-West region
NE: North-East region
SS: South-South region
SE: South-East region
SW: South-West region

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION ITEM		PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #				
TITLE							
Title	1	Identify the report as a scoping review.	1				
ABSTRACT							
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2				
INTRODUCTION							
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4,5				
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5				
METHODS							
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	N/A				
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6,7				
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	6				
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Supplementary file 2				
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6				
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6,7				
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6				
Critical appraisal of individual	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe	N/A				



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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #					
sources of evidence§		the methods used and how this information was used in any data synthesis (if appropriate).						
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6,7					
RESULTS								
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8					
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 2, 10					
Critical appraisal vithin sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A					
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Supplementary file 1					
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-11					
DISCUSSION								
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	12, 13					
Limitations	20	Discuss the limitations of the scoping review process.	13					
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	13					
FUNDING								
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1					

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. <u>doi: 10.7326/M18-0850</u>.



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