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MECHANISM OF WASTE MANAGEMENT IN SCHOOLS AND ITS EFFECT ON STUDENT PARTICIPATION IN EDUCATION

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ABSTRACT

Waste management is pausing challenges to the environment especially in schools world over. In schools, water, sanitation and hygiene do not reflect national policies aspirations and are not adequate to student's needs and hence affecting their health, well-being, performance and participation at school. An investigation intothe mechanism of waste management in schools and its effect on student participation in education in Bungoma County, Kenya was done using a cross-sectional survey design approach.A sample of sixty five (65) boarding schools was chosen to take part whilestratified sampling was employed in choosing the boarding Schools from the targeted population of 289 secondary schools. Questionnaires, interview schedules, document analysis and focus groups to gather data.Standard multiple linear regressions at α= .05 was used to examine waste disposal to see if it could predict participation in education in school. The model was not able to significantly predict the effect of waste management in schools on participation in education. It was concluded that engagement of school related groups need to encourage students to make waste reduction a part of their everyday life while increasing the flow of reusable and recyclable materials can even generate extra funds for school departments and groups.

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INTRODUCTION

Water is the most important natural resource, indispensable for life and at the same time the backbone of growth and prosperity for mankind. According to estimations by the United Nations (2009) more people die presently due to insufficient access to safe water and basic sanitation than in military conflicts, Because of the importance of water services for the economic growth of a country and the wellbeing of its population. United Nation Development programme (UNDP-2010) recommends that governments should provide investments equivalent to 1% of the national product in the provision of water. The growing demands for water against the limited natural endowment and its increasing scarcity could result in armed conflicts and pandemics if infrastructure and management of water is not improved. A joint report by United Nations Children's Fund (2016) and World health organization(2016) through monitoring programme for water supply, sanitation and hygiene shows that 570 million children go to school every day without safe water and Nearly 900 million children worldwide lacked basic hygiene service at their school. Further the report reveals that quarter of secondary schools had no hygiene service and Over 620 million children worldwide lacked a basic sanitation service at their school.Globally, 69% of schools had a basic drinking water service, 66% of schools had a basic sanitation and 53% of schools had a basic hygiene service in 2016. The negative impact of insufficient of water services on education and on productivity of the population is equally huge. Thus, water is a key determining aspect for economic growth in a country and for the wellbeing of its population. Many rural households have to spend hours per day fetching water from unsecured sources where water quality is suspect. The burden is borne by women and children for whom may be there isno time to attend school regularly because of the obligation to secure water for the household (UNICEF, 2016). The Government of Kenya (GOK) has continuously been committed to increasing provision of safe, potable, and affordable water to all its citizens as an integral part of its Social and Economic Growth through its policies which included: Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and Development, The Water Act 2002 which had three (3) primary objectives namely: improving the management of water services, access to water and sanitation services and enhancing accountability for water resources management through decentralization of service delivery. The Kenya Constitution (2010), entrenched the water and

sanitation in the Bill of Rights, effectively making them human rights in Article 43(i) (b) & (d) of the Kenya Constitution. A school with adequate WASH services has a functional and reliable water system that provides safe, sufficient water for all needs of the school, especially for toilet use, hand-washing and drinking. It has a sufficient number of toilets for students and teachers and the toilets are private, safe, accessible, clean and separate for boys and girls. Adequate WASH in schools service caters for the needs of the entire school population, including small children, girls of menstruation age, children with disabilities and staff. Indicators are 'signals' that show whether the guidelines have been followed and standards attained in a WASH in schools project or programme. An indicator is 'a quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect changes connected to an intervention, or to help assess the performance of a development actor. Without indicators, the guidelines would be little more than statements of good intent, difficult to put into practice.

THE LITERATURE

Adequate sanitation facilities prevent faecal contamination of water and so curb transmission of faecal-oral diseases at source. Inadequate sanitation leads to coping mechanisms like sharing of dirty, defecation in the open and indiscriminate dumping of household wastes. Such dumpsites pollute the environment through bad odour and are breeding grounds for vermin namely; rodents, fleas, flies and mosquitoes Sanitation practices that remove human waste from the immediate vicinity of one community only to contaminate the water supply and environment of neighbours are unsustainable. Children spend a significant portion of their day at school where Water, sanitation and hygiene services can improve educational opportunities and decrease the potential for disease transmission between students, in addition to addressing issues around dignity, particularly for girls. The importance of WASH in schools has been recognized globally by its inclusion in the SDGs (targets 4.a, 6.1, 6.2). School sanitation or proper WASH facilities can be considered as an influential aspect of children's attendance in two ways; first, improved conditions at school provide them a more appealing environment for education where they have access to proper latrines as compared to their home and second due to poor WASH facilities at home they might get illnesses or additional WASH related responsibilities such as fetching water resulting in being absent from school (Dreibelbis*et al*. 2013). Having inaccessibility to latrines in school can cause problems for children especially for female students causing an increase ratio of drop outs from school (Adhikari and Shrestha 2008).

Improvements to sanitation and hygiene are known to increase school attendance, especially for girls, and help children better learn (K-SHIP, 2013). Poor hygiene practices, low sanitation coverage and reliance on unprotected sources of water often lead to outbreaks of water borne diseases. The government agency tasked with rural water and sanitation improvement is the Ministry of Health (MOH) – the focal ministry in charge of sanitation and hygiene. The MoH works with the Ministry of Education, Science and Technology (MoEST) on school sanitation and hygiene, and with the Ministry of Water and Natural Resource in rural and urban areas. Kenya's National Environmental Management Authority (NEMA) has set out guidelines on water quality and quality requirement for discharge into the environment. Schedules three, eight, nine and ten of the NEMA water quality standards give the quality standards for water to be discharged into the environment or to be used for irrigation or recreational purposes (Government of Kenya, 2006). Research has however shown that the quality of waste water in Nairobi generally falls within the NEMA guidelines. Githuku0 (2009), for example, analyzed the quality of wastewater in Nairobi and found the levels of nitrates (100 mg/l) and TDS (630 mg/l) falling within the acceptable NEMA standards. Similarly, cadmium (0 mg/l) and chlorides (47.7 mg/l) were also with the acceptable limits. However, the levels of BOD and Coliform bacteria in the raw sewage were higher than NEMA limits. This makes it necessary for sewage to be treated for the removal of BOD, turbidity and microbial contamination.

METHODOLOGY

The study adopted a cross-sectional survey design;the cross-sectional research is a research approach in which the researchers investigate the state of affairs in a population at a certain point in time (Wayne and Curt, 2015). This method was chosen because it is relatively faster and inexpensive (Creswell, 2013). The population targeted consisted of 83 Boarding secondary schools and comprised of the students (78,481), Teachers (3,238), principals (83), Public Health Officers nine (9) and the Quality Assurance and Standards officers nine (9). The Boarding secondary school level was chosen because a majority of the student resides at the school using WASH facilities. Stratified random sampling was used to select Boys boarding schools and Girls Boarding school. A total number of secondary schools in Bungoma County was first grouped into Boys Boarding, Girls Boarding, Mixed Boarding, Mixed Day & Boarding, Girls Day & Boarding, Boys Day & Boarding, Girls Day, Mixed Day, Mixed Day schools to get the sample frame as shown in table 1.

Table 1. Category of Boarding Secondary Schools in Bungoma County

School Category	Number
Boys Boarding	24
Girls Boarding	22
Mixed Boarding	37
Total	83

This study applied Krejcie and Morgan (1970) table for determining the sample size to select a representative sample for each category of the stratified population. Krejcie and Morgan developed a formula and table for determining sample size for a given population for easy reference applied where the population is finite as in this case. Their sample size calculation was based on p = 0.05 where the probability of committing type I error is less than 5% or p <0.05.

$$s = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

s = required sample size.
X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).
N = the population size.
P = the population proportion (assumed to be .50 since this would provide the maximum Sample size).
d = the degree of accuracy expressed as a proportion (.05).

Based on Krejcie and Morgan's table for determining sample size, a sample size of sixty five (65) boarding secondary schools were chosen to take part in the study.Stratified sampling was employed in choosing the Girls boarding secondary schools, Boys Boarding Secondary schools and Mixed Boarding Secondary Schools. Random sampling was used to sample Five (5) form four students and Two (2) teachers that have been in the Station for more than five years to take part in the study from each school participating in the study. Three (3) Quality Assurance and Standards officers, three (3) Public Health Officers were purposively sampled to participate in the study. Stratified random sampling was considered suitable in this case because the population is divided into different strata or groups. The data was collected using questionnaires for students, teachers and principals of Bungoma County. Interview schedules were used for Principals, Public Health Officers and Quality Assurance and Standards officers.

RESULTS

The risk of unhealthy disposal of solid waste is one of the important problems in many societies. Environmental knowledge attitude practices of young people (like students) appears to be crucial as their

Table 2. Proportionate sampling of Boarding Secondary schools

H	Stratum	Population (N_h)	$\sqrt{N_h}$	$a_h = \frac{\sqrt{N_h}}{\sum\sqrt{N_h}}$	Sample (n_h)
1	Boys Boarding	24	4.89	0.3123	20
2	Girls Boarding	22	4.69	0.2995	19
3	Mixed Boarding	37	6.08	0.3883	25
	TOTAL	83	15.66	1.000	65

Table 3. Sampling of respondents

H	Stratum	Population (N_h)	Sample (n_h)
1	Students	28,821	325
2	Teachers	3238	130
3	Principals	83	65
4	Quality Assurance and Standards officers	9	3
5	Public Health Officers	9	3
	Total	32,160	526

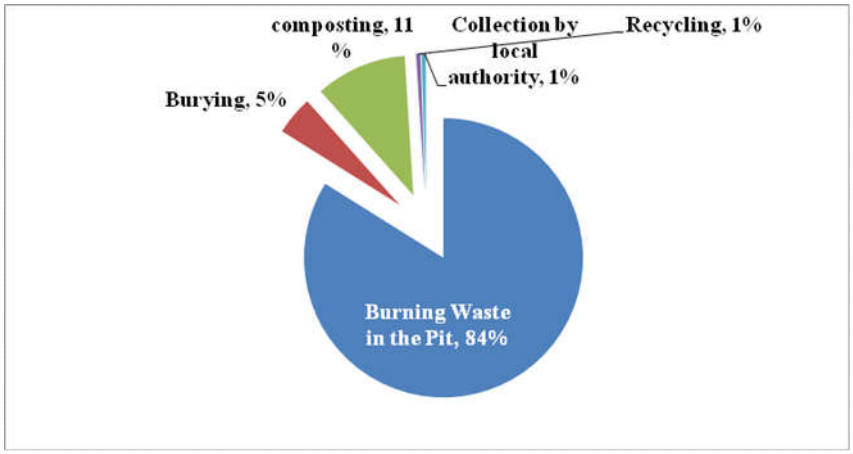

Figure 1. Methods of Solid Waste Disposal in schools

point of view ultimately plays an important role in providing solution to future environmental problems (Singh,2015). Insufficient environmental knowledge among individuals usually corresponds to poor practices towards maintaining good environmental conditions (Licy *et al.,* 2013). There are several Waste Management Practices which include; collection of solid waste from point of production (residential, industrial commercial, institutional) to the point of treatment or disposal. Bins are placed at fixed points in a neighborhood or locality for the collection of the waste. Uncollected waste can provide breeding areas and food to potentially disease carrying vectors such as insects and rodents, with their associated health and nuisance issues. Incineration requires waste placed outside for collection to be containerized to stay dry for combustion. Landfills require land availability, and siting is often opposed by potential neighboring residents. Landfills are a common final disposal site for waste and should be protected to minimize environment and public health hazard. Landfilling usually progresses from open-dumping, controlled dumping, controlled landfilling, to sanitary landfilling. The key advantages of recycling and recovery are reduced quantities of disposed waste and the return of materials to the economy. Poorly managed waste has an enormous impact on health, local and global environment, and economy. Both liquid and solid waste management remain to be a challenge in many schools. Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes, e-wastes are examples of solid waste produced in school. Facilities for waste management such as waste disposal bins are hardly provided in school compound. There is an increased concern on proper management of sanitary pads and provision of sanitary bins in girls' latrines; pads are thrown haphazardly causing unsightly condition and foul smells, used pads are infectious wastes, hence, require special handling. In schools with water borne sanitation facilities there is frequent clogging of wastewater systems caused by thrown sanitary pads or cloths.

The process of waste management may be divided into six functional components Ogola et al. (2012). The result figure 1 shows the existing waste management practices in schools in Bungoma county. Majority of the schools eighty four percent (84%) Burn Waste in the Pit, Toxins in burn pit smoke may affect the skin, eyes, respiratory and cardiovascular systems, gastrointestinal tract and internal organs. Health effects depend on a number of other factors, such as the kind of waste being burned and wind direction. Burning waste in open air pits can cause more pollution than controlled burning, such as in an incinerator. Incineration is used primarily as disposal for biological waste associated with medical care. After burning, the ash is usually moved straight to an adjacent landfill, where it takes up only a tenth of the volume of the original waste. Five per cent (5%) of the schools bury their solid waste; burying waste in landfills creates offensive odors and potentially dangerous gases that are capable of moving through soil into nearby buildings. The most harmful gases generated in landfills are methane, carbon dioxide, ammonia and sulfides. Methane is flammable, while carbon dioxide is known to move into buildings and displace oxygen. Landfills cause various problems, such as the contamination of the soil and water with toxins, the accumulation of electronic waste, the formation of leachate and the release of greenhouse gases. Landfills allow the accumulation of excessive waste pieces that are hazardous to people and the environment. Eleven per cent (11%) of the schools composite their waste, composting could reduce environmental pollution and provide job opportunities. Compost fertilizer also could help improve agricultural production and improve soil structure – which means it offers a longer term advantage over other non-compost mineral-based fertilizers. One per cent (1 %) of the schools practices informally Recycling; schools do not dispose of plastics, bottles, paper, cardboards and cans readily. Recyclable materials are used and reused and only thrown away when they are no longer of any use to the owners.

Table 4. Model Summary for Waste Management

R	R Square	Adjusted R Square	Std. Error of the Estimate
.126[a]	.016	.001	4.317

Predictors: (Constant), School Drainage system, Method of solid waste Disposal in school, provision of dustbin in the school

Table 5. ANOVA for Waste Management

	Sum of Squares	df	Mean Square	F	Sig.
Regression	57.893	3	19.298	1.036	.378[b]
Residual	3614.733	194	18.633		
Total	3672.627	197			

Table 6. Coefficients for Waste Management

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.323	.692		7.691	.000
Method of solid waste Disposal in school	.035	.436	.006	.081	.936
provision of dustbin in the school	-.379	.391	-.071	-.970	.333
School Drainage system	-.411	.340	-.089	-1.208	.229

Recycling is an important part of any waste management strategy, the greatest environmental benefits are achieved through source reduction and reuse, may also provide the additional benefit of saving money. The remaining One per cent (1 %) of the schools gives their solid waste to county government. The collected waste is disposed in open dumpsites, where scavengers separate recyclable materials, and the rest is left to rot, or is burned to reduce the volume. Students store waste on storage bins provided to each site by the school for collection for collection of solid waste. The waste storage bins may be full and people do not have alternative storage containers and may cause bad odour in the households. Seventy two per cent (72 %) of the respondents reported that they don't store solid waste in refuse bins because they are not available. Schools could have different bins for different types of rubbish, for example, a paper bin, a food waste bin, cardboard waste bins and general rubbish bins.

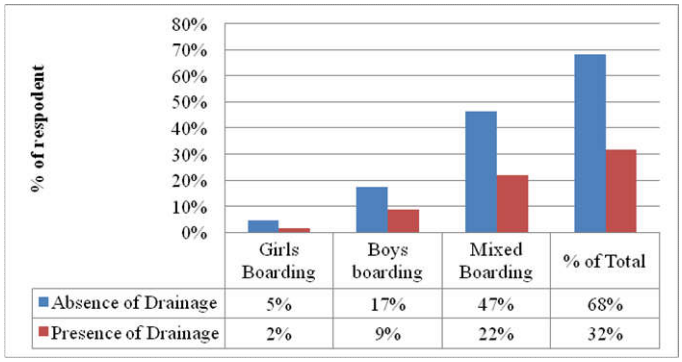

Figure 2. Proportion of Schools with Drainage in school

This would limit the chance of the bins over flowing as much and attracting unwanted animals. With specific bins, the waste is more manageable and safe. Inspection reports from the quality assurance officers show that although Litter Bins have been provided in some schools they are utilized properly. It is also reported from the inspection reports that a majority of the schools lack proper drainage. It is observed that some lack Septic tanks and end up discharging effluent in the open environment. Plumbing and drainage problems can happen unexpectedly if plumbing maintenance is irregular. Disruption in water service or improper functioning of drains can cause classes to be cancelled and schools to close, such as when restrooms are not working because of the non-functioning sewage system.A system that takes only storm water only from roofs and lard standings which would normally discharge into a brook, river or water course of some description, some properties will have soak always to discharge into given the correct ground and sub-soil conditions.

Sixty eighty percent (68%) of the respondents reported absence of drainage system in there school of which five percent (5%), seventeen percent (17%) and forty seven Percent (47%) were from Girls Boarding, Boys Boarding and Mixed boarding respectively as shown in figure 4.17 . Proper drainage in school will minimize water stagnation in school which will otherwise pose a health hazard. Pools of standing or slow-flowing water provide a breeding ground for many insects, including mosquitoes that can transmit diseases. In addition, efforts should be made to eliminate standing water or pools of water which are immediately adjacent to learning environment.

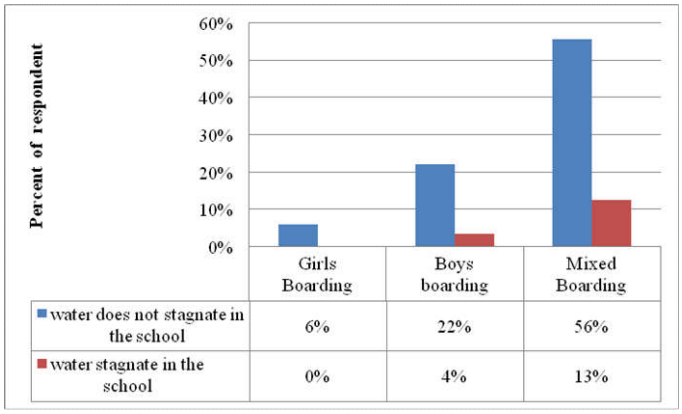

Figure 3. Proportion of schools with stagnant water

From the results, thirteen percent (13%) of the respondents in mixed schools reported to have stagnant water in their schools, four percent (4%) of the Boys boarding reported to have stagnant water in their schoolsas shown in Figure 3. A multiple regression analysis was conducted to test if Waste Management in schools significantly predicted student drop out from schools. Standard multiple linear regressions at α= .05 was used to examine the efficacy of Waste Management on student dropout in schools table 4,5 and 6, represents the results of regression. The independent variable in the study was Waste Management; the dependent variable was student drop out. The null hypothesis was: H_0 1d: there is no effect of waste management to participation in education. Preliminary analysis was conducted to assess whether the assumption of multi collinearity, outliers, Normality, homoscedasticity and independent of residuals were met. The Model was not able to significantly predict Student drop out from schools. (F (3, 194) = 1.036, p <.378), with an R^2 of .016. The coefficient of determination R^2, which is the proportion of variance in the dependent variable(Student dropout rate) that can be explained by the independent variables (Waste Management), that our independent variables explain 1.6% of the variability of the

dependent variable (dropout rate), When Waste Management in schools is coded as Solid waste is collected and disposed of safely measured by presence of dustbins and method of waste disposal and coded as (5= highly available, 4= medium availability, 3= fairly availability, 2= poorly available 1= not available). Wastewater is disposed of quickly and safely and coded as (5= Very Good drainage that is not blocked, 4= Good drainage that is not blocked 3= fair drainage that is blocked, 2= poor drainage that is blocked 1= absence of drainage. The analysis shows that Method of solid waste Disposal in school used in schools did not significantly predict student drop out from school (Beta =.006, t (194) = .936), also the analysis revealed that provision of dustbin in the school did not significantly predict student drop out from school (Beta = -.071, t (194) =.333). Finally the Drainage system in school did not significantly predict student drop out from school (Beta = -.089, t (194) =.229).

Conclusion

The results from the multiple linear regression indicated that the Mechanism of waste management in schools did not significantly predict student participation in education suggesting that there are other factors within the school as well as outside school that affects student's participation in education. It is thus prudent that there should be an engagement of school related groups including science classes, environmental clubs, and parent-teacher organizations to encourage students to make waste reduction a part of their everyday life. Increasing the flow of reusable and recyclable materials can even generate extra funds for school departments and groups.

REFERENCES

Berkman, D. S., Lescano, A. G., Gilman, R. H., Lopez, S. L. & Black, M. M. 2002. Effects of Stunting, Diarrhoeal Disease, and Parasitic Infection during Infancy on Cognition in Late Childhood: a Follow-up Study. The Lancet.

Creswell, J. W. 2013. *Research design: Qualitative, quantitative, and mixed methods approach*. Sage Publications, Incorporated.

Dillingham, R. &. Guerrant, R. L. 2004. Childhood Stunting: Measuring and Stemming the Staggering Costs of Inadequate Water and Sanitation. The Lancet

Fadda, R. Rapinett, G. Grathwohl, D. Parisi, M. Fanari, R. 2012. Effects of drinking supplementary water at school on cognitive performance in children. *Appetite* 59: 730–737.

Freeman MC, Greene LE, Dreibelbis R, Saboori S, Muga R, et al. 2012.Assessing the impact of a school-based water treatment, hygiene and sanitation programme on pupil absence in Nyanza Province, Kenya: a cluster-randomized trial. *Tropical Medicine & International Health*. 17: 380–391.

Githuku, C. 2009. *Assessment of the Environmental Risks of Wastewater reuse in Urban and Peri-urban Agriculture in Nairobi.* MSc Thesis, JKUAT.

Kombo, D.K and Tromp D.L 2006. *Introduction to Research Methodology*. Pauline's Publications Africa, Nairobi, Kenya

Licy C.D, Raghavan. V, Kamath .S, Anies T.K, Josphina C.T, 2013. Awareness, Attitude and Practice of School Students towards Household Waste Management.*Journal of Environment (2013), Vol. 02, Issue 06, pp. 147-150*

Muganda O. M. &Mugenda A.G., 1999. *Research Methods. Quantitative and Qualitative Approaches*. African Centre for Technology Studies (ACTS). Nairobi

Ngome, C., K &Kikechi, R. W., 2015. Educational Wastage in Kenya: A Threat of Internal Efficiency in Bungoma County Secondary Education, *Journal of Educational Policy and entrepreneurial Research*: 2408-770

Orodho J. A (2004). *Elements of education and social science research Methods*. Nairobi, Masola Publishers.

Singh, R.K., Ruj, B. Plasticwaste management and disposal techniques - Indian scenario. *Int J PlastTechnol* 19, 211–226 2015. https://doi.org/10.1007/s12588-015-9120-5

Sphere Project Handbook, 2011, *Humanitarian Charter and Minimum Standards in Humanitarian Response* Hobbs the Printers, Hampshire, United Kingdom.

United Nations. 2009, United nations 2000-2008 Millennium Development Goals Indicators-The official united nationals' site for the MDC indicators. ; II 7&8: Proportion of population using improved drinking water source. Retrieved from http://unstats.un.org/unsd/mdg/data.aspx. 10th January 2018

Water Services Regulatory Board (WASREB), 2009. Water and Sanitation Coverage in Kenya. Impact report, Nairobi.

Wayne K. Hoy, Curt M. Adams 2015. Quantitative Research in Education Second Edition. SAGE Publications

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