Towards improving the measurement of unsafe abortion: substantive estimates and methodological insights from Zambia

ONIKEPE OLUWADAMILOLA OWOLABI

Thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy of the University of London

JULY 2016

Department of Infectious Disease Epidemiology

Faculty of Epidemiology and Population Health

LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE

Funded by the Economic and Social Research Council (ESRC)

Research group affiliation(s): MARCH Centre for Maternal, Reproductive and Child Health
Declaration by candidate

I, Onikepe Oluwadamilola Owolabi confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm this has been indicated in the thesis

Signed:

Date: 5th January 2016
Abstract

Background: Measuring unsafe abortion is essential to understand the magnitude of the problem and monitor progress in women’s reproductive health. However, legal and societal constraints in high-burden contexts foster underreporting of induced abortions which makes obtaining accurate estimates challenging. My PhD examines the methodological challenges around defining and measuring unsafe abortions using Zambia as my country context.

Methods: First, I conducted interrupted time series analysis on admissions for abortion-related complications and deaths from 2007-2015 at University Teaching Hospital (UTH), Lusaka to assess the impact of key contextual changes. Second, I collected data from women hospitalized for abortion-related complications in three provinces to estimate the incidence of abortion-related near-miss in 2014. Third, I compared estimates of the incidence of induced abortion in the three provinces using data from 3 methodological approaches.

Results: The prevalence of unsafe and induced abortion is high in Zambia. Following the release of clinical guidelines in May 2009, there was an immediate decline in the absolute number of abortion complications by 86 cases (p=0.003). The abortion-related near-miss incidence rate was 72 per 100,000 women, and it was feasible to apply the adapted WHO near-miss criteria in Zambia. Estimates of the incidence of induced abortion per 1000 women ranged from 30 to 80. There was variation in the proportion of women estimated to seek facility care for abortion-related complications in each approach.

Conclusion: The burden of unsafe abortion is high in Zambia despite its liberal law. Although there is no gold standard method to measure the burden of unsafe abortion, my findings suggest there is scope to improve use of available data to describe the burden of the most unsafe abortions and evaluate the impact of interventions on abortion-related indicators in restrictive contexts.
Acknowledgements

At the end of this journey, I am unbelievably grateful for the help I have received and the people I have met. I have been blessed with more time, support and love than I could have requested, and there are not enough words to express my gratitude to every single person who helped me along the way.

This work would not have been possible without the help of my wonderful supervisors. I am deeply grateful to Veronique Filippi, who gave me the opportunity to learn from her and explore my research ideas, provided outstanding pastoral care during the most trying time of my PhD and has given me many amazing opportunities for professional growth. Jenny Cresswell has been an excellent co-supervisor, giving untold amount of time to the minutest details of my work, helping me with many statistical queries and providing advice on many practical issues along the way. I am extremely grateful to David Osrin for being a wonderful mentor and member of my advisory panel and providing timely feedback on every document I have asked him to read. I am particularly grateful to Ann Moore, Akin Bankole and Tamara Fetters for their help with acquiring the data collection tools, and facilitating the training I needed to estimate abortion incidence in my PhD, and to Bellington Vwalika for his assistance with accessing hospital data in Zambia. I am also very grateful to Schadrac Agbla and Jonathan Bartlett for their statistical advice.

I am extremely grateful to every member of the EVAPMDUP team at LSHTM, Population Council Zambia and the Guttmacher Institute for providing feedback on my work many times over the past few years and for giving me a sense of belonging at the school. I feel incredibly privileged to have found mentors and friends who have become family and have gone above and beyond to make my time at the school an unforgettable experience.

I would like to thank Oona Campbell, Lenka Benova, Lori Miller and Francesca Cavallaro for all the academic support/feedback, taking care of me during an extremely difficult pregnancy, opening their homes to me, helping me babysit, and comforting me when I cried. To my best friends Kasman, Mardieh, Ngozi and Tosin thank you being there every step of the way, for countless conversations, for listening to my ideas and for making this a great journey.
To the love of my life Kayode, there are no words to say how grateful I am for your love, support and the many sacrifices you have made for us to finish this PhD. This work is as much yours as it is mine. Oluwatiere, you are the best thing that happened to me during this PhD, thank you for being such a good baby and for allowing me to work when I needed to. To my father and sisters, thank you for always being there, and for believing in me even when I did not believe in myself.

In loving memory of my mum Mary Omoyosola Owolabi. Your deep unwavering faith in God, your passion for every patient’s health and your ability to chase a dream continues to inspire me and give me a reason to think I can change the world.
# Table of contents

Abstract 3  
Acknowledgements 4  
List of tables 8  
List of figures 10  
Acronyms and abbreviations 11  

## CHAPTER 1. INTRODUCTION 13
1.1 OUTLINE OF THESIS 15

## CHAPTER 2. DEFINING AND MEASURING UNSAFE ABORTION 17
2.1 DEFINITION OF TERMS 17  
2.2 THE EVOLUTION OF THE WHO DEFINITION OF UNSAFE ABORTION 18  
2.3 INCONSISTENCIES BETWEEN THE WORDING OF THE WHO DEFINITION OF UNSAFE ABORTION AND THE WAY IT HAS BEEN USED TO GENERATE ESTIMATES 18  
2.4 RECENT UPDATES ON HOW THE WHO DEFINITION OF UNSAFE ABORTION SHOULD BE INTERPRETED 21  
2.5 MEDICAL ABORTION, ITS IMPACT ON HOW WOMEN ACCESS ABORTIONS, AND ON THE DEFINITION AND MEASUREMENT OF UNSAFE ABORTION. 27  
2.6 INDICATORS AND METHODOLOGICAL APPROACHES FREQUENTLY USED TO MEASURE THE BURDEN OF UNSAFE ABORTION IN RESTRICTIVE CONTEXTS 30  
2.6.1 DATA SOURCES 31  
2.7 RECENT IDEAS ON THE DEFINITION AND MEASUREMENT OF UNSAFE ABORTION 51  
2.8 CONCLUSION 52

## CHAPTER 3. AIM, OBJECTIVES AND DESIGN OF PHD THESIS 54
3.1 STUDY AIM AND OBJECTIVES 54  
3.2 STUDY CONTEXT, PROJECT SETTING AND ROLE OF THE CANDIDATE 55  
3.2.1 STUDY CONTEXT 55  
3.2.2 PROJECT FRAMEWORK 58  
3.2.3 ROLE OF THE CANDIDATE IN EVA-PMDUP 60  
3.3 ETHICAL APPROVAL 61  
3.4 FUNDING 62  
3.5 RESEARCH TIMELINE 62

## CHAPTER 4. HOW DO CONTEXTUAL CHANGES AFFECT TRENDS IN ABORTION-RELATED COMPLICATIONS? A TIME SERIES ANALYSIS OF ZAMBIAN HOSPITAL DATA 64
4.1 INTRODUCTION TO THE PAPER 66  
4.2 METHODS 69  
4.2.1 SETTING 69  
4.2.2 STUDY DESIGN 69  
4.2.3 DATA COLLECTION TOOLS 69  
4.2.4 DATA COLLECTION 70  
4.3 ANALYSIS 70  
4.3.1 OUTCOME MEASURE: 70  
4.3.2 MISSING DATA 71  
4.3.3 KEY INTERVENTION EVENTS 71  
4.3.4 DATA ANALYSIS 72  
4.4 RESULTS 73  
4.5 DISCUSSION 77
### CHAPTER 5. INCIDENCE OF ABORTION-RELATED NEAR-MISS COMPLICATIONS IN ZAMBIA: CROSS-SECTIONAL STUDY IN CENTRAL, COPPERBELT AND LUSAKA PROVINCES

5.1 INTRODUCTION
5.2 METHODS
5.2.1 DESIGN, SETTING, AND POPULATION
5.2.2 DATA COLLECTION
5.2.3 DATA ANALYSIS
5.3 RESULTS
5.4 DISCUSSION
5.4.1 STRENGTHS OF THIS STUDY
5.4.2 METHODOLOGICAL CHALLENGES
5.5 CONCLUSIONS

### CHAPTER 6. HOW DO THE NUMBERS COMPARE? ESTIMATING THE INCIDENCE OF INDUCED ABORTION IN ZAMBIA USING INDIRECT METHODOLOGIES THAT RELY ON COMMUNITY-BASED AND FACILITY-BASED DATA

6.1 INTRODUCTION TO THE PAPER
6.2 OBJECTIVE
6.3 METHODS
6.3.1 STUDY DESIGN
HEALTH FACILITY BASED METHODS
COMMUNITY-BASED METHOD
6.4 RESULTS
6.4.1 AICM
6.4.2 PMM
6.4.3 COMPARISON OF AICM AND PMM
6.4.4 ATPR
6.5 DISCUSSION
6.5.1 MAIN FINDINGS
6.5.2 METHODOLOGICAL CHALLENGES
6.5.3 STRENGTHS OF THE STUDY
6.5.4 INTERPRETATION
6.6 CONCLUSION

### CHAPTER 7. DISCUSSION

7.1 SUMMARY OF THE KEY FINDINGS
7.1.1 SUMMARY OF BACKGROUND-DEFINING AND MEASURING UNSAFE ABORTIONS
7.1.2 SUMMARY OF SUBSTANTIVE ESTIMATES IN RESULTS CHAPTERS
7.1.3 INTERNAL CONSISTENCY OF SUBSTANTIVE ESTIMATES AND LIMITATIONS OF THE STUDY
7.2 INTERPRETATION WITHIN THE LITERATURE ON ABORTION
7.2.1 TREND STUDY
7.2.2 NEAR-MISS STUDY
7.2.3 ABORTION INCIDENCE HOSPITAL STUDY AND CONFIDANTS STUDY
7.3 IMPLICATIONS FOR UNDERSTANDING AND MEASURING ABORTION SAFETY
7.3.1 MEDICAL ABORTION IS CHANGING HOW WE CAN MEASURE THE BURDEN OF UNSAFE ABORTIONS
7.4 IMPLICATIONS FOR PROVISION OF ABORTION CARE IN ZAMBIA
7.5 RECOMMENDATIONS FOR RESEARCH AND POLICY
7.5.1 Refine the assumptions used to adjust health facility outcome data in methods like the AICM 149
7.5.2 Explore approaches to improve reporting in community-surgeries of women to generate data on provision and care-seeking for induced abortions 150
7.5.3 Refine the criteria used to describe abortion-related morbidity and the WHO near-miss criteria to increase applicability in low income contexts 152
7.6 Conclusion 153

Appendix 1: Ethical Approval Letters 176
Appendix 2: Consent Forms for Women of Reproductive Age Participating in the Community Survey 181
Appendix 3: Data Collected from Hospital Registers for Trend Study 190
Appendix 4: Correlogram and Partial Correlogram Graphs for Data on the Abortion-Related Complications 191
Appendix 5: Results of Interrupted Time Series Describing Trends in Death Rate for Chapter 4 193
Appendix 6: Data Extraction Algorithm for Near Miss Study 194
Appendix 7: Near-Miss Study Tool 195
Appendix 8: Data Collection Tools for Abortion Incidence Complications Method (AICM) 197
Appendix 9: Anonymous Third Party Reporting Method (ATPR) 221
List of Tables

Table 2-1: Summary of WHO evidence-based standards-of-care for safe abortion care provision 23
Table 2-2 WHO Figa-Talamanca criteria used for reclassification of abortion cases 35
Table 2-3 How my proposed unsafe abortion near-miss indicator addresses the limitations of other abortion indicators 39
Table 2-4 Categories of indicators that have been used to measure near-miss: advantages and disadvantages 41
Table 2-5 WHO maternal near-miss identification criteria 44
Table 3-1 Summary table briefly describing each study in my PhD and how it will be referred to subsequently 59
Table 3-2 Summary of the role of the candidate in EVA-PMDUP research activities 61
Table 3-3 Timeline of PhD research activities 63
Table 4-1 Admissions for abortion-related complications and gynaecological indications at UTH between 2006 and 2015 73
Table 4-2 Interrupted time series analysis on UTH admissions for abortion-related complications (count) between two important contextual events affecting access to abortion care 75
Table 4-3 Interrupted time series analysis on UTH admissions for abortion-related complications per 1000 gynaecological admissions between two important contextual changes affecting access to abortion care 76
Table 5-1 Differences between WHO near-miss morbidity criteria and criteria used in the study, adapted for abortion-related complications in Zambia 89
Table 5-2 Comparing between the level of morbidity amongst cases in the original study and the validation study 92
Table 5-3 Sociodemographic and reproductive characteristics of 2406 women seeking post abortion care 93
Table 5-4 Clinical conditions in abortion-related near-miss cases and abortion-related deaths 94
Table 5-5 Overlap between blood transfusion and haemoglobin levels based on WHO near-miss criteria and Zambia study adapted criteria 94
Table 5-6 Near-miss outcome indicators by province 95
Table 6-1 Comparing the sources of data for estimating abortion incidence 118
Table 6-2 Comparing the incidence of abortion using different weights for private health centres 120
Table 6-3 Estimated number of cases admitted in each type of facility in different provinces using the AICM and PMM approaches 122
Table 6-4 Table comparing age distribution of respondents to ATPR with women in 2013/14 ZDHS 123
Table 6-5 Results for different measures using the 3 approaches 123
Table 6-6 Methods used to induce abortion by confidants where respondent knew method (ATPR) 124
Table 6-7 HPS respondent’s views on types of abortions obtained by different categories of women 125
Table 7-1 How the HPS questions were adapted for the Zambia AICM 213
Table 7-2 Sampling facilities achieved with hospitals included in the AICM study 216
Table 7-3 Distribution of facilities in Central, Copperbelt and Lusaka provinces capable of providing PAC and sampled according to ownership and level of facility 217
Table 7-4 HPS respondent’s views on types of abortions obtained by different categories of women 219
List of Figures

Figure 2-1 Approaches to defining unsafe abortion, and the common data sources and indicators for measurement 32
Figure 2-2 The spectrum of abortion-related morbidity: from non-complicated abortions to near-miss and maternal death 39
Figure 3-1 Map of Zambia showing where the study was conducted 55
Figure 4 Data series showing the segmented regression model examining the effect of contextual changes between 2009 and 2015 on UTH admissions for abortion related complications (count) 75
Figure 4-2 Observed UTH abortion complication rate per 1000 gynaecological admissions and interrupted linear trends assessing the effect of contextual changes between 2006 and 2015 77
Figure 6-1 Flow diagram outlining how the sample for the AICM was achieved 113
Figure 6-2 Step-by-step analysis of AICM data 116
Figure 7-1 Flowchart showing how eligible hospitals were identified for the EVA-PMDUP study 215
Acronyms and Abbreviations

AICM   Abortion Incidence Complications Method
ATPR   Anonymous Third Party Reporting Method
CAC    Comprehensive Abortion Care
DHS    Demographic and Health Surveys
EVA-PMDUP   Evaluation of the Prevention of Maternal Death from Unwanted Pregnancy program
FP     Family Planning
HFS    Health Facility Survey
HPS    Health Professional Survey
MA     Medical abortion
MVA    Manual vacuum aspiration
PAC    Post abortion care
PMDUP  Prevention of Maternal Death from Unwanted Pregnancy
PMM    Prospective Morbidity Survey
SSA    Sub-Saharan Africa
TOP    Termination of pregnancy
UTH    University Teaching Hospital
WRA    Women of reproductive age
WHO    World Health Organization
ZDHS   Zambia demographic and health survey