





Mapping evidence of interventions and strategies to bridge the gap in the implementation of the prevention of mother-to-child transmission of HIV programme policy in sub-Saharan countries: A scoping review



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Background: Prevention of mother-to-child transmission (PMTCT) of HIV is a life-saving public health intervention. Sub-Saharan African (SSA) countries have made significant progress in the programme, but little is known about the strategies used by them to eliminate mother-to-child transmission of HIV.

Aim: To map evidence of strategies and interventions employed by SSA in bridging the implementation gap in the rapidly changing PMTCT of HIV programme policy.

Methods: Electronic search of the databases MEDLINE, PubMed and SABINET for articles published in English between 2001 and August 2016. Key words included 'Sub-Saharan African countries', 'implementation strategies', 'interventions to bridge implementation gap', 'prevention of mother-to-child transmission of HIV' and 'closing implementation gap'.

Results: Of a total of 743 articles, 25 articles that met the inclusion criteria were included in the study. Manual content analysis resulted in the identification of three categories of strategies: (1) health system (referral systems, integration of services, supportive leadership, systematic quality-improvement approaches that vigorously monitors programme performance); (2) health service delivery (task shifting, networking, shared platform for learning, local capacity building, supportive supervision); as well as (3) community-level strategies (community health workers, technology use – mHealth, family-centred approaches, male involvement, culturally appropriate interventions).

Conclusion: There are strategies that exist in SSA countries. Future research should examine multifaceted scientific models to prioritise the highest impact and be evaluated for effectiveness and efficiency.

Introduction

Sub-Saharan African (SSA) countries are highly burdened by HIV.¹ The children are at risk of transmission of HIV from mother-to-child, which is a major public health concern. The programme 'prevention of mother-to-child transmission (PMTCT) of HIV' is aimed at addressing this problem. It has been demonstrated that the risk of mother-to-child transmission (MTCT) of HIV can be reduced by implementing key interventions, especially in resource limited settings. Countries are working towards^{2,3} meeting the Global Plan targets of the elimination of MTCT of HIV. Also, eradicating the HIV epidemic by 2020 remains the key target of the Sustainable Development Goal on health and well-being.^{1,3,4,5}

Sub-Saharan African countries have demonstrated significant progress in the scaling up of PMTCT. The number of new HIV infections among children had significantly dropped from 350 000 in 2009 to less than 199 000 by 2013, which is a 43% decline in SSA countries. However, this is not in tune with the 90% reduction aimed for in the Global Plan (2011–2015).⁴ Disparities exist in the reduction of new HIV infection in children in the SSA countries. It is clear that the progress is slow, and efforts to accelerate progress are needed for countries to achieve the universal targets of 90-90-90.^{1,3,4,5,6}

Much evidence exists demonstrating barriers to PMTCT programme policy implementation,^{2,7,8,9,10,11,12,13} meant to save lives. While World Health Organization (WHO) had recommendations for countries to adopt including Option B+ which promotes universal life-long

antiretroviral treatment (ART) for all, crucial barriers to successful implementation remain.^{4,9,14,15} Strategies are employed by the SSA countries to bridge the implementation gap for the PMTCT programme. As appreciation of the impact of implementation of policy develops interest, it is crucial that the evidence of such interventions is identified and mapped out.

The aim of the scoping was to map the existing literature on the interventions and strategies applied in the SSA countries to close PMTCT of HIV policy implementation.

Methods

Search strategy

The scoping review involved a comprehensive systematic literature search in MEDLINE, PubMed, SABINET databases, including the reference list of included studies and key websites from WHO and UNAIDS. Two independent reviewers (WH and ZL) screened all titles and abstracts using predetermined inclusion and exclusion criteria, reviewed full text articles for inclusion, with disagreements settled by third and fourth reviewers (BN, JN) to ensure reliability of findings. The keyword search included 'sub-Saharan African countries, implementation gap strategies, interventions to bridge implementation gap, prevention of mother-to-child transmission of HIV, closing implementation gap for PMTCT'.

The search was limited to English language publications between 2001 and August 2016. Studies were included if they reported on interventions or strategies for bridging implementation gap for PMTCT of HIV health programme policy in SSA countries; if they were fully accessible; and if they dealt with public health setting strategies or community-level interventions.

We excluded studies that were not published in English; not conducted in SSA countries, did not provide the setting; did not provide strategies; focused their intervention on programmes other than PMTCT; had inaccessible full texts; had inappropriate methodology; had comments or debates; were published prior to 2001.

Data extraction and analysis

The search criteria used PRISMA 2009 diagram tool¹⁶ to map relevant searched articles (see Figure 2). A standardised data extraction form was used to guide eligibility of extracted studies edited from PICOS framework (Population, Intervention, Comparison, Outcome, Study design) which charted information on author and year, study design, population, % of population, intervention, aim of the study as well as the key findings including recommendations if any (see Table 1). The review was not limited to study designs. Manual content analysis was used to identify key categories and reporting on key findings. Mixed Method Appraisal Tool (MMAT) was used for quality assessment of included studies.^{17,18}

Ethical consideration

This article is part of a PhD thesis, which is being currently conducted in accordance with permission from the ethics committee of the University of KwaZulu-Natal (UKZN) BREC (Biomedical Research Ethics Council), under the protocol reference number BE112/14.

Review results

The three-step study selection process for this scoping review comprised (1) first step: database search using keywords and title screening that returned 734 articles; 11 additional records were identified through reference lists and websites for WHO and UNAIDS. A total of 329 records after exclusion criteria, duplicates and non-English records were excluded; (2) second step: screening of titles and abstracts identified 73 records for full text review after exclusion of 256 papers which were either not conducted in SSA countries or reported on strategies or interventions for other health programmes and not for the PMTCT programme; (3) third step was full article screening, done in duplicate on 73 records, which resulted in 44 records being excluded for providing insufficient information; no description of interventions or strategies of interest; the full article not being accessible; for being in comment or debate form of report and conducted prior to 2001. This resulted in 29 records assessed for quality using MMAT tool checklist; however, a total of four articles were excluded for reasons such as inappropriate methodology or for not providing key findings (report on a protocol for randomised control trial). Average time spent critically appraising one article was 15 minutes. At the end of the final review and assessment, 25 eligible studies were included for final analysis. Details related to the search are provided in the PRISMA flow diagram (see Table 1).^{19,20,21}

Papers were mainly from six specific countries as well as from studies done across SSA countries as follows: South Africa ($n = 8$); Nigeria ($n = 2$); Uganda ($n = 2$); Malawi ($n = 3$); and a study done in three different countries of Malawi, Nigeria and Zimbabwe ($n = 1$), including studies done in SSA countries ($n = 9$) not specifically in one country. Majority of studies conducted in SSA countries were systematic reviews ($n = 9$), studies reporting on operational research ($n = 3$), qualitative studies ($n = 6$), quantitative studies ($n = 4$) and record review studies ($n = 3$). There were neither randomised controlled trial studies nor studies of mixed methods.

Types of strategies

Studies reported on the various stages of the implementation of PMTCT of HIV programmes by SSA countries ranging from the use of Option B to that of Option B+ as recommended by WHO.^{3,6}

After content analysis, the three most significant strategies and interventions that were in line with our objectives and inclusion criteria were categorised as follows: health service delivery, community-based interventions and health system strategies (see Figure 1).

TABLE 1: Summary of studies identified.

| Author and year | Study setting | Study design | Population | % of the target population | Intervention | Main aim of the study | Results |
|------------------------|--------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Youngleson et al. 2010 | South Africa, Cape Town, Cape Metro district | Operational research | Primary health care sites | All primary care sites in Cape Metro district | Health system intervention consisted of quality-improvement framework (system changes to identify and improve performance gaps; learning network to accelerate peer-to-peer learning approach that uses data to monitor improvement), policy and protocol changes as well as targeted resource addition | To reduce transmission of HIV from mother to infant, through health system strengthening approaches | PMTCT processes and outcome improvement included reduction in infants testing positive, from 7.6% to 5%. Spread of successful changes: postnatal testing improved from 79% to 95%. Recommendation: System improvement approach is needed to rapidly improve the performance of PMTCT implementation programme at scale in SSA; however, it requires clear design, leadership buy-in, local capacity building and reliable data system. |
| Ditekemena et al. 2012 | SSA countries | Literature review | Studies that reported male involvement in MCH services | 34 studies | Male participation in MCH and PMTCT services | To identify determinants of male partners' involvement in MCH activities, focusing specifically on HIV PMTCT | Few interventions addressing male involvement and participation in MCH services. Identified three main determinants for male participation in PMTCT services: (1) socio demographic factors (level of education, income status) (2) health services-related factors (hours of health service operations, staff behaviour and space), (3) Sociologic factors (beliefs, attitudes). Recommendation: Improvement in PMTCT programme requires interventions addressing male involvement to create more male-friendly services and health education campaigns to change beliefs and attitude. |
| Haines 2004 | Low-income countries | Systematic reviews | Policy makers, public and health service providers | A total of 180 studies | Strategies to promote the uptake of research findings in low- and middle-income countries | To provide an overview of the effective approaches used to encourage the uptake of research findings for three main groups: policymakers, the public and health service providers | Strategies such as outreach from existing facilities, social marketing, supportive supervision and application of the principles of quality assurance can result in increased coverage of evidence-based interventions. Recommendation: To reckon that the effect of interventions varies per setting and behaviour that is targeted. |
| Whitworth 2010 | SSA | Systematic review | SSA | Countries of SSA | Building research capacity in MCH in Africa | To understand issues of implementation in SSA countries in Maternal Newborn and Child Health (MNMCH) | There is a need to broaden the base for health research in SSA countries, especially for implementation research. Addressing issues at implementation level. Recommendation: Strong health research systems that address bottlenecks to upscaling of effective interventions are needed; however, support is needed for African scientists, institutions and systems to solve African problems. |
| Ssengooba et al. 2011 | Uganda | Case study; Pure qualitative study | Policy makers, technical officers, funders, researchers, print and media journalists | 30 stakeholders (8 researchers, 12 policymakers, 10 media journalists) | A comparison of three domains of interest; lessons learnt from PMTCT and SMC, and evidence that drives policy | To understand the process of translating research into policy in order to improve health outcomes related to national health priorities in Uganda | Factors that facilitate PMTCT uptake and implementation included shared platform for learning, decision-making among stakeholders and implementation pilots to assess feasibility of intervention. Recommendations: Implementation research should be prioritised to guide policy processes. Feasibility should be determined of implementing new innovations on a large scale in different contexts of the research environment. |
| Turan and Nyblade 2013 | Low-income settings | Review of literature | 1599 articles | The final review included findings from 150 documents mainly from peer-reviewed journals | Conducted a strategic literature review and scan of both peer-reviewed and grey literature | To examine how HIV-related stigma affects utilisation of the series of steps that women must complete for successful PMTCT | Key steps and strategies include: (1) Identifying, addressing and monitoring stigma in health services for pregnant and childbearing women; (2) listening to pregnant women living with HIV and designing programmes that directly address their needs; (3) involving women living with HIV in PMTCT service delivery; (4) reaching out to and positively engaging the communities and male partners of pregnant women living with HIV; (5) designing PMTCT media campaigns with the participation and input of advocacy groups and pregnant women living with HIV. |
| Doherty et al. 2009 | South Africa one district in KwaZulu-Natal province, Amajuba | Operational research | PHC clinics, facility managers and lay counsellors | 18 PHC clinics, with 15 facility manager interviews and 35 lay counsellors interviews | Participatory assessment phase followed by a feedback and planning phase and then an implementation and monitoring phase | To report on the results of a participatory intervention to improve an integrated PMTCT programme in a rural district in South Africa | Assessment highlighted weaknesses in training and supervision. Routine data use can reveal bottlenecks and poor coverage of programme indicators. Improvement in processes: CD4 testing improved from 40% to 97%; PCR testing from 24% to 68%; infant NVP from 15% to 68%; maternal NVP from 57% to 96%. Recommendation: Quality-improvement intervention using participatory data-driven approach can help improve programme performance. |

Table 1. continues on the next page →

TABLE 1 (Continues...): Summary of studies identified.

| Author and year | Study setting | Study design | Population | % of the target population | Intervention | Main aim of the study | Results |
|-----------------------|-------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Horwood et al. 2010 | South Africa, Amaluba and UThukela districts, kwaZulu-Natal | A quantitative, cross-sectional descriptive study | Mothers in postnatal wards and immunisation clinics; antenatal and child health records reviews, nurses and lay counsellors in primary health care clinics | A total of 872 participants | An evaluation of routine implementation of the PMTCT programme, and the integration of PMTCT with routine maternal and child health services | To evaluate PMTCT implementation and integration of PMTCT with routine maternal and child health services | Programme performance improvement noted. About 47% of exposed babies had a PCR test. 91.3% received NVP, 33.1% had results for cd4 recorded, 47% received co-trimoxazole, a dedicated PMTCT nurse in 12 of 26 clinics. Roles not clear, leading to confusion of roles among health workers. Recommendation: Integration of PMTCT services into routine care; role clarification of health workers and record keeping are key interventions to prevent barriers to accessing services. |
| Kasenga et al. 2009 | Malamulo SDA hospital in Thyolo district, Makwasa, Malawi | Retrospective record review | One hospital which has 15 mobile sites with two health centres | Three hospital-based registers were analysed from 2005 to 2007 | Free maternity services were introduced at Malamulo hospital as an intervention to cater to the surrounding 15 villages | To study the implications of policy changes on the demand for antenatal care. HIV testing and hospital delivery among pregnant women in rural Malawi | Programmatic improvement: HIV testing increased from 52.6% to 98.8%, with 15.6% testing positive after free maternity services that is believed to have increased access to antenatal services. The programme reached 4528 pregnant women during the study period. 52.6% tested positive, delivered in hospital, and got NVP. Recommendation: Maternity services availability to clients, affordability of health services, involvement of service providers, communities and families, in designing and maintenance of service delivery is needed for programme uptake improvement. Economic constraints should be addressed. |
| Rollins et al. 2014 | Malawi, Nigeria, and Zimbabwe | Qualitative participatory research | Policy-makers, district health workers, academics, implementing partners and persons living with HIV | Between 42 and 70 representatives attended each workshop | Two-day workshops using the CHNRI process to identify barriers and formulate questions to address them | To describe the process used for prioritising PMTCT (IR) questions | Health systems approaches for integrating and decentralising services or increasing access and uptake to interventions were consistently prioritised. Bridging the barrier between health facilities and communities and male involvement was ranked as important after health system. Recommendation: CHNRI promotes country ownership and helps direct strategic allocation of research resources. |
| Bhutta et al. 2005 | Developing countries | Meta-analyses of RCTs | Review of available published and unpublished data | A total of 186 studies from developing countries were identified for in-depth review | The principal reviewers independently evaluated the data, and a common reporting matrix was used in summarising the findings. Studies were evaluated for size, setting, quality and design | To identify the impact of community-based strategies and interventions on perinatal and neonatal health status outcomes | Identifies a package of priority interventions to include in programmes and formulates research priorities for advancing the state of the art in neonatal health care. RCTs: 31 community-based RCTs reported primary neonatal health outcomes, and 40 reported secondary neonatal health outcomes. Only 10 studies were interventions conducted in health system settings or effectiveness trials. Most interventions had been tested on relatively small numbers of individuals. Recommendations: Importance of health system research, as well as evaluation of interventions to assess impact. |
| Kinney et al. 2010 | SSA countries | Literature review | SSA countries | N/A | Review of literature on SSA countries to identify high impact opportunities for saving lives | To present known interventions to prevent child deaths and coverage of the interventions in SSA countries | Critical understanding of where and why the deaths occur, strategic data-based prioritisation is essential for progress. Scientifically proven interventions are available; however, they are underutilised to save the woman and child's lives. Recommendation: Essential evidence-based interventions for MINCH, including PMTCT, can save many lives when it reaches everyone. A need to prioritise interventions using health service coverage data. |
| Friberg et al. 2010 | SSA countries | Literature review | 46 SSA countries | 42 countries of SSA | Included all interventions in LIST (Lives saved tool). Doing modelling to determine lives saved | To estimate lives that could be saved by scaling up proven health interventions in health systems | Contexts count in selecting interventions. Outreach interventions/community-based interventions can save lives. Local data and differing health system settings are necessary. Recommendation: Outreach services and facility-based care is required for functioning health system. Use of local data to prioritise effective interventions is crucial. |
| Barker et al. 2015 | South Africa | Descriptive study | Health facilities | South African Department of Health facilities | Quality-improvement methods to improve the performance of the PMTCT programme (model for improvement includes identification of an outcome goal based on best-available evidence, a set of measures to track progress towards that goal and a systematic way to test local ideas to close performance gaps) | To demonstrate how quality-improvement methods played a significant part in PMTCT improvements | The scale-up of the quality-improvement approach contributed to a dramatic fall in the nationally reported transmission rate for MTCT of HIV. By 2012, measured infection rate of HIV-exposed infants at around six weeks after birth was 2.6%. Recommendation: Quality-improvement methods can be used to improve reliability of complex treatment programmes delivered at the primary care level |
| Ezeanolue et al. 2016 | Nigeria | Qualitative study | Policy-makers, programme implementers, researchers | 1.45 individuals (10 groups) | Engagement of stakeholders to identify interventions and implementation strategies to improve PMTCT | To advance research and practice related to PMTCT in Nigeria | 25 unique interventions and implementation strategies including linkage (1) HIV diagnosis, (2) HIV diagnosis and linkage to care, (3) linkage and retention, as well as policy and data needs. Recommendation: Involvement of state, policymakers, implementers and researchers help ensure relevancy. |

Table 1 continues on the next page →

TABLE 1 (Continues...): Summary of studies identified.

| Author and year | Study setting | Study design | Population | % of the target population | Intervention | Main aim of the study | Results |
|-------------------------|----------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Byamugisha et al. 2010 | Uganda, eastern Uganda, Mbale district | Cross-sectional study – Qualitative | Men whose spouses were attending antenatal care at Mbale Regional Referral Hospital | 388 men | Male involvement in spouses of women attending antenatal clinic | To determine the level of male involvement and identify its determinants in the PMTCT programme | The majority (74%) had a low male involvement index and only 5% of men accompanied their spouses to the antenatal clinic. Recommendation: Improvements in the health care system and community sensitisation of men about the benefits of antenatal care and the PMTCT programme are essential for mitigating the effect of socioeconomic and cultural factors. |
| Chabikuli et al. 2013 | Nigeria | Records review | Public health care facilities | 60 public health care facilities | Evaluation of service improvement intervention | To assess improvement, or lack thereof, in the uptake of PMTCT services at selected sites | About 120 537 women attended an ANC for the first time. Average of 167.4 monthly attendances per facility. ANC attendance increased per facility by 11.1 women monthly, ($p < 0.01$). The uptake of HIV testing was 87%, ARV prophylaxis uptake rose from 3.3 to 5.4 women per facility per month ($p < 0.01$). Recommendation: Service improvement intervention improved the utilisation of PMTCT services. |
| Kalemba and Zgambo 2012 | SSA countries | Literature review | 678 articles | 44 articles | Searched peer-reviewed public research articles in SSA countries | To explore how LTFU has affected the successful implementation of PMTCT programme in SSA countries | Health facility factors, stigma and discrimination, and socioeconomic factors contribute to LTFU. Recommendation: Strategies to address LTFU includes psychosocial support, family-focused approach and monitoring and evaluation of health information systems. |
| Wettstein et al. 2012 | SSA countries | Systematic review and meta-analysis | PMTCT studies in SSA countries | 44 studies from 15 countries | Systematic review to identify missed opportunities to PMTCT | To determine reasons of loss to programme and poor PMTCT ART coverage in SSA countries | Programme performance improvement: HIV testing uptake increased to 94%, ART coverage improved to 70%, 64% infants tested for HIV to determine transmission. Improved PMTCT interventions noted when male partner is involved or if treatment was provided in facility. Recommendation: An integrated family-centred approach improves retention. |
| Woldesenbet et al. 2015 | South Africa, 9 provinces | Cross-sectional survey – Quantitative study | Mother and care-giver in public health facilities | 580 public health facilities (10 820) | To estimate the population attributable fraction associated with dropouts at each service point | To measure national uptake of antenatal and early postnatal PMTCT services, and identify key dropout points | High dropout rate, especially among adolescent mothers (34.9%). Of 31.7% mothers tested positive, 80.4% received ART. 85.2% of adolescent mothers were unaware of their status. Recommendation: Community-level interventions and health facility-level interventions are required to identify the risk factors for missed opportunities for PMTCT, including raising community awareness. |
| Mate et al. 2013 | South Africa, 5 districts | Operational research | NGO partners, health facilities | 6 NGOs, 5 districts (181 facilities) | Improving DOH-NGO collaboration using Quality-improvement model involving: setting targets, improving data, simplifying processes and building networks | To reduce MTCT rates to <5% in all intervention districts through engaging partners | Accelerated plan used to improve PMTCT services at health care facilities. A total of 676 health care workers and managers were trained in quality-improvement methods and tools. Coverage of seven key processes in the PMTCT programme was tracked on a monthly basis. Recommendation: Network models could successfully recruit key stakeholders into strong partnerships, leading to rapid scale-up of public life-saving interventions. |
| Ibeto et al. 2014 | South Africa, Cape Town, Khayelitsha | Case series record review | Health facility records | Community health centre records | Investigation of each HIV-positive PCR baby records review | To establish possible causes of transmission of HIV-infected infants to identify obstacles to PMTCT | Reduction of PCR-positive infants to 1.6%. A total of 926/1158 (80%) of exposed infants had PCR results, with 15/926 (1.6%) PCR-positive. Main risk factors for elimination of mother-to-child transmission (EMTCT): late presentation for antenatal care, inadequate PMTCT prophylaxis and lack of viral load monitoring. Recommendation: PMTCT programme must consider each PCR-positive infant to provide with insight into correcting clinical and programmatic reasons for HIV transmission. |
| Herce et al. 2015 | Malawi, 5 districts | Cross-sectional study | Government health facilities | 5 districts' health facilities | Health worker training and mentorship; HIV counselling for couples and testing; male partner involvement; psychosocial support for women | To evaluate performance on PMTCT indicators | Programme performance of facility-level outcome indicators improved. HIV counselling and testing improved from 66% to 87%, ART coverage from 23% to 96%, NVP infants from 1% to 100%, PCR and testing from 52% to 62%. Recommendation: Continued investments are needed to strengthen PMTCT cascades. |
| Mahmud et al. 2010 | Malawi, rural hospital | Evaluation study – Quantitative | Community care workers in rural setting in Malawi | 75 community care workers in rural setting in Malawi | Text message-based interventions using mHealth by community care workers (trained on its utilisation) | To use mHealth interventions in bridging the patients-physicians gaps | Reduced operational costs: saved on worker time; fuel saving. Recommendations: mHealth interventions can provide cost-effective solutions to communication barriers in rural settings. |
| Leon et al. 2013 | South Africa, Cape Town | Qualitative study – Longitudinal study | Staff and patients in health care setting | 4 primary health care services' nursing staff, lay counsellors, leadership team, facility managers, trainers, patients | PICT | Process evaluation of PICT intervention | PICT embedded in practice leads to improvement in counselling and testing. Recommendation: Strong senior leadership; implementation support; accountability mechanism; responsive organisational context. |

Source: Adapted from Arksey and O'Malley¹⁷

ANC, antenatal clinic; ART, anti-retroviral treatment; CHNRI, Child Health Nutrition Research Initiative; LFTU, lost to follow up; IR, implementation research; MCH, maternal and child health; mHealth, mobile health; NVP, nevirapine; PCR, polymerase chain reaction; PICT, provider-initiated counselling and testing; PMTCT, prevention of mother-to-child transmission of HIV; RTCs, randomised controlled trials SSA, sub-Saharan Africa.

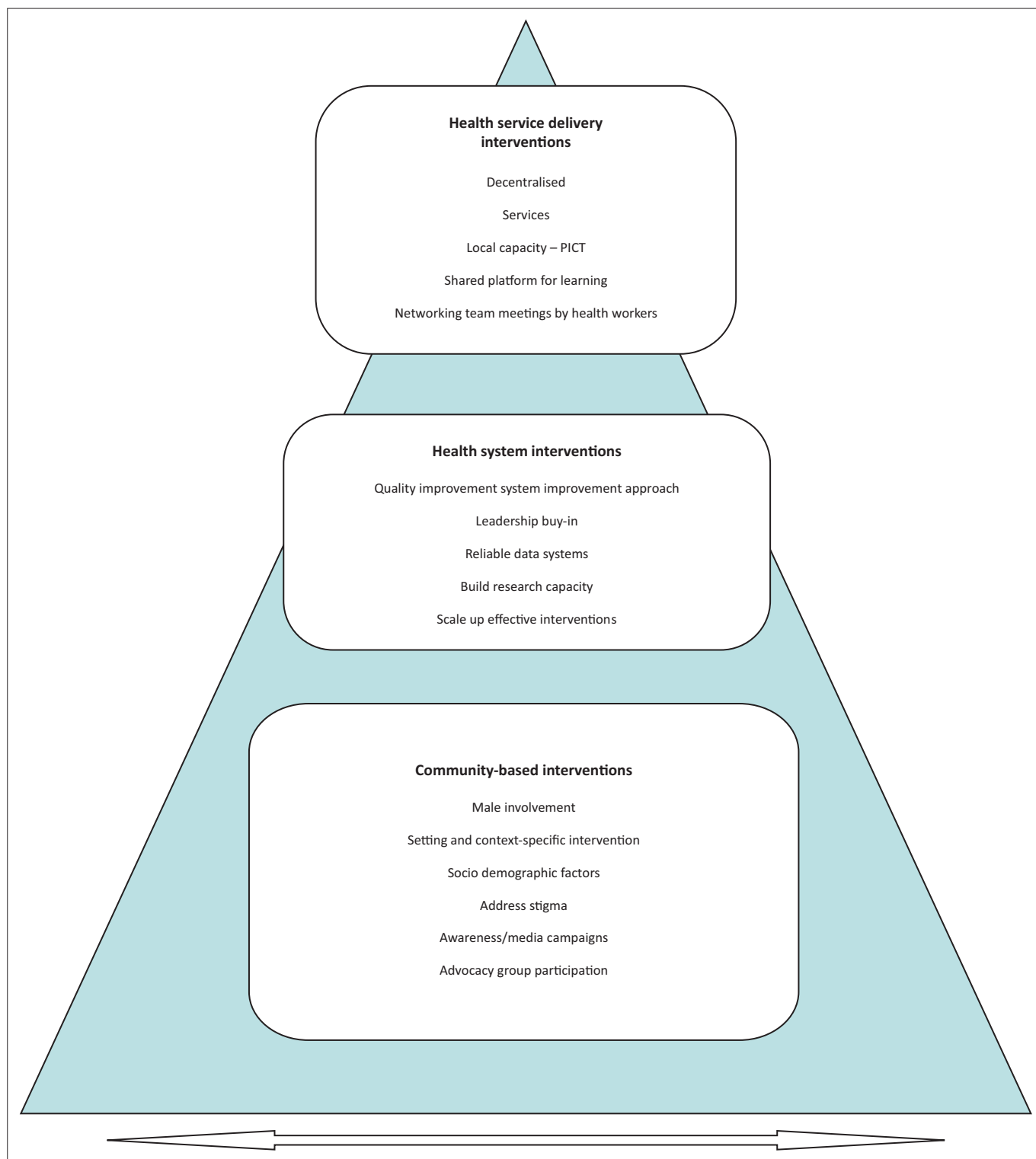
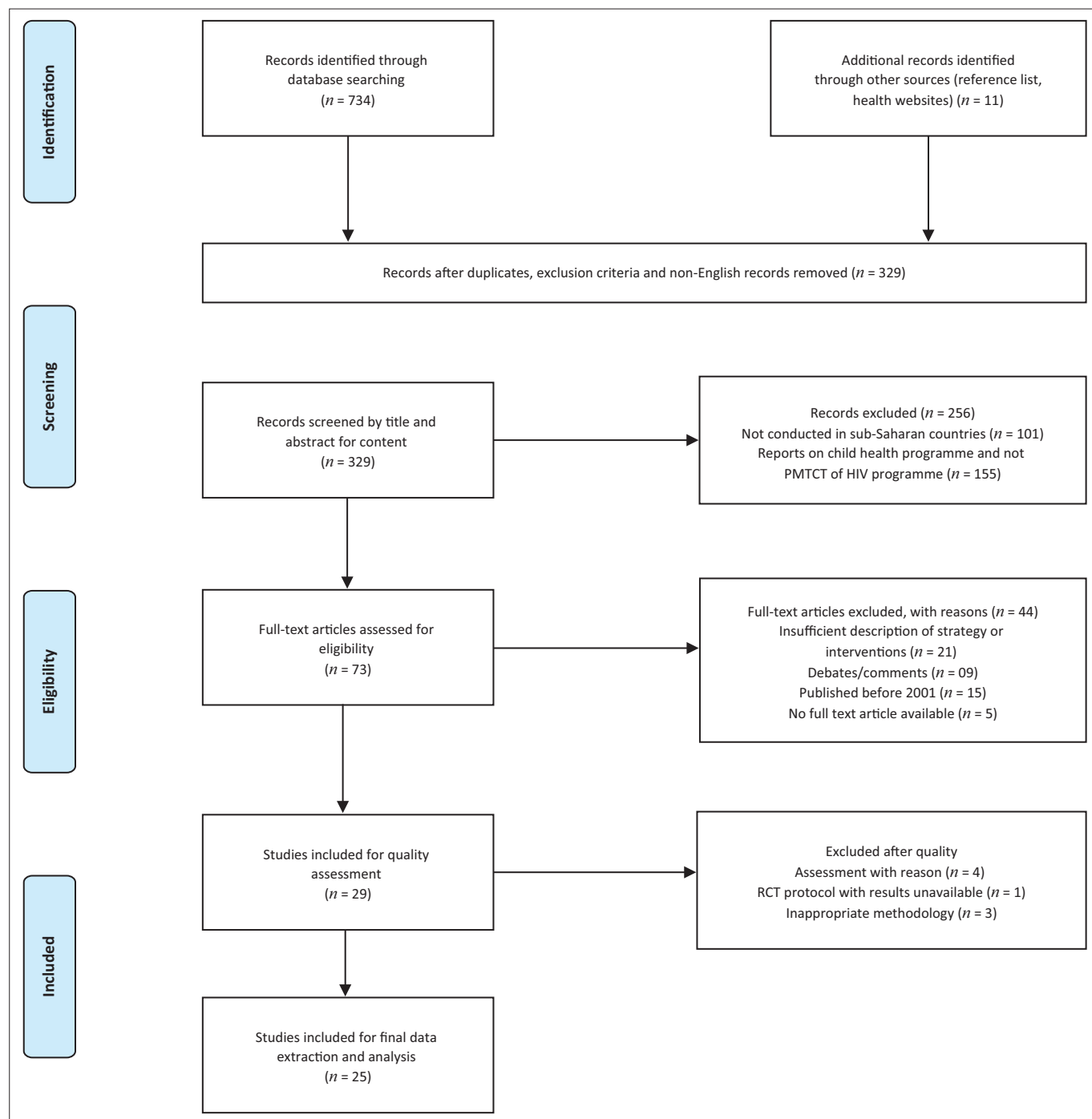


FIGURE 1: Model developed providing summary of three key categories from final articles.

Health service delivery strategies

The common strategies reported included shared platform for learning and decision-making among stakeholders,²² health service improvement of processes^{2,23,24} and data-driven quality-improvement approach which was mainly reported in South Africa.^{25,26,27,28} This approach included health workers forming information teams to discuss issues relating to performance, forming learning networks which also promote shared learning, and discussing changes and planning for implementation.

There were studies that reported on strengthening of integration of PMTCT services into maternal health programme as well as clear role clarifications among the implementers^{8,10,29,30}; reinforcement of provider-initiated counselling and testing services by health workers to improve uptake³¹ which is also linked to task shifting. Another approach for assisting in bridging the gap of PMTCT implementation is monitoring individual infants to determine the reason for transmission so that interventions can be targeted at



Source: Moher et al⁶⁶

FIGURE 2: PRISMA 2009 flow diagram of searched articles.

the barriers.³² This, according to the study, can reveal specific barriers to be addressed for countries to get to zero infections.

Community-based strategies

It was common among assessed articles that the consideration of context and settings remained crucial, especially in SSA countries.^{11,12,33,34} The reality on the ground is seen as one of the major barriers to implementation of prevention programmes such as the PMTCT programme; hence, strategies should be tailor-made to cater to such barriers. The importance of community involvement in bridging the gap in policies remains crucial.^{21,35,36,37}

There were articles that considered the promotion of disclosure of HIV infection in ensuring that communities are supported in the programme.¹² According to health care workers, failure to disclose can result in poor support. Owing to the fact that the programme needs communities to take part for its success, linkage between public health facilities and communities was seen as one strategy to close gaps in implementation.

Some models included the community care-givers, strengthened the linkages and the referral system between communities and health facilities^{37,38,39} as well as made

communities aware through community sensitisation models, including conducting campaigns in communities to create awareness and to address stigma which is reported as a barrier in communities.^{34,37,40}

In the inclusion of families using family-centred approach⁴¹, male involvement^{36,38} was identified as a gap where only women seem to be the focus. This calls for more engagement of men in future studies. For some studies, innovations, including use of technology, for example use of text messages by community care workers (mHealth) to reach communities,³⁹ demonstrate how technology can be utilised to access health.

Access to services remains crucial for any prevention programme to be a success; therefore, free and affordable services that can improve uptake of services are employed⁴¹; however, considering contexts, the affordability of such interventions across countries and sustainability of such an approach need to be further explored.

Health system interventions

Health system-related interventions included among others the importance of leaders in the health system to pave the direction for implementers; hence, leadership buy-in²⁷ to effect change in the use of quality-improvement model for improvement is proposed for the implementation to take place. However, models on leadership engagement need to be explored for countries to maximise benefits from it.

The reviews highlighted the importance of using reliable data systems with the health workers as implementers and adopting an approach that addresses health system improvement^{25,26,27,28} as one of the strategies, for example the use of quality-improvement approaches towards improvement that promotes health system strengthening. WHO, in its framework of six building blocks, highlighted information as one of the health system-building blocks and the importance of monitoring health system performance of programmes for progress as well as impact.^{23,42}

Strengthening research capacity among SSA countries is seen as vital in improving implementation. This included capacity building on implementation science research targeting health workforce, especially in resource limited countries.^{4,27,43,44,45} By doing so, it is believed that low-resource countries can better understand implementation science as it relates to answering critical research questions in their context.

Figure 1 represents the model to summarise identified key categories.

Discussion

Our review on mapping strategies and interventions to bridge the gap in the implementation of PMTCT of HIV in the SSA countries had found articles on strategies and promising approaches used while identifying areas for future research. Based on this review, majority of papers are secondary papers ($n = 9$), reporting on systematic reviews

and lack primary researches reported on this area. Papers also reported on barriers to implementation and enablers thereof with limited studies reporting on strategies for closing the implementation gap. It was common that for a strategy to be effective, it needed to be informed by identified barriers to implementation.³⁴

Evidence regarding particular strategies mostly relates to the PMTCT programme performance through data indicators monitoring of the PMTCT cascade. Previous evidence had mainly focused on monitoring performance for PMTCT indicators through the PMTCT cascade. This was used to measure programme implementation, and identified gaps in the PMTCT programme coverage which identified strategies that included using quality-improvement approaches in public health care settings that focus on obtaining and building will from leadership, ideas for changes, monitoring data as well as using platforms for shared learning which was common across studies.^{2,25,26,27,32,48}

While task shifting emerged as one of the key solutions to bridge policy implementation gaps, and was seen as a strategy to improve healthcare coverage as well as address human resources challenges which were common across the SSA countries, inadequate supervision and poor role clarification remain a challenge.^{8,49}

Majority of papers report on health worker interventions including health system intervention,^{22,25,26,27} with the majority reporting on the importance of engaging implementers for any implementation gap to be closed^{26,27,31,39,43,44} which was found to be crucial, especially in low-resource countries.

While the strategies were offered by the SSA countries, they lack evaluations to determine the effectiveness of those identified strategies.⁴⁴ The lack of evaluation of implementation strategies hinders their assessment for effectiveness. Interventions reported including free service delivery⁴¹ may require further assessment for sustainability of such an approach in a given low-resource country; however, the majority of SSA countries were offering free maternity services.

With countries expected to eliminate MTCT of HIV, demand for countries to speed up implementation and package interventions and strategies that are effective in closing the implementation gap remain crucial.

Strengths and limitations of this study

The review was limited to studies published in English, as it is the commonly used language for communication in the majority of SSA countries. The review was limited to articles published from 2001 to August 2016, and publications prior to this year were excluded for relevancy of the research topic as well as for reasons related to PMTCT not fully being implemented in SSA countries before 2001. The review focused on articles published in SSA countries, due to comparable settings and similar resources available.

Our review focused on the strategies and interventions for PMTCT of HIV programme to close the gap in implementation, and therefore excluded the broader aspect of other programmes that may offer strategies to close the gap in implementation; however, this review can guide future research so that a broader evidence of effective strategies used in health and other prevention programmes can be mapped.

Conclusions and recommendations

Prevention of MTCT of HIV remains a growing global public health priority, more so in the highly HIV-burdened SSA countries. This review revealed that there is no one size fits all approach in closing the implementation gap for priority prevention programmes such as PMTCT of HIV in countries with low resources. There is a need for a combination of multifaceted approaches that consider contextual settings, leadership involvement, shared learning forums while considering resources towards closing the implementation gap.

Packaging of strategies that have proven to work for scale-up to similar settings is needed; however, evaluation of such interventions and strategies for effectiveness and efficiency is of vital importance. The Global Plan vision (2011–2015), of no child shall be born with HIV and keeping mothers alive as well as eliminating MTCT of HIV until it does not constitute a public health concern, as well as achievement of universal 90-90-90 strategies require unusual business approaches as well as the engagement with researchers, policymakers, implementers and communities to prioritise implementation in the policy development phase, considering various contextual settings.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

W.H.N. was responsible for the conceptualisation of the review. T.M. assisted in the design of the article. W.H. and Z.L. devised the plan for data extraction. All authors critically reviewed and revised the manuscript. B.P. and J.N. were the third and the fourth reviewers for the confirmation of disagreements. W.H.N. prepared the final manuscript. All authors were involved in the final manuscript review and approval.

References

- UNAIDS. Global plan towards the elimination of new HIV infections among children by 2015. Geneva, Switzerland: UNAIDS; 2014.
- Herce ME, Mtande T, Chimbwandira F, et al. Supporting Option B+ scale up and strengthening the prevention of mother-to-child transmission cascade in central Malawi: Results from a serial cross-sectional study. *BMC Infect Dis*. 2015;15(1):1. <http://dx.doi.org/10.1186/s12879-015-1065-y>
- UNAIDS. Global AIDS update 2016. Geneva, Switzerland: UNAIDS; 2016.
- World Health Organization. Global update on HIV treatment 2013: Results, impact and opportunities. Geneva, Switzerland: WHO; 2013.
- Sidibé M, Loures L, Samb B. The UNAIDS 90–90–90 target: A clear choice for ending AIDS and for sustainable health and development. *J Int AIDS Soc*. 2016;19(1):21133. <http://dx.doi.org/10.7448/IAS.19.1.21133>
- WHO. Use of antiretroviral drugs for treating pregnant women and preventing HIV infection in infants. Geneva: WHO; 2012.
- Chopra M, Daviaud E, Pattinson R, Fonn S, Lawn JE. Saving the lives of South Africa's mothers, babies, and children: Can the health system deliver? *South Africa. Lancet*. 2009;374(9692):835–846. [http://dx.doi.org/10.1016/S0140-6736\(09\)61123-5](http://dx.doi.org/10.1016/S0140-6736(09)61123-5)
- Kinney MV, Kerber KJ, Black RE, et al. Sub-Saharan Africa's mothers, newborns, and children: Where and why do they die? *PLoS Med*. 2010;7(6):e1000294. <http://dx.doi.org/10.1371/journal.pmed.1000294>
- Peltzer K, Mosala T, Shisana O, Nqueko A, Mngqandano N. Barriers to prevention of HIV transmission from mother to child (PMTCT) in a resource poor setting in the Eastern Cape, South Africa. *Afr J Reprod Health*. 2007;11(1):57–66. <http://dx.doi.org/10.2307/30032488>
- Stringer EM, Sinkala M, Stringer JS, et al. Prevention of mother-to-child transmission of HIV in Africa: Successes and challenges in scaling-up a nevirapine-based program in Lusaka, Zambia. *AIDS (London, England)*. 2003;17(9):1377. <http://dx.doi.org/10.1097/00002030-200306130-00012>
- Aizire J, Fowler MG, M Coovadia H. Operational issues and barriers to implementation of prevention of mother-to-child transmission of HIV (PMTCT) interventions in Sub-Saharan Africa. *Curr HIV Res*. 2013;11(2):144–159. <http://dx.doi.org/10.2174/1570162X11311020007>
- Nuwagaba-Biribonwoha H, Mayon-White R, Okong P, Carpenter L. Challenges faced by health workers in implementing the prevention of mother-to-child HIV transmission (PMTCT) programme in Uganda. *J Public Health*. 2007;29(3):269–274. <http://dx.doi.org/10.1093/pubmed/fdm025>
- Sherman G, Jones S, Coovadia A, Urban M, Bolton K. PMTCT from research to reality—results from a routine service. *S Afr Med J*. 2004;94(4):289–292.
- Both J, Van Roosmalen J. The impact of Prevention of Mother to Child Transmission (PMTCT) programmes on maternal health care in resource-poor settings: Looking beyond the PMTCT programme – A systematic review. *Brit J Obstet Gynaec* 2010;117(12):1444–1450. <http://dx.doi.org/10.1111/j.1471-0528.2010.02692.x>
- Doherty TM, McCoy D, Donohue S. Health system constraints to optimal coverage of the prevention of mother-to-child HIV transmission programme in South Africa: Lessons from the implementation of the national pilot programme. *African Health Sci*. 2005;5(3):213–218.
- Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Ann Intern Med*. 2009;151(4):264–269. <http://dx.doi.org/10.7326/0003-4819-151-4-200908180-00135>
- Pace R, Pluye P, Bartlett G, et al. Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *Int J Nurs Stud*. 2012;49(1):47–53. <http://dx.doi.org/10.1016/j.ijnurstu.2011.07.002>
- Pluye P. Critical appraisal tools for assessing the methodological quality of qualitative, quantitative and mixed methods studies included in systematic mixed studies reviews. *J Eval Clin Pract*. 2013;19(4):722. <http://dx.doi.org/10.1111/jep.12017>
- Friberg IK, Kinney MV, Lawn JE, et al. Sub-Saharan Africa's mothers, newborns, and children: How many lives could be saved with targeted health interventions? *PLoS Med*. 2010;7:e1000295. <http://dx.doi.org/10.1371/journal.pmed.1000295>
- Turan JM, Nyblade L. HIV-related stigma as a barrier to achievement of global PMTCT and maternal health goals: A review of the evidence. *AIDS Behav*. 2013;17:2528–2539. <http://dx.doi.org/10.1007/s10461-013-0446-8>
- Woldesenbet S, Jackson D, Lombard C, et al. Missed opportunities along the prevention of mother-to-child transmission services cascade in South Africa: Uptake, determinants, and attributable risk (the SAPMTCTE). *PLoS One*. 2015;10:e0132425. <http://dx.doi.org/10.1371/journal.pone.0132425>
- Ssengooba F, Atuyambe L, Kiwanuka SN, Puvanachandra P, Glass N, Hyder AA. Research translation to inform national health policies: Learning from multiple perspectives in Uganda. *BMC*. 2011;11(1):1. <http://dx.doi.org/10.1186/1472-698x-11-s1-13>
- Chabikuli O, Gwarzo U, Olufunso A, et al. Closing the prevention of mother-to-child transmission gap in Nigeria: An evaluation of service improvement intervention in Nigeria. *S Afr Fam Pract*. 2013;55(1):96–102. <http://dx.doi.org/10.1080/20786204.2013.10874310>
- Ezeanolue EE, Powell BJ, Patel D, et al. Identifying and prioritizing implementation barriers, gaps, and strategies through the Nigeria implementation science alliance: Getting to zero in the prevention of mother-to-child transmission of HIV. *J Acquir Immune Defic Syndr*. 2016;72:S161–S166. <http://dx.doi.org/10.1097/QAI.0000000000001066>
- Doherty T, Chopra M, Nsiband D, Mngoma D. Improving the coverage of the PMTCT programme through a participatory quality improvement intervention in South Africa. *BMC Pub Health*. 2009;9(1):1. <http://dx.doi.org/10.1186/1471-2458-9-406>
- Mate KS, Ngubane G, Barker PM. A quality improvement model for the rapid scale-up of a program to prevent mother-to-child HIV transmission in South Africa. *Int J Qual Health Care*. 2013;25:373–380. <http://dx.doi.org/10.1093/intqhc/mzt039>
- Youngleson MS, Nkurunziza P, Jennings K, Arendse J, Mate KS, Barker P. Improving a mother to child HIV transmission programme through health system redesign: Quality improvement, protocol adjustment and resource addition. *PLoS One*. 2010;5(11):e13891. <http://dx.doi.org/10.1371/journal.pone.0013891>

28. Barker P, Barron P, Bhardwaj S, Pillay Y. The role of quality improvement in achieving effective large-scale prevention of mother-to-child transmission of HIV in South Africa. *AIDS*. 2015;29:S137–S143. <http://dx.doi.org/10.1097/QAD.0000000000000718>
29. Horwood C, Haskins L, Vermaak K, Phakathi S, Subbaya R, Doherty T. Prevention of mother to child transmission of HIV (PMTCT) programme in KwaZulu-Natal, South Africa: An evaluation of PMTCT implementation and integration into routine maternal, child and women's health services. *Trop Med Int Health*. 2010;15(9):992–999. <http://dx.doi.org/10.1111/j.1365-3156.2010.02576.x>
30. Welty TK, Bulterys M, Welty ER, et al. Integrating prevention of mother-to-child HIV transmission into routine antenatal care: The key to program expansion in Cameroon. *J Acquir Immune Defic Syndr*. 2005;40(4):486–493. <http://dx.doi.org/10.1097/01.qai.0000163196.36199.89>
31. Leon N, Lewin S, Mathews C. Implementing a provider-initiated testing and counselling (PITC) intervention in Cape Town, South Africa: A process evaluation using the normalisation process model. *Implement Sci*. 2013;8(1):1. <http://dx.doi.org/10.1186/1748-5908-8-97>
32. Ibeto M, Giddy J, Cox V. Closing the gaps: Steps towards elimination of mother-to-child transmission of HIV. *Southern Afr J HIV Med*. 2014;15(3):107–109. <http://dx.doi.org/10.7196/sajhivmed.1047>
33. Buttenheim AM, Asch DA. Behavioral economics: The key to closing the gap on maternal, newborn and child survival for millennium development goals 4 and 5? *Matern Child Health J*. 2013;17(4):581–585. <http://dx.doi.org/10.1007/s10995-012-1042-7>
34. Haines A. Bridging the implementation gap between knowledge and action for health. *Bull World Health Organ*. 2004;82(10):724–731.
35. Bhutta ZA, Darmstadt GL, Hasan BS, Haws RA. Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: A review of the evidence. *Pediatrics*. 2005;115(Suppl 2):519–617. <http://dx.doi.org/10.1542/peds.2004-1441>
36. Byamugisha R, Tumwine JK, Semiyaga N, Tylleskär T. Determinants of male involvement in the prevention of mother-to-child transmission of HIV programme in Eastern Uganda: A cross-sectional survey. *Reprod Health*. 2010;7(1):1. <http://dx.doi.org/10.1186/1742-4755-7-12>
37. Tomlinson M, Doherty T, Jackson D, et al. An effectiveness study of an integrated, community-based package for maternal, newborn, child and HIV care in South Africa: Study protocol for a randomized controlled trial. *Trials*. 2011;12(1):1. <http://dx.doi.org/10.1186/1745-6215-12-236>
38. Ditekemena J, Koole O, Engmann C, et al. Determinants of male involvement in maternal and child health services in sub-Saharan Africa: A review. *Reprod Health*. 2012;9(1):1. <http://dx.doi.org/10.1186/1742-4755-9-32>
39. Mahmud N, Rodriguez J, Nesbit J. A text message-based intervention to bridge the healthcare communication gap in the rural developing world. *Technol Health Care*. 2010;18(2):137–144.
40. Wettstein C, Mugglin C, Egger M, et al. Missed opportunities to prevent mother-to-child-transmission in sub-Saharan Africa: Systematic review and meta-analysis. *AIDS (London, England)*. 2012;26(18):2361. <http://dx.doi.org/10.1097/QAD.0b013e328359ab0c>
41. Kasenga F, Byass P, Emmelin M, Hurtig A-K. The implications of policy changes on the uptake of a PMTCT programme in rural Malawi: First three years of experience. *Global Health Action*. 2009;2:1–7. <http://dx.doi.org/10.3402/gha.v2i0.1883>
42. World Health Organization. Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies. Geneva, Switzerland: World Health Organization; 2010.
43. Rollins N, Chanza H, Chimbwandira F, et al. Prioritizing the PMTCT implementation research agenda in 3 African countries: INtegrating and Scaling up PMTCT through Implementation REsearch (INSPIRE). *J Acquir Immune Defic Syndr*. 2014;67(Suppl 2):S108–S113. <http://dx.doi.org/10.1097/QAI.0000000000000358>
44. Whitworth J. Improving implementation: Building research capacity in maternal, neonatal, and child health in Africa. *PLoS Med*. 2010;7(7):3. <http://dx.doi.org/10.1371/journal.pmed.1000299>
45. Williams C. Strategies for enhancing the implementation of school-based policies or practices targeting risk factors for chronic disease. *Cochrane Database Syst Rev*. 2015;5:1–21. <http://dx.doi.org/10.1002/14651858.CD011677>
46. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med*. 2009b;6:e1000097. <http://dx.doi.org/10.1136/bmj.b2535>
47. Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*. 2005;8(1):19–32.
48. Kalembo FW, Zgambo M. Loss to followup: A major challenge to successful implementation of prevention of mother-to-child transmission of HIV-1 programs in sub-Saharan Africa. *Isrn AIDS*. 2012;2012:1–10.
49. Crowley T, Mayers P. Trends in task shifting in HIV treatment in Africa: Effectiveness, challenges and acceptability to the health professions. *Afr J Prim Health Care Fam Med*. 2015;7(1):1–9. <http://dx.doi.org/10.4102/phcfm.v7i1.807>