

## A model for enhancing prevention of mother to child HIV transmission in a low resource setting

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### ABSTRACT

**Background:** The prevention of mother-to-child transmission (PMTCT) programmes plays a significant role in the reduction of human immunodeficiency virus (HIV) infections in the under-five age group and maternal mortalities. A phenomenological study on the experiences of HIV-positive women who utilised the PMTCT services identified challenges affecting the use of those services. An enabling environment is required for the effectiveness of the PMTCT programme.

**Purpose:** The purpose of this paper is to develop and describe a model for enhancing prevention of mother-to-child HIV transmission in a low-resource setting.

**Method:** The model was developed in three sequential phases: empirical foundation, development of the model and description of the model. The model was developed using Walker and Avant's steps of theory development. Chinn and Kramer's criteria were used to evaluate the model and the modified version of the Delphi technique was utilised for peer review and further refinement of the model. This emanated from findings of a doctoral thesis on the experiences of HIV-positive PMTCT clients at a central hospital in Zimbabwe. The procedure involved the use of systems theory, central concept identification, a literature review, the definition of key terms and the identification of the elements of the model, after which the model was developed, described, and evaluated.

**Results:** The elements of the model encompass the context, input, process and outcome.

**Conclusion:** The model will act as a reference framework for midwives and programme planners with a view of enhancing utilisation and the quality of PMTCT services.

### 1. Introduction

The prevention of mother-to-child transmission (PMTCT) programme was piloted in Zimbabwe in 1999. The rate of mother-to-child transmission (MTCT) of HIV is currently around 5.78 per cent in Zimbabwe (Zimbabwe Ministry of Health and Child Care, 2018a). This is compared to 1% or less in the United States and Europe, according Centers for Disease Control and Prevention (2020), who posits that the rate of MTCT of HIV is closely associated with the effective utilisation of the PMTCT programme. The country has a high under-five mortality rate of 69 deaths per 1 000 live births (ZIMSTAT, 2016). Antiretroviral therapy (ART) coverage for 2017 was 84.2 and 89.5 per cent for adults and children respectively, whilst HIV prevalence was 12.7 per cent (ZIMSTAT, 2016; UNAIDS, 2013; Zimbabwe Ministry of Health and Child Care & NAC, 2018). The PMTCT programme plays a significant role in the reduction of paediatric HIV infections, and under-five and maternal mortalities (World Health Organisation, 2017).

The United Nations (2015) report states that the global target for the reduction in maternal mortality ratio is to less than 70 per 100,000 live births by 2030. The set target for new-borns and under-fives is the reduction to less than 12 per 1,000 and 25 per 100 000 live births for neonatal and under-fives mortalities respectively (WHO, 2017; McArthur et al. 2018). Since Zimbabwe faces so many challenges in health delivery, the development and utilisation of the PMTCT model will contribute significantly towards the Sustainable Development Goal 3. An effective PMTCT programme is critical for the achievement of the 95;95;95 UNAIDS targets. This will help improve the health of pregnant and lactating mothers and that of their children. This, in turn will contribute to the HIV epidemic control (WHO, 2017).

The PMTCT model was developed as a second phase of a study conducted by Moyo (2016), which focused on the experiences of HIV-positive women who were using PMTCT services at a central hospital in Zimbabwe. The study participants of that phase were PMTCT clients who were aged between 18 and 49 years, had received antenatal care,

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had delivered a baby, and who received postnatal and paediatric follow-up care at that hospital until the baby was two years old. That phase of the study adopted a qualitative approach which, according to Polit and Beck (2018), sees the researcher collecting primarily qualitative narrative descriptions in natural settings. Because qualitative researchers believe there are multiple interpretations of reality, the researchers deemed this approach to be best suited for gaining an understanding of the clients' use of PMTCT services at a central hospital, through in-depth interviews.

Despite the significant contributions of the PMTCT programme, a number of challenges which act as barriers to the effective implementation thereof were identified, including key health system factors such as poor staff-client interactions, staff shortages and service inaccessibility. These findings are corroborated by studies in sub-Saharan Africa, undertaken by Chiya et al. (2018) and Yah and Tambo (2019), while similar challenges are cited in a related study in Zimbabwe by McCoy et al. (2015). Notably, there is no PMTCT model to assist healthcare practitioners involved in the PMTCT programme. As the success of the PMTCT programme is linked to the utilisation of related services, the creation of a model to guide healthcare practitioners was deemed critical.

## 2. Research purpose and objectives

### 2.1. Research purpose

The purpose of this research study was to develop and describe a model for enhancing prevention of mother-to-child HIV transmission in a low-resource setting.

### 2.2. Research objective

The study's specific objectives were developed based on processes outlined by Chinn and Kramer (2018), which involve:

1. Selecting the concepts of the model from the study findings.
2. Describing and defining the key concepts identified.
3. Describing the relationships between these concepts.
4. Defining the structure and processes of the proposed model.

## 3. Definition of key concepts

### 3.1. Continuous quality improvement

Continuous Quality Improvement (CQI) is a progressive incremental improvement of processes, safety, and patient care. The goal of CQI is to improve operations, quality healthcare outcomes, systems processes, improved work environment and regulatory compliance (O'Donnell and Gupta, 2021).

### 3.2. Effective utilisation

In the context of this study, effective utilisation is deemed to refer to how PMTCT services are used to achieve the intended outcomes of the programme.

### 3.3. Model

Polit and Beck (2018) define a model as a representation of inter-related concepts that are assembled in a rational scheme, by virtue of their relevance to a common theme.

### 3.4. PMTCT

According to the Zimbabwe Ministry of Health and Child Care (2018a), PMTCT refers to those measures that are put in place to prevent

the transmission of HIV from an HIV-positive woman to her child during pregnancy, labour, delivery and breastfeeding.

### 3.5. PMTCT model

Brereton et al. (2017) refer to a model of care as an implementation model, defining it as an operational model for redesigning nursing and midwifery practice in respect of the provision of patient care in an organisation. In this study, a model refers to a schematic representation of how PMTCT services can be organised to improve the quality of care and enhance the utilisation of related services.

### 3.6. PMTCT services

The Zimbabwe Ministry of Health and Child Care (2018a) states that PMTCT services are measures or services offered to prevent the transmission of HIV from an HIV-positive woman to her child during pregnancy, labour, delivery and breastfeeding. In this context, PMTCT services are viewed as a sub-system of the healthcare system.

### 3.7. Quality assurance

Quality assurance is a system to support performance according to standards. It implies a systematic way of establishing and maintaining quality improvement activities as an integral and sustainable part of systems or organisations. This includes all activities that contribute to the design, assessment, monitoring of standards agreed upon by all stakeholders and improving quality of service delivery, client satisfaction and effective utilisation (Zimbabwe Ministry of Health and Child Care, 2016b).

### 3.8. Systems theory

According to Anderson (2016), a system refers to a collection of different elements or parts which produces results that cannot be obtained by the relevant individual components in isolation. In this study, PMTCT services were viewed from a systems perspective.

## 4. Measures to ensure trustworthiness

According to Moule and Goodman (2017), trustworthiness refers to a method of establishing or ensuring scientific rigour in qualitative research, without sacrificing relevance. The researchers complied with measures aimed at ensuring credibility, dependability, confirmability and transferability. Moule and Goodman (2017) define credibility as the manner in which the study findings are a true reflection of the experiences and perceptions of the study participants. To enhance credibility, the researchers made every effort to build rapport and trust with the research participants through prolonged engagement, bracketing and peer debriefing. Transferability was ensured through the use of dense descriptions of the participants' lived experiences, as well as demographic information and the use of direct quotes. To further enhance trustworthiness, the model was shared and reviewed by nursing colleagues with PMTCT and maternal and child health expertise, for consensual validation.

## 5. Ethical approval

Ethical clearance was obtained from the Higher Degrees Committee of the Department of Health Studies at the University of South Africa (HSHDC/205/2013). Permission was also sought from the Zimbabwe Ministry of Health and Child Care and the hospital concerned, through the chief executive officer. Participants gave their consent in writing prior to the data-collection process (Moyo, 2016).

## 6. Method

### 6.1. Design

This study was designed in three sequential phases: presentation of the empirical foundation of the model, development of the model and description of the model. Theory development design was used to populate the model. The complexity of factors influencing PMTCT health outcomes necessitated that the conceptual framework be guided by a holistic and a systems perspective, anchored in a framework for health systems put forward by the World Health Organisation (2019) and a number of scholars (Tello et al. 2020; Plack et al. 2019; and Bradley et al. 2020).

### 7. Theory development approach processes

The theory development was informed by the works of Anderson (2016), the World Health Organisation (2012), Walker and Avant (2018), Chin and Kramer (2018), Veugelers et al. (2020, Fletcher and Marchildon (2014) and Wilkes (2015). From Anderson (2016) and the World Health Organisation (2012), we derived the systems theory. Concept analysis, synthesis and derivation, were informed by Walker and Avant (2018) and Chinn and Kramer (2018). Veugelers et al. (2020), Fletcher and Marchildon (2014) and Wilkes (2015) informed the evaluation and refinement of the model using the Delphi technique. The following description reflects the phases that were followed (Fig. 1).

#### 7.1. The empirical foundation of the model

In this study, a model refers to a schematic representation of how PMTCT services can be organised to improve the quality of care using a systems approach (Polit & Beck, 2018, Anderson, 2016). This model is premised on a previous qualitative study (Moyo, 2016), which used a phenomenological descriptive design (Streubert & Carpenter, 2020).

The aim of the previous study was to gain an understanding of the experiences of HIV-positive women regarding their utilisation of PMTCT services at a central hospital in Zimbabwe.

Sampling from the study population of the participants was done through non-probability sampling (Hennink et al. 2017; Saunders et al. 2018). The sample consisted of 15 females aged 18 to 49 years. The sample size was attained after data saturation. Data collection was done through in-depth face-to-face (audio-recorded) interviews and field notes. The data were analysed using the interpretive phenomenological analysis framework. According to Alase (2017), this type of phenomenological analysis facilitates an understanding of the in-depth accounts of the research participants. The following steps as outlined by Alase (2017) were followed: (1) reading and re-reading the transcript, (2) note making and developing emergent themes, (3) clustering the emergent themes, (4) crafting a master table of themes composed of superordinate themes, subthemes and extracts from the interviews, (5) examining and comparing the similarities between the master tables of the themes and (6) compiling a single master list composed of a superordinate theme, themes and sub-themes.

Concept analysis served to describe the experiences of HIV-positive women who accessed the PMTCT services in question. This resulted in empirical findings in the form of a superordinate theme, themes and sub-themes as shown in Table 1. This assisted in the generation of rich,

in-depth data, which provided the concepts for the model that was subsequently developed (Chinn and Kramer, 2018; Walker & Avant, 2018). Thus, the model development was grounded in human interactions and the experiences of the PMTCT mothers involved in the phenomenon of interest. The model described in this study is based on the original study's empirical findings and specifically on gaps identified in the healthcare system as summarised in Table 1.

#### 7.1.1. Theoretical framework

According to (Anderson, 2016), a system comprises a collection of diverse elements that, in combination, delivers results that cannot be obtained by each of the relevant individual elements. A systems approach is premised on the fact that the overall effectiveness and efficiency in achieving goals is dependent on identification, understanding and management of interrelated processes as a collective system. The findings of Moyo (2016) showed a health system that was under-funded and had inadequate manpower and material resources (see annexure 1: for a summary of the findings). This is further corroborated by Chingono (2019). It was against this background that the PMTCT model was developed model, underpinned by the systems theory. The emphasis of

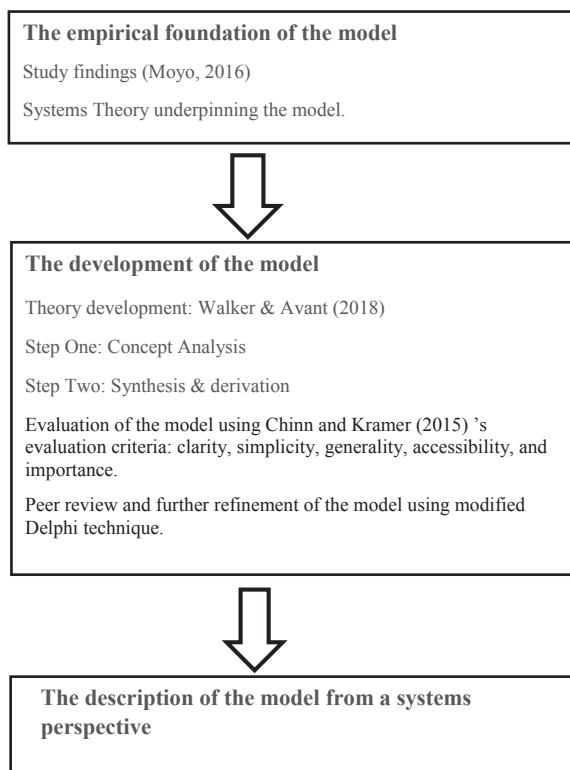


Fig. 1. The Model Development Processes. The figure depicts the processes that were followed in the development of the model.

Table 1  
Key study findings that formed the basis of model development (Moyo, 2016).

<b>Resource-related challenges</b>	<p><b>Challenges related to financial resources:</b> The study found that, on paper, maternity services were said to be free, but in reality, the opposite was true. The user fee policy was also inconsistently applied.</p> <p><b>Challenges related to material resources:</b> PMTCT clients experienced challenges associated with limited resources. For instance, clients undergoing caesarean sections had to purchase materials such as surgical gloves, suture materials, surgical blades, urinary catheters and bags.</p> <p><b>Challenges related to human resources:</b> The impact of low staffing levels manifested itself in delays in service provision. In addition, the health workers' positive or negative attitudes affected PMTCT clients.</p>
<b>Approaches and nature of PMTCT care</b>	<p>From the experiences of the PMTCT clients, it became clear that information was mainly disseminated through group educational sessions. The counselling mode, considered a vital communication strategy in a PMTCT setting, was found to be inadequate or non-existent.</p> <p>Also, found to be deficient or lacking were male partner involvement, a family-centred approach to care and the discharge planning process.</p>

this theory is on the inter-dependence and inter-connectedness of different parts of a system. The rationale for using the systems theory was enhanced by the fact that, as a point of departure, the world is viewed as made up of sub-systems that are inter-connected and inter-dependent, to form a larger, integrated and holistic system. The study was carried out in a healthcare institution which comprises different

units, departments and programmes, one of which is the PMTCT programme. Notably, the programme, which is a sub-system of the whole healthcare system, is influenced by both the environment and the context (Galli, 2017).

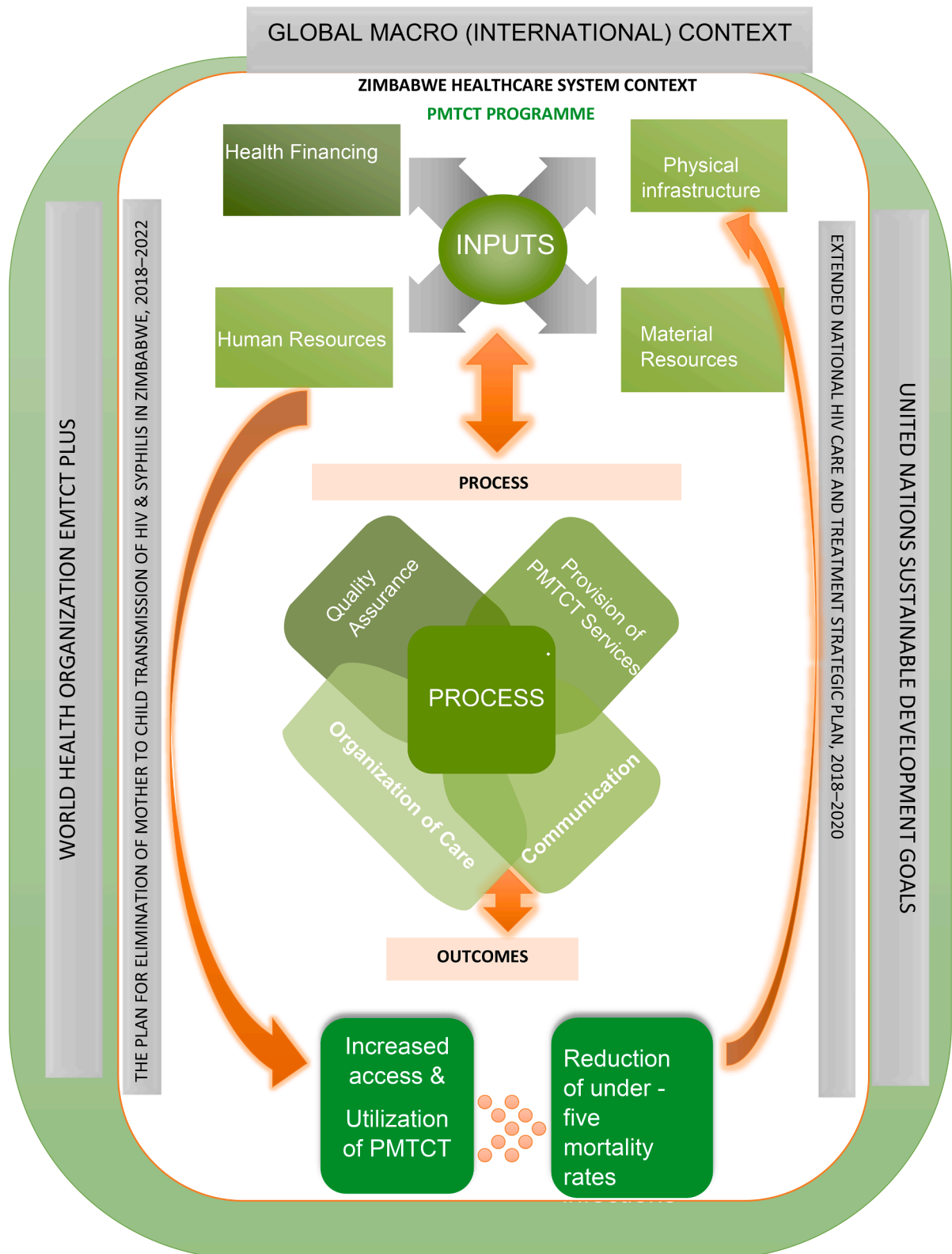


Fig. 2. The PMTCT model The figure depicts the context in which the model was formulated and took a systems approach.



## 7.2. The development of the model

Walker and Avant's (2018) processes for theory development, Chinn and Kramer's (2018) steps for model development and a modified Delphi technique according to Barrett & Heale, (2020) and Fletcher and Marchildon (2014) were used to develop the model.

### 7.2.1. Step one: Concept analysis

Walker and Avant (2018) define concept analysis as a mechanism for identifying a set of characteristics that is essential for giving meaning to a particular concept. In this case, concept analysis formed the basis for the development of the PMTCT model. According to Walker and Avant (2018), the first and most important step in conducting concept analysis is concept selection. The concept selected for this model was PMTCT service delivery, in the context of systems theory. The PMTCT services were viewed from a systems perspective, with different views on a systems approach in health services delivery having been identified by different authors (Anderson, 2016; Clarkson et al. 2018). A system was then defined as a whole with inter-related parts, characterised by elements such as PMTCT programme inputs, processes and outputs/outcomes or impacts. These components of the systems theory formed the basis for the development of the present model.

### 7.2.2. Step two: Synthesis and derivation

**7.2.2.1. Synthesis.** According to Walker and Avant (2018), synthesis refers to the generation of new ideas by examining data for fresh insights, or the development of statements about relationships, through an observation of phenomena. Concept synthesis always begins with raw data. In the context of this model, the research findings from phase one of the study, the reviewed literature and the systems theory underpinning the study, all facilitated the generation of innovative approaches to developing a PMTCT model. The results of concepts analysed in the systems were also used. The relationships among all these elements, in the context of the systems approach, proved critical for the establishment or formulation of the PMTCT model (see Fig. 2 for the relationship between different elements).

**7.2.2.2. Derivation.** For Walker and Avant (2018), the process of theory derivation refers to a scenario of transposing or redefining a concept or theory from one context to another. This approach to theory building may be necessary if existing theories are considered outdated, and new innovative approaches or perspectives are required. Walker and Avant (2018) state that the purpose of theory derivation is to arrive at strategies of explanation or prediction about a particular phenomenon that is poorly understood, and where there are no current means to study them. In the case of this model, theory derivation was used to link the research findings with the reviewed literature. In addition, the PMTCT model adopted the basic approaches of Walker and Avant (2018) and the systems perspective.

### 7.2.3. Evaluation and refinement of the model

For evaluation and refinement of the model, Chinn and Kramer's (2015) criteria, along with the modified version of the Delphi technique were utilised. According to Veugelers et al. (2020), the Delphi technique is a group process employed to collect the opinions of experts on a subject. It is characterised by the geographical distance of the experts from one another. The expert reviewers were based in Canada, Bulawayo and Harare. These were selected for the diversity of their skills and their professional training (midwifery and maternal and child health, nursing education and model generation). They were asked to evaluate the model using Chin and Kramer's (2018) evaluation guide, which included clarity, simplicity, generality, accessibility and importance of the model. As part of the evaluation process, two rounds of questionnaires were sent to the group of experts, in keeping with

recommendation by Fletcher and Marchildon (2014). The two rounds enabled the expert reviewers to respond to and to revise their answers in light of the group members' previous responses, until a consensus was reached (Wilkes, 2015). Based on their feedback, the model was further presented at a clinical meeting for midwives and doctors in a sexual and reproductive health setting. Comments from the participants, which touched on model clarity, were taken on board. Following adjustments, the model was presented to a larger group of midwives and doctors attending a refresher course. The participants of the refresher course agreed that the model was clear, accessible, user-friendly and could be utilised in other clinical settings.

## 7.3. The description of the model

The PMTCT model is composed of the following elements: context, input, processes and output (increased access and utilisation of PMTCT services and a reduction in paediatric HIV infection), as depicted diagrammatically in Fig. 2. All these elements, as will be discussed later, have their sub-elements.

### 7.3.1. Assumptions

The model is grounded on the philosophical assumptions of the systems theory (Anderson, 2016, Byskov et al. 2019). The model assumes that if PMTCT services are viewed as a system, and are well resourced, service quality will improve. Systems theory was used as a point of departure for developing the PMTCT model. Healthcare systems are taken to be open systems that are influenced by environmental factors. To attain efficiency in PMTCT service provision, an enabling environment must be established.

The overall healthcare system can enhance or deter the provision and utilisation of PMTCT services, due to various structural or service-related challenges.

Nurses, who constitute the largest number of health providers, play a pivotal role in midwifery and PMTCT settings, and therefore need empowerment – something which this model can bring about.

Developing standards of care and implementing quality assurance and continuous quality improvement activities at a PMTCT setting will enhance PMTCT health outcomes.

A well-resourced PMTCT healthcare environment is essential for increasing access to, and the utilisation of, related services.

### 7.3.2. Environment/PMTCT context

A context is characterised by a "specific set of properties pertaining to a phenomenon and a particular set of circumstances" within which an action takes place (Strauss & Corbin, 1990). Fig. 2 depicts the context in which the PMTCT model was formulated. That context encompasses three levels, namely the global, national and institutional.

**7.3.2.1. Global context.** The global context (macro factors) is represented by the outer rectangle in Fig. 2. It is composed of Sustainable Development Goal number three, and the World Health Organisation's (WHO) EMTCT Plus Framework for the elimination of mother-to-child transmission of HIV (UN, 2015; WHO, 2017). These provide operational guidelines and benchmarks in clinical and midwifery practice, as well as being indicators of maternal and child healthcare.

**7.3.2.2. National context (Zimbabwe healthcare system).** Factors at the national level include the Plan for the Elimination of Mother-to-Child Transmission of HIV and Syphilis in Zimbabwe, 2018–2022, and the Extended National HIV Care and Treatment Strategic Plan, 2018–2020 (Zimbabwe Ministry of Health and Child Care, 2018a; Zimbabwe Ministry of Health and Child Welfare, 2018b).

The current health finance model is both public and donor-funded. It has its challenges, and falls far below the 15 per cent of the national budget recommended by the Abuja Declaration (UNAIDS, 2013). The

model proposed here outlines a more realistic, sustainable, alternative way of funding public health.

The current human resource for health policy is archaic, having been developed before diseases such as HIV and acquired immunodeficiency syndrome (AIDS) emerged, and before the PMTCT programme evolved (Zimbabwe Ministry of Health and Child Welfare 2016a). According to the Department for International Development (2012), the staff complement in the past 30 years has remained static, compounded by the current freeze in recruitment. The proposed model calls for a review of current human resource allocation policies, in line with epidemiological trends. This is further acknowledged in by the Zimbabwean government in its development strategy of 2020 to 2021 (Republic of Zimbabwe, 2020).

**7.3.2.3. Institutional context.** There is a need to resource institutions properly, to enable health centres to carry out their mandate. The structural and regulatory policies governing the Zimbabwe healthcare system (discussed under the national context) can act as either enablers of, or barriers to, implementation.

### 7.3.3. Input

Input refers to resources required to carry out a process or procedure, or provide a service (Galli, 2017). In the context of the PMTCT model, the inputs required pertain to financial, physical infrastructure, human and material resources. The discussion which follows shows the proposed inputs that are necessary to create an enabling environment for the provision of PMTCT services.

**7.3.3.1. Financial and material resources.** The research findings indicate that the PMTCT setting faces challenges associated with central government's underfunding of the institution. Health institutions have to be innovative and mobilise resources, rather than rely only on conventional methods of funding. To this end, they could involve the community in resource mobilisation. Non-governmental organisations, private companies and churches could be requested to adopt specific programmes or departments in a public-private partnership initiative. Institutions need to come up with cost-saving and cost-cutting measures, and to prioritise expenditure, so as to make resources available for emergency care (e.g., for surgeries, blood transfusions and maternity services).

**7.3.3.2. Human resources.** Staff shortages was another significant finding to emerge from the study. The Ministry of Health and Child Welfare, the Health Services Board, the Civil Service Commission and the Ministry of Finance need to revisit current staff complement ratios across the country: the hospital under study, for instance, had a nursing complement of 684 nurses, with 44 (7%) vacant posts. Initially, the hospital had a bed state of 500, which increased to 1 000 after commissioning a paediatric and maternity wing (without proportionally increasing the nursing establishment). Worryingly, in 2012 all vacant posts in the public service were frozen (Zimbabwe Ministry of Health and Child Care, 2016b; DfID, 2012).

Given the latest HIV epidemiological trends, the emergence of new health settings such as the PMTCT and Opportunistic Infections clinic, the nursing staff ratio should be proportional to the workload and programme expectations. These new disease trends have resulted in significant task-shifting among nursing personnel. Nursing assignments and job descriptions thus need to accommodate new disease patterns and programmes. In the context of this study, the model calls for regular in-service education for healthcare workers.

Furthermore, nursing and midwifery curricula should address the dynamic and essential aspects of the PMTCT programme, in particular by incorporating the discharge planning process into the pre- and in-service education of both general nurses and midwives. The idea of lobbying Zimbabwean nurses in the diaspora to voluntarily offer their services and transfer skills during their vacations would help to alleviate

human resources shortages.

**7.3.3.3. Physical infrastructure.** Physical infrastructure refers to buildings and hospital consulting rooms. These physical facilities play an essential and critical role as required inputs. To provide an environment that is client friendly, while affording privacy and confidentiality, the recommended model calls for a modification of, or adjustments to, the current health infrastructure, to promote (among other things) client safety, confidentiality and the quality of care, in the light of emerging disease patterns (in this context, HIV/AIDS) and in keeping with international best practice.

**7.3.3.4. Reference materials.** According to the European Commission Joint Research Centre (2015), reference materials include documents that provide background information or quick facts on any given topic or procedure. Reference materials thus serve as reliable quality assurance tools – in this context, in a PMTCT setting. Examples include PMTCT and ART guidelines, and manuals outlining standard operating procedures. These should be available as reference materials for service providers since they implement care. The model proposes that such guidelines incorporate aspects of quality assurance standards, as well as continuous quality improvement activities in PMTCT care.

### 7.3.4. Processes

A process refers to how inputs (raw products) are transformed into usable product outputs and/or services (Clarkson et al. 2018). Processes such as quality assurance and continuous quality improvement activities, communication and referral networks are critical for the effective functioning of the proposed PMTCT model.

**7.3.4.1. Quality assurance and continuous quality improvement.** In the context of this paper, quality assurance shall be understood as defined by the Zimbabwe Ministry of Health and Child Care, (2016b): a system to support performance according to standards. It implies a systematic way of establishing and maintaining quality improvement activities as an integral and sustainable part of systems or organisations. By implication, this includes all activities that contribute to the design, assessment, monitoring of standards agreed upon by all stakeholders and improving quality of service delivery, client satisfaction and effective utilisation.

The research revealed that, at the PMTCT institution under study, the quality of care was compromised. The quality of care is measured on a set of standards. The Zimbabwe Ministry of Health and Child Care (2016b) describes a standard as a written description that reflects the desired level of performance, and is usually associated with a measure of excellence. Accordingly, these standards are used in the organisation of maternity care, and to evaluate actual performance during clinical decision making. Therefore, as part of the implications for policy (for the purposes of this model), the researchers advocate for the development and definition of quality assurance standards. These will represent an ideal standard of how care should be implemented and/or provided. The researchers further advocate for the adoption of standards of care in respect of the following: technical competence, privacy and confidentiality, informed choice and consent, continuing care, communication and documentation of care.

Standards on technical competence indicate that all staff who provide PMTCT services should be adequately trained and undergo regular in-service training to enhance their technical expertise. Informed consent and choice imply that services need to be patient-centred, should be based on good communication, and should provide clear or sufficient patient information to facilitate appropriate decision making about clients. In turn, clients need to be informed about PMTCT-related services, risks and benefits. In the context of this model, clients need to take critical decisions, for example, as regards infant feeding options, the mode of delivery and other reproductive health goals.

On privacy and confidentiality, services should be provided in observance of the confidentiality policy. A continuum of care is another important standard advocated for by the model. In the context of the model, the focus would be on ensuring that PMTCT clients are linked to HIV care. Another important aspect is setting and communicating review dates and appointments appropriately.

The provision of PMTCT services needs to be supervised, and feedback must be given on performance according to set standards. There should be regular internal and external evaluation of care in terms of quality, access, process and outcomes-related issues from the point of view of the client. Lastly, the researchers underscore the critical role of documentation in a PMTCT setting, as this forms the baseline for evaluating the care provided, and hence it is one of the standards recommended in the proposed PMTCT model.

For the purpose of this paper, the definition of continuous quality improvement (CQI) by O'Donnell and Gupta (2021). (2015) shall suffice. They see CQI in healthcare as a structured organisational process that involves healthcare providers and other personnel in the activities of planning and implementing ongoing proactive improvements to processes of care, with a view to providing quality healthcare outcomes (O'Donnell and Gupta, 2021; Zimbabwe Ministry of Health and Child Care, 2016b).

Continuous quality improvement should focus on the ongoing assessment of PMTCT processes, and on creating systems that meet the current and evolving needs of participating mothers. This calls for an identification of gaps in the system, as well as continuous quality improvement priorities and plans. Additionally, continuous quality improvement methods will guide midwives towards improved performance by using locally generated data to provide feedback on practices and knowledge. Once gaps in performance have been identified, it will enable nursing practitioners and midwives to generate, develop and test local solutions, and track change in performance in order to achieve improvement (Zimbabwe Ministry of Health and Child Care, 2016b)

**7.3.4.2. Organisation of care and provision of PMTCT services.** The first phase of the study established that there were delays in the care being provided, while individualised care and/or a couple-centred approach were lacking. The organisation of care will include issues such as tracking client flows, and providing individualised and couple-centred PMTCT care.

**7.3.4.3. Communication and the referral system.** As a mechanism for reducing the turnaround time for DNA PCR test results, the central hospital under study needs to adopt short message service (SMS) technology, to enable it to give clients feedback on their results. The same model of communication can also be used to track mothers and HIV-exposed infants, to ensure that they are linked to instances which can offer suitable care.

Another critical communication strategy advocated for, in the proposed model, would be to have community sensitisation meetings involving stakeholders such as residents' associations and Ward Aids Action Committee structures, to communicate issues to do with user fees, the importance of male partner involvement and referral procedures. Significantly, the referral system should be modified in such a way that it informs clients of expectations at every level of care.

The community would need to be informed of the eligibility criteria in respect of fee waivers and services which are exempt from user fees. The patients' charter is another tool that needs to be communicated to both clients and stakeholders.

The communication and referral systems need to be strengthened. The establishment of referral tools and the tracking of referred clients (to determine whether they reached the intended referral facility) is advocated for. A public relations desk should be put in place to keep clients informed and direct their queries appropriately. A suggestion box should be utilised. There is also a need to conduct client exit interviews

periodically, to capture client satisfaction with care, as well as to determine which factors facilitate or hinder the continuity of PMTCT care.

### 7.3.5. Output

Output has to do with the tangible products, outcomes, goods or services a system produces (Anderson, 2016). It is anticipated that if human and material resources are adequately allocated under input (as spelled out in the proposed model), processes will also be carried out according to set WHO and Zimbabwean standards. The resultant output will be an enhanced quality of care for PMTCT services, increased access to and utilisation of PMTCT services, and a resultant reduction in under-five mortality rates.

## 8. Application of the PMTCT model

The developed model will contribute significantly towards building a body of knowledge in midwifery care and in the nursing fraternity in general. The model can be utilised in any PMTCT or HIV-related health setting in Zimbabwe and in other sub-Saharan countries. The implementation of this model will contribute towards establishing an enabling environment that facilitates the effective utilisation of PMTCT services. Currently, the environment in Zimbabwe is not enabling due to the economic crisis, which has seen the health sector almost crumbling as noted by Chingono (2019). Therefore, this model will assist policy makers, programme managers and midwives in planning and resource mobilization for the PMTCT programme. Utilisation of this model will strengthen the PMTCT programme and hence contribute to the HIV epidemic control. In addition, this model can be utilised in influencing the midwifery curricular.

## 9. Main outcomes of the research

It is anticipated that utilisation of this model will contribute to efficiencies in the PMTCT programme. These in turn will result in increased access and utilisation of the PMTCT services. It will also contribute to the attainment of the Sustainable Development Goals (number 3) and a reduction in new paediatric HIV infections. In the context of under-funding in health, this model will trigger innovative resource mobilisation strategies for the PMTCT programme. Because the model is based on the systems theory, it will result in enhanced inter-professional collaboration in the management of HIV positive mothers in the PMTCT programme.

## 10. Limitations and strengths of the study

The limitation of this study is that the model was not piloted as this was out of the scope of this study.

## 11. Strengths of the study

Its unique strength is that the model has been evaluated for its effectiveness. The model is simple and can be utilised in low-resource settings. To the best of the researchers' knowledge, this study is the first to present a model aimed at enhancing the enhancing prevention of mother-to-child HIV transmission in a low-resource setting.

## 12. Recommendations

Although the model was evaluated after its development, further monitoring of its implementation is called for. The authors recommend its adoption and adaptation in other

low-resource settings, to curb or prevent mother-to-child transmission of HIV.



### 13. Conclusion

The article has described the development of a model that serves as a reference framework for midwives, with a view to improving the utilisation and quality of PMTCT services. It is anticipated that, in a future article, the researchers will share the experiences on how the model was implemented. It is envisaged that this approach will facilitate the utilisation of the model in other provinces of the country.

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### CRedit authorship contribution statement

**Idah Moyo:** Conceptualization, Methodology, Validation, Investigation, Formal analysis, Writing – original draft, Data curation, Funding acquisition. **Azwihangwisi Helen Mavhandu-Mudzusi:** Data curation, Methodology, Validation, Funding acquisition, Formal analysis, Supervision, Writing - review & editing.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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