



**IERI Working paper**  
**WP2019-004, April 2019**

## **Broad-basing Rural Sanitation: Issues and Strategies for Inclusive Development in South Africa**

**Lindile Ndabeni**

[ndabenil@tut.ac.za](mailto:ndabenil@tut.ac.za)

Tshwane University of Technology (TUT)  
Institute for Economic Research on Innovation (IERI), Tshwane, South Africa

### **Abstract**

Globally about 2.5 billion people do not have access to improved sanitation and 1.1 billion practice open defecation. Being seen practicing open defecation can provoke the greatest form of embarrassment. In particular, open defecation symbolises an embedded form of marginalisation especially in remote rural villages where latrines are often restricted to village elites. That is, rural sanitation is closely linked to global inequalities in which rural poor sanitation reflects multiple levels of inequality. Similarly, rural systems of sanitation are interlinked with fragile rural livelihoods. The paper utilizes social exclusion to frame and highlight critical issues in rural systems of sanitation. Consequently, the paper draws our attention to how sanitation improvements should be viewed as part of wider processes of social and political change. Typically, the objective in this paper is to unpack the specific conditions that impact on sanitation exclusion and highlight implications for systemic policy interventions that can sustain improvements in rural sanitation systems in developing world especially in Asia and Africa. The paper enhances the contribution of critical sanitation scholarship to policy development and sustained rural sanitation improvements.

**Key words:** water, sanitation systems, hygiene.

### **Acknowledgements**

The paper is part of the research project undertaken by the Institute for Economic Research on Innovation in Pretoria and the Gujarat Institute of Development Research in Ahmedabad. The research is funded by the National Institute for the Humanities and Social Sciences, Republic of South Africa, and the Indian Council of Social Science Research, India.

The contribution of my research assistants Eugene Mashapa, Magret Molefe, Tsholofelo Modise and Professor Lukhele is acknowledged.

## 1. Introduction

Water and proper sanitation are critically important for life and well-being (Statistics South Africa, 2016). Lack of adequate sanitation and poor hygiene and lack of portable water are serious global health problems (Demberere et al, 2016, p. 119). The most affected are those that are at the bottom of the economic pyramid (Ramani et al, 2011). Over one billion people lack access to safe drinking water (Gutierrez, 2007; Paterson et al, 2007). Similarly, it is estimated that about 37% of the world population (about 2.5 billion) do not have access to improved sanitation (Lansing et al, 2016; Rtiz-Correa et al, 2016; Seleman and Bhat, 2016; Letema et al, 2014; Sibiya and Gunbo, 2013; Gutierrez, 2007). It is tempting to reveal that 1.1 billion people that practice open defecation (Bardosh, 2015; Ramani et al, 2011) appears to be a symbolic and real contrast especially in a world that constantly produces cutting edge technologies. Indeed, the theme of science and society partly emphasises that the success of science and scientists should be measured by their contributions in improving our well-being. In particular, 1 in 4 people in the developing world practice open defecation (Sibiya and Gumbo, 2013). Open defecation is more widespread in India than anywhere else in the world (Sorensen et al, 2016)- refer to Box 1 for what seems to be a real and simultaneously metaphorical contrast worth noting. Similarly, about 4% of South Africans practice open defecation (Statistics South Africa, 2016) with the largest number (16.3%) being in the Eastern Cape (SERI, 2011). These situations result in poor water quality which results to about 1.7 million deaths per year or 3.1% of global deaths (Lansing et al, 2016).

### Box1: Inequality in India

In 2004 India had 4 billionaires and this number grew to 53 billionaires in 2008 (Sudin and Smita, 2009). This growth co-existed with 2.1 million children that die in India before they reach the age of five (Sudin and Smita, 2009). Again, one third of all underweight children in the world are in India (Sudin and Smita, 2009).

Source: Adapted from Smita, P., Sudin, K., and Reid, P., 2009.

The paper utilizes social exclusion to frame and highlight critical issues in rural systems of sanitation. The conceptual framework in this paper is intended to bridge the gap in current discourse of rural sanitation which tends to focus on individuals affected by poor systems of sanitation but do not link their discussion to the broader environment of sanitation systems. In addressing this gap, the paper increases our awareness and understanding of the extent to which inequality and social exclusion of the marginalized rural inhabitants is symbolically reproduced in rural sanitation systems.

Consequently, the paper draws our attention to how sanitation improvements should be viewed as part of wider processes of social and political change. The paper highlights contextual complexities that have not been given sufficient attention though they can enhance or constrain sanitation improvements (O'Reilly, 2017; Bardosh, 2015; Isunju et al, 2011). Typically, the paper (1) draws our attention to the underlying factors that sustain open defecation in remote rural areas and that determine sanitation inequalities (2), and highlight inter-related factors that can drive and sustain sanitation improvements in rural areas of the developing world including policy development. Likewise, the objective in this paper is to unpack several conditions that impact on rural sanitation exclusion especially in the developing world. Equally, the paper (1) contributes to little available critical sanitation scholarship (O'Reilly et al, 2017; Gatierez, 2007), (2) contextualizes rural sanitation to its socio-economic contexts of remoteness, lack of infrastructure, poverty, marginalization, unemployment, and agricultural livelihoods, (3) and encourages new ways of thinking about sustained sanitation improvements.

## 2. Social Exclusion

Social exclusion was first conceptualized by Adam Smith (1776) as inability to appear in public without shame (Sudin and Smita, 2009). It was later popularized in France by Rene Lenoir in 1970s and was later widely used in Europe in the late 1980s (Sudin and Smita, 2009). In this paper, social exclusion is used to frame our analyses of rural sanitation systems and clarify why remote rural inhabitants have been left out of improved sanitation practices. By paying more attention to exclusion, the analyses allow a broader view of deprivation and disadvantage (Sudin and Smita, 2009). Typically, social exclusion (1) highlights the broader environment that surrounds remote rural inhabitants and their behaviors such as cultural, political, social, economic, geographic cognition and historical contexts in which chronic deprivation and open defecation occur (O'Reilly et al, 2017). Of significant concern is how our improved understanding of these contextual realities (O'Reilly and Louis, 2014) can be reproduced in sanitation interventions and improvements. That is, by understanding the processes of social exclusion in rural sanitation, it is possible for policy makers to direct their efforts to creating a more inclusive society., (2) allows us to focus on causes of open defecation and poor sanitation rather than their characteristics and enable us to recognize the multi-dimensionality of marginalization and inequality, (3) directs us to the way in which social structures can generate sanitation disparities, (4) draws our attention to how sanitation improvements should be viewed as part of the wider struggles and processes for social and political change. In sum, the discussion in this paper is informed by the importance of social inclusion and social cohesion.

## 3. Rural Sanitation Issues

Water and sanitation are subjects that affect all of us (Government of South Africa, 1996). That is, when it comes to water and sanitation, there are no non-users. The term sanitation refers to the principles and practices that relate to the collection, removal or disposal of human excreta, refuse and waste water, as they impact upon users, operators, and the environment (Government of South Africa, 1996, p. 3). Improved sanitation is defined as the access to facilities that hygienically separate faeces from human contact. The actors in the rural systems of sanitation include *inter alia* governments and government departments, NGOs, universities and research institutions, and users. Sanitation technologies range from flush or pour flush to piped sewer system, septic tanks, pit latrine, ventilated improved pit latrines, pit latrines with slab and composting toilets (Fuhmeister et al, 2015 cited in Tong et al, 2016; Simba et al, 2016; SERI, 2011). Safe sanitation defined as flush toilet, covered pit latrine and ventilated improved pits (Awuah et al, 2009). Likewise, water and sanitation indicators include *inter alia*, open defecation, improved sanitation, and shared sanitation. In drinking water the following indicators can be highlighted piped water on premises, surface water etc. Improved water drinking source is defined as one by nature of its construction or through active intervention is protected from outside contamination especially contamination from faecal matter (Statistics South Africa, 2016). Therefore, proper sanitation systems are essential to protect the environment (Government of South Africa, 1996) and sanitation users.

Access to clean drinking water and improved sanitation is not equitably available to all human beings. That is, the main issues in sanitation are the inadequate sources of drinking water and particularly lack of sanitation facilities especially in remote rural areas. Globally, one in five persons does not have access to safe and sufficient sanitation (WHO/ UNICEF, 2000 cited in Langergraber and Muellegger, 2005). Lack of adequate sanitation and poor hygiene and lack of portable water are serious global health problems (Demberere et al, 2016, p. 119). However, about 2.5 billion people do not have access to any improved sanitation facility (Crocker et al, 2016; Hammer and Spears, 2016; Langergraber and Muellegger, 2005) and 1.1 billion practice open defecation (Bardosh, 2015; Ramani et al, 2011); about 88-90% of all diarrhoea cases are attributed to poor sanitation and unsafe drinking water (Tong et al, 2016;

Isunju et al, 2011); diarrhoeal mortality is 13 times greater in rural regions than in the urban regions (Zhang, 2012 cited in Tong et al, 2016). More significantly, about 6.6 million children under the age of 5 years died in 2012 from diarrhoeal diseases associated with poor sanitation (Odagiri et al, 2016). This is about the combined populations of Swaziland, Botswana and Lesotho. What is more concerning is that some government do not appear to have stronger control over sanitation budgets as up to 75% of sanitation budgets fall outside government budgets (Gutierrez, 2007).

Unimproved water and sanitation systems constitute a significant potential hazard to the environment (Seleman and Bhat, 2016) and well-being. Similarly, given the importance of clean water in environment, well-being, and economic growth (Johnson et al, 2008), this situation is concerning. Indeed, ensuring access to clean water can substantially reduce the global burden of diseases (Munamati et al, 2016; Statistics South Africa, 2016). It can improve school attendance and enable poor rural families to save up to five hours of time spent collecting water for household use (Gutierrez, 2007). With better access to water and sanitation rural inhabitants can devote more time to improving their livelihoods and their children can perform better at school (Ortiz-Correa, 2016).

The main focus on toilets is mainly driven by the need to stop open defecation (Chong et al, 2016). Likewise, the pit latrine system is widely used in marginalized areas of the developing world especially in Africa and Asia due to its affordability. Indeed, this technology provides a barrier between the users and the excreta. However, the majority of latrines in rural areas do not have a hand washing facility nearby. It is noteworthy that increasing access to improved sanitation should be viewed within the water, sanitation and hygiene nexus which can offer more sustained interventions in rural sanitation (Ganesappilai et al, 2016).

It is worth noting that when some government authorities report their achieved targets on sanitation, their reports appear to be heavily reliant on the quantitative delivery of toilets, a technological solution to a broader water, sanitation and hygiene nexus. What these reports appear to miss is that sanitation is broader than the provision of toilets (Simba et al, 2016; O'Reilly and Louis, 2014). Further, this technology does not always provide a barrier between ground water and the pathogens and parasites in the excreta which are widely responsible for a variety of diseases in the developing world (Langergraber and Muellegger, 2005). Some of the key weaknesses of this technology is its bad odour, it can be a breeding ground for mosquito and flies and there are limits in available land for digging the next toilet when the one is full (Langergraber and Muellegger, 2005). That is, it does not adequately disrupt pathogen transmission pathway of excreta from coming into contact with ground water, liquids and food especially in remote rural areas (Ogadiri et al, 2016). As revealed in Box 2, efforts aimed at water and sanitation improvements need to simultaneously reduce contact with microbial exposure which is an under-recognized health risk (Odagiri et al, 2016; Tong et al, 2016).

## **Box 2: Impact of Drinking Polluted Water on Rural Inhabitants**

While doing our fieldwork in Mbizana (South Africa) we visited a local clinic. Among rural inhabitants was the problem of what they called epilepsy. Upon paying closer attention to this phenomenon, it became clear that the water they were drinking in this village was contaminated with animal fecal. No one in the village including the nurses at the local clinic was able to make this link between contaminated water and its effects on local inhabitants. The clinic was linked to the nearest hospital in town but still no one was able to make this link.

Source: Kraemer-Mbula, Ndabeni and Maharajh, 2014

Water and Sanitation Hygiene (WaSH) (WHO, 2014 cited in Crocker et al, 2016) are important elements of rural sanitation systems. Some of WaSH key aspects include encouraging rural inhabitants to continuously wash their hands with soap at critical moments when touching or preparing food, before eating, after using a toilet and after changing child's diapers as this can reduce the incidents of diarrhoea by almost 40% (Demberere et al, 2016, p. 121).

Indiscriminate disposal of waste water provide breeding ground for flies and can also cause diarrhoea (Pathela et al, 2006 cited in Demberere et al, 2016). Children under the age of five are particularly more affected by poor sanitation and un-purified drinking water. At that age their immune system is still weak and unable to fight pathogens on their own. Worth noting, is that the diarrhoea can erode the significant nutrients in their bodies thereby making them more prone to cognitive under-development and stunted growth (Hammer and Spears, 2016) thus affecting the potential for greater human resource development in the developing world and its impact on the economy.

Children's excreta requires proper disposal as they contain considerable amounts of pathogens (Demberere et al, 2016) and their inadequate treatment or disposal can lead to the transmission and spread of diseases that originate from excreta (Demberere et al, 2016, p. 119). However, poor knowledge of WaSH among the mothers of children under the age of five (Demberere et al, 2016) is a disturbing concern. When the WaSH knowledge of mothers of children under the age of five years is poor, it can be a contributory factor to the incidence of diarrheal diseases among the children under the age of five years (Dembere, 2016). What is equally concerning is that some of the water used to wash hands (sometimes without soap) may be contaminated with animal fecal and human excreta. Overall, as women are the greater victims of unequal WaSH, improved sanitation should be viewed as an integral element of women's emancipation. Gendered research can reveal critical issues that are overlooked in the mainstream research (O'Reilly, 2017). Indeed, conventional approaches to sanitation improvements often fail to (1) reveal that sanitation actors are not homogeneous and that they do not have equal power relations, (2) that rural women and men are variedly affected by poor sanitation practices.

A critical concern is that most rural inhabitants do not purify water before drinking (Demberere et al, 2016). This is disturbing concern considering the dangers of drinking un-purified water (Demberere et al, 2016). However, it is worth noting that WaSH is often influenced and constrained by its context. Water purification can be influenced by the level of education of those who drink (un) purified water (Demberere et al, 2016). That is, the context of WaSH can potentially enhance or constrain its intended outcomes (Crocker et al, 2016). Consequently, for WaSH interventions- especially those that are aimed at participatory behaviour-change and a long lasting impact- should be contextualized within the livelihood contexts of the rural inhabitants especially in view of the fact that rural systems of sanitations are largely intertwined with fragile rural livelihoods.

The global political-economic factors such as Millennium Development Goals (MDGs) and later Sustainable Development Goals (SDGs) continues to shape water and sanitation interventions. Indeed, water and sanitation remain critical pillars of the then MDGs and the current SDGs. Partly as a result of the MDGs, from 1990 to 2012, global access to drinking water increased from 76% to 89% while improved sanitation increased from 45% to 64% (WHO/ UNICEF, 2014 cited in Fuller et al, 2016). These improvements are encouraging though disparities exist between countries and within countries. More empirical studies are required so that they can highlight specific areas that require additional support in order to achieve sustainable development goals in 2030.

Sub-Saharan Africa missed her MDG target of 62% sanitation coverage (WHO and UNICEF, 2015 cited in Munamati et al, 2016). Currently, sanitation coverage in SSA stands at 30% (Munamati et al, 2016). Munamati et al (2016) attribute this failure to lack of demand for sanitation services by the peoples of SSA. Similarly, Ramani et al, (2011) consider the lack

provision of appropriate toilets and (lack of) behavioural change among the target beneficiaries as the causes of this situation. Bardosh (2015) in his study of sanitation in rural Zambia refers to situations that normalise open defecation. His contention is based on the existing shrubland in Zambia which constituted common property and was used for grazing and defecation. Referring to its use as common toilet, he contends that 'it was well used' (Bordash, 2015, p. 57). He appropriately views this situation in relation to its under-development context. However, his assertion that the open shrubland normalises open defecation seem to reveal his understanding of 'other' and 'otherness' which resonates in the way that he frames the 'other' in his analysis of open defecation in Zambia. Likewise, Munamati et al (2016) contention that the failure of SSA to reach its MDGs sanitation targets is due to lack of demand from the users appear to overlook the structural factors that produce and reproduce sanitation inequalities and certain behaviours among rural inhabitants. Indeed, without a thorough understanding of the cognitive processes that lead to certain forms of behaviours among the marginalised users and their contextual constraints, it is difficult to believe their conclusion. Again, an important point is made by Ramani et al (2011) that 'the way in which the poor make decisions are much more influenced by their social and cultural environments'. For 'poor people' and more appropriately in this context 'marginalised people' social and cultural contexts may not be sufficient factors to understand this phenomenon especially because cognition exists everywhere (Ndabeni, 2017) and may appear to play a more significant role in decision making. Once again, their analyses seem to resonate with their understanding of the 'other' and 'otherness' and the way they frame the 'other'. Equally, it may be of great value to us as scientists to allow the interaction between our own cognitive and meta-cognitive processes so that we can think carefully about what we are thinking and allow this process to identify the thought behind the thought (Ndabeni, 2017). Such a process can improve our understanding of the situations that we are studying including our own inaccuracies- which we bring to these situations- often embedded in our own meta-cognitive processes.

Income disparities among and within countries are in turn reflected in sanitation disparities among countries and within countries. Typically, latrine ownership tends to share a close relationship with the income of the household (Demberere et al, 2016). Again, Seleman and Bhat (2016) highlight a significant relationship between family income and educational level on the one hand and whether a household had an improved sanitation technology on the other. Being seen practicing open defecation can provoke the greatest form of embarrassment. One is tempted to suggest that open defecation can be viewed as part of a system of marginalisation where it can be regarded as a symbolic form of embedded marginalisation especially in remote rural villages where latrines are often restricted to village elites. In this analysis, rural sanitation is closely linked to global inequalities wherein rural poor sanitation reflects multiple levels of inequality.

As revealed in Box 3, the livelihood strategies of remote rural inhabitants are intertwined with their sanitation practices.

### **Box 3: Viewing Open Defecation Within The Context Of Fragile Rural Livelihoods**

(1)An unemployed man who is struggling to buy school uniforms for his children and is unsure where the next family meal is going to come from, is unlikely to prioritize building a toilet to meet the sanitation requirements of the family. (2) Again young women who have to collect wood to make sure that the energy needs of the family are met, when they are in the forest collecting wood and the nature calls, they are unlikely to walk 30-40 minutes back home to relieve themselves and another 30-40 minutes back to the forest to continue collecting wood. Again, they are more likely to use the wood sparingly and may not prioritise the boiling of water for drinking, which may later be contaminated by flies and dust. (3) Once again a young man looking after the family cattle in the remote rural Eastern Cape or KwaZulu-Natal Province when nature calls, he is unlikely to leave the cattle alone, walk over about an hour to relieve himself and another hour back to continue looking after the cattle.

The practical option for him is to defecate in the veld. (4) In some rural towns of Eastern Cape SUCH AS Lusikisiki and Flagstaff where there are no public toilets available, the long grass and shrubs provide a hiding space for rural inhabitants who want to relieve themselves when the nature calls while they are in town.

Source: Ndabeni, this Volume

#### **Box 4: Viewing Rural Sanitation Within the Daily Practices of Rural Life**

When women and children are responsible for ensuring that there is water for cooking, water for drinking, and water for bathing for all the members of the family, and that they take about 40 minutes (which is above the WHO standard of 30 minutes round trip, Demberere et al, 2016) to fetch 20 litres each of water (which itself may be contaminated with fecal pathogens). Their efforts are unlikely to meet the WHO standard of 20L per capita per day (Demberere et al, 2016). They are likely to use water sparingly and may not prioritize the washing of hands every time they touch or prepare food. Again, if the nature calls while they are at the river, they may not complete the exercise of fetching water before they answer the call of nature. Consequently, they are likely to embark on open defecation along the river bank. After this major operation (minor operation being urinating), they may wash their hands but without soap- (soap breaks down grease and dirt that carry germs and diseases-causing pathogens and increases the amount of time one spends washing hands- (Demberere et al, 2016 and Fewtrell et al cited in Demberere et al, 2016). With their hands though potentially contaminated, may shake hands with people they know on their way back home and if they are offered fruit, they may eat it with the same potentially contaminated hands. Again, when migrant labour takes away adult men in the village women and children take on the responsibility of ploughing the agricultural fields and spend most of their time away from home. During the ploughing season, they are likely to spend their time away from home where they drink, eat and defecate.

Source: Ndabeni, this Volume

Urban middle class politicians, leaders, and scientists have tended to control the sanitation discourse and sanitation resources (O'Reilly, 2017). Consequently, in the mainstream discourse, the narrative of open defecation and poor sanitation practices of remote rural residents is often told from the perspective of the observer rather than the lived experiences of the marginalized rural inhabitants. The so-called walks of shame (Bordash, 2015) which are intended to disgrace the marginalized rural inhabitants so that they can build toilets. It is tempting to assume that these so called walks of shame are mainly planned and led by those who have no lived experiences of remote rural life and its embedded marginalization. It is also tempting to believe that such researchers and scientists derive their understanding of these complex issues from what they read. Interestingly, our understanding of what we read is mediated by our current cognitive and meta-cognitive processes and the inaccuracies often embedded in them. Indeed, it is tempting to contend that it is doubtful that anyone else who has by accident come across human excreta and its smell would be a willing participant in such a hoodwinked walk except to please the urban scientist. Worth noting is that the walk of shame can potentially create irreparable damage on the self-esteem and confidence of those affected- especially if they have no means to build their own toilets. The walk of shame can be viewed as a peculiar symbol of power relations that can potentially reproduce an inferiority complex in the way that those affected view themselves in a society that is unequal. It is interesting that the pigs which are part of their fragile livelihoods often come to their rescue by removing all the traces of open defecation (Bordash, 2015). Dogs and chickens normally do likewise after the children under the age of five years have defecated in the yard. Science and scientists are not invulnerable to the unequal power relations that occur in society including the contexts that they study. What is more concerning is when the dominant views- with their assumptions often embedded in what seems to be inaccuracies in the way they frame and

understand the 'other' and 'otherness'- are reproduced into policy making and development practice and are eventually accepted as the bases of official policy.

It is often contended that in today's world more people have access to cellphones than sanitation (Bardosh, 2015). Indeed by all means this can be true. However, this contention seems to neglect the empirical sanitation contexts. The contention seems to be based on potentially inaccurate assumptions that (1) the marginalized peoples of the world who suffer the indignity of poor sanitation seem to be unable to prioritize their competing choices (2) the implicit advice being that they should choose between cellphones and sanitation- a public good- and that they cannot have both, (3) if indeed they want to enjoy the benefits of this technology, first they should ensure that they have proper sanitation. Further, the claim can be misleading because the cost of an average cellphone is far less than the costs of building a toilet. In fact, some of the cellphones are gifts from urban relatives who want to keep contact with their rural relatives.

Community-led total sanitation is a significant grass-roots approach to improving sanitation (Bardosh, 2015). Indeed, it is an important initiative in the rural sanitation system. However, its emphasis on shocking people to building their own toilets seem to overlook the public good nature of sanitation and factors that produce sanitation inequalities. Further, it is hard to believe that 'community-led total sanitation' can indeed achieve 'total sanitation' and the goals of improved sanitation if does not significantly address the broader socio-economic context that affect the remote rural inhabitants. Rather than put emphases on provoking disgust and shame especially in an unequal society, it can simultaneously insist that governments provide improved sanitation systems, contribute to the establishment of a system (1) that seeks to hold governments responsible for poor sanitation and its consequences (2), and shame those that fail to provide proper sanitation to their citizens.

Conventional sanitation technologies by their nature potentially discriminate against the marginalized remote rural inhabitants. By virtue of its costs and water requirements conventional sewerage is an anti-poor technology (Paterson et al, 2007). Ramani et al (2011) contend for the building of sanitation technologies that are appropriate to their socio-economic context. While their proposed intervention could be made in good faith, it can potentially normalise inequities in sanitation systems.

Conventional sanitation systems and technologies which are designed to transport waste water via a sewer system do not seem to resonate with the emerging realities of green sanitation systems. The emerging- more environmentally sensitive- perspective reveal emerging resource recycling pathways (Ganesapillai et al, 2016), and requires major revamping of the sanitation system and development of new sanitation technologies (Afolabi and Sohali, 2017). Rich nutrients which occur in human excreta make it suitable for nutrient recycling rather than viewed just as waste that needs to be disposed. Human urine is rich in nitrogen, a key ingredient in the manufacture of fertiliser (Simba et al, 2016). If heavy metals can be eliminated, as well as improvements in salt content and hygienic quality can be eliminated from the sewage sludge (Wong et al, 1997 cited in Kuai et, 2000) it can prove to be a valuable agricultural resource that is useful for its organic, nitrogen and phosphorus content (Kuai, 2000 et al, 213). It can also be useful for improving the soil physical characteristics, humus content and water holding capacity especially of light textured sandy soils (Esrey et al, 2001 and GTZ, 2002 cited in Langergraber and Muellegger, 2005; Pascual et al, 1997 cited in Kuai et al, 2000). As a soil conditioner, sewage sludge reduces run-off of fertilisers (Davis, 1989 cited in Kuai et al, 2000). Properly treated sewage sludge can also be used as a forestry fertilizer (Moffat and Bird, 1989 cited in Kuai et al, 2000). More interestingly, Mihelcic et al, 2011 cited in Munamata et al (2016) estimate that by the year 2050 Sub Saharan Africa can potentially recover over 1 million tonnes of phosphorus per year from human faeces. Transforming current sanitation technologies will require strategic thinking and a better understanding of local physical conditions and local development contexts.



In large part, local governments in many rural regions are characterized by weak governance. Nonetheless, local governments have the primary responsibility to deliver sanitation services (Chong et al, 2016; SERI, 2011). A critical observation is that investments by local governments in sanitation services and infrastructure often remain low (Chong et al, 2016). Consequently, this weak governance context and its inadequate capacities to deliver sanitation services have a greater impact on rural inhabitants. Given the severity of the water and sanitation in rural areas, it is disquieting that central governments in many developing countries continue to leave this critical area of people's well-being to a weak governance framework. Central governments need to prioritize building the capacities of local governments to deliver improved sanitation services to the rural peoples of the world or take this critical function to themselves and thereby improve the well-being (public health and environmental outcomes as Chong et al, 2016 state it) of all their citizens.

#### **4. Conclusions And Implications For Policy Development And Practice**

##### **(i) Conclusions**

It has been revealed that water is life and sanitation is dignity and that sanitation can lead to improved social status. (Jenkins and Curtis, 2005 cited in Crocker et al, 2016; According to Water Aid Bangladesh (2003 cited in Demberere et al, 2016) a considerable number of people build latrines for their convenience, privacy and social status. These authors seem to reveal what they perceive as characteristics of rural sanitation rather than highlight root causes of sanitation indignity. One would have agreed with them if they emphasized that improved sanitation can make a difference between well-being and the burden of dangerous pathogens that are responsible for many diarrhoeal cases and deaths especially in rural Africa and Asia. By contrast, their observations seem to be based on inaccurate assumptions. Interestingly, many people in urban areas enjoy improved sanitation but do not realise the link between improved sanitation and their dignity or social status. When everyone in society has a proper toilet then the toilet loses its symbolic meaning of social status. In an unequal society open defecation can often assume a metaphorical symbol of embedded marginalisation. Equally, a toilet can only be viewed as a symbol of social status, privilege and its embedded power only in an unequal society.

In conclusion, the discussion in this paper is not intended to justify unhygienic practices that often occur in rural systems of sanitation. By contrast, it is intended to (1) examine critical causes of rural sanitation practices and structural issues that reproduce sanitation inequalities and (2) to unearth the complexities of rural sanitation systems in the developing world. The paper encourages the (a) production of critical scholarship on inclusive rural systems of sanitation and (b) generation of implications for the development of systemic interventions and contextualized sanitation policies which are an integral part of an inclusive economic development policy. Equally, the paper attempts to reveal how insights from debates and (more importantly listening) can allow undisrupted interactive processes between our cognitive and meta-cognitive processes (Ndabeni, 2017) thereby eliminate or reduce potential for our own inaccuracies to reproduce themselves in policy making and development practice. Overall, the discussion in this paper highlights the critical importance of rural sanitation in the global development agenda. Against this backdrop, the following implications for policy development and practice are proposed.

##### **(ii) Implications For Policy Development And Practice**

**Context Matters:** Sanitation occurs in a cultural, economic, spatial, and socio-technical context. Work and land-use patterns of rural inhabitants often inform the practices of defecation (O'Reilly, 2017). Open defecation and accompanying efforts that seek to improve rural sanitation should be viewed within the poverty, inequality and unemployment nexus as these factors often reproduce the poor sanitation conditions and practices. As economic and

education situations of rural inhabitants improve, they are more likely to make a transition towards sustainable forms of sanitation practices within the water sanitation and hygiene nexus.

**Global Political Economy:** Sanitation is a complex phenomenon. Sanitation improvements are shaped by varied factors such as gender, influence and pressure from others, political will and more importantly the global political economy such as MDGs and SDGs. Achieving sustained improvements and success in rural sanitation lies in improving our understanding of these factors and their interaction with the rural sanitation environment.

**WaSH and Disrupt Transmission Passages of Pathogens:** Improvements in sanitation are expected to improve the equality of local drinking water and vice versa. While contamination of water resources by fecal material depends on the environmental conditions of a specific area (Tong et al, 2016) improving rural sanitation systems should by all means disrupt water contamination and eliminate water-borne diseases in rural regions. For WaSH to yield its desired results, intensifying educational programmes such as washing hands especially at critical moments should be accompanied by improvements in the living conditions of rural inhabitants especially their rural livelihoods. This will potentially ensure that (1) flies do not roam freely between the toilets and the dinner tables, and (2) transmission of pathogens are significantly disrupted.

**Governance:** Local governance is a critical sphere of government. Improving rural sanitation systems should be prioritised in government budgets. Similarly, central governments need to prioritize building the capacities of local governments to deliver improved sanitation services to the rural peoples of the world or take this critical function to themselves.

**Towards a Greener Future:** The emerging realities show that the current sanitation technologies are often ill-equipped for a transition towards a more climate resilient and a greener future. Current sanitation systems need to be overhauled and green technologies need to be designed which can provide a more safer system of sanitation and which can remove human waste from the environment while simultaneously recovering recyclable material from it (Afolabi and Sohali, 2017).

**Improving Sustainable Rural Systems of Sanitation and Policy Management:** Behind a sustainable rural system of sanitation is a complex network of actors and a set of relationships consisting of varied capabilities, varied interests and motivations, sustainability, safety, costs, toilets, systems for collection, transport, treatment, recovery of nutrients, financiers, donors, facilitators, field workers, service providers, NGOs, CBOs (Ramani et al, 2011), knowledge, attitudes, practices, water, hygiene (Sibiya and Gumbo, 2013). Consequently, policy development and its management processes which seek to improve rural sanitation systems should be strongly linked to national and regional socio-economic policies and well-being. Progressing towards inclusive systems of sanitation should include among others rural mothers, sanitation entrepreneurs, youth, politicians, civil society, scientists- from various fields like sociology, psychology, geographers, development planners, poets, teachers, farmers, technologists, innovators, political scientists, policy analysts, policy makers, economists, geologists, biochemists, pathologists- public health officials such as- medical doctors, nurses, nutritionists, traditional healers, traditional birth attendants- traditional leaders, priests or church leaders, policy makers, private sector, development workers, engineers, construction companies, and environmentalists. Knowledge sharing among these actors within the system of rural sanitation can generate critical insights for systemic interventions and inclusive sanitation policies and practice.

## References

- Afolabi, O. O. D., and Sohali, M., 2017. Microwaving human faecal sludge as a viable sanitation technology option for treatment and value recovery- A critical review, *Journal of Environmental Management*, 187, 401-415.
- Awuah, E., Nyarko, K. B., Owusu, P. A., 2009. Water and Sanitation in Ghana, *Desalination*, 248, 460-467.
- Bardosh, K., 2015. Achieving "Total Sanitation" in Rural African Geographies: Poverty, Participation and Pit Latrines in Eastern Zambia, *Geoforum*, 66, 53-63.
- Chong, J., Abeyesuriya, K., Hidayat, L., Sulisto, H., and Willetts, J., 2016. Strengthening local governance arrangements for sanitation: case studies of small cities in Indonesia, *Aquatic Procedia*, 6, 64-73.
- Demberere, T., Chidziya, T., Ncozana, T., and Manyuruke, N., 2016. Knowledge and practices regarding water, sanitation and hygiene (WASH) among mothers of under-fives in Mawabeni, Umzingwane District of Zimbabwe, *Physics and Chemistry of the Earth*, 92, 119-124.
- Fuller, J. A., Goldstick, J., Bartram, J., and Eisenberg, J. N. S., 2016. Tracking progress towards global drinking water and sanitation targets: A within and among country analysis, *Science of the Total Environment*, 541, 857-864.
- Ganesappilai, M., Simba, P., Gupta, K., and Jayan, M., *Procedia Engineering*, 148, 346-353.
- Government of South Africa, 1996. National Sanitation Policy, National Task Team, Republic of South Africa, Pretoria.
- Hammer, J., and Spears, D., 2016. Village sanitation and child health: Effects and external validity in a randomized experiment in rural India, *Journal and Health Economics*, 48, 135-148.
- Isunju, J. B., Schwartz, K., Schouten, M. A., Johnson, W. P., and van Dijk, M. P., 2011. Socio-economic aspects of improved sanitation in slums: A review., *Public Health*, 125, 368-376..
- Johnson, D. M., Hokanson, D. R., Zhang, Q., Czupinski, K. D., and Tang, J., 2008. Feasibility of water purification technology in rural areas of developing countries, *Journal of Environmental Management*, 88, 416-427.
- Kraemer-Mbula, E., Ndabeni, L., and Maharajh, R., 2015. Rural Health Systems in South Africa, Cassiolato, J. E., and Soares, M. C. C., *Health Innovation Systems, Equity and Development*, E-Papers Servicos Editoriais, Rio de Janeiro, 267-296
- Kuai, L., Farida, D., Vertrate, W., 2000. Sludge treatment and reuse as soil conditioner for small rural communities, *Bioresource Technology*, 73, 213-219.
- Langergraber, G., and Muellegger, E., 2005. Ecological Sanitation- a way to solve global sanitation problems?, *Environmental International*, 31, 433-444.
- Lansing, S., Bowen, H., Gregorie, K., Klavon, K., Moss, A., Eaton, A., Lai, Y., Iwata, K., 2016. Methane production for sanitation improvement in Haiti, *Biomass and Bioenergy*, 91, 288-295.
- Letema, S., van Vliet, B., and van Lier, B., 2014. Sanitation policy and spatial planning in urban East Africa: Delivering sanitation spaces and actor arrangements in Kampala and Kisumu, *Cities*, 36, 1-9.
- Munamata, M., Nhapi, I., and Misi, S., 2016. Exploring the determinants of sanitation success in Sub-Saharan Africa, *Water Research*, 103, 435-443.

- Ndabeni, M. 2017. Informal conversations in industrial psychology, unpublished, Mobanda Valley, Durban.
- Odagiri, M., Schriewer, A., Daniels, M. E., Wuertz, S., Smith, W. A., Clasen, T., Schmidt, W., Jin, Y., Torondel, B., Misra, P. R., Panigrahi, P., and Jenkins, M. W., 2016. Human fecal and pathogen exposure pathways in rural Indian villages and the effect of increased latrine coverage, *Water Research*, 232-244.
- O'Reilly, K., Dhanju, R., and Goel, A., 2017. Exploring "The Remote" and "The Rural": Open Defecation and Latrine Use in Uttarakhand, India, *World Development*, Vol. xx, pp. xxx.
- O'Reilly, K., and Louis, E., 2014. The toilet tripod: Understanding successful sanitation in rural India, *Health and Place*, 29, 43-51.
- Ortiz-Correa, J. S., Filho, M. R., and Dinar, A., 2016. Impact of access to water and sanitation services on educational attainments, *Water Resources and Economics*, 14, 31-43.
- Paterson, C., Mara, D., and Curtis, T., 2007. Pro-poor sanitation technologies, *Geoforum*, 901-907.
- Ramani, S. V., SadreGhazi, S., and Duysters, G., 2011. On the diffusion of toilets as bottom of the pyramid innovation: Lessons from sanitation entrepreneurs, *Technology Forecasting & Social Change*, xxx, xxx-xxx.
- Seleman, A., and Bhat, M. G., 2016. Multi-criteria assessment of sanitation technologies in rural Tanzania: Implications for program implementation, health and socio-economic improvements, *Technology in Society*, 46, 70-79.
- SERI, 2011. Basic Sanitation in South Africa: A Guide to Legislation, Policy and Practice, Socio-economic Rights Institute of South Africa, Johannesburg.
- Sibiya, J. E., and Gumbo, J. R., 2013. Knowledge, Attitudes and Practices (KAP) Survey on Water, Sanitation and Hygiene in Selected Schools in Vhembe District, Limpopo, South Africa, *International Journal of Environmental Research and Public Health*, 10, 2282-2295.
- Simba, P., Mathew, M., Jain, P., and Ganesapilai, M., 2016. Resource Recovery and Recycling in Sanitation in key to Health, Water and Food Security, *Procedia Technology*, 25, 201-2017.
- Sorensen, J. P. R., Sadhu, A., Sampath, G., Sugden, S., Gupta, S. D., Lapworth, D. J., Marchant, B. P., and Pedley, S., 2016. Are sanitation interventions a threat to drinking water supplies in rural India? An application of tryptophn-like fluorescence, *Water Research*, 88, 923-932.
- Statistics South Africa, 2016. Water and Sanitation: In-depth analysis of the General Household Survey 2002-2015 and Community Survey 2016 data, Statistics South Africa, Pretoria.
- Sudin, K, and Smita, P., 2009. Social Inclusion: The Indian Context, in Smita, P., Sudin, K., and Reid, P., eds, Finding Pathways: Social inclusion in Rural Development, Books of Change, Bangalore.
- Tong, L., Yao, R., He, W., Zhou, F., Chen, C., Liu, X., Lu, Y., Zhang, W., Wang, X., Lin, Y., and Zhou, M., 2016. Impacts of sanitation upgrading to the decrease of fecal coliforms entering into environment in China, *Environmental Research*, 149, 57-65.