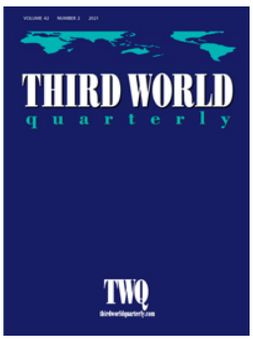

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Sustainable sanitation jobs: prospects for enhancing the livelihoods of pit-emptiers in Bangladesh

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ABSTRACT

Manual pit-emptying – the removal of faecal sludge from pits and tanks using hands or basic tools – is a widespread practice in Bangladesh, and in other low- and middle-income countries. Despite this, little is known about the livelihoods of pit-emptiers. This paper analyses data from six cases of pit-emptying in three cities in Bangladesh, across three different operational modes: private cooperatives, government employees and self-employed workers. These cases describe the experiences of emptiers from diverse socio-economic, religious and ethnic backgrounds, operating across a formal–informal spectrum. We find that government employees and self-employed groups are deprived of basic rights, fear a loss of income brought about by mechanisation and cannot access alternative livelihoods. While the status of emptiers in private cooperatives has improved recently due to the support of governmental oranisations (GOs) and non-governmental organisations (NGOs), the extent to which these cooperatives are sustainable, without the ongoing support of NGOs or GOs, remains unclear. In all modes, sustainable livelihoods are hindered by deep-rooted social and financial barriers. Organisations can support pit-emptiers by designing sanitation interventions that prioritise the human right to decent work, focussing not only on the beneficiaries of universal sanitation, but also on those who work to implement this ambitious goal.

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Introduction

Over 82% of the global population has access to a latrine or toilet that meets the World Health Organization/United Nations International Children's Emergency Fund (WHO/UNICEF) definition of a 'basic' sanitation system (WHO/UNICEF 2019). The facility prevents any contact by users with their own urine, faeces or menstrual fluid. In many cases where this waste is not immediately transported to a sewer network or buried for an extended period of time, there is one group of individuals, particularly in low- and middle-income countries (LMICs), who are highly likely to come into contact with it: namely, pit-emptiers.

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In Bangladesh, over 99% of the population has access to some form of latrine or toilet (WHO/UNICEF 2019). The country has essentially eradicated open defaecation. But this positive achievement means that the country, along with many other LMICs, is now facing a significant 'secondary' challenge – unsafe storage of faecal sludge (FS) in latrines or toilets, and its unsafe removal and transportation to treatment or final disposal. This results in widespread hazards to public health, but for pit-emptiers it also represents the continuous violation of their human rights.

Despite rapid increases in the number of people with access to basic sanitation, there has been little work focussing on the lives and livelihoods of those who work with the raw excreta of others. This exploratory study focuses on Bangladesh, explaining the global and national context of pit-emptying as a livelihood. It uses six case studies, across three operational modes – private cooperatives, government employees and self-employed workers – to illustrate the livelihoods of pit-emptiers and identify ways in which they could be improved. In the next section, the global relevance of pit-emptying is examined. The methodology of the study is set out in the third section, while the results and discussion are presented in the fourth section. The fifth section summarises the main findings, policy implications and recommendations for future research.

The realities of pit-emptying in the sanitation value chain

The sanitation value chain (SVC) is a way of understanding the flow of excreta through sanitation systems from containment, emptying and transportation to treatment, reuse or disposal. The containment step of a sanitation system can either be provided on-site (eg pit latrines and toilets connected to septic tanks) or off-site (eg water closets connected to sewers). In Bangladesh, 92.7% of the population use on-site containment methods such as pit latrines (WHO/UNICEF 2017). Pit latrines are often designed so that the sludge in the pit can be left for months/years to allow for *in situ* biological treatment. Where this is not possible, the pit requires regular emptying. In dense urban areas, such as the cities of Bangladesh, there is a prevalence of single-pit latrines, sealed tanks and so-called 'septic tanks' (although many may not function in the way septic tanks have been designed), which require regular emptying.

On-site sanitation systems can be emptied mechanically or manually. Mechanical emptying may rely on human power or fossil fuels (Tilley et al. 2014). Human-powered mechanical emptying is normally performed using a hand or foot-operated pump, such as a gulper. Most mechanical emptying uses a single device or vehicle to collect and transport the FS from the pit latrine or septic tank to treatment or disposal, such as a vacuum tanker (IWA 2014). By contrast, manual emptying, which can use long-handled implements or sometimes requires the operator to enter the pit, results in FS being transferred using a bucket or other receptacle into a wheeled transport device of some kind prior to being transported for treatment or open dumping (IWA 2014).

Whilst the situation varies according to context, manual pit-emptying usually requires two to five emptiers (Nkansah, Fisher and Khan 2012; Eales 2005). It begins with the removal or destruction of the superstructure of the latrine. Water may be poured in to loosen condensed sludge and ease the process; some emptiers also pour kerosene to cover the putrid smell of sludge. Emptiers then enter the pit or septic tank and fill a bucket, and then other

emptiers lift the bucket with a rope and empty it into a drum (Eales 2005). In many countries where pit-emptying is common, including Bangladesh, India, Pakistan, Kenya, Ghana, Uganda, Burkina Faso, Senegal, South Africa and Haiti, it is a regular practice to work at night and consume alcohol to cope with the challenging nature of the work (World Bank 2019; Stevens et al. 2015; Nkansah, Fisher and Khan 2012; Eales 2005).

The wearing of personal protective equipment (PPE) is uncommon among manual pit-emptiers due to it being unaffordable and/or uncomfortable (unsuited to the task or climate), and/or because emptiers are unaware of its benefits (Nkansah, Fisher and Khan 2012). Thus, manual emptiers often come into direct contact with human faeces, as well as other items commonly found in latrine pits, including sanitary products, sharp objects and other solid waste. This leads to injury and illness; infections due to cuts and abrasions; and excreta-related parasitic and vector-borne infections, skin disorders and respiratory diseases. Khurana and Ojha (2009) reported emptiers in India suffer from tuberculosis, typhoid, malaria, vision and hearing impairment and, in some cases, death as a result of exposure to toxic fumes and heat. In July 2018 in Tongi district, Bangladesh, three pit-emptiers died inside a septic tank due to noxious gases (Akand 2018). Similarly, in June 2019, seven pit-emptiers died in Gujarat, India, while cleaning hotel drains, due to suffocation from toxic fumes (Gupta 2019).

In addition to health risks, manual pit-emptiers face severe social discrimination and financial insecurity. Many emptiers come from marginalised, low-income and low-caste or tribal backgrounds with an 'ascribed' occupation and little education. They may face harassment (from police and local residents) when carrying out their work, and stigma and discrimination in the wider community (World Bank 2019; Nkansah, Fisher and Khan 2012; Eales 2005). For example, in Kibera, Kenya, local residents beat or spit on emptiers since they are working illegally and their role is extremely socially stigmatised (Eales 2005). In India, activists refer to this work as a form of 'caste-based slavery' that must be eradicated, but is largely unseen and unheard by politicians, planners and wider society (Prasad and Ray 2019; Khurana and Ojha 2009).

Although manual pit-emptying is often seen as 'the dark underbelly of on-site sanitation' (Eales 2005), many people rely on the limited income from the work to support their family, and have few alternative and viable livelihood options. However, wages from pit-emptying are often very low and irregular. Wages can also be driven down by the high competition for work and the need for groups of workers to collaborate, meaning that any income must be shared among several workers (Nkansah, Fisher and Khan 2012). It is also driven by uncertain and variable costs of leasing/buying equipment (eg shovel, buckets, carts, alcohol and cigarettes; Consiglieri 2017; Eales 2005), and considerable financial burdens such as high health care expenditure (pit-emptiers have neither health insurance nor compensation for days lost due to illness; World Bank 2019; Nkansah, Fisher and Khan 2012). Other expenses depend on context. For example, in Kibera, Kenya, the emptiers pay to dump the waste and to use a public shower after finishing their tasks. The shower operator reportedly inflates the costs of showering, knowing that operators have often been in contact with faeces and will therefore have a high demand for washing facilities (Eales 2005).

Manual emptying is illegal in many countries, including India, Kenya, Ghana and Bangladesh (Nkansah, Fisher and Khan 2012; Khurana and Ojha 2009; Eales 2005). Despite this, many governments condone it and turn a blind eye, or give the pit-emptiers a vague title (eg 'cleaning workers') that does not imply they empty FS from pits, protecting the

government legally, even though this may be a core part of the work. This results in a persistent dilemma for pit-emptiers. They risk persecution by the government, but the work is their main or only form of livelihood. Often the same government relies on their services, especially in areas (both rural and urban) where mechanical solutions, such as trucks, may not be financially viable. Their illegal status is also a growth barrier; potential financiers do not provide loans or funds for emptiers due to the perceived risks (van der Wel et al. 2010).

Many pit-emptiers therefore sit in a legal 'limbo', across a formal–informal spectrum. According to the International Labour Organization (ILO), a person is considered an 'informal' worker if his/her work arrangements are 'in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.)' (ILO 2018). Even where pit-emptying is 'legal' it might be considered informal, as the overall outcomes may still fail to meet the minimum 'decent' standards, including dignity, equality, fair income and a safe work environment (ILO 2019). Due to its hazardous nature, manual emptying is currently not compatible with Sustainable Development Goal (SDG) 8, specifically goals 8.3, 8.5 and 8.8, which advocate for decent work, encourage formalisation and aspire to protect labour rights for all (United Nations 2019).

Manual pit-emptying in Bangladesh

According to Opel and Bashar (2013), in Bangladesh manual emptying is more financially and technically viable than mechanical emptying. Dhaka is the only LMIC capital city where manual emptying is known to be more prevalent than mechanical emptying (Chowdhry and Kone 2012). Manual pit-emptying was declared 'illegal' by the Government of Bangladesh in the 1980s as a step to end it permanently (Parkinson and Quader 2008), but it remains a widespread practice. In Bangladesh, and across South Asia, pit-emptying work and solid waste management – often known as 'sweeping' – has historically been occupied by low-caste Hindu communities, related to entrenched socio-political structures and religious teachings (Sultana and Subedi 2016; Chowdhury 2009).

Three hundred years ago, during the British colonial period in East Bengal (now Bangladesh), the ruling class brought low-caste, impoverished Hindus from India, including Uttar Pradesh, Bihar and Andra Pradesh, to Dhaka to become 'sweepers', cleaning public places (including Railways) and emptying latrines. Since then, it has become the designated role and only livelihood option for subsequent generations (Hossain 2013). An estimated five million sweepers reside in Bangladesh (Hossain 2013). 'Sweeper' colonies (segregated low-income settlements with limited access to basic services and partial or non-existent land tenure and housing security) have persisted and become part of the social fabric of the country. These colonies include mostly Hindu but also Muslim and (converted) Christian emptiers. Mahatma Gandhi named the Hindu emptiers 'the sons of God' to challenge their status as 'untouchables' (in Hindi, 'Harijan'). Despite the negative connotation of these names, many low-caste Hindu pit-emptiers in Bangladesh continue to self-define and identify themselves as Harijan (rather than 'Dalit') to this day.

Although the caste system is not strongly enforced in Bangladesh compared to neighbouring countries, emptiers face ongoing prejudice and discrimination when entering public spaces and when seeking alternative livelihoods (eg running small businesses), due to their social status (Chowdhury 2011). In the last 30 years, other socio-economic and religious

groups have also become pit-emptiers as equipment and business opportunities have improved (ie via the introduction of gulpers and trucks). Hossain (2013) argues that Hindu sweepers are losing their primary source of income to Muslim sweepers, as local people seem to prefer to hire them. In addition, those from low-caste Hindu backgrounds are not able or qualified to undertake other forms of income generation, so are increasingly losing their livelihoods.

Despite the historical and continuous role that pit-emptiers play in managing sanitation infrastructure and services in Bangladesh, the experiences of emptiers have only recently gained attention in government policy and programmes. Decentralisation and a growing move towards private provision of services mean that numerous government, private and non-governmental institutions are now involved in the provision, financing, design, implementation and regulation of urban sanitation (World Bank 2018). In urban areas, the proliferation of institutions operating in the sanitation sector has led to ambiguous governance arrangements, and fragmented or absent management of local sanitation services. To address this ambiguity, the Ministry of Local Government (MLG) formed the Institutional and Regulatory Framework for Faecal Sludge Management (IRF-FSM) in 2017, to clarify roles and responsibilities (MLG 2017). Similar to the 2009 Environmental Act, the IRF-FSM highlighted the responsibility of city corporations and municipalities to protect the safety of 'sanitation workers' or 'cleaning workers', including a broad remit of workers involved in solid waste management, road sweeping, toilet cleaning and pit-emptying. In addition, non-governmental organisations (NGOs) are increasingly entering the sector, with initiatives to support and rehabilitate manual pit-emptiers in Bangladesh.

In 2015, the NGO Practical Action (PA) developed a public–private partnership (PPP) between two self-employed (informal) pit-emptying groups and Faridpur municipality, to provide affordable FSM services. The intervention included capacity building and technical support for the groups to help them run their newly registered cooperatives (de La Brosse, Stevens and Islam 2017). The municipality formed a multi-stakeholder steering committee to monitor the groups' performance and ensure they were providing satisfactory services. They also provided each group with one vacuum tanker truck (for mechanical emptying) through an ongoing lease agreement. Stevens et al. (2015, 5) note that the PPP would formalise the emptiers' work 'only to the extent that it will help both them and the municipality deliver a better service'. The main aim of the project was to ensure safe and efficient sanitation service provision for customers.

In 2016, the FSM Network in Bangladesh hosted an FSM Convention in Dhaka. This included a day dedicated to promoting better working conditions for pit-emptiers. One hundred emptiers from across Bangladesh shared their experiences, including the challenges of their profession and their vision for improvements (WSUP 2016). The participants were from small-scale and large businesses. The convention raised the pit-emptiers' challenges in line with the ILO criteria for decent work: dignity, equality, fair income and safe working conditions (The Daily Star 2016). More advocacy work was then done independently by the participating organisations. For example, the NGO SNV Bangladesh published a report titled *City Cleaners: Stories of Those Left Behind* (Karim 2017) and produced an Occupational Health and Safety (OHS) manual for pit-emptiers (Chowdhury, Faruq, and Mamtaz 2015). These and other efforts to promote the health, safety and dignity of sanitation workers have been recognised in the first global report on sanitation workers from the World Bank, World Health Organization, WaterAid and ILO (World Bank, 2019).

These initiatives are a promising start to shift to a more reliable and safer pit-emptying service in Bangladesh. However, to date, there is limited evidence of a system-wide approach to improving FSM that takes into account long-term impacts on the livelihoods and well-being of emptiers. Efforts to support emptiers have so far focussed primarily on short-term income generation or financial effects. Of particular concern is that little or no effort has been made to assess the impact of changes to project and programme designs on the sustainability of livelihoods in the sector. Other concerns include the likely fate of new organisations (such as cooperatives) if support from external organisations like NGOs is withdrawn. There is little evidence of proposed new arrangements, such as the Faridpur PPP, becoming embedded in the long-term plans for FSM at the local level, and no information to suggest that they are independently financially viable. The impact of such interventions, or absence of interventions, on the lives and livelihoods of pit-emptiers, their families and communities is a further critical information gap. One source of information would be longitudinal tracking of livelihood effects over time. To support this process, this study examined six cases of pit-emptying in Bangladesh, covering three different operational modes. The following section outlines the methodological approach, cases and modes in greater detail.

Methodology

Data collection

This research was designed to investigate the current livelihood conditions of pit-emptiers in Bangladesh. In order to understand this it was necessary to examine in detail the characteristics of the workers, the context within which they operate and their interactions and relationships with relevant NGOs and governmental organisations (GOs). Secondary data was collected from the academic and policy literature to establish the current sanitation status and institutional context in Bangladesh. This included the 2017 IRF-FSM, as well as numerous news articles and NGO reports. The secondary data informed the development of primary data collection objectives and tools, as it shed light on different pit-emptying modes and important aspects of the pit-emptiers' lives.

Primary data collection took place in Dhaka, Faridpur and Khulna, Bangladesh, in June–July 2018. Pit-emptiers, all of whom were male, due to the dominance of men in the work, and the NGO and GO staff who collaborate closely with emptiers were recruited purposively by the research team to represent the various institutional and technical arrangements of pit-emptying in Bangladesh. Manual and former manual (now mechanical) pit-emptying groups and individuals operating across the formal–informal spectrum were selected, to ensure representation of various types of pit-emptying services in the three cities. Due to time restrictions, the study focussed on the recruitment of a saturation sample of pit-emptying services. A snowball sampling technique and NGO gatekeepers were used to recruit pit-emptiers. To address any potential bias (brought about by the presence of gatekeepers), the research team triangulated the primary and secondary data to crosscheck information.

Semi-structured interviews (SSIs) and focus group discussions (FGDs) were used to allow the interviewer to probe new themes, study the topic in greater depth (based on the participants' responses) and create rapport and dialogue with the participants. Using the same set of questions in the SSIs and FGDs (see the online appendix) enabled the identification of emerging patterns and trends (Edwards and Holland 2013). A total of eight FGDs (two

with NGO professionals, one with GO professionals and five with pit-emptiers) were conducted, with 3–10 participants in each session. In addition, 13 SSIs (one with a pit-emptier, 10 with NGO professionals and three with GO professionals), were conducted. Informal conversations and field observations were noted and included in the analysis. The first author and a research assistant collected the data using a digital recorder. Data was later translated and transcribed for analysis.

Data analysis

To better understand the lived experiences and sustainability of pit-emptiers' livelihoods in Bangladesh, the primary and secondary data was deductively coded to the themes of vulnerability, livelihood assets, enabling environment, livelihood strategies and outcomes, adapted as a 'codebook' from the Sustainable Livelihoods Approach (SLA) (Table 1) (DFID 2001). Whilst we acknowledge the limitations of the SLA, particularly in relation to neglect of socio-economic, historical and political factors that affect livelihoods (Mdee 2002; Baumann and Sinha 2001), our aim is not to re-invent the SLA, but rather to shed light on the lives and livelihoods of pit-emptiers, to fill this crucial knowledge gap. We therefore use the codebook as an analytical tool to identify key differences and similarities between and within the different modes of pit-emptying. We also highlight, in our analysis, how significant social, financial and political factors are in shaping livelihoods for pit-emptiers in Bangladesh.

Ethics

Ethical approval (MEEC 17-025) was obtained from the Maths and Physical Sciences and Engineering Faculty Research Ethics Committee at University of Leeds, UK. Prior to each SSI or FGD the research team provided participants with an information sheet, clearly explained the research to the participants and obtained their verbal or written consent.

Results and discussion

The study identified six cases of pit-emptying across the three cities, where a case is defined as 'a detailed account of the development of a particular person, group, or situation that has

Table 1. Codebook for data analysis (adapted from DFID 2001).

Theme	Description
Vulnerabilities	The extent to which individuals are subject to shocks, trends and seasonality that can increase their vulnerability, which lies outside of their control.
Livelihood assets	Human (eg health, skills and education), physical (eg conditions, tools and equipment), social (eg social capital and equity), financial (eg expenses, income, access to loans) and natural (eg access to natural resources) assets.
Enabling environment	The set of institutions, policies and legislation that mediate livelihoods, and are found at all organisational levels (eg households, and local and international organisations).
Livelihood strategies	The activities, plans and decisions through which individuals seek to achieve their livelihood goals, such as their income or well-being.
Livelihood outcomes	The results of the livelihood, related to, for example, income or well-being.

been studied over a period of time' (Longman 2009, 195). This section presents the six cases bundled under three operational modes – private cooperatives, government employees and self-employed groups. It explains the arrangements, success potentials and challenges of each mode. The section then presents the common cross-cutting trends that are crucial to address across the three modes.

Pit-emptying modes

Private cooperatives – Faridpur

The study investigated two private cooperatives: Cooperative (1), a group of 25 low-caste Hindus, who previously worked as self-employed individuals or in small groups, and Cooperative (2), a Muslim group with 33 founding members, who also work formally at the Faridpur Municipality. Both cooperatives provide mechanised services using vacuum tankers. According to cooperative members, this has eased the emptying process and raised work efficiency. As a member of Cooperative (1) noted, 'the pump does it all. When we worked manually we did not even have gloves. Now the municipality and PA gave us boots, gloves, goggles etc. so we don't get dirty. Also, when we wear the dress, the mask, our neighbours and friends don't recognise us! It does not really matter'.

Both cooperatives are formal private entities registered under the Cooperative Societies Act 2001, and have service-level arrangements with the municipality, with support from PA, as part of a PPP. In general, this structure allows for improved access to the market, mitigates social stigma and regulates pit-emptying activities as it makes the overall process of pit-emptying more organised through offering subsidised vacuum tanker lease, a customer assistance desk, task assessment, pricing and quality control (see also Table 2). The leader of Cooperative (2) highlighted that

> Sixteen years back. We did not know how to mingle with people. Now we can go anywhere. We have meetings with the councillor. Even before three years we were still very disorganised. None of us really knew each other. Then we got the chance to get training and go places.

There is also a designated dumping place in the form of a faecal sludge treatment plant.

However, the PPP arrangements do not include explicit enforcement of laws to protect the emptiers' right to receive pensions and health insurance; this remains a future priority for PA. At present, the municipality controls access to the main physical assets (vacuum tanker, market and client information). Both cooperatives are dependent on PA and the municipality to sustain their businesses, as they do not have the financial and human capital to own, manage and maintain the essential physical assets.

The livelihood outcomes for the two private cooperatives have improved since the formal arrangements were put in place, especially in terms of well-being and reduced vulnerability. Cooperative members can now participate in decision making and planning with the municipality and PA, and no longer perform the manual pit-emptying that negatively affected their health. During the FGDs, pit-emptiers highlighted how these improvements have boosted their self-esteem and gave a sense of inclusion. The cooperatives, as shown in Table 3, currently benefit from financial support since they lease the vacuum tankers at subsidised rates and receive other support, in the form of training and equipment, from PA. When this support is removed, the cooperatives may not be financially viable, due to the high costs of

Table 2. Vulnerability context. The shocks, trends and seasonality concerns affecting each case. PPE: personal protective equipment; O&M: operation and maintenance.

Case name	Shocks	Trends	Seasonality
Private cooperatives (mechanical)			
Cooperative (1) – Faridpur	Vulnerable to accidents as they work at night with heavy equipment. Risks of low productivity as their machine breaks down often.	The vacuum tanker has improved working conditions; however, it breaks down often. Formalisation has reduced social stigma but minimised their income level.	High vulnerability to diseases in cold weather. Poor demand during the dry season since the latrines and septic tanks do not fill up quickly.
Cooperative (2) – Faridpur	Vulnerable to accidents as they work at night with heavy equipment and do not always wear PPE.	The vacuum tanker has improved working conditions. Formalisation has reduced social stigma and raised income.	As above.
Government employees (manual)			
Standard – Dhaka	Vulnerable to diseases because of the working conditions.	Formalisation has minimised their income. Vulnerable to new legislation as they do not have official employment papers and do not receive benefits. Occasional use of vacuum tanks to ease emptying.	Stable monthly salary as they are standard workers. Vulnerable to diseases in cold weather.
On call – Dhaka	As above.	Formalisation has minimised their income. Vulnerable to new legislation as they do not have official employment papers and they do not receive benefits.	Less demand during the dry season and therefore poor salary. Vulnerable to diseases in cold weather.
Self-employed (manual)			
Self-employed – Dhaka	Frequent health problems because of the working conditions.	Limited opportunities as more Muslim emptiers have begun doing this job. Occasional use of vacuum tankers to ease emptying.	High vulnerability to diseases in cold weather. Poor demand during the dry season since the latrines and septic tanks do not fill up quickly.
Self-employed – Khulna	As above.	Unemployment as more Muslim emptiers and masons have begun offering the same service. Expensive vacuum tanker lease to meet the preference of the clients and the city corporation. Registered in the city corporation but this does not improve their livelihood.	As above.

Table 3. Livelihood assets of pit-emptiers in each of the six cases.

Case name	Human capital	Financial capital	Physical capital	Social capital
Private cooperatives (mechanical)				
Cooperative (1)	Work as a group. Received occupational health and safety training; technical training for the vacuum tanker; management and entrepreneurship training. They manage the cooperative appropriately with their partners.	Receive payments each trip (300 BDT = 3–4 USD). High O&M costs as the vacuum tanker breaks down often. Other expenses such as health treatment costs, days lost to illness and vacuum tanker failure.	Reside in designated colony for 'sweepers'. Improved access to public utilities and services after forming the cooperative. Access to information and clients from their partners, promotional campaigns for their services, vacuum tanker lease and PPE their partners. No office for their business.	More tolerance and acceptance from the community, but they do not want to be recognised as pit-emptiers due to stigma. Less favoured than the other cooperative; the municipality considers them disorganised and as having bad behaviour because they consume alcohol while working.
Cooperative (2)	As above.	Receive payments from the cooperative (300 BDT = 3–4 USD) per trip, in addition to monthly salary (around 6000 BDT = 70–71 USD) from the Municipality. High O&M costs for the vacuum tanker. Other expenses such as health treatment costs, days lost to illness and vacuum tanker failure.	Reside in designated colonies for 'sweepers'. Improved access to public utilities and services in the colony. Access to information and clients, PPE, vacuum tanker lease from their partners. Their partners hold promotional campaigns for their services. Rent an office for their business and have purchased land for investment.	The cooperative supports the members with loans and gifts. More tolerance and acceptance from society than historically, but hope that their children will pursue better jobs.
Government employees (manual)				
Standard	Poor health status. No capacity building or occupational safety and health training from the employer.	Receive monthly salary (20,000 BDT = 235 USD). Have 30% discount for pharmacy. Pay monthly workers' union fees (200 BDT = 2–3 USD). Other expenses such as health treatment costs.	Reside in a designated government housing colony for 'sweepers', poor access to public utilities. Access to free basic emptying tools, PPE, discounts on health services and occasional access to vacuum tankers.	Social stigma due to living place and occupation. The colony's pit-emptiers refer jobs and support each other financially. Work at night as they prefer to be discreet.
On call	Poor health status. No capacity building or occupational safety and health training from the employer. No access to health services.	Receive daily payments for working days only (300 BDT = 3–4 USD per trip). Pay monthly union fees (200 BDT = 2–3 USD). Other expenses such as health treatment costs and days lost to illness.	Reside in a designated government housing colony for 'sweepers', poor access to public utilities. Access to free basic emptying tools such as shovels. No access to mechanical emptying tools, PPE or health insurance	Live in designated housing colony for sweepers only and work at night due to social stigma. As most of the colony's inhabitants are pit-emptiers, they refer jobs and support each other financially when needed. Work at night to avoid harassment and being recognised by the public.

Table 3. (Continued)

Self-employed (manual)				
Self-employed – Dhaka	Work as a group. Poor health status. No training in occupational safety and health or management. Mistrust of the government and no access to information.	No access to loans and financial assets. Other expenses such as health treatment costs and days lost to illness.	Reside in slums with poor housing conditions and poor access to public utilities. Have signboard close to their colony to advertise their services, and a church for their own use. Access to basic emptying tools and PPE, and limited access to vacuum tankers.	Hired less frequently than the Muslim emptiers. Cannot access public places easily, cannot occupy other jobs, and work at night due to the social stigma.
Self-employed – Khulna	Work as a group. Poor health status. Received occupational safety and health training, technical, management and entrepreneurship training. Mistrust of the government and limited access to information.	No financial assets. Hesitant to apply for loans because of their terms and conditions. Vacuum tanker lease fees and PPE from the city corporation. Other expenses such as health treatment costs and days lost to illness.	Reside in a designated slum for 'sweepers', with poor housing conditions and poor access to public utilities. Access to basic emptying tools; limited access to vacuum tanker and to PPE. No office for their business and no marketing.	As above.

operation and maintenance. A similar scenario was documented in eThekwini Municipality, South Africa, where the municipality provided technical support to the pit-emptiers and subsidised their services to households. Eventually, however, the project required continuous funds and subsidies from the government, which was beyond the government's capacity, and thus it was not financially independent (Eales 2005). This research suggests that to sustain these outcomes when the support is removed, it is vital to put other viable financial arrangements in place – for instance, a targeted financial instrument provided by the municipality, in recognition of the valuable public service that the cooperatives provide.

Government employees – Dhaka

The study included two cases where manual emptying was being carried out by 'formal' government employees – in each case these are Muslims, and they are either on-call (temporary) or standard (permanent) 'sweepers' who provide manual pit-emptying in addition to solid waste collection, living in government housing colonies in Dhaka. The permanent emptiers have regular monthly working hours and salaries, while the on-call emptiers receive work tasks and payments from the government when they are needed (Table 3). Whilst the 2009 Environmental Act and 2017 IRF-FSM states that the city corporations and government utilities should protect pit-emptiers' safety while performing their job, which includes the provision of PPE (MLG 2017), this framework is not proactively implemented in either case. One government on-call emptier stated: 'there is no scheme to help us; so many workers died, we never saw anyone getting much help. And, if I work, I get paid. If I am absent, there is no pay'. This echoes Murungi and van Dijk's (2014) argument that the kind of support

provided by the public or the private sector might actually compromise the occupational health and safety of pit-emptiers in the push for affordable sanitation services.

Although the government employees are supposed to receive support from the city corporation, in reality this institution plays a hindering role for the emptiers, as they have to work for the government to keep their houses in the colonies, and did not necessarily choose the profession (Table 2). Both permanent and on-call emptiers are members of the government employees' union, but stated that it is a financial burden with few benefits in return. As one on-call worker highlighted,

> The union here takes 200 taka [2–3 USD] every month from each worker saying it will work as an insurance when we die. We do not really believe in them. There is no use complaining to them when we are facing any issues. We manage our problems by ourselves. They are getting all the money, but we are not getting anything. We are forced to pay. If you do not pay, you will lose your job.

The livelihood outcomes for the two cases of governmental employees are low wages, work in highly hazardous environments without any PPE, and limited benefits (comprising a discount on hospital bills). However, working conditions for the permanent emptiers are marginally better than for the on-call workers, as they have a guaranteed monthly income and partial health subsidies from the city corporation, and can negotiate their salaries through the government sweepers' union.

Self-employed groups – Dhaka and Khulna

Two 'informal' self-employed groups were also studied – one low-caste Hindu group and one Christian group – residing in segregated illegal settlements in Dhaka and Khulna. These groups offer manual pit-emptying (and, on rare occasions, mechanical services) to schools, hospitals, garment factories and households. The near-complete absence of supporting institutions (eg NGOs and GOs) and programmes (for capacity building, skills development, etc.) has led to minimal regulation of the work and thus further vulnerabilities, as shown in Table 2. For instance, the Dhaka group dumps sludge illegally in streets and does not belong to a formal committee or public office which could coordinate its activities. Since they are a minority community, members of the groups are also excluded from occupying other jobs, have limited access to the market and resources, and are unable to serve as governmental pit-emptiers, as the government only hires Muslim emptiers (NGO personnel, pers. comm.).

The two groups are unaware of their right to access public-sector services, and do not advocate for improvements to their livelihoods. Some group members also mistrust the government and other support organisations. As one member of the Dhaka group stated,

> the government doesn't help us anyway. They are trying to evict us. They are trying to destroy our properties. We are always paying so much for poor services. They are only taking money. We want to stay this way. We have our way of doing things.

The Khulna group had some short-term support from the city corporation and SNV Khulna, in the form of occupational health and safety training, provision of PPE and vacuum tanker rental. However, the group does not have the financial capacity to purchase or lease their own truck and, despite training, have very limited job opportunities in the mechanical emptying service run by the municipality (Table 3).

The livelihood outcomes for these groups are limited income (since they charge less for the service to compete with many others to get the job) and reduced well-being. A pit-emptier from Dhaka mentioned:

> this job runs in our blood and the Bengalis [Muslims] hated this job so it was just us. Now, we have so many competitions. Others do it for cheap like 500 taka [5–6 USD] for the whole day. So, we are bound to do it for cheaper. So we also do a job for 500 taka, which we used to do for around 1000 [10–11 USD] or more before.

The groups lack a sense of control and inclusion due to the restrictions by or negative involvement of the public sector either within their livelihood or regarding the poor-quality and expensive services provided to their residential settlements, which are in constant risk of eviction.

Cross-cutting trends

Despite the structural differences and variation in livelihood outcomes outlined above, the three modes were found to face common challenges to sustainable livelihoods and decent work. The following subsections highlight this by examining the challenges, assets and livelihoods alternatives for the three modes. This is also presented in Table 2, which explains the vulnerability context, and Table 3, which highlights the livelihood assets in each case.

Whilst the external and internal challenges vary according to the enabling environment (especially supporting institutions and organisational structures), emptiers in all modes reported challenges with health, finance, technology and concerns over long-term employment opportunities. For example, all emptiers perform their tasks at night due to social stigma and the clients' preference, contributing to poor physical conditions. All groups are susceptible to physical and emotional distress, such as harassment or injury, as mentioned in the manual emptying study carried out in Ghana (Nkansah, Fisher and Khan 2012).

The existing challenges also have a knock-on effect on assets (presented in Table 3) held by manual emptiers across all three operational modes. None of the individuals in the studied modes have health insurance, and many do not have regular access to PPE, which undermines human capital. While technology is a vital physical asset for the mechanical emptying groups, none of the service providers in this study own their own vacuum tankers. The leasehold options available in some cases may be valuable in lowering entry barriers, avoiding the need for large capital investment. However, the prevalence of leasing may contribute to low levels of investment in the machinery, and may also represent an onerous ongoing financial burden. All emptiers experience financial burdens, including the cost of purchasing and leasing tools and days lost due to absence, in addition to expensive health care costs for medicines and treatment following (frequent) accidents.

Despite limited human, financial and physical assets, social capital between the members of each emptying group was relatively high, and central to their livelihoods and broader well-being. For instance, one of the private cooperatives offers financial and moral support to its members for special occasions such as weddings, and the self-employed group in Dhaka has a savings account they use to cover its members' financial needs and fund small projects, such as building a church for the community. Nkansah, Fisher and Khan (2012) also

emphasise that emptiers in Ghana are well known to each other, they assist each other to find clients and share profit, and they also support each other in their social lives.

Beyond this, however, emptiers across the modes did not have many resources to generate more income and improve well-being in the long term. This is due to constraints (shown in Table 2) imposed by broader societal structures (such as social taboo, stigma and discrimination that negatively affects social capital) and financial insecurities (with limited access to loans and credit to start-up businesses or buy equipment) or by the NGO and GO institutions that regulate access to assets and information. Many individuals from the studied cases also tried to seek alternative livelihoods, but were unable to. For example, one pit-emptier in Khulna started a tea stall, but as he was associated with managing faecal matter, people boycotted his business. In addition, some members of Cooperative 1 wanted to set up an auto-rickshaw business, but were encouraged by PA, the municipality and cooperative leaders to continue primarily as mechanical emptiers. As mentioned above, governmental employees are bound to this work (due to their place of residence) and not permitted to occupy other income-generating activities during working hours. As one permanent governmental employee explained,

> we do not have time to work elsewhere. After completing work for the city corporation, we return home very late then we eat and get fresh, so we do not have much time to work elsewhere. Everyone expects the work to be done in the night, when we are not free.

There were some variations in the experiences of manual emptiers; these differences related to both institutional arrangements and religious affiliations. Whilst stigma related to pit-emptying has relatively decreased for members of the cooperatives, due to their involvement with the municipality, the multi-stakeholder committee and PA, social stigma was still widely reported by the self-employed groups and governmental employees, as it remains a caste-based profession. One member of the group in Khulna expressed their concerns, noting that 'some household owners do not even offer us water when we ask for it because we are full of dirt. When they pay the money, they put it on the ground, so they do not get in touch with us'. Chowdhury (2011) emphasises that pit-emptiers face a continuous struggle to feel included in society; they are not allowed to participate in social or religious activities, admit their children to public schools or use public places (eg restaurants, markets). All of the pit-emptiers reside in areas designated for them by the city corporation or municipality, with poor services and facilities, which is an act of spatial discrimination. Most of the pit-emptiers expressed their desire to change their profession because their families are not happy with it. As one member of Cooperative (2) explained,

> we hope for our children to work in different sectors. Not all of us are qualified for other jobs so we are staying here and we are happy but our children are not happy because of the kind of work we do. Our children are studying and doing better jobs than us and we want them to do jobs that we could not do.

As highlighted by Hossain (2013), the pit-emptying market has changed over the years in Bangladesh, with different socio-economic groups entering into the occupation, reducing job opportunities for low-caste 'Harijan' and (converted) Christian emptiers. This study supports these observations. Members of the self-employed group in Dhaka argued that they have lost many income-generating opportunities, as the city corporation directed clients towards, and preferred to recruit, their neighbouring Muslim 'sweepers'. One pit-emptier

from Dhaka noted: 'Bengalis [Muslims] take our jobs. Previously, we had many jobs. Now we have a lot of unemployed people'.

Similarly, this preference has created disparities between the two cooperatives, which originally had the same organisational structure. To illustrate, Cooperative (2), with majority Muslim members, registered earlier with the Department of Cooperatives and surpassed Cooperative (1) with majority low-caste Harijan Hindu members in access to physical assets (such as land ownership for future investments and a larger, more efficient vacuum tanker). Field observations suggest that these disparities are a result of the different levels of organisation and capacities between the two cooperatives before the intervention of PA, as well as after forming the cooperatives, in addition to the discrimination and/or ongoing bias from clients and within the municipality towards Cooperative (1), who are regarded as 'unruly and disorganised'. As one high-profile municipal employee stated:

> Cooperative (2) did not have any issues with the police, but Cooperative (1) did because they engaged in alcohol drinking activities after work, unlike the Muslims in Cooperative (2), and created public disorder, so the police had to get involved. We had to work a lot with Cooperative (1), for example, they did not want to open a bank account and the NGO had to convince them. But, now we have a good relationship with them.

Members of Cooperative (2) have better access to assets and markets than those of Cooperative (1), as the municipality allowed the cooperative to serve beyond its mandate (eg surrounding towns and the Rohingya refugee camps). Members of Cooperative (1) are hesitant to serve beyond work referred to them by the municipality. One member of Cooperative (1) explains, 'we do not work personally anymore because there are issues of dumping the waste with the municipality'. Also, Cooperative (2) argued that social stigma had decreased; their community, clients and partners treat them with respect, and their income had increased drastically; enabling them to rent an office, purchase land and offer loans to their members. In contrast, the income of members in Cooperative (1) has decreased, with the emptiers arguing that they earned more as manual pit-emptiers.

Analysis using the codebook (Table 1) ultimately reveals that the enabling environment has particular implications for the long-term sustainability and outcomes for pit-emptiers. Potential contributions of the enabling environment, resources and income alternatives are undermined by growth barriers, and deeply entrenched social and financial barriers (such as stigma, discrimination and dependency); these prevent pit-emptying – across the modes – from being a sustainable livelihood.

Conclusion

This paper outlined six cases of pit-emptying in Dhaka, Khulna and Faridpur, Bangladesh, across three operational modes – private cooperatives, government employees and self-employed groups. The enabling environment and livelihood outcomes were found to be the main factors that distinguished the three modes from each other. The private cooperatives were found to have the most positive outcomes, with increased resilience to external and internal barriers, and greater access to resources. Regardless of the level of formality, the government employees (especially the on-call workers) and self-employed groups had largely negative outcomes, with few resources or income-generating strategies and limited resilience to external and internal barriers. Permanent government

employees had slightly better outcomes than on-call employees, as they had a regular salary.

Crucially, none of the cases meet the ILO criteria for 'decent' work, and face underlying social and financial insecurities that hinder sustainable livelihoods. Based on the fairly similar outcomes of the three modes, this paper argues that pit-emptying in Bangladesh, despite its diverse arrangements, is ultimately affected by broader structural factors (such as entrenched caste, class and religious discrimination and segregation), as well as interventions (or the lack thereof) by GOs and NGOs. Whilst progress is being made, none of the current modes go far enough to secure safe long-term livelihoods or to support alternative livelihood options. This would require more funding and active management from GOs, NGOs and pit-emptiers themselves, to improve lives and livelihoods. One could argue that GOs and NGOs should not advocate the sustainability of such degrading jobs. However, manual pit-emptiers continue to play a crucial role in sanitation provision amidst few viable alternatives, and remain reliant upon the limited income this occupation provides. Policy and programming efforts should therefore be more usefully targeted towards protecting the livelihoods and well-being of the pit-emptiers, promoting formalised arrangements that incentivise government and non-government partners to provide them with increased job security and personal safety, and advocate for alternative livelihood options. This may require some novel policy development and structural changes in the design of sanitation programmes and engagement with labour and human rights organisations.

Further research is required to establish a holistic understanding of the political dynamics between pit-emptier groups, NGOs and GOs, to allow understanding of the factors contributing to unsustainable livelihoods. A natural progression of this work is investigating the short- and long-term impacts of emerging technology promoted in FSM. In addition, similar research should take place in other LMICs to reach an understanding of how modes of pit-emptying and livelihood outcomes differ according to context, and develop recommendations for how to support pit-emptiers, especially in an era of increasing mechanisation and intergenerational change. Finally, critical reflection is needed within research and practice on the historically rooted barriers to education, skill development and capabilities currently hindering the socio-economic mobility of pit-emptiers in Bangladesh, and across South Asia. As many emptying groups report having strong social capital between workers, supporting workers to form unions, community-based organisations or cooperatives may be one way in which to represent their profession within their community, to GOs and NGOs, to advocate for the creation of more sustainable (or alternative) livelihoods, and to ensure decent work for all.

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Bibliography

Akand, R. I. 2018. "Three Cleaners Die after Inhaling Toxic Gas in Tongi." *Dhaka Tribune*. https://www.dhakatribune.com/bangladesh/nation/2018/07/09/three-cleaners-die-after-inhaling-toxic-gas-in-tongi.

Baumann, P., and S. Sinha. 2001. "Linking Development with Democratic Processes in India: Political Capital and Sustainable Livelihoods Analysis." Natural Resource Perspectives, No 68. https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2825.pdf.

Chowdhry, S., and D. Kone. 2012. "Business Analysis of Fecal Sludge Management: Emptying and Transportation Services in Africa and Asia." Bill and Melinda Gates Foundation, Seattle. https://www.susana.org/_resources/documents/default/2-1662-chowdhury-2012-business.pdf.

Chowdhury, A., O. Faruq, and R. Mamtaz. 2015. "Occupational Safety and Health Guidelines for Faecal Sludge Management." Khulna, Bangladesh. http://www.snv.org/public/cms/sites/default/files/explore/download/guideline-occupational_safety_and_health_guidelines_for_fsm_0.pdf.

Chowdhury, I. U. 2009. "*Caste Based Discrimination in South Asia: A Study of Bangladesh*." Working Paper Series III. New Delhi. http://idsn.org/wp-content/uploads/user_folder/pdf/New_files/Bangladesh/Caste-based_Discrimination_in_Bangladesh__IIDS_working_paper_pdf.

Chowdhury, S. 2011. "Traditional Profession and Livelihood : A Study on Sweeper Community." *Journal of Economics and Sustainable Development* 2 (3): 87–94.

Consiglieri. 2017. "*A Study on Willingness to Pay for Faecal Sludge Management Services*." Dhaka: SNV. https://snv.org/cms/sites/default/files/explore/download/faecal_sludge_management_service.pdf.

de La Brosse, N., L. Stevens, and R. Islam. 2017. "Preliminary Results of the FSM Business Model in Faridpur, Bangladesh: Tackling the Post-ODF Challenge through Public-Private Partnerships." Rugby, UK. https://infohub.practicalaction.org/bitstream/handle/11283/620507/FaridpurGatesFoundationproject_FSM4casestudy2017.pdf.

DFID. 2001. "Sustainable Livelihoods Guidance Sheets." London, UK. http://www.livelihoodscentre.org/documents/20720/100145/Sustainable+livelihoods+guidance+sheets/8f35b59f-8207-43fc-8b99-df75d3000e86.

Eales, K. 2005. "*Sanitation Partnerships Series: Bringing pit emptying out of the darkness : A comparison of approaches in Durban, South Africa, and Kibera, Kenya*." Building Partnership for Development in Water and Sanitation, London, UK. http://www.ircwash.org/sites/default/files/Eales-2005-Bringing.pdf.

Edwards, R., and J. Holland. 2013. *What is Qualitative Interviewing?, 'What is?' Research Methods Series*. London, UK: Bloomsbury Publishing. doi:10.5040/9781472545244.

Gupta, S. 2019. "7 Die of Suffocation While Cleaning Gujarat Hotel Septic Tank." NDTV. https://www.ndtv.com/india-news/seven-including-four-sanitation-workers-die-of-suffocation-while-cleaning-hotel-drain-in-gujarat-new-2053655.

Hossain, T. 2013. "The Sweepers: A Socially Excluded Community." *The Daily Star*. https://www.thedailystar.net/news/the-sweepers-a-socially-excluded-community.

ILO. 2018. "*Informality and Non-Standard Forms of Employment*." Buenos Aires. http://www.g20.utoronto.ca/2018/g20_paper_on_nse_and_formalization_ilo.pdf.

ILO. 2019. "Decent Work." https://www.ilo.org/global/topics/decent-work/lang–en/index.htm.

Karim, A. 2017. "City Cleaners: Stories of those Left Behind." Khulna, Bangladesh. http://www.snv.org/public/cms/sites/default/files/explore/download/english_book_design_v3.pdf.

Khurana, I., and T. Ojha. 2009. "*Burden of Inheritance: Can we Stop Manual Scavenging? Yes, but First we Need to Accept it Exists*." New Delhi, India. https://www.ircwash.org/sites/default/files/Khurana-2009-Burden.pdf.

Longman. 2009. *Longman Dictionary of Contemporary English*. 5th ed. Harlow: Longman Press.

Mdee, A. L. 2002. "*Sustainable Livelihoods Approaches - Can They Transform Development?*" BCID Research Paper No. 2. Bradford Centre for International Development, Bradford, UK.

MLG. 2017. "*Institutional Regulatory Framework for Faecal Sludge Management (IRF-FSM)*." Dhaka, Bangladesh. http://www.snv.org/public/cms/sites/default/files/explore/download/lgd-irf-fsm-megacity-english2017.pdf.

Nkansah, A., J. Fisher, and M. S. Khan. 2012. "Manual Pit Emptying as a Sustainable Livelihood in Ghana." *Proceedings of the Institution of Civil Engineers - Engineering Sustainability* 165 (3): 215–221. doi:10.1680/ensu.10.00056.

Opel, A., and M. K. Bashar. 2013. "Inefficient Technology or Misperceived Demand: The Failure of Vacutug-Based Pit-Emptying Services in Bangladesh." *Waterlines* 32 (3): 213–220. doi:10.3362/1756-3488.2013.022.

Parkinson, J., and M. Quader. 2008. "The Challenge of Servicing on-Site Sanitation in Dense Urban Areas: Experiences from a Pilot Project in Dhaka." *Waterlines* 27 (2): 149–163. doi:10.3362/1756-3488.2008.017.

Prasad, S. C. S., and I. Ray. 2019. "When the Pits Fill up: (in)Visible Flows of Waste in Urban India." *Journal of Water, Sanitation and Hygiene for Development* 9 (2): 338–347. doi:10.2166/washdev.2019.153.

Stevens, Lucy, Raful Islam, Alexis Morcrette, Noemie de la Brosse, and Abdullah al Mamun. 2015. "Faecal Sludge Management in Faridpur, Bangladesh: Scaling up through Service Level Agreements." https://infohub.practicalaction.org/oknowledge/bitstream/11283/575954/1/WEDCFSMinFaridpurpaper.pdf.

Strande, L., M. Ronteltap, and D. Brdjanovic, eds. 2014. *Faecal Sludge Management: Systems Approach for Implementation and Operation*. London, UK: IWA Publishing. https://www.un-ihe.org/sites/default/files/fsm_book_lr.pdf.

Sultana, H., and D. B. Subedi. 2016. "Caste System and Resistance: The Case of Untouchable Hindu Sweepers in Bangladesh." *International Journal of Politics, Culture, and Society* 29 (1): 19–32. doi:10.1007/s10767-015-9202-6.

The Daily Star. 2016. "Dignity for Septic Tank Emptiers: Ensuring Decent Work Conditions for All." https://www.thedailystar.net/star-weekend/bulletin/dignity-septic-tank-emptiers-1334008.

Tilley, Elizabeth, Lukas Ulrich, Christoph Luithi, Philippe Reymond, and Christian Zurbrugg. 2014. *Compendium of Sanitation Systems and Technologies*. 2nd ed. Swiss Federal Institute of Aquatic Science and Technology (Eawag), Dübendorf, Switzerland. https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/schwerpunkte/sesp/CLUES/Compendium_2nd_pdfs/Compendium_2nd_Ed_Lowres_1p.pdf.

United Nations. 2019. "Sustinable Development Goal 8: Promote Sustained, Inclusive and Sustainable Economic Growth, Full and Productive Employment and Decent Work for all." https://sustainabledevelopment.un.org/sdg8.

van der Wel, Aat, Emeline Bereziat, Gert de Bruijne, Jaqueline Barendse. 2010. "Financing the Informal Entrepreneur : Recognizing Business Opportunities in Sanitation, Sustainable Sanitation Practice." http://www.ircwash.org/sites/default/files/Wel-2010-Financing.pdf.

WHO/UNICEF. 2017. "Bangladesh- Population Using Sewer, Septic and Latrines (2017)." https://washdata.org/data/household#!/dashboard.

WHO/UNICEF. 2019. "Progress on Household Drinking Water, Sanitation and Hygiene 2000–2017." New York. https://www.who.int/water_sanitation_health/publications/jmp-2019-full-report.pdf?ua=1.

World Bank. 2018. "*Precarious Progress: A Diagnostic of Water Supply, Sanitation, Hygiene, and Poverty in Bangladesh*." WASH Poverty Diagnostic, Washington DC.

World Bank. 2019. *Health, Safety and Dignity of Sanitation Workers: An Initial Assessment*. Washington DC: World Bank. doi:10.1596/32640.

WSUP. 2016. "Dignity for Pit and Septic Tank Emptiers: WSUP Co-Convenes Dhaka Conference to Highlight Need for Improved Working Conditions." https://www.wsup.com/blog/dignity-for-pit-and-septic-tank-emptiers/.