

Understanding the drivers of sanitation behaviour in riverine communities of Niger Delta, Nigeria – the case of Odi and Kaiama communities

E.D. Sample^{1, 3*}, B.E. Evans¹, M.A. Camargo-Valero^{1, 4}, N.G. Wright², T.G. Leton³

¹Institute for Public Health and Environmental Engineering, School of Civil Engineering, University of Leeds, Woodhouse Lane, LS2 9JT, Leeds, UK.

²De Montfort University, Leicester, UK

³Department of Civil and Environmental Engineering, University of Port Harcourt, Choba, Nigeria

⁴Departamento de Ingeniería Química, Universidad Nacional de Colombia, Campus La Nubia, Manizales, Colombia

*Corresponding email: cneei@leeds.ac.uk

ABSTRACT

Recent reports show that between 1990 and 2012 among countries, Nigeria had the highest increase in the absolute number of open defecators. Bayelsa State makes a huge contribution to these numbers as almost 70% of residents lack access to improved sanitation. The adoption of Community-Led Total Sanitation (CLTS) as national policy has improved sanitation in the country but progress has been slower or non-existent in riverine communities where open defecation persists. In communities where defecation is directly into water bodies, evidence of the practice is hidden which may hinder attempts to trigger community-wide behaviour change. This study evaluates sanitation in two riverine communities of Bayelsa state. It applied qualitative multiple-case methodology using observations, interviews and focus group discussions to explore existing sanitation behaviours. Field notes and interview transcripts were analysed using NVivo and qualitative content analysis. Findings highlight physical, cultural and economic drivers inhibiting the successful implementation of CLTS in riverine communities of Bayelsa State. Findings suggest that to be effective, sanitation interventions in riverine communities, where defecation is predominantly into water bodies, may need to make use of modified tools and also be coupled more strongly with development of supply chains for appropriate sanitation goods and services.

Keywords | Bayelsa, CLTS, Nigeria, open defecation, riverine areas, sanitation

INTRODUCTION

Research has shown that improvements in sanitation can lead to improvements in health, social and economic development, self-respect and other aspects that can improve quality of life (Esrey et al., 1991, Prüss et al., 2002, Cairncross, 2004, Jenkins and Sugden, 2006, Mara et al., 2010). In particular, open defecation is strongly associated with incidence of diarrhoeal disease, prevalence of helminthic infection and stunting especially in children under five years of age (Clasen et al., 2014, Spears et al., 2013). Globally, almost 1 billion (10^9) people always practise open defecation, having no toilet at home; the majority are rural dwellers in less-developed countries (WHO/UNICEF, 2014). Nigeria is home to a significant number of open defecators and has experienced the largest increase in the number of open defecators of any country during the past 15 years; increasing from 23 million in 1990 to 39 million in 2012 (WHO/UNICEF, 2014).

Globally, the target to halve the proportion of people without access to basic sanitation was missed in 2015 (WHO/UNICEF, 2015). Improving access to sanitation requires more than building toilets. It has been recognised that behaviour change interventions are at least as important as the provision of infrastructure in the successful elimination of open defecation (Mosler, 2012, Dreifelbis et al., 2013). Over a period of about 30 years, a number of approaches have developed which seek to address sanitation and hygiene behaviours (Peal et al., 2010). An example of an approach which addresses community-wide norms but with a focus on a single behaviour is Community-Led Total Sanitation (CLTS). There have been several approaches developed which seek to support the marketing of sanitation – understanding personal or community level drivers of demand and addressing market failures (in supply of goods and services for example).

CLTS, which was first developed in Bangladesh, uses a series of facilitated interventions with groups of community members to trigger a sense of shame and disgust about the extent and effects of open defecation (Kar and Chambers, 2008). After ‘triggering’ many communities are able to overcome the barriers to community action and collectively commit to building and using latrines and eliminating open defecation. The development of CLTS coincided with a period during which open defecation rates in Bangladesh fell from around 34% to around 3% (WHO/UNICEF, 2014). Variants of CLTS have been adopted as policy by governments in several countries including Bangladesh, Pakistan, Indonesia, Cambodia, Kenya, Ethiopia and Nigeria (Chambers, 2009).

The widespread adoption of CLTS is in part because of the step-change in progress which was observed in many places where it was implemented. However, the success rate of CLTS intervention has been variable (Evans et al., 2009, Robinson, 2009, Tyndale-Biscoe et al., 2013). A particular set of challenges are associated with the implementation of CLTS in areas prone to flooding, close to rivers and the coast. For example, the implementation of CLTS in Moma, a riverine district of Nampula Province, Mozambique, did not yield expected results; many households reported that technical challenges, particularly with respect to soil conditions were a constraint to building latrines (Godfrey, 2010). In a study in East Java, Indonesia, communities located near water bodies had the poorest outcomes in terms of achieving Open-Defecation-Free (ODF) status (Mukherjee, 2011).

Due to its focus on societal norms and collective behaviours, and its use of shame and disgust to trigger behaviour change, success rates are strongly linked to social factors within communities. For instance, research suggests that the culture and context of communities in South Asia may enhance the effectiveness of shame and disgust as tools to trigger behaviour change when compared with cultures in West Africa (Robinson, 2009).

In Nigeria, CLTS was introduced in 2004 through a pilot project in Benue State which was carried out between 2004 and 2007. The approach became policy and was subsequently scaled up to the national level starting in 2008 (WaterAid, 2011). CLTS principles promote self-help by communities to become open defecation free after triggering, however, where there are compelling challenges, not all communities are able to solve this problem on their own without help, hence the need for adaptation of the approach.

In spite of the adoption of CLTS as national policy, open defecation persists in many riverine communities of Niger Delta. Extensive open defecation on the fringes of water bodies and the use of overhanging latrines or jetty toilets where excreta are delivered directly into water bodies result in faecal contamination of water supplies which are often used as a source of water for domestic and personal use. Pathogens may also be concentrated in seafood and freshwater fish which are widely consumed and may be distributed to many other communities (Adebayo-Tayo et al., 2011b, Adebayo-Tayo et al., 2011a).

Despite these obvious risks there is little or no research which assesses the degree to which CLTS programmes have been successful in addressing open defecation in these types of communities in Nigeria. Most of the reported experience of CLTS in Nigeria has been in non-riverine areas where open defecation is predominantly on land. Staff of the WASH office in Kaiama report that, CLTS has been tried in multiple riverine communities of Bayelsa State but none has yet become open defecation free. There is limited evidence to show that any community in Nigeria where open defecation was predominantly in water bodies has become open defecation free.

This gives rise to the question: what particular aspects of riverine communities hinder the successful implementation of the national sanitation programme in Nigeria and does this relate to particular aspects of the CLTS approach? It may be possible to modify the approach to the particular contexts but to date there has been insufficient information about current practices and drivers of sanitation behaviours on which such a modification could be based. To address this gap, a study was implemented in the Niger Delta region of Nigeria to better understand existing sanitation behaviours and drivers.

The findings of this study are intended to form the basis for the identification of candidate strategies which could be tested to examine their effectiveness in addressing defecation behaviours in riverine communities in Nigeria and beyond.

METHODS

Study area

Located in the south of Nigeria with a large coastline along the Atlantic Ocean, the Niger Delta region consist of 9 states with a population of about 35 million people (NBS, 2013a). It experiences two seasons; the rainy season from April to October and dry season from November to March although rain does occur periodically all year round. The region has a flat topography and its soil is generally fine grained with its clay silt and organic content increasing seawards (Akpokodje, 1987).

Analysis of the 2011 Multiple Indicator Cluster Survey (MICS) (Figure 1) showed that 22% of the population of the Niger Delta region have no toilet facility and always practise open defecation (NBS, 2013b). Bayelsa, a State in the Niger Delta region with a population of about 2 million people had the lowest rate of access to improved sanitation with 32% of the population practising open defecation and 39% using hanging toilets built over water bodies.

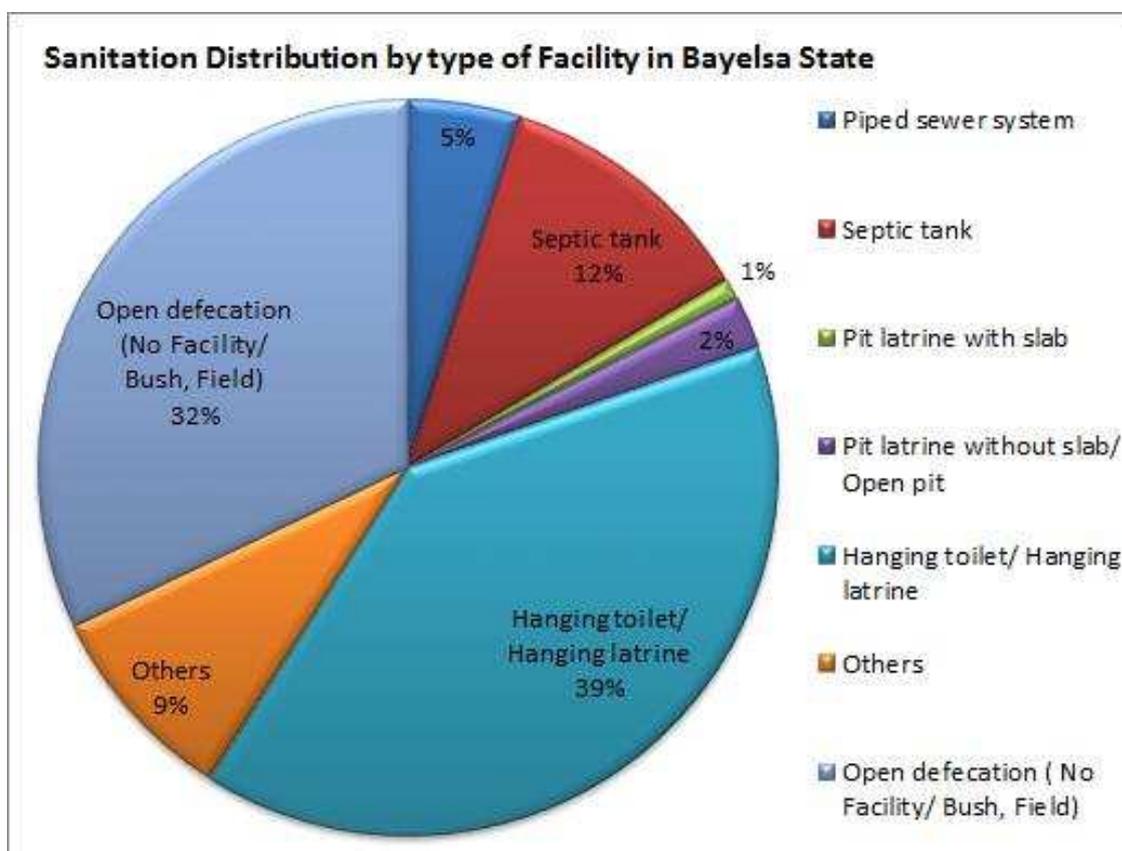


Figure 1: Sanitation distribution in Bayelsa state - Analysis from 2011 MICS data, (NBS, 2013b). (Author's own)

In order to understand the current practices and drivers of sanitation in Bayelsa state, a mixed methods study was carried out in two communities. The communities were Odi (GPS coordinates: 5° 10' 30.1008" N, 6° 17' 47.4648" E) and Kaiama (GPS coordinates: 5° 8' 4.9848" N, 6° 18' 5.6592" E), rural towns in Kolokuma-Opukuma Local Government Area (LGA). The projected population for Kolokuma-Opukuma LGA for 2010 is 91,635 (NBS, 2014). Both communities lie along the River Nun, a major tributary of the River Niger. The main occupations of people in both communities are fishing and farming.

The communities were selected on the basis that they were riverine but had road access to main towns or cities and had not experienced communal unrest in the 6 months preceding the study.

Study design

The study used qualitative multiple-case study methodology (Yin, 2014) to explore the current sanitation behaviour in the study area. It combined data triangulation (by collecting data from different stakeholders) and methodological triangulation. This helps to improve the richness of research in terms of depth, rigour and validity (Liamputtong, 2013). Unstructured observation, semi-structured interviews with key informants and Focus Group Discussions (FGDs) were the research tools used to collect data. Findings from FGDs were used to validate findings from interviews.

Participant selection

The qualitative study involved different stakeholders. Participants were purposively selected from amongst the residents of the study communities and included traditional rulers, nursing and pregnant women, plumbers, masons, landlords, tenants, health workers, students, Environmental Health Officers (EHOs) of the government, and staff of the Water, Sanitation and Hygiene (WASH) unit at the LGA headquarters. Participants were selected on the basis that they had the potential to provide information relevant to the objective of the study. A meeting with the ‘Amanyabo’ (king) of each community to seek consent and permission preceded the study in each community.

Data collection and analysis

Data was collected between June and July, 2014. The interview guides used were tested in a different location (Aluu community, Choba, Rivers State) and modified prior to their use in the study location. There were 7 FGD sessions (4 in Odi and 3 in Kaiama) and 26 semi-structured interviews (15 in Odi and 11 in Kaiama) in the study with a total of 80 participants (59 females and 21 males). Descriptive and reflective field notes were taken. Interviews and FGDs were recorded (audio). Recordings were replayed and transcribed. Field notes and transcripts were entered into QSR NVivo 10 and systematically analysed using qualitative content analysis to extract key themes as they relate to the objective of the studies (Flick, 2014, Schreier, 2012). Themes were categorised into a coding frame and other parts of the data classified within these themes.

Ethical considerations

The University of Leeds Faculty of Mathematics and Physical Science, MaPS, and Faculty of Engineering joint faculty research committee, approved this study. Participants were given information sheets to read (or had them read to them in some cases) before making a decision on taking part in the study. They were given the opportunity to ask further questions if they were unsure of anything. They were also informed of their right to withdraw from the study at any point. All participants gave voluntary consent before taking part in the study. Permission was obtained from participants before audio recording of each session. Data collected were stored on a laptop with encryption key while in the field and transferred to the University drive as soon as internet access was established.

Limitations

The selected communities are typical of riverine communities in the Niger Delta region. However, they may not represent the worst case scenario for sanitation in Bayelsa State. This is because the state has many remote riverine communities mostly accessible via river transportation only. Such communities often have poorer infrastructure because of the challenge with access. At the time of this study, the UK's Foreign and Commonwealth Office, FCO, only permitted travel to communities with road access in the Niger Delta region.

Furthermore, sessions with participants took place between 9am and 4pm. This implied that people in occupations which involved leaving home early and returning late evening were unable to take part in the study. The researcher stayed outside the study community and night travels were avoided for safety reasons. The findings of this study should be interpreted with care taking cognisance of these limitations.

RESULTS AND DISCUSSIONS

Existing sanitation behaviour

Themes emerging from this study revealed widespread open defecation in both communities. This included defecation behind buildings, at dumpsites, bushes near homes and predominantly direct open defecation into the River Nun. In its annual abstract of statistics, the Nigerian Bureau of Statistics reported that in 2010, nearly 70% of households in Bayelsa State defecated directly into water bodies and just over 16% used improved toilet facilities (NBS, 2014). According to a man in a focus group session in Odi:

“Shitting in the river is the best. Toilets bring shit too close to the house and causes sickness for women and children. This is why people in big cities are always falling sick even when they are richer than us. In this our village, people who have toilet are doing the worst thing because from their toilet, shit still goes into water which people collect from the borehole or well next door.”

Children's faeces are seen to be harmless and therefore can be disposed of anywhere. There is social cohesion in the practice of open defecation. Participants reported that groups of friends often go together to the riverside to defecate while discussing a subject of interest such as football. In Odi, males and females had separate defecation places along the river banks. Most households with 'improved' toilets stated that they had a septic tank but observations revealed that most of the so-called septic tanks in the communities were poorly constructed vaults sometimes with an overflow to a drainage field. The high water table in both communities often results in backflow of wastewater from these 'septic tanks' into households especially during the rainy season. Participants reported that this limits everyday use of such toilets forcing households back to open defecation during the rains.

Participants from both focus group sessions and interviews reported that irrespective of their defecation practice, the water from the river was their preferred source of drinking water because it tastes better and has healing powers that keep them healthy.

There was also a strong belief by participants that because the river is fast flowing, there is no risk of contamination of the water from deposited faeces. According to a mother in a focus group session in Kaiama:

“I shit in the river and wash my hands and drink water immediately. The river is flowing so it is not a problem.”

Key drivers for current behaviour

Physical drivers

Participants in both communities reported annual flooding following torrential rainfall in the rainy season. Faeces deposited around the community at dumpsites, bushes and other places are washed away during rainfall events and enter flood waters. However, most defecation is deposited into the river which makes it ‘invisible’ – this could potentially significantly decrease the effectiveness of some CLTS methods such as the transect walk and open defecation mapping, both of which are a key component of CLTS (Kar and Chambers, 2008). The transect walk involves CLTS implementation team members walking through a community, asking questions, listening and possibly identifying and stopping at an open defecation area to continue conversation in the presence of faeces lying around and the smell emanating from the site (Kar and Chambers, 2008). Where there is a reduced chance of seeing lots of faeces lying around despite the fact that there is wide spread open defecation, the capacity of a transect walk to trigger change may be limited.

Cultural drivers

Participants reported that open defecation is considered a ‘traditional’ activity. This is not unique to the study area – there have been well-documented studies of cases where open defecation is passed on from one generation to another and is culturally and socially accepted within the community (Dittmer, 2009). According to a participant:

“We were born into this habit of using the river to toilet just like our parents. There is no problem with it. Anybody that will live long will live long not because of the place they toilet.”

There is no sense of disgust or shame in open defecation within both communities. Even toilet owners still defecate in the open for different reasons. This implies that the use of shame as the main trigger towards behaviour change in the context of riverine communities may limit outcomes. This limiting factor has been observed elsewhere; a study in rural northern India revealed that many people who had toilets at home still defecated in the open whether the toilet was privately acquired or built by government as an incentive to end open defecation (Coffey et al., 2014).

Participants in the study communities indicated that the cultural practice of anal cleansing with water plays a role in open defecation in rivers. According to a participant:

“It is easier to wash after defecation in a river than at home in a toilet. Tissue paper cannot clean faeces properly and one could smell; besides it is not affordable.”

There was also the belief that ‘heat’ from latrines causes infections that could lead to infertility in women. Only one participant reported using a pit latrine. Pit latrines were seen to be ‘old fashioned’ and their use would mean that a household is not making better progress in life when compared with their ancestors. There was a strong sense to continue with open defecation rather than use any type of pit latrine. The flush toilet referred to as a ‘modern toilet’ was the preferred toilet in both communities irrespective of financial status. This high level of expectation with respect to sanitation can limit the ability of the community to address its own sanitation challenges; digging a simple pit latrine is commonly reported as the first strategy adopted by communities after CLTS triggering to get them on the first step of the sanitation ladder. The willingness of the community to adopt simple latrines in this way may be limited.

Economic drivers

Several participants mentioned cost as a challenge to building toilets, similar to that reported in a study in Ghana (Jenkins and Scott, 2007). The fact that open defecation has no direct financial cost associated with it appears to be one reason why the behaviour persists.

Space and land ownership were mentioned by most participants as key barriers to ending open defecation. In Kaiama, space for building toilets was reported to be a bigger challenge than cost. With most areas already built up with houses which have no toilets, property owners were not willing to convert a room which presently earns them money into a toilet. Furthermore, the density of the settlements and the layout of the housing means that the rear of one property faces the front of the next property. This makes it challenging to choose a location to build a toilet as it leads to conflict between property owners and tenants of such properties. Similarly, participants revealed that people living in other properties without toilets destroy locks and access toilets belonging to other properties at night leaving a mess behind. This often causes conflict and leads to the abandonment of some toilets as no one is willing to take responsibility for maintaining such toilets. These findings resonate with earlier studies which note that tenants are often less willing or able to address sanitation infrastructure needs than house owners (Songsore et al., 2004, Hernandez et al., 2009, Wegelin-Schuringa and Kodo, 1997, Roy et al., 2013). In the study communities in Bayelsa this conflict between landlords and tenants regarding the responsibility for the provision of toilets was strongly evident; for CLTS to be successful therefore, specific interventions to support and overcome these barriers would be needed.

According to participants, most riverine communities in the Niger Delta region are host communities to oil producing companies. This has brought a strong belief among the people that everything should be given free of charge in exchange for exploration of crude oil in their communities.

There have been several conflicts between riverine communities and the government, mainly caused by environmental degradation resulting from oil exploration and its effect on economic activities and the livelihoods of the people especially fishing and farming (Oviasuyi and Uwadiae, 2010). This among other things has led to misunderstandings between communities, oil producing companies and the government. For instance, one such misunderstanding led to the Odi massacre of 1999 which happened in Odi, one of the study

communities, and led to the death of almost 2500 civilians (Omeje, 2004). This is likely to affect trust and cooperation between communities and government programmes especially where the inputs, responses or action of members of the community are required for the programmes to succeed. This indicates that there is need for a holistic analysis of barriers to sanitation behaviour change in riverine communities of Niger Delta before the implementation of an intervention approach like CLTS to enhance its chances of success (Dittmer, 2009).

Summary of challenges relating to the success of CLTS in riverine communities

In summary, several features of these riverine communities may render the direct transfer of CLTS less effective than might be expected. In common with other riverine areas, the predominance of defecation into water bodies may render some conventional CLTS tools less effective than they might otherwise be. This includes the transect walk, shit mapping and other visual cues and triggers. This links to the constraints of the use of shame to trigger behaviour change – where the impact of open defecation is harder to demonstrate visually, it may also be harder to trigger a sense of collective responsibility for ill health. The visual cues of transfer between faeces and water or food for example may resonate less strongly in communities where there are not large amounts of faeces lying on dry land.

Some constraints appear to be specific to the Niger Delta region. These include the strongly-expressed desire for a ‘modern toilet’ coupled with the widespread reported concern about ‘heat’ rising from pit latrines. There is also a deeply-embedded expectation of subsidised services. Both of these could limit the willingness and ability of communities to respond even where their motivation to improve the sanitation situation is generally high. Finally, the high rate of tenancy and overcrowding may constrain communities to take joint action to address sanitation.

The specific conditions in these communities suggest that interventions which improve the supply of appropriate sanitation goods and services may be at least as important as interventions to change societal norms. For example, sanitation marketing interventions to increase the scale and effectiveness of services to communities could address some of the current constraints. Identifying appropriate systems for the collection and treatment of excreta which work significantly better than the current poorly-functioning so-called septic tanks might change community motivations. In reasonably-accessible communities such as Odi and Kaiama the use of cartridge toilets which are designed to respond to community desires for ‘modernity’ but which also result in the frequent removal of excreta to an appropriate location for treatment might be effective (Tenkorang, 2014, Sanergy, 2015). However, modifications in the business model would be needed since these systems have had limited success in rural areas to date. The regular collection and processing of excreta could reduce the risks associated with flooding of latrines and open defecation sites but does not come without a cost. Recent work in rural Bangladesh noted the high costs associated with emptying and transporting faecal sludge from latrines to a safe place for treatment (Balasubramanya et al., 2016); subsidised operation of any such system might be necessary to ensure it was properly operated.

CONCLUSIONS

This study found that there are physical, cultural and economic factors that may be limiting the effectiveness of CLTS as an intervention in riverine areas of Bayelsa state. There are several riverine communities in Niger Delta with similar sanitation conditions. While the adoption of CLTS in the National Policy for sanitation in Nigeria provides an impetus for a focus on sanitation behaviour change, its implementation in riverine communities of Niger Delta may present challenges. It seems likely that CLTS tools would need to be adapted to ensure that they address challenges and overcome current drivers for persistent open defecation behaviours in riverine communities of Niger Delta. CLTS could also be supplemented by a push to identify and support appropriate interventions to build up the supply of appropriate sanitation goods and services which meet the particular demands of these communities.

Further work is required to design and test a range of modified interventions which would include typical CLTS activities modified to address a range of potential challenges identified here. Formative research methods could be used to gain a much clearer understanding of the aspirations of these communities in terms of improved or changed sanitation behaviours and outcomes. This would enable CLTS tools to be appropriately adapted and linked to other supplementary interventions, such as sanitation marketing, and to be designed and tested. This could show if CLTS or other interventions are more appropriate for the riverine communities of Niger Delta. As a first step the research team are implementing a study to understand the extent and severity of faecal contamination in the study communities as a result of prevailing sanitation practices. The results of that study will be used to identify critical points of intervention.

ACKNOWLEDGEMENTS

The authors acknowledge traditional rulers and people of Odi and Kaiama Communities of Bayelsa State for taking part in this study.

REFERENCES

- Adebayo-Tayo, B., Okonko, I., Esen, C., Odu, N., Onoh, C. & Igwiloh, N. 2011a. Incidence of potentially pathogenic *Vibrio* spp. in fresh seafood from Itu Creek in Uyo, Akwa Ibom State, Nigeria. *World Applied Sciences Journal*, 15, 985-991.
- Adebayo-Tayo, B. C., Onilude, A. A. & Etuk, F. I. 2011b. Studies on microbiological, proximate mineral and heavy metal composition of freshwater snails from Niger Delta Creek in Nigeria. *AU Journal of Technology*, 14.
- Akpokodje, E. G. 1987. The engineering-geological characteristics and classification of the major superficial soils of the Niger Delta. *Engineering Geology*, 23, 193-211.
- Balasubramanya, S., Evans, B. E., Ahmed, R., Habib, A., Asad, N. S. M., Vuong, L., Rahman, M. M., Hasan, E., Dey, D. & Camargo-Valero, M. A. 2016. Pump it up: making single-pit emptying safe in rural Bangladesh. *Journal of Water, Sanitation and Hygiene for Development*, washdev2016049.
- Cairncross, S. 2004. The case for marketing sanitation. WSP-AF (Water and Sanitation Program for Africa) Field Notes, Nairobi, Kenya, digitally available at: www.wsp.org/sites/wsp.org/files/publications/af_marketing.pdf [Online]. [Accessed 13th December, 2015].
- Chambers, R. 2009. Going to Scale with Community-Led Total Sanitation: Reflections on Experience, Issues and Ways Forward. *IDS Practice Papers*, 2009, 01-50.
- Clasen, T., Boisson, S., Routray, P., Torondel, B., Bell, M., Cumming, O., Ensink, J., Freeman, M., Jenkins, M. & Odagiri, M. 2014. Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection, and child malnutrition in Odisha, India: a cluster-randomised trial. *The Lancet Global Health*, 2, e645-e653.
- Coffey, D., Gupta, A., Hathi, P., Khurana, N., Spears, D., Srivastav, N. & Vyas, S. 2014. Revealed preference for open defecation. *Economic & Political Weekly*, 49, 43.
- Dittmer, A. 2009. Towards Total Sanitation: Socio-cultural barriers and triggers to total sanitation in West Africa. *WaterAid report*, 12.
- Dreibelbis, R., Winch, P. J., Leontsini, E., Hulland, K. R., Ram, P. K., Unicomb, L. & Luby, S. P. 2013. The integrated behavioural model for water, sanitation, and hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings. *BMC public health*, 13, 1.
- Esrey, S. A., Potash, J. B., Roberts, L. & Shiff, C. 1991. Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bulletin of the World Health Organization*, 69, 609.
- Evans, B., Colin, C., Jones, H. & Robinson, A. 2009. Sustainability and equity aspects of total sanitation programmes-A study of recent WaterAid-supported programmes in three countries: global synthesis report. *WaterAid*.

- Flick, U. 2014. *The SAGE handbook of qualitative data analysis*, Los Angeles, SAGE.
- Godfrey, A. 2010. Documentation of CLTS experiences with ASNANI in NAMPULA Province. Water and Sanitation Programme.
- Hernandez, O., Dejene, M., Faris, K. & Shaw, R. Potential motivators behind household toilet adoption: results from a study in Amhara, Ethiopia. *Water, sanitation and hygiene: sustainable development and multisectoral approaches*. Proceedings of the 34th WEDC International Conference, United Nations Conference Centre, Addis Ababa, Ethiopia, 18-22 May 2009, 2009. Water, Engineering and Development Centre (WEDC) Loughborough University of Technology, 298-303.
- Jenkins, M. W. & Scott, B. 2007. Behavioral indicators of household decision-making and demand for sanitation and potential gains from social marketing in Ghana. *Social science & medicine*, 64, 2427-2442.
- Jenkins, M. W. & Sugden, S. 2006. Rethinking sanitation: Lessons and innovation for sustainability and success in the new millennium. Human Development Report Office (HDRO), United Nations Development Programme (UNDP).
- Kar, K. & Chambers, R. 2008. *Handbook on community-led total sanitation*, Plan UK London.
- Liamputtong, P. 2013. *Qualitative research methods*, South Melbourne, Vic, Oxford University Press.
- Mara, D., Lane, J., Scott, B. & Trouba, D. 2010. Sanitation and health. *PLoS medicine*, 7, e1000363.
- Mosler, H.-J. 2012. A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: a conceptual model, a review, and a guideline. *International Journal of Environmental Health Research*, 22, 431-449.
- Mukherjee, N. 2011. Factors Associated with Achieving and Sustaining Open Defecation Free Communities: Learning from East Java. Water and Sanitation Programme, WSP.
- NBS 2013a. Annual Abstract of Statistics 2011. National Bureau of Statistics, Federal Republic of Nigeria.
- NBS 2013b. Nigeria Multiple Indicator Cluster Survey 2011. FEDERAL REPUBLIC OF NIGERIA, NATIONAL BUREAU OF STATISTICS.
- NBS 2014. Annual Abstract of Statistics 2012. NATIONAL BUREAU OF STATISTICS, Federal Republic of Nigeria.
- Omeje, K. 2004. The state, conflict & evolving politics in the Niger Delta, Nigeria. *Review of African Political Economy*, 31, 425-440.
- Oviasuyi, P. & Uwadiae, J. 2010. The dilemma of Niger-Delta region as oil producing states of Nigeria. *Journal of Peace, Conflict and Development*, 16, 110-126.
- Peal, A. J., Evans, B. E. & Van Der Voorden, C. 2010. *Hygiene and Sanitation Software: An Overview of Approaches*, Geneva, Switzerland, Water Supply and Sanitation Collaborative Council

- Prüss, A., Kay, D., Fewtrell, L. & Bartram, J. 2002. Estimating the burden of disease from water, sanitation, and hygiene at a global level. *Environmental health perspectives*, 110, 537-542.
- Robinson, A. 2009. Sustainability and equity aspects of total sanitation programmes A study of recent WaterAid-supported programmes in Nigeria. WaterAid.
- Roy, M., Hulme, D. & Jahan, F. 2013. Contrasting adaptation responses by squatters and low-income tenants in Khulna, Bangladesh. *Environment and Urbanization*, 25, 157-176.
- Sanergy. 2015. The Sanergy Model [Online]. Available: <http://saner.gy/our-work/the-sanergy-model> [Accessed 10th March 2016].
- Schreier, M. 2012. *Qualitative content analysis in practice*, London, SAGE.
- Songsore, J., Mcgranahan, G. & Kjellen, M. 2004. Tenure, housing and environmental management among families in the Greater Accra Metropolitan Area (GAMA) of Ghana. *Institute of African Studies Research Review: Gendered Family Dynamics and Health: African Family Studies in a Globalizing World: Supplement 15*, p. 69-83.
- Spears, D., Ghosh, A. & Cumming, O. 2013. Open defecation and childhood stunting in India: an ecological analysis of new data from 112 districts. *PLoS One*, 8, e73784.
- Tenkorang, A. G. 2014. Benefits of Using a Business Model to Solve Sanitation Challenges. Available from: <http://cleanteamtoilets.com/5-benefits-of-using-a-business-model-to-solve-sanitation-challenges/> [Accessed 11th January 2016].
- Tyndale-Biscoe, P., Bond, M. & Kidd, R. 2013. *ODF Sustainability Study*. FH Designs. Australia: PLAN International, 1-181.
- Wateraid 2011. *Revitalising Community-led Total Sanitation A process guide*.
- Wegelin-Schuringa, M. & Kodo, T. 1997. Tenancy and sanitation provision in informal settlements in Nairobi: revisiting the public latrine option. *Environment and Urbanization*, 9, 181-190.
- WHO/UNICEF 2014. *Progress on Sanitation and Drinking-Water 2014 update*. World Health Organisation and UNICEF.
- WHO/UNICEF 2015. *Progress on Drinking-Water and Sanitation–2015 Update and MDG Assessment*.
- Yin, R. K. 2014. *Case study research: design and methods*, Los Angeles, SAGE.