Evaluation of Sanitation and Hygiene Services within Schools in Dream Big Ghana NGO Locality

Dominic Bride BSc
Charity Development Consultant

Linda East PhD, MPhil, BSc
Honorary Associate Professor, School of Health Sciences, University of Nottingham

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Executive Summary

This report describes the sanitation and hygiene conditions of schools in the villages of Dzita and Dzita-Agbledomi in the Volta Region of Ghana. The villages are served by a non-governmental organisation, Dream Big Ghana NGO, that specialises in community sanitation and hygiene.

Using tools provided by the World Health Organisation and the UNICEF Joint Monitoring Programme (JMP), the facilities of four schools were assessed using a standardized questionnaire. All schools featured improved sanitation facilities that were separate for males and females, meaning they have the ability to provide a basic sanitation service. However, the numbers of students and teachers using each toilet were well above the recommended student to toilet ratios in every school.

Dream Big Ghana NGO has recently constructed an Ecosan block for one of the schools, which was found to be functioning well. The other schools utilised ventilated pit latrines installed by the local government, some with funding from UNICEF. The condition of most of the pit latrines was poor, with dark cubicles and an unpleasant smell. This resulted in the continuation of open defecation among both students and teachers. Some pit latrines could no longer be used as they were full and there was no discernible system for emptying them. Facilities for menstrual hygiene management were poor or absent in all of the schools. Handwashing facilities were also limited or non-existent, with only one school providing soap and water at the time of the survey.

The report concludes with recommendations for remedial action in each of the schools surveyed, including suggestions as to the order of priority. The methods used to carry out this survey will be adapted to create a monitoring and evaluation system to ensure improvements are sustained.

Key words: Sanitation, Hygiene, Menstrual Hygiene, Schools, JMP, Ecosan, Ventilated Pit Latrines, Open Defecation

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1. Introduction

The purpose of this study is firstly to explore the impact that Dream Big Ghana NGO's (DBG's) first school Ecological Sanitation (Ecosan) Toilet block has had on the sanitation and hygiene experience for pupils and teachers at Dzita Basic School. Second, the study has been conducted to assess the sanitation and hygiene conditions in schools located within DBG's operating area in an attempt to determine the best course of action to ensure all pupils within the area are being provided with the highest possible level of sanitation and hygiene services whilst at school.

This report has been presented to Dream Big Ghana Foundation (UK) in order to develop costed proposals for improvements to school sanitation. In the longer term, the study will be used as a pilot for further monitoring of sanitation and hygiene conditions in schools where DBG have invested in infrastructure.

Research Questions:

1) According to guidance from UNICEF and WHO, what level of sanitation and hygiene is DBG EcoSan Toilet block providing to Dzita Basic School?
2) Which school within the locality has the lowest level of sanitation and hygiene services according to the UNICEF and WHO minimum standards?

Through answering these two questions, this study will identify what action is required to improve sanitation and hygiene services at each school within the locality, and which school is in the most urgent need of investment.

The four schools surveyed are all located within the area local to DBG as follows: Dzita Basic School, Philio Basic School, Anyanui Basic School and Agbledomi Basic School. Dzita Basic School was the first school to receive a DBG Ecosan toilet block in 2018, which has now been in use for approximately 15 months. Please see Figure 1.1 below for visualisation of school locations.

In total, the four schools serve nearly 3000 pupils and employ nearly 100 teachers. The age of pupils ranges from 4 years to the early 20's, noting that there is no standard age for leaving school in Ghana. It can take individuals many years to complete schooling due to work and family commitments and lack of financial support. While elementary schooling is free in Ghana, there are associated costs with school attendance that are difficult to afford for some families, including textbooks and uniforms.



Figure 1.1 Location of schools within DBG locality, taken from Google Earth.

2. Background

2.1. WASH in Schools

Approximately one third of schools globally still lack necessary water supply, sanitation and hygiene (WASH) facilities for their pupils and teachers[1]. Inadequate WASH infrastructure can be attributed to 10% of diseases globally, with an estimated 1.5 million deaths linked to diarrhoea annually, mainly within children[2]. Appropriate and well managed WASH interventions in the Global South can significantly reduce the rate of diseases such as diarrhoea and aid in the reduction of child mortality rates. Further economic benefits such as reduction in medical costs and an increase in productivity are also attributed to effective improvements in WASH infrastructure and services. Although progress has been made, global attention to WASH, particularly in schools, has failed to be prioritised. The creation of the Sustainable Development Goals (SDGs) addressed this to a degree, with access to WASH facilities mentioned directly as part of Goal 4: Quality Education, and a dedicated goal, Goal 6: Clean Water and Sanitation.

Good quality WASH practices among children are important for many reasons. Diseases associated with poor WASH practices are the biggest cause of child absenteeism from school, but also a major contributor to deaths of children under the age of 5[3]. An estimated 4 billion cases of diarrhoea lead to 1.8 million deaths annually, with 90% of these deaths among children under the age of 5. Diarrhoea is the most common health related issue associated with poor WASH practices. Other diseases include cholera, typhoid, trachoma and intenstinal worms[4]. Children are particularly vulnerable to WASH related diseases. Due to the importance of education, getting WASH practices and services within schools to an acceptable level is vital for development. Furthermore, if good WASH practices are taught and maintained in schools, then children are able to ingrain good hygiene and sanitation practices into their daily lives. If this is achieved, then good practice can be taken back to the home setting, advocated for by the children.

Female students, and women generally, experience more difficulty around poor WASH practices and facilities. The absence of separate-sex sanitation facilities often discourages girls from using the toilet

[1] McGinnis, S.M., McKeon, T., Desai, R., Ejelonu, A., Laskowski, S. and Murphy, H.M., 2017. A systematic review: costing and financing of water, sanitation, and hygiene (WASH) in schools. *International journal of environmental research and public health*, *14*(4), p.442.
[2] Prüss-Üstün, A.; Bos, R.; Gore, F.; Bartram, J. Others Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health. Available online: **https://www.cabdirect.org/cabdirect/abstract/20083318172**
[3] Adams, J., Bartram, J., Chartier, Y., and Sims, J. (2009) *Water, sanitation and hygiene standards for schools in low-cost settings.* World Health Organisation
[4] UNICEF (

whilst in school[5]. Furthermore, lack of menstrual hygiene management services in place at school can lead to girls either being absent from school during menstruation or dropping out of school completely. Sustainable Development Goal 6.2 calls for special attention to be paid to women and girls when providing adequate and equitable sanitation to all. The empowerment of women through education and equality is seen as the most effective method to reduce population growth in the Global South[6]. This starts in school, meaning appropriate, single-sex facilities that are usable, functional and private are essential.

The increase in attention paid to WASH in recent years is noticeable, with a plethora of data collected globally regarding the WASH conditions in schools. A joint partnership between the World Health Organisation (WHO) and The United Nations Children's Fund (UNICEF) created a Joint Monitoring Programme (JMP) for WASH in schools, aimed at improving overall understanding of current service provision. The JMP has sought to establish how many children are provided with what they term as "Basic Services". The JMP was first established in 1990 and has continuously been reviewed and refined; it is now being directly linked to the SDGs. Data from 2016 revealed that 66% of schools globally had a basic sanitation service, but 620 million children globally still lacked a similar service[7].

Figure 2.1 sets out the definition for each level of service provision, from the lowest level "No Service" to highest "Advanced Service"[8]. For a Basic level of sanitation, an improved facility must be present. Facilities classed as improved are as follows: flush/pour-flush toilets, pit latrines with sealed slab and composting toilets. In 2018, the JMP updated their definition with a further point asking how the improved facilities were being managed. If faecal matter was either treated or disposed of in situ, temporarily stored and then emptied for off-site treatment, or transported through a sewer for later treatment, it could be classed as providing a safely managed sanitation service. If the faecal material was not managed correctly (for example, pit latrines were not being emptied once full up), then only a basic sanitation service could claim to be provided.

[5] UNICEF (2015) *How WASH relates to health, education and development.*
[6] Kates, C.A. (2004) Reproductive liberty and overpopulation. *Environmental Values, 13*(1), pp. 51-79
[7] UNICEF (2018) WASH in Schools. Available at: https://data.unicef.org/topic/water-and-sanitation/wash-in-schools/
[8] UNICEF (2016) WHO. Core Questions and Indicators for Monitoring WASH in Schools in the Sustainable Development Goals. *World Health Organisation:* Geneva, Switzerland. 2016.

SANITATION	HYGIENE
Advanced service: Additional criteria may include student per toilet ratios, menstrual hygiene facilities, cleanliness, accessibility to all users, and excreta management systems	**Advanced service:** Additional criteria may include hygiene education, group handwashing, menstrual hygiene materials, and accessibility to all users
Basic service: Improved sanitation facilities at the school that are single-sex and usable (available, functional and private) at the time of the survey	**Basic service:** Handwashing facilities with water and soap available at the school at the time of the survey
Limited service: Improved sanitation facilities at the school that are either not single-sex or not usable at the time of the survey	**Limited service:**Handwashing facilities with water but no soap available at the school at the time of the survey
No service:: Unimproved sanitation facilities or no sanitation facilities at the school	**No service::** No handwashing facilities available or no water available at the school
Note: Improved facilities include flush/pour flush toilets, ventilated improved pit latrines, composting toilets and pit latrines with a slab or platform. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines.	Note: Handwashing facilities may be fixed or mobile, and include a sink with tap water, buckets with taps, tippy-taps and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent and soapy water but does not include ash, soil, sand or other handwashing agents.

Figure 2.1 Emerging JMP service ladders for monitoring WASH in schools in the SDGs.

Data from Ghana's profile for the JMP (2017) states that 90.6% of primary schools, and 76.1% of secondary schools operate with sanitation facilities that provide students and teachers with a Basic level of service[9]. This is an improvement, as a decade before in 2007, national data from Ghanaian schools showed 43.8% of schools did not have any kind of sanitation facility on the school site. These figures show Ghana's commitment to the Millennium Development goals and now the Sustainable Development Goals.

[9] JMP Country Files 2018. Available at: https://www.washdata.org/monitoring/schools/country-files-2018

However, the statistics do not give student-to-toilet ratios and lack specific data around condition and usage, so could be somewhat misleading. There is also an absence of any hygiene data recorded in the JMP database, specifically for schools.

National statistics from the JMP 2017/18 state that 48.5% of Ghanaian households have access to a hand washing facility with soap and water. However, the Volta region records a lower percentage of 36.6%. Disparities between urban and rural populations regarding sanitation and hygiene access exist globally, with 70% of the 2.4 billion people who do not have access to improved sanitation facilities living in rural areas[10].

2.2 The importance of WASH for females

Sustainable Development Goal (SDG) 6.2 states; *"*By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations"[11]. Women and girls have been identified as being some of the most vulnerable groups in relation to poor WASH practices and infrastructure. Some have stated that the most impactful method for eradicating poverty of woman is to focus on WASH, where 1 in 10 schoolgirls on the African continent fail to complete school due to poor WASH practices and infrastructure[12]. The managing of menstrual hygiene for women and girls is a human right, as the negative impacts of poor management can impact access to education, work and health[13].

Menstruation is a natural monthly process that occurs for adolescent girls and women. Poor management of menstrual hygiene has been directly linked to school absenteeism and dropouts for girls in the Global South, further securing gender inequalities[14]. It has also been associated with long term ill health effects, including reproductive tract and urinary tract infections[15]. A variety of factors affect how women manage their menstrual hygiene, dependent upon location, cultural norms, economic and social status, access to

[10] UNICEF and WHO (2015) Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment. UNICEF and World Health Organisation

[11] Desa, U.N., 2016. Transforming our world: The 2030 agenda for sustainable development.

[12] Haws, N.J., 2006. Access to safe water and sanitation: The first step in removing the female face of poverty. *Women's Policy Journal*, *3*, pp.41-46.

[13] UNICEF, 2019. Guidance on menstrual health and hygiene. *New York: United Nations Children's Fund (UNICEF) Programme Division/WASH*.

[14] Sumpter, C. and Torondel, B., 2013. A systematic review of the health and social effects of menstrual hygiene management. *PloS one*, *8*(4).

[15] Tegegne, T.K. and Sisay, M.M., 2014. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. *BMC public health*, *14*(1), p.1118.

education and materials. Many of these factors will result in women having to manage their menstruation in an unhygienic and uncomfortable manner.

Menstrual Hygiene Management (MHM) has been defined in the JMP as, "Women and adolescent girls are using a clean menstrual management material to absorb or collect menstrual blood, that can be changed in privacy as often as necessary for the duration of a menstrual period, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials."[16]

UNICEF have highlighted the importance of effective MHM in achieving numerous SDGs, namely Goal 3: Good Health and Wellbeing, Goal 4: Quality Education, Goal 5: Gender Equality, Goal 6: Clean Water and Sanitation, Goal 8: Decent Work and Economic Growth and Goal 12: Sustainable Consumption and Production. The ability to achieve these goals is highly dependent upon the education that girls receive when starting menstruation, that will in turn allow them to effectively manage their menstruation throughout their lives. This places a significant level of responsibility on schools to ensure that girls have this education, as well as boys. Access to materials and knowledge of hygienic management ensures that girls and women can manage their menstrual hygiene in a dignified and comfortable manner, giving them equal opportunity to complete education, keep good health and access job markets.

2.3. Ecological Sanitation (Ecosan)

DBG NGO has been working with Ecosan since 2010. Ecosan has been identified internationally as an appropriate WASH technology to reach some of the world's poorest communities, doing so in an environmentally friendly manner[17]. Ecosan toilets are above ground units that safely store and recycle human excreta, using natural processes to transform that waste into a safe, organic compost and fertilizer.

Three principles underline the effectiveness of Ecosan:
1) disease prevention and removal of pathogen ridden excreta from the environment in a hygienic manner;
2) does not lead to groundwater contamination or use any water so saves scarce resources;
3) closes nutrient cycle and reduces the need for artificial fertilisers, utilising what is otherwise considered a waste product [18].

[16] UNICEF, 2019. Guidance on menstrual health and hygiene. *New York: United Nations Children's Fund (UNICEF) Programme Division/WASH*. (P13)
[17] Vinnerås, B., Jönsson, H., Salomon, E. and Stintzing, A.R., (2003) April. Tentative guidelines for agricultural use of urine and faeces. In *Proceedings of the 2nd International Symposium on Ecological Sanitation* (pp. 101-107).
[18] WaterAid (2008) Ecological sanitation latrines: The experience of Nepal

These three principles make the technology appropriate in DBG's locality, where a lack of excreta treatment facilities and a generally low level of basic sanitation access meet with a high proportion of people employed in agriculture. Furthermore, being situated in a coastal location, the sandy soil produces low agricultural yields due to very poor quality and benefits from organic composting materials.

As of May 2020, DBG's Ecosan portfolio consists of 117 above ground family units which provide approximately 1400 people with access to an improved sanitation service. More recently, the NGO has upscaled their sanitation programme to build toilet blocks for schools. Dzita Basic School was the first recipient in 2018, with a second toilet block completed in early 2020 for Volta Senior High School.

The school toilet blocks use the same design for the cubicles as the family toilets. As can be seen in Figure 2.2, two seats are located in each cubicle, positioned above two separate chambers. As in Figure 2.3, the six open chambers located on the bottom left of the structure are the separate chambers for 3 cubicles. The users will use one side of the toilet until the chamber is full. The time this takes to fill up depends on how many people are using the toilet, but it typically takes 6-9 months. When using the toilet, 2 scoops of sawdust or ash are added after every use to aid the decomposition processes and to prevent smell by absorbing moisture. Another method for preventing smell is urine diversion, as the lower water content in the chamber will result in less smell. Urine diversion also offers further benefits in agriculture, where is can be an alternative to water, although this is not used in DBG Ecosan toilets. Within the structure of DBG Ecosan toilets are urinals for both males and females which reduces the amount of urine entering the compost chamber.



Figure 2.2 Cubicle of DBG Ecosan School toilet block, with toilets used in rotation



Figure 2.3 DBG second Ecosan school toilet block under construction at Volta Senior High School



Figure 2.4 DBG first Ecosan school toilet block at Dzita Basic School

Once the chamber is full, the other side of the toilet with a separate chamber is opened and used in the same manner. After 6-9 months when the new chamber is full, the other side will have finished composting. As in Figure 2.4 above, the concrete slabs to the chambers are sealed with cement.

Emptying the compost is managed by cracking the cement layer and pulling the slab out, as in Figure 2.5. Once the chamber is emptied of all compost inside, the back slab can be sealed with cement once more and the toilet is ready to use again. The compost can then be applied directly to agricultural land, as in Figure 2.6.



Figure 2.5 Opening Ecosan slab and emptying compost



Figure 2.6 Compost being applied to spring onions

A criticism of Ecosan globally is the high cost of implementation required to build the facilities, which often requires a large subsidy. The Ecosan toilets that DBG build in schools cost approximately $15,000 (dependent on local building material price fluctuations), with this figure also including wages for masons. Critics of Ecosan state that high initial costs severely affect the long-term sustainability of any Ecosan projects. But Ecosan's appropriateness in rural areas lacking sanitation facilities and featuring high levels of agricultural employment make it an attractive technology if the subsidies are available.

Ecosan's potential to make up a significant proportion of improved sanitation facilities at a national level has been recognised in other West African countries. The government of Burkina Faso's sanitation policy envisages 15% of improved facilities are Ecosan. They state that it is particularly important in rural areas where agricultural employment is high and soil quality is low. A 2018 study into the long-term sustainability of Burkina Faso's Ecosan system concluded that Ecosan reduced the number of people practicing open defecation. Interestingly, those who received training focused on the reuse of material in the form of compost for agriculture were more likely to empty their toilet when full compared to those who were given training only on the sanitation and health benefits[19].

[19] Dickin S., Dakerskog L., Jimenez A., Andersson K. and Savadogo K. (2018) Understanding sustained use of ecological sanitation in rural Burkina Faso. *Science of the Total Environment 613-614*, p.140-148.

2.4 Other sanitation technologies in use in schools

Ventilated Improved Pit Latrines (VIP) are the most common form of improved sanitation facilities found throughout the Global South and their coverage is on the rise as countries attempt to provide their populations with universal access to improved sanitation facilities to meet the targets of the SDGs[20]. VIP are classed as an improved sanitation facility because of their ability to safely separate faecal matter from human contact and do so in a similar way to Ecosan. See Figure 2.7, the main structure houses separate cubicles that have a sealed pit below. The pits are accessible from behind the cubicle (lower platform on right hand side of Figure 2.7). See Figure 2.8, inside each cubicle is a hole in the floor that enters into the pit below. Faecal matter builds up in the pit below until it is full. At this point, the sealed slab on the back must be opened and the waste either pumped or dug out. A downside to the use of pit latrines compared to Ecosan is the waste material is emptied from the pit and transported elsewhere, where it is still waste. Ecosan produces a usable resource out of faecal matter. The ventilation pipes in Figure 2.7 are to reduce the smell inside the cubicle. Another criticism of VIP is the smell quite often puts people off using them. The ventilation pipe also reduces the number of insects that can enter the



Figure 2.7 Ventilated Improved Pit Latrine (VIP)



Figure 2.8 Inside a VIP cubicle

[20] Graham, J.P. and Polizzotto, M.L., 2013. Pit latrines and their impacts on groundwater quality: a systematic review. *Environmental health perspectives*, *121*(5), pp.521-530.

pit, provided there is fly mesh covering the end of the pipe[21]. VIP toilets can be used in a similar way to Ecosan with the addition of either sawdust or ash as an absorbent material to further reduce the smell[22].

Planning of VIP construction must be thorough in order for it to be effective and not cause wider negative impacts. The pit must be sealed completely otherwise faecal matter can infiltrate down to water systems and pollute the surrounding environment. Furthermore, the emptying of pit latrines often requires a pump leading to a truck to transport the material away. This can result in significant costs, outweighing the benefits of cheaper initial costs of construction. If emptying of the pit is done by hand to save cost, it puts workers in a very precarious position as the possibility of pathogen transfer is extremely high[23].

[21] Ahmed, M.F. & Rahman, M.M. (2003). Water Supply & Sanitation: Rural and Low Income Urban Communities, 2nd Edition, ITN-Bangladesh

[22] François Brikké (2003). *Linking technology choice with operation and maintenance in the context of community water supply and sanitation*

[23] Tilley, E.; Ulrich, L.; Lüthi, C.; Reymond, Ph.; Zurbrügg, C. (2014). *Compendium of Sanitation Systems and Technologies*

3. Methodology

3.1 Methods Introduction

The aim of this study was to evaluate current sanitation and hygiene conditions within schools in DBG locality. Quantitative data collection methods in the form of a survey were chosen in order to provide data in a short period of time that was also reliable and accurate. This approach enabled DBG to explore the sanitation and hygiene conditions currently being experienced within all local schools.

The design of the questionnaire (Appendix 1), was based on a WHO/UNICEF paper that aims to provide universal monitoring and evaluation questions around WASH facilities in schools [24]. The paper includes core questions in three categories under the WASH heading: 1) access to basic drinking water, 2) sanitation and 3) hygiene. This study used only the sanitation and hygiene questions. Where necessary, the questions were adapted for to fit locally specific terminology Each multiple-choice answer was given a coded score so that an overall WASH facilities rating could be provided for the schools analysed.

3.2 Data Collection Method

Each school surveyed was contacted to explain the study beforehand but the actual day of the survey was not revealed. This is because DBG wanted to see what the sanitation and hygiene facilities and practices were like on an everyday basis so that we could make the most appropriate decisions based on sound data. Data collection was undertaken by the DBG Sanitation Squad, with personnel kept the same throughout the study to ensure reliability. The survey was conducted twice at each school over a period of 4 weeks in February/March 2020 to enable average scores to be generated. The survey was due to be conducted a total of 5 times for each school, however the impact of the COVID-19 pandemic resulted in all Ghanaian schools being closed indefinitely during the study period. Therefore, analysis of survey responses is based on the survey being conducted 2 times at each school. Furthermore, while the initial proposal set out to evaluate all schools in the locality, data from Volta Senior High School could not be collected due to the pandemic.

[24] UNICEF and WHO (2018) Core questions and indicators for monitoring WASH in Schools in the Sustainable Development Goals

3.3 Data Analysis Method

Data analysis was conducted using Microsoft Excel. The responses to the questionnaire were given coded scores dependent on the directly observed level of sanitation and hygiene. For example, all toilet facilities considered by UNICEF and WHO to be 'improved services' were given a +2 score, whereas facilities considered 'unimproved' given +1, and no service at all a score of 0. A further example of the coding system, a question asking whether sanitation facilities are single sex, asked for a Yes/No answer. Yes was given a +1 coded response, whilst No had 0 coded response. The WHO/UNICEF document offers annotations for each question, explaining what answers would be considered appropriate, and which not. This enabled the researcher to code the questionnaire in its entirety using the information from WHO/UNICEF.

Core questions were scored together, with the maximum sanitation core score being out of 3, and for the hygiene core questions out of 4. This is based on questions 1-6 of the questionnaire, excluding questions 2 and 4, thus providing a core sanitation and hygiene rating for each school analysed. The scores for the core questions determined whether the facilities at the school were assessed as providing a Basic service, as described by UNICEF and WHO [25] in Figure 2.1 (page 8). To be providing a Basic service according to the JMP ladder, a score of 7 out of 7 had to be achieved.

The expanded questions enabled the team to find out why each school scored as it did in the overall assessment of the level of service provided. For the expanded sanitation questions (questions 7-18 in the questionnaire), the maximum score that could be achieved was 19. For the expanded hygiene questions (19-25 in the questionnaire excluding 21 and 22), the maximum score was 9. The responses to these expanded and more detailed questions have enabled recommendations to be made for each school to improve. For example, there are 4 questions centred upon menstrual hygiene management throughout the survey. If all questions received negative responses, we could recommend this as a topic of focus when trying to improve facilities and services. The same could be applied to handwashing practices.

Questions 2 and 4 were analysed separately due to their significance in determining which school needs the most urgent investment (combining them with other data might mask their significance). These two questions are also more dependent on the size of the school population, which varies between the schools. These questions were therefore analysed separately, as is also the case with survey question 21.

[25] UNICEF and WHO (2018) Core questions and indicators for monitoring WASH in Schools in the Sustainable Development Goals

4. Findings and analysis

This section presents the findings of the quantitative data sets collected from the 4 schools in the locality.

4.1 Demographic Profile of Local Schools

Name of School	Number of Pupils	Number of Girls	Number of Boys	Age Range of Pupils (years)	Number of Female Teachers	Number of Male Teachers
Anyanhui Basic	714	329 (46%)	385 (54%)	4-22	4 (16%))	21 (84%)
Philio Basic	686	308 (45%)	378 (55%)	4-24	5 (28%)	13 (72%)
Agbledomi Basic	754	323 (43%)	431 (57%)	4-24	12 (35%)	22 (65%)
Dzita Basic	585	299 (51%)	286 (49%)	4-22	3 (20%)	12 (80%)
TOTAL	**2739**	**1259 (46%)**	**1480 (54%)**	**N/A**	**24 (26%)**	**68 (74%)**

Table 4.1 Demographic profile for schools assessed

Ghana's male to female population ratio is 50.9% to 49.1% respectively[26]. However, the data gathered for this investigation suggests the male to female ratio in schools is 54% to 46%. With the exception of Dzita Basic School, all schools surveyed recorded male to female ratios greater than the national average. Whilst conclusions cannot be drawn from these statistics, the survey findings might suggest there is a significant number of girls not attending school in the local area.

The sanitation and hygiene profiles of the four schools surveyed are presented in Table 4.2 below. This table provides an overview of the current situation for pupils and teachers at school, highlighting current practices and issues that are particularly problematic.

[26]World population Review (2020) Available at: https://worldpopulationreview.com/countries/ghana-population/ Accessed 7.04.20

Name of School	Type of Sanitation Facility	Who build the sanitation facilities	Number of Functioning Cubicles	Number of Functioning Student Cubicles (Females/Males)	Number of Functioning Teacher Cubicles (Females/Males)	Number of Cubicles Not in Use	Number of Handwashing Facilities	Open Defecating Occurring
Anyanui Basic School	Pit Latrine with sealed slab	District Assembly in collaboration with Social Insurance Fund	8	3/3	1/1	12	0	Most children and teachers, due to smell
Philio Basic School	Pit Latrine with sealed slab	UNICEF and District Assembly	14 (Built by UNICEF)	7/7	Use the same as students	10 (Built by District Assembly)	1	No
Agbledomi Basic School	Pit Latrine with sealed slab	UNICEF	11	5/5	1 shared between females and males	0	0	Some children, due to smell
Dzita Basic School	Ecosan Toilet Block	DBG	4	2/2	Use the same as students	0	5	NO

Table 4.2 Sanitation and hygiene facilities at Anyanui Basic School, Philio Basic School, Agbledomi Basic School and Dzita Basic School.

4.2 Research Question 1: *level of sanitation and hygiene provided by the DBG Ecosan toilet block to Dzita Basic School*

Our first research question asked what level of sanitation and hygiene services is being provided by the DBG Ecosan toilet block to the students and teachers of Dzita Basic School. Individual survey responses from the three sections of the survey (Basic Sanitation and Hygiene, Expanded Sanitation and Expanded Hygiene) were analysed to assess the level provided. All three sections are visualised against results that would provide basic sanitation and hygiene, advanced sanitation and advanced hygiene. Student to toilet ratios are presented and analysed below.

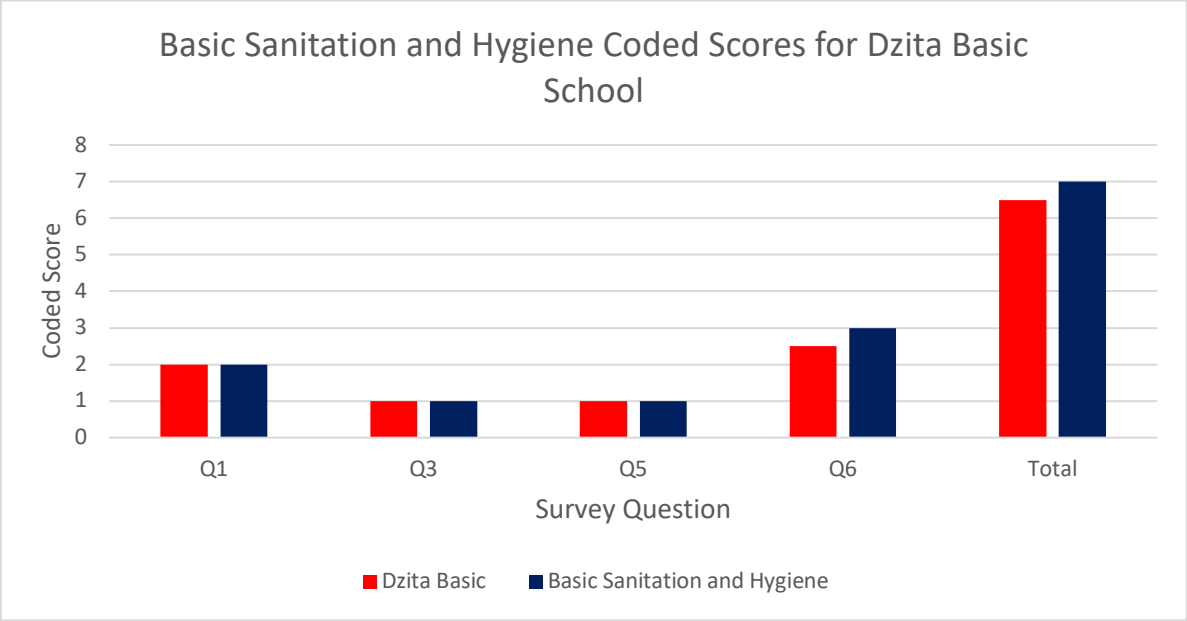


Figure 4.1 Basic Sanitation and Hygiene Coded Scores for Dzita basic School compared to WHO/UNICEF Basic Sanitation and Hygiene Provision.

The responses in Figure 4.1 are averages from two rounds of the survey that were completed. Survey Q1 regarding the type of toilet was answered with a +2 coded score due to a compost toilet being considered an 'improved sanitation facility' by WHO and UNICEF[27]. An improved sanitation facility is one that hygienically separates human waste from human contact[28].

Survey Q3 provides a Yes/No answer as to whether the toilets are separated based on gender, which in Dzita Basic School they are, a 'Yes' answer providing a +1 code response and No answer providing a 0 code.

[27] UNICEF and WHO (2018) Core questions and indicators for monitoring WASH in Schools in the Sustainable Development Goals
[28] JMP Sanitation Definitions https://www.washdata.org/monitoring/sanitation

Survey Q5 relates to the presence of some form of hand washing infrastructure that enables students and teachers to wash hands effectively. A tippy tap is present in both sides of DBG Ecosan block located at Dzita Basic School, providing students and teachers with the ability to wash their hands and therefore a coded score of +1 was attached to the 'Yes' answer. Survey Q6 asked about the availability of both soap and water at the time the survey was conducted. At the time of the second round of surveying, soap was not present at the tippy tap in Dzita Basic School, which explains the average score for survey Q6 being 2.5 rather than 3.

The DBG Ecosan school toilet block located at Dzita Basic School scored an average Basic Sanitation and Hygiene Score of 6.5 out 7, meaning Basic Sanitation is being provided (refer back to Figure 2.1 for definitions). However, the lack of soap at the time of the second survey resulted in an overall assessment of Limited Hygiene provision, with the standard of Basic Hygiene not quite being met.

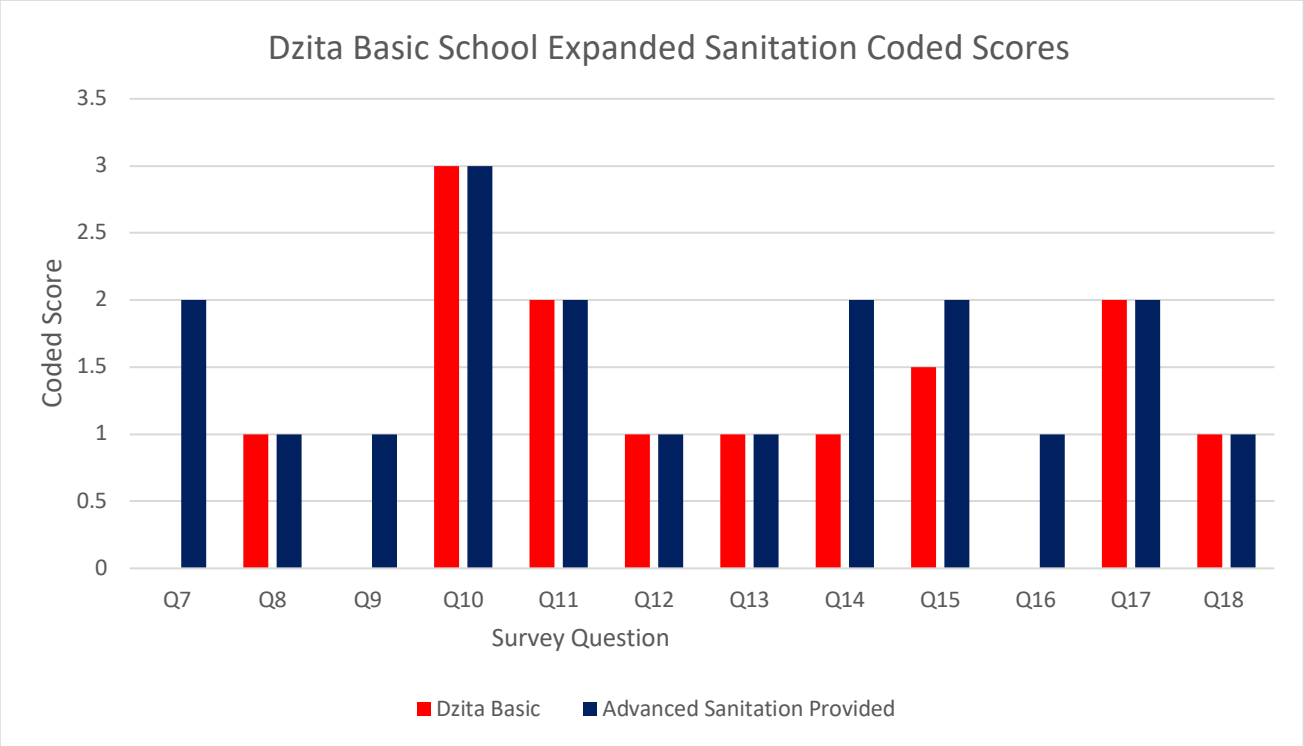


Figure 4.2 Dzita Basic School Expanded Sanitation Coded Scores compared to WHO/UNICEF Advanced Sanitation Provision coded score

Figure 4.2 reveals coded responses to Expanded Sanitation questions collected at Dzita Basic School. Positive responses that meet WHO/UNICEF Advanced Sanitation definition were recorded in survey Q8, 10, 11, 12, 13, 17 and 18. Survey Q18 reveals how the toilet is managed, including whether material is removed once it is full. If material is removed from the toilet once it is full, or in the case of Ecosan, compost removed, then the sanitation facility can be classed as providing a safely managed sanitation

service by WHO/UNICEF[29]. Dzita Basic School recorded a positive response for Q18 meaning material is removed, classing it as a safely managed sanitation facility. If the toilet were to not be emptied and managed in the correct manner, it would only be classified as a basic sanitation service. As noted in Table 4.2, a local resident comes to empty the compost from the chamber once decomposition is completed and applies the compost to agricultural land.

Notable responses feature in Q8, asking about the presence of covered bins within the female cubicles to allow girls to manage menstrual hygiene. A +1 score for Q8 highlights the presence of covered bins in Dzita Basic School's female cubicles. However, negative responses arose regarding Q7 (presence of soap and water for menstrual management in cubicles), and Q9 (whether there are disposal mechanisms for menstrual hygiene around the school and not just in the toilet cubicles). The menstrual hygiene facilities currently provided by DBG Ecosan Toilet Block to the female students of Dzita Basic School do not reach an Advanced Sanitation categorisation according to WHO and UNICEF.

Q10 and 11 addressed the cleanliness of the toilet facilities at the time of the survey. Positive responses to both questions indicated that the toilets are cleaned at least once per day and cleaning is carried out to a good standard. The cleanliness of toilet facilities either encourages or discourages use by students, as the cleaner the toilet, the more likely it is to be used. The cleaning of Dzita Ecosan block is carried out by a student-led WASH team who are responsible for the daily maintenance of the toilet. A key factor in reducing the prevalence of diarrhoeal disease and worm infections is through using a clean latrine regularly [30]. The positive responses in Q10 and 11 are encouraging as it represents a level of ownership undertaken by the pupils at the school and suggests that a clean and useable toilet is valued by the students.

However, there was a negative response to survey Q16 (presence of appropriate anal cleansing materials). Lack of appropriate anal cleansing material, which for use with Ecosan toilets must be biodegradable, could result in students and teachers using a non-biodegradable material for anal cleansing that would then disrupt that composting process of the Ecosan toilet. Informal questioning during the time of data collection revealed that numerous different materials are used for anal cleansing, including various tree leaves and lottery tickets, both of which are suitable for Ecosan.

[29] JMP Sanitation Monitoring (2017) Available at: https://www.washdata.org/monitoring/sanitation
[30] UNICEF, 1998. A manual on school sanitation and hygiene. *Towards Better Programming Water, Environment and Sanitation Technical Guidelines*.

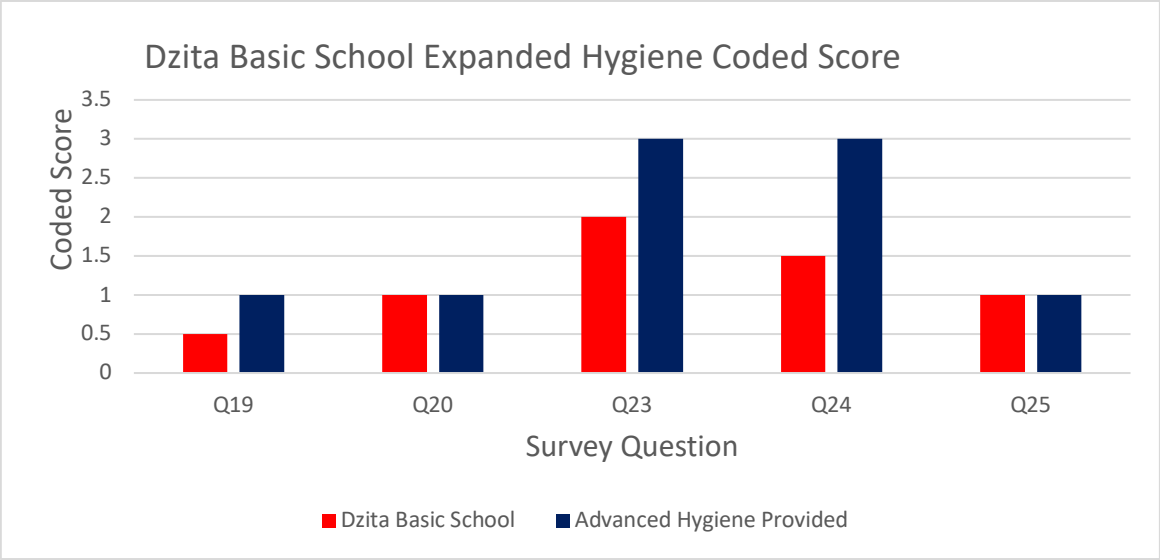


Figure 4.3 Dzita Basic School Expanded Hygiene Coded Score compared to WHO/UNICEF Advanced Sanitation Provision coded score

Figure 4.3 shows coded scores for Expanded Hygiene questions. Q19 refers to hand washing facilities being accessible to those with limited mobility and vision. An average response of 0.5 shows that such facilities were not always available during the time of the survey, meaning hygiene facilities are not accessible to all.

Similar to the evaluation of Expanded Sanitation questions 7 and 9, Q24 relates to management of female menstrual hygiene. An absence of a bathing area with soap and water specifically for menstrual hygiene management is the notable point (materials such as disposable pads are available for purchase in the community, but these need washing). Education for female students around menstrual hygiene is available from the local community nurses, however not universally provided.

Another area that is important for this analysis is looking at student to toilet ratios: see Table 4.3 for the ratios for Dzita Basic School. International recommendations deem 25-30 students per cubicle the acceptable minimum for females, with 50 students per cubicle plus urinals for males[31]. This study shows that ratio for girls at Dzita Basic School are approximately 5 times the international recommendation, with the ratio for boys being approximately 3 times greater than the international recommendation. Furthermore, the ratio above includes teachers at Dzita Basic School, who according to WHO should have a separate facility dedicated to them, one for each gender[32].

[31] UNICEF (2012) "School Water, Sanitation and Hygiene Knowledge, Attitudes and Practices Survey. Available at: https://www.unicef.org/oPt/UNICEF_-_English_Report_Final.pdf

[32] Adams, J., Bartram, J., Chartier, Y. and Sims, J. eds., 2009. *Water, sanitation and hygiene standards for schools in low-cost settings*. World Health Organization.

Number of Male Students and Teachers	298	RATIO: 149
Number of Male Toilets	2	
Number of Females Students and Teachers	301	RATIO: 150.5
Number of Female Toilets	2	

Table 4.3 Dzita Basic School, Student and Teacher to Toilet ratios

Overall, it can be seen that the Ecosan toilet block at Dzita Basic School is functioning well and meets many of the international standards. However, areas of concern include the small number of toilets for the number of students; insufficient provision for anal cleansing and menstrual hygiene management and the lack of separate facilities for students and teachers.

4.3 Research Question 2: *scores of other schools within the locality, exploring which school has the lowest level of sanitation and hygiene services according to UNICEF and WHO*

Research question 2 was designed to assess which school in DBG locality currently has the lowest level of Sanitation and Hygiene services. Analysis for this research question focussed on the coded scores for individual survey questions on Core Sanitation and Hygiene. Expanded Sanitation and Hygiene questions were also analysed to add further understanding around current situations in each school. Survey Q2 (toilet to student ratio) and Q21 (number of functional handwashing facilities on the school site) also provided further insight into the conditions at each location.

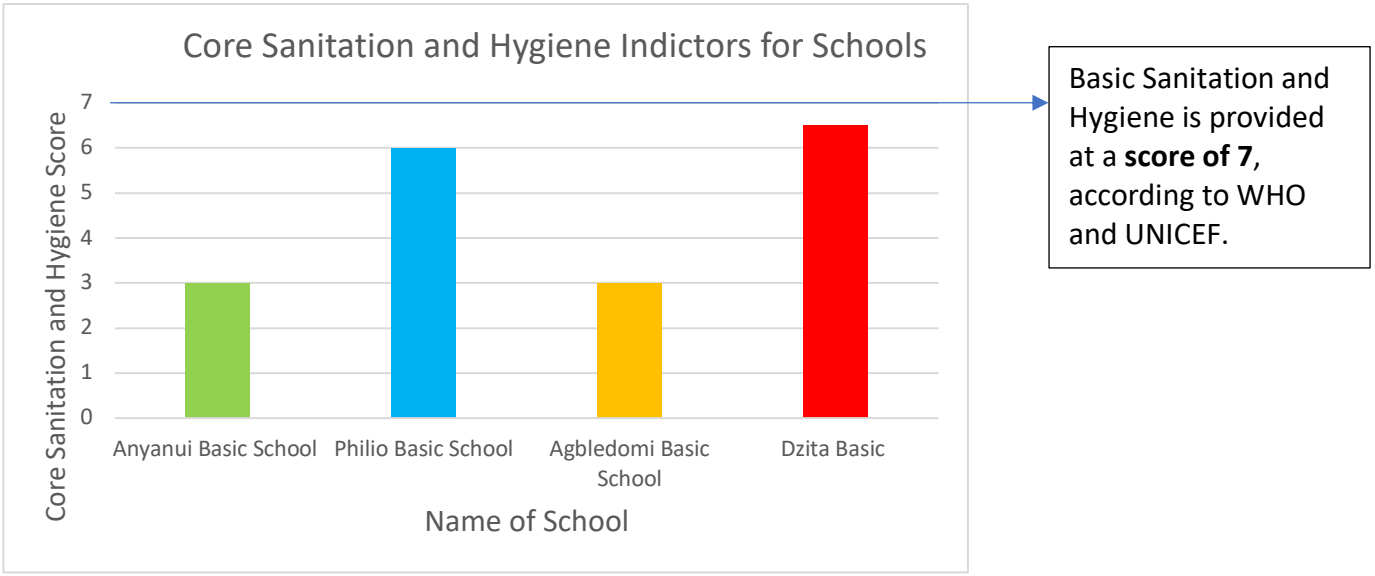


Figure 4.4 Core Sanitation and Hygiene Total Coded Scores for Schools within Locality

Figure 4.4 shows the average coded score out of 7 for survey questions 1, 3, 5 and 6, for each school that was assessed. Dzita Basic School received the highest coded score of 6.5, reflecting the recent installation and good management of the Ecosan block. However, it should be noted that these scores do not take account of the low toilet to student/teacher ratios, common across all schools.

Anyanui, Philio and Agbledomi Basic schools all feature an improved sanitation facility according to WHO/UNICEF, namely a VIP with a sealed slab on the back (illustrated in Figure 4.5). Regarding survey Q1, therefore, all schools in the locality have an improved sanitation facility meaning they score +2. Furthermore, all toilets are single sex, resulting in positive responses for all three schools on survey Q3. The toilets in use are therefore providing Basic Sanitation to Anyanui, Agbledomi and Philio Basic Schools according to WHO/UNICEF definitions[33].



Figure 4.5 A pit latrine at Philio Basic School

An improved sanitation facility such as a VIP with sealed slab or an Ecosan toilet needs to be emptied once full. If it is emptied appropriately, then it can be classed as providing the school with a safely managed sanitation service. However, if it is not emptied appropriately then only basic sanitation service is being provided. The analysis of research question 1 revealed that Dzita Basic School is being provided with a safely managed sanitation service because the compost is emptied from the chamber once the process is complete. As illustrated in Figure 4.6, survey Q18 established whether latrines are emptied once they fill up. Agbledomi and Philio Basic Schools confirmed that the latrines are emptied once they fill up, thus providing the schools with a safely managed sanitation service. Anyanhui Basic School scored 0 for Q18, meaning the school's sanitation facilities are only providing a basic service.

[33] UNICEF and WHO (2018) Core questions and indicators for monitoring WASH in Schools in the Sustainable Development Goals

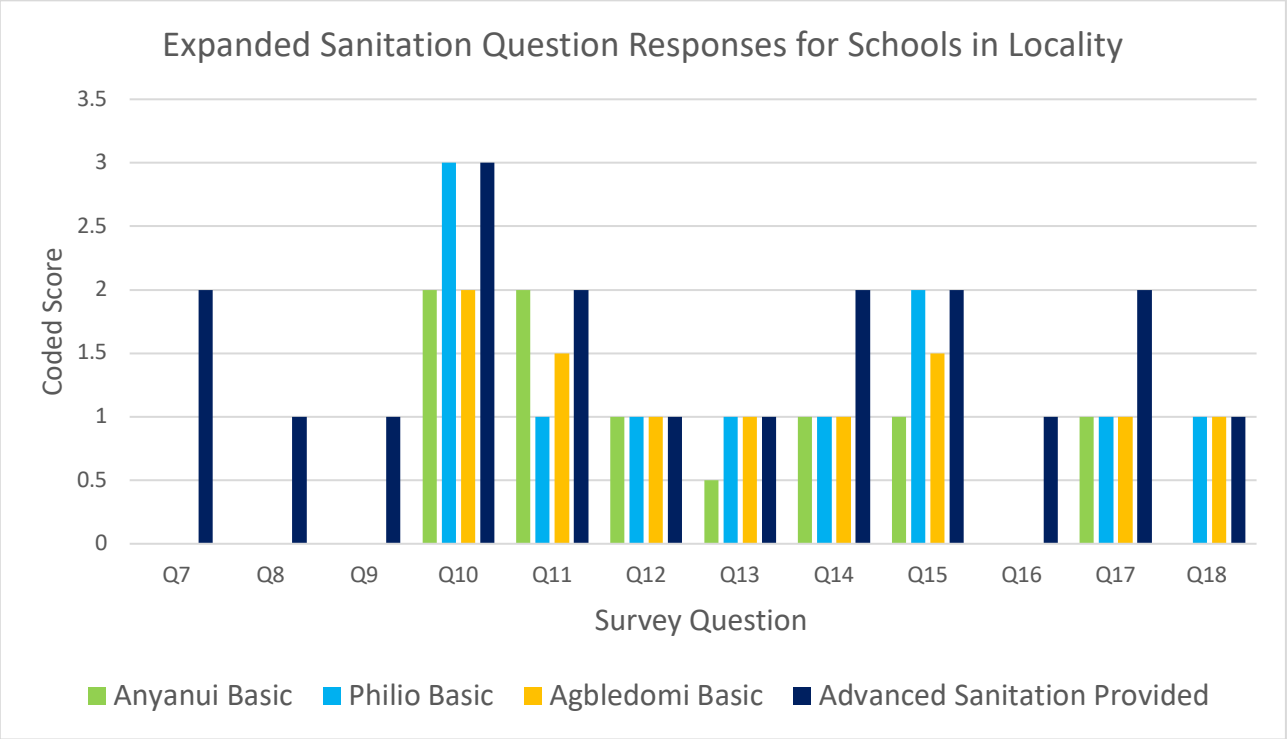


Figure 4.6 Expanded Sanitation Coded Question Responses for Schools in Locality

Survey Q10 and 11 examined the number of times per week the toilets were cleaned and the cleanliness of the toilet at the time of the survey. Despite being cleaned every day, Philio Basic School's toilets were considered only 'somewhat clean', compared to Anyanui and Agbledomi that were cleaned fewer times a week but recorded higher scores for cleanliness on the day of the survey.

Further explaining the scores in Figure 4.4 above, Anyanui and Agbledomi both recorded average scores of 3 out of 7 for the Core Sanitation and Hygiene Questions, whereas Philio recorded a score of 6. Referring to survey Q5 and Q6 regarding presence of handwashing facilities and soap, both Anyanui and Agbledomi have no such facilities anywhere on the school property. This is visualised in Figure 4.7 below, showing Philio recording 1 hand washing facility, Dzita Basic School 5 and Anyanhui and Agbledomi both 0. Philio's handwashing station was a shared facility in the middle of the school yard, rather than being located by the toilets. Whilst there was running water and the ability for multiple children and teachers to be washing their hands simultaneously, there was no soap present during survey data collection. Referring to the WHO/UNICEF definitions, a Limited Hygiene Service is being provided at Philio Basic School. Dzita Basic School also delivers a 'Limited Hygiene Service' due to a lack of soap during the time of the survey.

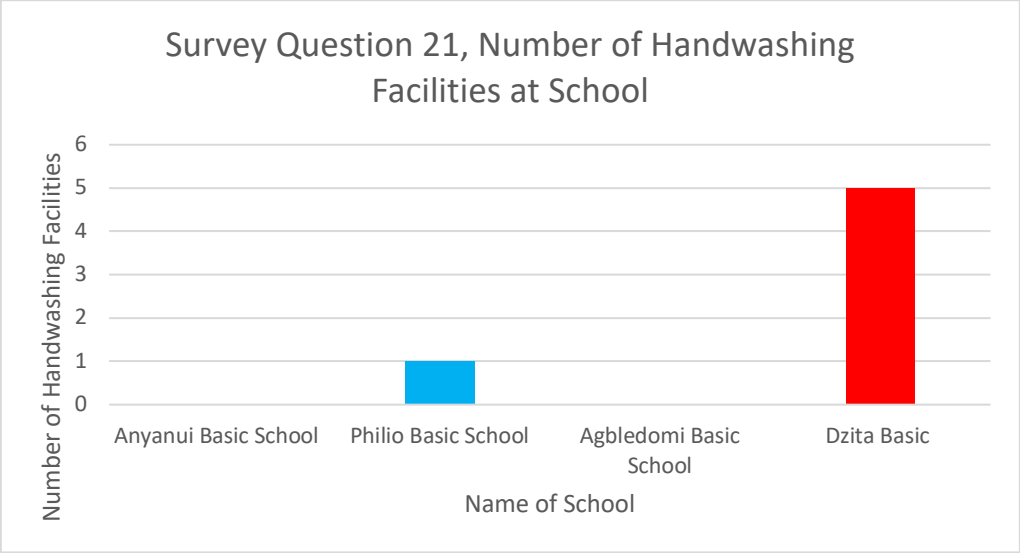


Figure 4.7 Number of Handwashing Facilities at each School within locality

A lack of handwashing facilities at Anyanui and Agbledomi results in both schools recording a 'No Service' hygiene rating according to the WHO/UNICEF criteria.

Questions regarding female menstrual hygiene are visualised in Figure 4.6 (questions 7, 8 and 9) as well as in Figure 4.8 (question 24). Anyanui, Philio and Agbledomi Basic Schools all recorded 0 in survey questions 7, 8 and 9 (Figure 4.6) showing facilities for managing menstrual hygiene at all schools is minimal. A lack of menstrual hygiene management is one of the largest contributors to female pupils not finishing school globally or being absent during menstruation. Statistics presented in this research cannot allow us to form conclusions on whether this lack of menstrual hygiene management service does contribute to female pupil absenteeism in Anyanui, Philio and Agbledomi Basic Schools.

Figure 4.8 shows some positive responses to survey question 24 asking whether there are; 1) bathing areas for menstrual hygiene, 2) menstrual hygiene materials (pads/tampons) and 3) menstrual hygiene education. Philio recorded the highest average score for this, stating that there were both menstrual hygiene materials and education on offer at the school. Agbledomi Basic School was recorded having menstrual hygiene materials available some of the time, representing the half point score in Figure 4.8, as well as education for female pupils around managing their menstrual hygiene. Anyanui Basic School recorded the lowest response for question 24 (Figure 4.8), stating that only education was available for female pupils to manage their menstrual hygiene.

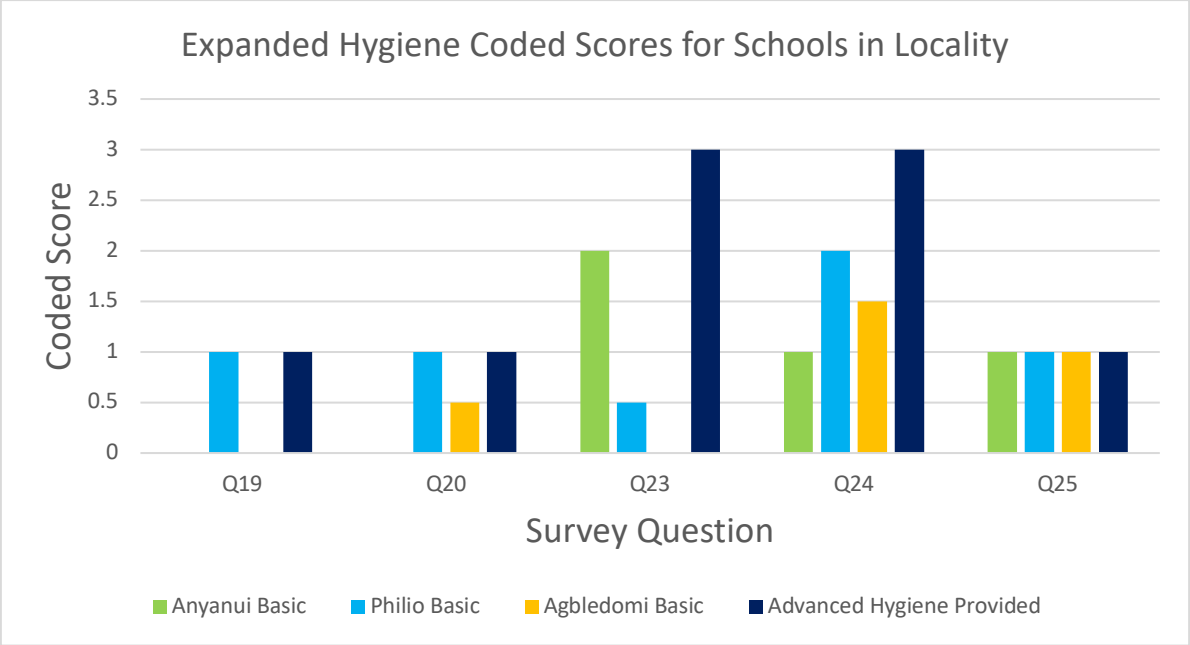


Figure 4.8 Expanded Hygiene Question Responses for Schools within Locality

International standards recommend that there be 25-30 girls per cubicle in schools, and 50 boys to one cubicle and one urinal[34]. All schools within our locality recorded ratios significantly higher than those that are internationally recommended. Table 4.4 below presents the student-to-cubicle ratios for each school included in the survey. The ratios are based on number of cubicles available and usable at the time of the survey, some cubicles were not in use and therefore not included in the ratio calculation.

[34] UNICEF (2012) "School Water, Sanitation and Hygiene Knowledge, Attitudes and Practices Survey. Available at: https://www.unicef.org/oPt/UNICEF_-_English_Report_Final.pdf

Philio Basic School (including teachers)	Number of Male Students	391	RATIO: 78.2
	Number of Male Cubicles	5	
	Number of Female Students	313	RATIO: 62.6
	Number of Female Cubicles	5	
Agbledomi Basic School (excluding teachers)	Number of Male Students	431	RATIO: 86.2
	Number of Male Cubicles	5	
	Number of Female Students	323	RATIO: 64.6
	Number of Female Cubicles	5	
Anyanui Basic School (excluding teachers)	Number of Male Students	385	RATIO: 128.3
	Number of Male Cubicles	3	
	Number of Female Students	329	RATIO: 109.6
	Number of Female Cubicles	3	
Dzita Basic School (including teachers)	Number of Male Students	298	RATIO: 149
	Number of Male Cubicles	2	
	Number of Female Students	301	RATIO: 150.5
	Number of Female Cubicles	2	

Table 4.4 Student-to-Toilet ratios for schools assessed

Philio recorded the lowest ratio of students-to-toilets for males and females, 78.2 and 62.6 respectively. However, the male ratio is still 50% over the recommended ratio, the female ratio over approximately 100% over the recommended ratio. These ratios include teachers and students due to both groups sharing the same facilities. A further 5-7 female cubicles and 2-3 cubicles for male students, would be required to meet international guidelines. At Philio, there are 10 pit latrines that are currently full up, with no organised method for emptying them and were therefore not included in the ratios. Reports from teachers stated that pupils, teachers and people from the local community use the toilets. If people from the local community are also using these toilets then the ratios recorded will be even higher, although this data was not collected as part of the survey.

Anyanui recorded the second highest ratio of students-to-toilets for both males and females, 128.3 and 109.6. In order to meet international guidelines Anyanui Basic School would need a total of 8 cubicles for male students, 5 more than they already have, and the female students would require an additional 8-10

cubicles. Similar to Philio, Anyanui have an additional 12 pit latrines on site, but they are full up with no method of emptying and were not included in the ratios. Teachers at Anyanui Basic School have separate, single sex cubicles for male and females, meeting the WHO guidelines[35]. These toilets are in a similarly poor condition to the student toilets and are not used by all teachers who choose instead to practice open defecation.

The latrines that are currently not in use at Anyanui and Philio are worth noting. Philio would require a further 10 cubicles to meet international guidelines, based on the number of pupils and teachers attending the school. The school currently has 10 pit latrines that were constructed by the District Assembly that are full up and have not been emptied. If these toilets were made usable again, then Philio Basic School would have enough cubicles to meet international guidelines for both male and female pupils. Anyanui is in a similar situation whereby the school has 12 pit latrines that are full up and not in use. Anyanui Basic School requires a further 15 pit latrines to meet international requirements, if the 12 full latrines were made usable then a further 3 cubicles would be required to meet international guidelines.

Agbledomi Basic School presented ratios of students-to-toilets of 86.2 for males and 64.6 for females. An additional 3 male cubicles and 11-13 female cubicles would be required to meet international guidelines. Teachers at Agbledomi Basic School use one cubicle for both sexes. All cubicles at Agbledomi Basic School were in use so to meet international guidelines additional cubicles would need to be constructed.

Dzita Basic School recorded ratios of 143 and 149.5 for males and females respectively. A further 4 male cubicles and a further 8-10 cubicles for females would be required to meet international guidelines at Dzita Basic, as well as providing two segregated cubicles for male and female teachers.

In total, the four schools would require a combined 32-40 cubicles for female students, and 14-15 cubicles for male students in order to be meeting international guidelines.

Informal questioning during the conduct of the surveys revealed that students and teachers at Anyanui and Agbledomi Basic Schools sometimes or often practised open defecation rather than using the pit latrines due to the unpleasant smell. This might explain the responses to Q10 and Q11 regarding the cleanliness of the toilets. If the toilets at Philio are being used regularly by pupils and teachers, whereas Anyanui and Agbledomi are not being used as much, more daily use of the Philio Basic School toilet could result in it

[35] Adams, J., Bartram, J., Chartier, Y. and Sims, J. eds., 2009. *Water, sanitation and hygiene standards for schools in low-cost settings*. World Health Organization.

being considered less clean during the time of the survey even if it is cleaned daily. If Anyanui Basic School and Agbledomi Basic School toilets are not used regularly, then cleaning them fewer times a week could result in them appearing cleaner due to lack of use. The odour of the toilet appears to be a significant issue over and above general cleanliness, although this factor is not addressed in WHO/UNICEF standards.

Based on data presented for research question 2, Anyanui Basic School recorded the combined lowest coded total response for the Core Sanitation and Hygiene questions, alongside Agbledomi Basic School. Philio recorded the second highest Core Sanitation and Hygiene score with 6, closely behind Dzita Basic School with 6.5. For both these schools the presence of soap at handwashing facilities would mean they meet WHO/UNICEF requirements for provision of Basic Sanitation and Hygiene. For expanded Sanitation Total score (Figure 4.8) Anyanui also received the lowest score of 8.5, with Agbledomi Basic School just ahead with a total score of 9. Anyanui and Agbledomi also featured the two lowest Total Expanded Hygiene coded scores (Figure 4.10), Agbledomi scoring 3 and Anyanui 4.

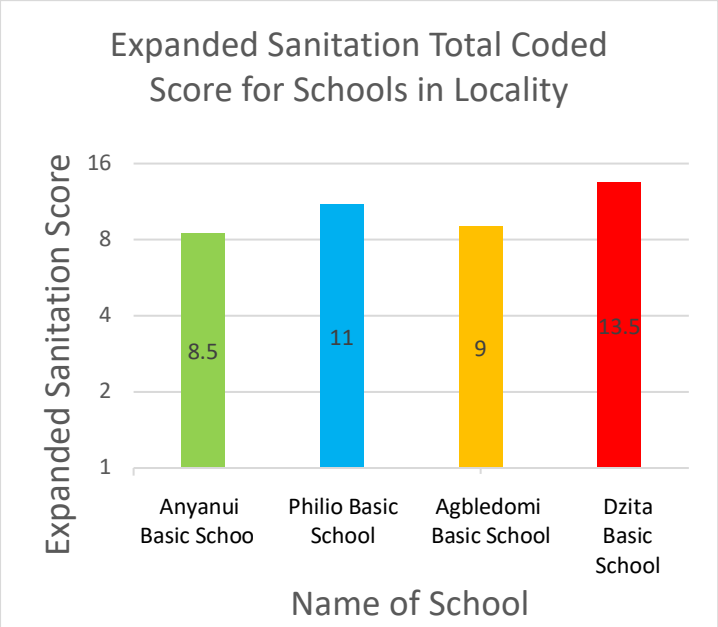


Figure 4.9 Expanded Sanitation Questions Total Coded Score for Schools within Locality

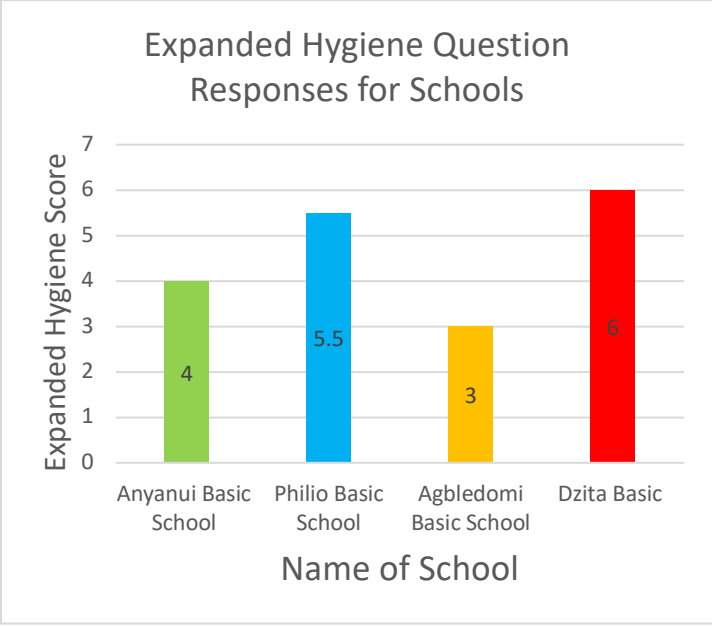


Figure 4.10 Expanded Hygiene Questions Total Coded Score for Schools within Locality

To determine the school with the lowest Sanitation and Hygiene facilities in the locality, student-to-toilet ratios were also integrated into the assessment. Anyanui and Agbledomi had the lowest initial coded scores, and of these two Anyanui recorded a significantly higher student to toilet ratio, suggesting Anyanui has the lowest overall level of service provision from its current infrastructure. However, despite recording the highest coded score for Core questions, Dzita Basic School featured an alarmingly high student to toilet ratio which is significantly greater than all other schools assessed. On the other hand, reports from teachers during the time of the survey were compared suggest that Anyanui is the only school where the

majority of students and teachers practice open defecation due to the smell of the toilets. Agbledomi Basic School also reported practicing of open defecation, albeit it not as frequently. Menstrual hygiene management is generally poorly managed in all school's subject to this assessment and an area for significant improvement across the board.

5. Discussion and Recommendations

Based on the results of research questions 1 and 2, Anyanui Basic School has the lowest level of sanitation and hygiene service, as well as the second highest student to toilet ratio behind Dzita Basic School, which recorded the highest level of sanitation and hygiene service provision. The following discussion and recommendations are based on the data collected for research questions 1 and 2 and will provide an action list for each school to improve their scoring based on the JMP monitoring system.

Anyanui Basic School

Anyanui Basic School recorded the joint lowest total coded score for Core Sanitation and Hygiene questions (Figure 4.4), the lowest coded score for total Expanded Sanitation question (Figure 4.8) and the second lowest total Expanded Hygiene coded score (Figure 4.9). Whilst an improved sanitation facility is in place, the failure to empty the latrines means the school is providing a basic sanitation service rather than a safely managed service. In addition, reports from teachers highlight that children and teachers are practicing open defecation due to the smell of the toilets. The facilities are almost sufficient to meet the number of children, with only a further three female cubicles needed. However, the poor management of the school toilets means they cannot be used. Furthermore, there are no handwashing facilities on the school premises so there is no hygiene service being provided.

The toilets were constructed by the District Assembly in partnership with Social Insurance Fund, so an immediate response would be for Dream Big Ghana NGO to contact both parties to work out a system for emptying the pit latrines. Once the toilets currently in use are full up, there will be no sanitation infrastructure at the school (there is no accurate timescale as to when this will happen). Other immediate responses to improve service delivery at Anyanui Basic School would be the provision of handwashing facilities. To meet international standards of 30 students per tap, a total of 24 taps need to be installed. The provision of handwashing facilities with soap and water would ensure basic hygiene services are being provided.

If the toilets were emptied, additional measures could be taken in an attempt to improve the experience for pupils and teachers. Firstly, urine diversion has been proven to reduce the smell of pit latrines, whilst also taking a longer period of time to fill the pit[36]. The creation of a female and male urinal separate to the pit latrines would help to reduce the smell once the latrines are emptied. Furthermore, reducing the need to use water to clean the inside of the toilets would further reduce the amount of moisture that enters the pit with faeces. Tiling the floors, as DBG has done in their Ecosan toilet blocks, makes the toilet easier to clean with less water. Furthermore, the responses to survey Q17 revealed not all toilets had sufficient light. Creating holes at the top of the structure, below the roof, will allow light in and provide further ventilation. Teachers also require separate facilities, one cubicle for each sex, which would further increase the score on the JMP monitoring survey.

A complete lack of menstrual hygiene management services at Anyanui Basic School is of great concern, given the negative impact such conditions can have on female students' experience at school and attendance. The provision of a covered bin in female cubicles, availability of pads or tampons, alongside delivery of menstrual hygiene education and dedicated bathing areas would benefit the 329 female students of Anyanui Basic School and improve total scores for Expanded Sanitation and Hygiene (Figures 4.8 and 4.9). A proposed female urinal could also act as a menstrual hygiene bathing area, where soap and water are also available.

Anyanui Action List:

1) Build tippy taps at entrance to all classrooms and toilets, accompanied by hygiene education sessions.
2) Work out a system for emptying pit latrines that are currently full.
3) Menstrual hygiene management education and demonstration for all girls.
4) Covered bins in female cubicles.
5) Construct male and female urinals. Female urinal sufficient for menstrual hygiene bathing.
6) Construct male and female cubicle, one for each sex.
7) Upgrade pit latrines, holes for light and tiling the floors.
8) Consider adding EcoSan cubicles to reduce student to toilet ratio.

[36] Tilley, E., 2014. *Compendium of sanitation systems and technologies*. Eawag.

If it is not possible to come up with a system to empty the pit latrines in a safe manner, then construction of further cubicles must be undertaken. Any new developments must consider the management of faeces once the latrine is full. If a system cannot be implemented to empty their latrines, then Anyanui Basic School would be the first school in need of new facilities, based on their Sanitation and Hygiene scores and student to toilet ratios.

Philio Basic School

Of the three schools that have received no intervention from DBG, Philio Basic recorded the highest Core Sanitation and Hygiene total coded score (Figure 4.4), the highest Expanded Sanitation and Hygiene total scores (Figures 4.8 and 4.9). The pit latrine with a sealed slab that is emptied can be classed as a safely managed sanitation service. The presence of a single handwashing facility in the school yard, albeit without soap, gives the school the possibility of providing basic hygiene.

An immediate response for Philio Basic would be the installation of more handwashing facilities that have both soap and water. A further 22 such facilities are required to meet international recommendations. The current handwashing facility is in the school yard rather than next to the toilet; thus it would be beneficial for any new installations to consider proximity to the toilets. In conjunction with installation of more facilities, educational activities based on handwashing could also be increased to 2-4 times weekly.

Similar to Anyanui, Philio recorded very poor scores on questions regarding the management of menstrual hygiene for females. Providing bins, bathing areas, materials and universal education for menstrual hygiene would provide the 308 female students with much needed knowledge and increase the level of sanitation and hygiene closer to providing an advanced level.

The student to toilet ratio for Philio was the best for all schools surveyed for this research, although still approximately double the international guidelines. Bringing the 10 cubicles on site that are full up back into use would allow Philio to meet international guidelines. The cubicles currently in use at Philio were constructed by UNICEF and are emptied once full, although they are not full yet. The 10 cubicles not emptied were constructed by the District Assembly. A further two cubicles are required for male and female teachers at the Philio Basic School.

Considering all data presented above, Philio Basic School has the ability to be providing an advanced service of sanitation and hygiene without investing in major sanitation facilities. Management and

maintenance of sanitation facilities, as well as a focus on handwashing facilities, menstrual hygiene management and broader hygiene education would enable the students to receive a service close to advanced.

Upgrades to the pit latrines, as well as the construction of urinals would be an option for Philio Basic School, similarly to Anyanui Basic School. The creation of urinals that could also act as a female bathing area for menstrual hygiene would be beneficial for female students.

Philio Basic School Action List:

1) Build tippy taps at entrance to all classrooms and toilets, accompanied by hygiene education sessions.
2) Work out a system for emptying pit latrines that are currently full.
3) Menstrual hygiene management education and demonstration for all girls.
4) Covered bins in female cubicles.
5) Construct male and female teacher cubicles, 1 for each sex.
6) Construct male and female urinals. Female urinal sufficient for menstrual hygiene bathing.
7) Upgrade pit latrines, holes for light and tiling the floors.

Agbledomi Basic School

Agbledomi Basic School recorded the joint lowest total coded score for Core Sanitation and Hygiene questions (Figure 4.4), the second lowest total coded score for Expanded Sanitation (Figure 4.8) and the lowest Expanded Hygiene total coded score (Figure 4.9). The facilities are almost a mirror image of those seen at Anyanhui, with an improved sanitation facility providing only a basic service, rather than a safely managed service due to it not being emptied. There is also a complete lack of handwashing facilities at the school, meaning no level of hygiene is provided.

Immediate responses would be centred upon provision of handwashing facilities. To meet international guidelines, a total of 25 hand washing stations would be required featuring soap and water. Educational group activities centred upon hygiene practices are also required to promote the benefit of handwashing.

A continuing pattern of poor menstrual hygiene management is present within schools assessed, with Agbledomi following Anyanhui and Philio in needing urgent intervention. The provision of bins in female cubicles, education, materials and bathing areas is required to enable female students to manage menstruation without it affecting them or their attendance negatively.

The ratio for students to toilets recorded at Agbledomi was the second lowest after Philio but is still significantly greater than international recommendations. Teachers also require separate sex cubicles in order to meet international guidelines.

Agbledomi Basic School Action List:

1) Build tippy taps at entrance to all classrooms and toilets, accompanied by hygiene education sessions.
2) Menstrual hygiene management education and demonstration for all girls.
3) Covered bins in female cubicles.
4) Construct male and female urinals. Female urinal sufficient for menstrual hygiene bathing.
5) Upgrade pit latrines, holes for light and tiling the floors.
6) Construct male and female teacher cubicles, one for each sex.
7) Consider EcoSan cubicles to reduce student to toilet ratio.

Dzita Basic School

Compared to the other three schools in the locality, Dzita Basic recorded the highest coded responses for all sections of the survey, with the exception of having the worst student to toilet ratio. The Ecosan toilet available to students and teachers at Dzita Basic School is providing a safely managed sanitation service, and the presence of tippy taps within the toilet structure mean basic hygiene services can be provided. A presence of soap at these hand washing facilities must be recorded in order for basic hygiene to be provided, which it was not during one round of the survey.

Immediate responses, similar to the other 3 schools, would be installing more hand washing facilities around the school. A total of 15 additional facilities would be needed to meet international guidelines. The provision of daily hand washing education and activities for all children, highlighting the importance of using soap, would further improve the service provided.

To improve the current sanitation and hygiene services at Dzita Basic School, a focus on menstrual hygiene management must be attended to. A school wide disposal system for menstrual materials, alongside dedicated bathing areas featuring soap and water, the universal provision of menstrual materials and education would see improvements to coded scores from this survey.

The major point of concern for Dzita Basic School is the student to toilet ratio which was significantly higher than all other schools in the locality, as well as the internationally recommended guidelines. Having more cubicles accessible, particularly for female students and teachers would benefit the school's sanitation provision. Furthermore, installing dedicated cubicles for teachers would meet international guidelines.

Dzita Basic School Action List:

1) Build tippy taps at entrance to all classrooms and toilets, accompanied by hygiene education sessions.
2) Construct male and female teacher cubicles, 1 for each sex.
3) Consider a female bathing area for menstrual management.
4) Consider more EcoSan cubicles to reduce student to toilet ratio.

6. Conclusion

The aim of this study was to evaluate the impact the DBG Ecosan school toilet is having on Dzita Basic School, following the JMP international WASH monitoring system. From this data, the Ecosan toilet is providing a safely managed sanitation service and is scoring superior results in comparison to other local sanitation technologies, namely VIPs. The ability to produce a useful agricultural resource from what would otherwise be a hazardous waste product is of great benefit to the users and the local environment. The cost of implementation for Ecosan is high, but maintenance of the toilet is lower due mainly to the emptying of compost being safe and straightforward.

In addition to considering how the Ecosan block installed by DBG NGO is working, this study has examined the sanitation and hygiene conditions within the other basic schools in the DBG locality. The study has shown that all schools have the infrastructure in place to provide basic sanitation but limited or no service of hygiene is being provided. The study provides valuable insight into the conditions and needs of schools to improve their service provision. Table 6.1 presents the data according to a 'traffic light' system, giving a further indication as to the priorities for improvement.

	Sanitation Facility	Student/Toilet Ratio	Open Defecation	Menstrual Hygiene Management	Handwashing
Anyanui Basic School					
Philio Basic School					
Agbledomi Basic School					
Dzita Basic School					

Green: satisfactory. Yellow: in need of attention but not urgently Red: urgent attention is required

Table 6.1 Priorities for improvements

The survey questions used for this research was taken from a UNICEF and WHO collaboration that aims to increase transferable data on the conditions in schools regarding WASH. However, this study gives a general picture of what conditions are like but fails to address what the individual pupils or teachers are experiencing. Therefore, further study would focus on individual stories from pupils or teachers, either in the form of questionnaires, interviews or focus groups. This would enable the researcher to reveal the motivating factors in using a toilet or practicing open defecation and would add depth to our understanding. Further interviews or questionnaires with female pupils and teachers regarding menstrual hygiene management would add greater depth of understanding about how best to manage menstrual

hygiene whilst at school, with the target of improved school attendance for female pupils. Registers from each school would be of further use to this study, revealing any relationships between investment in sanitation and hygiene and school attendance.

The purpose of this study was also to create a base level of data on the sanitation and hygiene facilities within schools, which had been lacking previously at DBG. The statistics collected in this report will be used to generate monitoring and evaluation systems for DBG to conduct. The recommendations of this report will assist DBG to secure resources to upgrade, invest or educate to ensure each school has at least a basic level of sanitation and hygiene service. Once interventions are completed, monitoring will ensure that the pupils and teachers are maintaining the facilities in the correct manner, and that the investments have been worthwhile.

6. Appendices

6.1 Appendix 1 *Dream Big Ghana NGO School Sanitation and Hygiene Assessment Questionnaire*

This survey is being conducted by Dream Big Ghana NGO (DBG) with the purpose of determining which of the schools in our locality require the most urgent investment into their sanitation and hygiene services through the use of EcoSan Toilet facilities and handwashing stations. The resulting data will then be presented to Dream Big Ghana Foundation (UK) to prepare for funding proposals for prospective partners within the UK. Terminology within the questions has been adapted to fit the local context. The survey will be filled out by DBG Sanitation Squad, all questions must be answered in relation to the condition of any current facilities on the day of data collection.

School Profile:

Name of School:
Location:
Number of Pupils:
Number of Teachers:
Male to Female ratio:
Number of Classes:

CORE QUESTIONS:

1) What type of toilets/latrines are at the school? (tick most common)

+2	Flush/Pour-flush toilet	
+2	Pit latrines with slab	
+2	Composting toilet	
+1	Pit latrines without slab	
+1	Hanging latrines	
+1	Bucket latrines	
0	No toilets or latrines	

2) How many student toilets/latrines are currently useable (accessible, functional, private)? (insert number)

3) Are toilets separate for male/female? (tick one)

+1	Yes	
0	No	

4) Toilet to student ratio? (insert number)

5) Are there hand washing facilities at the school? (tick one)

+1	Yes	
0	No	

6) Are both soap and water currently available at the handwashing facilities? (tick one)

+3	Yes, water and soap	
+2	Water only	
+1	Soap only	
0	Neither water or soap	

EXPANDED QUESTIONS Sanitation

Acceptability

7) Is water and soap available in the girls' toilet cubicles for menstrual hygiene management? (tick one)

+2	Yes, water and soap	
+1	Water, but not soap	
0	No water	

8) Are there covered bins for disposal of menstrual hygiene materials in girl's toilets? (tick one)

+1	Yes	
0	No	

9) Are there disposal mechanisms for menstrual hygiene waste at the school? (tick one)

+1	Yes	
0	No	

10) How many times per week are the student's toilets cleaned? (tick one)

+3	At least once per day?	
+2	2-4 days/week	
+1	Once per week	
0	Less than once per week	

11) In general, how clean are the student toilets? (tick one)

+2	Clean	
+1	Somewhat clean	
0	Not clean	

Accessibility

12) Is there at least one usable toilet/latrine that is accessible to the smallest children at the school? (tick one)

+1	Yes	
0	No	

13) Is there at least one usable toilet that is accessible to those with limited mobility or vision? (tick one)

+1	Yes	
0	No	

14) Where are the student toilets located? (tick one)

+2	Within school building	
+1	Outside building, but on-premises	
0	Off-premises	

Availability

15) When are students permitted to use the school toilets/latrines? (tick one)

+2	At all times during the day	
+1	During specific times during the school day	
0	There are no toilets available for use at the school	

Quality

16) Are culturally appropriate anal cleansing materials currently available to all students? (tick one)

+1	Yes	
0	No	

17) Is there functional lighting in the student toilets on the day of survey collection? (tick one)

+2	All toilets	
+1	Some toilets	
0	None	

18) Are latrines or septic tanks emptied? (tick one)

+1	Yes	
0	No	

Expanded Hygiene Questions

19) Are there handwashing facilities accessible to those with limited mobility or vision? (tick one)

+1	Yes	
0	No	

20) Are there handwashing facilities accessible to the smallest children at the school? (tick one)

+1	Yes	
0	No	

21) Where are handwashing facilities with water and soap located at the school? (tick all that apply)

+1	Toilets	
+1	Food preparation area	
+1	Food consumption area	
+1	Classrooms	
+1	School yard	
+1 (per extra)	Other	

22) How many handwashing facilities with soap and water are located at the school? (insert number of taps)

+1 for each tap	Total number of taps	
+1 for each	Number with soap and water	

23) How many times per week are group handwashing activities conducted for all students? (tick one)

+3	At least once per school day	
+2	2-4 days per week	
+1	Once per week	
0	No	

24) Which of the following provisions of menstrual hygiene management (MHM) are available at the school? (tick all that apply)

+1	Bath areas	
+1	MHM materials (e.g. pads)	
+1	MHM education	

25) How is solid waste from the school disposed of? (Tick one)

+1	Collected by municipal waste system	
+1	Burned on premises	
+1	Buried and covered on premises	
0	Openly dumped on premises	