Original Research Article

# Comprehensive Investigation of Water Quality and Its Significant Impact on Women's Health in Third-World Countries

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## ABSTRACT

The lack of good quality water in many third-world countries is a critical issue that demands urgent attention, among other environmental issues. Although the dangerous effects of poor water quality on the health of children are well known and extensively studied, there is relatively less research focusing on water quality's impact on women's health and living conditions. Women in third-world countries are potentially more vulnerable to exposure to toxins and adverse environmental conditions that affect their health differently from men due to diet, behavior, and living conditions. These exposures to toxins might lead to various health problems, including Urinary Tract Infections (UTIs), dysmenorrhea, Irritable Bowel Syndrome (IBS), parasites, and eczema.

This paper investigates the current state of water quality in third-world countries through a comprehensive literature review of previous studies, with different lifestyle factors contributing to women's health. These factors include age, housing, childbirth, health conditions, and access to medical care. Additionally, survey data from local women in third-world countries to provide practical insights into their living conditions. The survey findings suggest that over half of the women rate their overall health as fair and face significant challenges in obtaining medical care.



**Keywords**: Environmental Impact, Third World Countries, Water Quality, Women's Health




## 1. INTRODUCTION

Clean water is one of the basic elements for survival and existence in any growing area globally [1, 2]. It's a fundamental prerequisite for drinking, hygiene, sanitation, cultivation, and daily life in every aspect [3, 4]. Without clean water, communities face challenges that hinder progress and well-being [5]. In developing countries, about 85% of illnesses are linked to poor water and sanitation conditions [6]. 1 out of every 5 deaths under the age of 5 worldwide is due to a water-related disease [7]. Clean and safe water is essential to healthy living. Tiny worms and bacteria live in water naturally [8].

In many third-world countries, potable water is collected from communal sources, either unimproved or improved; these include unprotected wells, unprotected springs, rivers, boreholes, and public standpipes [9]. Microbial contamination of drinking water during and after collection from the water source has been recognized as a problem for households, resulting in poor health conditions and poorer water quality in storage [10, 11]. According to the WHO/UNICEF report, 30% of people around the world lack access to safe, readily drinkable water at home, and 60% lack safely managed sanitation [12]. Public health usually mentions the roles of basic hygiene and water quality that cause pathogen transmission without mentioning the gender roles that affect the overall risk of various health issues [13, 14].

Women are disproportionately affected by financial situations and living conditions compared to men [15]. This disparity is particularly pronounced in third-world countries, where virtually entire life challenges are more severe than developed nations. Numerous factors contribute to the higher vulnerability of women in these regions [16. 17]. For instance, women generally have less access to education and healthcare services, and they frequently encounter significant social and economic inequalities [18, 19]. These issues are compounded by systemic barriers limiting their economic independence and personal development opportunities [20].

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Consequently, women in third-world countries face complex challenges that significantly impact their overall well-being and quality of life [21].

This paper investigated typical water quality in third-world countries and highlighted infectious and noninfectious diseases to which women are particularly vulnerable because of their social roles and living situations. Furthermore, it explores the practical lifestyle patterns of women in third-world countries.

## 2. METHODOLOGY & DATA COLLECTION

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Why that location is selected- reason for it?

### 2.1 Data Collected Location

This data was collected from a rural area in Chimaltenango, Guatemala. Chimaltenango is a city, in southwestern Guatemala. It lies 48 km from Guatemala City, in the central highlands at an elevation of 1,790 meters above sea level. Built in 1526 at south of an old Mayan fortress, the city is popular as a market region and transportation center for its adjacent town villages. The inhabitants produce grains, sugarcane, and livestock. Chimaltenango is located on the Inter-American Highway. Its population is approximately 63,000.

### 2.2. Questionnaire Preparations

The water quality literature review methodology employed an initial search strategy using key terms such as 'water quality,' 'third-world countries,' and 'water management.' The literature search was extended to include studies investigating the water storage method in countries to ensure a comprehensive understanding and analysis of the water situation in third-world countries. This dual focus allowed a more systemic examination of the relationship between water quality and women's health.

A pre-made questionnaire was used to assess women's living conditions. The questionnaire contained seven different questions about women's general lifestyle, and thirty women participated in it. The survey questions were translated into Spanish for a better understanding of the participants. The thirty women were from various villages and medical volunteer sites in Guatemala to assess their medical or health issues. Asking for a survey at a medical volunteer site allowed us to simultaneously assess living conditions and their effect on women's health.

**2.3 Questionnaires**

Each question is given in the list below.

1. What is your age?" (¿Cuál es tu edad?)

2. "Who do you live with?" (¿Con quién vives?)

3. "At what age did you give birth to your first child?" (¿A qué edad diste a luz a tu primer hijo?).

4. "How would you rate your overall health?" (¿Cómo calificarías tu salud general?).

5. "Do you face challenges accessing healthcare?" (¿Enfrentas desafíos para acceder a la atención médica?).

6. "Do you face challenges accessing healthcare?" (¿Enfrentas desafíos para acceder a la atención médica?).

7. "When was the last time you saw a doctor, and what was the reason for your visit?" (¿Cuándo fue la última vez que viste a un médico y cuál fue el motivo de tu visita?).

8. "Have you ever experienced discrimination based on your gender?" (¿Alguna vez has experimentado discriminación basada en tu género?).

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### 2.4 Methods of Filling the ~~Questionaire~~Questionnaire

A township meeting was held, while our team was there on medical service activities. The people of the town should register their name, address, and age for getting treatment from a group of health professionals. During this registration time, our survey team distributed the questionnaire paper and asked them to fill in their answers.

### 2.5 Data Analysis

The data was carefully typed into a worksheet of Microsoft Excel, and statistical procedures were performed for summary and answer compositions with percentages. The pie chart was plotted in the same software.

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## 3. RESULTS

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### 3.1 Water Quality in Guatemala

In Guatemala, there are two different types of water systems: primary drinking water and secondary water. Primary drinking water is the most frequently consumed, and secondary water is other water present in the households. While primary drinking water is stored in a specific 5-gallon water bottle, secondary water is stored in a water tank in each household (Figure 1).

Figure 1. The water tank on the ceiling of Guatemala households

Although 64% of people consume primary drinking water, 74% of people said they also drink secondary water, other than primary drinking water, once or more a week. According to the study, people who only drink primary drinking water have a significantly lower rate of GI disease than people who drink both primary drinking water and secondary water, and it was proved by the fact that secondary water has 35 % more *E. coliI* bacteria than primary drinking water [22]. Furthermore, a study shows that about half of the studied households were drinking water containing arsenic>9 μg/L, and 13% of households exceeded the water quality standards of Guatemala and US Health [23]. Both studies showed that people in Guatemala drink water contaminated in households, which causes various GI diseases.

### 3.2 Surveys of Women in Guatemala

The survey conducted on women in Guatemala consists of seven questions designed to gather comprehensive data on several aspects, including age, house composition, age at childbirth, health status, access to medical care, and awareness of rights. These questions were



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asked to women at various medical volunteer sites throughout Guatemala. The survey was conducted in Spanish to ensure effective communication and accurate responses.

### 3.2.1 Age Distribution

The figure presents the results of the first question that was asked to thirty participants. The question, “What is your age?” (¿Cuál es tu edad?) was designed to collect demographic information on the age distribution of women visiting the medical tent. The data indicate that the majority of patients were in the 20 to 30 age group, comprising 46.7% of the respondents. Women aged over 40 represented the second largest group at 33.3%, while those ages 31 to 40 were the least represented at 20%. Given that some participants were mothers or grandmothers with at least two children, these findings suggest that women in Guatemala are likely to marry at a relatively young age.

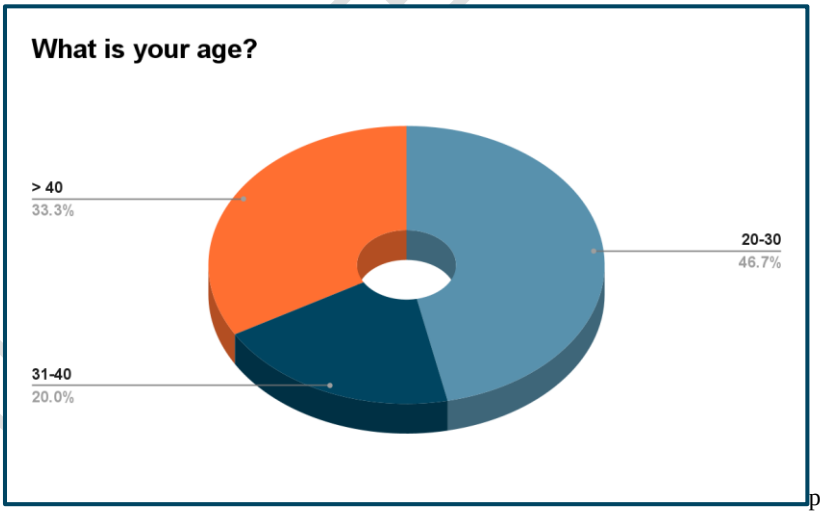


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Fig.2 shows the pie chart of age distribution (n=30).

### 3.2.2 Family Member Question

The figure illustrates the findings from the second question asked to thirty participants, who inquired, “Who do you live with?” (¿Con quién vives?). This question was designed to gather information regarding the household composition of women visiting the medical tent. The data provide insight into the general household arrangement in Guatemala. The results reveal that most respondents, accounting for 33.3%, live with their entire family, including children. The second largest group, representing 30% of the respondents, consists of women who reside with their parents. Women living exclusively with their husbands constitute 23.3% of the sample, while those living solely with their children are the smallest group, at 13.3%. The results indicate that a significant number of women, precisely 43.3%, do not reside with their husbands and live with their parents or children. This data leads to the assumption that women in these households may face increased financial difficulties due to the absence of men. Consequently, based on the overall result and number of responses, the researcher also assumed that there are two predominant family structures in Guatemala: with men in the household or without men in the household.

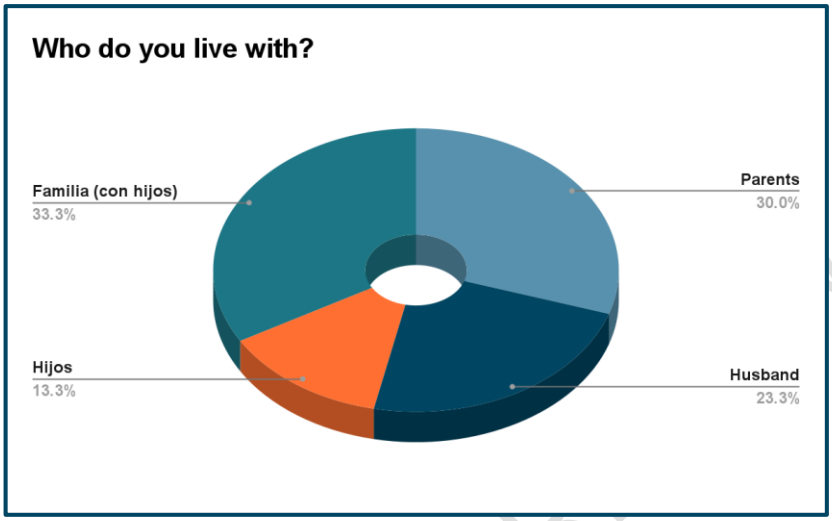


Fig.3 illustrates the pie charge from the question on family members (n=30).

### 3.2.3 Question on First Baby Born

The figure presents the findings from the third question asked to thirty participants, which asked, "At what age did you give birth to your first child?" (¿A qué edad diste a luz a tu primer hijo?). This question was intended to gather information on the age of first childbirth among women visiting the medical tent, with the hypothesis that the age of childbirth may be linked to various health issues, such as serious infections or postpartum depression. The results indicate that nearly half of respondents, 46.7%, gave birth to their first child before the age of 19. The second largest group, comprising 33.3% of the respondents, had their first child between 20 and 40. Additionally, approximately 20% of respondents had not yet given birth. The data offers valuable insight into the typical age of childbirth in Guatemala and aligns with the existing suggestion that women in third-world countries often marry and birth children at younger ages compared to women in developed nations. This data supports the assertion that early childbirth is

prevalent among women in third-world countries, reflecting broader socio-cultural patterns and health implications documented in prior research.

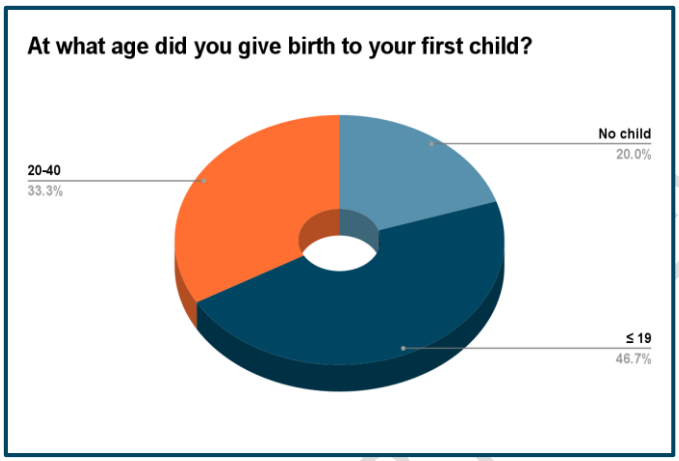


Fig. 4 presents the pi-chart on the question of the age of first childbirth.

### 3.2.3. ~~Questionaire~~Questionnaire on Overall Health

The figure presents the findings from the fourth question asked thirty participants, asking, "How would you rate your overall health?" (¿Cómo calificarías tu salud general?). This question was aimed to assess the self-awareness of women visiting the medical tent regarding their health status. The results reveal that nearly half of respondents, 46.7%, rated their health as fair, indicating it was neither good nor poor. The second largest group, comprising 33.3% of the respondents, rated their health poor. Lastly, 20% of respondents considered their overall health to be good. This finding highlights a significant awareness among the participants about their health conditions despite having limited access to medical care. The data support the assertion that women in Guatemala face substantial barriers to adequate medical treatment, likely stemming

from financial challenges and limited healthcare access. This underscores the necessity for targeted interventions to improve health outcomes for women in this region.

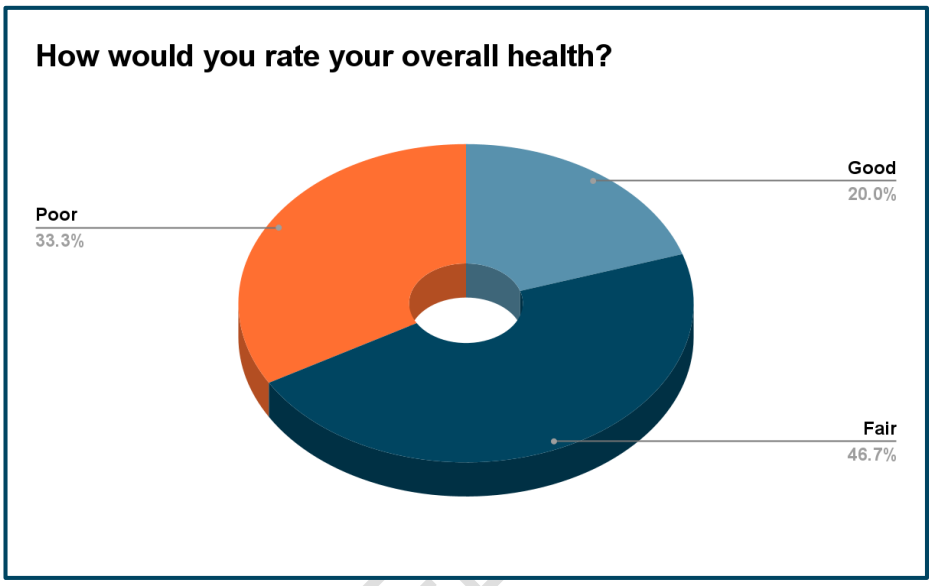


Fig.5 illustrates the pie chart summary of the question on overall health (n=30).



**3.5 Questionnaire on Healthcare Challenges**

The figure presents the findings from the fifth question asked by thirty participants: “Do you face challenges accessing healthcare?” (¿Enfrentas desafíos para acceder a la atención médica?). This question was designed to evaluate the practical circumstances of women who visited the medical tent regarding their access to healthcare resources. The results indicate that 56.7% of respondents reported experiencing difficulties accessing medical care, while 43.3% did not face such challenges. These findings underscore the practical healthcare accessibility issues faced by individuals in Guatemala. The data suggest that a significant portion of the population

struggles to obtain appropriate medical treatment and highlights the need for increased support from both local and national governments to improve the healthcare situation in the country.

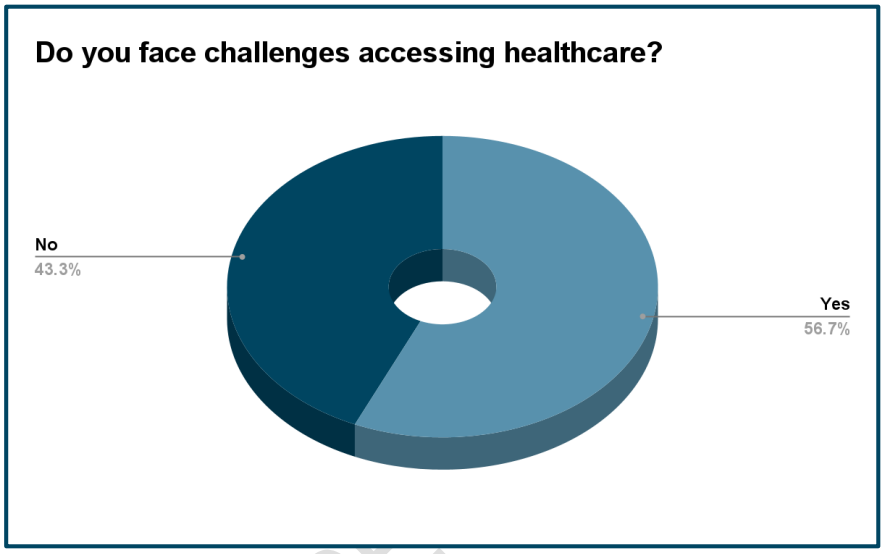


Fig.6 presents the pi-chart on the answer from healthcare accessibility.



**3.7 Questionnaire on Health Professional Exposure Duration**

Fig. 7 below illustrates the findings from the fifth question asked by thirty participants: "Do you face challenges accessing healthcare?" (¿Enfrentas desafíos para acceder a la atención médica?). This question was designed to evaluate the practical circumstances of women who visited the medical tent regarding their access to healthcare resources. The results indicate that 56.7% of respondents reported experiencing difficulties accessing medical care, while 43.3% did not face such challenges. These findings underscore the practical healthcare accessibility issues faced by individuals in Guatemala. The data suggest that a significant portion of the population

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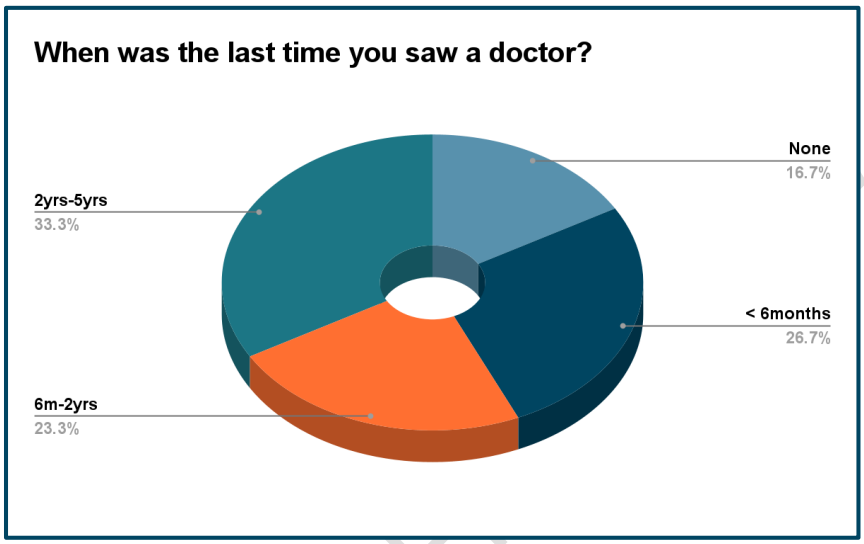


Fig. 7 gives the pi-chart from the questions on doctor visiting duration.

### 3.8 Questionnaire on the reason of doctor's office visit

The figures above present the findings from the sixth question asked by thirty participants: “When was the last time you saw a doctor, and what was the reason for your visit?” (¿Cuándo fue la última vez que viste a un médico y cuál fue el motivo de tu visita?). This question aimed to evaluate the frequency and accessibility of medical consultations and the reason for visits. By analyzing responses, the researcher assessed the regularity with which individuals sought medical attention and identified common health issues. This question provided detailed and specific insight related to Question 5 concerning women’s access to healthcare resources at the medical tent. The results indicate that 33.3% of respondents reported

seeing a doctor 2 to 5 years ago. The second largest group, comprising 26.7% of respondents, indicated they had seen a doctor less than six months ago. Approximately 23.3% of respondents reported seeing a doctor between 6 months and two years ago, while 16.7% never saw doctors. These findings reveal that a significant Guatemalan population has limited access to regular medical care, underscoring the challenges faced in obtaining necessary healthcare services.

To accurately assess women's current symptoms, the researcher inquired about the reasons for visiting the medical tent, not the reason for the previous visit to the doctor. The results show that 46.7% of respondents sought medical care for gynecological issues such as Urinary Tract Infections (UTIs) and severe menstrual pain. Additionally, 33.3% of respondents reported visiting the doctor due to Irritable Bowel Syndrome (IBS), stomach pain, or constipation. Orthopedic issues, including back, neck, and muscle pain, accounted for 6.7% of visits, while 13.3% of respondents cited other reasons for seeking medical care. The data suggest that a significant portion of the population experiences symptoms potentially linked to untreated water and dietary factors, such as UTIs, diarrhea, and stomach pain. The result highlights the need for enhanced support to improve daily living conditions and broaden access to medical care for the population in Guatemala.

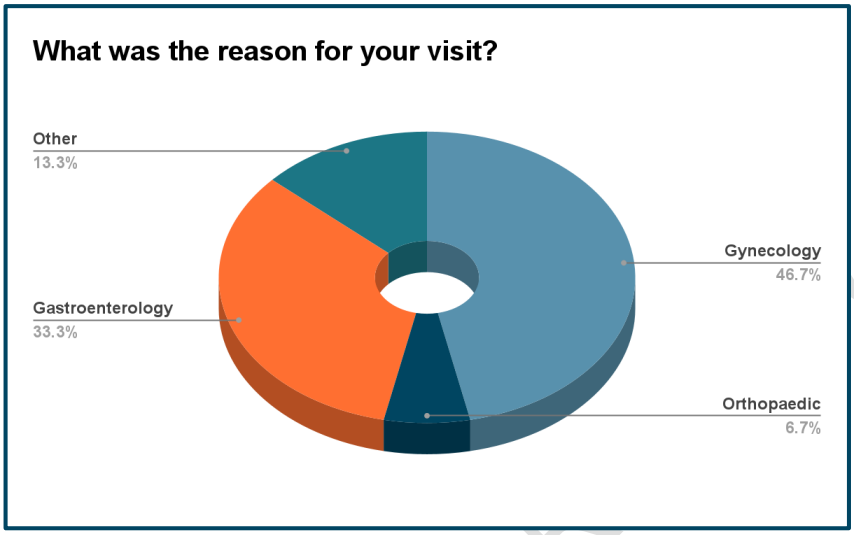


Fig. 8 shows the pi-chart of statistics created with the question on the doctor's visit of the day.

### 3.25 Questionnaire on Gender Discrimination

The figure presents the findings from the final question asked by thirty participants: "Have you ever experienced discrimination based on your gender?" (¿Alguna vez has experimentado discriminación basada en tu género?). This question aimed to assess the participants' self-awareness and the reality of gender discrimination in Guatemala, including issues such as unfair wages, denial of granted rights, and various limitations due to gender. The results reveal that 63.3% of respondents reported they had not experienced gender-based discrimination, while 36.7% indicated that they had encountered such discrimination. This finding emphasizes that many women in Guatemala continue to face gender inequality and struggle to secure their entitled rights. The data support the assertion that women in Guatemala experience unfair treatment compared to women in developed nations, highlighting the need for

the government and related organizations to intervene and improve conditions for women in the country.

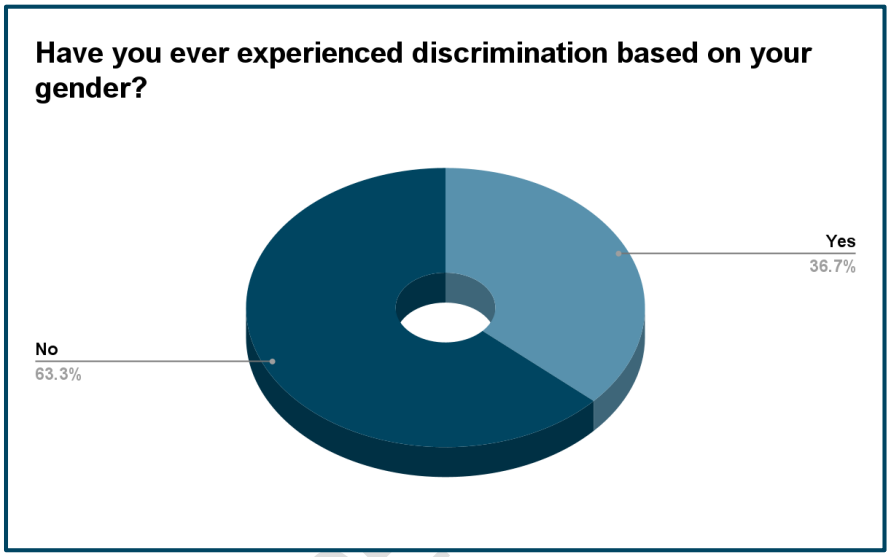


Fig. 9 shows the pie chart on the question of gender discrimination.



**DISCUSSION**

The findings of this study provide information on the significant health and social challenges faced by women in third-world countries, specifically focusing on water quality, healthcare access, and gender discrimination in Guatemala. The data from our survey and literature review reveal several critical issues that require attention and intervention.

Firstly, the survey results highlight the current healthcare accessibility situation among women in Guatemala. With 56.7% of respondents indicating challenges in accessing medical care, it is evident that there are potential barriers preventing women from receiving healthcare.

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These barriers may include financial limitations, geographic limitations, and insufficient healthcare institutions. The high percentage of women seeking medical attention for gynecological issues (46.7%) and gastroenterological issues (33.3%) emphasizes the untreated conditions that significantly impact women's quality of life. These findings align with previous studies documenting the adverse effects of poor water quality and inadequate sanitation on women's health in third-world countries [24~~][WHO~~] WHO. The correlation between untreated water and health issues such as UTIs, Irritable Bowel Syndrome (IBS), and eczema, and women-specific disease, such as dysmenorrhea, suggests a direct link between environmental factors and women's health outcomes [25](Silbergeld and Flaws 1119-1128).

Furthermore, the results regarding gender discrimination reveal that 36.7% of women have experienced gender-based discrimination. This statistic is alarming, considering the various forms of discrimination reported, including unfair wages, denial of rights, and suppression of voices. These forms of discrimination not only violate fundamental human rights but also contribute to the situation of gender inequality, limiting women's opportunities for education, employment, and overall well-being.

**CONCLUSION**

The research provides critical insights into the various issues women face in third-world countries, particularly regarding water quality and health issues. The findings highlight that poor water quality significantly affects women's health, leading to conditions such as Urinary Tract Infections, Irritable Bowel Syndrome, and skin issues. These health challenges are exacerbated by the socio-economic conditions in these regions, including limited access to education, healthcare, and financial opportunities. The study also highlights the urgent need for intervention

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to improve healthcare access, water quality, and gender equality in Guatemala. The findings advocate for comprehensive policies that address both the immediate health needs of women and the broader social determinants of health.

Future research should focus on studies to monitor the impact of these policies over time and further explore the interdisciplinarity of health and environmental factors.



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