

Peripartum access to care in Mozambique: Opportunities for reducing maternal mortality

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INTRODUCTION

The global maternal mortality rate is 211 maternal deaths per 100 000 live births, but it is an average 14 times higher in low-to middle-income countries (LMIC) compared to high-income countries, mainly due to disparity in access and quality of antenatal and postpartum care. Most countries in southern Africa have maternal mortality ratio (MMR) above the global mean, with diverse trends and rates of reduction in the last 20 years (Figure 1).⁽¹⁾ Pregnancy-related hypertension (pre-eclampsia and eclampsia), obstetric haemorrhage and sepsis remain the largest causes of maternal death in LMICs, but cardiovascular disease emerges as an important contributor to maternal mortality.⁽²⁻⁴⁾ Pregnancy-related hypertension occurs in around 16% of the pregnancies in LMIC, being the second leading cause of direct maternal mortality.⁽⁵⁾

Globally cardiovascular disease (CVD) seems to complicate between 1% and 4% of pregnancies, accounting for up to 15% of indirect maternal deaths.^(6,7) Unfortunately, pregnancy often masks symptoms and signs of heart failure, because it also causes shortness of breath and edema, delaying diagnosis.⁽⁸⁾ Thus, in southern Africa, CVD represents an especially complex topic, usually underdiagnosed, poorly managed and insufficiently researched. Research shows that hypertensive disease, rheu-

ABSTRACT

Women's health is prioritised in national health policies and strategies in Mozambique. However, only 34.1% of women start antenatal consultations before the 16th gestational week and attend at least 4 visits – the reported lack of easy access to health facilities contributing to late initiation of antenatal care. Data from the Mozambique National Audit Committee of maternal, perinatal, and neonatal deaths demonstrate institutional maternal mortality ratio increased from 81 deaths per 100 000 live births in 2016 to 84 in 2019, highlighting the need for greater surveillance and a vigorous response to this increase. In Mozambique, there are opportunities for improving access to and quality of peripartum care to reduce maternal morbidity and mortality. Research is needed to uncover the major causes of maternal mortality and morbidity, particularly the role of cardiovascular disease.

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matic heart disease and cardiomyopathies are major CVD in sub-Saharan Africa,^(9,10) where the uncontrolled HIV/AIDS epidemic and increased access to antiretroviral therapy add up to the cardiovascular risk of millions of women. Additionally, undetected/untreated congenital heart defects, undiagnosed pulmonary hypertension, uncontrolled heart failure, complications of sickle cell disease and nutritional deficiencies with cardiac effects are important challenges. However, systematic screening for cardiac disease is not performed during pregnancy or postpartum, thus hampering knowledge of the role of CVD in determining maternal morbidity and mortality.

This paper presents an historical perspective of Mozambique's maternal health services, the country's progress in reducing maternal mortality, and discusses the policy and determinants that affect this trend. Finally, it focuses on the challenges of peripartum care, highlighting current efforts to improve the diagnosis of indirect causes of maternal mortality, particularly CVD.

MATERNAL MORBIDITY AND MORTALITY IN MOZAMBIQUE

Data from the Mozambique National Audit Committee of maternal, perinatal, and neonatal deaths shows that the institu-

tional maternal mortality ratio (IMMR) went from 81 deaths per 100 000 live births in 2016 to 84 in 2019, highlighting the need for greater surveillance and a vigorous response to this increase.⁽¹¹⁾ Compared to the IMMR of 65.7 in 2008, the 76.8 maternal deaths per 100 000 live births in 2020 is a matter of greater concern, considering that an overall increase in maternal mortality ratio (MMR) was also reported: From 408 deaths per 100 000 live births in 2013⁽¹²⁾ to 452 deaths per 100 000 live births in 2017.⁽¹³⁾ The main direct causes of the exceedingly high maternal mortality are post-partum haemorrhage and hypertensive disorders, while the most important indirect causes are HIV/AIDS and malaria.^(14,15) Community-based research in southern Mozambique shows that tuberculosis and HIV/AIDS are prominent indirect causes of maternal death, while eclampsia represents the number one direct obstetric cause.⁽¹⁶⁾ The role of CVD - considered the leading cause of death in women⁽¹⁷⁾ and the most common cause of indirect MM worldwide^(18,19) - continues to be understudied.

In Mozambican pregnant women may have undiagnosed pre-existing heart conditions (such as unoperated congenital heart disease), known cardiovascular problems aggravated by pregnancy (e.g. hypertension, rheumatic mitral stenosis) or may develop pregnancy-related conditions, such as hypertensive disease of pregnancy and peripartum cardiomyopathy. The prevalence of cardiometabolic risk factors such as hypertension

and obesity in women has increased from 2005 - 2015,⁽²⁰⁾ while women continue to be exposed to biomass fuel and infections such as HIV, tuberculosis and schistosomiasis, all with major consequences in their cardiovascular health. Despite this, no systematic cardiovascular risk assessment is done by frontline health professionals during pregnancy, labor and postpartum.

HISTORICAL PERSPECTIVE OF MATERNAL HEALTH CARE IN MOZAMBIQUE

When Mozambique became independent in 1975, only 50 of the nation's 600 physicians stayed in the country.⁽²¹⁾ Soon after independence the health care system - oriented toward providing care for the white, urban population rather than for the country's largely rural population - was transformed into a public free for all National Health System. Maternal and child health (MCH) services were developed throughout the country, but were hindered by a lack of trained personnel, financial resources, scarcity of medical equipment and poor supply chain. A national nurse-midwife training programme was conducted at the Health Science Institutes ran by the Ministry of Health for women with 6 or more years or primary schooling, who entered an intensive 2 ½ year training programme and received practical experience by working at an adjacent tertiary provincial hospital. Upon graduation, most would take the responsibility for operating a rural MCH service to provide services for a large population with little or no medical backup, and minimal

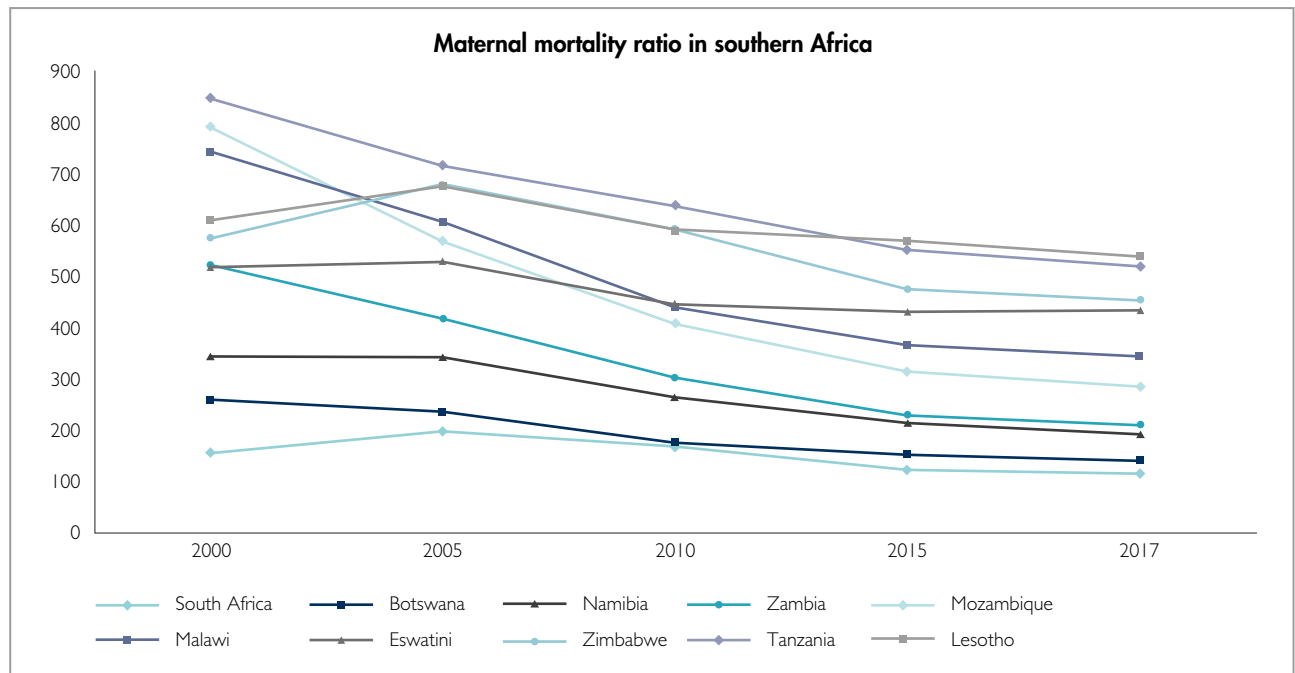


FIGURE 1: Maternal mortality ratio in southern Africa countries from 2000 - 2017 according to the World Health Organisation. Tanzania, Mozambique and Lesotho are the 3 countries that had the highest MMR in 2000. Mozambique has steadily reduced its MMR to become the 5th best among the 10 countries in the region.

equipment and supplies. As part of their training, they learned how to prioritise health care and how to recruit community volunteers to help run the unit. The maternal component of these services provided prenatal care, including high risk pregnancy referrals, nutritional counseling, and treatment of endemic parasitic diseases and anemia; additionally, it offered family planning - stressing the use of contraception for spacing rather than for limiting child births - was later added to the MCH programme. Still, in 1984 only 30% of the country's deliveries were performed in maternity units, ranging from hospital facilities to small, minimally equipped rural units; the majority of the country's deliveries were still performed at home by untrained traditional birth attendants with no linkage to the national health care system, resulting in high obstetric maternal morbidity and mortality.⁽²¹⁾

The health system was built in pyramidal structure of 4 levels, involving the public sector through the National Health Service (NHS), as well as the private sector and traditional medicine practitioners (already recognised by the Ministry of Health but mostly not registered).⁽¹¹⁾ The public sector has the widest geographic and technical coverage, and it is divided in a pyramidal system of attention (Figure 2).

A human resources pyramidal structure for prenatal and postpartum care was also developed, with professionals allocated according to the hierarchical level of the health facility. In general, prenatal care is provided at the primary and secondary health facility level by midwives, and childbirth by skilled professionals, physicians, medical and surgical technicians. Beside mid-level nurses and midwives, surgical technicians were for a long period the only professionals assisting emergencies in pregnant women in the most rural settings. These technicians are recruited mainly among the best experienced mid-level medical practitioners or nurses.⁽²²⁾ At the community level, this care is essentially provided by traditional birth attendances that benefit from regular training.

ACCESS TO ANTENATAL AND POSTPARTUM CARE IN MOZAMBIQUE

Only 34.1% of women start antenatal consultations before the 16th gestational week and attend at least 4 visits; moreover, they report lack of easy access to the health facility as one of the reasons for late initiation of antenatal care.⁽²³⁾ However, progress in utilisation of antenatal services has been made since

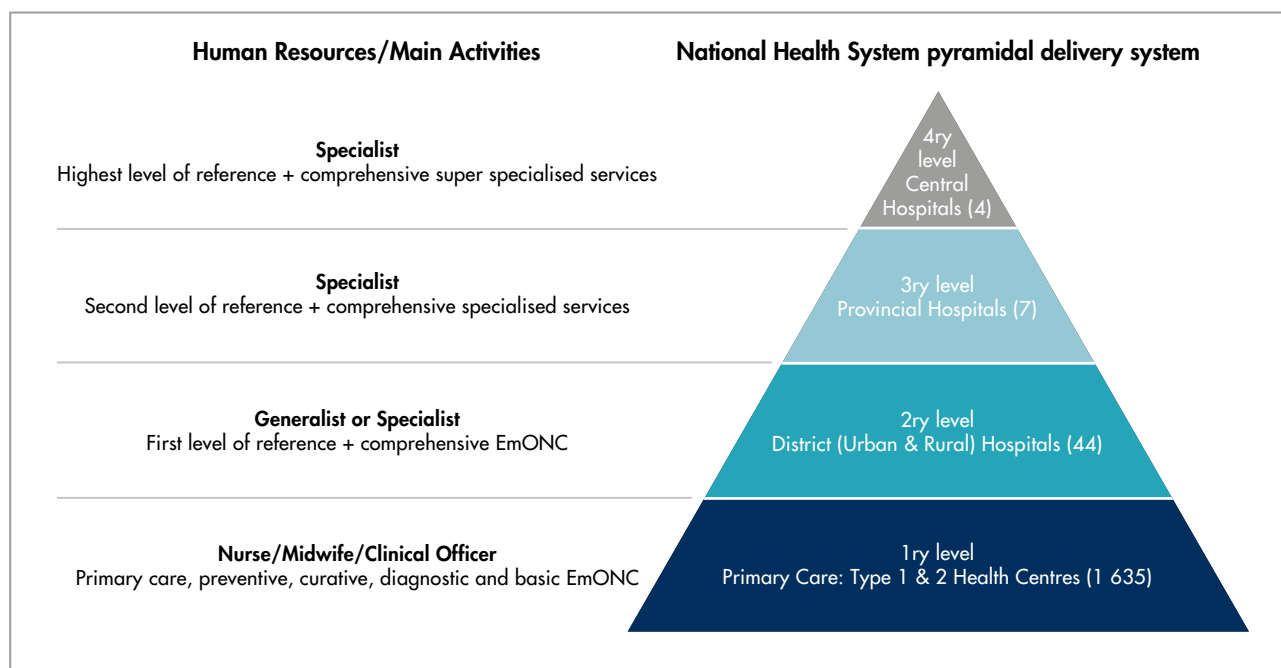


FIGURE 2: National Health System pyramidal delivery system for prenatal and postpartum care, main activities by health facilities and human resources by level in 2021. Primary and secondary level facilities consist of health centres and rural/general hospitals; the first ones provide ante-natal care, uncomplicated childbirths, and postnatal care to 7 500 - 20 000 people, and are mostly staffed by midwives and health technicians, while the secondary hospitals have non-specialised doctors and surgeons or surgical technicians able to provide some basic emergency curative health services (such as Cesarean section) to 16 000 - 35 000 inhabitants, and very few specialised clinicians. Tertiary and quaternary hospitals correspond to provincial (800 000 - 3 500 000 population served) and central hospitals (>3 500 000 population served) that offer differentiated care provided by specialists, and manage complications not solved at the lower levels.

EmONC = emergency obstetric and neonatal care.

2011, when more than a quarter of Mozambican women were not using health facility delivery services, with the prevalence being noticeably lower in the rural areas.⁽²⁴⁾ In 2020 the routine national information system revealed that only 13% of women had their first antenatal consultation before at 12 gestational weeks, with 58.5% of women with the 4th antenatal consultation done.⁽²⁵⁾

Routine data obtained from the health information system between 2012 and 2019 shows a seasonal pattern in utilisation of antenatal care and institutional delivery. In that period there was reduction of around 6% less in maternal health service utilisation in all during rainfall season, except in the 2 biggest cities in the country (Maputo and Nampula) and 2 of the less populated provinces (Maputo and Niassa).⁽²⁶⁾ Despite 96% healthcare facilities having access to an ambulance for referrals, women identify lack of transport to bring women from the community to the healthcare facility as a major barrier to use of maternal care services in southern Mozambique.⁽²⁷⁾ We suggest that women's perception of 3rd phase delays in health facilities, lack of equipment, shortage of supervisors, irregular drug availability, absence of integration of care and lack of multidisciplinary teams as additional barriers at health system level. Nevertheless, in 2020, 1 150 098 births were attended at health facilities, corresponding to 85% coverage; of these, 8.3% were referred by traditional birth attendants from the community, and only 2% of all births were recorded as non-institutional deliveries.⁽²⁵⁾

There are however, major disparities in access to care and indicators of quality of care, as shown in Table 1;^(7,28) this persisting disparity in distribution of resources is related to diverse outcomes across the country, but does not seem to fully explain the differences in IMMR.

The gains in antenatal care, such as the increase on 4th consultation going from 49% - 58.5% between 2018 and 2020, have not been followed by the corresponding increase on postpartum consultations. In contrast with the improvement in the percentage of postpartum consultation from 79 in 2018 to 81.6% in 2020, puerperal women with a visit between days 22 and 42 days postpartum corresponds to only 2%.⁽²⁵⁾ While these data could be attributed to COVID-19 mobility restrictions in 2020, unfortunately they represent a trend confirmed by looking at previous years' statistics.

Importantly, the quality of care also needs to be addressed. Standardised observation checklists and inventory assessment tools used in 643 health facilities of different levels in 6 sub-Saharan African countries (46 health facilities from Mozambique observed - 46% hospital and 54% health centres) revealed low use of WHO-recommended practices for pre-eclampsia/eclampsia screening and management.⁽²⁹⁾ The studies of quality of care in each country were conducted separately rather than as a multi-country study, to adapt the tools to national policy. Overall, of the 2 920 women receiving antenatal care only 39%

TABLE 1: Data on population per province (with percentage of women of reproductive age) and distribution of health professionals, maternal health personnel and primary and secondary level health facilities. Major disparities exist in access to health care, levels of maternal mortality and institutional maternal mortality ratios.

Provinces	Population*	Women 15 - 49 years (24.9% of population)	Doctors/10 000 inhabitants*	Non-Doctors MHC Professionals*	Primary Level HF**	Secondary Level HF**	IMMR (per 100 000 live births)**
Niassa	1 998 266	497 568	0.7	8.1	186	3	78.6
Cabo Delgado	2 525 416	628 829	0.6	8.4	93	3	58
Nampula	6 183 863	1 539 782	0.5	6.0	234	8	87
Zambézia	5 567 252	1 386 246	0.4	5.7	264	7	56
Tete	2 900 213	722 153	0.5	6.3	138	4	49.4
Manica	2 114 507	521 115	0.6	9.2	125	2	39.4
Sofala	2 457 828	611 999	1.2	10.7	166	5	112
Inhambane	1 531 959	381 458	1.0	12.5	139	4	86.2
Gaza	1 445 986	360 051	0.7	11.0	147	4	74
Maputo Província	2 216 460	551 899	0.9	7.1	110	2	55
Maputo Cidade	1 124 988	280 122	6.4	22.6	33	2	175
Total	30 066 648	7 481 222	0.8	8.2	1 635	44	73.3

*Source: Anuário Estatístico, 2020. MISAU;⁽²⁷⁾ **Source: Relatório Anual do Comité Nacional de Auditoria de Mortes Maternas e Neonatais⁽¹⁾

HF = health facility, IMMR = Institutional Maternal Mortality Ratio, MHC = maternal health care.

Non-Doctors MHC Professionals include nurses and MHC nurses and basic-level medical officers.

TABLE II: Proportion of women screened for pre-eclampsia/eclampsia in antenatal consultations, labour and delivery (adapted from Rawlins 2020). The 6 participating countries were Ethiopia, Kenya, Madagascar, Mozambique, Rwanda and Zanzibar.

Compliance to recommendations	Pre-eclampsia/eclampsia screening antenatal consultations	
	All countries (%)	Mozambique (%)
Asked for headache and blurred vision	27	12
Asked for swollen hands and face	27	26
Asked about either sign	39	31
Proper blood pressure measurement technique	68	48
Anamnesis and blood pressure proper measurement	31	25
Perform or refer for urine test	46	9
	Pre-eclampsia/eclampsia screening in labour and delivery	
	All countries (%)	Mozambique (%)
Asked about signs of pre-eclampsia and eclampsia	24	11
Initial blood pressure check done	77	59
Asked about at least 1 PE/E danger sign and take BP with proper technique	20	8
Testing of urine for proteinuria	7	2
Blood pressure recorded at least every 4 hours when diastolic is over 90mmHg	29	15

were asked about PE/E danger signs, 68% had their blood pressure taken correctly (range 48% - 96%) and less than half (46%) underwent testing for proteinuria. Data from Mozambique on PE screening during observations of 303 antenatal consultations were the worse of the 6 countries (proportion of women screened for each sign of danger stands between 12% and 36%); additionally, Mozambique had the lowest proportion of adequately taken blood pressure (48%) and the worst percentage of performance or referral for urine testing (9%). Rawlins, et al. showed that out of 2 689 women observed in labor and delivery, despite higher levels of correct measurement of blood pressure (77%), only 23% were asked about PE/E danger signs (range 11% - 34%) and 6% had testing for proteinuria; interestingly, data from Mozambique were also the worse and all below the means for 6 countries⁽²⁹⁾ (Table II).

Mozambican women enrolled at a median gestational age of 25.9 weeks in a study to assess the incidence of pregnancy hypertension had higher hypertension incidence (at 16.8%) and the highest incidence of pregnancy-related hypertension at 10.9% (compared to Pakistan's 9.3%, India's 10.3%, or Nigeria's 10.2%; $p=0.001$).⁽⁵⁾ Similarly, despite being an endemic area for rheumatic heart disease⁽³⁰⁾ reproductive health professionals' awareness and knowledge of its screening, diagnosis and management was poor in the country's major referral health facility.⁽³¹⁾ Among 73 doctors and mid-level professionals only 53% acknowledged the potentially poor maternal outcomes in presence of RHD.⁽³¹⁾

CHALLENGES AND OPPORTUNITIES

A major opportunity in Mozambique is the existence of a strong policy structure linked to community-based services that are recognised by the health authorities, and willing to collaborate. This has allowed the country to have the steady progress in institutional deliveries. Similarly, the increase in utilisation of antenatal care has been supported by community health workers, traditional birth attendants and community leaders.

Mozambique has made very good progress in reducing maternal mortality (Figure 1), but it still stands high – at 452 deaths per 100 000 live births, according to the latest national census.⁽⁷⁾ There have been extraordinary advances in antenatal care, increase in facility delivery attended by skilled health personnel, and strong investment in improving post-partum care through service organisation, task shifting and decentralisation of misoprostol use (to traditional birth attendants or for self-administration at home births).⁽³²⁾ In 2020 the coverage of antenatal care is over 91% of pregnant women attended at least once by a skilled health provider, and 81.6% of puerperal women had a postpartum evaluation within 48 hours of delivery.⁽²⁵⁾

Women's health is already sufficiently prioritised in national health policies and strategies in Mozambique,⁽³³⁾ but there may be opportunities for improving their implementation to meet the new World Health Organisation (WHO) targets.⁽³⁴⁾ The WHO aims to reach new goals by 2025, namely: (i) 90% pregnant women should attend 4 or more antenatal care visits

(towards increasing to 8 visits by 2030); (ii) 90% births should be attended by skilled health personnel; (iii) 80% women who have just given birth must have access to postnatal care within 2 days of delivery; (iv) 60% of the population must have access to emergency obstetric care within 2 hours of travel time; (v) 65% of women must be able to make informed and empowered decisions regarding sexual relations, contraceptive use, and their reproductive health.⁽³⁴⁾ Research to assess opportunities to improve postpartum care for mothers in SSA rural districts from Burkina Faso, Kenya, Malawi and Mozambique showed that few women received postpartum care during the first week after childbirth, thus suggesting (i) postpartum home visits/outreach services, (ii) maternal care integration with child immunisation clinics, (iii) guidelines dissemination among health workers, and (iv) postpartum care knowledge and skills upgrading through training.⁽³⁵⁾ We suggest that additional efforts be made to close these gaps in detection and management of cardiovascular disease - and direct causes of maternal mortality in general - namely: A strong investment on leveraging training of multidisciplinary teams, and health systems' research that includes exploring innovative models of care, integration, tailoring of evidence-based interventions and testing of selected approaches tackling the postpartum period.

While Mozambique has started its epidemiological transition with a clear increase in life expectancy⁽⁷⁾ infections, nutritional deficiencies and risk factors for non-communicable diseases still exist as major public health problems, and maternal care needs to be improved. Sustainable gains in women's health require access to a "continuum of care" before, during and after pregnancy. Additionally, unique patterns of multimorbidity in women of reproductive age that are commonly found in Africa need to be addressed.^(9,10) Hence, there is need for active screening for cardiovascular risk and disease during pregnancy and postpartum, in addition to the current focus on resolving the bottlenecks for the implementation of existing policies to reduce maternal mortality from obstetric causes.

The Pan African Society of Cardiology (PASCAR) suggests the ways forward on a position paper by its taskforce for reproductive health services for women with cardiovascular disease.⁽²⁾ Based on poor outcomes reported for women with RHD⁽³⁶⁾ this taskforce provides guidance on how to address health systems' barriers to integrate obstetric and cardiovascular care at peripheral levels of the health systems in Africa, aiming at improving outcomes and reducing disparity in maternal mortality worldwide.⁽³⁷⁾ Promising results of multicentric studies involving Mozambican communities show the feasibility of providing supplementary hypertension-oriented care using community health workers trained to assess proteinuria using

urinary dipstick at the first and subsequent antenatal visits once hypertension is detected,⁽³⁸⁾ as well as of pre-eclampsia/eclampsia screening and pre-referral management at the community-level.⁽²⁷⁾ Additionally, a study that used maternal plasma levels of placental growth factor (PIGF) to improve pregnancy outcomes for pre-eclampsia or placenta-mediated complications in antenatal clinics in Mozambique, resulted in shortening of the clinic-to-delivery interval to 24 days (interquartile range, 10 - 49) in women with low PIGF.⁽³⁹⁾

Cardiovascular risk screening and disease management beyond puerperium is being introduced through pilot Joint Maternity Cardiac Clinics where obstetricians/residents and MCH nurses are trained to detect and treat RHD using algorithms that include cardiac auscultation and abbreviated cardiac ultrasound.⁽²²⁾ Training courses consisting of videos followed by remotely supported scanning, using an Android tablet and the EpiCollect web application, have also been piloted in northern Mozambique.⁽⁴⁰⁾

Finally, like most countries, Mozambique continues to record maternal morbidity and deaths only up to 42 days postpartum, while avoidable maternal deaths may occur later on. Globally, there are more postpartum and late maternal deaths from direct and indirect obstetric causes than maternal deaths during pregnancy.⁽¹⁷⁾ These late maternal deaths usually fall into cardiovascular cause, thromboembolism, cancer, and suicide (often related to postpartum depression); hence the need for cardiovascular screening beyond the 42 days.⁽⁴¹⁾ However, the acceptability and feasibility of long-term postpartum follow up needs to be assessed in different settings, particularly the strategies to integrate maternal and child visits in high volume health facilities. Interestingly, the COVID-19 pandemic has uncovered the potential of digital technology to improve follow up of puerperal women that can be added to the existing devices for ambulatory monitoring and point-of-care diagnostics, allowing to envisage community-based CVD screening, diagnosis and management, which can be supported remotely.

CONCLUSIONS

Women's health is highly prioritised in national health policies and strategies in Mozambique. However, there are opportunities for improving access to and quality of peripartum care aiming at reducing maternal morbidity and mortality. Research is still needed to uncover the major causes of maternal mortality and morbidity, particularly the role of cardiovascular disease.

Conflict of interest: none declared.

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