

## Where is the source? Water sources for non-resident students at the University of Kabianga, Kenya

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### Abstract

The immense increase in residential developments around universities to provide private accommodation for the rapidly growing population of university students has constrained providing a safe, clean, and sufficient water supply. The Kenyan Constitution protects everyone's fundamental right to access adequate water. However, the reality for non-resident students at the University of Kabianga (UoK) is far from their entitlements by the Kenyan Constitution. This project aims at establishing the sources of water available for non-resident students of the UoK. To achieve this, the study employed an exploratory approach that employed a descriptive survey. Its target population was the non-resident students (673 students) of the UoK, from whom a sample size of 250 students was selected. Simple random sampling was used in selecting the participants, while purposive random sampling was utilized to choose the study's private hostels (15 Hostels). The tools for data collection included questionnaires, key informant interviews, and an observation guide. The collected data was analyzed using SPSS to generate descriptive statistics. Findings obtained from the study revealed that most respondents (68%) relied on rainwater during the rainy season. However, most students (46%) relied on wells/boreholes, while 44% relied on private vendors during the dry season. In addition, majority of the respondents (61%), the available sources of water were not safe for drinking. In terms of challenged faced by the respondents in accessing water, time wastage while trying to access water was stated to be the main challenge (78%) as this highly affected their studies. Taken together, the study show that the water sources are unreliable, and this may not satisfy the demands of water in the area. The findings of this study will provide a basis for the provision of a sustainable water supply of adequate quality to non-resident students' hostels at the University of Kabianga and inform the stakeholders of appropriate measures that should be put in place to ensure adequate water supply to their tenants.

**Keywords:** Water sources; Water usage; Non-resident students; University of Kabianga

### 1. Introduction

Maintaining human health and well-being requires access to clean and safe water for daily usage. However, people's access to safe and clean water has been challenging in developed and developing countries despite water occupying the largest portion of earth. Despite occupying a significant portion of the earth, only 2.5% of the water comprises fresh water. Further, people can only access less than 1% of the freshwater for human usage. Additionally, research has shown that approximately 20% of the population lack access to drinking water, while 40% do not have access to proper sanitation facilities (Davis et al., 2017). Moreover, the larger portion of that population come from developing nations (Waziri, 2018). Therefore, this indicates that a significant portion of the global population is not connected to a sustainable water supply system that meets their needs. Achieving a sustainable water supply for the entire population is key to meeting Sustainable Development Goals (SDGs) (Goals 3 & 6). In Kenya, approximately 60% of the urban population experience sustainable access to clean and safe drinking water while only 20% of the urban poor constitute

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approximately half of the urban population in Kenya (Cherunya et al., 2015). As a result, this increases the risk of increased waterborne diseases within the population. This resonates with the finding by WHO that claims that over five million annual deaths are water-related diseases. Therefore, better water supply management can lead to the realization of people's good health and well-being globally (Cherunya et al., 2015).

In recent years, Universities have experienced significant growth in the number of students, thus leading to a high demand for student accommodation. For example, in the 2022 Economic Survey report by the Kenya Bureau of Statistics (KEBS), the number of students enrolled in universities increased from 546,699 students in the 2020/21 academic year to 562,066 students in 2021/22. University of Kabianga enrollment was not an exception since it saw an increase in student enrollment from 6,482 students in the 2020/21 academic year to 6,647 students in the 2021/22 academic year (KEBS, 2022). The student enrollments are beyond the university's bed capacity, forcing universities to run residence halls commercially, where students pay for university accommodation or look for alternative accommodation outside university precincts. For example, in the academic year 2021/22, the University of Kabianga had 2250 students, of whom 1,577 had paid for university accommodation while 673 sought alternative accommodation outside the university. This has been the case since the University received its charter in 2013 due to a high number of students admitted. As a result, universities have sought to engage with private investors in student accommodation development through a Public Private Partnership (PPP). This has resulted in mushrooming up housing units of low standards without commensurate infrastructure services such as water and sanitation. Most developers focus more on making profits from their hostels rather than the well-being of their tenants, who are the students.

Universities have experienced phenomenal growth in student numbers due to the government's decision to de-link students' accommodation and catering from academic programs to increase the number of students enrolled in public universities. As a result, universities have collaborated with private investors through Public Private Partnerships (PPPs) to provide student accommodation (Ngochi, 2020). This has resulted in mushrooming up of housing units of low standards without commensurate infrastructure provisions, such as water and sanitation. Most developers focus more on making profits from their hostels rather than on the well-being of their tenants. This has led to various challenges like water rationing, which eventually worsens in the dry seasons of the year, leading to, students buying water of unknown qualities, thereby putting their health at risk. University of Kabianga's non-resident student population of 673 is not an exception to such challenges due to rapid growth in the development of housing units.

Additionally, the lack of a functional municipal water supply forces students to buy water of unknown quality from private vendors at high prices. Moreover, water scarcity affects learning since students spend much time looking for water rather than learning, which may contribute to poor performance and attendant prospects. The Kenyan Constitution (2010) protects everyone's fundamental right to access adequate water. However, the reality for non-resident students at the University of Kabianga is far from their entitlements by the Kenyan Constitution. Therefore, this study sought to assess water adequacy among non-resident students at the University of Kabianga, Kenya.

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## 2. Materials and Methods

### 2.1. Study area

The study was conducted at Kabianga University Town. According to the Urban Areas and Cities Act Part II, Section (1), the county governor may, in consultation with the committee constituted under Section 8(2), confer the status of a town on an area that meets the criteria set out in subsection (2). The criteria under subsection (2) state that the area under question must have; a population of at least ten thousand residents according to the final gazetted results of the latest population census carried out by an institution authorized under any written law preceding the grant; the existence of an integrated development plan under the Act; the capacity to effectively and efficiently deliver essential services to its residents as provided in the First Schedule; and sufficient space for expansion (Urban Areas and Cities Act, 2011). Kabianga University Town was conferred as a town since an integrated plan was done in 2015 and approved in 2018. Moreover, it had a population of 17,000 residents per the census of 2009 and had sufficient space for expansion.

The study focused on non-resident students residing in private hostels within Kabianga University Town. Being a public university town, it will provide a good representation of public university students' experience in private hostels. The main reason for preferring this area is the increase in students residing in private student accommodation hostels and the increased construction of low-standard private hostels within the town.

**Table 1** Kabianga University Township Population by Sex and Sub-Location, 2009

| Division      | Location | Sub-location | Sex   |        | Total  | Area in Km <sup>2</sup> | Households | Density |
|---------------|----------|--------------|-------|--------|--------|-------------------------|------------|---------|
|               |          |              | Male  | Female |        |                         |            |         |
| Kabianga      | Kabianga | Kibingei     | 795   | 809    | 1.604  | 4.4                     | 338        | 364.61  |
|               |          | Kapcheluch   | 2.691 | 2.872  | 5.563  | 11.37                   | 1,119      | 489.19  |
| Kabianga      | Mobego   | Kabianga     | 3.338 | 2.922  | 6.260  | 13.06                   | 1,297      | 479.17  |
|               |          | Mobego       | 2.255 | 2.316  | 4.571  | 11.46                   | 882        | 398.86  |
| Overall total |          |              | 9,079 | 8,919  | 17.998 | 40.29                   | 3.636      | 446.71  |

Source: Kenya National Bureau of Statistics (2010): 2009 Kenya Population and Housing Census, Volume I

## 2.2. Research Design

The study used an exploratory approach employing a descriptive survey design because it was effective in describing the current phenomenon without manipulating variables. A descriptive survey design seeks to explore a phenomenon in detail without manipulating it. Akhtar further observes that descriptive survey design is very effective in gathering information, summarizing, presenting, and interpreting data in preliminary and explorative studies (Akhtar, 2016).

## 2.3. Target Population

The target population for this study was the University of Kabianga undergraduate non-resident students in private hostels within Kabianga University town. Accordingly, the population included all the non-resident students residing within the Kabianga market center, Kapmaso market center, and Chepnyogaa market center.

## 2.4. Sample and Sampling Procedures.

Oribhabor and Anyanwu (2019) assert that a sample from a large population can be calculated using the formula below;

$$n = N / [1 + N (e)^2]$$

Where

n = the sample size

N = total population (673)

e = tolerance of desired confidence level (0.05%) at 95% confidence level

Hence the sample size is 251 students.

Simple random sampling was used to categorize students into various subgroups (gender). This method aimed at achieving desired representation from various subgroups, thus ensuring gender differentiation (Taherdoost, 2016). Grouping the respondents into different genders was essential to determine if different factors influence water use between both genders. However, simple random sampling was used to select the students to ensure that all the students had an equal chance of inclusion in the study. Purposive random sampling was used to select private student accommodation hostels (15 Hostels). The researcher focused on hostels that contain a large population of students, unlike those that are mostly populated by individuals who are not students. As a result, this allowed a researcher to use cases with the required information concerning this study (Taherdoost, 2016).

## 2.5. Data Collection Instruments

This study used four research instruments, questionnaires, a key informant interview, an observation guide, and a camera.

## 2.6. Questionnaire for Students

Questionnaires were preferred for data collection from the non-resident students because they are appropriate in descriptive surveys with many respondents. Moreover, the questionnaires allowed the respondents to express their views and make suggestions freely. Therefore, this tool was critical in collecting relevant data for determining water demand. Such data included the amount of water used daily by respondents, the cost of buying water, and sources of water during dry and wet seasons, among others. Overall, questionnaires were critical in collecting data for carrying out descriptive and inferential analysis to determine the demand for water.

## 2.7. Interview

The researcher used interviews to gather information from the key informants, such as Hostel Department Officers at the University and Landlords. Interviews are more effective than questionnaires when collecting information from a small sample since one can gather more data from respondents because the questionnaires tend to limit more data. Therefore, this was critical in collecting data on the available sources of water within the hostels, and the uses various uses of water among students.

## 2.8. Observation Schedule

Observation guides were used to collect information on the various sources of water supply within private student accommodation hostels. While using them, the researcher was supposed to tick the sources of water that are available within the selected hostels. Therefore, this tool was useful in collecting relevant data for the first and second objectives by providing data on the available water sources and various water uses within the Hostels.

## 2.9. Validity of Instruments

The researcher assessed content validity using professionals who included my university supervisors and other lecturers within the department. This was achieved through a content validity survey whereby every item was evaluated through a three-point scale (not necessary, useful, but not essential and essential). Additionally, the total number of panelists who conducted the study's content validity was five.

## 2.10. Reliability of the Research Instrument

The reliability of the questionnaires was assessed using a pilot study, after which a score was established. According to Taherdoost (2016), the reliability of a pilot study should be equal to or above 0.60. Other suggested cut-off points for reliability includes excellent reliability ( $\geq 0.90$ ), high reliability (between 0.70 and 0.90), moderate reliability (between 0.50 and 0.70), and low reliability ( $\leq 0.50$ ) (Taherdoost, 2016). Upon conducting the pilot study, the questionnaires were deemed reliable after obtaining a Pearson correlation coefficient of 0.653 which was found to be valid.

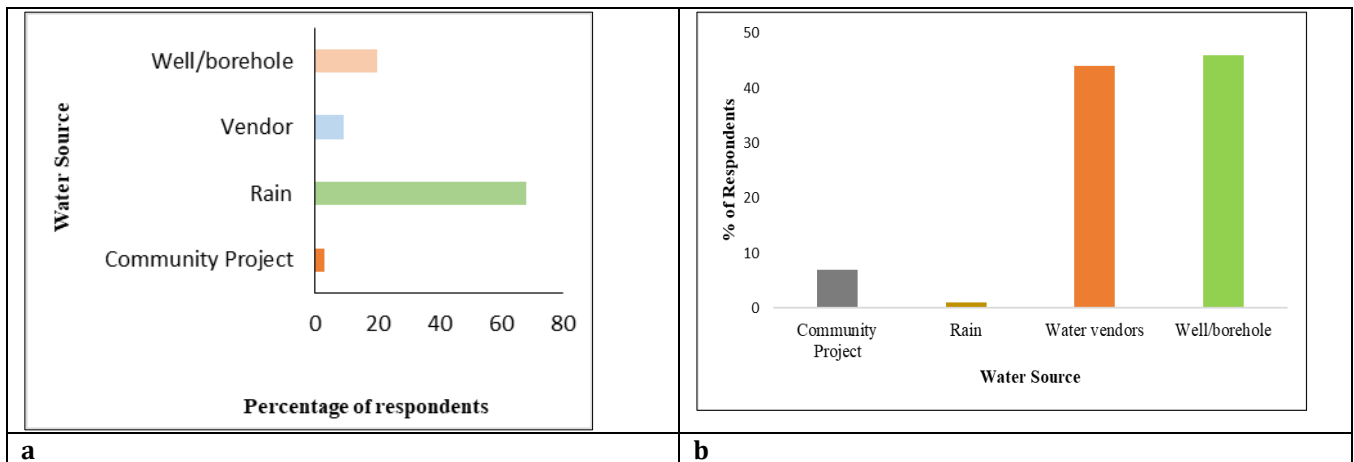
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## 3. Results

### 3.1. Sources of Water Available for Use by Non-resident Students

This study focused to establish the sources of water available for use by non-resident students at the University of Kabianga. Determination of primary water sources would shed light on the water accessibility, reliability, and suitability of water for the various uses by the students. According to the findings, majority of the respondents (68%) relied on rainwater during the rainy season, 20 % of the respondents relied on wells/boreholes, while 9% relied on water vendors. The smallest percentage (3%) of the respondents obtained their water from community water projects such as the Kapmaso water project (Fig 1a),

From the findings, it was noted that respondents obtained water from wells/boreholes and vendors during the dry season, as indicated in Fig 1b. Most respondents indicated that the cost of water was very high during the dry season, with prices of a 20Litre Jerrican of water -selling between 15-20 Kenya shillings. However, these prices keep on fluctuating depending on water scarcity and student demand. As a result, students are forced to follow the water vendors to the spring to ensure that they do not spend a lot of time waiting to buy water because the demand is very high, especially during the months of January and February; thus, the highest bidders were bound to get it first.

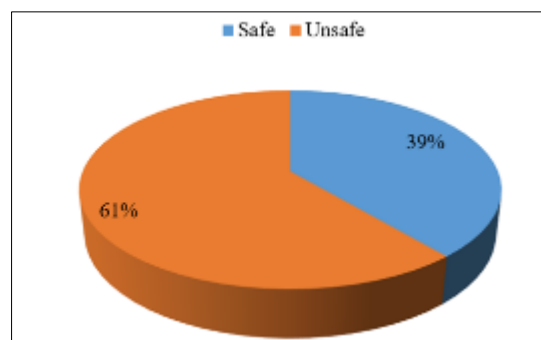


**Figure 1** Main source of water during the wet (a) and dry (b) seasons

### 3.2. Preferred source of water based on reliability and accessibility during the dry seasons.

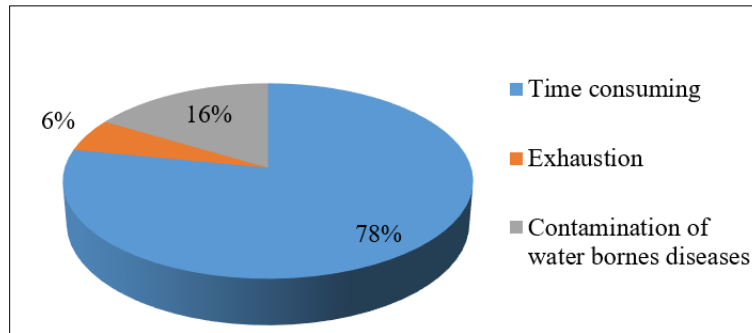
Student preference for the primary source of water was based on the source’s suitability for drinking, its effect on their studies in terms of the time they spent accessing its water, its availability, and reliability during the dry and wet seasons, and cost as well. According to majority of the respondents (61%), the available sources of water were not safe for drinking. For example, some argued that water from the wells was untreated. Others claimed that the water vendors’ level of hygiene was poor since their water vessels were rarely washed, thus increasing the chances of their water being contaminated. Moreover, others whose residential houses had rainwater harvesting water tanks confirmed that their landlords never made any efforts to ensure the water tanks were cleaned regularly. As a result, most respondents resorted to boiling the available water to prevent health risks since it was cost-effective compared to buying drinking water from shops.

According to a study by Wagner et al. (2020), using the available water source doesn’t necessarily mean that the residents don’t have any regard/value for clean drinking water. Instead, point-of-use treatment such as filtering, boiling, or chlorinating may be more cost-effective than paying a higher price or walking long distances to access clean water. Moreover, it may also minimize the risks of re-contamination while transporting. Therefore, the respondents’ use of the available water, regardless of its quality, didn’t necessarily mean that they disregarded the importance of clean drinking water but instead found it cost-effective. Figure 2 shows perceptions of the safety of drinking water by respondents.



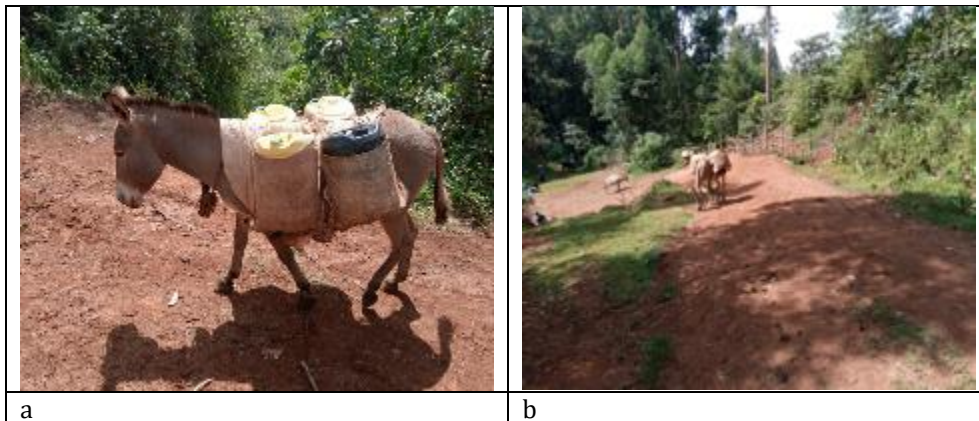
**Figure 2** Perceptions for Drinking water safety

The findings further indicated respondents’ preference for the most reliable and accessible water source was its effect on their studies in terms of the time they spent accessing it. Most of the respondents (78%) confirmed time wastage while trying to access water highly affected their studies. The likelihood of contamination of water-borne diseases (16%) and exhaustion (6%), respectively, formed part of the reasons behind water sources affecting their studies. Most respondents waste much time that could have otherwise been directed to studies instead of waiting for water vendors, especially in the dry seasons. Moreover, others cited the need to walk for more than one kilometer to go and wash their clothes or fetch water due to the high costs of water, especially in the dry seasons. Therefore, these reasons also formed the basis of the respondents’ identification of the major challenges of accessing water in the study area. Figure 3 depicts the challenges of access to water and the attendant effects on studies.



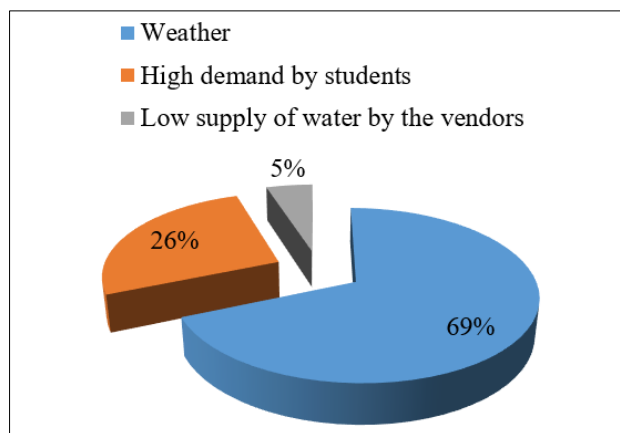
**Figure 3** Challenges of water access by off-Campus Students

According to the study, the changes in weather patterns was most respondents' main cause of the challenge in accessing water. This was mainly due to the scarcity of water during the dry seasons that led to high water demand, hence the high prices of water. Moreover, high rainfall resulted in an increase in soil particles in water, thus compromising the quality of water in such areas as water colour and turbidity from private vendors. However, very few students considered a low water supply by water vendors as a challenge in accessing water in the study area, especially during the rainy seasons. Additionally, other students cited high water demand as a challenge in accessing water, especially during the dry seasons. Romano et al. (2014) state that rainfall strongly influences residential water consumption. This resonates with this study's findings since rainfall increases the water supply during the rainy seasons, thus reducing the demand. However, it also poses various risks, such as an increase in soil particles in water, thus affecting its color and turbidity. Moreover, increased rainfall renders the access roads to the wells impassible, thus limiting the private vendors from supplying the students with adequate water.



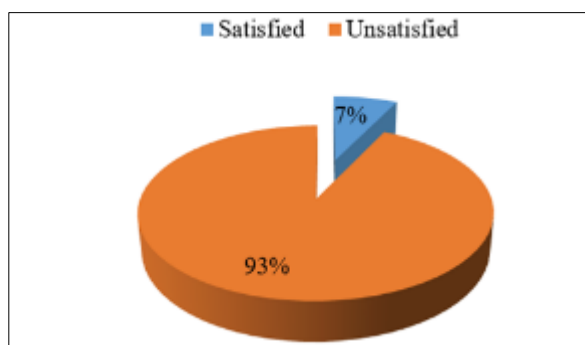
**Figure 4** (a) A donkey transporting water from the well (b) hilly terrain from the well

Haque et al. (2015) established that an increase in temperature had a significant impact on water consumption. This agrees with this study's finding that weather forms a significant challenge in accessing water since a temperature rise during the dry seasons will increase the water demand, thus creating a shortage. As a result, the water vendors increased the prices of the available water, thus rendering it unaffordable for most students (76.8%). Moreover, this forces some students to walk to the spring, where they can fetch water. However, this results in exhaustion, thus affecting their commitment to their studies. Figure 5 provides the main causes of challenges in accessing water.



**Figure 5** The main causes of challenges in accessing water

A majority (93%) of the students were unsatisfied with the Kericho County government’s role in ensuring that the town’s residents had reliable, affordable, and sustainable water sources for their use.



**Figure 6** Student satisfaction on County Government’s role in water supply in the town

According to most (49.4%) of them, the town lacks a piped water supply system for distributing water to their respective hostels, thus leaving them to pay high costs for water of unknown qualities from private vendors. Moreover, (17.7%) claimed that the county did not provide alternative sources of clean water, like clean water tankers, from which their landlords could buy water for their daily uses. Their claims were confirmed by landlords and the University’s hostels department. For example, one of the landlords claimed that “there was no existing clean water supply distribution system from which they could access water for their tenants, thus necessitating the provide other sources of unknown qualities like shallow wells, rainwater harvesting.” Moreover, officers from the hostel’s department confirmed that some hostels did not have reliable water sources within their premises for use by the tenants who were non-residents of the University.

#### 4. Discussion

It was established that most respondents (68%) relied on rainwater harvesting during the rainy season, while a relatively smaller percentage (3%) of the respondents obtained their water from community water projects. Most respondents draw their water from wells/boreholes (45.6%) and vendors (44%) during the dry seasons. The cost of water was considered by students as very high during the dry season since 20 litres of water was selling at between 15-20 shillings. Moreover, these prices kept on fluctuating depending on water scarcity and student demand. Other challenges that were linked with water scarcity during the dry season include walking for more than a kilometer to access water, exhaustion, and time wastage while waiting for private vendors to buy water. Additionally, female students were mostly affected during water scarcity periods since they were forced to pay high prices for water or wait for their male counterparts to get water first since walking for more than one kilometer to the spring was very exhausting and challenging to them. It was further established that students’ preference for the primary source of water during dry and wet seasons was based on the source’s suitability for drinking, its effect on their studies in terms of the time they spent accessing water, its availability and reliability during the dry and wet seasons, and cost. The weather

was also established as most respondents' main challenge in accessing water, while others cited high water demand as a challenge in accessing water (26%) and low water supply by water vendors (5%), especially during the dry seasons.

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## 5. Conclusion

According to the study, the water sources are unreliable, especially in the dry season, since the respondents were forced to pay high costs to get water or walk for more than a kilometer to fetch water, or look for a vendor to supply the much-needed water, either way, they wasted a lot of time (approximately 30-60 minutes) that they could have used to do part of their academic work if a reliable water source like piped water was available. As a result, most of them preferred piped water as their most reliable source. The project recommends that the landlords should work together with water Resource development and management agencies to provide for a more reliable water source, like piped water, from which students can get water at their convenience.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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