Short Communication

The Need for Population Specific Normative Reference Ranges for Vital Signs in Healthy Pregnant and Non-Pregnant Women in Qatar and its Clinical Significance

Nada Ahmed Al-Mulla[1]*

[1]Doctor of Medicine, Postgraduate Student, Women and Children's Health, Department of Life Sciences & Medicine, King's College London, Hodgkin Building, Guy's Campus, Newcomen Street, London SE1 1UL, United Kingdom

*Corresponding author:** Nada Ahmed Al-Mulla
Doctor of Medicine, Postgraduate Student, Women and Children's Health, Department of Life Sciences & Medicine, King's College London, Hodgkin Building, Guy's Campus, Newcomen Street, London SE1 1UL, United Kingdom

Accurate interpretation of physiological parameters is essential for both clinical decision-making and research. Current clinical practice relies on standardized norms adopted from international historic standards for normal ranges of vital signs. However, these generalized ranges may not accurately reflect the physiological characteristics of individuals in the Qatari context due to variations in genetics, lifestyle, and environmental factors. Using non local reference ranges can result in overdiagnosis or underdiagnosis of obstetric complications. Research evidence demonstrates substantial ethnic differences in vital signs among pregnant women, underscoring the need for population specific reference ranges (Green *et al*., 2020). This limitation complicates the assessment of normal physiological changes in healthy non pregnant women and during pregnancy, when maternal adaptations substantially influence hemodynamic parameters (Valente & Economy, 2025). To date, a significant gap remains in this field, with no published data on reference ranges for vital signs representative of Qatari women (see Figure 1 for significance and implications).

Pregnancy introduces complex physiological alterations, including variations in blood pressure, heart rate, respiratory rate, oxygen saturation and temperature, all of which are critical for maternal and fetal health. Understanding these changes requires robust baseline data from healthy women within the local population. Developing normative values for nonpregnant women and subsequently for pregnant women in Qatar would enable clinicians and researchers to distinguish between normal pregnancy related adaptations and pathological deviations. Such differentiation is vital for early screening and detection of cardiopulmonary conditions, which often manifest through changes in vital signs combined with reported symptoms and clinical findings. In addition, assessing lifestyle factors is essential, as they can influence the interpretation of vital signs. Parameters such as diet, sleep patterns, physical activity and mental health should be systematically evaluated during the clinical assessment of such presentations as they influence interpretations. Furthermore, while population-based reference ranges provide a valuable benchmark, clinicians must also consider individual variability during evaluations, as what is normal for one woman may differ for another.
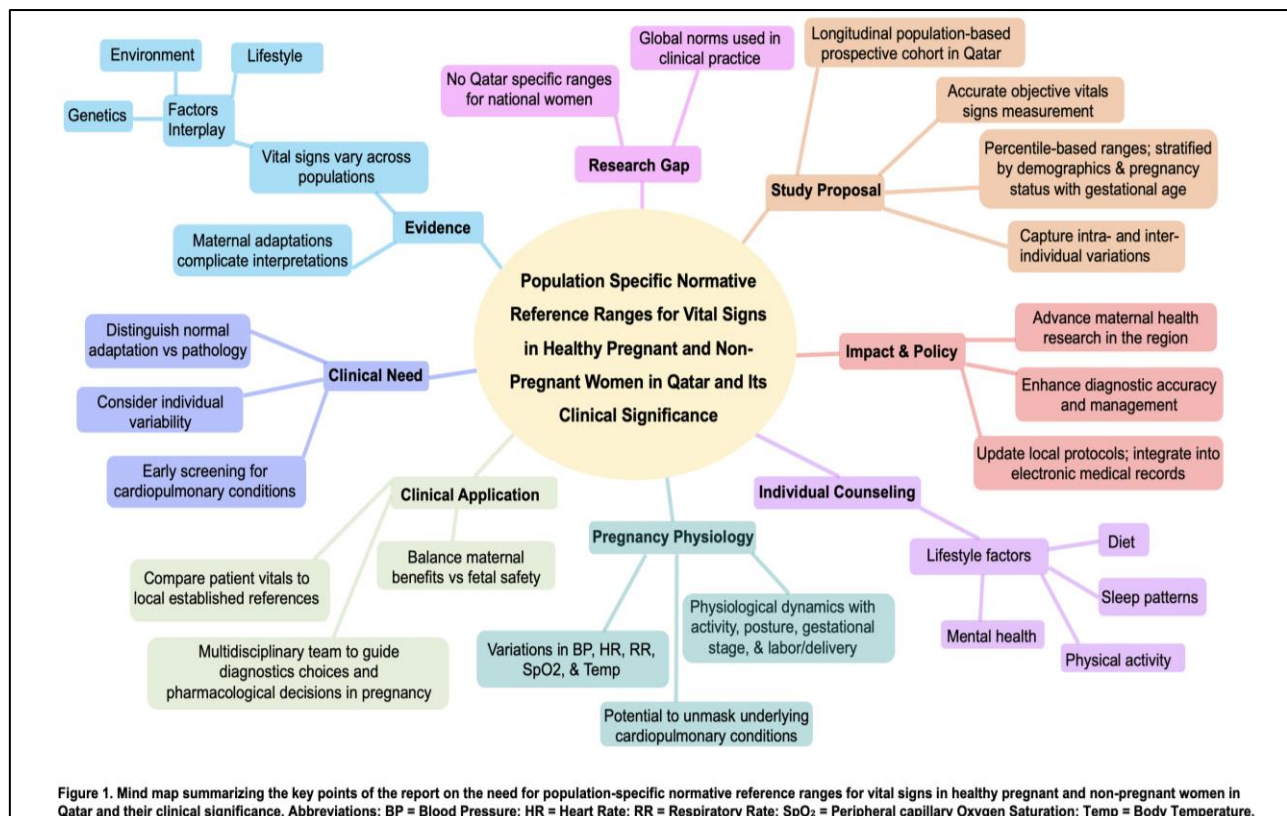
To address this gap, a longitudinal population-based prospective cohort study is necessary for systematic screening of vital signs among healthy women in Qatar. This study should incorporate accurate, objective measurements (Alim & Imtiaz, 2023) in reproductive aged women and pregnant women without comorbidities, followed by rigorous statistical analysis to establish percentile based, population specific normative reference ranges stratified by demographics and pregnancy status with the gestational age. These measurements must capture both intra individual and inter individual variations. Ultimately, the resulting data will enhance diagnostic accuracy, support evidence-based international guidelines while tailoring it to the local population. Thus, improving the detection and management of cardiopulmonary disorders during pregnancy.

Building on this foundation, it is important to consider common clinical presentations among pregnant women, particularly those experiencing new-onset symptoms. Pregnancy is characterized by profound maternal cardiovascular adaptations, including an increase in cardiac output by approximately 30% to 50% (Halpern *et al*., 2019). These changes are dynamic and influenced by maternal activity, posture, and the stage of pregnancy, as well as the physiological demands during labor and delivery (Halpern *et al*., 2019). Resting heart rate typically rises by 10 to 20 beats per minute, accompanied by a hypercoagulable state that develops progressively throughout gestation. While these alterations are essential for supporting fetal development, they may unmask underlying arrhythmias, thereby elevating the risk of maternal heart failure and thromboembolic events if rate and rhythm are not adequately controlled (Halpern *et al*., 2019).

Early identification of medical diseases such as arrhythmic disorders or pulmonary embolism necessitates precise measurement of vital signs and recognition of deviations from an individual's baseline. Comparing these assessments to locally established reference ranges, as proposed above, is critical for distinguishing physiological adaptations from pathological changes that warrant investigation. This approach underpins accurate diagnosis and informs clinical decision-making regarding the safety and appropriateness of further diagnostic approaches and the prescribing of pharmacological interventions during pregnancy, while considering the potential known and unknown maternal and fetal risks associated with such interventions. Therefore, in these cases it is required to carefully balance the maternal benefits and fetal safety across different diagnostic and management strategies.

If a medical disease is suspected and further diagnostic assessment is required, then a multidisciplinary approach should include cardiology, obstetrics and psychology for the mother to be able to make decisions that require weighing the risks versus the benefits of continuing management. For instance, If cardiac medications such as beta blockers are needed to be prescribed during pregnancy, discussing the known fetal risks, which is not limited to neonatal multicystic renal dysplasia, intrauterine growth retardation, neonatal bradycardia and hypoglycaemia and preterm birth from established studies (Halpern *et al.,*2019), as well as the limitations in the literature for randomized clinical trials for dose dependent risks and safety during pregnancy in different classes of beta blockers. Also, we do not know the long-term neurodevelopmental outcomes of in-utero exposure for beta blockers. As mentioned above, the assessment of lifestyle factors and optimization of these elements should be considered as first line. This reflects the complexity of applying existing evidence in a clinical environment and underscores the need for individualized counseling.

Figure 1. Mind map summarizing the key points of the report on the need for population-specific normative reference ranges for vital signs in healthy pregnant and non-pregnant women in Qatar and their clinical significance. Abbreviations: BP = Blood Pressure; HR = Heart Rate; RR = Respiratory Rate; SpO₂ = Peripheral capillary Oxygen Saturation; Temp = Body Temperature.

In conclusion, reliance on global reference ranges that fail to capture the physiological characteristics of women in Qatar highlights the urgent need for local research. Pregnancy introduces complex cardiovascular and metabolic changes, and without population-specific data, clinicians face significant challenges in interpreting vital signs and identifying early indicators of medical conditions. The absence of localized norms further limits personalized care and informed risk versus benefit analyses from a multidisciplinary team to determine the threshold for therapeutic interventions. Addressing this gap will not only enhance clinical decision-making but also advance maternal health research in the region, where such studies remain scarce. Finally, such an observational study could inform policies that update local clinical protocols and integrate the collected data into electronic medical records.

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