Ignatius Ajuru University of Education
Journal of Public Health and Safety Education Research
ISSN: 3141-2831

**Print ISSN: 3141-2831, e-ISSN:**
https://iauejournals.com
**Volume 1; Issue 1; April 2026; Page No. 40-47.**

# Behaviour Change Communication and Knowledge of Water, Sanitation, and Hygiene Among Government Senior Secondary School Students in Rivers State, Nigeria

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**Abstract**
WASH as access to safe water, sufficient sanitation, and hygiene, is an important tool in facilitating the well-being of adolescents, their health and academic achievements. Behaviour Change Communication (BCC) adopts a systematic approach in changing people's behaviour to improve health outcomes. Although some interventions have been undertaken, a lack of knowledge of WASH is still a significant concern among adolescents in Nigeria. The paper discussed how Behaviour Change Communication can impact the knowledge of WASH among students in government senior secondary schools in Rivers State. A quasi-experimental design was used with 216 students sampled using a multistage sampling method. The data were gathered with a validated self-administered questionnaire and processed with the help of descriptive statistics and ANCOVA with a significance level of 0.05. The findings revealed that the students were more knowledgeable about WASH post the BCC intervention, with mean scores increasing from 2.00±0.83 at pre-test to 6.88±1.43 at post-test ($F(1, 215) = 17.14$, $p < 0.05$). The study further showed significant differences based on gender [$F(1,215) = 7.48$, $p<0.05$], and parents' occupation [$F(1,215) = 2.15$, $p<0.05$]. The results indicate that well-designed Behaviour Change Communication can have a beneficial effect on WASH knowledge of adolescents, irrespective of their demographic background. To promote sustainable hygiene behaviours and enhance health outcomes, the study recommends the incorporation of Behaviour Change Communication into school health curricula by the Rivers State Ministry of Education.

**Keywords**: Behaviour Change Communication, Water Sanitation, Hygiene, Knowledge, Adolescents.

## Introduction

Access to safe water, adequate sanitation, and good hygiene (WASH) is essential for health, learning and human development. In school settings, functioning Water, Sanitation Hygiene services reduce the incidence of diarrhoeal and respiratory diseases, improve attendance (especially for adolescent girls during menstruation), and create environments conducive to learning (UNICEF & WHO, 2024). Despite global progress, recent joint monitoring shows persistent gaps: many schools still lack basic drinking water, safe sanitation, or handwashing facilities with soap, undermining efforts to protect child and adolescent health and to meet Sustainable Development Goal 6.1 to 6.2 targets for schools. (World Health Organisation & UNICEF, 2024). Nigeria faces substantial Water, Sanitation and Hygiene challenges in both households and institutions, including schools. National assessments show wide subnational variation, with many schools, particularly in rural and underserved states, lacking reliable water supplies and hygiene


*Cite this article as*:
Okene, A.I. & Samuel, G.K. (2026). Effects of behavior change communication on knowledge of water, sanitation and hygiene (wash) among government senior secondary school students in rivers state, Nigeria. *IAUE Journal of Public Health and Safety Education Research, 1*(1), 40-47.

facilities (Federal Ministry of Water Resources et al., 2021). The 2021 WASHNORM mapping highlighted inequalities in access to basic Water, Sanitation and Hygiene services across states and wealth quintiles and emphasised that improving behaviour and infrastructure together is necessary to translate services into health gains (Federal Ministry of Water Resources, NBS & UNICEF, 2021). In developing countries, including Nigeria, inadequate WASH facilities and poor hygiene practices remain prevalent in many Government secondary schools, contributing to absenteeism, reduced academic performance, and increased disease burden (Lawal et al., 2025). Rivers State studies similarly document inadequate school WASH conditions in several localities, indicating that students remain vulnerable to water- and sanitation-related illnesses and that knowledge-to-practice gaps often persist even where infrastructure exists. (UNICEF, 2021) Behaviour Change Communication, a strategic, theory-informed approach to designing and delivering messages, skills training, and enabling environments, is widely used to promote healthy WASH behaviours such as handwashing with soap, safe water handling, and sanitary disposal of faeces (Watson et al., 2021). Behaviour Change Communication works by addressing knowledge, attitudes, social norms and practical barriers simultaneously, often combining interpersonal communication, school-based education, demonstrations, and environmental cues. Systematic reviews show that school-based interventions can improve hygiene knowledge and practices, but effect sizes vary and success depends strongly on intervention design (interactive versus didactic), the use of behaviour-change techniques, and whether messaging is paired with reliable facilities and supplies (Pradhan et al., 2020; Watson et al., 2021). Behaviour Change Communication has also become a central strategy in Government health interventions aimed at improving knowledge and promoting healthy practices, particularly in the area of Water, Sanitation, and Hygiene. It involves the systematic use of communication approaches such as mass media, interpersonal education, and community engagement, to influence positive health behaviours and enhance knowledge acquisition among target populations (Udoudom et al., 2023). Behaviour Change Communication has been shown to significantly improve health-related knowledge and practices when effectively implemented. Evidence from Government health interventions in Nigeria and other African countries demonstrates that exposure to BCC messages increases knowledge, shapes positive attitudes, and enhances the adoption of preventive behaviours (Eze et al., 2025; Orkoh & Efobi, 2024). Moreover, the use of multiple communication channels—including digital platforms, peer education, and school-based programmes—has been identified as an effective approach for reinforcing WASH messages among adolescents (Udoudom et al., 2024). Adolescents in senior secondary schools are a critical population for WASH interventions. They are at an age where habits (positive or negative) become established, and school-based education can cascade to households through peer and family influence (Joshi & Amadi, 2013). In contexts like Rivers State, where student populations are large and schools are central community institutions, well-designed Behaviour Change Communication has the potential to increase WASH knowledge and to translate that knowledge into practice, provided messages are culturally appropriate, repeated, and reinforced with enabling resources (soap, water, toilets) and supportive school policies (Joshi & Amadi, 2013).

However, evidence also points to key implementation barriers: knowledge gains do not always translate to sustained practice if facilities are absent, if social norms oppose certain behaviours, or if interventions are one-off and not reinforced (Pradhan et al., 2020; MacLeod et al., 2025). Recent systematic work highlights that behaviour-change techniques that build understanding, create habit cues, leverage social norms, and provide feedback are most promising, but that these must be adapted to local contexts and delivery platforms (e.g., teacher-led sessions, peer education, school clubs) to achieve sustained effects. This underscores the need for context-specific evaluations that measure both knowledge and practice before and after Behaviour Change Communication interventions (Watson et al., 2021). In Rivers State, limited empirical studies have rigorously evaluated the effect of structured Behaviour Change Communication on WASH knowledge among senior secondary students using pre-post designs or controlled studies. Where local research exists, it often documents infrastructure deficits or describes cross-sectional knowledge and practice but falls short of testing tailored communication strategies and linking those to measurable knowledge gains (Wami, 2022). Consequently, there is a knowledge gap on (a) which Behaviour Change Communication approaches most effectively increase WASH knowledge among older adolescents in Rivers State schools, and (b) how knowledge gains vary by school type, gender, access to facilities or parents' income level. Filling this gap is important for programme design, resource allocation, and policy decisions at state and national levels.

This study examines the impact of behaviour change communication on WASH knowledge among Government senior secondary school students in Rivers State, Nigeria. The research used a pre-test/post-test quasi-experimental methodology to assess alterations in WASH knowledge after a theory-driven BCC intervention and investigates


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contextual variables that may affect knowledge acquisition. Findings are intended to inform state-level policy and school programs by identifying feasible, scalable communication strategies that can strengthen WASH knowledge among adolescents and support downstream improvements in WASH practice and health outcomes.

This study aimed to examine the effect of behaviour change communication on knowledge of water, sanitation and hygiene (WASH) among Government senior secondary school students in Rivers State, Nigeria. In specific terms, the objectives of the study were to:

1. Determine the effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State.
2. Ascertain the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender.
3. Investigate the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation.

Research Questions.

1. The following research questions were answered:
2. How does behaviour change communication affect the knowledge of WASH among Government senior secondary school students in Rivers State?
3. How does behaviour change communication affect the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender?
4. What is the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation?

Hypotheses

The following null hypotheses were stated and tested at a 0.05 level of significance:

1. Behaviour change communication has no significant effect on the knowledge of WASH among Government senior secondary school students in Rivers State.
2. Behaviour change communication has no significant effect on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender.
3. Behaviour change communication has no significant effect on the Knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation.

**Methodology**

This study employed a pre-test–post-test quasi-experimental design, which is suitable for evaluating the effect of an intervention administered to a selected group of participants without random assignment. The design enabled the researcher to measure baseline characteristics before the intervention and assess changes following exposure to the treatment. All seniors in Rivers State's Government secondary schools were considered part of the study's target population. There were a total of 261,404 pupils, both male and female, as reported by Patrick (2023) and the Planning, Research & Statistics Department of the Rivers State Senior Secondary Schools Board (2021). From this demographic, researchers selected study participants. A sample size of 278 students was initially determined using a simplified Cohen's formula appropriate for quasi-experimental studies involving pre-test and post-test measurements. Of the participants recruited, 216 students completed the entire study process, and this final number formed the basis for data analysis. A multi-stage sampling procedure was used to ensure adequate representation across the different geographical zones of Rivers State. The following five stages were involved: stratification into three zones, selection of Local Government Areas from the zones, selection of schools from the Local Governments, Proportionate allocation of participants to schools according to their size and systematic sampling of the students from the selected schools. Data were collected using a self-administered questionnaire titled Knowledge of WASH (KWASH). While reliability of the instrument was established using the Pearson Product-Moment Correlation (r). Correlation of responses from two different administrations of the instrument yielded: Knowledge: r = 0.80. The value exceeds the acceptable threshold of 0.70, indicating that the instrument was reliable. An official approval letter from the Rivers State Senior Secondary Schools Board was presented to the principals of the selected schools to obtain access and permission. The researcher explained the purpose and procedures of the study to the students, and informed consent was obtained. Data collection occurred in three phases: Pre-intervention Phase, Intervention Phase and Post-Intervention Phase and

completed questionnaires (representing a 78% return rate) were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 25.0. Analyses were conducted on data from the 216 participants who completed both the pre-test and post-test phases.

**Results**

**Research Question 1:** What is the effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State?

**Table 1: Mean and standard deviation on the effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State**

| Group | N | $\bar{X}$ | Std Dev | Mean difference (post – pre) | Decision |
|---|---|---|---|---|---|
| Pretest | 219 | 2.00 | 0.83 | 4.88 | Positive effect |
| Posttest | 216 | 6.88 | 1.43 | | |

The effect of behaviour change communication on the understanding of WASH among Government senior secondary school students in Rivers State is shown in Table 1, along with the standard deviation of the mean. The study found that there was a beneficial impact, as the mean score pre-test was 2.00±0.83 (out of a possible 10), and the mean score post-test was 6.88±1.43. The mean difference was 4.88. Therefore, pupils' awareness of WASH increased after receiving behaviour change communication in Rivers State's Government senior secondary schools.

**Research Question 2:** What is the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender?

**Table 2: Mean and standard deviation on the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender**

| Gender | Pretest | | Posttest | | Mean difference | Decision |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | (post – pre) | |
| **Male** | 1.50 | 0.36 | 1.67 | 0.31 | 0.17 | Positive effect |
| **Female** | 1.67 | 0.32 | 1.95 | 0.04 | 0.16 | |
| **Total** | **1.74** | **0.29** | **1.90** | **0.29** | 0.16 | |

Table 2 displays the gender-based means and standard deviations for the impact of behaviour change communication on WASH knowledge among Government high school seniors in Rivers State. Research found that female participants in the pretest group had an average knowledge score of 1.67±0.32, which improved to 1.95±0.05 on the posttest, with a mean difference of 0.16. Similarly, male participants in the pretest group had an average knowledge score of 1.50±0.36, which improved to 1.67±0.31 on the posttest, with a mean difference of 0.17. Therefore, Government high school seniors in Rivers State benefited from behaviour change communication in terms of their WASH knowledge.

**Research Question 3:** What is the effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation?

**Table 3: Mean and standard deviation on the effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation**

| Parent's occupation | Pretest | | Posttest | | Mean difference | Decision |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | (post – pre) | |
| **Farming** | 1.26 | 0.68 | 1.72 | 0.41 | 0.46 | Positive effect |
| **Fishing** | 1.22 | 0.67 | 1.82 | 0.32 | 0.60 | |
| **Business** | 1.61 | 0.54 | 1.86 | 0.27 | 0.25 | |
| **Formal Work** | 1.08 | 0.83 | 1.80 | 0.34 | 0.72 | |
| **Total** | 1.29 | 0.68 | 1.80 | 0.33 | 0.51 | |


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Government high school seniors in Rivers State can see the average and standard deviation of their parents' occupation-based WASH knowledge after receiving behaviour change communication in Table 3. The study's findings demonstrated a beneficial impact, with an average change of 0.51 points between the pretest and posttest knowledge scores, from 1.29±0.68 to 1.80±0.33. As a result, students' WASH knowledge increased after receiving behaviour change communication at Rivers State's Government senior secondary schools, regardless of their parents' occupations.

**Hypothesis 1:** There is no significant effect of behaviour change communication on the knowledge of WASH among Government senior secondary school students in Rivers State

**Table 4: Analysis of Covariate (ANCOVA) on the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial eta square |
|---|---|---|---|---|---|---|
| Corrected Model | 94.786[a] | 1 | 94.786 | 17.142 | .000 | 0.74 |
| Intercept | 2308.537 | 1 | 2308.537 | 417.492 | .000 | 0.66 |
| PreKnow*WASH | 94.786 | 1 | 94.786 | 17.142 | .000* | 0.74 |
| Error | 1183.320 | 214 | 5.530 | | | |
| Total | 11515.000 | 216 | | | | |
| Corrected Total | 1278.106 | 215 | | | | |

*Significant; p<0.05

To determine the impact of behaviour change communication on WASH knowledge among Government senior secondary school students in Rivers State, an Analysis of Covariance (ANCOVA) was performed, as shown in Table 4. The understanding of WASH was significantly impacted by behaviour change communication, according to the ANCOVA result [F(1,215) = 17.14, p<0.05]. Additionally, the behaviour change communication might account for 66.0% (ϋ2 = 0.66) of the variation in the post-test WASH knowledge score. As a result, we can reject the null hypothesis that Government high school seniors in Rivers State would not benefit from behaviour change communication in terms of their WASH knowledge.

**Hypothesis 2:** Behaviour change communication has no significant effect on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender

**Table 5: Analysis of Covariate (ANCOVA) on the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on gender**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial eta square |
|---|---|---|---|---|---|---|
| Corrected Model | 3.98 | 1 | 3.98 | 7.48 | .002 | .487 |
| Intercept | 2474.22 | 1 | 2474.22 | 300.54 | .584 | .000 |
| PreKnow*Gender | 3.98 | 1 | 3.98 | 7.48 | .002* | .487 |
| Error | 1761.77 | 214 | 8.23 | | | |
| Total | 12044.00 | 216 | | | | |
| Corrected Total | 1765.75 | 215 | | | | |

*Significant; p<0.05

An analysis of covariance (ANCOVA) was performed to determine the influence of behaviour change communication on gender-based WASH knowledge (Table 5). The understanding of WASH was significantly impacted by behaviour change communication, according to the ANCOVA result [F(1,215) = 7.48, p<0.05]. In addition, the gender of the respondents may account for 48.7% (ϋ2 = 0.487) of the variation in the post-test knowledge score. Hence, the gender-based null hypothesis that Government high school pupils in Rivers State did not benefit from behavioural change communication about their WASH knowledge was rejected.


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**Hypothesis 3:** Behaviour change communication had no significant effect on the knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation

**Table 6: Analysis of Covariate (ANCOVA) on the effect of behaviour change communication on the Knowledge of WASH among Government senior secondary school students in Rivers State based on parents' occupation**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial eta square |
|---|---|---|---|---|---|---|
| Corrected Model | 57.458[a] | 1 | 57.458 | 2.150 | .149 | .043 |
| Intercept | 548.832 | 1 | 548.832 | 20.532 | .000 | .300 |
| PreKnow*Occup | 57.458 | 1 | 57.458 | 2.150 | .049* | .043 |
| Error | 1283.042 | 214 | 26.730 | | | |
| Total | 40261.000 | 216 | | | | |
| Corrected Total | 1340.500 | 215 | | | | |

*Significant; $p<0.05$

The Analysis of Covariance (ANCOVA) in Table 6 was conducted to determine the impact of behaviour change communication on the knowledge of WASH in relation to the occupation of the parents. The ANCOVA results indicated that the knowledge of WASH was significantly influenced by behaviour change communication [$F(1,215) = 2.15$, $p<0.05$] in relation to the occupation of the parent. Nevertheless, the parent's occupation could account for only 4.3% ($\omega 2 = 0.043$) of the variance in the post-test WASH practice score. Consequently, the null hypothesis, which posited that the knowledge of WASH among Government senior secondary school students in Rivers State was not significantly influenced by behaviour change communication based on the occupation of their parents, was rejected.

**Discussion**

In Table 1, we can see that the study found a favourable impact, since the mean score before the test was 2.00±0.83 (out of a possible 10), while the mean score after the test was 6.88±1.43. Consequently, the results showed that the understanding of WASH among Government senior secondary school students in Rivers State was positively impacted by behaviour change communication ($F(1,215) = 17.14$, $p<0.05$). Students in Rivers State's Government senior secondary schools had their knowledge of water, sanitation, and hygiene (WASH) improved as a result of exposure to basic information through a behaviour change communication intervention. This intervention had a positive effect on students' knowledge levels. Education has a favourable effect on knowledge when it is provided acceptably. These results are in agreement with those of Amar (2021), who looked at elementary school students in Bangun Rejo, Indonesia, and found that there was a statistically significant link between students' knowledge and their behaviour when it came to certain aspects of water, sanitation, and hygiene (WASH), including how often they washed their hands with soap. The similarities between this study and Amar's might be explained by the fact that both studies utilised a similar technique and both focused on students. Consistent with previous research, this study found that health education had a highly significant effect on participants' health after the intervention program. Boshra and Mariod (2021) investigated the impact of personal hygiene education on students' health in primary schools in Khartoum state, Sudan. The researchers concluded that health education messages can help raise students' awareness of the importance of good hygiene and reduce the health problems linked to poor hygiene. The similarities between the current research and Boshra and Mariod's might be explained by the fact that both studies concentrated on students, which makes their study populations quite comparable. Nevertheless, Novák et al. (2020) found no statistically significant differences between the groups of respondents with and without proper hand hygiene compliance in routine hand washing. Their survey results suggested that respondents may be prone to forgetting to wash their hands, which could explain why there is decreased compliance with hand washing protocols. This study disagrees with their findings. As a sub-component of WASH, hand hygiene knowledge impacts hygiene compliance among healthcare professionals. Differences in research population, technique, and site could account for the observed variance.

According to Table 2, the study found that the average knowledge score for female respondents in the pretest group was 1.67±0.32, while for male respondents it was 1.50±0.36. After the test, the average knowledge score was


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1.95±0.05 for females and 1.67±0.31 for males, with a mean difference of 0.16 for females and 0.17 for males, and a grand mean difference of 0.16 for both groups, indicating a positive effect. As a result, pupils' knowledge of WASH increased after receiving behaviour change communication at Rivers State Government senior secondary schools. Based on these findings, it can be concluded that behaviour change communication increased respondents' WASH understanding. Contrary to what was found in a cross-sectional study on gender disparity that examined the knowledge and behaviour of people with different ages and levels of education regarding hand hygiene (a subcomponent of WASH), this study found that women had significantly higher scores on the hygiene knowledge test than men did. (Suen et al., 2019). The differences in some of the study's factors could be to blame for this discrepancy. There are other studies that support the current research's perspective. Additionally, the results demonstrated that male and female students' attitudes and conduct differed significantly (<0.05) with a significance level of 0.003 and 0.010, respectively. The fact that the factors in both studies are so similar could explain this consistency. Nurudeen and Toyin (2020) researched undergraduates' knowledge of personal hygiene (a component of WASH) at Nigeria's University of Ilorin. There is a statistically significant gender gap in personal hygiene awareness among University of Ilorin freshmen (p= 0.018). This study found that undergraduates at the University of Ilorin are generally well-versed in personal hygiene practices; however, there is a significant age-and gender-based gap in this area of knowledge. Possible methodological similarities explain the connection between this study and the work of Nurudeen and Toyin.

Table 3 displays the results of this study, which reveal that Government senior secondary school students in Rivers State who were surveyed about their parents' occupations had a beneficial impact on their knowledge of WASH through behaviour change communication (mean difference = 0.51). Knowledge of WASH as it relates to parents' profession was shown to be significantly affected by behaviour change communication, according to the ANCOVA results [$F(1,215) = 2.15$, $p<0.05$]. Students whose parents work in an official capacity benefited the most from behaviour change communication, according to a breakdown of the results; nonetheless, the overall mean difference indicates a favourable effect. The students' attitudes and behaviours differed significantly from one another, but there was no significant difference in their knowledge or cognitive abilities, according to the study. A child's cognitive abilities, attitude, or knowledge are not significantly different from those of a child whose parents have paid employment. On the other hand, kids whose parents worked in various fields acted differently.

**Conclusion**

The study's findings concluded that behaviour change communication significantly influences the knowledge of water, sanitation and hygiene among Government senior secondary school students in Rivers State. Based on gender and parents' jobs, behaviour change communication also has a big influence on Government senior secondary school students' awareness of water, sanitation and hygiene in Rivers State.

**Recommendations**

The findings of the research led to the following recommendations being made:

1. The Government and policymakers should support education and awareness campaigns and invest in initiatives that educate the students and the Government about the importance of clean water, sanitation and hygiene.
2. The communities should actively engage in Local clean-up initiatives, organise community clean-up days to improve local sanitation and promote a culture of cleanliness.
3. Governments should create and uphold policies that encourage long-term water and sanitation sustainability.
4. Schools and communities should participate in Knowledge sharing and host workshops to educate community members about proper hygiene practices and the importance of sanitation.
5. To promote sustainable hygiene behaviours and enhance health outcomes, the Rivers State Government through the Ministry of Education should incorporate Behaviour Change Communication into the school health curriculum.

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