

# Cardiac obstetric care in Botswana

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## INTRODUCTION

Botswana's maternal mortality ratio (MMR) is 166.3 deaths per 100 000 live births (2019), more than double the average maternal mortality for upper-middle-income countries of 70 deaths per 100 000 live births.<sup>(1)</sup> MMR encompasses the annual number of female deaths from any cause related to or aggravated by the pregnancy or its management during pregnancy, delivery and up to 42-day postpartum.<sup>(2)</sup> Most maternal deaths are due to direct causes such as obstetric pregnancy complications, interventions, omissions, or incorrect treatment.<sup>(3)</sup> However, indirect deaths resulting from a previous existing disease, or disease that develops during pregnancy that is not due to direct obstetric causes but aggravated by pregnancy physiology, are increasingly frequent.<sup>(3)</sup> Cardiovascular diseases (CVD) during pregnancy are among the indirect causes of maternal death.<sup>(4)</sup> Structural changes in the left ventricle, increase in blood volume, cardiac output, heart rate, and other changes during pregnancy can strain the heart (Figure 1). These pregnancy-related hormonal and physiological changes can exacerbate the pre-existing conditions or lead to a new cardiovascular disease during or after pregnancy.

Regardless of the mechanism, cardiovascular disease during pregnancy is a significant cause of morbidity and mortality in many countries, including Botswana.<sup>(1)</sup> CVD prevalence in preg-

## ABSTRACT

**Cardiovascular diseases (CVD) in pregnancy are significant causes of maternal mortality in Botswana. Like other developing countries, acquired CVD such as hypertensive disorders, rheumatic heart disease and cardiomyopathy are common in Botswana. CVD-related maternal deaths are often attributed to failure to provide risk-appropriate care. A multidisciplinary pregnancy heart team is an essential approach in managing CVD in pregnancy and improving maternal and foetal outcomes. Given that more women with CVD are becoming pregnant in Botswana, we review the current practice, gaps, and potential areas of improvement.**

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nancy varies globally between 0.4% and 4.1%.<sup>(4,5)</sup> Whereas surgically corrected congenital heart diseases comprise the most CVD in the Western world, acquired heart diseases such as hypertensive disorders, rheumatic heart disease, hypertensive disorders, and cardiomyopathies contribute to most cases of CVD in pregnant women in developing countries.<sup>(6,7)</sup> Pregnant women with CVD are at an increase in the maternal mortality rate by up to 17%, foetal risk of cardiac medications and interventions, and the need for urgent surgical intervention during pregnancy.<sup>(5)</sup> However, the risk of complications to the mother and foetus depends on the complexity of the underlying cardiac disease. Minimising these complications requires high suspicion in identifying women with some evidence of cardiac disease and referral to a proper level of medical care. Generally, diagnosing CVD in pregnancy is difficult due to similarities between disease manifestations and pregnancy-related physiological changes. Distinguishing symptoms related to physiologic changes of normal pregnancy from those of CVD should ideally occur at primary health facilities during antenatal visits, followed by referral of those with suspected heart disease to the next level for further care.

With 95% of Botswana's population having access to health services and living within an average of 8 kilometres of the nearest health facility, screening and referral systems can effectively be coordinated. Although most antenatal services are at clinics that may be ill-equipped to recognise cardiac diseases, women suspected of having cardiac diseases are regularly referred to a single general cardiology clinic at a

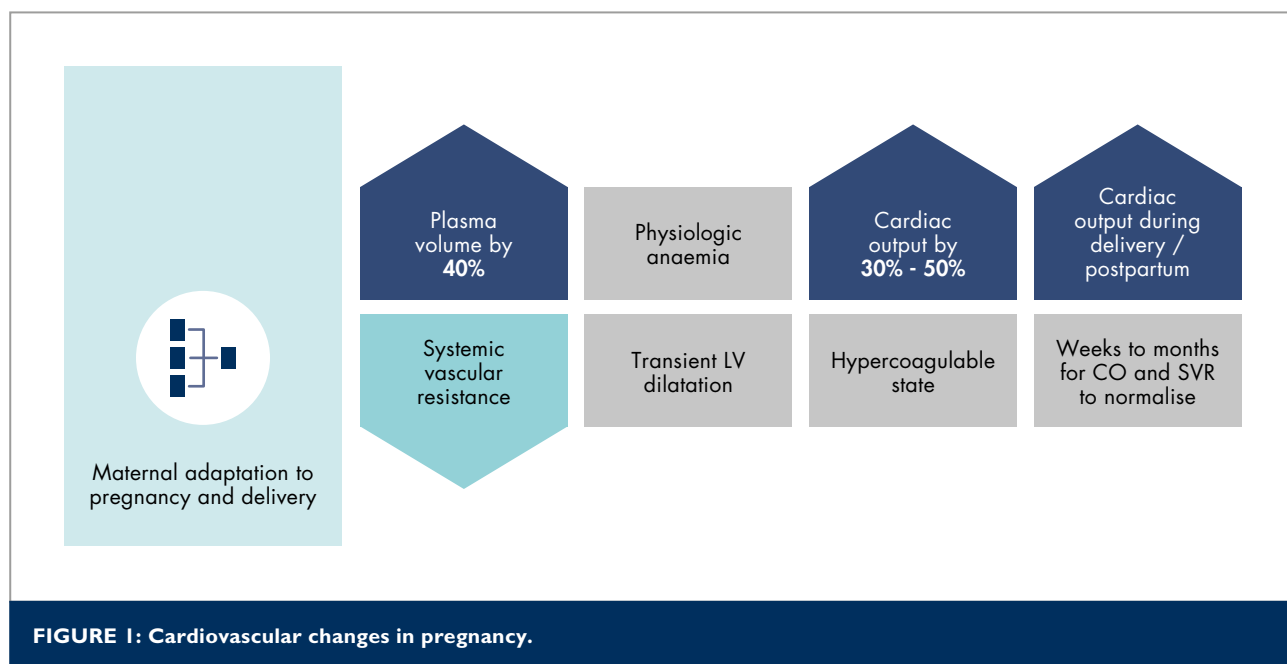
tertiary clinic in the capital city of Gaborone.<sup>(1,8)</sup> In addition, all pregnant women with pre-existing CVD are often referred for a cardiology review. Given the high rate of unplanned pregnancy, some women with pre-existing CVD regularly present to health care facilities when pregnant and when hemodynamic compromise has already begun. Ideally, these patients should have received timely pre-pregnancy counselling when they wish to conceive.

Nevertheless, identifying these women and prompt referral to cardiology early in pregnancy is critical and often encouraged. On receiving patients with suspected and pre-existing CVD, the cardiologists at the clinic confirm the diagnosis, assess severity, risk-stratify and plan management. Although the focus is on identifying high-risk features, we also document the presence of comorbid conditions, medication use, and past obstetric history. We regularly substitute or remove potentially terato-genic medications and optimise the management of comorbid conditions such as hypertension and diabetes. We perform a baseline electrocardiogram and echocardiogram at the first visit. Additional assessments and investigations depend on the pre-presentation and the need to define risk stratification further. We then classify maternal risk using the modified World Health Organisation (mWHO) classification and provide counselling about the risk of adverse cardiac events in pregnancy.<sup>(9)</sup> After this baseline assessment, we advise on antenatal care and mode of delivery.

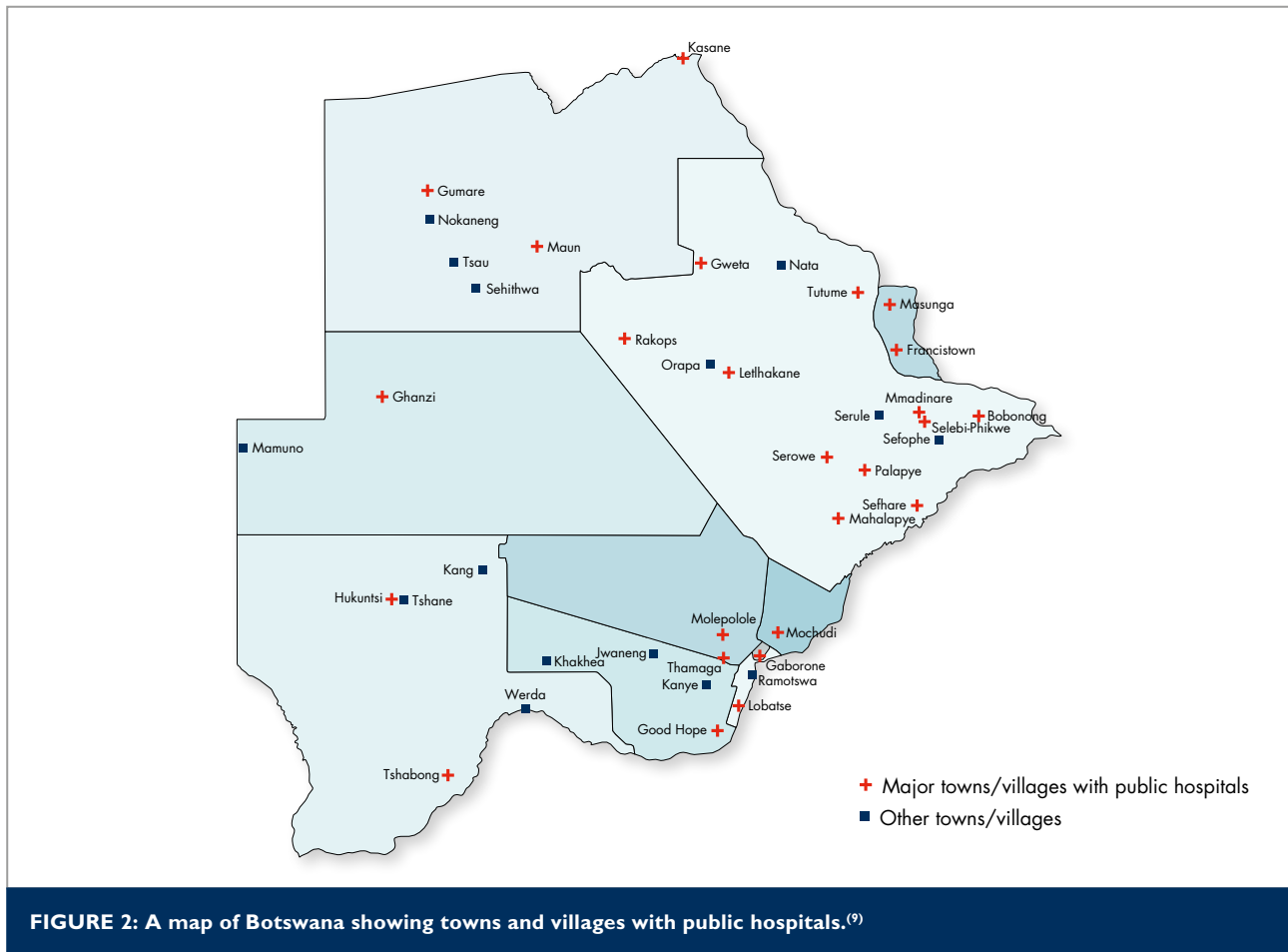
Most patients classified as mWHO class I are referred back to district hospitals for antenatal care and delivery. Women with significant cardiac diseases are followed up at our clinic and at

a high-risk obstetric clinic culminating in delivery at our centre. The frequency of visits is based on the gestation age, severity or complexity of the cardiac disease and the distance from our centre in Gaborone (Figure 2). Although the cardiologist would suggest a delivery plan, pregnant women are often admitted and cared for by the obstetric teams at delivery. Furthermore, postpartum care is separately done by cardiology and obstetric teams. For women in whom pregnancy is contraindicated (mWHO IV) or those requesting family planning services, we usually refer them to our colleagues in the reproductive health unit.

The biggest challenge in Botswana is the lack of a multidisciplinary pregnancy heart team that, at a minimum, requires a cardiologist, obstetrician, and anaesthetist.<sup>(9,10)</sup> Other members of the pregnancy heart team are maternal-foetal medicine specialists, geneticists, neurologists, nurses, and pharmacists.<sup>(10)</sup> The team jointly manage women with moderate or high risk (mWHO II–III, III, and IV) during pregnancy, delivery, and postpartum.<sup>(9)</sup> The approach can improve cardiovascular outcomes and decrease maternal morbidity and mortality up to the first year postpartum.<sup>(10)</sup> Given the importance of the multidisciplinary pregnancy heart team, Botswana should strive to have one referral centre that can provide the service in the public sector. The clinic can provide pre-pregnancy counselling, management during pregnancy, delivery, and ongoing continuity of care after childbirth.<sup>(10)</sup> The current practice where specialists individually see patients at different times, locations, and health systems can potentially lead to communication barriers or gaps in care. Although the most experience of multidisciplinary teams is from developed countries, similar benefits have been



**FIGURE 1: Cardiovascular changes in pregnancy.**



**FIGURE 2: A map of Botswana showing towns and villages with public hospitals.<sup>(9)</sup>**

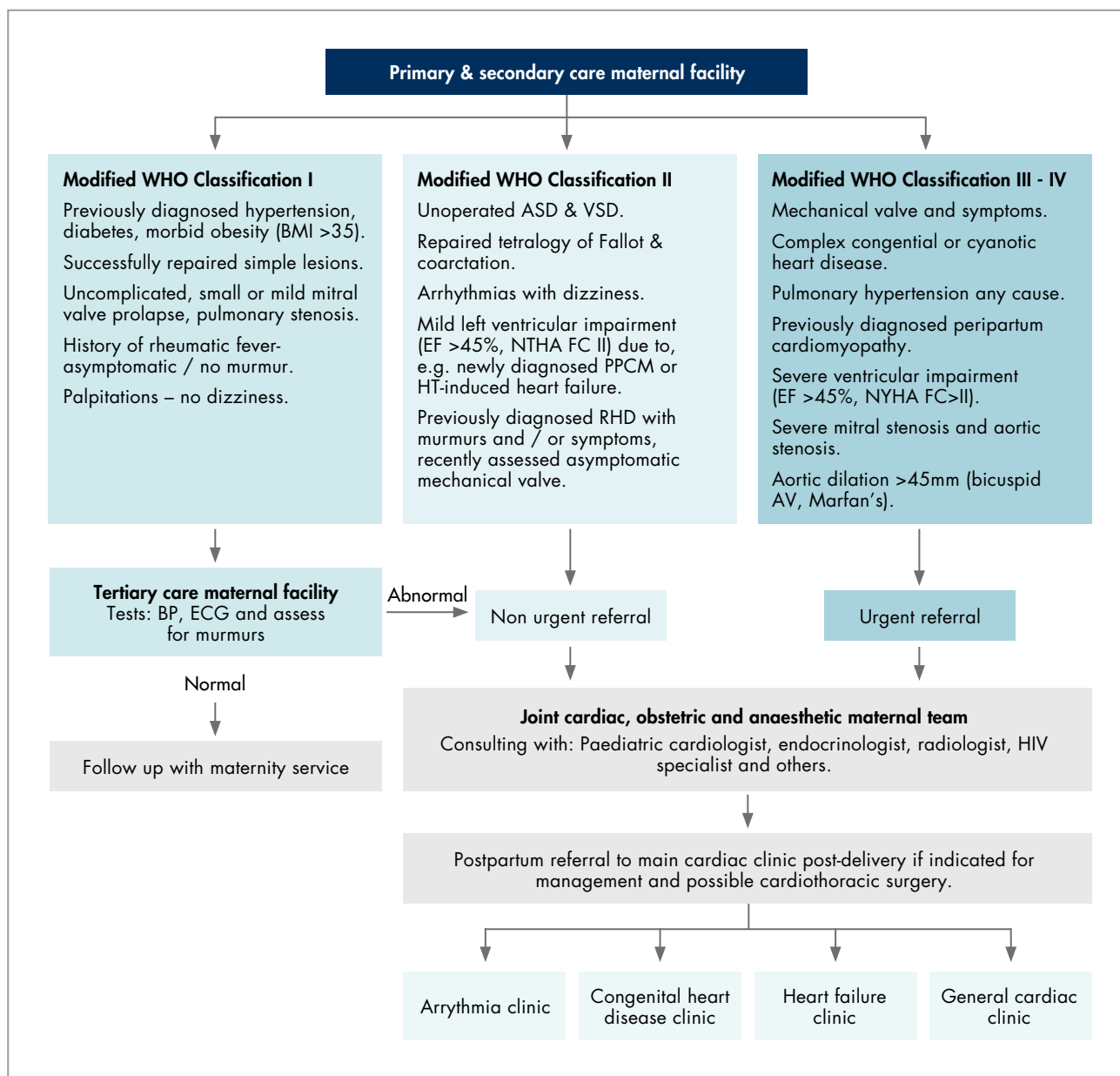
reported in low-resource sub-Saharan Africa.<sup>(9-12)</sup> Women with CVD in pregnancy who attend joint cardio-obstetric care in Cape Town have excellent survival outcomes, like those in the western world.<sup>(11)</sup> Moreover, an early postpartum follow-up combined with targeted pharmacological interventions reduce peripartum heart failure admission and mortality.<sup>(13)</sup> Given the presentation of some CVD beyond the 42-day cut-off that defines maternal mortality, late presentation to health facilities and the high risk of death even after the puerperium, the Cape Town clinic follows up patients for up to a year postdelivery.<sup>(13)</sup> Although, at a minimum, the multidisciplinary pregnancy heart team requires a cardiologist, obstetrician, and anaesthetist, the clinic in Cape Town is jointly run by a cardiologist and obstetrician with consultation from other disciplines only when necessary.<sup>(9-11)</sup>

Given the shortage of healthcare workers in Botswana, as in other developing countries, it may be difficult for the few anaesthetists to participate in the frequent multidisciplinary pregnancy heart team clinics. Hence the Cape Town model would likely work in our setting, given that there are weekly cardiology and obstetric clinics.<sup>(14)</sup> The collaboration between cardiology and

obstetrics would help diagnose, risk-stratify and plan the care of women with CVD during pregnancy, delivery and postpartum. Along with preconception counselling and contraceptive advice, the cardio-obstetrics will offer a pathway for continuity of care for those diagnosed with CVD during pregnancy (Figure 3). Without disease-specific cardiac clinics, the cardio-obstetric clinic will refer patients to the general cardiac clinic present at our tertiary hospital in Gaborone. Anticipated benefits of a multidisciplinary pregnancy heart team include improving care by minimising miscommunication and facilitating cross-disciplinary education through knowledge sharing. The latter is even essential, given that most postgraduate programmes do not teach pregnancy physiology's impact on pre-existing cardiovascular disease and the overlap of symptoms of normal pregnancy physiology and clinical condition.

## CONCLUSION

With an increasing number of women with pre-existing cardiac conditions becoming pregnant, the contribution of CVD to maternal mortality is also growing. Consequently, there is a need for accurate diagnosis and appropriate care of pregnant women with CVD to minimise adverse outcomes. This can be



**FIGURE 3: Referral algorithm for suspected and previously known cardiovascular disease in maternity.<sup>(11)</sup>**  
 BMI = body mass index, ECG = electrocardiogram, ASD = atrial septal defect, VSD = ventricular septal defect, EF = ejection fraction, NYHA FC = New York Heart Association unctional class, PPCM = peripartum cardiomyopathy, HT = hypertension, AV = aortic valve.

achieved by identifying women with pre-existing CVD or clinical features of cardiac disease and a referral to a proper level of medical care with expertise to manage such patients. Given the recognised benefits of a multidisciplinary pregnancy heart team, its establishment in at least 1 tertiary hospital is paramount. The team's establishment will add to the existing success in a country with high access to health care, and most pregnant women are cared for by skilled birth attendants.

Conflict of interest: none declared.

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