Title:

Estimates of induced abortion among women in Osun state Nigeria: evidence from a modified abortion incidence complications methodology

BACKGROUND

Abortion is a significant contributor to maternal mortality in Nigeria [1]. This is partly due to the restrictive laws that make abortion broadly illegal, thus making women resort to clandestine abortion performed in settings that lack minimal medical standards [2,3]. To illuminate the extent of women's exposure to abortion and the attendant consequences in Nigeria, researchers have used different methodologies [4,5]. A commonly used method is one in which women are directly asked about their abortion experience. However, this approach is likely to provide inaccurate estimates because of deliberate misreporting attributable to social stigma and the restrictive laws around abortion. Researchers have thus developed several methodologies that use a range of data sources, assumptions, and elements from both direct and indirect approaches to improve the accuracy and completeness of abortion measures [4,6,7].

Specific indirect methods that have been widely used in several countries are Abortion Incidence Complications Methodology (AICM), Modelling, Randomized Response Technique and Anonymous Third Party Reporting, the Sealed Envelope method and Secret Ballot. Created in the early 1990s, the AICM has been widely applied and adapted to produce robust estimates of abortion incidence in many contexts. In Nigeria, AICM has been used to produce national estimates of abortion incidence [4]. However, the method has rarely been applied to obtain estimates from any of the 36 States that make up the country. Given the political and structural make-up of Nigeria, which constitutionally empowers States to make their own laws and health policies, State-specific evidence of abortion incidence is likely to provoke appropriate legal amendments that would strengthen women's access to reproductive health services, including safe abortion.

Moreover, despite the wide use of AICM, it has not been modified to adapt to the contextual realities at sub-national levels. In this study, we modified the standard AICM and used it to estimate the incidence of induced abortion in one of Nigeria's states.

METHODS

- **Setting**

The study was carried out in Osun state, and data was collected between 2021 and 2022. We chose Osun State because of recent evidence of declines in modern contraceptive use [8,9], which might have increased the rate of unintended pregnancies and the attendant consequences.

- **Estimation with AICM**

The standard AICM is built on the empirical observation that of all women who had an abortion in Osun state, some would experience complications, and some would not. Of those who experienced complications, some sought and obtained care in a health facility, and some did not for several reasons. The estimation was carried out in the five steps summarised below:

i. We carried out a health facility survey (HFS) during which we collected data on the number of women treated for abortion complications from a sample of health facilities capable of providing post-abortion care (PAC) in Osun state. To improve reporting accuracy, we collected the data for two reference periods (the previous month and a typical month) and used the average.

Modification to the standard AICM: Given the sensitive nature of abortion services, we assumed that some of the women who received PAC in health facilities in Osun would be women who were not residents of the state. Many women travel out of their residential areas to seek abortion services to reduce the likelihood of being seen by people who know them [10]. We thus included the question "*Percent of women who came from outside Osun state?*" in the data collection checklist, and the information obtained was applied to the computation of PAC caseload in each facility.

ii. We collected information on the proportion that women in 'i' above constituted among all women who had abortions in the state. The information was obtained through a survey of health professionals (HPS) and key informants who had extensive experience and knowledge about abortion services in the state.

iii. We removed complications of miscarriages from the total PAC cases in 'i'. This was done using an indirect method based on clinical studies that established the biological pattern of spontaneous abortion and the proportion of all live births and pregnancies that late miscarriages constitute [11-14]. The annual live births and total pregnancies were estimated using data from NDHS 2018 specific to Osun state.

iv. Calculation of the Multiplier: ***Multiplier*** = $\frac{1}{Y}$, where Y = weighted per cent hospitalized. The adjustment multiplier was calculated using the data obtained in 'ii' above, alongside information on the proportion of Osun state women in different socio-economic sub-groups, such as urban, rural, rich and poor, which were also obtained from the 2018 NDHS.

v. Calculation of the induced abortion incidence per year: The multiplier's value, multiplied by the total induced abortion cases (gotten in 'iii' above), gave the total number of induced abortions in Osun state. The number of abortions was converted to annual totals and averaged to provide an estimate of abortion incidence for the calendar year.

RESULTS

Results show that 12,632 women living in Osun state were treated for abortion complications in the state in 2021. The AICM multiplier of 3.71 shows that 46,865 (12,632 * 3.71) abortions were performed in the state. Using the estimated population of women aged 15-49 years in Osun in 2021 (based on the medium variant assumptions of the United Nations Population Division and Nigeria's latest census figure as baseline), we computed the abortion incidence as $\frac{46865}{1201565}$, which gives 0.039. Hence, the abortion incidence rate in Osun state is 39 per 1,000 women in 2021.

Results, as presented in Table 1, show that the abortion complication rate was much higher among rural-poor women (57.6%) than among urban non-poor (30.1%). Also, the likelihood of women with abortion complications getting facility care was at the highest level among urban non-poor (0.89) but at the lowest among rural-poor (0.46). The weighted percent hospitalized (Y) was 26.99, indicating that only about 27% of all abortions that had complications in the state were treated at health facilities. The inverse (3.71) - the multiplier estimate - indicates that for every 1 woman seen in the health facilities for PAC, about 4 were not seen.

DISCUSSION/CONCLUSION

The 39 abortions per 1,000 women reported in this study is higher than the rate reported in previous studies with similar methodology [15,16], plausibly due to an increase in abortion practice between 2014 and 2021. Moreover, while the present study took cognizance of the use of misoprostol for inducing abortion among women, previous abortion estimations in Nigeria did

not [15-17], and this might also explain the difference in the results. The rate is also higher than estimates reported in studies that used direct methods [18,19], plausibly because they are prone to underreporting, given the stigma and restrictive laws that could make women deny abortion experience.

A major takeaway from this study is that abortion is highly practised in Nigeria despite legal restrictions. About three-quarters of women who had abortions do not make it to a health facility to seek PAC because they lack access or even die before reaching a health facility. However, while it is plausible that some women not seen in a health facility for PAC might not have had any complication requiring facility care, this proportion is likely to be extremely low due to the low abortion safety index in Nigeria [20]. Furthermore, the study shows that the majority of rural and poor women had no access to PAC despite their much higher abortion complication rates. These are a pointer to how the restrictive abortion laws have widened health inequalities in Nigeria. We recommended strengthening PAC services in rural areas of Nigeria and other socio-economic characteristics that need targeting to mitigate the negative impact of restrictive abortion laws on women's health.

APPENDIX

Table 1 Calculation of the Multiplier

	*% who had complications among women who had abortions^*	*% who would get facility care among women with abortion complications+*	*% who would get facility care among women who had abortion^*	% Poor and Non Poor by residence*	Weighted Percent Hospitalized^ **(Y)**	1/Y
Urban Non-poor	30.07	88.79	26.70	26.84	7.17	
Rural Non-poor	38.85	77.48	30.10	39.57	11.91	
Urban Poor	38.91	57.15	22.24	23.16	5.15	
Rural Poor	57.58	45.87	26.41	10.44	2.76	
Total				100.0	26.99	3.71

*computed from NDHS 2018 data; ^Author's computation; +Obtained through HPS

- Abortion Estimate = Estimate from HFS x Multiplier from HPS
- Abortion Estimate = 12,632 x 3.71 = 46,865