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Assessing Sustainability of WASH Projects Using USAT: A Case of Public Schools in Zambezi District of Zambia

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ABSTRACT

This paper presents the findings of an empirical case study of public schools in Zambezi district of Zambia undertaken to assess the sustainability of Water, Sanitation and Hygiene (WASH) projects in the rural schools using five variables and a simpler assessment framework- the unit-based sustainability assessment tool (USAT). The importance of sustainability in WASH Projects cannot be overemphasized with the rampant outbreaks of cholera in Zambia. The study contends that in order for WASH to be sustainable, there ought to be five ingredients: availability of WASH facilities; training and equipment capacity amongst the WASH implementers; community participation; effective monitoring and evaluation system; knowledge-transfer to pupils in the rural schools. It is against this background that a survey of school teachers and community members was undertaken. Empirical findings show that all variables scored below the 50% benchmark for adequate sustainability performance. The study concludes that WASH projects in the rural schools of Zambezi district are not sustainable. It is therefore recommended that WASH implementers should be adequately trained. The beneficiaries of WASH should be provided with all facilities and, the community should be fully involved in the WASH implementation process.

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1. Introduction

This paper presents the findings of an empirical study undertaken to assess the sustainability of Water, Sanitation and Hygiene (WASH) projects in rural schools of Zambia taking Zambezi district in the North Western Province of Zambia as a case study.

Water, Sanitation and Hygiene (WASH) as a concept in rural education is a strategic intervention towards providing schools with safe drinking water, improved hygiene and sanitation facilities (UNDP, 2006). It involves a number of activities such as construction, maintenance and use of pit latrines, other WASH facilities and community outreach programs focusing on sensitisation and awareness activities such as school WASH clubs, setting up of hand washing facilities in schools and communities, safe water collection, transportation and storage, promotion of hygiene education and behaviour change and environmental management through tree planting (Schmidt, 2011).

Generally, WASH Projects strive to link water, sanitation and hygiene. What this implies is that, there should be equal emphasis on all the three components. Once one component is neglected, the rest will suffer thereby reducing the sustainability of WASH in schools (Schmidt, 2011). In the long run, neglecting one component will lead to children's continued suffering from water and sanitation related diseases (HELVETAS, 2014).

In all, the main purpose of WASH projects can be understood in two parts. The first part is the provision of safe water and sanitation facilities in schools. The second part is school education that promotes good hygiene behavior and practices. A combination of these two components helps to prevent water and sanitation- related diseases in pupils (Chikwanu, 2014). And according to DFID (2012) with a well implemented WASH project, children will also learn better and take back to their families good water, sanitation and hygiene practices.

Sustainability has wide interpretations in development. However, it is beyond the scope of this paper to discern on the definitional challenges of sustainability. Based on WaterAid (2011), sustainability is used in this paper to establish if the intended project benefits continue beyond the period of donor or government intervention. And the principal objective of this paper is to present the findings of an empirical study undertaken to assess the sustainability of WASH projects in the rural schools of Zambia using a simpler framework- the unit based sustainability assessment tool (USAT). The paper commences by discussing the WASH situation and interventions in Zambia; literature on sustainability measurement; and the methodology. A profile of Zambezi district follows. The paper then presents the findings, analysis and a discussion before the conclusion.

2. Background

Globally more than 1 billion people do not have access to improved drinking water and around 2.6 billion including 1 billion children live without basic sanitation and hygiene facilities (Birch, 2012). The impact of these statistics has been manifested in the various illnesses recorded. Of all the illnesses, diarrhea is the leading cause of illness and death with

the main contributing factor in 88% of diarrheal deaths being attributed to a lack of access to basic water, sanitation and hygiene facilities (Birch, 2012).

Water is essential for healthy ecosystems and societies. Unfortunately, there is still uneven access to safe drinking water globally and challenges in managing freshwater resources at national and regional levels (Brooks, 2002). There is also uneven distribution of access to safe sanitation: 36% of the world's population (2.5 billion people) lack adequate facilities (Gleick, et.al., 2012). In fact, according to Titho (2005) an additional 37 million people in Africa live without access to sanitation.

As a direct intervention to improve water, sanitation and hygiene situation in the Country, Water, Sanitation and Hygiene (WASH) was adopted in 1996 (Chikwanu, 2014) that has gradually evolved into SPLASH (Schools Promoting Learning Achievement through Sanitation and Hygiene). In rural areas, WASH has involved the local population in determining priorities of WASH activities, selection of affordable and sustainable technologies in project implementation and knowledge empowerment (MLGH, 2007).

In Zambia, it has been widely acknowledged that poor water, sanitation and hygiene (WASH) are among the contributing factors to the low school enrolment, poor retention and progression for school-age children (GRZ, 2009). About 1 million pupils use water from contaminated sources or walk long distances to fetch clean water from safe sources (OWAS, 2006). Furthermore, there is a large discrepancy between the urban and rural settlements with the rural schools falling far below the acceptable hygiene and sanitation standards (GRZ, 2009).

The government through the Ministry of General Education (MOGE) has been pursuing a collective action to improve school WASH infrastructure. The Ministry of General Education (MOGE) Policy on Educating Our Future (EOF) recognizes that good health is an essential pre-requisite for effective learning (Sankwe, 2006). The general objective of the EOF policy on school health is to improve and provide equitable services in learning institutions through integrated health interventions in collaboration with the community and other stakeholders.

The Public Health Act, Cap 295 of the Laws of Zambia makes it mandatory for owners of schools to provide proper and sufficient latrine facilities for girls and boys. In fact, the Ministry of Education's Standards, Assessment and Evaluation Guidelines of 2001 state that 8 hand basins should be provided for the first 100 pupils and 3 hand basins for the next 50 pupils with the pupil latrine ratio being at 40 to 1 for boys and 25 to 1 for girls (GRZ, 2009). This is meant to encourage hand washing, good sanitation and safe hygiene practices in schools. It further states that any school found lacking in the above set standards should be closed. Sadly, many schools currently do not adhere to the MOGE standards and regulations with the bulk of poor compliance in government schools (Sankwe, 2006).

For instance, many schools in Zambezi District have just 2 functioning latrines (GRZ, 2011). In an extreme case, 660 children at a school share 4 latrines (GRZ, 2013). This scenario does not exclude teacher sanitation requirements and has become a normal way of living for both children and their teachers. Availability of safe and clean water is no different as only 51 schools of the total 109 schools in the district have functional protected boreholes leaving a deficit of 58 with no access to safe and clean water.

3. Literature Review

McMichael (2019) provides an elaborate account of WASH impact in Schools by systematically reviewing 38 peer- reviewed papers from 2010 to 2018. And although the thrust of McMichael's paper is to primarily review the impact of WASH interventions, it actually in doing so identifies the most commonly used study approaches as shown in Table 2.

Table 2 *WASH Study Designs 2010 to 2018*

Ref	Study Approach	Countries	Sample size range	Number of Studies
01	Cluster and Randomized Trial	Kenya, China, Burkina Faso, Bangladesh and Egypt	6 Schools to 185 Schools	16
02	Before and After Intervention study	Kenya, Niger and Bangladesh	1 School to 17 Schools	5
03	Randomized Controlled Trial	Lao's PDR, Nepal	4 Schools to 100 Schools	2
04	Matched Control Trial	Mali	42 Schools to 200 Schools	3
05	Cross Sectional Survey/ Study	Kenya, Indonesia, Columbia, Bangladesh	31 Schools to 228 Schools	5
06	Non- Randomized Cluster Trial	Cambodia, Indonesia, Lao's PDR	120 School girls to 1847 pupils	2
07	Randomized Case Controlled Intervention Study	India	56 Schools	1
08	Matched Control Trial	Mali	200 Schools	2
09	Longitudinal Study	Ethiopia	30 Schools	1
10	Qualitative Methods- Participatory Action Research	Tanzania	2 Schools	1
11	Quasi Experimental Case control Longitudinal Study	Cambodia	8 Schools	1
12	Mixed Method Cross- sectional Study	Kenya	28 Schools	1

Source: Based on McMichael (2019, pp7-15)

Cluster and Randomized Trial (CRT) emerges as the most favoured approach but sustainability assessment still remains complex and data intensive rendering its measurement process largely onerous in developing nations.

In fact, Taylor (2013, p6) rightly observes that sustainability is difficult to measure and asserts that '*one of the most detrimental omissions from current literature on WASH programmes is sustainability*'. Sustainability involves identifying impacts/ benefits that exclusively arise from an intervention that has ceased to exist. Methodologically, numerous questions arise rendering any one approach completely abortive particularly in environments where data availability is poor. Take for instance, when should sustainability be measured?; What is the scope of beneficiaries?; What timeframe should be assigned to sustainability?

What constitutes a benefit? Conventionally, studies have been undertaken using a myriad of approaches. Waddington and Snilstveit (2009) use meta-analysis on child diarrhea prevalence after an intervention has ended. It is contended that diseases such as diarrhea have established transmission pathways (Dar & Khan, 2011; Hunter et.al., 2010) that can be deterred through WASH interventions. Hence, any reduction in the disease prevalence in the post- intervention period is credited to WASH projects.

The use of DALY (or Disability Adjusted Life Years) as a measure of cost effectiveness is also widely used in sustainability studies (e.g., DFID, 2012). The benefits acquired or experienced are measured as an increase in the DALY (Cairncross and Valdamins, 2006). This approach is however shrouded with several assumptions casting the results into a doubt. The Cochrane method of systematic review approach is yet another commonly used approach.

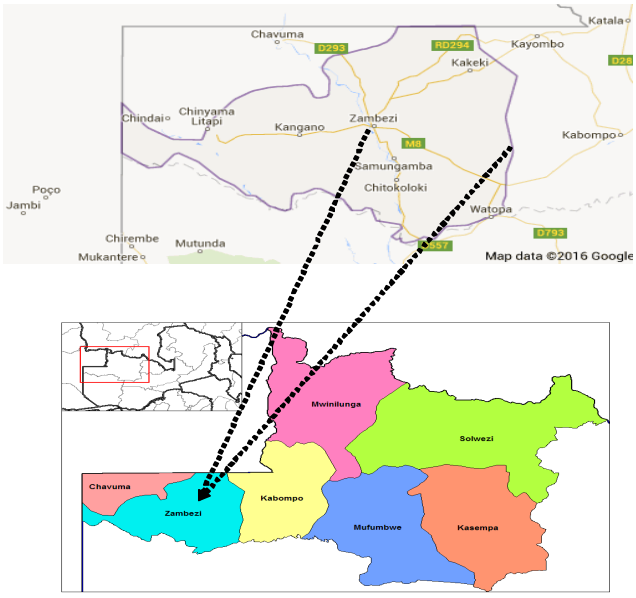
This paper however, elucidates on a simpler approach- the Unit-based Sustainability Assessment Tool (USAT). Although USAT was originally developed for use in the Swedish/Africa International Training Program (ITP) education for sustainable development in higher education (Rajendra, 2009), it has striking lessons for measuring sustainability with ease in other sectors/ industries. The advantage about this tool is that, it can be used to assess any sustainability performance provided the area being assessed has existing literature to generate relevant indicators for assessment (Lozano, 2006). '*The tool focuses on the different functional units ..., and how they are integrating sustainability concerns into their core functions*' (Togo, M. and Lotz-Sisitka, H., 2009, p3). Hence USAT is capable of considering the entire target population as a whole (Sterling, 2003 cited in Togo, M. and Lotz-Sisitka, H., 2009, p8) and the influences of each unit/ strata within the target population (Archer, 1995 cited in Togo, M. and Lotz-Sisitka, H., 2009, p8). USAT comprises of four distinct parts (viz., A: Core functions, B: Operations and Management, C: Community/ Beneficiaries' Involvement, and D: Policy and Written Statement) with cluster indicators under each part that are measured on a six-point rating scale (Togo, M. and Lotz-Sisitka, H. ,2009).

4. Methodology

This study assesses the sustainability of water, sanitation and hygiene (WASH) projects in 6 public primary schools (labelled as *School 1, School 2, School 3, School 4, School 5, School 6*) in the Zambezi district of North Western Province using the Unit-based Sustainability Assessment Tool (USAT) (Togo and Lotz-Sisitka, 2009). Although the tool was designed '*to establish to what level universities have integrated sustainability concerns in teaching, research and community service*' (Moges et.al., 2014, p67) and the contribution of various organizational structures, it has significant lessons for other sectors such as WASH. The main variables considered include: *capacity of WASH project implementers, availability of WASH project facilities, presence of community participation, effectiveness of the monitoring and evaluation system and the level of knowledge of WASH in pupils*. The study covered WASH projects implemented in rural schools from January 2010 to December 2013.

From a total population of 28 public primary schools in Zambezi district, 6 public primary schools (about 21%) were randomly selected. Sample sizes of 1 to 228 schools have been held acceptable for similar studies (See Table 2 above). 10 members of staff and 10 community members were then purposively (those that had been around since 2010 and earlier) identified from each school. There were collectively 120 respondents in the study: 60 members of staff and 60 community members from the six rural public schools. Discussions were held with these members of staff and the community using an interview guide. Although the interview guide was structured around the five variables and a number of indicators for each, it sought to acquire additional information on challenges and palliative interventions. And as rightly recommended by Togo, M. and Lotz-Sisitka, H., (2009, p7), the interview guide was targetted at respondents that were deemed to have '*an impression on the indicators*' such as the community and staff members. Data analysis was based on the USAT methodology wherein respondents were asked to arrive at a consensus for each indicator based on a six point (X, 0-4) USAT Scale format- don't know (X), none (0), a little (1), adequate (2), substantial (3) and a great deal (4). According to Togo, M. and Lotz-Sisitka, H., (2009) 'none' indicates a zero (0%) performance; 'little' indicates a poor (25%) performance; 'adequate' indicates a regular (50%) performance; 'substantial' indicates a good (75%) performance; and 'a great deal' indicates an excellent (100%) performance. As stated earlier in the literature review, USAT is a valid tool for measuring sustainability performance (see Lozano (2006); Togo, M. and Lotz-Sisitka, H., (2009)) since it has been widely applied in the education sector (see for instance, Kariaga et.al., (2015); Togo (2019)). Hence, it was considered as a reliable approach that conveniently assisted in measuring the sustainability of WASH projects in public schools of Zambezi district, North-western Province of Zambia.

Map 6.1 *Locational Map - Zambezi District*



Source: Adapted from Google Maps, 2018

As a background, Zambezi district lies on longitude 23 degrees east and latitude 13 degrees and stretches over 18,300 square kilometres which is 14.5% of the province (MLGH,

2010). The socio-economic life of the people is typically pastoralism and subsistence farming with root tuber crops and cereals (such as cassava and maize) as the major crops (MLGH, 2010).

5. Results and Discussion

5.1. Gender Profile of Respondents

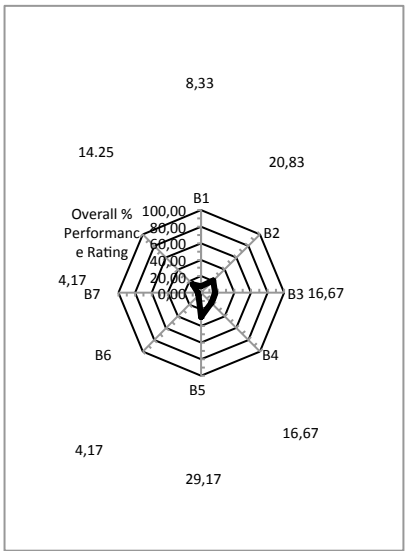
There was a fair balance between the male to female ratio in the study: 54.2% males to 45.8% females.

5.2. Capacity of WASH Implementers

A number of indicators were used to gauge the capacity of WASH implementers including: *the use of WASH National guide in the School; incorporation of WASH in the School curriculum; adequacy of teaching aids/ books; provision of teacher trainings; existence of school WASH advisory units; ability to mobilise resources; and adequacy of funds/ support*.

Table 3 *School Sustainability Performance Under Capacity of WASH Implementers*

		Primary Schools								
Indicator	**Code**	**School 1**	**School 2**	**School 3**	**School 4**	**School 5**	**School 6**	**Total Score (7)**	**% Rating**	**Average**
WASH national guide is used	B1	1	1	0	0	0	0	2	8.33	0.33
WASH is part of the school curriculum	B2	1	1	2	1	0	0	5	20.83	0.83
Adequate teaching aids/ books	B3	1	2	1	0	0	0	4	16.67	0.67
Teacher trainings are done	B4	1	0	0	0	2	1	4	16.67	0.67
Existence of school WASH advisory units	B5	1	0	0	1	3	2	7	29.17	1.17
Ability to mobilize resources	B6	1	0	0	0	0	0	1	4.17	0.17
Adequate funds/ support	B7	1	0	0	0	0	0	1	4.17	0.17
Total Score (28)		7	4	3	2	5	3			4.01
% Rating		25.0	14.3	10.7	7.1	17.9	10.7			
Average		1.00	0.57	0.43	0.29	0.71	0.43	0.57		



Source: Authors (2018)

The overall sustainability score for the capacity of implementers ranged from 0.29 (7.1%) for School 4 to 1.00 (25.0%) for School 1. Among the seven indicators for this variable, schools had relatively higher scores for indicators B5 (Existence of school WASH advisory units) and B2 (WASH is part of the school curriculum). However, most of the indicators for this variable performed poorly; with the least performing indicators being B7 (Adequate funds/ support) and B6 (Ability to mobilize resources) which both scored an average mean of 0.17 (4.17%). Besides, the teacher hygiene training programs that have immensely contributed towards better pupil handwashing rates in Kenya (Pickering et.al., 2013) and reduction of Soil transmitted Helminths (STH) in China (Bieri et.al., 2013) showed a very poor sustainability score of 0.67 (16.67%) amongst the 6 schools.

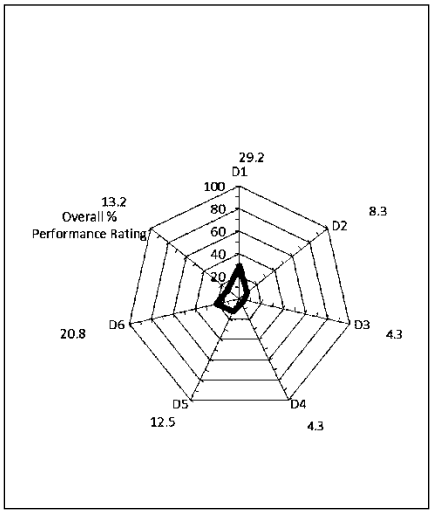
Since WASH activities perform well in a school that has adequate resources and capacity to mobilise funds for procurement of items that are essential for project implementation (Mooijman, 2005), the above indicators are absolutely critical for sustainability. The overall average sustainability score of 0.57 (14.25%) was far below the 50% threshold recommended by USAT as adequate performance suggesting that the capacity of WASH implementers is inadequate.

5.3. Availability of WASH Project Facilities in Schools

This variable was studied with the help of six indicators: '*Adequate facilities for hand washing'; 'well maintained facilities'; 'pupil/ latrine ratio is met'; 'adequate anal wiping material'; 'adequate tools for cleaning'; and 'availability of waste disposal facilities'.*

Table 4 *School Sustainability Performance Under Availability of WASH Project Facilities*

		Primary Schools								
Indicator	*Code*	*School 1*	*School 2*	*School 3*	*School 4*	*School 5*	*School 6*	*Total (6)*	*% Rating*	*Average*
Adequate facilities for hand washing	*D1*	*2*	*3*	*1*	*0*	*1*	*0*	*7*	*29.2*	*1.17*
Well maintained facilities	*D2*	*1*	*0*	*0*	*0*	*1*	*0*	*2*	*8.3*	*0.33*
Pupil/latrine ratio is met	*D3*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*4.3*	*0.17*
Adequate anal wiping material	*D4*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*4.3*	*0.17*
Adequate tools for cleaning	*D5*	*1*	*0*	*0*	*1*	*0*	*1*	*3*	*12.5*	*0.50*
Availability of waste disposal facilities	*D6*	*0*	*0*	*2*	*1*	*2*	*0*	*5*	*20.8*	*0.83*
Total (24)		*4*	*3*	*4*	*3*	*4*	*1*			*3.17*
% Rating		*16.7*	*12.5*	*16.7*	*12.5*	*16.7*	*4.2*			
Average		*0.67*	*0.50*	*0.67*	*0.50*	*0.67*	*0.17*	*0.53*		



Source: Authors (2018)

The sustainability average score for the six schools ranged from 0.17 (4.3%) scored by School 6 to 0.67 (16.7%) for three schools: School 3, School 1 and School 5. These schools are performing better than the rest. Other schools are performing at 0.50 (12.5%) or below. Among the six indicators, schools were found relatively stronger in D1 (Adequate facilities for hand washing) where an average score of 1.17 (29.2%) was recorded. The next well performing indicator was D6 (Availability of waste disposal facilities) which had an average score of 0.83 (20.8%). Hand washing although an important component towards good hygiene scored slightly above 25% yet far below the mean of 2 (50%).

The least performing indicators include: D4 (The toilets have material for anal wiping) and D3 (Pupil/ latrine ratio is met) both scoring 0.17 (4.3%). The pupil to latrine ratio was well below low the WHO recommendation as consistently found in Morgan et.al. (2017). With the pupil to latrine ratio falling far below the mean of 2, fewer toilets are extensively used and thus always remain dirty. This causes pupils to use the nearby bush leading to open defaecation problems- which in turn lead to water and sanitation related diseases (Nansereko,

2010). This is retrogressive for WASH. The poor score for anal wiping materials (0.17, 4.3%) is yet another source for concern. Children resort to using hands, latrine walls, the ground or sticks to wipe themselves. The indicator D5 (Adequate tools for cleaning) equally had a low mean of 0.50 (12.5%).

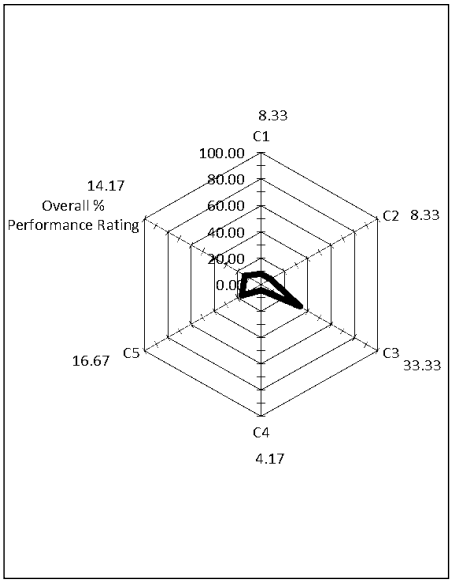
The overall percentage sustainability performance for the schools under this variable is at 0.53 (13.2%). This implies that WASH project facilities too are not adequate.

5.4. Presence of Community Participation in WASH Projects

Five indicators including: 'participatory decision making', 'community outreach programs/ awareness', 'WASH committee has community representatives', 'Written reports/ minutes', and 'community supported repairs' formed the focus of study under this variable.

Table 5 *School Sustainability Performance Under the Presence of Community Participation in WASH Projects*

		Primary Schools								
Indicator	**Code**	**School 1**	**School 2**	**School 3**	**School 4**	**School 5**	**School 6**	**Total (5)**	**% Rating**	**Average**
Participatory decision making	C1	0	1	0	0	0	1	2	8.33	0.33
Community outreach programs/ awareness	C2	0	1	0	0	1	0	2	8.33	0.33
WASH committee has community representatives	C3	0	1	1	1	3	2	8	33.33	1.33
Written reports/minutes	C4	0	0	0	1	0	0	1	4.17	0.17
Community supported repairs	C5	1	0	0	0	1	2	4	16.67	0.67
Total (20)		1	3	1	2	5	5			2.83
% Rating		5.0	15.0	5.0	10.0	25.0	25.0			
Average		0.20	0.60	0.20	0.40	1.00	1.00	0.57		



Source: Authors (2018)

The average scores were less than 1 (25%) for all the indicators except indicator C3 (WASH committee has community representatives)- which had a 1.33 (33.3 %). The reason for this high score could be that it is mandatory for every school to form a WASH committee. However, as observed by Chikwanu (2014), these committees merely exist on paper and only become active when funding is available.

Average scores for indicators C1 (Participatory decision making) and C2 (Community outreach programs/ awareness) were similar at 0.33 (8.33%). Low scores in indicators C1 and C2 suggest low levels of community participation. These findings corroborate with similar studies undertaken, for instance in Tanzania where Madon et.al., (2018) find a general lack of transparency and accountability within the Social Services Committee (SSC) and how that in

turn undermines the enhanced development governance (EDG). An informed or sensitised community member will be triggered or prompted to take a desired WASH action (Fisher, 2011).

Indicator C4 (Written reports/ minutes) scored the lowest with a value mean of 0.17 (4.17%). This shows that besides there being a lack of awareness programmes, schools are not adequately holding community meetings on WASH. It takes a round table discussion for solutions to be arrived at and thus for community support to come (Chikwanu, 2014).

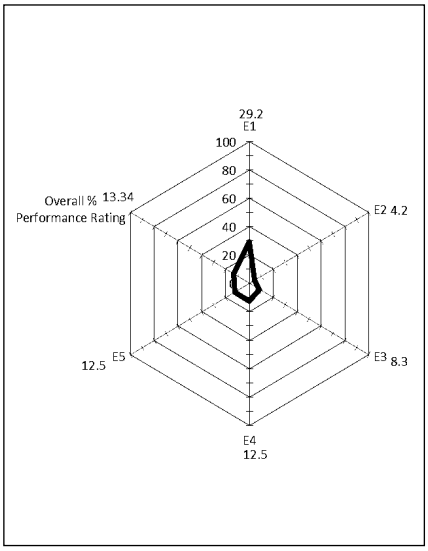
The overall average sustainability performance for the six schools under this variable was 0.57 (14.7%). This low score implies a poor presence of community participation.

5.5. Effectiveness of the Monitoring and Evaluation (M&E) System

Effectiveness of the M&E System was measured through the following indicators: Evidence of monitoring reports, Reports submitted to the district office, Feedback from submitted reports, Evidence of disease monitoring, and Monitoring schedules available.

Table 6 *School Sustainability Performance Under Effectiveness of the Monitoring and Evaluation System*

		Primary Schools								
Indicator	**Code**	**School 1**	**School 2**	**School 3**	**School 4**	**School 5**	**School 6**	**Total (5)**	**% Rating**	**Average**
Evidence of monitoring reports	**E1**	0	1	0	3	2	1	7	29.2	1.17
Reports submitted to the district office	**E2**	0	0	0	1	0	0	1	4.2	0.17
Feedback from submitted reports	**E3**	0	0	0	2	0	0	2	8.3	0.33
Evidence of disease monitoring	**E4**	0	0	1	1	1	0	3	12.5	0.50
Monitoring schedules available	**E5**	1	1	0	1	0	0	3	12.5	0.50
Total (20)		1	2	1	8	3	1			2.67
% Rating		5	10	5	40	15	5			
Average		0.20	0.40	0.20	1.60	0.60	0.20	0.53		



Source: Authors (2018)

The sustainability average score for the six (6) schools ranged from 0.20 (5%) for three schools: School 1, School 2 and School 6 to 1.60 (40%) for School 4.

Schools had the highest score in indicator E1 (Evidence of monitoring reports) which performed at 1.17 (29.2%). The least performing indicator was E2 (Reports submitted to the district office) with a mean score of 0.17 (4.2%). Thus M&E is conducted but not adequately. Reports are hardly submitted to the district education office or local council for scrutiny. In turn the district office cannot adequately monitor the schools. This also explains why E3

(Feedback is gotten from the submitted reports) had a low average score of 0.33 (8.3%). This if left uncorrected will affect the sustainability of WASH activities over time making them fully dysfunctional (UNICEF, 2003).

The importance of an effective M&E System cannot be over-emphasised. Disease monitoring which forms the central theme of WASH (Mwakila, 2008) has a poor score of 0.5 (12.5%). The same can be noticed for E5 (Monitoring schedules available) where a score of 0.50 (12.5%) was recorded.

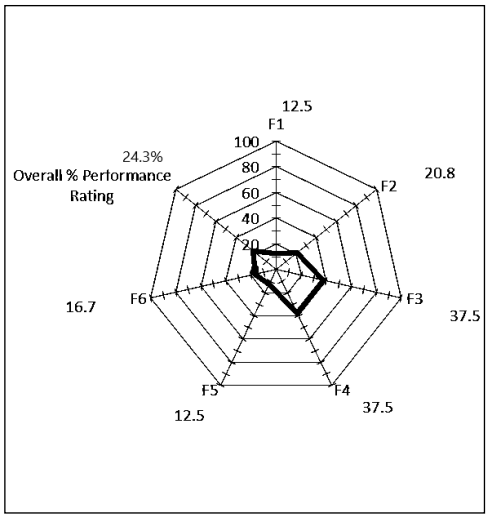
The overall average sustainability performance for the schools under this variable was 0.53 (13.34%) well below the required USAT guide for sustainability to exist.

5.6. The Level of Knowledge of WASH in Pupils

Knowledge of water borne diseases, knowledge of critical times for hand washing, school WASH clubs are in place, cleanliness of the school premises, evidence of hygiene education, and open defecation free surrounding all formed important indicators of the level of knowledge of WASH in pupils.

Table 7 *School Sustainability performance under the level of knowledge of WASH in Pupils*

Indicator	Code	Primary Schools								
		School 1	School 2	School 3	School 4	School 5	School 6	Total (6)	% Rating	Average
Knowledge of water borne diseases	F1	1	1	0	0	0	1	3	12.5	0.50
Knowledge of critical times for hand washing	F2	0	0	1	1	1	2	5	20.8	0.83
School WASH clubs are in place	F3	1	2	2	2	1	1	9	37.5	1.50
Cleanliness of the school premises	F4	1	2	2	2	1	1	9	37.5	1.50
Evidence of hygiene education	F5	1	1	1	0	0	0	3	12.5	0.50
Open defecation free surrounding	F6	0	1	2	1	0	0	4	16.7	0.67
Total (24)		4	9	8	6	3	5			10
% Rating		16.7	37.5	33.3	25	12.5	20.8			
Average		0.67	1.5	1.33	1.0	0.5	0.83	0.97		



Source: Authors (2018)

The sustainability mean scores for the six schools on the level of knowledge of WASH in pupils ranged from 0.5 (12.5%) scored by School 5 to 1.5 (37.5%) scored by School 2.

Indicators F4 (Cleanliness of the school premises) and F3 (School WASH clubs are in place) had high average scores of 1.50 (37.5%) each. Unlike the earlier indicators, indicators F4 and F3 are slightly close to the USAT guide of 2 for adequate performance. It appears that the influence of WASH has little contribution towards this score since schools are required to put in place WASH clubs as well as to keep their surroundings clean through the preventive maintenance system (PMS) (Luby, 2005).

Indicators F1 (Knowledge of water borne diseases) and F5 (Evidence of hygiene education) each scored the lowest mean of 0.50 (12.5%). It is not surprising that the two indicators equally scored low. Pupils will possess knowledge of water borne diseases if there is adequate hygiene education in the schools (Costello, 2013). With low levels of hygiene education, an indicator like F6 (Open defecation free surrounding) has performed poorly with a mean score of 0.67 (16.7%). And quite unlike the findings of O'Reilly et.al., (2008), the sustainability check of indicator F2 shows a very poor performance too with a mean score of 0.83 (20.8%). O'Reilly et.al., (2008) reports a rise (21 to 65%) in knowledge about water treatment procedures and handwashing post WASH intervention.

School 1, School 5 and School 6 scored 0 under indicator F6 (Open defecation free surrounding) displaying the complete failure of WASH sustainability in these schools. Pupils that don't fully know the perils of open defecation use the bush for defecation purposes unaware of the consequences (Zomerplaag, 2005).

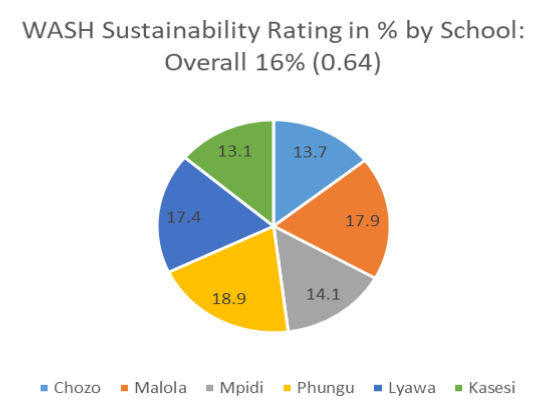
The overall average sustainability performance for the schools under this variable was 0.97 (24.3%).

5.7. Sustainability Performance of Rural Public Schools of Zambezi District

School 4 scored the highest sustainability rating of 18.9% followed by School 2 at 17.9%. School 6 had the lowest sustainability rating of 13.1% (0.50). However, all schools performed well below the required USAT adequate rating of 25% (2.0).

Table 8 *Overall Sustainability Performance of Rural Public Schools of Zambezi District*

School/ Variable	Capacity of Implementers	Availability of WASH Facilities	Community Participation	Monitoring and Evaluation System	Level of Knowledge	School Average
School 1	25.0	16.7	5.0	5.0	16.7	13.7
School 2	14.3	12.5	15.0	10.0	37.5	17.9
School 3	10.7	16.7	5.0	5.0	33.3	14.1
School 4	7.1	12.5	10.0	40.0	25.0	18.9
School 5	17.9	16.7	25.0	15.0	12.5	17.4
School 6	10.7	4.2	25.0	5.0	20.8	13.1
Variable Average	14.3	13.2	14.7	13.3	24.3	**16.0**



Source: Authors (2018)

The overall mean score for the schools under study stood at 0.64 (16.0%). This shows very little evidence of WASH projects being sustainable in the schools under study.

5.8. Challenges and Strategies in the Sustainability of WASH in Rural Public Schools

A number of challenges were identified for the poor sustainability of WASH in these schools. Lack of funds to procure facilities, low government funding and shortage of latrines were the major impediments in the sustainability of WASH projects in rural public schools.

Other challenges included: failure by most borehole users to pay user charges; poor water sources which mainly comprised of boreholes, scoop holes and shallow wells; water drying up (in dry seasons) e.g., at School 3 and School 5; and lack of NGO financial and/or technical support.

The principle strategies proposed by the school staff and community members included: joint decision- making amongst parents, teachers and pupils; increased community awareness about the benefits of WASH; increased funding and provision of technical support like training of teachers; make community members and teachers understand the role that they have in the transformation of WASH; and the need to have adequate facilities and guidelines on project implementation (see Table 8 for a comprehensive list of proposed interventions).

Table 9 *Measures for Improving WASH Sustainability in Rural Public Schools*

Response	Frequency	Percent (%)
Develop monitoring strategies to manage water usage conflicts	5	4.2
Use facilities that can be locally managed and maintained by the community	7	5.8
Secure WASH facilities against vandalism and damage from animals/ people	8	6.7
Increase funding and provide technical support like training of teachers	11	9.2
Keep latrines clean; and ensure that soap and water are always available for hand washing	8	6.7
Make community members and teachers understand the role that they have in the transformation of WASH	11	9.2
Make joint decisions with parents, teachers and pupils	15	12.5
Motivate and train teachers in project implementation	5	4.2
Need to fully integrate WASH into the school syllabus	9	7.5
Need to have adequate facilities and guidelines on project implementation	10	8.3
Promote flexible payment structures for water facilities	4	3.3
Reduce frequent staff transfers and set up a WASH maintenance plan	6	5.0
Schools to promote use of local materials for WASH implementation and involve community members fully	6	5.0
Increase community awareness about the benefits of WASH	12	10.0
Use the available political influence in enhancing school WASH clubs	3	2.5
Total	**120**	**100.0**

Source: Authors (2018)

6. Conclusion & Recommendations

The study has a twofold conclusion: one for the USAT framework itself and the other for the WASH project in rural public schools. USAT is a very user-friendly tool for assessing sustainability of WASH projects in schools. It renders little conceptual difficulties and most of all it is not data intensive like many other tools. As a result, the sustainability of WASH projects can be easily assessed particularly in the global south where data availability is a challenge.

Using the USAT framework, all five study variables (capacity of WASH implementers, availability of WASH facilities, presence of community participation, effectiveness of the monitoring and evaluation system and the level of knowledge of WASH in pupils) have performed well below the 50% adequacy requirement for sustainability. Hence, it is inferred that WASH is not sustainably implemented in the public schools of Zambezi district.

The research recommends that firstly, the implementers of WASH in rural public schools be trained and provided with the necessary tools. Secondly, WASH facilities should

be provided to its intended beneficiaries. For instance, convenient access to soap may influence an individual's opportunity to perform an action and help in the behavior change process. Thirdly, joint decision making with parents, teachers and pupils should be encouraged. This will in turn encourage community participation. Fourthly, monitoring and evaluation should be strengthened as it is meant to improve the implementation of WASH activities. And finally government should increase its funding allocation towards WASH activities in rural public schools.

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