

Spatial Patterns of Maternal Health Service Utilisation and Determinant Factors in Ethiopia

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Abstract

Access to and utilisation of maternal health services are very limited in low- and middle-income countries. Maternal morbidity and mortality are very high in these countries due to the limited access to and use of maternal health services. This is the case in Ethiopia, where a high number of maternal deaths occur every year. A geographically linked data analysis using population and health facility data is valuable for mapping maternal health service access and use. It also enables the identification of both the demand- and supply-side factors associated with the use of this service. This study aimed to assess the geographic variations and determinants of maternal health service use in Ethiopia.

This thesis used data from national population and health facility-based surveys. The two datasets were linked using geographic data linking methods. After linking these datasets, spatial analyses were carried out to identify geographic variations in maternal health service use in Ethiopia. Multilevel analyses were also undertaken to identify determinants of maternal health service use in Ethiopia.

There were wide geographic variations in maternal health service use across Ethiopia. Maternal health service use was influenced by both demand- and supply-side factors. Women and their spouses' education, parity, household wealth and place of residence were the most important demand-side factors in using maternal health services. Geographic access to and the availability of maternal health services, and the service readiness of healthcare facilities, were the most important supply-side factors.

There are geographic variations in maternal health service use in Ethiopia, revealing critical gaps in service availability and readiness. This indicates a need for targeted future investment to increase access to and use of these services, which in turn will contribute to the reduction of maternal morbidity and mortality.

Declarations

Statement of Originality

I hereby certify that the work embodied in the thesis is my own work, conducted under normal supervision. The thesis contains no material which has been accepted, or is being examined, for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made. I give consent to the final version of my thesis being made available worldwide when deposited in the University's Digital Repository, subject to the provisions of the Copyright Act 1968 and any approved embargo.

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I hereby certify that the work embodied in this thesis has been done in collaboration with other researchers. I have included as part of the thesis a statement clearly outlining the extent of collaboration, with whom and under what auspices.

Authorship

I hereby certify that the work embodied in this thesis contains published papers of which I am a joint author. I have included as part of this thesis a written statement, endorsed by my supervisors, attesting to my contribution to the joint publications.

Thesis by Publication

I hereby certify that this thesis is submitted in the form of a series of published papers of which I am a joint author. I have included as part of the thesis a written statement from each co-author; and endorsed by the Faculty Assistant Dean (Research Training), attesting to my contribution to the joint publications.

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Date: 11 November 2020

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Co-Author Statement

I attest that Research Higher Degree candidate Teketo Tegegne contributed to the listed publications included in this thesis by publication:

- Tegegne TK, Chojenta C, Loxton D, Smith R, Kibret KT. The impact of geographic access on institutional delivery care use in low and middle-income countries: systematic review and meta-analysis. *PLoS One* 2018; 13(8): e0203130.
- Tegegne TK, Chojenta C, Getachew T, Smith R, Loxton D. Service environment link and false discovery rate correction: methodological considerations in population and health facility surveys. *PLoS One* 2019; 14(7): e0219860.
- Tegegne TK, Chojenta C, Getachew T, Smith R, Loxton D. Antenatal care use in Ethiopia: a spatial and multilevel analysis. *BMC Pregnancy Childbirth* 2019; 19(1): 399.
- Tegegne TK, Chojenta C, Getachew T, Smith R, Loxton D. Giving birth in Ethiopia: a spatial and multilevel analysis to determine availability and factors associated with healthcare facility births. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2020.
- Tegegne TK, Chojenta C, Forder PM, Getachew T, Smith R, Loxton D. Spatial variations and associated factors of modern contraceptive use in Ethiopia: a spatial and multilevel analysis. *BMJ Open*. 2020;10(10): e037532.

Teketo Tegegne contributed by:

- contributing to each study's conception and design
- developing analyses plans and analysing the data
- interpreting the data
- leading the writing of the manuscripts.

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Conferences

Tegegne TK, Chojenta C, Getachew T, Smith R, Loxton D. Service environment link and false discovery rate correction: methodological considerations in population and health facility surveys. Paper presented at 20th J. B. Douglas Postgraduate Award; 2019 November; Sydney.

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Chapter 3

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Chapter 8

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Dedication

To my family, both near and far: you are the foundation that keeps me grounded and supports me as I continue to grow. I dedicate this thesis to all of you. I hope I have made you proud.

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List of Abbreviations

–2LL	Negative two–log likelihood
ANC	Antenatal care
ANC4+	Four or more antenatal care visits
BEmONC	Basic emergency obstetric and neonatal care
CEmOC	Comprehensive emergency obstetric care
CEmONC	Comprehensive emergency obstetric and newborn care
CI	Confidence interval
CSA	Central Statistics Agency
DHS	Demographic and Health Survey
EAs	Enumeration area
EDHS	Ethiopia Demographic and Health Survey
EmOC	Emergency obstetric care
EPHI	Ethiopian Public Health Institute
ESF	Eigenvector spatial filtering

ESPA+	Ethiopia Service Provision Assessment Plus
FDR	False discovery rate
GIS	Geographic information systems
G_i^*	Getis-Ord G_i^* statistic
ICC	Intra-class correlation coefficient
IPTp	Intermittent Preventive Treatment in Pregnancy
IUD	Intrauterine device
JB	Joanna Briggs Institute
M-SVC	Moran eigenvector spatially varying coefficient
MCMC	Markov chain Monte Carlo
Mcpr	Modern contraceptive prevalence rate
MCSE	Monte Carlo standard error
OR	Odds ratio
RE-ESF	Random-effects eigenvector spatial filtering
SARA	Service Availability and Readiness Assessment

SNNPR	Southern Nations, Nationalities and Peoples Region
SPA	Service Provision Assessment
TFR	Total fertility rate
WHO	World Health Organization