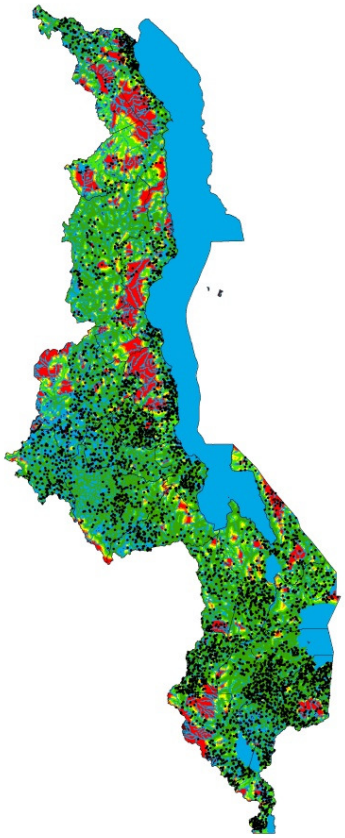
Investing the Marginal Dollar for Maternal and Newborn Health: Geographic Accessibility Analysis for Emergency Obstetric Care services in Malawi



Steeve Ebener, PhD [1] and Karin Stenberg, MSc [2]

[1] *Consultant, Gaia GeoSystems, The Philippines*

[2] *Technical Officer, Department of Health Systems Governance and Financing, World Health Organization, Geneva, Switzerland*

WHO/HIS/HGF/GIS/2016.3

Table of Contents

Acknowledgements .....

Executive summary i

1. Introduction 1

2. Reference indicators and targets 2

3. Assumptions related to the EmOC referral system 3

4. Tool used for the different analysis: AccessMod 4.0 6

5. Analytical approach 7

- 5.1 Accessibility coverage analyzes 7
- 5.2 Geographic coverage analyzes 8
- 5.3 Service utilization analyzes 11
- 5.4 Scaling up analyzes 12

6. Data and national norms used in the different analysis 15

- 6.1 Statistical data 17
  - 6.1.1 National level figures 17
  - 6.1.2 Sub national level figures 17
  - 6.1.3 Cluster level figures 18
  - 6.1.4 Health facility level data 19
- 6.2 Geospatial data 22
  - 6.2.1 Administrative boundaries 23
  - 6.2.2 Geographic location of the EmOC facilities 24
  - 6.2.3 Land cover including the extend of urban areas 25
  - 6.2.4 Road network 26
  - 6.2.5 Hydrographic network 27
  - 6.2.6 Digital Elevation Model 30
  - 6.2.7 Spatial distribution of unattended home deliveries 30
  - 6.2.8 Spatial distribution of the number of births 32
- 6.3 National norms 33

7. Results 36

7.1 Accessibility coverage analyzes 36
7.2 Geographic coverage analyzes 42
7.3 Service utilization analyzes 49
7.4 Scaling up analyzes 55

8. Knowledge transfer 65

9. Conclusions and recommendations 66

References 71

Annex 1 – Indicators and minimum acceptable levels from the 1997 UNICEF, WHO, UNFPA Guidelines for monitoring the availability and use of obstetric services 74

Annex 2 – Indicators and minimum acceptable levels from the 2009 WHO, UNFPA, UNICEF and Mailman School of Public Health handbook for monitoring emergency obstetric care 75

Annex 3 – Illustration of the current EmOC referral system in Malawi 76

Annex 4 – Region and district level demographic data used in the context of the project 77

Annex 5 – List of BEmOC and CEmOC identified during the 2010 EmOC assessment 78

Annex 6 – EmOC level information used in the different analysis 80

Annex 7 – non-BEmOC Facilities in which an important number of skilled attended births took place in 2011 [MOH HIS] 82

Annex 8 – Simplified classification for the global land cover distribution grid 83

Annex 9 – Process followed to create the final land cover distribution grid 84

Annex 10 – Process to generate the buffers around the DHS cluster location 85

Annex 11 – Protocol used to spatially distribute the number of births on a raster format GIS layer 87

Annex 12 – Regional and District level number and percentage of births where the household is located within 2 hours of travel time to a BEmOC (including CEmOC) for both considered scenarios 89

Annex 13 – Travel time between each BEmOC (including CEmOC) and the nearest CEmOC....90

Annex 14 – District level travel time statistics....91

Annex 15 – Health facility level results of the geographic coverage analysis for BEmOC (including CEmOC)....92

Annex 16 – District level number and percentage of births where the household is located within 2 hours of travel time of a BEmOC (including CEmOC) when taking both travel time and coverage capacity into account....93

Annex 17 – Estimated number of births with complications referred to the nearest CEmOC facility and corresponding expected number of EmOC surgical teams...94

Annex 18 – Health facility level results for the first scaling up scenario....95

Annex 19 – Estimated number of births with complications referred to the nearest CEmOC and corresponding expected number of EmOC surgical team when applying the first scaling up scenario....97

Annex 20 – Partially functional BEmOC facilities considered when implementing the second scaling up scenario....98

Annex 21 – Partially functional CEmOC facilities considered when implementing the second scaling up scenario....100

Annex 22 – Complete list of EmOC facilities considered when implementing the second scaling up scenario....101

Annex 23 – Health facility level results for the second variant of the 2nd scaling up scenario....104

Annex 24 – Travel time between each BEmOC and the nearest CEmOC facility for the second variant of the 2nd scaling up scenario....107

Annex 25 – Estimated number of births with complications referred to the nearest CEmOC and corresponding expected number of EmOC surgical team when applying the second variant of the 2nd scaling up scenario....109

Acknowledgements

The authors wish to express our gratitude to staff at the Ministry of Health of Malawi, Dr Fannie Kachale, Mr Macleod Mwale, Ms Twambilire Phiri and especially Mr Patrick Naphini for their time and for the health statistics and GIS data they have provided to inform the analysis presented in this report.

We also would like to take this opportunity to thank the Dr Felicitas Zawaira, WHO Representative and Mrs. Harriet Chanza from the WHO Malawi Country Office for their valuable insights and support.

Our gratitude also goes to Ms Martha Mondiwa and Ms Rodwell Sanje (Nurses and Midwives Council of Malawi), Mr Richard M Ndovie (Medical Council of Malawi), James Chilembwe (Save the Children Malawi) and Mr Stuart Miller (Calcon) for their contribution to the study.

We acknowledge the financial support provided to this project by the Government of Norway.

For comments, please contact Karin Stenberg, WHO (stenbergk@who.int) or Steeve Ebener, Gaia GeoSystems (steeve.ebener@gaia-geosystems.org).

Executive summary

Objective

Progress on MDG5a to reduce maternal mortality is lagging behind in many countries and a key constraint is access to skilled care at birth including emergency obstetric care (EmOC) services. In order to expand coverage, good-quality essential services must be integrated into strong health systems.

The World Health Report 2005 proposed a "close to client" approach with back up services at referral level. While the first level should be able to provide most of the Basic Emergency Obstetric Care (BEmOC) signal functions, there is also a universal need for access to comprehensive Emergency Obstetric Care (CEmOC) referral services, in case the need arises.

In recognition of the key impact that EmOC services can have on maternal mortality and safe birth outcomes, the World Health Organization (WHO) is supporting the use of Geographic Information Systems (GIS) to analyse physical accessibility to facilities providing EmOC in five selected countries, namely (by alphabetical order): Burkina Faso, Cambodia, Lao People's Democratic Republic, Malawi and Rwanda.[1]

Essentially, from a normative perspective every woman should be able to easily access a health facility that provides BEmOC. This is not currently the case in most low-income countries. Strategic decisions need to be made by policy makers and health planners with regards to what investments are feasible given limited resources and competing priorities.

The broader project aims to inform policy discussions on how to optimize or target the spending of the marginal dollar for maternal health at country level; in particular to examine the infrastructure requirements for scaling up coverage of institutional delivery with skilled attendance. The research undertaken as part of this project and presented here aims to investigate the current accessibility to EmOC and potential implications for future global and national level policy recommendations and norms.

Methodology

The analysis assesses accessibility coverage[2] and combine the results with the availability of human resources in the infrastructures providing the concerned health service to obtain a measure combining both the population needs and service availability, this measure is referred to as geographic coverage.

In the case of Malawi, working in close collaboration with the Ministry of Health of Malawi, a freely available GIS extension developed by WHO to measure physical

[1] This work has received financial support from the Norwegian Government as part of a work plan to operationalize the UN Secretary General's Global Strategy for women and children's health.

[2] Refers to ensuring that health services are located within reasonable reach of the people who should benefit from it (Tanahashi, 1978)

accessibility to health care, called AccessMod (See Chapter 4), has been used in combination with statistical data from existing sources (household surveys, Health Information System, data,..) to perform the following analyses (See Chapter 5 for more details):

1. Accessibility coverage:
    a. The percentage of all births where the household is located within 2 hours of travel time of a BEmOC facility;
    b. The travel time between each BEmOC facility and the nearest CEmOC facility.
2. Geographic coverage:
    a. The percentage of all births where the household is located within 2 hours of travel time of a BEmOC facility with enough capacity to cover all births if normal delivery (i.e., with sufficient availability of skilled birth attendants);
    b. The percentage of births with complications requiring blood transfusion/Caesarean-section (C-section) that will reach a CEmOC facility within 2 hours of travel time from BEmOC facilities, and where the CEmOC facility has enough capacity to manage complications (through the availability of EmOC surgical teams).
3. Service utilization: Comparing results from the accessibility/geographic coverage analysis with data on actual service utilization (estimated capacity of BEmOC compared with the percentage of births delivered in a health facility; the estimated capacity of CEmOC compared with the number of caesarean-sections).
4. Scaling up: Scenarios developed to reach universal coverage through various mechanisms of expanding the EmOC facility network.

The results coming out of these analyzes (Chapter 7) are presented in the form of tables, graphs and maps to be included into the analysis of maternal and new born health investments in the country.

Results

The analyses performed indicate that:

- From an **accessibility coverage** perspective (Section 7.1), the EmOC delivery network currently in place is sufficient and well located to allow for high