

ORIGINAL RESEARCH ARTICLE

The use of antibiotics in induced abortion among women aged 15-49 years in selected states in Nigeria

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Abstract

Antibiotics use is one of the unsafe methods women use to induce an abortion in sub-Saharan Africa and this misuse adds to the global burden of antimicrobial resistance. The study determined the prevalence of antibiotics usage as abortifacient, and identified related outcomes. The study used data from Performance Monitoring for Action follow up survey (2020), to study respondents who used antibiotics alone or in combination with other drugs as abortifacients. Of the 1,144 women, 5.41% of them used antibiotics as abortifacient. 22.58% of those who used antibiotics as abortifacients are aged between 25-29 years, 87.10% of them reported that use of antibiotics was the most accessible means to them. 43.55% didn't experience complications, while 19.35% experienced light bleed and 9.68% incomplete abortion. Primary medical store are the most common recommenders of this method. This study showed the use of antibiotics as abortifacient and that antibiotics are part of sources respondents consider closest to them. However, it is important to enlighten these women that there are specific pills designed to induce abortion and the use of antibiotics as abortifacients should be discouraged. (*Afr J Reprod Health* 2024; 28 [3s]: 68-79).

Keywords: Unsafe abortion, antibiotics, induced abortion and antimicrobial resistance

Résumé

L'utilisation d'antibiotiques est l'une des méthodes dangereuses utilisées par les femmes pour provoquer un avortement en Afrique subsaharienne et cette mauvaise utilisation ajoute au fardeau mondial de la résistance aux antimicrobiens. L'étude a déterminé la prévalence de l'utilisation d'antibiotiques comme abortifs et a identifié les résultats associés. L'étude a utilisé les données de l'enquête de suivi Performance Monitoring for Action (2020) pour étudier les répondants qui utilisaient des antibiotiques seuls ou en association avec d'autres médicaments comme abortifs. Sur les 1 144 femmes, 5,41 % ont utilisé des antibiotiques comme abortif. 22,58% de ceux qui ont utilisé des antibiotiques comme moyens abortifs sont âgés de 25 à 29 ans, 87,10% d'entre eux ont déclaré que l'utilisation d'antibiotiques était le moyen le plus accessible pour eux. 43,55 % n'ont pas eu de complications, tandis que 19,35 % ont eu des saignements légers et 9,68 % ont eu un avortement incomplet. Les magasins médicaux primaires sont les recommandateurs les plus courants de cette méthode. Cette étude a montré l'utilisation des antibiotiques comme abortifs et que les antibiotiques font partie des sources considérées comme les plus proches d'eux. Cependant, il est important d'informer ces femmes qu'il existe des pilules spécifiques conçues pour provoquer l'avortement et que l'utilisation d'antibiotiques comme agents abortifs doit être découragée. (*Afr J Reprod Health* 2024; 28 [3s]: 68-79).

Mots-clés: Avortement à risque, antibiotiques, avortement provoqué et résistance aux antimicrobiens

Introduction

Globally, an estimated twenty-nine percent (29%) of pregnancies are resolved with induced abortion, fifty-six percent of unintended pregnancies are resolved by abortion and 73 million induced abortions occur annually¹. About two-third of abortions done in sub-Saharan Africa countries are carried out using unsafe methods². Abortion done using unsafe methods are more likely to have complications³. PMA, 2020⁴ also stated that unsafe procedures contribute to 10% of maternal deaths

which is approximately equivalent to 6,000 women of reproductive age. Some common unsafe methods people use to induce abortion in the sub-Saharan African include: Herbal mixtures, Household remedies⁵ hangers, crochet pins, tea leaves, large amount of soda, bleach, laundry detergent, unknown medications⁶ as well as antibiotics⁷.

Complications like incomplete abortion, haemorrhage, infection, uterine perforation, death has been reported to be common among women of reproductive age who uses unsafe methods to induce abortion¹. However, complications like this

are likely to end with just the individual, but the possible complication that could arise from continuous repurposing of antibiotics as abortifacients is antibiotics resistance which is already a major threat to the global health.

This study sought to investigate the use of antibiotics as an unsafe and improper method for inducing an abortion using evidence from Performance Monitoring for Action Survey carried out in 2020 in Nigeria. Antibiotics and other agents have been reported to be used both as contraceptives⁸ and as abortifacients⁷. Generally, antibiotics are meant to kill or inhibit the growth of parasitic bacteria in a host without causing any form of harm to the host. Some antibiotics have teratogenic effects which is why some women seeking abortion might consider antibiotics as abortifacients. Antibiotics like metronidazole, tetracyclines, macrolides, sulphonamides, quinolones, fluoroquinolones could induce spontaneous abortion⁹. As a result of this, manufacturers are mandated to indicate the contraindications that comes with a medicine. However, some women seeking abortion use the information to identify abortifacients.

In a study carried out in Calabar, in a focus group discussion (FGD), a group of women mentioned antibiotics as one of their possible options for contraceptives¹⁰. Also, in a qualitative study on women's experiences with unplanned pregnancy and abortion in Kenya, Jayaweera¹¹ reported that some of the participants of the survey regarded a drug as abortifacient if it has "do not use if pregnant" on it. The case of repurposing antibiotics as contraceptives and abortifacients is a contributor to the abuse and misuse of antibiotics and this is one of the factors influencing antimicrobial resistance. Most times when antibiotics are used as abortifacients or as contraceptives, a wrong dosage is used because they are used without proper prescriptions¹² hence inducing the development of resistance in microorganisms.

Amongst others¹³, misuse and overuse of antimicrobials has been reported as the main drivers in the development of resistant microorganisms¹⁴. This actually is evident in Nigeria where antimicrobials (antibiotics) are generally available over the counter and not usually sold by licensed

pharmacist or with prescription. This ridiculous use of antimicrobials coupled with several other factors result in the development of resistant organism hence fueling the increase in the spread of antimicrobial resistant pathogens.

Chukwu *et al.*¹⁵, mentioned that the general public has a great influence on the spread of antibiotics resistance by using it only by prescription, and being responsible towards antibiotics. The emergence of community associated resistant strain indicates that the general public are also culpable for the spread of antimicrobial resistance strains. Although use of antibiotics as abortifacients has not been specifically linked to this phenomenon (Antibiotics resistance), misuse of antibiotics has been reported to be significantly associated with antibiotics resistance¹⁴.

Literature has reported wide range of unsafe methods used to procure abortion⁵⁻⁷, but little to nothing has been done to focus on the use of antibiotics as abortifacients. This is a misuse and abuse of drug, it is very important that the public is made aware of the dangers attached to this. While trying to solve a problem, there is need to be careful not to aggravate an already existing problem yet to be solved. Unsafe abortion in its self is a major public health problem in sub-Saharan African countries, coupled with the growing burden of antimicrobial resistance in this region and the world at large^{14,16,17}, it becomes necessary to take actions on how both can be resolved without creating more problems. This study aimed to determine the prevalence of the use of antibiotics as abortifacients, identify the characteristics of the women who used it. To also identify the outcomes of the abortion induced by using antibiotics and the providers of this method. This will provide information on the use of antibiotics in inducing abortion, provide evidence necessary to inform public sensitization and awareness and as a result, curb the misuse and abuse of antibiotics.

Methods

Study design

This descriptive study used data from a previous quantitative survey conducted by Performance

Monitoring for Action (PMA), Nigeria in 2020¹⁸ tagged Nigeria Round 5 Female follow-up survey. The survey was a follow up survey on the household and female survey conducted in 2018 tagged Nigeria Round 5 (NGR5), respondents in NGR5 who reported an abortion and consented to being re-contacted were surveyed in the NGR5 follow-up survey. NGR5 female follow-up survey covered additional details about the woman's previously reported abortion, it collected information on the method(s) they used in procuring abortion, the sources of those methods, symptoms, complications and their experience of the process.

The NGR5 (2018) survey was conducted in seven states in Nigeria including Anambra, Kaduna, Kano, Lagos, Nassarawa, Rivers, and Taraba but the female follow up (NGR5-FU) study survey excluded Kano because only a few abortions was reported there.

For the NGR5-FU, 1,353 women aged between 15-49 years who reported an abortion were followed up. PMA2020 Nigeria Round 5 follow-up survey female questionnaire was administered to the 1,158 women who consented. The questionnaire was administered by female data collectors using Computer Assisted Personal Interviews (CAPI). The respondents described their abortion event using two different terms "pregnancy removal" (i.e. doing something to remove a pregnancy when they were pregnant or worried they were pregnant) or "period regulation" (i.e., doing something to bring back a late period when they were worried, they were pregnant)".

Of the 1,353 women who were followed up, 1,158 respondents gave their consent to be interviewed however only 1,144 women completed the survey. This study is thus based on the responses gotten from the 1,144 women aged between 15-49 years (respondents) who completed the survey. The data collection was conducted between November 2019 and February 2020.

Although the PMA 2020 dataset addressed a wide range of questions, this study focused on respondents who reported that they used antibiotics (either as a single agent for the process or used it in combination with other pills for the process) to either end a pregnancy or to bring their period back.

Analysis

This study used Stata-MP v.17.0x64 to conduct descriptive statistics to analyze data on respondents who used antibiotics only and those who used it in combination with other drugs to remove a pregnancy or bring back their period. This was gotten by using the "keep if" command to retain all responses that used antibiotics either as a single agent or in combination with other pills to either end a pregnancy or bring back their period.

The study analyzed the sociodemographic characteristics of these women, the providers of the drugs they used, the complications they experienced based on the combination of drugs. The study also analyzed the level of certainty of abortion based on the combination of drugs used and whether or not they took a pregnancy test to confirm if abortion is complete and the respondent's awareness of other methods of inducing an abortion.

Results

In this study population, 306 (26.75) of them used pills to induce pregnancy removal or regulate their period. Of the 306 who used pills, 34 (11.11%) used antibiotics alone, 28 (9.15%) used antibiotics in combination with other drugs, 78 (25.49%) used emergency contraceptives only, 84 (27.45%) used contraceptives only, 16 (5.23%) used contraceptives, emergency contraceptives and other methods combined, 29 (9.48%) used antimalarial, 18 (5.88%) used other pills, and 19 (6.21%) either do not know what they used, did not respond to the question or chose not applicable.

Altogether 62 of the respondents (i.e. 5.41% of the 1,144 who completed the survey, and 20.26% of those who used pills) used antibiotics as a single agent or in combination with other pills to either remove a pregnancy or regulate a period.

Characteristics of women who used antibiotics to remove pregnancy or bring back their period

Table 1 describes the sociodemographic characteristics of the respondents who used

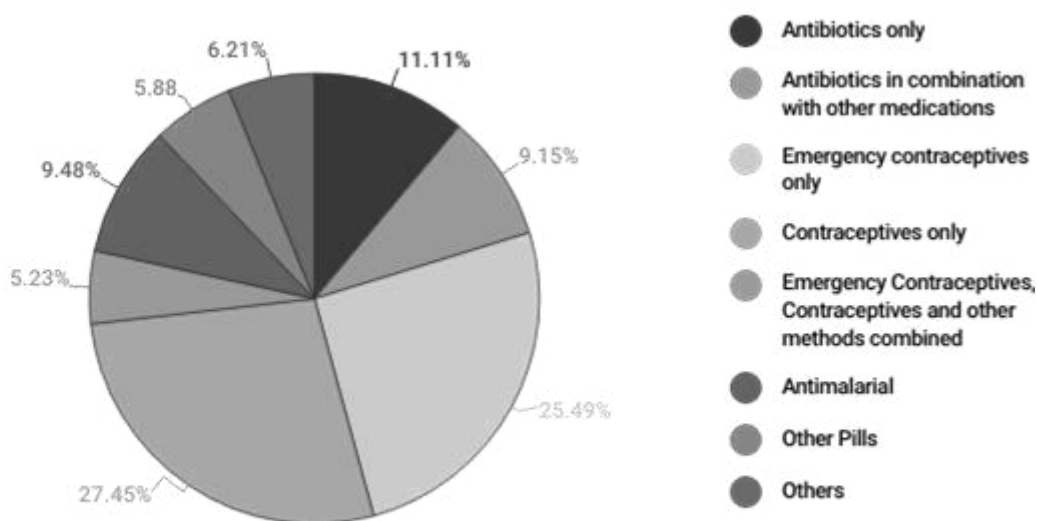


Figure 1: Distribution of those who used pills for pregnancy removal and period regulation

Table 1: Characteristics of women who used antibiotics as pregnancy removal or period regulation

| | Pregnancy Removal | Period regulation | Total |
|--------------------------------------|-------------------|-------------------|------------|
| Sociodemographics | 25 (40.32) | 37 (59.68) | 62 |
| Age | | | |
| 15-20 | 3 (12.00) | 2 (5.41) | 5 (8.06) |
| 20-29 | 8 (32.00) | 16 (43.24) | 24 (38.71) |
| 30-39 | 7 (28.00) | 13 (35.14) | 20 (32.26) |
| 40-49 | 7 (28.00) | 6 (16.22) | 13 (20.97) |
| Total | 25 | 37 | 62 |
| Married | | | |
| Yes | 18 (72.00) | 23 (62.16) | 41 (66.13) |
| No | 7 (28.00) | 14 (37.84) | 21 (33.87) |
| Total | 25 | 37 | 62 |
| Attending school | | | |
| Yes | 5 (20.00) | 13 (35.14) | 18 (29.03) |
| No | 20 (80.00) | 24 (64.86) | 44 (70.97) |
| Total | 25 | 37 | 62 |
| Level of education | | | |
| Not in school | 20 | 24 | 44 (70.97) |
| Lesser than Higher education | 5 | 9 | 14 (22.58) |
| Higher | - | 4 | 4 (6.45) |
| Total | 25 | 37 | 62 |
| Had children at the time of abortion | | | |
| Yes | 17 (68.00) | 21 (56.76) | 38 (61.29) |
| No | 8 (32.00) | 16 (43.24) | 24 (38.71) |
| Total | 25 | 37 | 62 |

Table 2: Details about pregnancy removal and period regulation

| Details of Abortion methods | Pregnancy Removal | Period Regulation | Total (%) |
|---|-------------------|-------------------|------------|
| Specific type of pills taken | | | |
| Antibiotics | 15 (60.00) | 19 (51.35) | 34 (54.84) |
| Antibiotics and antimalarial | 4 (16.00) | 9 (24.32) | 13 (20.97) |
| Antibiotics and Emergency contraceptives | 1 (4.00) | - | 1 (1.61) |
| Antibiotics, antimalarial and emergency contraceptives | 1 (4.00) | - | 1 (1.61) |
| Antibiotics, antimalarial and contraceptives | - | 5 (13.51) | 5 (8.06) |
| Antibiotics, antimalarial and contraceptives | 3 (12.00) | 1 (2.70) | 4 (6.45) |
| Antibiotics and contraceptives | 1 (4.00) | - | 1 (1.61) |
| Antibiotics, antimalarial, emergency contraceptives and contraceptives. | - | 2 (5.41) | 2 (3.23) |
| Antibiotics, contraceptives and emergency contraceptives | - | 1 (2.70) | 1 (1.61) |
| Antibiotics, contraceptives and emergency contraceptives | 25 | 37 | 62 |
| Antibiotics and other | | | |
| Total | | | |
| Abortion methods aware at the time of event | | | |
| Not Applicable | 3 (12.00) | 6 (16.22) | 9 (14.52) |
| Mifepristone+Misoprostol | 1 (4.00) | 2 (5.41) | 3 (4.84) |
| Misoprostol | 1 (4.00) | 1 (2.70) | 2 (3.23) |
| Misoprostol | 2 (8.00) | 2 (5.41) | 4 (6.45) |
| Misoprostol, Misoprostol+Mifepristone | 5 (20.00) | 11 (29.73) | 16 (25.81) |
| Surgery | 2 (8.00) | - | 2 (3.23) |
| Surgery, Mifepristone+Misoprostol | 5 (20.00) | 2 (5.41) | 7 (11.29) |
| Surgery, Misoprostol | 6 (24.00) | 13 (35.14) | 19 (30.65) |
| Surgery, Misoprostol, Mifepristone+Misoprostol | 25 | 37 | 62 |
| Total | | | |
| Spoke to people about decision (to terminate pregnancy or regulate period) | | | |
| Yes | 20 (80.00) | 27 (72.97) | 47 (75.81) |
| No | 5 (20.00) | 10 (27.03) | 15 (24.19) |
| Total | 25 | 37 | 62 |
| Was the source of this method the nearest to you? | | | |
| Yes | 24 (96.00) | 30 (81.08) | 54 (87.10) |
| No | 1 (4.00) | 7 (18.92) | 8 (12.90) |
| Total | 25 | 37 | 62 |
| Would you have preferred to use another method? | | | |
| No | 19 (76.00) | 28 (75.68) | 47 (75.81) |
| Yes | 5 (20.00) | 9 (24.32) | 14 (22.58) |
| Do not know | 1 (4.00) | - | 1 (1.61) |
| Total | 25 | 37 | 100 |

antibiotics to remove pregnancy or bring back their period, including their age, marital status, level of education, those who had children at the time of abortion. As seen in the table 1, 25 (40.32%) respondents used it to remove pregnancy, and 37 (59.68%) used it as a way to bring back their period. Most (38.71%) of those who used antibiotics for

pregnancy removal and period regulation are within 20-29 years and the least group are respondents who are lesser than 20years. Most (66.13%) of them are married women are not attending school at the time of the survey (70.97%). 61.29% of them had children at the time of the event.

Table 3: Level of certainty of those who used antibiotics or antibiotics plus other pill for abortion

| Specific types of pills taken to remove pregnancy/regulate period | Very certain | Somewhat Certain | Not at all | Total |
|---|--------------|------------------|------------|-------------|
| | N (%) | N (%) | N (%) | N (%) |
| Antibiotics | 16 (47.05) | 6 (17.64) | 12 (35.29) | 34 (100.00) |
| Antibiotics and antimalarial | 2 (15.38) | 6 (46.15) | 5 (38.46) | 13 (100.00) |
| Antibiotics and contraceptives and Emergency Contraceptive | 5 (71.43) | 2 (28.57) | - | 7 (100.00) |
| Antibiotics, antimalarial, Emergency Contraceptive, contraceptive and other | 6 (75.00) | 1 (12.5) | 1 (12.5) | 8 (100.00) |
| Total | 29 | 15 | 18 | 62 |

Table 4: Took a pregnancy test to confirm pregnancy removal or period regulation

| Specific type of pills taken | No (%) | Yes (%) | Total (N) (%) |
|---|---------------------|---------------------|----------------------|
| Antibiotics | 20 58.82 | 14 41.18 | 34 100.00 |
| Antibiotics and antimalarial | 9 69.23 | 4 30.77 | 13 100.00 |
| Antibiotics and Emergency contraceptives | 1 100.00 | - | 1 100.00 |
| Antibiotics, antimalarial and emergency contraceptives | - | 1 100.00 | 1 100.00 |
| Antibiotics, antimalarial and contraceptives | 1 20.00 | 4 80.00 | 5 100.00 |
| Antibiotics and contraceptives | 1 25.00 | 3 75.00 | 4 100.00 |
| Antibiotics, antimalarial, emergency contraceptives and contraceptives. | - | 1 100.00 | 1 100.00 |
| Antibiotics, contraceptives and emergency contraceptives | 1 50.00 | 1 50.00 | 2 100.00 |
| Antibiotics and other | 1 100.00 | - | 1 100.00 |
| Total | 34 54.84 | 28 45.16 | 62 100.00 |

Table 5: Cross tabulation of level of certainty and whether or not the respondent took a pregnancy test

| Level of Certainty | Took pregnancy test to confirm pregnancy | | | Took pregnancy test to confirm pregnancy | | |
|--------------------|--|---------------------|----------------------|--|---------------------|----------------------|
| | Pregnancy Removal | | Total (N) (%) | Period Regulation | | Total (N) (%) |
| No (N) (%) | Yes (N) (%) | No (N) (%) | | Yes (N) (%) | | |
| Very Certain | 4 23.53 | 13 76.47 | 17 100.00 | 2 16.67 | 10 83.33 | 12 100.00 |
| Somewhat Certain | 5 100 | 0 0.00 | 5 100.00 | 8 88.89 | 1 11.11 | 9 100.00 |
| Not at all Certain | 3 100.00 | 0 0.00 | 3 100.00 | 12 75.00 | 4 25.00 | 16 100.00 |
| Total | 12 48.00 | 13 52.00 | 25 100.00 | 22 59.46 | 15 40.54 | 37 100.00 |

Table 6: Complications experienced

| Types of Complications experienced | Removed pregnancy | Regulated period | Total |
|---|-------------------|------------------|------------|
| No complication | 8 (32.00) | 19 (51.35) | 27 (43.55) |
| Fever | 2 (8.00) | 1 (2.70) | 3 (4.84) |
| Fever, Long pain | 1 (4.00) | 1 (2.70) | 2 (3.23) |
| Fever Severe pain | | 1 (2.70) | 1 (1.61) |
| Fever, Long Pain, Severe Pain and discharge | 1 (4.00) | - | 1 (1.61) |
| Heavy bleeding | 1 (4.00) | - | 1 (1.61) |
| Heavy bleeding, long bleeding, fever, severe pain | 1 (4.00) | 1 (2.70) | 2 (3.23) |
| Incomplete | 3 (12.00) | 3 (8.11) | 6 (9.68) |
| Incomplete, heavy bleed, long bleed, fever | - | 1 (2.70) | 1 (1.61) |
| Incomplete, long bleed, Fever | 1 (4.00) | - | 1 (1.61) |
| Incomplete, severe Pain | 1 (4.00) | - | 1 (1.61) |
| Light bleed | 5 (20.00) | 7 (18.92) | 12 (19.35) |
| Light bleed, fever, long pain, discharge | - | 1 (2.70) | 1 (1.61) |
| Long bleed, fever, long pain | - | 1 (2.70) | 1 (1.61) |
| Light bleed, severe Pain | 1 (4.00) | - | 1 (1.61) |
| Long pain, severe pain | - | 1 (2.70) | 1 (1.61) |
| Total | 25 | 37 | 62 |

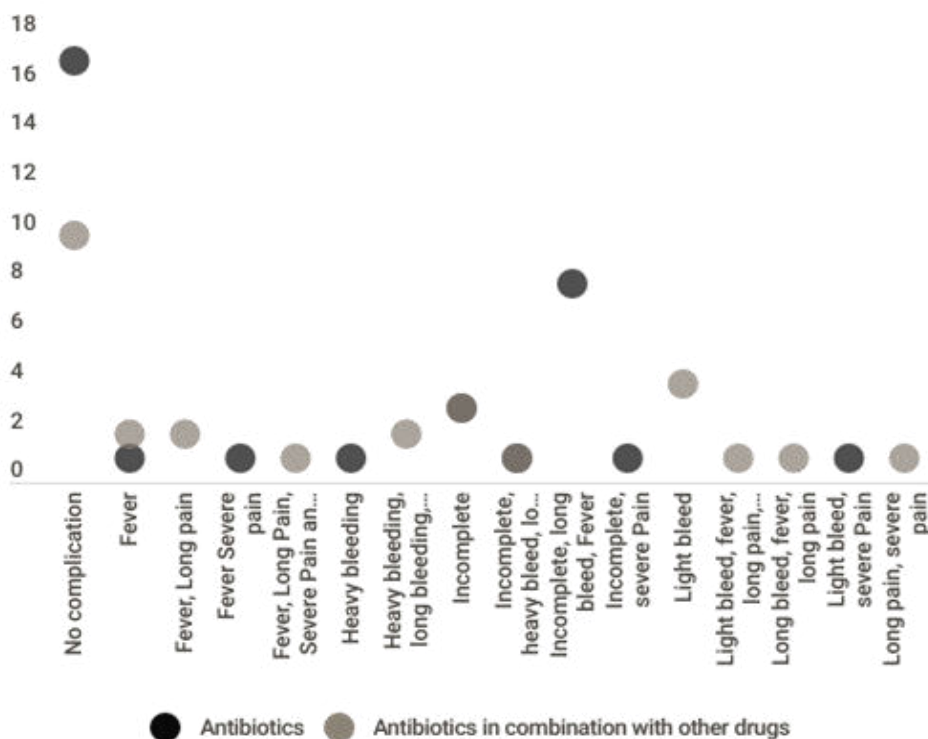


Figure 2: Complications by types of pills taken

Table 7: Sources who recommended antibiotics to remove pregnancy and regulate period

| Source that recommended antibiotics as birth control | Pregnancy removal | Regulate period | Total |
|--|-------------------|-----------------|------------|
| No response | - | 1 (2.70) | 1 (1.61) |
| Government Hospital | 2 (8.00) | 2 (5.41) | 4 (6.45) |
| Government Health | - | 2 (5.41) | 2 (3.23) |
| Private hospital/c | 3 (12.00) | 3 (8.11) | 6 (9.68) |
| Pharmacy | 6 (24.00) | 8 (21.62) | 14 (22.58) |
| Chemist/PMS Store | 11 (44.00) | 18 (48.65) | 29 (46.77) |
| Private doctor or Nurse | 3 (12.00) | - | 3 (4.84) |
| Mobile clinic (private) | - | 1 (2.70) | 1 (1.61) |
| Market/Hawking | - | 2 (5.41) | 2 (3.23) |
| Total | 25 | 37 | 62 |

Details about pregnancy removal and period regulation

Table 2 consist of details of methods used by respondent to carry out abortion, and the methods they are aware of. More than half of them (54.84%) used antibiotics as a single agent to remove pregnancy and regulate their period. Most of them are aware of surgery, Misoprostol, Mifepristone-Misoprostol as a way of inducing an abortion. Most of them spoke to people before making the decision and 87.10% of them reported that this method (Antibiotics only and Antibiotics combined with other drugs) was the nearest to them.

The respondent conveyed their level of certainty through three tiers to indicate their confidence regarding the effectiveness of antibiotics to either remove the pregnancy/regulated the period. The use of antibiotics only or in combination with other pills was checked with the level of certainty that respondents have after using this method was analyzed using cross tabulation. Table 3 shows that of those who used antibiotics alone as means to remove pregnancy/regulate their period were very certain that the pregnancy had been removed.

Table 4 shows whether or not respondents took a pregnancy test to confirm the success of the method and this was cross tabulated with the specific type of pills taken. This also indicates some of the behaviors of people who use this method to remove a pregnancy. As represented in the table, the 54.84% of people who used antibiotics for abortion did not take the test to confirm if pregnancy was completely removed or not.

Table 5 shows the cross tabulation of respondent's level of certainty of the getting their desired result from antibiotics usage and whether or not they took pregnancy test to confirm the result. As shown in the table most of between taking a pregnancy test and how certain these respondents are about completion of the process. The table showed that 76.47% and 83.33% of those who removed a pregnancy and regulated their period respectively took a pregnancy test to confirm removal of pregnancy and were very certain about the success of the procedure.

The sequence of complications the respondents experienced were also reported and it is represented in Table 6. Majority of the respondents didn't experience complications as shown in the table (43.55%) however, some other complications were also encountered, light bleed is the most encountered complication (19.35%) followed by Incomplete abortion (9.68%).

Definitions: Incomplete: The process was not complete, **Light bleed:** Little or no bleeding, **Heavy bleed:** Heavy bleeding to the point of feeling dizzy, **Long bleed:** Bleeding for more than 3 weeks, **Fever:** Fever for more than 1 day, **Long pain:** Pain in your belly that did not go away after 3 days, **Discharge:** Discharge from vagina that smelled bad.

The prevalence of complications experienced based of the pills they taken were also studies (Antibiotics only and Antibiotics combined with other medications). 62.96% of those who did not have complications used antibiotics only, also incomplete abortion mostly occurred with people

who used antibiotics alone and this could probably be because they constituted majority of the population. The rest of the result is shown in Figure 2. The providers of these medications were also reported, and this is shown in Table 7, chemist/Primary medical store are the most common providers accounting for 46.77% of providers.

Discussion

The study focused on investigating the use of antibiotics as abortifacients and sought to elucidate the impact of this misuse on antimicrobial resistance. The study identified the prevalence of the use of antibiotics as abortifacient amongst women of reproductive age and the characteristics of these women. The outcome of using antibiotics as abortifacients was also identified and the providers of this method were highlighted.

Women seeking abortion have been reported to engage a wide range of methods ranging from safe methods to unsafe methods². Two-third of the abortions done in sub-Saharan African countries are done using unsafe method², and the use of antibiotics as abortifacients⁶ and contraceptive¹⁰ has also been highlighted but not studied as a means of aggravating the burden of antimicrobial resistance in the region. This study found that one out of twenty women within the age of 15-49 years who had an abortion, used antibiotics as abortifacients. Although this prevalence seems little, it can't be ignored.

In a study done on antimicrobial stewardship in Ibadan¹⁹, it was reported that 17.1% of their respondents thought that antibiotics can be used to prevent pregnancy after having unprotected sex. This further validates the results of this current study, because people who believed antibiotics would work as contraceptives would most likely consider it as an option if the need arises. This misconception has to be dealt with in order to curtail the continuous abuse and misuse of antibiotics and by extension reduce the burden of antimicrobial resistance in Nigeria.

Going through the data gotten from this study, using antibiotics for this purpose appears to be with little complications, however this is bad news for antibiotics stewardship. Antibiotics should

not be used to induce an abortion or prevent pregnancy, the teratogenic effects are side effects and should not be capitalized on to repurpose it as abortifacients. Some of the respondents mentioned that they chose to use antibiotics because it was convenient and it was not too expensive. The ease of accessibility is one of the driving forces for antibiotics misuse and abuse¹⁹. Antibiotics drugs are readily available over the counter without prescription in chemist shops and it is readily sold to anyone.

The trends of the women that practice this method varies in this study but it is most prevalent among women aged 20-29 seeking abortion. It can be implied that women of this age are more likely to end a pregnancy probably because they are nursing a baby, high parity, their career, or economic reasons amongst others as reported also by Lamina²⁰. Two-third of the population that used antibiotics to end a pregnancy or regulate their period are married women and most of the population were not in school at the time of event and two-third of the women had children at the time of abortion. This indicates that these women probably used this method for child spacing not because of their education.

In this study, more than half of those who used antibiotics for abortion used it as a single agent. Muanda *et al*⁹, has shown that some range of antibiotics has increased risk of causing spontaneous abortion in early pregnancy. Some of the antibiotics mentioned in the study like tetracyclines, metronidazole, quinolones and sulfonamides are readily sold over the counter in Nigeria pharmacies and Chemist shop without prescription. This makes the antibiotics easily accessible to the women, so they would rather get those ones than stress over accessing the ones indicated for abortion. Although this study did not highlight the specific antibiotics type used by these women, the work of Muanda *et al*¹⁰, gives us an insight into that. These drugs are usually used to treat infections such as urinary tract infection, lower respiratory tract infections, some of them are used as surgical prophylaxis²¹, hence they should not be mishandled.

As shown in this study, the women are also aware of other methods like surgery, misoprostol and mifepristone as pills that are used to induce

abortion, however antibiotics seem more accessible to them judging from the responses on “is this method the nearest to you”. So, there is need to ensure that accessibility to antibiotics is regulated and efforts should be made to increase accessibility to medicines indicated contraception and abortion. These set of women were further asked if they would consider using other methods to procure abortion and three quarters of them said no. This just indicate how strongly they trust this method. This is an indication for more awareness to re-orientate the public about the functions and proper usage of antibiotics as well as the dangers of re-purposing antibiotics. Also, an awareness of recommended drugs for abortion and contraception would go a long way in enlightening these set of women.

This study also examined the behaviours of this set of women towards the use of antibiotics for abortion, and their level of certainty of the effectiveness of this antibiotics as abortifacients, it is quite surprising that majority of those who used antibiotics alone were very certain about the completion of the abortion, and more than half of those who used antibiotics in combination with antimalarial and other contraceptives to bring back their periods were very certain of the process. Whether or not the women took pregnancy test to confirm the completion of the process is also an indication in how confident they were of the method and also reflects their likelihood of using the method again.

The complication experienced by the women were also studied and light bleeding is the most encountered complication followed by incomplete abortion and fever others can be found in table 6. Almost half of the women did not experience any complication indicating that antibiotics seemed to produce the desired result for this group of women. However, this does not negate the fact that this is a misuse of drug and if these women are not reoriented and aware of antibiotics stewardship, they would probably consider using this method again and even recommend it to others thereby increasing misuse and improper use of antibiotics which could influence the burden of AMR in their community.

This study also considered the providers of the antibiotics to the women in this study. Chemist

shop/ patent medicine stores are the most common providers accounting for more than one third of all the sources. Grouping these sources into clinical and non-clinical sources. The clinical sources (government hospitals, government health centers, private hospital and clinic, private doctor/nurse, and mobile clinic account for one quarter of providers while non-clinical sources (pharmacy, chemist/PMS store, and market/hawking) account for almost three quarter of the sources. This is most likely due to ease of access to these vendors and considering that they are the first point of care for a lot of people in Nigeria²² there is need to involve them in the antibiotics stewardship programs to sensitize the citizens. As also reported in a study on antibiotics stewardship, access to antibiotics is influenced by the nearness to pharmacies¹⁹. Also, because most of these non-clinical sources are likely to require little or no detail about the purpose to which a drug is purchased, people are likely to consult them. This further emphasizes the need to sensitize and reorientate providers from these sources about the proper drugs for different conditions. Also, it is important to enforce the regulations binding these vendors and prohibit the sales of antibiotics without prescription. Although health workers (Clinical staff) are not the leading providers of this medications for abortion, it is still disheartening that they are involved despite knowing the dangers of misuse of antibiotics, measures have to be taken to ensure that this is curtailed by only prescribing and dispensing antibiotics when they are needed and according to current guidelines given by the WHO²² and advising their patients on the proper use of antibiotics.

Conclusions

Only 5% of the women in this study population used antibiotics alone or in combination with other drugs to induce pregnancy removal with few cases of complications. However, it doesn't negate the fact that it is a misuse and abuse of drug which should be discouraged, it is also an unsafe and improper method for procuring an abortion. From the study lots of people are culpable for providing this option to women of reproductive age seeking abortion, however chemist and PMS are the most

culpable. Unsafe Abortion and Antimicrobial resistance remain a serious public health problem especially in sub-Saharan African countries, and everyone is responsible for managing the situation by using medications indicated for each purpose, participating in antibiotics stewardship programs and avoiding abuse and misuse of drugs.

Limitation

This study investigated the use of antibiotics to induce abortion, but the specific antibiotics being used for this purpose were not indicated. If the antibiotics were known, it would have given a better understanding of the specific antibiotics that are at risk. The study also did not reveal the quantity of such antibiotics that this group of women use, this would have provided an insight to the level of risk such women are exposed to.

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Ethics approval

Not applicable.

Conflict of interest

The authors declared no conflict of interest.

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