Sanitation Challenges and Policy Options in Developing Countries: A Critical Review

24

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Abstract

Sanitation is a looming crisis with many policy challenges in the global South. Many developing countries struggle to cope with issues of sanitation which is exacerbated by water shortages, behavioural issues, and rapid urbanisation with limited resources. Sanitation challenges include poverty, lack of political will, limited or no community participation, inadequate gender inclusion, unreliable data and, finally, a lack of an integrated approach between the various stakeholders - government, private sector and civil society. A critical review of these challenges demonstrates that moving from the guidelines of Millennium Development Goals (MDG) to the Sustainable Development Goals (SDGs) has brought marginal improvements to solve sanitation related issues. In this context, this chapter presents a critical review of the endemic sanitation challenges across the developing nations and assesses various policy options to address sanitation challenges. This chapter also recognises that sanitation is a human right incorporated in the SDGs with the aim to ameliorate the conditions of those without access to basic sanitation and associated challenges. In order to reduce sanitation challenges, this chapter proposes the adoption of a multi-stakeholder, inclusive approach, comprising local government, communities, and the small enterprises sector with a view to achieving community empowerment to promote equitable access to hygiene needs, and advocating for political commitment, promoting gender equity, and enhancing youth involvement.

Keywords

Developing countries · Ecological sustainability · Millennium Development Goals (MDG) · Multi-stakeholder collaboration · Sanitation challenges · SDG · Swachh Bharat Abhiyan (Clean India Mission)

24.1 Introduction

The sanitation crisis is a major challenge in most developing countries. It is exacerbated by increasing urbanisation, poverty, lack of political will, poor institutional response, and limited financial resources to address the cumulative demands. Despite greater commitment to provide adequate sanitation and water following the adoption of the Millennium Development Goals (MDGs),

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and subsequently, the Sustainable Development Goals (SDGs), marginal improvement is noted. Vulnerable groups, especially women and children, bear the consequences. Open defecation remains a scourge in the twenty-first century. Poor sanitation is a risk to human health, the economy, and the environment.

The provision of sanitation has been plagued with two critical challenges in the developing countries for decades, and this continues in the twenty-first century. Firstly, the urgency to satisfy a human need through adequate sanitation access for the millions who are forced to resort to primitive and unhygienic methods in the absence of improved ablution facilities. Secondly, the governance and institutional reforms in the sector have not resolved the sanitation crisis, due to fiscal constraints, insufficient capacity, and the unresponsiveness to local context and societal-specific sanitation problems.

Box 24.1 Sustainable Development Goals

Sustainable Development Goal 6 aims to ensure the availability of sustainable management of water and sanitation worldwide. Sanitation is essential for the survival and development of children and adults, more so in the developing world. In the twenty-first century both Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) have aimed to reduce the demographics drastically and dramatically with no sustainable access to water and sanitation. So far, and as we enter the last decade of Agenda 2030 the effectiveness of the targets and indicators of SDG 6 has raised concerns among both academics and practitioners. While the urban population in developing countries has more than doubled between 1950 and 2000, its rural population has no access to improved sanitation. This has caused operational challenges of mammoth proportion and made developing regions vulnerable due to population growth, urbanization and increased industrialisation, and water competition which has been threatening agricultural production and food security affecting water quality. In this chapter, the authors not only review this emerging context vis-à-vis sanitation challenges but also recognise that sanitation issues are further compounded by the impacts of climate change, which hamper the achievement of SDG 6 if the broader issues are left unaddressed. This chapter as it assesses different policy measures also recognises that water scarcity, poor water quality, and inadequate sanitation all affect the health of ecosystems, societies, and economies and in the end will negatively impact the achievements of the other SDGs as well.

This chapter presents a critical review of the endemic sanitation challenges experienced in the developing countries in the twenty-first century. It also assesses various policy options to address the sanitation challenge. The chapter is divided into five sections and begins with an outline of sanitation challenges with specific reference to vulnerable groups, followed by a review of saniation and the Millennial Development Goals. The right to sanitation is the theme of the third section, the sustainable development goals are discussed in the fourth section. The final section assesses different policy measures which include multi-stakeholder collaboration and partnerships, recycling human waste and ecological sustainability; supply-driven sanitation solutions; innovation and enterprise, and alternative pro-poor sanitation options.

24.2 Sanitation Challenges and Vulnerability

In 2000, one-sixth (1.1 billion people) of the global population did not have access to a safe water supply. About 2.4 billion (two-fifths) lacked access to improved sanitation. The majority who lacked access to these basic services were in Asia and Africa, where there was also a sharp rural-urban divide. Eighty percent of those

in rural areas (2 billion) lacked satisfactory sanitation (WHO/UNICEF, 2000, p. 1). The UN (2019, p. 1) has emphasised that: "A toilet is not just a toilet. It is a life-saver, dignity-protector and opportunity-maker".

Women who are the primary care givers are burdened with the responsibility of managing household sanitary needs. Furthermore, primitive methods of defecating place women and children at risk of disease and even death. According to Ramachandraiah (2001, p. 620), of the 37 most fatal ailments in developing countries, 21 are caused by water and sanitation related diseases, with 1.5 million children under the age of 5 years dying annually. Similarly, there is a statistically significant relationship between maternal, infant, and child mortality due to the lack of access to water and sanitation (Cheng et al. 2012).

Poor sanitation contributes to blindness causing Trachoma. Helminth infections transmitted mainly through exposure to faeces which are exacerbated by open defecation. Schistosomiasis resulting in debilitated growth and impairment is contracted through exposure to contaminated faeces and urine. Although these diseases occur in adults as well, children are most susceptible to these fatal illnesses. While medical treatment through antibiotics and other medicines provides mitigation, improved sanitation shows greater promise of prevention (Mara et al. 2010, p. 1). The turn of the century witnessed greater focus on goals and targets to improve sanitation for the poor.

24.3 Sanitation and the Millennium Development Goals

The Millennium Development Goals (MDGs) were the universal framework advanced by the global community to improve the quality of life of people around the world. The MDGs gained impetus through pledges made at the 2000 Millennium Summit at the General Assembly of the United Nations (UN). The UN sealed the pledge of all countries to meet specific targets aimed at addressing critical human development

Table 24.1 Water and Sanitation—Advancing the MDGs

MDGS	Contribution of improved drinking water and sanitation
Goal 1: Eradicate Extreme Poverty and Hunger	• The security of household livelihoods rests on the health of its members; adults who are ill themselves or must care for sick children are less productive. • Illnesses caused by unsafe drinking water and inadequate sanitation generate high health costs relative to income for the poor. • Healthy people are better able to absorb nutrients in food than those suffering from water-related diseases, particularly helminths, which rob their hosts of calories. • The time lost because of long-distance water collection and poor health contributes to poverty and reduced food security.
Goal 2: Achieve universal Primary education	• Improved health and reduced water-carrying burdens improve school attendance, especially among girls. • Having separate sanitation facilities for girls and boys in school increases girls' attendance, especially after they enter adolescence.
Goal 3: Promote gender Equality and empower women	• Reduced time, health and care-giving burdens from improved water services give women more time for productive endeavours, adult education and leisure. • Water sources and sanitation facilities closer to home put women and girls at less risk of assault while collecting water or searching for privacy.
Goal 4: Reduce child mortality	• Improved sanitation and drinking water sources reduce infant and child morbidity and mortality
Goal 5: Improve maternal health	• Accessible sources of water reduce labour burdens and health problems resulting from water portage, reducing maternal mortality risks. • Safe drinking water and basic sanitation are needed in health care facilities to ensure basic hygiene practices following delivery.

(continued)

Table 24.1 (continued)

MDGS	Contribution of improved drinking water and sanitation
Goal 6: Combat HIV/AIDS, Malaria and other diseases	• Safe drinking water and basic sanitation help prevent water-related diseases, including diarrhoeal diseases, schistosomiasis, filariasis, trachoma and helminths. • The reliability of drinking water supplies and improved water management in human settlement areas reduce transmission risks of malaria and dengue fever.
Goal 7: Ensure environmental Sustainability	• Adequate treatment and disposal of wastewater contributes to better ecosystem conservation and less pressure on scarce freshwater resources. • Careful use of water resources prevents contamination of groundwater and helps minimise the cost of water treatment.
Goal 8: Develop a global Partnership for Development	• Development agendas and partnerships should recognise the fundamental role that safe drinking water and basic sanitation play in economic and social development.

Source: WHO/UNICEF (2004, p. 9)

problems and eradicating extreme poverty by 2015.

Water has intrinsic value in improving sanitation, health, and poverty reduction and was formally recognised in MDG seven. The target was to reduce the population with inadequate and unsustainable access to safe drinking water and basic sanitation by half by 2015 (UNDP 2003). However, improving access to water and sanitation was intrinsic to the realisation of all the MDGs as illustrated in Table 24.1. For example, unsafe water and poor sanitation contribute to poor hygiene, illness, infant and child mortality, poor school attendance especially for teenage girls. Improved water services and access to sanitation result in more productive time for women, reduced child mortality and better maternal health (Table 24.1).

Some progress was made in terms of access to safe drinking water. In 1990, (the MDGs baseline year), 76% of the global population had access to safe drinking water, but this had increased to 90% in 2012. However, there were regional variations and unevenness, especially between urban and rural, and the affluent and poor (WHO 2018). However, progress in terms of provision of basic sanitation was disappointing:

> In 2012, 2.5 billion people did not have access to improved sanitation facilities, with 1 billion these people still practicing open defecation. The number of people living in urban areas without access to improved sanitation is increasing because of rapid growth in the size of urban populations (WHO 2018, p. 1).

According to World Health Organisation (2012), a good indicator of improved sanitation in urban and rural areas to meet MDG targets must translate into a step-up in sanitation facilities. There must be a shift from a range of primitive mechanisms used for defecation. These less hygienic methods include bucket toilets, flush or pour-flush that deposit sludge into rivers or drains, open pit latrine, hanging toilets, i.e. using packets to relieve oneself, or the use of open fields where no other option is available. The step-up will include facilities which allow least exposure and handling of faecal matter. This may include a flush system that is transported by piped sewer, the use of a septic tank, a ventilated pit latrine with a slab to cover faecal matter, as well as composting toilets where the contents are allowed to dry over a period and then, used for agricultural purposes (WHO 2012).

As illustrated in Fig. 24.1, there was significant reduction in the global rate of open defecation. In the year 2000, 1.3 billion people (or 21% of the global population) were forced to practice open defecation. In 2017, this was reduced to 673 million (or 9%). Nevertheless, it is evident from Fig. 24.1 that many African and Asian countries were still struggling to reduce the number of people with inadequate access to sanitation. Notwithstanding, the flagship Swachh Bharat Abhiyan (Clean India Mission) sanitation project (Jain et al. 2020), India still has the largest number, with 344 million people practicing open defecation, followed by Nigeria and Indonesia (Kashiwase 2019).

An important development in the first decade of the twenty-first century was recognition of access to sanitation as a human right.

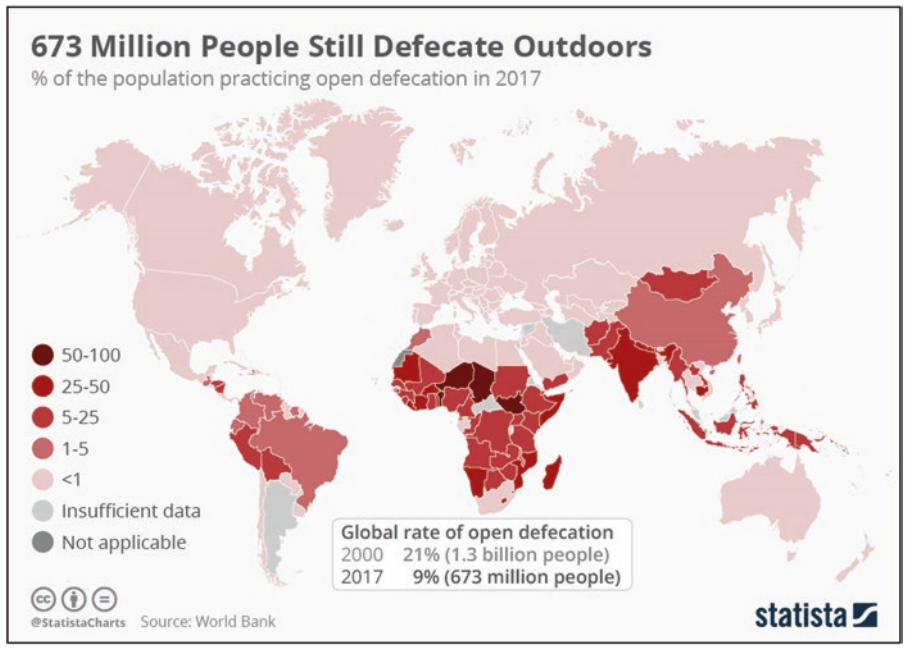

Fig. 24.1 Percentage of Population Practicing Open Defecation - 2017. Source:https://www.statista.com/chart/18419/progress-against-open-defecation/(accessed 10/02/2020)

24.4 Right to Water and Sanitation

Access to water and sanitation was recognised as a fundamental human right by the United Nations General Assembly on 28 July 2010 (United Nations 2010). The principles underlying rights to sanitation include equality and non-discrimination, right to information, participation, and accountability (Baer 2017). The realisation of the right to water and sanitation depended on availability, quality, accessibility, and affordability (Table 24.2). While the right is afforded to all citizens, the most vulnerable are women, children, people with disabilities and the aged, who require special infrastructure provision, especially regarding basic services, such as sanitation. Non-provision of sanitation facilities for vulnerable groups is a contravention of human rights (Mwebaza 2010; Mara et al. 2010; Mehta and Movik 2010; Reddy and Batchelor 2012, Bhanushali 2019).

Sanitation legislation and policy has failed to meet the practical sanitation requirements of the disabled. The inability to integrate the needs of disabled is not only discriminating in terms of the human rights of the individual, but also encroaches on family members or caregivers. Family members are constrained by the lack of adequately designed facilities at household level, restricting their human and economic engagements (Matsebe 2006).

The failure to provide adequate sanitation contributes to the triple discrimination and exploitation of women (Mehta and Movik 2010; Adams et al. 2019; Koonan 2019; McFarlane 2019). Women are more susceptible to infection in the absence of proper sanitation (Mara et al. 2010). In most of the poor households, women are burdened with the maintenance of sanitation facilities and provision of water consuming many hours of their day (Azeez et al. 2019).

Due to increased responsibility of family and household sanitation demands, women are restricted from engaging in productive income-generating activities, thereby perpetuating poverty and hardship (De Albuquerque and Winkler 2010). There are wider social repercussions, including "reduced school attendance, inconvenience, wasted time, and lack of privacy and

Table 24.2 Human Rights to Sanitation

Principles underlying the human right to sanitation:
1. **Non-discrimination and equality:** All people must be able to access adequate sanitation services, without discrimination, prioritising the most vulnerable and disadvantaged individuals and groups.
2. **Participation:** Everyone must be able to participate in decisions relating to their access to sanitation without discrimination.
3. **The right to information:** Information relating to access to sanitation, including planned programmes and projects must be freely available to those who will be affected, in relevant languages and through appropriate media.
4. **Accountability (monitoring and access to justice):** States must be able to be held to account for any failure to ensure access to sanitation, and access (and lack of access) must be monitored.
5. **Sustainability:** Access to sanitation must be financially and physically sustainable, including in the long term.
The normative content of the human right to sanitation is defined by:
1. **Availability:** A sufficient number of sanitation facilities must be available for all individuals.
2. **Accessibility:** Sanitation services must be accessible to everyone within, or in the immediate vicinity, of household, health and educational institution, public institutions and places and workplace. Physical security must not be threatened when accessing facilities.
3. **Quality:** Sanitation facilities must be hygienically and technically safe to use. To ensure good hygiene, access to water for cleansing and handwashing at critical times is essential.
4. **Affordability:** The price of sanitation and services must be affordable for all without compromising the ability to pay for other essential necessities guaranteed by human rights such as water, food, housing and health care.
5. **Acceptability:** Services, in particular sanitation facilities, have to be culturally acceptable. This will often require gender-specific facilities, constructed to ensure privacy and dignity.

Source: WHO (2018, p. 3)

security for women" (Asian Development Bank 2009a, b, p. 11). When safe, usable ablution facilities are not at hand,

> women and girls face three types of toilet insecurity: (1) the material reality for many women and girls that they do not have access to a toilet; (2) the risk of venturing out for open defecation if there is no toilet; and (3) having access to a public toilet, but one that is unusable (e.g., filthy) or unsafe (e.g., insufficient lighting), so that women and girls accept the risk of going for open defecation (O'Reilly 2016, p. 19).

Hence, in addition to the lack of infrastructure or availability of facilities, the sanitation crisis is exacerbated by outdated, superstitious traditions, and discrimination based on religion, caste, or tribe (Mukherjee et al. 2020).

While not all targets were met, the MDGs were very focused on reducing poverty and the progress was measurable. There is agreement in the UN community of nations that a global development agenda must continue beyond 2015. The MDGs was replaced by the Sustainable Development Goals (SDGs) for the next 15 years, 2016–2030.

24.5 Sanitation and the Sustainable Development Goals

Sustainable Development Goal 6 focused specifically on water and sanitation. The emphasis was on universal access to basic services, especially safe and affordable drinking water, as well as the elimination of open defecation (Table 24.2). The objective for SDG 6 was to: "ensure availability and sustainable management of water and sanitation for all". More specifically, the following targets were set for 2030:

- 6.1 achieve universal and equitable access to safe and affordable drinking water for all.
- 6.2 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.
- 6.3 improve water quality by reducing pollution, eliminating dumping, and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally.
- 6.4 substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address

Table 24.3 Water, Sanitation and Hygiene Challenges in 2015

Drinking water	Sanitation	Hygiene
• 71% of the global population (5.2 billion people) used a **safely managed** drinking water service; that is, one located on premises, available when Needed and free from contamination. • Eight out of ten people (5.8 billion) used improved sources with **water available when needed**. • Three quarters of the global population (5.4 billion) used improved sources **located on premises**. • Three out of four people (5.4 billion) used improved sources **free from contamination**. • 844 million people still lacked even a **basic** drinking water service. • 263 million people spent over 30 min per round trip to collect water from an improved source (a **limited** drinking water service). • 159 million people still collected drinking water directly from **surface water** sources, 58% lived in sub-Saharan Africa.	• 39% of the global population (2.9 billion people) used a **safely managed** sanitation service; that is, excreta safely disposed of in situ or treated off-site. • 27% of the global population (1.9 billion people) used private sanitation facilities connected to sewers from which **wastewater was treated**. • 13% of the global population (0.9 billion people) used toilets or latrines where excreta were **disposed of in situ**. • Available data were insufficient to make a global estimate of the proportion of population using septic tanks and latrines From which excreta are **emptied and treated off-site**. • 2.3 billion people still lacked even a **basic** sanitation service. • 600 million people used a **limited s**anitation service. • 892 million people worldwide still practised **open defecation**.	• 70 countries had comparable data available on handwashing with soap and water, representing 30% of the global population. • Coverage of **basic handwashing** facilities with soap and water varied from 15% in sub-Saharan Africa to 76% in Western Asia and northern Africa, but data are currently insufficient to produce a global estimate, or estimates for other SDG regions. • Iin least developed countries, 27 per cent of the population had basic handwashing facilities with soap and water, while 26% had handwashing facilities lacking soap or water. The remaining 47% had no facility. • In sub-Saharan Africa, three out of five people with basic handwashing facilities (89 million people) lived in urban areas. • Many high-income countries lacked sufficient data to estimate the population with basic handwashing facilities

Source: WHO/UNICEF (2017, p. 66)

water scarcity, and substantially reduce the number of people suffering from water scarcity.

- 6.5 implement integrated water resource management at all levels, including through transboundary cooperation as appropriate.
- 6.6 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes (United Nations 2016).

Water–Sanitation–Hygiene (WASH) was critical for the realisation of the 2030 SDGs (UN-Water 2016). The SDGs were interlinked and mutually reinforcing, and access to water and sanitation was integral to the realisation of several other goals:

> Examples of synergies include increasing access to water supply, sanitation and hygiene (WASH) [6.1, 6.2] in homes, healthcare facilities, schools, and workplaces, complemented by wastewater treatment [6.3], as a way to reduce risk of water-borne disease [3.1–3.3, 3.9] and malnutrition [2.2]; support education [4.1–4.5] and a productive workforce [8.5, 8.8]; and address poverty [1.1, 1.2, 1.4], gender inequality [5.1, 5.2, 5.4, 5.5] and other inequality [10.1–10.3] (UN-Water 2016, p. 6).

Several systemic challenges impeded developing countries in their progress towards achieving their MDG targets and are likely to remain an obstacle in realising the SDGs as well. A key concern was the insufficient investment in water and sanitation programmes (Herrera 2019).

Water cannot be substituted, it is at the forefront of sustainable development and a key factor for socio-economic development and food production. The unavailability of water impacts negatively on personal and sanitation hygiene practices. The absence of water for hand washing promotes ill health. In 2016, a survey of 36

Table 24.4 SDG 6 Global goals, targets and indicators for drinking water, sanitation and hygiene

Wash sector goal	SDG global target	SDG global indicator
Ending open defecation	6.2 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	6.2.1 population practising open defecation
Achieving universal access to basic services	6.4 By 2030, ensure all men and women, in particular the poor and vulnerable, have equal rights to economic resources, as well as access to basic services	6.4.1 population living in households with access to basic services (including basic drinking water, sanitation and hygiene)
Progress towards safely managed services	6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all 6.2 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	6.1.1 Population using safely managed drinking water services 6.2.1 Population using safely managed sanitation services 6.2.1 Population with a basic handwashing facility with soap and water available on premises

Source: WHO/UNICEF (2017, p. 2)

African countries revealed that 45% of households did not have sufficient clean water, and 51% had to leave their accommodation to obtain water. One-third did not have access to piped water, and two-thirds did not have access to sewer systems (Walker 2016). According to report prepared by the United Cities and Local Governments (UCLG 2018, p. 76), "844 million people around the world still lack basic access to water services and 2.3 billion people lack access to sanitation…".

The absence of adequate sanitation contributes to contamination and the rise in water-borne diseases, which inevitably impact negatively on the economy. The importance of clean water and adequate sanitation on productivity cannot be overemphasised for every dollar spent on the provision of adequate water and sanitation, nine dollars' worth of productive activity is yielded (Tissington 2011). The impact of inadequate water and sanitation services burdens the economy through low productivity exacerbated by absenteeism and a sickly workforce that are living under unhygienic and diseased conditions (Ramachandraiah 2001). The final section of this chapter assesses strategies to improve sanitation (Table 24.4).

24.6 Strategies to Improve Sanitation

Sanitation is about people. The need for dignity is inherent in all human beings. According to Mwebaza (2010: 10) there are four important factors to consider when providing basic sanitation:

> …accessibility on a sustainable basis; the ability to meet the basic human needs of safety, hygiene, and convenience; a service provision for both excreta and sullage disposal; and culmination in a clean and healthy living environment.

Furthermore, in 2018, the WHO proposed new guidelines on sanitation and health which can be summarised as follows: firstly, sanitation interventions should ensure entire communities which have access to toilets that safely contain excreta; secondly, the full sanitation system should undergo local health risk assessments to protect individuals and communities from exposure to excreta–whether this be from unsafe toilets, leaking storage or inadequate treatment, thirdly, sanitation should be integrated into regular local government-led planning and service provision to avert the higher costs associated with retrofitting sanitation and to ensure sustainability,

fourthly, the health sector should invest more and play a coordinating role in sanitation planning to protect public health (WHO 2018, p. 1).

Improved sanitation facilities should prevent human contact with waste, make sure that methods of disposal are controlled and environmentally friendly, thus ensuring maximum protection of human health and well-being.

Successful sanitation interventions also hinge on the user's acceptability of inventions to better manage human waste. Any innovation which compromises human dignity is bound to fail. A substantial increase in national budget allocations to sanitation and enhanced political will amongst most local government institutions, together with the need for an overhaul in governance mechanisms, are critical for improving global access to sanitation by 2015 (Mwebaza 2010; McFarlane and Silver 2017). Improved governance through better coordination between national, regional, and local government and community levels will enhance the possibility of improving sanitation for the poor (Mwebaza 2010; Ako et al. 2010; Kennedy-Walker et al. 2015; McFarlane and Silver 2017). The following policy options will be assessed in this section: "supply driven" sanitation solutions; multi-stakeholder collaboration and partnerships for improved sanitation; recycling human waste and ecological sustainability; innovation and enterprise in sanitation provision; and alternative pro-poor sanitation solutions.

24.6.1 Government-Led Sanitation Solutions

Government-led or "supply-driven" sanitation projects have arguably had limited success amidst scarce resources, in meeting the varied and enormous demands for sanitation worldwide (De Albuquerque and Winkler 2010; Hueso and Bell 2013). During the International Sanitation Decade 1980–1990, India launched the subsidised Central Rural Sanitation Programme (CRSP) aimed at improving the lives of people and saving the dignity of women. However, almost two decades into implementation, neither funding aid nor good policy has enabled expeditious delivery or the expected success rate (Ganguly 2008).

Ganguly (2008) adds that despite technical assistance and advice from WHO, UNICEF, and the UNDP, the 6-year review of the CRSP revealed that cultural practices and perceptions have impacted on people's use of the facilities. It was apparent that user rejection was due to the lack of information and education about the use of the facility. Community participation was minimum or non-existent. The review confirmed that the subsidised supply-driven, top-down model managed and guided by government did not work (Ganguly 2008). Hence, improving access to sanitation is not merely a matter of improving the physical facilities, but also requires intensive community education and sensitisation (Reddy and Batchelor 2012). New approaches to sanitation provision generally have low or no subsidies, for several reasons, including: firstly, improvements in sanitation coverage typically stop once subsidy budgets run out, secondly, subsidies lead to inappropriate facility designs that are often too expensive, thirdly, subsidies are often not captured by the poor, who need sanitation most, fourthly, subsidies can potentially destroy a developing sanitation market by creating perverse incentives; and finally, households often do not use and maintain latrines that are heavily subsidised (Graham 2011, p. 23).

24.6.2 Multi-Stakeholder Collaboration and Partnerships for Improved Sanitation

Participatory approaches have emerged in response to the challenges associated with supply-driven strategies. The governance approach in the sanitation sector has been increasingly evolving to accommodate an array of stakeholders, including the private sector and community organisations, and is a shift the purely government-led intervention (Graham 2011; Van Vliet et al. 2011; Adams and Boateng 2018). The goal is to ensure that all stakeholders are con-

sulted and participate in all phases of sanitation projects to ensure that the needs and choices are taken seriously, and solutions are suitable to local environmental conditions (Graham 2011).

Partnerships between the private sector, non-governmental sector, communities, and the state are recommended for resource mobilisation and sustainable sanitation provision (Tukahirwa et al. 2010; Powell and Yurchenko 2020). Partnership networks are a conduit for scaling up of pro-poor sanitation as well as exploring effective options for sustainable systems (Asian Development Bank 2009a, b; Van Vliet et al. 2011). Tukahirwa et al. (2010, p. 12) observe the emergence of a "modernized mixture model", where various sectors work in tandem to meet pro-poor sanitation needs, but also note the limited success of a private sector market-led approach due to profit orientation.

A study by Tukahirwa et al. (2010) observed greater success when civic organisations drive sanitation programs. Emphasis should be placed on the need for districts and communities to participate in decision-making to resolve problems, and to reduce the cancer of corruption in the delivery of sanitation (Mwebaza 2010).

24.6.3 Recycling Human Waste and Ecological Sustainability

Access to improved sanitation has a positive impact on the environment, health, social and economic status of people in developing countries (Mara et al. 2010; Kumar et al. 2011; Saleem et al. 2019). In India, for example, poor sanitation systems, shoddy sludge management, and unhygienic sanitation practices have grave environmental impacts. Sewage effluence deposited in rivers and streams is the main source of water contamination (Ramachandraiah 2001). Only 30% of the wastewater is being treated, with the balance deposited into rivers, streams, and open fields, exacerbating the challenge of clean water provision, and the risk of disease from faecal contaminated water. Innovative human waste management could avert environmental and health impact on poor communities (Asian Development Bank 2009a, b).

In Bangladesh, the impact of climate change, with seasonal flooding in slum settlements, exposed communities to unhygienic swampy living conditions which was contaminated by untreated stagnant sewerage (Rahman and Rahman 2015. In these desperate conditions, communities resorted to "hanging toilets" which emptied into the drains and rivers which are main source of water for washing and drinking, thereby exacerbating the crisis of human health and environmental integrity (Münch et al. 2009).

The most common means of human waste disposal practised in Kiberia were the defecation in polythene bags which were subsequently flung into the open fields and, hence, dubbed "flying toilets" (Corburn and Karanja 2014). This was a primary method of excreta disposal, and more than 60% of people in Kiberia engaged in this practice, which posed immense environmental and human health risks, as plastic bags blocked drains promoting flooding and exposure to the contents caused disease and illness (Münch et al. 2009,p. 3).

There is significant potential for sustainable ecological practices for energy and nutrient production through the recycling of human waste. Biogas and nutrients for agricultural use could be derived from processing human waste (Asian Development Bank 2009a, b). However, common human habits are difficult to break. Introducing innovation, therefore, meant that users needed to embrace new technology and use them correctly to improve environmental integrity and their personal health. In the slums of Kenya and Bangladesh, the use of a biodegradable sanitation "peepoo" bag was piloted. The technology is simply a packet which allowed the user privacy, minimal contact with the faeces and safe disposal. This sanitation technology is a scientifically developed ammonia-based bag which reacts to urea, and, in turn, acts as a catalyst for destroying dangerous pathogens and decomposing the content for use as fertiliser (Münch et al. 2009).

According to Factura et al. (2010), scientific methods of converting faecal matter into biowaste for agricultural use could also solve societal food security and faecal management challenges. Their studies have shown that faecal

waste may be converted to highly fertile material hygienically and sustainably.

The application of anaerobic vermi-composting and lacto-fermentation through the "tera petra sanitation" solution yields an odourless product suitable for urban agriculture. This application was tested in Brazil and shown to be ideal in areas where upgrades of pit latrines, urine diversion, and even bucket toilets are utilised. Factura et al. (2010) stressed that the success of the on-site application, however, depends on effective participatory planning, well-guided fermentation of the product, and effectively organised professional operations and maintenance for optimal, hygienic, and pollution free recycling of faecal matter.

24.6.4 Innovation and Enterprise in Sanitation Provision

In some developing countries, the market-driven model proved to be "demand responsive", yielding greater success and customer satisfaction. In certain countries, even the poor preferred a market-driven approach which gives them options with the choice of facilities they could access (De Albuquerque and Winkler 2010).

A study conducted in ten African countries by the UNDP-World Bank Water and Sanitation Programme between 1998 and 1999 recorded that peri-urban sanitation systems in African cities did not have bulk water-borne infrastructure. Sanitation services were unregulated and informal, with reliance on public toilets as the only facility in certain areas. Being outside the mandate of government, the cleaning of latrine systems was largely done by small-scale entrepreneurs who also worked in an unregulated and untaxed informal sector, which employed up to 90% of the urban workers. These entrepreneurs worked in a highly competitive market as their services were unsubsidised and customer satisfaction was the only criterion to keep them in business. They were independent and were therefore able to innovate around the type of service and facility they supported and maintained (Baskovich 2008, p. 2).

A study on sanitation entrepreneurship in rural Indonesia concluded that "insufficient customer demand, inadequate capacity building opportunities, lack of financing options for entrepreneurs and their customers, and limited government support" undermined the success of sanitation enterprises (Murta et al. 2018, p. 343).

Solo (1999) also noted success with the small-scale entrepreneurship and NGO driven services segment, which he coined the "other" sector, in sanitation provision. The "other" sector initiatives introduced a paradigm shift in countries like India, China, Tanzania, and Brazil, in providing services for the poor, including sanitation. Its proven success lies in its ability to "produce appropriate models and fill every circumstance and need" (Solo 1999, p. 121). Such models evolved to suit user needs. They have become a preferred choice of service providers due to their good customer relations and service quality, their ability to respond and grow with the demands, their capacity to reach the poor with flexibility in choice of technology and pricing of services. Scholars have iterated that the flexible and affordable sanitation solutions yield greatest satisfaction through improved services (Solo 1999; Reddy and Batchelor 2012). These strategies were subsequently incorporated in alternate pro-poor policies.

24.6.5 Alternative Pro-Poor Sanitation Solution (APSS)

The Alternative Pro-Poor Sanitation Solutions (APPS) approach views the poor as "customers" rather than "beneficiaries" waiting for government to deliver. This was a pilot project in Peru which offered a market-related solution for poor communities, with opportunities for the poor to enter the informal sector market through private sector driven sanitation solutions. The pilot study was mindful of the objectives of social inclusion, equality, and solidarity which have a bearing on societal behaviour and practices (Baskovich 2008).

The APSS integrated market-related, partnership-driven model introduced behaviour

Fig. 24.2 APPS Integrated Market-Related Partnership-Driven Model. Source: Adapted from Baskovich (2008, p. 4)

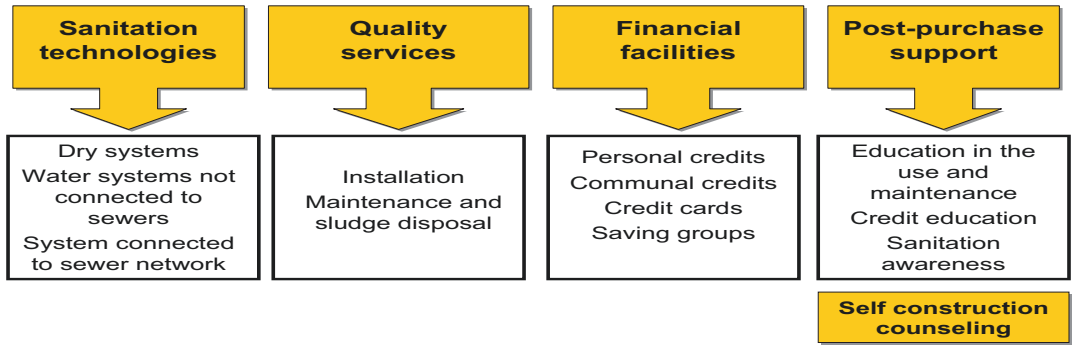

Fig. 24.3 Integrated Sanitation Package. Source: Adapted from Baskovich (2008, p. 8)

change in local communities seeking a local response to a local problem. Figure 24.2 illustrates the processes in introducing and marketing the APSS market approach. Communication, social marketing, promoting behavioural change, and the offer of financing options encouraged poor communities to see business initiatives in sanitation provision. It was viewed as an opportunity to improve their living standards, well-being, and environmental conditions, and restoring a sense of dignity. Sanitation options gave users a choice of a desired affordable system through an integrated sanitation package illustrated in Fig. 24.3.

Several lessons emerged from the adoption of the APSS model, and these included: firstly, commitment to activities of lower income groups or smaller enterprises increased through engagement in the larger economy; secondly, larger private sector companies increased their interests in social corporate responsibility; thirdly, the initiative shed new perspectives on restoring macroeconomic stability, peace, and democracy in Peru (Baskovich 2008).

The APSS model offers a new approach for market-related provision and increased choice for "customers" providing an opportunity for growing a business-like mindset for the sanitation market. However, these come with a series of challenges, namely:

1. Meeting people's demands require on-going innovation at low cost.
2. Endorsing behavioural change as a medium to long term task requiring financial support.

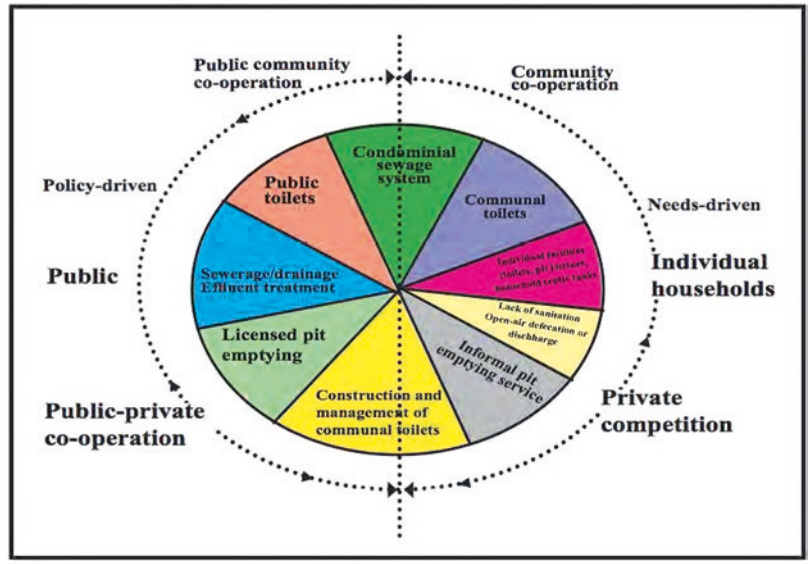

Fig. 24.4 The "Sanitation Wheel". Source: Adapted from Allen et al. (2006: 14)

3. Sustained private sector involvement required optimal public sector support regarding regulation and promotion of market-related services.
4. Impact of international financial sector on the micro-financiers.
5. A recommended government subsidised model does not augur well for the sanitation market and could disintegrate the APSS purpose of market-related sanitation provision.
6. The market-related APSS approach calls for a change in paradigm, roles, and functions of the different actors in sanitation governance (Baskovich 2008, p. 8).

The APSS market approach focused on quality, sustainable sanitation services. It responded to people's expectations, creating a sense of social inclusion and satisfaction, and promising improved basic services for the poor. The private sector engagement also provided an opportunity for skills transfers and knowledge building in local communities and emerging entrepreneurs, with emphasis on customer satisfaction. Improved product quality, branding and marketing, including research on innovation and environmental sustainability, were brought to the fore when local communities engaged as partners.

According to Michelutti (2008) community-driven projects are aimed at empowering local communities, while delivering water and sanitation projects. In Tanzania, for example, the success of such projects was dependent on the communities' ability to develop efficient projects together with an effective governance plan. Most often, community freedom in prioritising project intervention focused largely on water and neglected the need for proper sanitation. The institutional systems in sanitation (and water) governance in Tanzania operate within a formal, informal, and intermediate mechanism, as follows: (1) The Formal Sector comprises the policymakers, regulator, and private companies hired by the services authority to provide the services to all areas, including the informal settlements. Co-operative organisations formed partnerships with the formal sector and provided support with local intervention in terms of finance and consultation of local actors; (2) The Informal System served as a means for service acquisition by low-income settlements that are not reached by formal means of distribution; (3) The Intermediate System refers to the negotiators or facilitators between the formal and informal systems. They may be legal or illegal actors. They may include the NGO sector (Michelutti 2008, pp. 1–3).

The case of Dar es Salam presented conditions which by analogy, resonate with Sub-Saharan cities. Numerous systems and different blurred roles assumed by actors in the provision of sanitation contributed to the institutional fragmentation. Informal systems provided services in areas where formal distribution was not available. An increasing number of diverse actors from the non-governmental sector begin to work with local authorities as partners, advancing a more networked and complicated system with less control by the state (Michelutti 2008). In many ways, the fuzzy roles between formal and informal, private, and public sectors are accommodated in the "sanitation wheel" approach.

Allen et al. (2006, p. 3) developed "The Sanitation Wheel" which is a schematic representation of a strategy to incorporate public, private, and informal strategies to improve sanitation options for the poor (Fig. 24.4).

There are two sides of the wheel: "formal" on the left side, which represent the policy driven mechanisms and, the right side, represent the "informal", more localised strategies adopted by the poor for the provision of sanitation services. With both sides of the wheel working in tandem, an active spectrum of stakeholders from government, NGOs, private sector, and communities themselves can jointly develop strategies and implement them as a multi-sectoral co-operative solution to urban and peri-urban contexts. This multi-agent co-production proved to be effective in changing community perceptions and response to sanitation solutions in cities like Caracas, Mumbai, and Tiruchirappalli (Allen et al. 2006). There are flexible delivery systems with appropriate standards.

24.7 Conclusion

There is a global challenge to meet the basic needs of an increasing population due to rapid urbanisation, insufficient infrastructure, and inability of the local government structures to upscale and sustain innovative community-driven sanitation solutions. Inadequate sanitation facilities impact most on vulnerable groups, especially women and children. This chapter reviewed the endemic sanitation challenges in the developing countries. It also assessed the global benchmark towards poverty alleviation and improved sanitation conditions as was set out in the MDGs and SDGs. In both approaches access to sanitation was one of the key indicators of an improved and dignified quality of life, and was inextricably linked for the realisation of most of the goals and targets.

While there is evidence of some progress, a major problem is the lack of access to sanitation coupled with ineffective physical infrastructure provided by governments. Numerous strategies to deliver sanitation to the poorest communities prove ineffective without an integrated multi-stakeholder governance approach to sanitation. Innovation regarding sanitation technology bears no fruit if too much emphasis is placed on infrastructural issues, neglecting the softer issues of education, social acceptability, and behaviour change.

There are also problems in sanitation governance. Supply side challenges include institutional incapacity, shortage of resources, lack of political will, and tokenistic participatory governance in the sanitation sector. The chapter also underscored the economic potential of sanitation for poor communities through entrepreneurial initiatives regarding human waste management. It also illustrated that poor waste management could be mitigated through innovative recycling of human waste.

Any attempt to resolve the sanitation challenges must adopt a multi-stakeholder, inclusive approach, comprising local government, communities, and small enterprises sector. Amidst abject poverty, communities are more concerned about survival than practicing hygienic living. There is an opportunity for NGOs, CBOs, and training institutions to jointly engage in educating peri-urban and rural communities about dignified sanitation practices and health care. The collaboration of all stakeholders is pivotal in addressing the sanitation challenge worldwide. Working collectively, local government, communities, and the private sector are key to providing sustainable sanitation solutions.

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