Indicators and gaps for monitoring service provision along the continuum of care for maternal health in South Africa

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Research note

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Abstract

Objective This study assesses indicators for service provision along the continuum of care for maternal health at subnational levels in South Africa. It applies the emerging construct of adequacy of the continuum of care to assess multi-dimensionality of available indicators. Using adequacy and the process of assessment in the study, the comprehensiveness of the continuum of care for improving maternal health outcomes can be assessed. Results We found indicators along the adequacy dimensions of care utilization and access, linkages of care, and quality of care in the routine district health information system. The General Household Survey contained indicators for the social determinants of health on the continuum of care framework. Indicator gaps include health promotion during and after pregnancy, maternal nutrition, empowerment and quality of care. At present, the available indicators measure about 74% of the interventions on the continuum of care framework. We make recommendations regarding improvements needed to better measure and monitor the continuum of care for maternal health. These involve actions within the health system and include integration of non-health system indicators.

Introduction

The continuum of care is a strategy for improving the efficiency and effectiveness of service delivery to improve maternal health outcomes [1], [2]. It is the delivery of public health services from preconception to the postnatal period, including those related to social determinants of health. The continuum of care framework, developed by national stakeholders in South Africa, is presented in Fig. 1. It outlines linked intervention packages from the family/community to the district level of care. South Africa has a strategic goal to deliver and monitor services along the continuum of care in maternal and related health areas [3], [4]. However, there is a gap in defining measures for monitoring service delivery along the continuum of care to support these goals.

Figure 1. Continuum of care framework for maternal and newborn health in South Africa. Source: [2].

In a previous study, we described the construct of adequacy, which emerged from an analysis of gaps in measurement of the continuum of care [5]. To ensure comprehensive measurement and monitoring of the continuum, the adequacy approach proposes tracking indicators of timely access to care, quality of care, linkages between levels of care, and social determinants of health. The framework in Fig. 1 guides the essential interventions, while the adequacy approach determines important dimensions of continuum of care assessment. In this study we used the framework in Fig. 1 and the adequacy construct to i) propose an indicator tool for the continuum of care for maternal health in South Africa, and ii) describe current gaps to be addressed in improving monitoring and provision of services.

Methods
In this study we compile and assess existing indicators currently used for health and non-health sector policy and planning in different government programs. They thus have a defined monitoring purpose which is re-assessed for suitability to the continuum of care framework.

Indicator extraction

We used the routine district health information system (DHIS) to assess and extract relevant health system indicators. The DHIS is used to monitor health programmes, track patients and map service availability in the health system in South Africa[6]. The National Indicator Data Set (NIDS) within the DHIS contains indicators of service inputs, processes, outputs and outcomes (where relevant) extracted for this study[7]. For social determinants of health/ intersectoral factors as outlined in Fig. 1, we assessed datasets on the Statistics South Africa Nesstar portal and selected the General Household Survey (GHS) as the most suitable source. The GHS contains data on all intersectoral factors, is annually collected, and routinely used in policy and planning in the country[8], [9]. All GHS data can be obtained from the DataFirst Portal of the University of Cape Town in South Africa[10].

Indicator evaluation

The health service indicators from the DHIS were evaluated for suitability to the framework based on their current monitoring purposes and recommendations from existing guidelines. These guidelines included:

Annual performance plans of the Department of Health in SA
Guidelines for maternity care in South Africa
The strategic objectives of the global network to improve Quality, Equity and Dignity in maternal, newborn and child health[11].
Resources exploring the WHO Quality of Care Framework for maternal and newborn health[12], [13].
Global Review of Key Interventions related to reproductive, maternal, newborn and child health[14].
Guidelines for positive birth experience with a focus on monitoring Intrapartum care [15].
Quality of care at primary (Ideal Clinic program) and hospital (National Core Standards) level[16], [17]

For social determinants of health, we relied on evidence in literature on the relationship between interventions and maternal health outcomes. We also relied on recommendations by the WHO and Commission on Social Determinants of Health[18], conceptual framework of the social determinants of health[19], and frameworks for practice at country level[20]. The evaluation of indicators also revealed outstanding gaps in measuring interventions on the framework, which we describe in this study.

Results

Indicator set

In Fig. 2 we present a set of 38 indicators that were extracted and evaluated from the DHIS and GHS. The figure also describes measurement gaps per intervention package of the continuum of care. As Fig. 2 shows, indicators are available for most of the intervention packages on the continuum of care
framework. The exceptions were danger sign recognition and emergency preparedness, healthy behaviour promotion and indicators for emergency pregnancy care. The lack of indicators demonstrates unavailable services and/or poor monitoring by the health system. Sometimes indicators are available that do not directly tie to maternal health outcomes. Figure 2 shows proxies such as food fortification compliance rates (Indicator 3) used by the health system at community level. Other proxies in the figure include Ideal Clinic status (Indicator 20) and national core standards (Indicator 21), which are summary measures of quality of care at facility level. Where only proxies are available, we recommend health information system improvements to measure and integrate measures that are more directly related to maternal health outcomes.

Figure 2 Description of indicators and gaps in monitoring interventions along the continuum of care for maternal health in South Africa

Even where indicators are available, measurement improvements can be made in order to monitor each intervention package more comprehensively. Each intervention package consists of more than one intervention, as shown in Figure one. For example, while Reproductive Care at district hospital may include timely termination of pregnancy indicators, there is a gap in monitoring post-abortion care and treatment of complicated STIs as part of the package. Thus more research is needed to assess the extent to which the health system provides services within each intervention package of the continuum of care. Monitoring of new health system interventions, such as Human Papillomavirus (HPV) vaccinations for school going girls and health promotion through mobile phones (MomConnect program), should be integrated into the DHIS. This will improve the comprehensiveness of the data set and ease of monitoring the continuum of care in the health system.

Quality of care was an under-measured aspect of interventions such as antenatal care visits, normal and Caesarean deliveries, and post natal visits. There is a need for intervention specific qualities of care indicators, as exemplified by re-test rates for HIV positive clients during antenatal care (Indicator 11, Fig. 2). The health system runs parallel quality of care systems for maternal health, particularly the confidential maternal mortality audits[21]. We recommend establishment of routine measures from these sources for integration into the DHIS. Routine quality of care monitoring should also include reporting of safety incidents and outcomes from experience of care surveys that can be disaggregated by population groups.

While indicators are available for the intersectoral factors in the framework, we observed remaining gaps in monitoring indoor air pollution, maternal nutrition counselling, and women’s empowerment for decision making and demand for healthcare. Like health system interventions, each intersectoral factor could be measured by more than one indicator. For instance, in the water and sanitation intervention package, the GHS had variables that could assess safety of water, infrastructure and basic sanitation (Indicators 28–30). While educational achievement indicators may be straightforward, factors such as empowerment and nutrition are more multifaceted according to the literature. Thus, a number of indicators can be isolated for their measurement, depending on data availability.
In summary, Fig. 2 is the indicator tool which provides a description of available indicators and gaps that still need to be addressed to monitor the continuum of care for maternal health. The gaps identified should not preclude use of the tool to assess the nature and extent of provision of services along the continuum of care for maternal health in future studies. The improvement and validation of indicators in maternal health should be a continuous process that is tied with evolving policies and information system improvements[22].

Adequacy assessment

In Fig. 3 indicators are grouped according to adequacy dimensions and the information in Fig. 2 used to assess the level to which intervention package can be measured by available indicators. We assign “partial” (orange) measurement if indicators are available but there are measurement gaps identified. When assigned “no” (red) if no indicators or proxies were identified from the data sources. And we assigned “yes” (green) if, according to literature and existing guidelines, the indicators available to measure the intervention package are considered adequate. Adequate measurement of an intervention package does not preclude future rigorous validation processes and iterations; this is a normal process within the health information system that is encouraged.

All dimensions of the continuum of care can be measured by current indicators, although gaps remain within specific intervention packages. Data gaps were most prevalent in the care access and utilization dimension, where 40% (6/15) of intervention packages had no measures available. Dimensions of quality and linkages of care can only be partially measured; while only 40% (2/5) of social determinants of health domains are adequately measured. In general, the GHS and the DHIS provide indicator data for measurement of the majority (74%) of continuum of care intervention packages (17/23) as defined by the framework in Fig. 1.

Figure 3. Assessment of availability of indicators over dimensions and domains of the continuum of care for maternal health in South Africa

Discussion

In this study we developed and assessed the indicator tool for the continuum of care framework for maternal health in South Africa. This process can be applied to newborn and child health indicators within the framework, using relevant data sources. These processes contribute to the operationalization of the framework, in order to fulfil health system goals in comprehensive monitoring and evaluation of maternal health[23]. Our study also advances the application of the adequacy approach to assess the multi-dimensionality of the available indicators. The adequacy approach complements the framework developed by health system actors by integrating quality of care measures. The continuum of care has been criticized for under-emphasizing quality of care[24]. This study proposes quality of care indicators from the health system, and makes recommendations regarding improved measurement and monitoring. For instance, there is still a gap in monitoring quality of care signal functions for maternal health through the DHIS. Data from many programs in the health system are collected separately and only later
incorporated into the DHIS[25]. We recommend future research for assessing feasibility of integration of quality of care and service programs data into the routine monitoring and evaluation systems.

Interventions that signify “linkages of care” were also not well defined prior to our study. For that purpose, we proposed the use of indicators for patient transport from community to facility and in-between facilities. Transport facilitates referrals between different levels of care, and important determinant of maternal mortality in South Africa[26]. Referrals encompass not only transport but also matching skills to patient needs and managing congestion in facilities[26]. Thus more research is needed to identify indicators for monitoring human resources and patient management factors in facilities that can contribute to the framework. Our study identified an outstanding gap in linkages between one intervention package and another, which is also an important determinant of maternal health outcomes[27], [28]. The continuum of care framework improves on the country’s strategic plan because it includes more social determinants than water and sanitation[23]. Other frameworks propose even more social determinants, such as occupation, social class, race and ethnicity, social environment and psychosocial circumstances, and behavioural factors[19]. In this study we focused on the domains specified by the framework, and recommend future research to explore feasibility of additional indicators. The continuum of care framework is oriented towards health services. Our study introduced indicators for the under-specified aspects of the framework, thus improving potential use from a multisectoral perspective.

Limitations

The indicators used are only applicable to the South African context, but the adequacy model can be used by researchers from other LMICs to guide a multidimensional analysis of information in their context. We identified and assessed indicators only for the intervention packages outlined in the continuum of care framework and the dimensions proposed through the adequacy model. We recommend on-going research to refine the framework and indicators suitable for maternal health continuum of care.

**Abbreviations**

DHIS
District Health Information Systems
GHS
General Household Survey
HPV
Human Papillomavirus
LMIC
Low and Middle Income Countries
NIDS
National Indicator Data Set
SA
Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed for the General Household Survey during the current study are available in the DataFirst repository, [https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/central][10]. The datasets generated and/or analysed for the District Health Information System during the current study are available in the National Department of Health Data Dictionary repository, [https://dd.dhmis.org/][7].

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

MM and LM conceptualized the study. MM conducted data collection and analysis. LM and HM guided additional analysis of data. MM, LM, HT were involved in writing and revision of manuscript. All authors read and approved the final manuscript.

Acknowledgements
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Continuum of care framework for maternal and child health in South Africa. The continuum of care framework for South Africa was developed by national health system stakeholders and decision makers [2]. It outlines important evidence based interventions to improve maternal and child health outcomes across the continuum of care. Our study focuses on maternal health aspects. Interventions are implemented across the lifecycle from pre-pregnancy to postnatal period. The levels of care are outlined vertically, and the framework recommends connectedness or linkages between these levels to improve care. In addition, connection between intervention packages (boxed and colour coded) are important. As a primary health care framework, delivery of services on the continuum of care occurs at the district level and below. Besides health system interventions are “intersectoral factors” that represent important social determinants of health for maternal health. These include good living conditions, empowerment and education.
Description of indicators and gaps in monitoring interventions along the continuum of care for maternal health in South Africa. The indicator tool was developed to summarize available indicators, their source, and the data gaps that were observed in the study of the continuum of care for maternal health in South Africa. The levels of care and intervention package columns are based on the continuum of care framework developed by health system actors, and presented in Figure 1 of this study, and indicators are
grouped together to make the figure more concise (e.g. indicators 5-7 represents three indicators within the reproductive care package). The detailed definition and numerator and denominators of each indicator can be found in the metadata of the relevant data sources as specified in the Figure. The description of indicators gives a general guidance of the measures involved. Data gaps are also summaries from literature, global and national guidelines as specified in the manuscript.

| Dimension                                      | Level of care | Intervention package                                      | Indicators/proxies available |
|------------------------------------------------|---------------|----------------------------------------------------------|-------------------------------|
| Timely access and utilisation of care          | Family and community/Pre-pregnancy | Adolescence and pre-pregnancy nutrition                   | Yes                           |
|                                                |               | Prevention of HIV/STIs                                    | Yes                           |
|                                                | Family and community/Pregnancy      | Healthy Behaviour                                          | No                            |
|                                                |               | Danger Sign Recognition and Emergency Preparedness        | No                            |
|                                                | Family and Community/Postnatal      | Danger sign recognition and appropriate care seeking, nutrition | No                            |
|                                                |               |                                                          |                               |
| Primary health facility/Pre-pregnancy          | Family planning                          | Prevention of HIV/STIs                                    | Yes                           |
| Primary health facility/Pre-pregnancy          |               | Preconception folic acid                                  | No                            |
| Primary health facility/Pregnancy              | Basic Antenatal Care with PMTCT       |                                                          |                               |
| Primary health facility/Childbirth             | Care for normal deliveries             |                                                          |                               |
| Primary health facility/Postnatal care         | Early detection and referral of complications |                                                          | Partial                       |
| District Hospital /Pre-pregnancy               | Termination of pregnancy               |                                                          | Yes                           |
| District Hospital/Pre-pregnancy                | Post-abortion care                     |                                                          | No                            |
| District Hospital/Emergency Pregnancy and Childbirth Care | Treatment of complicated STIs           |                                                          | No                            |
| District Hospital/Emergency Pregnancy and Childbirth Care | Care for high risk pregnancies          |                                                          | Partial                       |
| Quality of Care                                | District Hospital/Crosscutting         | Quality of care at secondary level                         | Partial                       |
|                                                | Primary health facility/cross-cutting  | Quality of care at primary level                           | Partial                       |
| Linkages of care                               | All levels/cross-cutting               | Linkages of care levels (referrals)                        | Partial                       |
| Intersectoral factors/social determinants of health | Family and community/cross-cutting   | Housing                                                   | Partial                       |
|                                                |                                           | Water and Sanitation                                       | Yes                           |
|                                                |                                           | Nutrition                                                  | Partial                       |
|                                                |                                           | Empowerment                                                | Partial                       |
|                                                |                                           | Education                                                  | Yes                           |

**Figure 3**

Assessment of availability of indicators over dimensions and domains of the continuum of care for maternal health in South Africa. The dimensions of the continuum of care are defined according to the adequacy construct developed in a previous study[5]. The level of care and intervention packages contain indicators found in Figure 2 and are based on the continuum of care framework in Figure 1. We assign “partial” (orange) measurement if indicators are available but there are measurement gaps identified. When assigned “no” (red) when no indicators or proxies were identified from the data sources. And we assigned “yes” (green) if, according to literature and existing guidelines, the indicators available to measure the intervention package are considered adequate.