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**Original Research Article**

# Effect of school-led total sanitation intervention on school attendance among pupils in primary schools within Baringo County, Kenya

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## ABSTRACT

**Background:** School attendance critically determines educational outcomes, especially in resource-constrained settings. Poor sanitation and hygiene cause illness-related absenteeism in primary schools. This study evaluated the impact of school-led total sanitation (SLTS) intervention on pupil attendance in Baringo County, Kenya.
**Methods:** A pre-post quasi-experimental design with non-equivalent control groups was conducted in six primary schools across two sub-counties in Baringo County. Three Mogotio Sub-County schools received SLTS intervention; three Baringo South Sub-County schools served as controls. Using multistage sampling, 440 pupils from grades 4-7 were enrolled. SLTS intervention included health club establishment, triggering, and health education. Data were collected at baseline and post-intervention using questionnaires and headteacher key informant interviews. School attendance was measured as absence in the previous two weeks, with chi-square analysis at $p<0.05$.
**Results:** At baseline, absence rates were similar between intervention (22.6%) and control (26.1%) schools ($\chi^2=0.739$, $p=0.390$). At the endline, intervention schools improved to 20.6% absence rates while control schools declined to 28.7%. However, this difference was not statistically significant ($\chi^2=3.823$, $p=0.051$). Illness remained the primary cause of absenteeism across groups (>70%), with no significant differences in illness-related absences or specific conditions, such as diarrhoea and respiratory diseases, between groups. School feeding programs strongly motivated attendance, while cultural practices, gender roles, and environmental factors acted as barriers.
**Conclusions:** School-led total sanitation intervention did not significantly improve attendance in the study. School absenteeism is multifaceted with multiple contributing factors. While SLTS may create enabling environments, comprehensive approaches addressing multiple absenteeism determinants are needed for meaningful attendance improvements.

**Keywords:** Absenteeism, School attendance, School-led total sanitation

## INTRODUCTION

School attendance is a critical determinant of educational outcomes and long-term development prospects for children, particularly in resource-constrained settings across sub-Saharan Africa. While significant progress has been made in expanding access to primary education, with global net primary school attendance reaching 87% and Kenya achieving 85% in 2021.[1] Ensuring consistent attendance remains a persistent challenge. This challenge is particularly prevalent in rural and marginalized communities such as Baringo County in Kenya's Rift Valley region, where the primary school net attendance rate was 79% in 2019.[2] Despite the introduction of free primary education in 2003, various socioeconomic, environmental, and infrastructural factors continue to

contribute to irregular school attendance patterns among pupils in such areas.[3]

Among the multiple factors affecting school attendance, poor sanitation emerges as a significant barrier, with water and sanitation-related diseases causing 443 million lost school days globally each year.[4] The relationship between sanitation and attendance operates through multiple pathways. Poor sanitation, particularly inadequate access to clean toilets and handwashing facilities, increases the incidence of illness among students, which in turn leads to increased absenteeism. Additionally, unhygienic conditions facilitate disease transmission, impacting overall student health and well-being, which further compromises their ability to attend school regularly.[5] Conversely, improved sanitation and hygiene practices create a more conducive learning environment, potentially enhancing both student attendance and concentration while reducing illness-related absenteeism.

Evidence linking sanitation interventions and school attendance, however, remains mixed. In the Philippines, a school-based sanitation and hygiene intervention significantly reduced diarrhoea-related absenteeism, with pupils in intervention schools being seven times less likely to miss school due to diarrhoea.[6] In contrast, other studies have produced null findings. A matched-control trial in Mali found that while pupils from intervention schools were less likely to be absent due to diarrhoea and respiratory diseases, there was no significant difference in overall school attendance rates between intervention and control schools.[7] Similarly, a randomized control trial in Ethiopia found no statistically significant impact on school attendance between intervention and control schools.[8]

Given these mixed findings, there is a clear need for more experimental studies, particularly in Kenyan rural areas with poor access to sanitation facilities, to evaluate whether school-based sanitation and hygiene interventions influence school attendance among pupils. The school led total sanitation (SLTS) is one among the interventions that can be employed to address diarrhoea-related absences in primary schools. Building upon the principles of community led total sanitation (CLTS), SLTS is a school-driven approach that emphasizes behavioural change, community ownership, and sustainable sanitation practices within the school environment. This approach strategically uses schools as entry points and empowers children as agents of change through comprehensive hygiene education, community engagement, and the creation of an enabling environment that supports consistent school attendance.[9] By involving pupils, teachers, parents, and the broader community, SLTS aims to create lasting changes in sanitation and hygiene practices while reducing the burden of sanitation and hygiene-related infections that contribute to school absenteeism.

Therefore, this study aimed to evaluate the effect of the school-led total sanitation (SLTS) approach on school attendance among primary school pupils in Baringo County, Kenya.

## METHODS

### *Study setting*

The study was conducted in Baringo County, Kenya, located in the Rift Valley region. The county covers about 11,015 km$^2$ with a population of 754,014 people.[10] Baringo County's climatic conditions are arid and semi-arid, with a smaller portion having tropical rain forest. The research was conducted in two sub-counties: Baringo South and Mogotio.

### *Study design and sampling procedure*

A pre-post-test quasi-experimental design with a non-equivalent control group was adopted for this study. The study had an intervention (Mogotio Sub-County) and a control arm (Baringo South Sub-County). Using a multistage cluster sampling method, three primary schools were selected from each of the two sub-counties, 440 pupils, with 220 pupils drawn from each study arm. A baseline assessment was conducted before the intervention, which was implemented over a period of six months. An endline evaluation was then carried out three months after the intervention's completion.

**Table 1: Population and sample size selection from each participating school.**

| Arm | School | Total population | Sample size |
|---|---|---|---|
| **Intervention** | Lolbugo primary school | 215 | 60 |
| | Kiptoim primary school | 311 | 70 |
| | Sagasagik primary school | 433 | 90 |
| **Control** | Perkerra primary school | 209 | 40 |
| | Loropir primary school | 335 | 70 |
| | Sintaan primary school | 477 | 110 |
| **Total** | | 1978 | 440 |

The study targeted 6 schools in Mogotio and Baringo South sub-counties. Three schools were selected from each respective sub-county, with Mogotio being the

intervention arm while Baringo South was the control arm. In the intervention arm, all children from pre-primary to primary grades were exposed to the intervention, whereas in control schools, no intervention was implemented. Pupils participating in the study were selected from grades 4-7. The sample size from each school was proportional to its population size, as shown in Table 1.

Pupils in lower grades could not be selected as they were relatively young to respond to questionnaires. Pupils in grade 8 were also excluded as they were in their final year in primary school, and they could not be in school for the entire project period.

### *Study tools*

An interviewer-administered questionnaire was used to collect demographic data as well as knowledge and practices about hygiene and sanitation. Key informant interview was conducted with all the head teachers in the study schools.

### *Data collection*

Baseline data was collected between January and February 2021. Training of the study implementation team was carried out in March 2021. The school-led total sanitation intervention was carried out between April and September 2021. Post-intervention data collection was conducted between January and February 2022.

### *The intervention*

A team, consisting of two teachers, a school board of management representative, a parents and teachers association representative, a community health volunteer from each school, and an area public health officer, underwent training on SLTS program objectives, implementation processes, and their respective roles. Subsequently, health clubs were established. Membership in the health clubs was drawn from grades 3 to 8. The clubs received training on various topics, including faecal contamination pathways, handwashing, safe disposal of faeces, personal hygiene, menstrual hygiene, and environmental sanitation. Led by teachers responsible for health affairs, these training sessions were conducted under the guidance of the area's Public Health officer. The health club members from each school then devised action plans for SLTS implementation.

Triggering of schools involved utilizing ignition participatory rural appraisal tools (IPRA) that included school mapping, transect walks, determination of faecal contamination pathways using the F-diagram, and employing the shit calculation.[11] After triggering, there were ignition moments, leading to the emergence of natural pupil leaders who became integral members of the school health club teams.

Information, education, and communication (IEC) materials, including t-shirts for health club members, household brochures, and thematic posters, were distributed to all pupils in each school. Additionally, health messages were painted on the walls of both boys' and girls' latrines, known as "talking walls," to serve as constant reminders of proper hygiene and sanitation practices.

Continuous sensitization of pupils on SLTS objectives and activities was done by integrating the approach into regular classroom lessons and assembly forums. Consistent emphasis on the same messages took place during assemblies before half-term and holiday breaks, led by respective health club teachers.

### *Data analysis*

The data were analyzed using IBM SPSS statistics version 18. Demographic characteristics of the respondents were described using means and proportions. The normality of continuous data was evaluated by the Kolmogorov-Smirnov test before further analysis, while the listwise deletion method was used to handle missing data. Continuous data were analyzed and reported as means, while categorical data were summarized through the calculation of frequencies and proportions. Pupils' absenteeism was measured by the number of days missed in the last two weeks before the study. The comparison of school attendance between the control and intervention groups was determined using the Chi-square statistic method. Statistical significance was determined at a p value of $<0.05$ with a 95% confidence interval. All tests were two-tailed. Qualitative data from KII were transcribed and summarized into themes

## RESULTS

Table 2 shows the demographic characteristics of the pupils in both the intervention and control arms during baseline and end line. At baseline, the mean age for pupils in the intervention arm was 12.5 years, slightly lower than the control arm's mean age of 12.8 years. At the end-line assessment, the mean ages for the intervention and control arms were 12.7 and 12.4 years, respectively. In terms of gender distribution, at both baseline and end-line, a higher proportion of males (52% at baseline and 50.2% at end-line) were interviewed in the intervention arm. On the other hand, a higher proportion of females (53% at baseline and 55.3% at end-line) were interviewed in the control arm. The majority of the households were headed by fathers in all the study arms, both at baseline and at end line.

**Table 2: Demographic characteristics of pupils in the study and control arms.**

| | Baseline | | End line | |
|---|---|---|---|---|
| | Intervention | Control | Intervention | Control |
| **Characteristic** | **N (%)** | **N (%)** | **N (%)** | **N (%)** |
| **Age (years)** | | | | |
| Mean±SD | 12.54±0.98 | 12.82±1.83 | 12.71±1.12 | 12.37±0.89 |
| **Gender** | | | | |
| Male | 115 (52) | 102 (47) | 105 (50.2) | 100 (44.5) |
| Female | 106 (48) | 116 (53) | 104 (49.8) | 123 (55.2) |
| **Grade** | | | | |
| 4 | 54 (24.4) | 50 (22.9) | 43 (20.6) | 55 (24.7) |
| 5 | 54 (24.4) | 53 (24.3) | 44 (21.7) | 52 (23.3) |
| 6 | 72 (32.6) | 56 (25.7) | 53 (25.4) | 60 (26.9) |
| 7 | 41 (18.6) | 59 (27.1) | 69 (33) | 56 (25.1) |
| **Head of household** | | | | |
| Mother | 25 (11.3) | 31 (14.2) | 35 (16.7) | 36 (16.1) |
| Father | 157 (71.1) | 172 (78.9) | 150 (71.8) | 166 (74.4) |
| Guardian | 39 (17.6) | 15 (6.9) | 24 (11.5) | 21 (9.4) |

**Table 3: Comparison of school attendance in control and intervention schools at baseline and endline.**

| Description | Baseline | | | | | End line | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Intervention N (%) | Control N (%) | Df | $\chi^2$ | P value | Intervention N (%) | Control N (%) | Df | $\chi^2$ | P value |
| **Absent in the last 2 weeks** | | | | | | | | | | |
| Absent | 50 (22.6) | 57 (26.1) | 1 | 0.739 | 0.390 | 43 (20.6) | 64 (28.7) | 1 | 3.823 | 0.051 |
| Present | 171 (77.4) | 161 (73.9) | | | | 166 (79.4) | 159 (71.3) | | | |
| **Reason for being absent** | | | | | | | | | | |
| Sickness | 39 (78) | 42 (73.7) | 1 | 0.227 | 0.601 | 31 (72.1) | 46 (71.9) | 1 | 0.0024 | 0.961 |
| Others | 11 (22) | 15 (26.3) | | | | 12 (27.9) | 18 (28.1) | | | |
| **Absence due to diarrhoea and respiratory disease symptoms** | | | | | | | | | | |
| Yes | 13 (33.3) | 13 (30.9) | 1 | 0.042 | 0.840 | 8 (25.8) | 14 (29.5) | 1 | 0.188 | 0.665 |
| No | 26 (66.7) | 298 (69.1) | | | | 23 (74.2) | 32 (69.5) | | | |

At baseline, 50 children (22.6%) had been absent in the previous two weeks in intervention schools, while in control schools, 57 children (26.1%) missed school during the same period. This difference was not statistically significant ($\chi^2$=0.739, df=1, p=0.390. The endline assessment absence rates in intervention schools decreased to 43 children (20.6%), representing an improvement from baseline. In contrast, control schools showed a slight increase in absences to 64 children (28.7%). This difference was, however, not statistically significant ($\chi^2$=3.823, df=1, p=0.051).

Among children who were absent at baseline, sickness accounted for 39 cases (78%) in intervention schools and 42 cases (73.7%) in control schools. The remaining absences were attributed to other factors such as family obligations, cultural practices, or economic responsibilities. The difference in illness-related absences between groups was not statistically significant either ($\chi^2$=0.227, df=1, p=0.601). The pattern of illness-related absences remained consistent at endline, with sickness continuing to be the primary reason for missing school. Among absent children, 31 cases (72.1%) in intervention schools and 46 cases (71.9%) in control schools were attributed to illness ($\chi^2$=0.0024, df=1, p=0.961).

Regarding specific health conditions, diarrhoea and respiratory disease symptoms were identified in 13 children (33.3%) from intervention schools and 13 children (30.9%) from control schools among those who were absent due to illness. This similarity between groups was confirmed by the non-significant statistical test ($\chi^2$=0.042, df=1, p=0.840), suggesting a comparable burden of these particular health conditions at baseline**.** At the end line, 8 pupils (25.8%) of those absent due to illness in the intervention schools presented with diarrhoea and respiratory diseases, while control schools recorded 14 children (29.5%) with similar conditions. However, this difference was not statistically significant ($\chi^2$=0.188, df=1, p=0.665).

***Qualitative analysis of motivators and barriers of school attendance in Baringo County-headteachers KII***

Motivators for school attendance were identified through key informant interviews with the head teachers from intervention and control schools. One of the key motivators that came out across all the study arms was the presence of the school feeding program in all the schools during the time of the study.

*"When the feeding program is running, we see nearly full attendance. But when it stops, many children stay at home—some even drop out."*. -Head Teacher, Intervention 1

"*Currently, we have a school feeding program ongoing, thus school attendance is very high"*. -Head Teacher, Intervention 3

*"Many pupils now attend school due to the school feeding program; we have rice and beans in store"*. -Head Teacher, Control 2

The other motivators were identified as clean toilets that raised the pupils' self-esteem, health education sessions were also interesting, making the pupils look forward to coming to school, and reduced cases of hygiene and sanitation-related illness by pupils becoming hygiene champions and peer influencers.

*"Clean toilets make the pupils proud of their school, and there's a stronger sense of belonging. Hence, they always look forward to attending school"*. -Head Teacher, Intervention 2.

"*Hygiene Education Sessions have motivated school attendance as the children find them interesting compared to the regular classroom sessions"*. -Head Teacher Intervention 3

*"Pupils have become champions of hygiene. They even remind each other to wash their hands. We've seen fewer cases of illness-related absenteeism,"*. -Head Teacher, Intervention 1

The barriers for school attendance were identified as displacement from the recent floods in the region, lack of food during drought seasons, and when the schools do not have food for the school feeding program. Gender and community roles also came out strongly as girls were expected to take care of their younger siblings when the parents went out working, while boys were expected to take care of animals. Community cultures and traditions also played a role, as on a particular day, bi-weekly, the entire family would head to the market to auction livestock, and then proceed to the market to buy supplies for each family member and food for the family.

*"Every second Tuesday, our enrolment drops by almost 30%. This is market day when families go to sell their livestock and buy supplies. Parents say, 'This is how we eat for the next two weeks', so children must accompany them. It's not just about selling animals- it's about teaching children how to survive."*. -Head Teacher, Intervention 1

*"Cultural practices are strong here. The market day is sacred - children learn negotiation, animal husbandry, and family responsibility.' I understand their point, but education suffers."* -Head Teacher, Control 3

*"Boys aged 10-14 are often absent for weeks during dry spells, herding cattle to distant pastures. Girls of the same age stay home to care for younger siblings and help mothers with household tasks."* Head Teacher, Intervention 3.

## DISCUSSION

The overall school attendance across all the arms pre- and post-study was above 70%, comparable with findings from a UNESCO 2019 report that found the net primary school attendance in Baringo County to be at 79%. While intervention schools demonstrated improved attendance (absence rate decreased from 22.6% to 20.6%) and control schools experienced declining attendance (absence rate increased from 26.1% to 28.7%) ($\chi^2$=3.823, df=1, p=0.051), no statistically significant difference in school attendance was observed between intervention and control sites post-intervention. Despite the biological plausibility that SLTS reduces illness and consequently reduces absenteeism, the study found no statistical differences in absences due to illness, diarrhoea, or respiratory diseases.

These findings are consistent with several school sanitation and hygiene trials that reported null effects on attendance. A cluster randomized trial in Ethiopia found no impact of school WASH interventions on attendance or diarrhoea.[8] Similarly, a cluster randomized trial in Laos and a school-based WASH study in Mali reported similar findings.[12,13]

However, some studies have found an association between sanitation and hygiene interventions and absenteeism. A systematic review of 19 studies across Asia, Europe, Africa, and South America found that rinse-free hand hygiene programs were associated with small but potentially beneficial reductions in illness-related absences.[14] Studies in urban Nepal and China reported positive outcomes, with the latter finding a 54% reduction in missed school days following school WASH interventions.[5,15] Notably, these studies were conducted in urban settings where schools and households already had relatively better WASH infrastructure, possibly explaining why results differ from those observed in rural Baringo County.

Sickness was the primary cause of absenteeism, accounting for over 70% of all the absent pupils in the

study across all groups and time points. This finding mirrors results from the Netherlands, where sickness accounted for 75% of school absences in primary schools.[16] This underscores the strong link between child health and school attendance. While the majority of children attended school consistently, those who were absent were disproportionately affected by health-related issues. Addressing preventable illness, therefore, remains a critical pathway for improving attendance.

The non-significant findings in this study can be attributed to several methodological and contextual factors. The study's six-month intervention period followed by a three-month observation period may have been insufficient to substantially alter the underlying determinants of school attendance. Secondly, the concurrent presence of school feeding programs across all schools may have masked the potential effects of the SLTS intervention, as feeding programs are drivers of school attendance. On the other hand, the high baseline attendance rates across schools in both the intervention and control arms may have created a ceiling effect, making it more difficult to demonstrate significant improvements through the SLTS approach.

The SLTS intervention was designed primarily to address illness-related absences; it did not account for other factors influencing attendance. Headteachers reported that school feeding programs served as strong motivators, while socio-economic and cultural barriers also played a significant role. For instance, children missed school to assist with herding livestock, care for younger siblings, or accompany parents to markets. The positive health-related effects of the SLTS intervention may have been attenuated by the influence of these non-health-related factors as well, highlighting the complex nature of school attendance causality.

The relatively short intervention duration may have been insufficient to establish sustained behavioral changes and observable impacts on attendance patterns. Secondly the study relayed on self-reported data that may be subject to recall biases.

## CONCLUSION

The study found no significant difference in school attendance between the intervention and control sites post the SLTS intervention. This is because school attendance is influenced by many other factors apart from sanitation and hygiene. While SLTS may create an enabling environment, comprehensive approaches addressing multiple determinants of absenteeism are needed to achieve meaningful improvements in school attendance.

### *Recommendations*

To effectively address the problem of school attendance, the SLTS approach alone is insufficient. For greater impact, this intervention should be integrated with a comprehensive package of nutritional, health, and social interventions that target the multiple underlying causes of school absenteeism.

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