# Evaluating and Enhancing Water Facility Satisfaction and Quality: A Case Study of International Islamic University Islamabad Boys' Hostels

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**Abstract.** This research investigates the satisfaction levels of boys' hostel residents of International Islamic University Islamabad (IIUI) with water facilities, considering both quality and quantity dimensions. A survey, administered to 205 residents through a carefully designed questionnaire, employs data analysis on Statistical Package for Social Science (SPSS). F-test and Analysis of Variance (ANOVA) tests were applied. Results indicate an overall sense of contentment among most residents regarding water facilities. Notably, a significant proportion expressed satisfaction with the available amenities, while approximately one-fourth conveyed dissatisfaction, specifically regarding drinking water provisions. The null hypothesis: Hostel Number vs Water Consumption per day and Hostel Number vs Satisfaction Level, were considered and found acceptable. These findings offer nuanced insights into the complex dynamics of water facility satisfaction within hostel environments. The study not only contributes to the understanding of resident perspectives but also identifies key areas for targeted improvements. This research provides a foundational platform for further exploration and interventions aimed at enhancing the overall satisfaction and well-being of hostel residents.

**Keywords:** Water Facility Satisfaction, Hostel Residents, Hostel Amenities.

## 1 Introduction.

Water is a vital component of life. Every living thing on Earth must survive. We cannot expect our lives without water because we need it for drinking, sanitation, hygiene, and


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laundry purposes. We need water whether we are at home or somewhere else. Many people coming from far-flung areas move towards bigger cities for higher studies [1]. Universities attract diverse students, with many residing in on-campus hostels. A study at the University of Malaysia Sabah found that student attitudes are significantly influenced by satisfaction, particularly with hostel facilities [2]. Hundreds of students live in a hostel depending on its capacity. The hostel plays a crucial role in students' academic success and significantly influences their lifestyle. A study shows most water is utilized for toilets, accounting for 27%, followed by laundry at 22%, showers at 17%, faucets at 16%, baths at 2%, dishwashers at 2%, leaks at 14%, and other purposes at 3%. According to another study, the highest consumption of water is observed in toilets at 76.1 LPCD (liters per capita per day), washing machines at 56.8 LPCD, showers at 50.3 LPCD, and toilet flush tanks at 36.3 LPCD [3]. Adequate water availability is crucial in hostels, with the recommendation for at least one water purifier or filter machine for every ten residents. Challenges, including the continuous supply of quality water, impact students' contentment. Satisfaction, defined as an individual's enjoyment derived from comparing a product's perceived performance to expectations, plays a key role in evaluating hostel facilities [4][5]. In one study at the University of Sains Malaysia, 288 undergraduates were surveyed, revealing critical factors influencing satisfaction. The study identified a significant difference between on-campus and off-campus students but lacked clarity on population representativeness [6]. Another study at the University Utara Malaysia surveyed 51 participants, indicating mixed satisfaction levels in sports, accommodation, and bus transportation. Caution is needed in generalizing findings due to the small sample size and unclear study population rationale [7].

Two studies in Pakistan examined student satisfaction. The first, focusing on 401 students at Bahauddin Zakariya University, unveiled dissatisfaction with various services, except for transportation, classrooms, and prayer facilities [8]. The second study, at Mehran University of Engineering and Technology, found a significant relationship between factors like Food Quality, Cleanliness, Water Supply, and First Aid services, emphasizing the need for improved hostel facilities [9].

This research extensively investigates students' satisfaction with water facilities in the boys' hostel at IIUI, covering consumption patterns, awareness of water-related issues, habits, experiences of scarcity, and overall satisfaction with supply facilities. It also evaluates willingness to conserve water, attention to dripping taps, adequacy of quantity and pressure, efforts to reduce usage, and reasons for wastage. Additionally, it assesses overall satisfaction with water quality, including source, appearance, smell, taste, complaints, filtration effectiveness, filter changes, and hostel facilities' overall water quality rating.

### 1.1 Study Location

The International Islamic University, Islamabad, a prominent public institution in Pakistan, expanded its campus over time, transitioning from reliance on the Capital

Development Authority (CDA) water supply to installing eight boreholes, each reaching a depth of 350 feet. Despite lacking a filtration plant, the university has initiated the use of water filters on dispensers within the hostels to address public health concerns. However, annual water shortages persist, especially during summer, prompting a perception survey in boys' hostels to assess residents' satisfaction with water quality and quantity. Despite having an extensive water storage system and tube well infrastructure, the university is actively planning to enhance its storage capacity to alleviate recurring water scarcity issues for the approximately 2600 hostel residents. The breakdown of the student population in different hostels is shown in Table 1.

**Table 1.** Hostel-Wise Student Population.

| Hostel Name | Bed wise Population | Rounded off Population. (rough estimation) |
|---|---|---|
| Hostel 1 (Hazrat Abu Bakr R.A.) | 398 | 400 |
| Hostel 2 (Hazrat Omar R.A.) | 398 | 400 |
| Hostel 3 (Hazrat Usman R.A.) | 398 | 400 |
| Hostel 4 (Hazrat Ali R.A.) | 398 | 400 |
| Hostel 5 | 428 | 450 |
| Hostel 6 | 546 | 550 |
| Total | 2600 | |

## 2 Methodology

Initially, a comprehensive questionnaire survey was developed and thoroughly cross-checked by the professor. The primary aim of this survey was to solicit the opinions of students residing in the university boys' hostels. Specifically, the survey sought to measure their perceptions regarding the quality and quantity of water. The survey encompassed 30 questions, disseminated through an online Google Form link shared across various social media platforms. The online survey results were systematically documented in a Google Sheet. Additionally, a door-to-door survey was also conducted within the hostels, yielding a total of 205 recorded responses. All the responses were then transferred to a single Excel sheet. The majority of the questions were structured as yes or no queries, supplemented by a few open-ended descriptive questions having four to five options to provide a more nuanced understanding of the respondents' perspectives. The questionnaire was structured into three sections shown in Fig. 1.

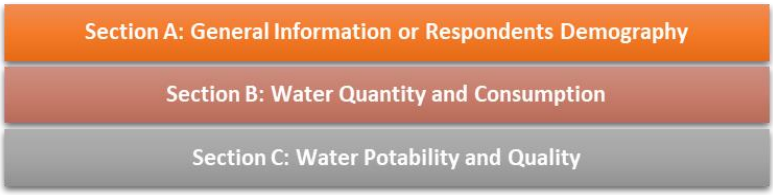


**Fig. 1.** Questionnaire Sections.

## 3 Data Analysis

The simple percentage technique which is a widely utilized method was adopted to assess the results of the survey, which involves expressing a part of a whole as a percentage. Percentages are frequently employed to depict the proportion of something relative to a total. The formula for calculating a percentage is as follows:

$$Percentage = (Part\ of\ Response / Total\ Responses) \times 100$$

This formula enables the conversion of a fraction of the whole into a percentage, providing a clear and concise representation of proportions within the study's data analysis.

This study's data were collected via a survey, and in order to make statistical analysis easier, they were decoded using a specified process and then imported into the SPSS. Two null hypotheses served as the analysis's central focus. In order to identify any notable differences between various hostel categories, the first hypothesis examined the possible relationship between the number of hostels and the water consumption per day. In order to identify trends or variations in satisfaction levels, the second hypothesis examined the association between hostel number and satisfaction level. To analyze these hypotheses, the statistical method ANOVA of and F-test was employed.

## 4 Results and Discussions

The tabular presentation of the results helps to identify the pattern of the responses, thus, facilitating in analysis of the responses of the respondents. The responses are shown below in the form of Tables.

The first question of the survey included the name of the participant for record purposes which was followed by a question enquiring the participants about their year of study.

**Table 2.** Depicts the Response of Students in Hostels Regarding Q2 of the Survey Form.

| Statements/Questions | 1st | 2nd | 3rd | 4th | 5th | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Q2. Year of Study? | 18 (9.0%) | 25 (12.4%) | 41 (20.4%) | 89 (44.3%) | 27 (13.4%) | 3.4227 | 1.14571 |

It can be seen from Table-2 that most of the students who took part in this survey were in 4th year of their studies, which means they had spent enough time at hostels and were well aware of the hostel lifestyle. Moreover, the age of the respondents of this survey ranged between 19 - 26 years, and were students of bachelor's degree.
Table-3 gives statistics of the students from which hostel they belong. Table-4 shows that many of the survey responders live in three-seater rooms.

**Table 3.** Depicts the Response of Students in Hostels Regarding Q3 of the Survey Form

| Statements/ Questions | Hostel 1 (Hazrat Abu Bakr RA) | Hostel 2 (Hazrat Umar RA) | Hostel 3 (Hazrat Usman RA) | Hostel 4 (Hazrat Ali RA) | Hostel 5 | Hostel 6 | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|---|
| Q3. Hostel Number/Name? | 26 (12.9%) | 23 (11.4%) | 49 (24.4%) | 34 (16.9%) | 35 (17.4%) | 34 (16.9%) | 3.6495 | 1.61945 |

**Table 4.** Depicts the Response of Students in Hostels Regarding Q4 of the Survey Form.

| Statements/Questions | 1 | 2 | 3 | 4 to 5 | 6 to 7 | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Q4. How many individuals live in your hostel room? | 6 (3.0%) | 58 (28.9%) | 88 (43.8%) | 42 (20.9%) | 7 (3.5%) | 3.2062 | 1.33458 |

The second category comprised sixteen questions about water supply, pressure, quantity, losses, consumption, and usage. 68.7% of respondents think that the amount of water they consume within 24 hours is less than 100 liters/day. While only 6.0% think that they consume more than 130 liters/day of water. According to the literature minimum limit of water consumption for hostels is 70 liters/day and the maximum limit is 130 liters/day which can be seen in the Table-5 below.

**Table 5.** Depicts the Response of Students in Hostels Regarding Q5 of the Survey Form.

| Statements/Questions | Less than 100 liters/day | Between 100 -130 liters/day | More than 130 liters/day | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Q5. How much average water do you consume per day? | 138 (68.7%) | 51 (25.4%) | 12 (6.0%) | 1.3814 | 0.60126 |

A daily shower is found to be the major activity of water consumption as 48.3% of the residents take showers daily. Followed by 41.3% who take showers twice or thrice a week, given in Table-6.

**Table 6.** Depicts the Response of Students in Hostels Regarding Q6 of the Survey Form.

| Statements/Questions | Daily | Twice or thrice a week | Once a week | Once in a month | Mean | Standard Deviation |
|---|---|---|---|---|---|---|
| Q6. How many times a week do you take shower? | 97 (48.3%) | 83 (41.3%) | 18 (9.0%) | 3 (1.5%) | 1.6443 | 0.71425 |

**Table 7.** Depicts the Response of Students in Hostels Regarding Q7 of the Survey Form.

| Statements/Questions | Once a week | Twice or thrice a week | Once in a month | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Q7. How many times do you laundry in a week? | 53 (26.4%) | 94 (46.8%) | 54 (26.9%) | 2.9948 | 0.73051 |

Laundry is also one of the major activities of water usage. 46.8% of hostel residents do laundry twice or thrice a week, followed by 26.9% once a month, and 26.4% once every week as shown in Table-7 above. There is more demand and usage of water during the morning i.e., 6 am till 10 am as 40.3% of the respondents have agreed on it. This is because students wake up in the morning and everyone uses the washroom to get ready for classes. During these hours many residents take showers as per Table-8.

**Table 8.** Depicts the Response of Students in Hostels Regarding Q8 of the Survey Form.

| Statements/ Questions | Very early morning (12 AM - 6 AM) | Morning (6 AM - 10 AM) | Mid-Day (10 AM - 2 PM) | Afternoon (2 PM - 6 PM) | Evening (6 PM - 9 PM) | Night (9 PM - 12 AM) | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|---|
| Q8. During what hours of the day/night do you usually use more water? | 28 (13.9%) | 81 (40.30%) | 35 (17.4%) | 26 (12.9%) | 15 (7.5%) | 16 (8.0%) | 2.8247 | 1.45403 |

In response to a series of yes/no questions given in Table-9, we found against Q9 that 80.1% of the students were aware of the water dryness situation in Pakistan while 19.9% were unaware. A positive response from the majority i.e., 75.1% of students about the availability of water in hostels was recorded followed by a 24.9% negative response against Q10. Of the respondents in Q11, 53.2% have admitted that they have experienced water shortage or crisis during their lifetime in hostels while 40.3% have said that they have not been through such experience as mentioned in Table-9.

**Table 9.** Depicts the Response of Students in Hostels Regarding Q9, Q10, Q11, Q13, Q14, Q15, Q16, Q17, Q18, And Q19 of the Survey Form.

| Statements/Questions | Yes | No | Mean | Standard Deviation |
|---|---|---|---|---|
| Q9. Are you aware of the water scarcity situation of Pakistan and its cities? | 161 (80.1%) | 40 (19.9%) | 1.1959 | 0.3979 |
| Q10. Does water available throughout the year in your hostels/university? | 151 (75.1%) | 50 (24.9%) | 1.2474 | 0.43263 |
| Q11. Did you ever face a water crisis or shortage in a university's hostels? | 120 (59.7%) | 81 (40.3%) | 1.5258 | 0.61236 |
| Q13. Are you satisfied with the university's water supply facilities? | 157 (78.1%) | 44 (21.9%) | 1.2165 | 0.41292 |
| Q14. Do you feel that you can take your part in saving water? | 185 (92.0%) | 16 (8.0%) | 1.1443 | 0.43164 |
| Q15. Do you pay attention when the taps are dripping at toilets or kitchens? | 176 (87.6%) | 25 (12.4%) | 1.1289 | 0.33592 |
| Q16. Is the quantity of water that you receive is adequate? | 176 (87.6%) | 25 (12.4%) | 1.1289 | 0.33592 |

| | | | | |
|---|---|---|---|---|
| Q17. Does the water that reaches the hostels is of adequate pressure? | 175 (87.1%) | 26 (12.9%) | 1.1289 | 0.33592 |
| Q18. Have you ever tried to reduce your water usage in any way? | 165 (82.1%) | 36 (17.9%) | 1.268 | 0.52926 |
| Q19. Are you motivated to conserve water? | 179 (89.1%) | 22 (10.9%) | 1.1134 | 0.3179 |

88.6% of respondents have experienced water shortages during the summer season. Only 11.4% of respondents have said winter as shown in Table-10.

**Table 10.** Depicts the Response of Students in Hostels Regarding Q12 of the Survey Form.

| Statements/Questions | Summers | Winters | Mean | Standard Deviation |
|---|---|---|---|---|
| Q12. When did you face a water crisis? | 178 (88.6%) | 23 (11.4%) | 1.1134 | 0.3179 |

Table-9 shows the responses of residents' satisfaction with water facilities provided by the university in Q13. 78.1% of respondents have shown satisfaction while a quarter of respondents that is 21.9% have shown dissatisfaction. Q14 asks the hostel residents about their willingness and enthusiasm for the conservation of water. 92.0% of respondents have responded positively, and 8.0% have negatively responded. Q15 shows that 87.6% of hostel residents pay attention to the tipping taps while 12.4% do not pay any attention. In Q16 about adequate water supply by the university, 87.6% of respondents have shown satisfaction while 12.4% have shown dissatisfaction. On a question about water pressure i.e., Q17, 87.1% of respondents have shown their satisfaction while 12.9% have shown dissatisfaction. In response to Q18 about reducing water usage. 82.1% of respondents have said Yes as they try to lessen their water usage while 10.9% of them have responded No. In Q20 about the reason for water wastage or losses in hostels, 44.8% of respondents agreed on leaking taps and pipes as a major cause of water loss which can be minimized by fixing loose taps and leaks on time. Followed by 31.8% who consider individual behavior, further followed by 18.9% who consider lack of awareness, and 4.5% who consider poor water supply systems as a reason for water losses as per Table-11.

**Table 11.** Depicts the Response of Students in Hostels Regarding Q20 of the Survey Form.

| Statements/Questions | Lack of awareness about the importance of water | Individual's behavior/ Attitude | The poor water supply system | Leaked taps and pipes | Mean | Standard Deviation |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Q20. What do you consider the main reason for water wastage in hostels? | 38 (18.9%) | 64 (31.8%) | 9 (4.5%) | 90 (44.8%) | 2.7526 | 1.21332 |

The third category is comprised of ten questions about water potability and quality. Each question along with a table is shown. 65.7% of the respondents have said that they use university water for drinking while 34.3% have said that they buy filtered water bottles from outside for drinking purposes according to the Table-12.

**Table 12.** Depicts the Response of Students in Hostels Regarding Q21 of the Survey Form.

| Statements/Questions | Purchase bottled water from outside | Hostel's water | Mean | Standard Deviation |
|---|---|---|---|---|
| Q21. Which water source do you use for drinking purposes? | 69 (34.3%) | 132 (65.7%) | 1.6598 | 0.475 |

In a series of yes and no questions, 51.7% of respondents showed satisfaction with the quality of water while 48.3% showed dissatisfaction with Q22 which shows the resident's doubtfulness about the water quality mentioned in Table-13. In response to Q23, 56.2% of respondents have said that there is no odor in the available water at a hostel while 43.8% have expressed that they feel a smell in it. In Q24, 71.1% of respondents said that the water available in hostels is tasteless while 28.4% said that they do feel some sort of taste in it given in Table-13.

**Table 13.** Depicts the Response of Students in Hostels Regarding Q22 Q23, Q24, Q26, and Q27 of the Survey Form.

| Statements/Questions | Yes | No | Mean | Standard Deviation |
|---|---|---|---|---|
| Q22. Does water available in your hostel is of good quality? | 104 (51.7%) | 97 (48.3%) | 1.6598 | 0.63387 |
| Q23. Does water have any smell or odor? | 88 (43.8%) | 113 (56.2%) | 1.5567 | 0.49806 |

| | | | | |
|---|---|---|---|---|
| Q24. Does water have any kind of taste? | 57 (28.4%) | 143 (71.1%) | 1.7113 | 0.45431 |
| Q26. Did you ever complain about the quality of water to the hostel's administration? | 63 (31.3%) | 138 (68.7%) | 1.6753 | 0.46949 |
| Q27. Do you have a water filtration system installed at hostels? | 167 (83.1%) | 34 (16.9%) | 1.1649 | 0.37209 |

Q25 asked about the visibility and clarity of the water in the response of which 43.3% of respondents said that water is clear, 28.9% said neither clear nor unclear and 27.9% said unclear Table-14.

**Table 14.** Depicts the Response of Students in Hostels Regarding Q25 of the Survey Form.

| Statements/Questions | Clear | Unclear | Neither clear nor unclear | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Q25. How does the water look like? | 87 (43.3%) | 56 (27.9%) | 58 (28.9%) | 1.8711 | 0.83876 |

In response to a question asked that whether they have ever complained about the water quality, the majority of the hostel residents i.e., 68.7% have said No while 31.3% have responded with Yes. In Q27, 83.1% of respondents agreed that hostels do have filters installed while 16.9% said no filters are installed at their hostel shown in Table-13.

A question was asked about the workability of water filters installed at water dispensers. 47.3% of respondents agreed that some of the filters work while some not followed by 26.9% who said that they do not work and 25.9% said that the filters available in hostels do work according to Table-15.

**Table 15.** Depicts the Response of Students in Hostels Regarding Q28 of the Survey Form.

| Statements/Questions | Yes | No | Some do while some not | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Q28. Do these water filters work? | 52 (25.9%) | 54 (26.9%) | 95 (47.3%) | 2.1959 | 0.83498 |

41.3% of respondents have shown their response on changing water filters that they are not changed on time. Followed by 36.3% who were unsure. While 22.4% say they do change filters [TABLE-16].

**Table 16.** Depicts the Response of Students in Hostels Regarding Q29 of the Survey Form.

| Statements/Questions | Clear | Unclear | Neither clear nor unclear | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Q29. Do they change filters on time? | 45 (22.4%) | 83 (41.3%) | 73 (36.3%) | 2.1289 | 0.75419 |

In the last question, it was asked how they would overall rate the university for their water facilities in terms of supply and quality. 10.0% of students responded as Best, 7.0% as Good, 63.7% as Fine. 14.4% as Bad and 5.0% have rated it as Worst which can be seen in the Table-17 below.

**Table 17.** Depicts the Response of Students in Hostels Regarding Q30 of the Survey Form.

| Statements/Questions | Best | Good | Fine | Bad | Worst | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Q30. How would you rate your hostel facilities in terms of water quality and supply? | 20 (10.0%) | 14 (7.0%) | 128 (63.7%) | 29 (14.4%) | 10 (5.0%) | 2.9742 | 0.90156 |

# 5 Testing of Hypothesis

## 5.1 HYPOTHESIS 1: Hostel Number vs Water Consumption Per Day

An F test was conducted on the data using ANOVA in which Hostel Number is kept independent and water consumption/day is considered a dependent variable. A hypothesis was developed that water consumption per day varies for each hostel. As the Water consumption for each hostel varies therefore the significance value obtained through this analysis is 0.527, greater than 0.05. Thus, it can be concluded that our null hypothesis is accepted given in Table-18 below.

**Table 18.** ANOVA - Relation Between Hostel Number and Water Consumption Per Day.

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 1.487 | 5 | 0.297 | 0.834 | 0.527 |
| Within Groups | 69.528 | 195 | 0.357 | | |
| Total | 71.015 | 200 | | | |

### 5.2 HYPOTHESIS 2: Hostel Number vs Satisfaction Level

An F test was conducted on the data using ANOVA in which Hostel Number is kept independent and Satisfaction level is considered a dependent variable. A hypothesis was developed that the satisfaction level of each individual varies. As the satisfaction level varies, the obtained significance value was 0.09. Hence, it is concluded that our hypothesis is accepted as shown in Table-19.

**Table 19.** ANOVA - Relation Between Hostel Number and Satisfaction Level.

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 7.707 | 5 | 1.541 | 1.937 | 0.09 |
| Within Groups | 155.168 | 195 | 0.796 | | |
| Total | 162.876 | 200 | | | |

## 6 CONCLUSION

In conclusion, the perception survey conducted among boys' hostel residents at the university sheds light on the satisfaction levels regarding water facilities. The majority of respondents expressed contentment with overall water amenities, but a notable quarter displayed dissatisfaction, particularly concerning drinking water quality and the effectiveness of water filters. To address these concerns, it is recommended to install high-quality filters on water dispensers, ensuring regular maintenance. The survey emphasizes the need for increased awareness among residents about water conservation, with proposed initiatives such as educational seminars, awareness campaigns, and incorporating water conservation information into the students' handbook. Furthermore, Acceptable results were obtained from the evaluation of two null hypotheses regarding the relationship between Hostel Number and daily Water Consumption and Satisfaction Level. The findings underscore the importance of prioritizing service quality and enhancing hostel facilities to elevate overall student satisfaction. Furthermore, the results serve as valuable input for policymakers,

suggesting improvements in water facilities and advocating for additional boreholes to meet future water demands and enhance efficiency in water utilization within the hostels.

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