Journal of Fundamental and Applied Sciences

ISSN 1112-9867

Available online at http://www.jfas.info

Research Article

CONTRACEPTIVE USAGE AMONG UNDERGRADUATE FEMALE STUDENTS: A SURVEY SAMPLING APPROACH

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Received: 20 December 2019 / Accepted: 28 July 2020 / Published online: 01 September 2020

ABSTRACT

In this paper, a survey sampling on contraceptive usage among the female undergraduates of Federal University of Technology, Akure using the randomized response technique proposed by Warner [1] was extensively carried out. The data for the study was obtained from the administration of well-structured survey questionnaires on respondents from three different schools in the University. Consequently, the estimated Warner's proportions of female undergraduate students who used contraceptives and their resulting variances were evaluated at varying sample sizes and predetermined probabilities *P* respectively. The results as presented in the summary table 10 revealed that contraceptive usage was at maximum level for School of Agriculture and Agricultural Technology as sample sizes varied.

Keywords: Randomized response technique, contraceptives, estimated Warner's proportion, sensitive attribute

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doi: http://dx.doi.org/10.4314/jfas.v12i3.7

1. INTRODUCTION

Globally, female students are unduly susceptible to the danger of unwanted pregnancy due to unsuitable use of contraceptives [2,3]. This may lead to psychological challenges, unwanted

pregnancy which may eventually affect students' ability to attain academic success, inability to sustain profitable job and making one-sided marital decisions [3]. Young students' sexual activities are of serious general health concern. These activities especially pre-marital sexual activities seem to be on the high side among higher educational institution students in countries in Asia and Africa as a result of factors such as rapid urbanization and exposure to mass media [4].

The Nigerian National Demographic Health Survey [5] revealed that 16% of young women and 6% of young men between ages 15 and 24 years started having sexual intimacy before age 15. Nearly half of young women and more than a quarter of young men between ages 18 and 24 years had first sexual intimacy before the age of 18.

Despite dangerous sexual behaviours among adolescents, sufficient health education is lacking and contraceptive uses remain comparatively low in both their first and last sexual encounters. To further buttress this, there has been high prevalence of sexually transmitted infections, dependence on risky abortion and many other abortion-related complications.

The lack of knowledge on efficient contraceptive use among tertiary education female students leads to the abuse of contraceptives. This undoubtedly amounts to high unwanted pregnancy rates. Studies estimated that it leads to some millions of annual pregnancies on the globe [6,7].

In recent researches conducted globally among university students, different factors were observed to be responsible for the inappropriate use of contraceptives. These factors include age, culture, religion, ethnicity, poor access to contraceptive services, lack of awareness, peer pressure etc. [8,9]. In another related research embarked upon among university students in United States of America estimated that regular contraceptive use can prevent about 12 million unwanted pregnancies every year [10].

Contraceptive use reduces the pregnancy rate, the number of accidental pregnancies and associated induced abortions therefore causing depletion in maternal mortality. Studies have estimated that 30% to 40% of maternal deaths [8,11-13]) and 90% of induced abortion related maternal deaths [14] could be controlled if all women who desired to use contraceptives had access to them. In addition, contraception makes significant contributions to ameliorating levels of infant, neonatal and under-five mortality [15].

In addition, Hussain and Shabbir [16] put forward a randomized response survey technique to gather data on sensitive attribute such as an induced abortion which is based on the random use of one of the two randomization devices R_1 and R_2. In design, the two randomization devices R_1 and

R_2 are similar to Warner [1] device but with different probabilities of selection of the sensitive question. The idea behind this survey technique is to reduce the suspicion among the respondents by providing them chance to randomly choose the randomization device itself. Adebola and Adepetun [17] proposed a new tripartite randomized response survey technique to estimate the proportion of respondents with sensitive attribute by modifying Hussain and Shabbir [16] dichotomous randomized response survey technique. Ewemooje *et al.* [18] in their study examined the prevalence of two related sensitive characters induced abortion and multiple sexual partners among women of Akure, Ondo State Nigeria using the improved randomized response technique. Ewemooje *et al.* [19] also developed a new stratified technique to address the problem involving estimation of the population proportion of people with sensitive attributes. The proposed technique was applied to a survey on drug use disorder. Acheampong *et al.* [20] presented a detailed description of student data on family life that was gathered at the North-West University, South Africa between 2015 and 2016. Responses were obtained from 835 students in the three campuses of the university with the adoption of multi-stage sampling. Adepetun [21] applied randomized response technique to carry out empirical survey on yeast infection among some female undergraduates living on campus at the Federal University of Technology Akure, Nigeria using well-structured survey questionnaire. Ajayi *et al*. [22] in their study made use of an interviewer-administered questionnaire to gather data from 809 participants chosen using a three-stage cluster random sampling procedure. They also carried out 46 in-depth interviews in order to investigate the relationship between the socio-demographic variables and use of contraceptives using the binary logistic regression models. They concluded that the rate of contraceptive use was on the high side in the study. However, several women adopted less effective traditional contraceptive methods over more effective modern contraceptive methods due to fear of side effects of the latter. This paper therefore aims at determining the estimated Warner's proportions of sexually active female students who are conversant with contraceptive use and their resulting variances at the Federal University of Technology, Akure, Ondo State, Nigeria as a case study using the Randomized Response Technique proposed by Warner [1] thereby leading to the results which can enhance the students' knowledge regarding contraceptive usage and prevention of unwanted pregnancies.

2. MATERIAL AND METHOD

In this study, Warner's Randomized Response Technique is adopted to determine the proportion of Nigerian University female students who make use of contraceptives and their resulting variances in the School of Sciences (SOS), School of Agriculture and Agricultural Technology (SAAT) and the School of Management Technology (SMAT) of the Federal University of Technology, Akure using real life data obtained from administered survey questionnaires on some sexually active female students from the three different Schools in the University. Consequently, comparison of the schools in terms of contraceptive usage was carried out using their estimated Warner's proportions at varying sample sizes. Since this paper adopted Warner's Randomized Response Technique, it is pertinent to define the following as used in the work:

$n =$ the number of sampled respondents

$x =$ the number of respondents who answered 'yes' to the sensitive attribute in the sample size,

$P =$ the predetermined probability of 'yes' response, $0 \leq P \leq 1$.

$\hat{\theta} = \frac{x}{n}$ = the estimated proportion of 'yes' response in a sample size n.

$\hat{\pi}_W = \frac{\hat{\theta}-(1-P)}{2P-1}$ estimated Warner's proportion of 'yes' response

$V(\hat{\pi}_W) = \frac{\pi(1-\pi)}{n} + \frac{P(1-P)}{n(2P-1)^2}$ is the resulting variance of $\hat{\pi}_W$ such that $P \neq 0.5$

In order to enhance privacy of respondents, there is need to choose the predetermined probability P very close to one in line with Warner's Randomized Response Technique. Also, the privacy of the respondents was further enhanced with respect to the sensitive attribute "contraceptive usage" by designing the administered questionnaire in such a way that the identities of the respondents were fully preserved. They were just required to provide an answer "Yes" or "No" to the sensitive attribute in the study.

To determine the appropriate sample size n for this study, the formula according to Cochran [23] which is stated as follows is used:

$n = \frac{N}{1+N(e)^2}$ where n is the sample size and N is the population size and e is the level of precision.

In this case, $N = 1500$, $e = 0.05$.

Therefore, $n = \frac{N}{1+N(e)^2} = \frac{1500}{1+1500(0.05)^2} \approx 316.$

Out of these 316 administered survey questionnaires, only 300 were returned for the three different schools in the University. Consequently, the sample size was later partitioned into small, medium and large sample sizes for each school in order to draw appropriate statistical conclusion.

3. RESULTS AND DISCUSSION

In this section, the results using Warner's Randomized Response Technique in the methodology above as well as discussion of the results at varying sample sizes n and predetermined probability P are presented in the following tables respectively.

Table 1: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 20$, $x = 4$ for School of Sciences

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.20	0.1250	0.0125
0.91	0.20	0.1341	0.0119
0.92	0.20	0.1429	0.0113
0.93	0.20	0.1512	0.0108
0.94	0.20	0.1591	0.0103
0.95	0.20	0.1667	0.0099
0.96	0.20	0.1739	0.0095
0.97	0.20	0.1809	0.0091
0.98	0.20	0.1875	0.0087
0.99	0.20	0.1939	0.0083

Table 2: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 50$, $x = 8$ for School of Sciences

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.16	0.0750	0.0042
0.91	0.16	0.0854	0.0040
0.92	0.16	0.0952	0.0038
0.93	0.16	0.1047	0.0036
0.94	0.16	0.1136	0.0035
0.95	0.16	0.1222	0.0033
0.96	0.16	0.1304	0.0032
0.97	0.16	0.1383	0.0030
0.98	0.16	0.1458	0.0029
0.99	0.16	0.1531	0.0028

Table 3: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 100$, $x = 20$ for School of Sciences

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.20	0.1250	0.0125
0.91	0.20	0.1341	0.0119
0.92	0.20	0.1429	0.0113
0.93	0.20	0.1512	0.0108
0.94	0.20	0.1591	0.0103
0.95	0.20	0.1667	0.0099
0.96	0.20	0.1739	0.0095
0.97	0.20	0.1809	0.0091
0.98	0.20	0.1875	0.0087
0.99	0.20	0.1939	0.0083

Table 4: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 20$, $x = 5$ for School of Agriculture and Agricultural Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.25	0.1875	0.0146
0.91	0.25	0.1951	0.0139
0.92	0.25	0.2024	0.0133
0.93	0.25	0.2093	0.0127
0.94	0.25	0.2159	0.0121
0.95	0.25	0.2222	0.0116
0.96	0.25	0.2283	0.0111
0.97	0.25	0.2340	0.0106
0.98	0.25	0.2396	0.0102
0.99	0.25	0.2449	0.0098

Table 5: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 50$, $x = 13$ for School of Agriculture and Agricultural Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.26	0.2000	0.0060
0.91	0.26	0.2073	0.0057
0.92	0.26	0.2143	0.0055
0.93	0.26	0.2209	0.0052
0.94	0.26	0.2273	0.0050
0.95	0.26	0.2333	0.0048
0.96	0.26	0.2391	0.0045
0.97	0.26	0.2447	0.0044
0.98	0.26	0.2500	0.0042
0.99	0.26	0.2551	0.0040

Table 6: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 100$, $x = 32$ for School of Agriculture and Agricultural Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.32	0.2750	0.0034
0.91	0.32	0.2805	0.0032
0.92	0.32	0.2857	0.0031
0.93	0.32	0.2907	0.0029
0.94	0.32	0.2955	0.0028
0.95	0.32	0.3000	0.0027
0.96	0.32	0.3043	0.0026
0.97	0.32	0.3085	0.0025
0.98	0.32	0.3125	0.0024
0.99	0.32	0.3163	0.0023

Table 7: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 20$, $x = 4$ for School of Management Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.20	0.1250	0.0125
0.91	0.20	0.1341	0.0119
0.92	0.20	0.1429	0.0113
0.93	0.20	0.1512	0.0108
0.94	0.20	0.1591	0.0103
0.95	0.20	0.1667	0.0099
0.96	0.20	0.1739	0.0095
0.97	0.20	0.1809	0.0091
0.98	0.20	0.1875	0.0087
0.99	0.20	0.1939	0.0083

Table 8: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 50$, $x = 11$ for School of Management Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.22	0.1500	0.0054
0.91	0.22	0.1585	0.0051
0.92	0.22	0.1667	0.0049
0.93	0.22	0.1744	0.0046
0.94	0.22	0.1818	0.0044
0.95	0.22	0.1889	0.0042
0.96	0.22	0.1957	0.0041
0.97	0.22	0.2021	0.0039
0.98	0.22	0.2083	0.0037
0.99	0.22	0.2143	0.0036

Table 9: Comparison of estimated Warner's Proportion ($\hat{\pi}_W$) and Variance ($\hat{\pi}_W$) at $n = 100$, $x = 23$ for School of Management Technology

P	$\hat{\theta}$	$\hat{\pi}_W$	$V(\hat{\pi}_W)$
0.90	0.23	0.1625	0.0028
0.91	0.23	0.1707	0.0026
0.92	0.23	0.1786	0.0025
0.93	0.23	0.1860	0.0024
0.94	0.23	0.1932	0.0023
0.95	0.23	0.2000	0.0022
0.96	0.23	0.2065	0.0021
0.97	0.23	0.2128	0.0020
0.98	0.23	0.2188	0.0019
0.99	0.23	0.2245	0.0018

Discussion of results: Based on the results from tables 1 to 9, the following summary table of findings of the survey on contraceptive usage among the female undergraduate students of Federal University of Technology, Akure, Ondo State, Nigeria is presented below:

Table 10: Summary of findings of the survey on contraceptive usage at varying sample sizes n

n	Schools	$\hat{\pi}_W$ interval	$V(\hat{\pi}_W)$ interval
20	SOS	$0.1250 \leq \hat{\pi}_W \leq 0.1939$	$0.0083 \leq V(\hat{\pi}_W) \leq 0.0125$
50	SOS	$0.0750 \leq \hat{\pi}_W \leq 0.1531$	$0.0028 \leq V(\hat{\pi}_W) \leq 0.0042$
100	SOS	$0.1250 \leq \hat{\pi}_W \leq 0.1939$	$0.0083 \leq V(\hat{\pi}_W) \leq 0.0125$
20	SAAT	$0.1875 \leq \hat{\pi}_W \leq 0.2449$	$0.0098 \leq V(\hat{\pi}_W) \leq 0.0146$
50	SAAT	$0.2000 \leq \hat{\pi}_W \leq 0.2551$	$0.0040 \leq V(\hat{\pi}_W) \leq 0.0060$
100	SAAT	$0.2750 \leq \hat{\pi}_W \leq 0.3163$	$0.0023 \leq V(\hat{\pi}_W) \leq 0.0034$
20	SMAT	$0.1250 \leq \hat{\pi}_W \leq 0.1939$	$0.0083 \leq V(\hat{\pi}_W) \leq 0.0125$
50	SMAT	$0.1500 \leq \hat{\pi}_W \leq 0.2143$	$0.0036 \leq V(\hat{\pi}_W) \leq 0.0054$
100	SMAT	$0.1625 \leq \hat{\pi}_W \leq 0.2245$	$0.0018 \leq V(\hat{\pi}_W) \leq 0.0028$

It can be deduced from table 10 above that as sample size varies, contraceptive usage among the female undergraduate students varies significantly from one school to another in the University. However, at sample size $n = 100$ for School of Agriculture and Agricultural Technology, contraceptive usage is at maximum level between estimated Warner's proportion interval $0.2750 \leq \hat{\pi}_W \leq 0.3163$ and variance interval $0.0023 \leq V(\hat{\pi}_W) \leq 0.0034$ respectively.

4. CONCLUSION

This study extensively involved survey sampling of the proportion of female undergraduate students who make use of contraceptives in The Federal University of Technology, Akure, using Warner's Randomized Response Technique. The summary results in table 10 clearly revealed that among the three different schools under study, contraceptive usage was at maximum level for School of Agriculture and Agricultural Technology since it has the highest estimated Warner's proportion interval $0.2750 \leq \hat{\pi}_W \leq 0.3163$ in this survey study.

5. ACKNOWLEDGEMENT

The author would like to appreciate the anonymous referees for their laudable comments and suggestions which significantly improved the paper.

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How to cite this article:
Adepetun A O. Contraceptive usage among undergraduate female students: a survey sampling approach. J. Fundam. Appl. Sci., 2020, *12(3), 1101-1113.*