

National Estimates of Liberia's 2021 Unintended Pregnancy and Induced Abortion

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Purpose: More than 60% of unintended pregnancies globally end in induced abortions. In Liberia, limited access to contraceptives leads to many unintended pregnancies, with little known about the incidence of induced abortion and unintended pregnancy in the country. This study aimed to estimate the incidence of induced abortion and unintended pregnancy in Liberia in 2021.

Methods: The Abortion Incidence Complications Method was used. First, the induced abortions that resulted in women seeking facility-based post-abortion care (PAC) in 2021 were estimated using data from a nationally representative sample of health facilities (n=128). Next, data from a survey of experts on abortion in Liberia (n=89) were used to estimate the proportion of induced abortions that resulted in complications treated in health facilities in 2021. The inverse of this proportion is a multiplier, which was applied to the estimate of the total induced abortion-related complications treated in health facilities, generating the total induced abortions in 2021. This estimate of induced abortion was complemented with the Demographic Health Survey data to estimate the 2021 incidence of unintended pregnancies in Liberia.

Results: An estimated 14,555 women received PAC treatment in Liberia in 2021. Approximately 58% of these PAC cases (n=8461) were due to induced abortions. Accounting for uncomplicated induced abortions and complicated abortions not requiring facility-based treatment, an estimated 38,779 induced abortions occurred in Liberia in 2021, corresponding to a national induced abortion incidence rate of 30.7 per 1000 women of reproductive age (WRA) (15–49). The unintended pregnancy rate among WRA was 86.54 per 1000, and approximately 35.0% of all pregnancies ended in induced abortions.

Conclusion: Despite the legal restrictions on abortions, unintended pregnancy and induced abortion are common in Liberia. Increasing access to contraceptives, safe abortion care, and quality PAC will improve socioeconomic and health outcomes for women/girls in Liberia.

Keywords: abortion incidence complications method, health facility survey, knowledgeable informant survey, post-abortion care

Introduction

While unsafe abortion and its associated complications are a leading public health concern in many parts of Africa, abortion is regulated by the criminal code rather than a public health framework in most countries.¹ In the context of Liberia, under the Liberian Penal Code (1978), Section 16.3, abortion is justified on the following grounds: to save the life of the woman; to preserve the physical health of the woman; to preserve the mental health of the woman; rape or incest or other felonious intercourse; and fetal impairment.² The Penal Code states that it is a felony offence to contravene these provisions.

Though preventable, unsafe abortions contribute an estimated 10% to Liberia's maternal mortality, one of the highest globally, at 1072 deaths per 100,000 live births.³ There is a broad consensus that this figure is a gross underestimate of abortion-related deaths, partly because of the clandestine nature of the practice, as documented in an eight-country study

using a network approach.^{4–6} Other notable contributors to maternal mortality in Liberia are hemorrhage (25%), pre-eclampsia (16%), and sepsis (10%).⁷ There is also evidence to suggest that providers in restrictive contexts use these diagnoses to conceal or deliberately misclassify cases of induced abortion.⁸ For this reason, the number of abortion-related morbidities and mortalities is grossly underestimated in national health databases.⁹

Globally, the main driver of induced abortion is unintended pregnancy.¹⁰ While modern and safe contraceptive methods exist for preventing unintended pregnancies,¹¹ there remain notable gaps in the provision and uptake of family planning services in Liberia, as only 23.9% of all reproductive-age women reported using modern contraceptives.¹² Consequently, unintended pregnancy in Liberia is among the highest in Africa, especially among adolescents and young women.¹³

In addition to being highly restrictive, induced abortion is highly stigmatized in Liberia, even when legally indicated. Both factors create diverse challenges in generating reliable data and estimates of the incidence of abortion, the conditions under which abortions take place and the burden of unsafe abortions, including the types and severity of complications.⁸ First, administrative health records on induced abortion are often inaccurate and incomplete. In addition, research has consistently shown that women responding to social surveys are likely to underreport experiences with abortion,^{14,15} and women presenting with post-abortion complications in facilities often report induced abortions as miscarriages.¹⁶ As a result of these difficulties, there is very little available evidence on abortion in Liberia. According to the 2007 Liberia Demographic and Health Survey (DHS), only 6% of women reported ever having had an induced abortion,¹⁷ yet estimates from recent global statistical models suggest this is a dramatic underestimation.¹³ A population-based study in 2015 also attempted to measure lifetime induced abortion prevalence using an indirect method, finding that 32% of women reported ever having an abortion.⁸ However, limitations to the methods used make it difficult to determine the validity of this estimate or the frequency of abortion annually.

The most recent legal reforms by the parliament of Liberia to the Public Health Law (Title 33) gained momentum in 2022, with proposed amendments including sections addressing the legality of induced abortion. This process requires sound, robust, and nationally representative data to inform and guide decision-makers in legal reforms that could reduce maternal morbidity and mortality through the availability of safe abortion services. This study provides the first nationally representative estimate of the incidence of induced abortion and unintended pregnancy in Liberia.

Materials and Methods

Study Design

The study used the Abortion Incidence Complications Method (AICM)¹⁸ to estimate the 2021 incidence of induced abortion in Liberia.¹⁹ The AICM is an indirect method of abortion measurement that has enjoyed considerable usage and acceptability across several geographies globally, including 11 countries in sub-Saharan Africa in the last decade.²⁰ Data for the study are drawn largely from two 2021 national cross-sectional surveys, namely, 1) the Health Facilities Survey (HFS), which involves health facility interviews with post-abortion care (PAC) service providers, and 2) a Knowledgeable Informant Survey (KIS), which was a survey of purposively selected key informants with extensive knowledge on abortion in their regions. The other data required for abortion incidence estimate using the AICM, such as the national population of women of reproductive age (with subnational distributions), age-specific fertility rates, and data on poverty or wealth distribution by subnational groupings and rural and urban locations, come from secondary sources, chiefly the national census or the Liberia Demographic and Health Survey.

Health Facility Survey

The data were collected from a nationally representative sample of health facilities in Liberia that are capable of providing post-abortion care services. A stratified random sampling approach was used to select facilities based on administrative region (South Central, North Western, North-Central, South Eastern A, and South Eastern B) and level of care (clinic, health center, and county hospital). In addition to public health facilities, private facilities, including private-for-profit, faith-based, and concession facilities exist across Liberia. The Liberia Ministry of Health's (MOH) Master Facility List was obtained on May 31, 2021 to identify eligible public and private facilities. The Master List had a universe of 894 facilities, comprising clinics (802), health centers (59), and hospitals (34). We selected 132 health

facilities for the HFS, which included 31 hospitals (91.2%), 41 health centers (69.4%), and 60 clinics (7.5%). One hundred and twenty-eight (97%) of the sampled facilities completed the HFS (see Table 1). Four hospitals were excluded because one was burnt down during the study, two were specialized hospitals, and one refused participation.

At each selected facility, the healthcare provider most knowledgeable about PAC was identified and interviewed. In large facilities, such as hospitals, the head of the maternal health, labor or delivery unit or an obstetrician/gynecologist who oversees PAC services was interviewed. In lower-level facilities, nurses, midwives, officers in charge, or health workers who could provide information about abortion-related care in that facility were interviewed. Each respondent was interviewed using a face-to-face structured questionnaire.

The HFS collected retrospective estimates of the number of PAC patients (inpatient and outpatient) treated at each facility in the past month and in a typical month. Caseloads for past and typical months were collected to account for abortion seasonality. If the respondent could not give the monthly estimates, retrospective estimates of the past year and typical year were requested. Other information captured in the survey included the health facilities' provision of PAC services, including PAC management approaches, provider knowledge of comprehensive abortion care (CAC, which is inclusive of safe abortion and PAC), and the provision of post-abortion family planning.

Knowledgeable Informant Survey

The knowledgeable informant survey (KIS) involved in-person structured interviews with a sample of purposively selected respondents who were knowledgeable about the provision of abortion and PAC in the country (nationally or in specific regions). Informants were not restricted to clinicians providing direct CAC services to patients. Potential key informants were identified through purposeful and snowball sampling. The individuals recruited for the KIS were in the following roles: 1) Key national MOH and County Health Team (subnational) staff involved in SRH programs; 2) Heads/informed members of non-governmental organizations implementing SRH programs; 3) Heads/informed members of SRH advocacy groups, including civil society groups; 4) Researchers on SRHR from different regions of Liberia. Selected individuals were asked to list up to two referrals they believed were knowledgeable on the provision of abortion and PAC in Liberia.

A total of 89 key informants were interviewed on topics that included their perceptions regarding the type of providers women seek abortions from, the likelihood of women experiencing complications that require treatment in a facility according to the type of abortion provider and method used, and the likelihood that women who need treatment would receive it at a health facility. These questions were asked for four major sub-groups of women within the population: rural poor, rural non-poor, urban poor, and urban non-poor. This information was used to estimate the proportion of all induced abortions in Liberia that ended in a complication that was treated in a health facility. The inverse of this proportion is called the “multiplier”. This indicator represents, for every one woman who receives postabortion care in health facilities in Liberia, the additional number of women/girls who had induced abortions who either did not have a complication or had a complication that was not treated in the formal health system.

Table 1 Liberia Health Facilities Survey Sample by Region and Facility Type

Region	Clinic	Health Center	County Hospital	Total Facilities
National total	57	43	28	128
North Central	17	11	10	38
North Western	5	3	3	11
South Central	22	18	9	49
South Eastern A	7	3	3	13
South Eastern B	6	8	3	17

Other Data Sources

Other data sources used for calculating abortion incidence were the 2019/2020 Liberia Demographic and Health Survey (LDHS),²¹ which provided information on fertility, contraceptive prevalence, unmet need for contraception, pregnancy wantedness, and measures of access to health care. We also drew from the 2021 population projection data for the number of women of reproductive age (15–49) (WRA) in the different regions of Liberia.²² The Poverty Equity Brief for Liberia 2021²³ and the Global Multidimensional Poverty Index Liberia Country Briefing 2021²⁴ were used to estimate the proportion of poor and non-poor women in urban and rural settings in Liberia.

Data Analysis

Estimating PAC Caseloads

The study followed the steps for estimating abortion incidence through the AICM approach described in Singh et al.²⁰ First, the health facility PAC caseloads were calculated using the HFS data. The annual PAC caseload in each facility was generated by averaging the number of women treated in the past month and the average month for in-patients and outpatients and adding the two estimates. To create annual estimates, each facility PAC caseload was then multiplied by 12. For facilities with low caseloads where respondents could not provide PAC estimates by past month or typical month, the past year and typical year estimates were averaged for inpatients and outpatients. The resulting facility-level estimates were weighted to generate nationally representative data, accounting for sampling proportions and non-response. After this, cases referred to other (usually higher-level) facilities were removed to avoid double-counting PAC cases.

Accounting for PAC Caseload Due to Spontaneous Abortion

The PAC caseload estimates at this point include those resulting from spontaneous and induced abortion because the AICM does not require HFS respondents to separate complications due to the two types of pregnancy loss. This practice is based on the understanding that complications from induced and spontaneous abortion have similar clinical presentations.¹⁸ As such, the next step in the analysis involves removing cases due to spontaneous abortion. The AICM accounts for PAC cases that were due to spontaneous abortion by estimating the number of second-trimester miscarriages, as they are most likely to require facility-based treatment. Previous work has suggested that the number of second-trimester miscarriages in a population is approximately 3.41% of live births.²⁵ Therefore, the number of spontaneous abortions was estimated by taking 3.41% of all live births within each region. After subtracting the number of PAC cases due to miscarriages from the regional PAC caseload estimates, these new regional estimates were weighted to generate the total number of women treated in health facilities for complications resulting from induced abortions in Liberia in 2021.

Calculating the Multiplier and Creating Abortion Incidence Estimates

The next step is the creation of a multiplier. A detailed description of the steps for calculating the multiplier is provided elsewhere by Sully et al.²⁶ In brief, data from the KIS were used to multiply the proportion of women obtaining abortions from each provider type within each abortion method by the respective probabilities of experiencing complications from each provider type-abortion method combination. Next, information on the likelihood of receiving treatment for complications was used to create an estimate for the proportion of women who have an induced abortion and receive treatment for a complication. This is done separately for four different sub-populations within Liberia (urban poor, urban nonpoor, rural poor and rural nonpoor) to account for differences in abortion and treatment-seeking behaviors by women because of these factors. These estimates were then weighted by the population distribution of the four groups in each region using population census estimates for 2021,²² and the poverty profiles for Liberia by region,^{21,27} which resulted in estimates of the proportion of all abortions that resulted in PAC treatment in a facility in each region. The multiplier for each region is the inverse of this proportion.

Applying the regional multiplier to the regional estimates of PAC cases due to induced abortion provides the total estimated number of women who obtained an induced abortion in Liberia in 2021. Using data on the population of women of reproductive age in Liberia,²² the abortion incidence (number of induced abortions per year), abortion rate (number of induced abortions per 1000 women of reproductive age [15–49]), and abortion ratio (number of induced abortions per 1000 live births) were calculated.

Unintended Pregnancy Estimation

Finally, the total number of abortions was used to estimate the number and rate of pregnancies and the unintended pregnancy rates. The prevalence of intended pregnancy was calculated as the total number of unintended pregnancies divided by the total number of all pregnancies in Liberia in 2021. To calculate the total number of unintended pregnancies, it was assumed that all induced abortions were from unintended pregnancies. Unintended pregnancies were defined to be composed of all unplanned births, which were obtained from the Liberia Demographic and Health Survey of 2019/2020,²¹ plus all induced abortions. Intended pregnancies include planned births and miscarriages. In line with previous AICM studies, miscarriages were estimated as 20% of live births and 10% of induced abortions.^{20,28}

Ethics Approval and Consent to Participate

The University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board (UL-PIRE) [now the Atlantic Center for Research and Evaluation (ACRE)] Institutional Review Board approved the study protocol (#21-07-275). The Ministries of Health and Sanitation also reviewed and approved the study. All investigators on the team completed the human subjects' protection training before engaging in the study. All respondents provided signed informed consent before participation.

Results

There were an estimated 14,223 PAC cases treated in Liberian health facilities in 2021 (Table 2). Accounting for the underlying population of women of reproductive age, the national PAC treatment rate was 11.3 per 1000 women aged 15–49. After removing second-trimester miscarriages, an estimated total of 8461 PAC cases were a result of induced abortions.

The KIS multiplier for each region ranges from 2.4 in the North Central region to 5.5 in South Central (Table 3). After adjusting each regional PAC caseload by applying the corresponding multipliers, it was estimated that a total of 38,779 induced abortions occurred in Liberia in 2021, corresponding to a national induced abortion incidence rate of 30.7 per 1000 women aged 15–49. As such, the national PAC caseloads represented approximately 22% of all induced abortions in Liberia in 2021. There were significant regional variations, with the abortion incidence rate ranging from 6.6 per 1000 in the North Central region to 49.7 per 1000 in the South-Central region.

Accounting for all live births, miscarriages, and induced abortions, an estimated total of 109,262 unintended pregnancies occurred in Liberia in 2021 (Table 4). This corresponds to a national unintended pregnancy rate of 86.5 per 1000. Close to half (44%) of all pregnancies in Liberia were unintended, with significant regional differences. The North Western region had the highest unintended pregnancy rate (118.0 per 1000), while the largest proportion of unintended pregnancies was observed in South Central (55%). Nationally, an estimated 35% (approximately) of all unintended pregnancies ended in an induced abortion in 2021.

Table 2 Post-Abortion Care Caseloads by Region

Region	Total PAC Caseloads (Referrals Removed)	PAC Treatment Rate (Caseloads per 1000)	PAC Caseloads Due to Induced Abortion	Induced PAC Treatment Rate (per 1000)
Liberia total	14,223	11.3	8461	6.7
North Central	3444	8.0	1157	2.7
North Western	1835	17.7	1254	12.1
South Central	7347	12.7	5243	9.1
South Eastern A	898	11.1	456	5.7
South Eastern B	699	9.6	351	4.8

Table 3 Induced Abortion in Liberia, 2021

Region	PAC Cases Due to Induced Abortion	Multiplier	Number of Abortions	Abortion Rate per 1000 Women 15–49
Liberia total	8461	–	38,779	30.7
North Central	1157	2.4	2819	6.6
North Western	1254	3.5	4402	42.5
South Central	5243	5.5	28,725	49.7
South Eastern A	456	3.5	1601	19.9
South Eastern B	351	3.5	1232	16.8

Table 4 Unintended Pregnancy in Liberia, 2021

Region	Number of Unintended Pregnancies	Unintended Pregnancy Rate per 1000 Women 15–49	Proportion of Pregnancies Unintended	Proportion of Unintended Pregnancies Ending in Abortion
Liberia total	109,262	86.5	44%	35%
North Central	28,308	66.0	34%	10%
North Western	12,208	118.0	48%	36%
South Central	57,658	99.8	55%	50%
South Eastern A	6312	78.3	36%	25%
South Eastern B	4776	65.3	35%	26%

Discussion

This study is the first nationally representative study designed to estimate the incidence of unintended pregnancy and induced abortion in Liberia. The findings reveal that induced abortion and unintended pregnancy are common experiences in Liberia. The study estimates of abortion incidence and unintended pregnancy rates are slightly lower than recently released model-based estimates for 2015–2019 (42 per 1000 and 106 per 1000, respectively),¹³ but similar to earlier estimates for West Africa at 31 per 1000 WRA between 2010–2014.¹⁰ However, that model relies heavily on estimates from neighboring countries when country-specific estimates are unavailable, which may have resulted in a slightly inflated estimate for Liberia. Further, the study found significant variations in the abortion rate across regions in Liberia, with North Central having the lowest abortion rate (6.6/1000) and South-Central having the highest (49.7/1000). These variations in abortion rates could be reflective of the regional differences in access to services such as contraceptive and abortion care, including post-abortion care, but also of the preponderance towards abortions to navigate shame and stigma around unintended pregnancies.¹³ However, these regional incidence rates must be cautiously interpreted because it does not necessarily mean that the people who had these induced abortions are domiciled in South Central; for example, it is possible that South Central (where the capital city is located) may see more induced abortions due to accessible, safe abortion services, whether performed formally or informally.

The findings also highlight the important limitations of existing indicators. This study's estimate of facility-based PAC caseloads (14,223 PAC cases) is markedly higher than the official number reported to the government through the District Health Information System 2 (DHIS2) for the same year (2636, including PAC cases from induced abortions and miscarriages). This finding is unsurprising because there is a consensus that official records significantly underreport abortions.¹⁴ However, what was unexpected was the similarity of the findings to the most recent DHS, which reported that 33% of births were mistimed and 8% were unwanted. This is surprising, given known biases in self-reported

abortion data.²⁹ Some reasons why DHS underestimate unintended pregnancy include its use of the timing-based measure, which produces ambivalent responses and fails to consider the partner's intention³⁰ and the nature of questions asked about pregnancy intentions and unwillingness to consider pregnancy as unwanted rather than mistimed.³¹

The unintended pregnancy rate of 86.5 per 1000 is considerably higher than the subregional average (75 per 1000).¹³ The high unintended pregnancy rates in Liberia suggest that women and girls have a high unmet need for family planning. For instance, in 2020, one-third of married women had an unmet need for family planning (21% for spacing and 13% for limiting the number of children), and this gap increases among adolescents and young people.²¹ Other studies have summarized factors influencing existing rates of unintended pregnancy and abortion, including contraceptive failure because of incorrect and inconsistent use, unprotected sexual activity, and strong motivation to have small families among women and couples.³² The role of broad ecological factors such as urbanization, educational attainment, and the changing status and roles of women in society has also been documented.³³ Further, connecting the high unintended pregnancy rate to the high abortion rate reinforces the well-established fact that legal restrictions do not necessarily reduce the occurrence of abortions, but instead drive women toward unsafe abortion methods likely to result in complications and death.³⁴

This study also indicates that most women seeking PAC services do so in public (67%) and primary-level health facilities (74%) compared to health centers and hospitals. Yet, despite these public and primary-level facilities being the dominant access points to women seeking PAC services in Liberia, they are most often the least equipped with trained staff, essential equipment, commodities, and supplies for PAC, thus impeding access to quality and comprehensive abortion-related services.³⁵ Greater investment by the Liberian government in PAC provision at lower-level public facilities would markedly improve access to safe services.

This study has some limitations. The weaknesses of the AICM have been documented in previous research.¹⁸ In sum, the method depends on facility-based estimates of PAC caseloads from a survey of providers assumed to have the best knowledge of PAC services in the selected health facilities. By selecting providers to take the interview on behalf of the facility, it was assumed that the respondents could estimate the number of PAC cases accurately. However, the PAC caseload estimated at each facility is as good as the respondent's knowledge of patient volume and memory. Because it is challenging to differentiate PAC due to induced and spontaneous abortion, the method assumes that only late-stage miscarriages require facility-based care to enable separating the two, since there is evidence of a biological relationship between late-term miscarriage and live births. Furthermore, this biological relationship was derived from a decades-old study conducted in the USA. This relationship between late-term miscarriage and live births may not be reflective of the Liberian context, resulting in an over- or under-estimation of unintended pregnancy and abortion rates. Nevertheless, the estimate from this study is the only available reliable evidence for this estimation until newer evidence is produced. Further, to account for abortions that do not result in complications or complications not treated in the facility (multiplier), the method involves selecting individuals from the community considered knowledgeable about abortion in Liberia for the KIS component. This approach creates a weakness because the information for calculating the multiplier is based on the informants' subjective opinions. Future abortion incidence studies could consider triangulating data sources with respondent-driven sampling surveys of women who have had abortions to capture real-life experiences of abortions. This study is unable to provide reasons for unintended pregnancies or abortions or why women seek abortions outside the healthcare facilities, and only presents after complications, because the approach focuses on obtaining the estimates of incidence. Notwithstanding these limitations, there are no better alternatives to these assumptions and no better methodological alternative to the AICM.

This study has several strengths. It provides the first nationwide estimates of unintended pregnancy and abortion and utilizes a well-established method, which allows a cross-national comparison of the findings. The findings provide estimates from which future studies in Liberia can make trend analysis; at the time of this study, there were no comprehensive estimates to facilitate decision-making, especially on methodological issues. The estimates of abortion incidence and rates, generated directly from health facilities, represent a significant improvement on any other data sources existing before this study, and they could not compare the findings in a trend format because of that. Finally, this study comes at the most opportune time to feed into the legal and policy processes currently underway in Liberia.

Conclusion

Based on these findings, several recommendations targeting diverse stakeholder groups are warranted. The government of Liberia and its partners must continue to invest in the provision of contraceptives and ensure access to quality FP services and effective modern methods for all women and men, particularly to implement high-impact practices in family planning. It is also necessary to undertake community education and awareness on the burdens and dangers of unsafe abortion, current legal provisions on abortion, current access points for both safe abortion and PAC, stigma reduction, and awareness of the wide range of family planning methods available in Liberia. Of paramount importance is the improvement of the health system and health facilities to ensure that they have the necessary equipment and supplies, including medications and contraceptives, and trained personnel to provide quality sexual and reproductive health services, including abortion and post-abortion care. Expanding access to quality post-abortion care, including post-abortion contraceptive counseling and method provision at all health system levels, could improve uptake and reduce unintended pregnancies. This also includes strengthening the capacity of lower-level health facilities and mid-level providers to utilize appropriate uterine evacuation technologies, including MVA, misoprostol, and mifepristone/misoprostol combi pack, availing essential equipment and supplies, and ensuring pre-service and in-service training for PAC providers.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request. Also, according to the APHRC policies (the organization hosting the datasets), all deidentified datasets will be publicly available on the APHRC microdata portal after three years (<https://aphrc.org/microdata-portal/>).

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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