Hypertensive disorders of pregnancy are the third most common cause of maternal mortality worldwide, and the proportion of deaths resulting from these disorders is increasing [1,2]. Proper management begins with correct diagnosis and appropriate referral decisions. Within maternity referral networks in low-resource countries, rural healthcare workers are the first to identify hypertension, which requires accurate equipment and proper measurement technique.

The aim of the present study was to assess whether referral procedures based on blood pressure measurements were consistent throughout a maternity referral network.

Seventy-five semi-structured interviews were performed at healthcare centers—teaching hospital (n = 1), district hospitals (n = 10), health clinics (n = 11), and community health posts (n = 8)—within a convenience sample of 9 districts in Ghana. Participants were asked to define the blood pressure measurement that would be considered high and warrant treatment and/or referral. Participant groups included obstetricians and physicians, midwives/nurses, and community health workers (CHWs).
study was approved by institutional review boards at the University of Michigan and Ghana Health Service, and each participant gave informed consent before the study began.

Data analysis was performed using SPSS version 19 (IBM, Armonk, NY, USA). *P* < 0.05 was considered to be statistically significant.

A consistent blood pressure threshold for treatment and/or referral was not identified among the groups (Fig. 1). Nearly all obstetricians and physicians noted 140/90 mm Hg as the threshold for referral, consistent with the definition of hypertension and the Ghana Health Service’s referral criteria and associated protocols (i.e. patients are referred when either their systolic or their diastolic pressure is equal to or exceeds 140 or 90 mm Hg, respectively) [3,4]. Midwives/nurses and CHWs reported more variable thresholds. When comparing group variances, folded *F* tests revealed statistically significant differences between all groups (*P* < 0.05). In addition, there were differences in variance between urban (teaching/district hospitals) and rural (health clinics/community health posts) healthcare centers with regard to systolic thresholds (*P* < 0.05). Only 9 participants reported that they also considered a rise in blood pressure from pre-pregnancy to be an indication to treat/refer.

The present study found inconsistent referral procedures among participants in rural settings. Thirteen participants set referral thresholds below 140/90 mm Hg—possibly leading to normotensive women being unnecessarily referred to higher-level facilities, placing an unnecessary burden on pregnant women, and leading to reduced levels of confidence in the referring providers. Nineteen participants set referral thresholds above 140/90 mm Hg—possibly leading to hypertensive women not being referred to the proper facility at the appropriate time and to the worsening of symptoms.

The inconsistent referral practices found among healthcare workers in rural areas highlight the need for simple and clear criteria and educational materials/training methods that reduce these inconsistencies. Furthermore, blood pressure equipment and accompanying measurement techniques tailored to the needs of rural healthcare workers may facilitate the identification of hypertension.

**Conflict of interest**

The authors have no conflicts of interest.

**References**


