



Hygiene Practices amongst Patronizers of Fairly Used Female Underwear: A Study in a Nigerian Tertiary Institution

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Fairly used clothing items, due to antecedents and widespread use pose a major health risks to the public.

Aim: This study aimed to survey the hygiene level practices amongst users of fairly used female undergarments in a tertiary institution in Port Harcourt.

Study Design and Methods: A completely randomized design was used for this study amongst undergraduate females resident in the institution, within the various campus female hostels, in which a structured questionnaire was administered to respondents with a calculated sample size of 316.

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Methodology: Eighty (80) respondents amongst four (4) female hostels (Hostels B, C, D and NDDC) were selected using simple random sampling which gave a total of Three hundred and twenty (320) respondents.

Results: The findings showed that only a significant proportion (27.5%) of the total respondents are users of fairly used clothing. Regarding laundering, 95% were seen to be thorough in washing before usage, although a greater proportion (97%) employed the technique of hand wash. For further sterilization and inspection practices, 27% and 94% respectively engage in these processes. The economic factor seemed to be the major driver for use of these undergarments as 64 % of users attested to having made purchase influenced by it. The major source of purchase of these undergarments were seen to be thrift stores (80%). Regarding users perception on health risk associated with usage, 84% of users agree to the possibility of infection with usage, but 68% believe that effective laundering can greatly reduce the risk while 20% reported experiences of health challenge associated with usage. Users educate themselves through different sources; medical professionals (44%), online sources (30%), friends and family (26%).

Conclusion and Recommendation: The study highlights the need for tailored educational campaigns and awareness programs on potential health risks with emphasis on the importance of proper sanitization methods, such as machine washing and the use of disinfectants, to empower users in making informed choices and adopting safer hygiene practices. Following observed results however, the use of fairly used underwear is highly discouraged.

Keywords: Fairly used clothing; female underwear; hygiene practices; students.

1. INTRODUCTION

1.1 Background of the Study

Fairly used clothes in Nigeria are known as “Okrika” and are clothing materials like shirts, trousers, towels, socks, panties, pillow cases, curtains and bed sheets imported from United States of America, United Kingdom, Asia, Germany and Netherlands after being used for a while by the initial buyer [1].

Fairly used clothing items, due to antecedents and widespread use pose a major health risks to the public. The recognition of this fact prompted the Rwanda Bureau Standard to ban second hand undergarment in Rwanda, certain disease that may be transmitted via contact such as candidiasis, hepatitis A, B and C as well as skin infection such as scabies, ringworm could be transmitted through these popular clothing items [2].

Bloomfield *et al.*, [3], showed that clothes have the capacity to retain bacteria, fungi and viruses for varied lengths of time. It is quite obvious that fairly used clothing have an inherent ability to retain and transmit microorganisms from the first to the final user. And treating them with detergents and antiseptic has been shown to be an effective means of disinfecting them, the effectiveness of the disinfection process is however dependent in a few variables [3]. In a study by Dixon, [4], clothes were found to be

infected with chemicals and biotic factors. Used clothes have been shown to support the transmission of pathogens from one individual to another, through body fluids like sweat, fabric types such as wool, nylon, and cotton, act as thread to carry pathogens far away from the original contact position with human skin, mainly when moisture is present from sweat, saliva, secretions from open pimples, wounds and spilled drinks.

Bacteria flora, also known as the microbiota, refers to the community of microorganisms that reside in or on the human body. These microorganisms, primarily bacteria, play a crucial role in maintaining our overall health. They can be found in various parts of the body, such as the skin, mouth, gut, and reproductive organs. The bacteria flora helps with digestion, nutrient absorption, immune system regulation, and protection against harmful pathogens.

The bacteria flora associated with the vagina is known as the vaginal microbiota. It consists of a diverse community of microorganisms, primarily bacteria, that naturally reside in the vagina. The predominant bacteria in a healthy vaginal microbiota are *Lactobacillus species*, which help maintain the acidic pH of the vagina and provide protection against harmful pathogens. However, the composition of the vaginal microbiota can vary among individuals and may be influenced by factors such as hormonal changes, sexual activity, hygiene practices, and the use of certain medications.

In an assessment conducted by Briones *et al.*, [5] to determine the prevalence of bacterial and fungal pathogens on different types of second-hand clothing, *Staphylococcus epidermidis* was the only bacterium isolated. The isolates, however, only occurred in some of the sampled bras, briefs and perianal regions of long pants. Also, Awe & Abuh, [6], isolated seven different bacterial species including *Staphylococcus aureus*, *E. coli*, *Klebsiella sp.*, *Pseudomonas aeruginosa* and *Proteus vulgaris* from second-hand garments purchased from International market Lokoja, Kogi State Nigeria. This study aimed to assess the hygiene practices amongst users of fairly used female underwear in a tertiary institution in Port Harcourt.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out in the various female hostels within a tertiary institution in Port Harcourt, the capital city of Rivers State, Nigeria. It has a coordinate 4.8062° N, 6.9864° E. The various female Hostels such as B, C, D, and NDDC have coordinates of 4.79293° N, 6.98307° E; 4.77130°N, 6.96682°E; 4.79198°N,6.98253°E and 4.79375° N, 6.98091° E respectively.

2.2 Study Design

A completely randomized design (lottery system) was used for this study amongst undergraduate female residents in the institution, within the various female hostels. Eighty (80) respondents amongst four (4) female hostels (Hostels B, C, D and NDDC) was selected using simple random sampling which gave a total of Three hundred and twenty (320) respondents.

2.2.1 Inclusion and Exclusion Criteria

Students who use fairly used underwear and were willing to participate in the study, were included. Those who either do not use fairly used underwear or were not willing to participate in the study, were excluded.

2.3 Sample Size Determination

Sample size was determined using the formula;

$$n = Z^2 p (1-p)/d^2 [7], \text{ and a confidence level of } 95 \%$$

Where, n= sample size

Z = Z statistic for level of confidence

P = expected prevalence or proportion

d = precision

The prevalence of bacteria isolates in the study “Microbiological Assessment of female second-hand undergarments sold in Abraka” is 29 % [8]

Therefore, $P = 29$

$d = 0.05$

$z = 1.96$ (for the level of confidence of 95 %, which is conventional, z value is 1.96).

Thus, $1.96^2 \times 0.29(1-0.29)/0.05^2 = 316$

2.4 Questionnaire

For all study participants, a structured and pretested interview schedule was administered to obtain data on different parameters. The questionnaire was administered after a reconnaissance visit to the hostels. See sample below.

2.5 Statistical Analysis

Statistical analysis was carried out using Statistical Package for Social sciences (SPSS, version 22.0, IBM). Categorical variables was presented such as frequency and percentages. Additional analytical tools like bar chart was used to present findings.

3. RESULTS

3.1 Socio Demographic Data

The participants in this study were female undergraduate students from a tertiary institution in Port Harcourt. 57% of the students fall within the age of 16 to 19 years while 43% of them are above 20 years. For academic level, 51% fall within 100 to 200 level, while 49% are within 300 to 500 level. These are presented in Figs. 1 and 2 respectively.

3.2 Usage Information

The result of this study which surveyed a total of 320 respondents, where 27.5% (88) were observed to be users of fairly used undergarments, while 72.5% (232) which are the non-users of fairly used undergarments is presented in Table 1. While Table 2 shows the frequency of purchase of the undergarments by users, where 52% of users are seen to rarely make purchase, 42% occasionally making purchase and 6% frequently making purchase.

3.3 Laundering Practices of Users

The result regarding the laundering practices of users showed that a large proportion of users

(95%) of fairly used female undergarments always engage in thorough washing after purchase while 3% engage in thorough washing sometimes, 1% say they never attempt to wash thoroughly after purchase, this is presented in Table 3.

Table 5 shows the proportion of users who further clean these undergarments before use, of which a very small proportion (27%) of users use proper technique such as ironing, while 73% do not use ironing technique before use.

Table 4 shows the method of laundering and proportion of users who launder by hands and machine as it is seen that a larger proportion (97%) launder by hand and only 3% launder with machine.

Table 6 shows the inspection practices of users after purchase and it is seen that a larger percentage (94%), follow through this process while 6% do not follow through.

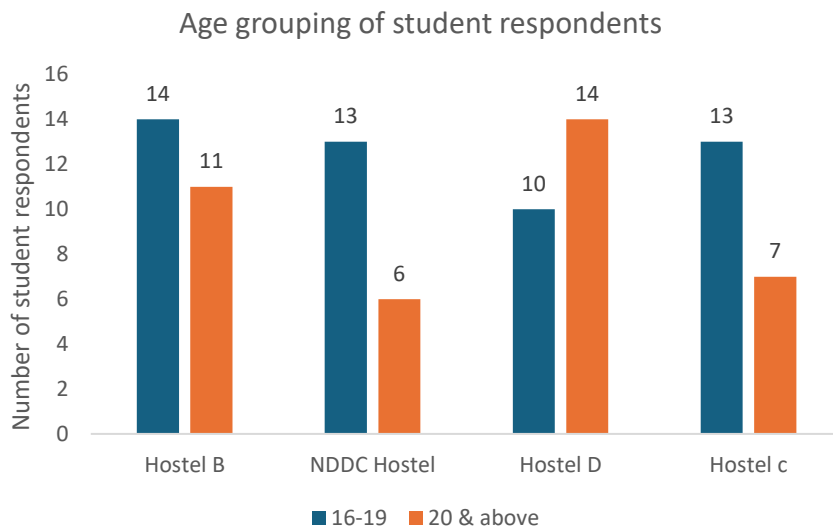


Fig. 1. Bar Chart Showing Age Distribution

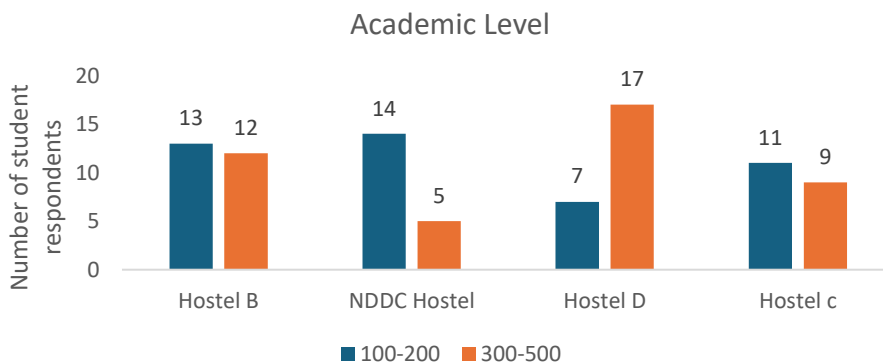


Fig. 2. Bar Chart Showing Academic Level of the Participants

Table 1. Usage Information of Participants

Usage	Frequency	Percentage (%)
Yes	88	27.5
No	232	72.5
Total	320	100

Table 2. Distribution of Respondents on Frequency of Purchase

How often do you buy or acquire fairly used female underwear?	Frequency	Percentage (%)
Rarely	46	52
Occasionally	37	42
Frequently	5	6
Total	88	100

Table 3. Distribution on Frequency of Laundry of Undergarments

Do you thoroughly wash or clean fairly used female undergarments before using them?	Frequency	Percentage (%)
Always	84	95
Sometimes	3	3
Rarely	0	0
Never	1	1
Total	88	100

Table 4. Distribution of Laundry Methods of the Undergarments

How do you launder or disinfect the undergarments before use?	Frequency	Percentage (%)
Machine wash	3	3
Hand wash	85	97
Others	0	0
Total	88	100

Table 5. Distribution of Sterilizing Methods of the Undergarments

Do you iron fairly used female undergarment before using it?	Frequency	Percentage (%)
Yes	24	27
No	64	73
Total	88	100

Table 6. Distribution of Frequency of Inspection of Undergarments before Usage

Do you inspect the undergarments for any signs of wear or damage before using them	Frequency	Percentage (%)
Yes	83	94
No	5	6
Total	88	100

3.4 Economic Factors Associated with Fairly Used Undergarments

Results showed that a significant proportion of users (61%) of fairly used clothing make a choice of patronage due to economic reasons, this is seen in Table 7. Table 8 gives a broader view as to why users make a choice of obtaining fairly used undergarments which could be due to sustainability (25%), lack of access to new garments (11%) or other reasons (0%) and economic factors is seen to be the major driving factor for reason of purchase (64%). Table 9

shows the distribution of sources of purchase of the undergarments which included thrift stores (70%), online market (8%) or friends and family (12%) and users are seen to have patronize thrift stores more often.

3.5 Users Perception and Awareness Regarding Health Risk

Regarding users perception to possible risk of health related to fairly used undergarment, a larger proportion (84%) of users agree to the possibility of acquiring a health challenge due to

usage while 16% did not agree to the possibility of a health challenge, this is presented in Table 10. Table 11 shows users perception on the effect of laundering in reducing health risk, and 68% of users hold an opinion that washing of the undergarments before usage can greatly reduce health risk. While 10% were against this, 22% were in doubt as they were uncertain. Table 12 shows the proportion of users of fairly used undergarments who have experienced health

issues related to the use of these undergarment and only 20% of users reported having an experience of health challenge relating to usage the other 80% indicated having no experience of health challenge. Table 13 shows the different sources in which users educate themselves regarding underwear usage; medical professionals (44%), online sources (30%), friends and family (26%)

Table 7. Economic factors

Have you ever felt that your financial situation influences your choice to buy or use fairly used underwear?	Frequency	Percentage (%)
Yes	54	61
No	22	25
Not sure	12	14
Total	88	100

Table 8. Reasons for use of fairly used undergarments

What are your primary reasons for using fairly used undergarments?	Frequency	Percentage (%)
Economic reasons	56	64
Sustainability	22	25
Lack of access to new garments	10	11
Others	0	0
Total	88	100

Table 9. Sources of purchase of fairly used undergarments

Where do you usually obtain fairly used female undergarments?	Frequency	Percentage (%)
Thrift stores	70	80
Online marketplaces	7	8
Friends or family	11	12
Others	0	0
Total	88	100

Table 10. Awareness on the health risk associated with usage

Do you agree that using fairly used female undergarment can pose a health risk?	Frequency	Percentage (%)
Yes	74	84
No	14	16
Total	88	100

Table 11. Users perception on the effect of laundry

Do you think washing fairly used underwear thoroughly before wearing them reduces the health risks?	Frequency	Percentage (%)
Yes	60	68
No	9	10
Not sure	19	22
Total	88	100

Table 12. Experiences of health related issues associated with the undergarments

Have you ever experienced any hygiene-related issues associated with using fairly used undergarments?	Frequency	Percentage (%)
Yes	18	20
No	70	80
Total	88	100

Table 13. Educational sources

How do you educate yourself about hygiene and health concerns related to underwear usage?	Frequency	Percentage (%)
Medical professionals	39	44
Online sources/social media	26	30
Friends and family	23	26
Total	88	100

4. DISCUSSION

The trading and use of fairly used clothing, including female undergarments, have gained popularity in many regions due to economic reasons and fashion trends. While these garments offer affordability and variety, there is a potential health risk associated with the use of fairly used female undergarments. Understanding the hygiene implications of used items is crucial, as it not only addresses public health concerns but also empowers users to make informed choices regarding their personal health and safety.

The Study which surveyed a total of Three hundred and Twenty (320) respondents across the various female hostels in Rivers State University showed that a significant proportion (27.5%) of the female undergraduate students surveyed were users of fairly used undergarments. This highlights a significant prevalence of this practice within the target population. The prevalence of usage, found in this study is consistent with the findings of a study by Mwangi, [9], which suggested that the demand for second hand apparel and accessories, including undergarments, remains significant despite the increasing availability of new products. This reinforces the notion that economic and accessibility factors continue to drive the popularity of second-hand clothing, particularly among economically disadvantaged populations. The economic factor emerged as a significant driver for the use of fairly used undergarments, with the majority of the respondents (61%) indicating that their financial situation influenced their choice. This aligns with

the existing literature by Eunsuk, [10], which suggests that the affordability and accessibility of second-hand clothing, including undergarments, are primary reasons for their popularity, particularly among economically disadvantaged populations.

Regarding cleaning and sanitization practices, the majority of the users (95%) reported that they always thoroughly wash or clean the undergarments before use. However, the methods employed were primarily hand washing (97%), with only a small fraction using machine washing (3%). While hand washing can be effective in reducing microbial load, the efficacy is heavily dependent on the thoroughness of the process and the use of appropriate disinfectants. The lack of widespread use of machine washing and sterilization techniques may leave room for improvement in ensuring effective decontamination of the undergarments which is in line with the report by Rutala, & Weber, [11], which details the effect of various laundering techniques such as combined effect of different detergents, impact of temperature and dilution and drying in the reduction of microbial load on clothing.

Regarding awareness and perception, the majority of the users (84%) acknowledged the potential health risks associated with the use of fairly used undergarments. However, this understanding does not always translate into consistent adoption of effective hygiene practices, as seen in the limited use of sterilization methods. However, these findings differ somewhat from more recent study. A study by Eunsuk, [10], found that while consumers are

increasingly aware of the environmental and social implications of second hand clothing usage, the hygiene and health concerns are often overlooked. This contrasts with the findings of the current study, where the majority of the respondents acknowledged the potential risks, but the level of awareness and the adoption of effective hygiene practices were not entirely consistent. The variance in these findings may be attributed to the contextual and cultural differences, as well as the specific target population within the university setting. The users level of education and exposure to health-related information may have influenced their awareness and perceptions, highlighting the need for tailored educational interventions that address the unique circumstances of the target group.

This study also explored the experiences of the users, with 20% reporting having encountered hygiene-related issues associated with the use of fairly used undergarments. These findings are consistent with previous research in several aspects. For instance, A study by Dixit *et al.*, [12] found that commonly sampled areas of clothing, such as the sleeve cuffs, pockets, and collar region, contained high bacterial loads, highlighting the potential for pathogen transmission through textiles. Similarly, a study by Sanders *et al.*, [13], provided evidence of bacteria transferring from the wearers' skin to clothing items.

5. CONCLUSION

This study showed that a significant proportion of the female undergraduate students surveyed were users of these fairly used underwear. While the majority of the users reported thoroughly washing or cleaning the undergarments before use, the primary method employed was hand washing, with only a small fraction utilizing more effective machine washing and sterilization techniques. Economic factor emerged as a significant driver for the use of fairly used undergarments, with the majority of the respondents indicating that their financial situation influenced their choice. This aligns with existing literature, which suggests that the affordability and accessibility of second-hand clothing are primary reasons for their popularity, particularly among economically disadvantaged populations.

Regarding awareness and perception, the majority of the users acknowledged the potential health risks associated with the use of fairly used

undergarments. However, this understanding did not always translate into consistent adoption of effective hygiene practices. Furthermore, a sizable proportion of the respondents did not believe that thorough washing could reduce the health risks, suggesting a need for more comprehensive education and awareness campaigns.

The study also found that a notable percentage of the users had experienced hygiene-related issues associated with the use of fairly used undergarments, highlighting the real-world implications of the potential health risks. This reinforces the importance of addressing the public health concerns surrounding the use of these second-hand underwear.

6. RECOMMENDATIONS

Based on the findings and conclusions of this study, it is recommended that enhanced educational campaigns and awareness efforts are crucial to address the lacuna in knowledge and practice observed among the users of fairly used female undergarments. Developing and implementing comprehensive informational programs that highlight the potential health risks and emphasize the importance of proper sanitization methods, such as machine washing and the use of disinfectants, can enhance users ability to make more informed choices and adopt safer hygiene practices.

Strengthening the regulatory framework governing the importation, sale, and distribution of second-hand undergarments is also crucial. Advocating for the implementation of stricter guidelines and enforcing mandatory sanitization protocols can help ensure the safety of these items before they reach the end users. Quality control measures and credible systems can also contribute to enhancing the overall hygiene standards of the second-hand clothing market.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that no generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text to image generators have been used during the writing or editing of this manuscript.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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QUESTIONNAIRE

Sample Questionnaire

This questionnaire consists of five sections (Sections 1, 2, 3, 4 and 5). Kindly answer all the questions by ticking in the appropriate box or filling in the spaces provided below.

SECTION 1: DEMOGRAPHIC INFORMATION

1. Name (optional):
2. Age:
3. Academic Level:
4. Hostel:

SECTION 2: PATRONAGE

5. Do you use fairly used female undergarments?
Yes No
6. If yes, how often do you buy or acquire fairly used female underwear?
Rarely Occasionally Frequently

SECTION 3: HYGIENE PRACTICES

7. Do you thoroughly wash or clean fairly used female undergarments before using them?
Always Sometimes Rarely Never
8. How do you launder or disinfect the undergarments before use?
Machine wash Hand wash Other (please specify):
9. Do you iron fairly used female undergarment before using it?
Yes No
10. Do you inspect the undergarments for any signs of wear or damage before using them?
Yes No
11. Do you agree that using fairly used female undergarment can pose a health risk?
Yes No
12. Do you think washing fairly used underwear thoroughly before wearing them reduces the health risks? Yes No Not sure
13. Have you ever experienced any hygiene-related issues (e.g., infections, irritation) associated with using fairly used undergarments?
Yes No.
14. If yes, please describe your experience briefly:

SECTION 4: SOCIOECONOMIC FACTORS

15. Where do you usually obtain fairly used female undergarments?
Thrift stores Online marketplaces Friends or family
Other (please specify):

16. Have you ever felt that your financial situation influences your choice to buy or use fairly used underwear? Yes [] No [] Not sure []
17. What are your primary reasons for using fairly used undergarments?
Economic reasons [] Sustainability/Environmental concerns [] Lack of access to new undergarments [] Other (please specify):

SECTION 5: KNOWLEDGE AND INFORMATION

18. How do you educate yourself about hygiene and health concerns related to underwear usage?
Medical professionals [] Online sources/ social media [] Friends and family []

SECTION 4: ADDITIONAL COMMENTS

19. What are your suggestions for improving hygiene level amongst users of fairly used female undergarment in this institution?

Thank you for your time. Your responses will help us to better understand the hygiene practices of users of fairly used female undergarment in this institution. This information will be used to develop interventions to improve hygiene levels and reduce the risk of health problems associated with the use of fairly used female undergarment.

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