Access to antenatal blood pressure measurement in Malawi: Findings from a national census of health facilities

William Stones¹,², William Wayne Peno²

1. Department of Public Health, College of Medicine, University of Malawi
2. Department of Obstetrics & Gynecology, College of Medicine, University of Malawi

Abstract

Aim
To identify service side factors associated with access to antenatal blood pressure measurement at health facilities in Malawi.

Methods
Secondary data analysis of 1499 observations of antenatal consultations undertaken in the Service Provision Assessment survey 2013-14, a census of all formal health facilities in the country.

Results
Differentials in access to antenatal blood pressure measurements by client age or educational status and provider gender or in-service training did not reach statistical significance although clinically important effects cannot be excluded. There was substantial variation among districts, ranging from 14% to 100% of observed consultations. Facilities in the Central and Southern regions had lower odds of providing blood pressure measurement relative to the Northern region (OR 0.17, 95% CI 0.03 to 0.30 and 0.11, 95% CI 0.04 to 0.31 respectively). Facilities affiliated to the Christian Health Association of Malawi and facilities under private management had higher odds of provision relative to government facilities (OR 3.24, 95% CI 1.71 to 6.11 and 5.77, 95% CI 1.87 to 17.79 respectively). Where observed consultations included taking the client's weight and measuring the symphysis-fundus height, the odds of blood pressure measurement were significantly increased (OR 6.4, 95% CI 3.32 to 12.34 and 1.71, 95% CI 1.01 to 2.88 respectively).

Conclusion
An indicator for effective coverage, the proportion of antenatal visits that included blood pressure measurement, recorded in health passports examined at the time of admission for delivery, should be tested for incorporation into the District Health Information System to enable tracking of quality improvement in antenatal care. Further research is needed to elucidate the reasons for the variations identified here.

Key words: Pregnancy Hypertension, Pre eclampsia, Antenatal care, Quality of Health Care, Service Provision Assessment

Introduction
While Malawi has seen substantial reductions in child mortality since 2010, neonatal and maternal mortality have been more resistant to programmatic interventions. This is despite increased utilization of maternity services; according to the 2015-16 Malawi Demographic and Health Survey, as many as 91% of births are now in health facilities and, for antenatal care, over half of women report attending four or more visits¹. The realisation that adverse maternal and neonatal outcomes have persisted despite relatively high coverage of services has prompted a greater policy focus on the quality of clinical care that is provided in health facilities. Furthermore, recognition of the previously hidden burden of stillbirth in low resource countries such as Malawi has prompted attention to the actual care received during clinical contacts during the antenatal period and at the time of delivery, so as to prevent complications through timely intervention².

Historically, detecting and managing hypertensive disease was the main purpose of antenatal care, as it was appreciated from early public health work that eclampsia and its associated complications could, to a large extent, be averted by detecting pre-eclampsia³. Availability of functional equipment for measuring blood pressure is listed as one of this six basic items of equipment for clinical facilities and is included in the list of World Health Organization ‘Service Availability and Readiness Assessment’ (SARA) indicators, recommended to Ministries of Health for annual monitoring⁴. Presence of functioning equipment in a health facility is a necessary but not sufficient condition to ensure that clients and clinical staff have access to blood pressure measurement. However, obtaining data on actual clinical use in a systematic manner presents challenges. The Malawi Service Provision Assessment (MSPA) 2013-14⁵ was a census of all formal health facilities in the country and included both a facility inventory of equipment (with documentation of its functionality) and observation of clinical consultations, thus providing an opportunity to examine the use of available equipment in clinical settings. In this study, we aimed to identify service side factors associated with access to antenatal blood pressure measurement at health facilities in Malawi.

Methods
Data
We used data from the 2013-14 Malawi Service Provision Assessment. This was a census of all formal health facilities under public, private, faith based, non-governmental organisation and company managing authority in the country, including hospitals, health centres, dispensaries and health posts. The methods and tools used in the census are
Antenatal blood pressure measurement in Malawi

During the survey, 632 health facilities in Malawi were identified as offering antenatal services. Among these, records of observations of antenatal consultations were available for 412 facilities. Among these 412 facilities, functioning apparatus for measuring blood pressure, either a digital device or manual sphygmomanometer plus a stethoscope, was documented for 30% (79 facilities) of which 1,499 antenatal consultations were observed. The age and educational attainment of clients whose consultations were observed were recorded in exit interviews. Provider characteristics including professional cadre, gender, and access to training in antenatal care components including blood pressure measurement were also obtained.

### Results

The presence of functional blood pressure apparatus at health facilities where antenatal consultations were observed was statistically associated with non-Government managing authorities (P<0.001) but was not influenced by facility type or region. Most antenatal consultations were undertaken by enrolled midwives/nurse-midwives (55.3%), community health nurses (19.6%) or enrolled nurse-midwives (17.9%).

### Independent variables

Geographical and facility-related independent variables were the region and district where the facility was located, rural or urban location, managing authority and whether the facility was a health centre, clinic, or hospital. Provider-related independent variables were the providers’ gender, professional group and whether and when they received relevant in-service training. Client-related independent variables were age group and highest educational attainment. The selection of ‘client side’ independent variables was based on the possibility that providers might behave differently during consultations with younger clients such as adolescents, or with those of lower educational status; in some contexts, such clients may be treated less favourably in contacts with health services. On the service side, we wished to examine the possibility that different professional groups might undertake the mandated task to a different extent, or that male of female providers might exhibit different behaviours based on perceived gender or gender-based behavioural norms might play a part. Finally, as much emphasis is typically placed on the importance of in-service training as a strategy for quality improvement, access to training for providers was also examined. To investigate clinical behaviour through possible associations between the blood pressure measurement and other components of antenatal physical examination, we included four observed elements as independent variables. These were fundal height examination by palpation, symphysis-fundus height measurement with a tape measure, weighing and height measurement.

### Analytical methods

A district-wise table showing the percentage of antenatal consultations at facilities with functional blood pressure apparatus where blood pressure measurement was observed was constructed and displayed graphically. Following initial cross tabulations, bivariate associations between blood pressure measurement and geographical, facility, provider and client related explanatory variables were examined and the statistical significance of differences estimated using chi

### Table 2: Percentage of observed antenatal consultations that included blood pressure measurement, in facilities with functioning blood pressure apparatus, by other antenatal examination procedures

| Facility Managing Authority | Symphysis-fundus height measurement | Measured | Not measured |
|-----------------------------|------------------------------------|----------|--------------|
| Government                  |                                    | 0.0007   |              |
| Private                     |                                    | 0.0007   |              |
| Company                     |                                    | 0.0007   |              |

### Discussion

Our analysis indicates that there is a substantial gap in access to blood pressure monitoring during antenatal care in Malawian health facilities. While much of the variability in access relates to facility managing authority, with lower odds of access to blood pressure measurement in Government facilities, we also identified regional- and district-wise variations. Differences relating to certain client-side and provider-side factors did not reach statistical significance in our analysis but should be noted for potential further study. For example, there may be a deficiency in provision for adolescents relative to older clients which is of clinical significance considering their excess risk from hypertensive disease. One might have expected a greater effect by providers to ensure that blood pressure was checked for adolescent clients rather than the lower percentage observed (albeit not

### Table 3: Multiple logistic regression of observed blood pressure measurement against selected facility, provider and client characteristics

| Facility Managing Authority | Symphysis-fundus height with tape measure |
|----------------------------|------------------------------------------|
| Government                 | Not measured                              |
| Private                    |                                          |
| Company                    |                                          |

https://dx.doi.org/10.4314/mmj.v30i3.2
statistically significant). Similarly, a non-significant trend to a lower standard of provision for un-educated clients was observed in the Malawi service provision assessment survey. Malawian providers undertook fewer blood pressure checks; while this difference did not reach statistical significance and female providers were more numerous, this may reflect further study as to whether a gender gap in provision of maternity care in the Malawi context. Interestingly, an apparent (but again non-significant) adverse effect of in-service training related to antenatal care was seen. It is possible that the content or delivery of training is counterproductive or in some cases it may unintentionally focus providers’ efforts on other aspects of antenatal care and insufficiently reinforce the need for consistent blood pressure measurement. Again, further investigation would be needed to confirm whether this is a real influence.

We observed that blood pressure measurement was significantly more likely to be done where symphys-fundal height was also measured, the measurement was done where the client’s weight was taken on the same occasion, suggesting that elements of clinical quality of care tend to be provided together. Our analysis was restricted to facilities at which the presence of functional apparatus for measuring blood pressure was documented during the Service Provision Assessment survey, thus the observed variations can be ascribed to provider behaviour rather than to equipment availability.

The present findings are consistent with the available population-based data from Malawi;83% of women reported that they had their blood pressure taken during their last pregnancy or antenatal visit. While this headline figure may appear favourable, recall of what might have been a single blood pressure reading during the entire pregnancy falls far short of the clinical need to assure consistent checking of blood pressure at every antenatal visit and during admission for labour and delivery, not to mention appropriate further measures such as urine testing for protein and referral for pre-eclampsia.

In efforts to increase the quality of maternity service provision, approaches have been tested including those on the ‘demand side’ such as community mobilisation. Unfortunately, as hypertension is usually not symptomatic, there is a low level of awareness in the general population about the importance of blood pressure measurement during pregnancy. In a study of community perceptions of perinatal care in Malawi, women attached importance to receiving bed nets and medication during antenatal visits but did not mention blood pressure measurement.4 Service side’ interventions such as performance-based financing of health facilities using defined service indicators have not proved successful to date in increasing access to blood pressure checking at the time of admission for delivery.4

Internationally, attention has been focused on assuring access to essential commodities for maternal and newborn health care in low resource settings. Notably, the UN Commodities Commission identified 13 priority commodities that should receive particular attention.8 Of these, two were directly related to maternal health care, magnesium sulphate for eclampsia and misoprostol for postpartum haemorrhage. Blood pressure apparatus and urine protein test sticks were not included at that stage, although this gap has been recognised in the agenda of the Reproductive Health Supplies Coalition more recently.9 There have been very useful technological developments in reliable and low cost blood pressure measurement devices, now fully validated for African antenatal populations.8

As our analysis indicates, simply providing functional equipment is necessary but not sufficient to assure access to blood pressure measurement measurement for pregnant women. Similarly, access to in-service training would not appear to offer prospects for improvement in isolation and may even be counterproductive. Programming needs to address all elements of coverage so that ‘effective coverage’, in this case, could range from reliable and consistent measurement at each and every visit, to being able to document quality improvement efforts at the level of care.10 With regard to drivers of variability in access to blood pressure measurement, health facility workload is likely to be a factor especially in government-run facilities and may explain the better performance of CHAM and private facilities. However, the design of this survey does not allow researchers to capture the volume of cases in a particular service and relate this to staff deployment for blood pressure measurement; a more specific indicator of health workforce and workload enquiry would be required to elucidate the observed differences in performance. Very often in human resource planning in the region, health service staffing norms are based on different type ratios than client numbers so that the small number of clinic staff may be overwhelmed with clients, resulting in ‘short cuts’ to speed up client flow. It is possible that there are also differences with regard to clinical protocols or monitoring of provider performance, such as chart reviews or local supervisory observations that could favourably influence performance. The better performance of facilities in the Northern region could be explained by a generally lower population relative to health worker and facility provision. However, according to the most recent DHS survey, while there is a more favourable pattern of antenatal blood pressure measurements (consistent with our findings), this is not the case for several other components of care, such as tetanus vaccination.

To achieve effective coverage and health benefits in preventing eclampsia and related complications in the current context of very high service utilisation, quality improvement initiatives need to add an indicator for blood pressure measurement during antenatal care and incorporate this into routine reporting in the District Health Information System. We propose that the denominator for this purpose would be the number of health passports with a blood pressure recorded at each antenatal visit, collected in facilities at the time of admission for delivery, with the denominator being the number of health passports examined. This indicator would provide rapid feedback to health facilities regarding the effectiveness of their antenatal care arrangements. Furthermore, combining this indicator with the existing routine service indicators of numbers of antenatal attendances per pregnancy and the proportion of women attending in the first trimester, it would be feasible to offer facilities in Malawi to undertake ‘bottleneck’ analysis at district level as part of a strategy to ensure complete and effective coverage. It would also allow useful learning from better-performing districts so that strategies that have proved effective can be cascaded nationally.

Conclusions

Strengthening of procurement and maintenance of blood pressure machines at government health facilities is needed. An indicator for effective coverage, the proportion of antenatal visits that included blood pressure measurement, recorded in health passports examined at the time of admission for delivery, should be tested for incorporation into the District Health Information System to enable tracking of quality improvement in antenatal care. Further research is needed to elucidate the reasons for the variations identified here.

Acknowledgements

This study used skills imparted at a DHS Program workshop in 2015 funded by USAID Malawi and facilitated by Wanjie Wang, Paul Ametepi and Shireen Assaf of ICF International and Jupiter Simbeye of Chancellor College, University of Malawi, whose teaching is gratefully acknowledged. We thank Rachael Cooper-Bohannon for generating the district map. No specific funding was obtained for this work and the views expressed are those of the authors.

References

1. National Statistical Office (NSO) [Malawi] and ICF. 2017. Malawi Demographic and Health Survey 2015-16. Zomba, Malawi, and Rockville, Maryland, USA. NSO and ICF.
2. de Benois L, Kinney M, Stones W, ten Hoope-Bending P, Vivio D, Leasher S et al. Stillbirths: Ending preventable deaths by 2030. Lancet. 2016; 387 (10019): 703-716. doi:10.1016/S0140-6736(15)00954-X
3. Loudon I. Death in Childbirth: an international study of maternal care and maternal mortality 1850-1990. 1993; Oxford: Clarendon Press. ISBN 9780198229971
4. World Health Organization. Service Availability and Readiness Assessment (SARA): an annual monitoring system for service delivery. Reference Manual, Version 2.2 [Internet]. 2015 [cited 2018 Mar 11]. Available from: http://www.who.int/healthinfo/systems/sara_reference_manual/en/
5. Ministry of Health (MoH) [Malawi] and ICF International. 2014. Malawi Service Provision Assessment (MSPA) 2013-14. Lilongwe, Malawi, and Rockville, Maryland, USA: MoH and ICF International.
6. Han A, Helewa M, Stones W, Nathan H, Miller S, Magee L, Hypertension. In Magee L, von Dadelszen P, Stones W, Mathai M (Editors), The FIGO Textbook of Pregnancy Hypertension: An evidence-based guide to monitoring, prevention and management. London: The Global Library of Women’s Medicine. 2016. p. 1-18.
7. Kumbani LC, Chirwa E, Malata A, Oldala 30, Rujone G. Do Malawian women critically assess the quality of care? A qualitative study on women's perceptions of perinatal care at a district hospital in Malawi. Reprod Health 2012;9:30. doi:10.1186/1742-4755-9-30.
8. Brenner S, Wilhelm D, Lohmann J, Kambula C, Chinkhunda J, Munas A, et al. Implementation research to improve quality of maternal and newborn health care, Malawi. Bull World Health Organ 2015;97(7):491-502. doi:10.12477/BH.16.178202.
9. World Health Organization. United Nations Commission on Life-Saving Commodities [Internet], undated [cited 2018 Mar 20]. Available from: http://www.who.int/medical_devices/uncles/en/.
10. Reproductive Health Supplies Coalition. Eighteenth Meeting, Brussels [Internet]. 2018. [cited 2018 Mar 20]. Available from: https://www.therasupplies.org/
11. Nathan HL, de Greeff A, HeezeGrave NL, Chappell LC, Shann AH. An accurate semiautomated oscillometric blood pressure device for use in pregnancy (including pre-eclampsia) in a low-income and middle-income country population: the Microlife 3SAT-2. Blood Press Monit 2015; 20(1): 52–55. doi: 10.1097/BPM.0000000000000086.
12. Baker U, Peterson S, Marchant T, Mburaku G, Temu S, Mauzu Y, et al. Identifying implementation bottlenecks for maternal and newborn health interventions in rural districts of the United Republic of Tanzania. Bull World Health Organ 2015; 93(6):380–389. doi: 10.2471/BLT.14.141879

Malawi Medical Journal (3); 141-145 September 2018 Antenatal blood pressure measurement in Malawi 144

Malawi Medical Journal (3); 141-145 September 2018 Antenatal blood pressure measurement in Malawi 145