Do restrictive abortion laws affect the severity of abortion-related morbidities in Africa? A-cross sectional analysis of data from eleven countries

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Abstract

Objective

Unintended pregnancy rates are highest in countries that restrict abortion access and lowest in countries that guarantee access to reproductive health services, including where abortion is broadly available. Individuals seek out and procure services regardless of the legal status of abortion – in countries with restrictions, this means they seek extra-legal services. In this study, we investigate whether the severity of abortion-related mortalities differs across countries with varying levels of abortion restrictions in Africa.

Methods

We conducted a cross-sectional study with prospective data collection in 11 countries in Africa. We included women presenting to each facility with signs and symptoms of abortion complications or miscarriage, or death at facility discharge from abortion-related complications or miscarriage. We constructed a logistic regression model and calculated predictive probabilities to understand the effect of restrictive abortion laws on the severity of abortion morbidities.

Results

Our final sample includes 12,368 records across 210 health facilities. Individuals in countries with abortion to preserve health had 1.244 (1.211-1.279) times higher odds of more severe abortion morbidities, individuals in countries with abortion to save a woman's life had 1.101 (1.070-1.133) times higher odds of more severe abortion morbidities, and individuals in countries with abortion prohibited altogether had 1.419 (1.367-1.472) times higher odds of more severe abortion morbidities than mild

complications compared to women residing in countries with abortion on request.

Conclusion

More restrictive abortion laws are associated with greater risk of moderate complications, potentially-life threatening complications, near miss complications, and mortality. There are opportunities to improve knowledge around abortion law for both individuals seeking out services and healthcare providers.

Introduction

In Africa, 43% of pregnancies are unintended.[1] Unintended pregnancy rates are highest in countries that restrict abortion access and lowest in countries that guarantee access to reproductive health services, including where abortion is broadly available.[2] Less and least safe abortion rates are higher in countries with restrictive laws than in countries with less restrictive laws. Individuals seek out and procure services regardless of the legal status of abortion – in countries with restrictions, this means they seek extra-legal services.

Abortion laws vary greatly across the 54 countries of Africa. Eight countries allow abortion on request, three countries permit abortion on socioeconomic grounds, 25 to preserve health, and twelve grant abortion to save the pregnant woman's life.[3] In only six countries in Africa is abortion prohibited altogether. An additional 24 countries, excluding those with abortion on request, allow abortion in cases of rape. Despite abortion being legal for at least one indication in most countries in Africa, not all pregnant women and girls are aware of the service,[4,5] and healthcare providers may limit who is able to access services based on their knowledge of the law or beliefs.[6,7] Other barriers, such as cost of services, may prevent provision of abortion.[8] Even when trained providers use the appropriate abortion method in a sanitary environment, related complications may occur.

While previous studies have explored availability of abortion services and abortion safety (least safe, less safe, safe) across countries,[9–11] in this study, we investigate whether the severity of abortion-related mortalities differs across countries with varying levels of abortion restrictions in eleven countries in Africa. We hypothesize

that individuals in countries with stricter abortion laws experience more severe abortion complications.

Materials and methods

Study design

This manuscript presents a sub-analysis of the World Health Organization's Multi-Country Survey on Abortion (WHO MCS-A).[12] We conducted a cross-sectional study with prospective data collection in countries in the Latin America and Caribbean region and Africa. We selected eleven countries in Africa (Benin, Burkina Faso, Chad, Democratic Republic of the Congo, Ghana, Kenya, Malawi, Mozambique, Niger, Nigeria, Uganda) and six in the Latin America and Caribbean region (Argentina, Bolivia, Brazil, Dominican Republic, El Salvador, Peru) – using multi-stage sampling at country, province, and facility-level. Health facilities were eligible for inclusion if they had more than 1,000 deliveries per year, had signal functions for emergency obstetric care, provided abortion and/or post-abortion care to the extent of the law, and had, on average, at least ten post-abortion clients per month. Data collection comprised three months in each country between February 2017 and April 2018. In this analysis, we limit our discussion to the Africa sample.

All women presenting to each facility with signs and symptoms of abortion complications or miscarriage, or death at facility discharge from abortion-related complications or miscarriage were included in the study. Research assistants abstracted information from medical records for each eligible woman. Women who were hospitalized for more than 24 hours were invited to participate in an audio computer-assisted self-interview. We collected information about each health facility's capacity

and structure, ability to provide post-abortion care, and service records using a structured questionnaire. The full study protocol is published online.[13]

Statistical analysis

We used R programming for statistical analyses.[14] We coded abortion complications as deaths, near-miss complications, potentially life-threatening complications, moderate complications, and mild complications. Near-miss complications refer to cardiovascular, respiratory, renal, coagulation, neurologic, hepatic, or uterine organ dysfunction. Potentially life-threatening complications encompass severe hemorrhage, severe systemic infection, and uterine perforation. Moderate complications including bleeding symptoms (heavy bright red vaginal bleeding with or without clots; blood-soaked pads/towels/clothing and pallor), suspected intra-abdominal injury (abdominal pain/cramping, nausea, and vomiting; distended/tense/hard abdomen; shoulder pain; decreased bowel sounds, rebound, and tenderness), and infection (chills, fevers, and sweats; foul smelling vaginal discharge; history of interference with pregnancy). Included within mild complications were vaginal bleeding, open cervix, abnormal vital signs (based on temperature, heart rate, systolic/diastolic blood pressure, and respiratory rate), uterine tenderness, abnormal mental state (agitated, lethargic, or comatose), abnormal abdominal examination (rebounding/guarding; distended, decreased bowel sounds, tense/hard, tenderness on palpitation), abnormal appearance (sick-looking, pallor, jaundice, clammy), cervical motion tenderness, foul smelling vaginal discharge, evidence of foreign body, and adnexal mass). Throughout this manuscript, we refer to mild complications versus

"more severe complications", which includes moderate complications, potentially life-threatening complications, near-misses, and mortality.

We classified each country's abortion laws according to the categories used by the Center for Reproductive Rights: on request, broad social or economic grounds, to preserve health, to save a person's life, or prohibited altogether.[3] We explored covariates at country level (whether misoprostol is approved for use in the country [yes/no], whether there is a country-level provision of abortion for rape indications [yes/no]), facility level (level of care [primary, secondary, tertiary, other referral level], location [urban, peri-urban, rural]), and individual level (age [10-19 years, 20-29 years, 30+ years], marital status [married, single, separated/divorced/widowed], education level [none, primary completed, secondary completed], current employment [yes/no], gestational age [first trimester, second trimester], previous births [0, 1+], previous abortions [0, 1+]). These variables were selected a priori based on theoretical associations between them and the outcome of interest.

We compared the characteristics of individuals with abortion-related morbidity or mortality across countries with dissimilar levels of abortion law restrictiveness in Africa using bivariate analysis. We then constructed a logistic regression model with variables with $p<0.20$ to compare various abortion complication outcomes across abortion law categories. This approach allows for the inclusion of variables that might not reach traditional levels of significance (i.e., $p<0.05$), but could contribute to the model's explanatory power when adjusted for other covariates. In the second step, which we will present in our final manuscript, we will utilize likelihood test ratios to compare the fit of the full model against reduced models, wherein a variable is removed to assess fit. We

will then include variables that contribute a significant amount ($p<0.05$) of explanatory power to the final model, which we will test using log-likelihood ratio tests. We will produce post-model estimations to explore predictive probabilities of abortion severity; those probabilities will be run by country, for the Africa region, and according to restriction. We will also run these probabilities according to sociodemographic characteristics that are statistically significant across abortion law categories in a bivariate analysis with $p<0.05$. For all logistic regression models, we present unadjusted and adjusted odds ratios in addition to 95% confidence intervals.

Ethical considerations

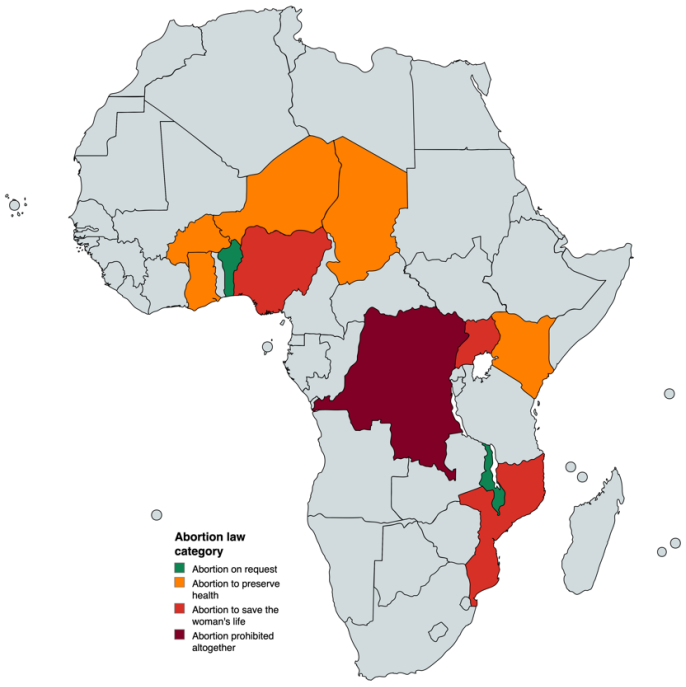
This study was approved by the World Health Organization Ethical Review Committee (#0002699) and the World Health Organization Human Reproduction Programme (HRP) Review Panel on Research Projects. We also received ethics approval in each country Benin (Le Comité National d'Ethique pour la Recherche en Santé), Burkina Faso (Le Ministère de la Recherché Scientifique et de l'Innovation), Chad (Ministère de l'Enseignement Supérieur et de la Recherche Scientifique), the Democratic Republic of Congo (Ecole de Santé Publique Comité d'Ethique), Ghana (Ethical Review Committee of the Ghana Health Service and Ethical and Protocol Review Committee of the College of Health Sciences, University of Ghana), Kenya (University of Nairobi Ethics and Research Committee), Malawi (College of Medicine Research Ethics Committee (COMREC)), Mozambique (Comité Nacional de Bioetica para e Saude, Ministerio de Saude), Nigeria (Federal Capital Territory Health Research Ethics Committee; Research Ethical Review Committee, Oyo State and State Health Research Ethics Committee of Ondo State) and Uganda (Mulago Hospital Research Committee; Uganda

National Council for Science and Technology). All individuals participating in exit interviews provided informed consent.

Results

We collected data 210 health facilities in Africa. At the time of data collection, two countries provided abortion on request (Benin, Malawi), five countries provided abortion to preserve health (Burkina Faso, Ghana, Kenya, Niger, Chad), three countries provided abortion to save the woman's life (Mozambique, Nigeria, and Uganda), and the Democratic Republic of Congo prohibited abortion altogether. No countries in our analysis allowed abortion on broad socioeconomic grounds. Five countries allowed abortion in the case of rape (Burkina Faso, Benin, Ghana, Mozambique, and Chad) and only three countries did not have misoprostol approved for use (Burkina Faso, Niger, Chad). A map detailing the countries included in the analysis is available in *Figure 1.*

Figure 1. Abortion law categories of countries, at the time of data collection, included in the analysis[15]



Our final sample includes 12,368 records with each category of abortion and morbidity after removing individuals with ectopic and molar pregnancies, no abortion complication diagnosis, or no final diagnosis. Almost half (46%) of the sample resided in countries with abortion to preserve health, while approximately one quarter each lived in countries with abortion on request (23%) and abortion to save a woman's life. Seven percent (7%) resided in countries with abortion prohibited. 60% of participants resided in countries without a rape provision in the law and 22% of participants lived in countries where misoprostol is not approved. The majority of participants sought care at secondary facilities (56%) in urban locations (72%). About half of the study participants (48%) were 20-29 years old, 70% were married or co-habitating, and they were evenly divided across educational level (no education: 25%, primary completed: 25%, secondary completed: 26%, not reported: 23%) and employment status (currently working: 53%, not currently working: 47%). Regarding the terminated pregnancy, 58% of participants were in their first trimester, the majority (65%) had a previous birth and only 27% had a previous abortion. Fewer participants (36%) had mild abortion-related complications than more severe complications. Detailed characteristics of the study sample are available in *Table 1.*

Table 1. Characteristics of the study sample according to abortion complication severity

Variable	Mild complications N = 4,415	Moderate, potentially life-threatening, and near-miss complications or mortality N = 7,953	p-value[1]
Abortion law			<0.001[2]
On request	1,324 (30%)	1,572 (20%)	
Preserve health	1,699 (38%)	3,936 (49%)	
Save a life	1,253 (28%)	1,692 (21%)	

Variable	Mild complications N = 4,415	Moderate, potentially life-threatening, and near-miss complications or mortality N = 7,953	p-value[1]
Prohibited	139 (3.1%)	753 (9.5%)	
Misoprostol approved for use			<0.001[2]
Included	3,610 (82%)	6,034 (76%)	
Not included	805 (18%)	1,919 (24%)	
Rape provision in abortion law			<0.001[2]
Included	1,438 (33%)	3,449 (43%)	
Not included	2,977 (67%)	4,504 (57%)	
Facility level			<0.001[2]
Primary	167 (3.8%)	748 (9.4%)	
Secondary	2,533 (57%)	4,408 (55%)	
Tertiary	1,081 (24%)	2,027 (25%)	
Other referral level	633 (14%)	729 (9.2%)	
Not reported	1 (<0.1%)	41 (0.5%)	
Facility location			<0.001[2]
Urban	3,195 (72%)	5,717 (72%)	
Peri-urban	740 (17%)	1,206 (15%)	
Rural	480 (11%)	1,030 (13%)	
Not reported	0 (0%)	0 (0%)	
Age			0.055[2]
<=19 years	727 (16%)	1,198 (15%)	
20-29 years	2,095 (47%)	3,866 (49%)	
30+ years	1,587 (36%)	2,865 (36%)	
Not reported	6 (0.1%)	24 (0.3%)	

Variable	Mild complications N = 4,415	Moderate, potentially life-threatening, and near-miss complications or mortality N = 7,953	p-value[1]
Marital status			0.2
Married/co-habitating	3,122 (71%)	5,548 (70%)	
Separated/divorced/widowed	74 (1.7%)	174 (2.2%)	
Single	875 (20%)	1,628 (20%)	
Not reported	344 (7.8%)	603 (7.6%)	
Education level			<0.001[2]
No education	1,141 (26%)	2,004 (25%)	
Primary completed	1,171 (27%)	1,960 (25%)	
Secondary completed	1,205 (27%)	2,023 (25%)	
Not reported	898 (20%)	1,966 (25%)	
Employment status			<0.001[2]
Currently working	2,163 (49%)	4,429 (56%)	
Not currently working	2,252 (51%)	3,524 (44%)	
Not reported	0 (0%)	0 (0%)	
Gestational age			0.4
First trimester	2,580 (58%)	4,578 (58%)	
Second trimester	1,835 (42%)	3,375 (42%)	
Not reported	0 (0%)	0 (0%)	
Previous births			0.024[2]
0	259 (5.9%)	497 (6.2%)	
1+	2,801 (63%)	5,198 (65%)	
Not reported	1,355 (31%)	2,258 (28%)	
Previous abortions			0.004[2]
0	1,938 (44%)	3,493 (44%)	

Variable	Mild complications N = 4,415	Moderate, potentially life-threatening, and near-miss complications or mortality N = 7,953	p-value[1]
1+	1,121 (25%)	2,202 (28%)	
Not reported	1,356 (31%)	2,258 (28%)	

In the unadjusted logistic regression model, individuals in countries with abortion more restrictive than on request had significantly greater risk of more severe abortion morbidities than mild complications: 1.168 (1.144-1.193) times in countries with abortion to preserve health, 1.032 (1.008-1.057) times in countries with abortion to save a woman's life, and 1.352 (1.305-1.400) times in countries with abortion prohibited altogether. The interim model includes the following covariates that were associated with abortion severity in bi-variate analyses at $p<0.20$: misoprostol approved for use, rape provision in abortion law, facility level, facility location, education level, employment status, previous births, previous abortions. Each of these results were also statistically significant: individuals in countries with abortion to preserve health had 1.244 (1.211-1.279) times higher odds of more severe abortion morbidities, individuals in countries with abortion to save a woman's life had 1.101 (1.070-1.133) times higher odds of more severe abortion morbidities, and individuals in countries with abortion prohibited altogether had 1.419 (1.367-1.472) times higher odds of more severe abortion morbidities. The results of the unadjusted and adjusted models are in *Table 2.*

Table 2. Effect of more restrictive abortion law on more severe abortion morbidity than mild complication

	Unadjusted model		Interim model	
Predictor	**Odds ratio (confidence interval)**	**P-value**	**Odds ratio (confidence interval)**	**P-value**
Abortion on request	—	—	—	—
Abortion to preserve health	1.168 (1.144-1.193)	<0.001[1]	1.244 (1.211-1.279)	<0.001[1]
Abortion to save a woman's life	1.032 (1.008-1.057)	0.01[1]	1.101 (1.070-1.133)	<0.001[1]
Abortion prohibited altogether	1.352 (1.305-1.400)	<0.001[1]	1.419 (1.367-1.472)	<0.001[1]

[1] p<0.05

Discussion

In this manuscript we present the first study to explore the effect of abortion laws on abortion morbidity and mortality. We find that there is a significantly higher risk of more severe abortion complications in countries with more restrictive abortion laws. The most restrictive abortion law category (abortion prohibited altogether) is associated with 1.419 times higher odds of more severe complications. Previous research in Nigeria, Cote d'Ivoire, and India showed that abortion safety varied by abortion legal context — there were significantly more abortions using non-recommended methods and non-clinical providers in the countries with abortion to save a woman's life than in the country with abortion on request.[9] These less safe abortions are more likely to result in abortion complications.[16] Our research extends this previous research to demonstrate the relationship between abortion's legal status in a country and the severity of associated complications. We hypothesize that the most restrictive abortion law category is the most impactful in increasing risk of more severe abortion complications due both to the

lack of availability of safe abortion services and fear of seeking out post-abortion care due to the criminality of having procured an abortion in the first place.[17,18]

The reason for a higher risk of more severe complications in countries with abortion to preserve health compared to countries with abortion to save the woman's life is less clear. There may be misinformation or confusion about legality of abortion or the law may not be applied uniformly across health facilities in these countries.[5–7,18] However, we hope that the results of this research will be useful to policymakers, advocates, and government officials interested in reducing preventable maternal deaths and morbidities due to abortion complications. Regardless of the exact restrictiveness of abortion law in a country, women are more likely to experience mild complications in countries with abortion on request than in other countries. They have higher risk of more severe abortion complications in countries with abortion to preserve health, abortion to save a woman's life, and where abortion is prohibited altogether. Dispelling myths at the community and facility-level may make abortion more accessible and safer for individuals where there is any indication for services and may prevent avoidable morbidity and excess mortality.

Strengths and limitations

To our knowledge, this is the first study to look at the effect of abortion laws, across several countries with different law severity, on abortion morbidity and mortality. We use national-, facility-, and patient-level data to parse out the effect of more severe abortion laws on the likelihood of more severe abortion outcomes with a large cohort of over 12,000 individuals across 210 facilities and 11 countries. However, there are also limitations that affect interpretation of study results. While we aim to understand the

effect of abortion laws on abortion complications, our analysis does not include individuals who received abortions and did not experience complications. We are also unable to adjust for the degree to which the laws are implemented, or not implemented, in each facility in which we collected data. Lastly, the study population does not include a country with abortion availability on broad socioeconomic grounds. However, this study starts to fill a gap in the research that we hope will continue to be explored through future studies.

Conclusions

Abortion law restrictiveness is associated with negative outcomes in women seeking post-abortion care, including moderate complications, potentially life-threatening complications, near misses, and mortality. Initiatives to improve legal abortion service provision in countries with indications for abortion may improve these outcomes. These initiatives should focus on education about the law, values clarification for providers, and targeting other barriers at the facility- and community-level. Policy initiatives to expand access to services may reduce excess abortion-related morbidity and mortality. Future research should explore the effects of these types of interventions on clinical outcomes.

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