Human Geographies of Stellenbosch

Transforming Space,
Preserving Place?

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7. Urban risk and the lived experience of communal ablution facilities in Kayamandi

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Introduction

The informal settlement areas of Kayamandi in Stellenbosch today, together with the dilapidated labour hostels that are remnants of the apartheid era, continue to accommodate thousands of households who have not benefited from housing programmes, as well as many newcomers who continue to arrive seeking economic opportunities. In 2007, Stellenbosch was ranked fifth among South African cities in terms of its economic growth rate (John 2012), illustrating why it continues to attract large numbers of jobseekers, many of whom settle in Kayamandi.

In informal living environments throughout the world, residents like those in Kayamandi are daily exposed to a variety of health risks, resulting from overcrowded living conditions, endemic levels of poverty and a lack of access to adequate sanitation infrastructure. With the onset of the Covid-19 pandemic early in 2020, concerns about access to sanitation have been drawn even more sharply into focus, particularly among poor densely crowded urban communities. While much has been written about the inadequate sanitation typically found in informal settlements (Govender, et al. 2011; Hardoy, et al. 2013; Lagardien & Cousins 2004; Pelling & Wisner 2009; Seeliger & Turok 2013), much less has been said about the lived experiences of shared communal ablution facilities from the perspective of those who use them (Roma, et al. 2010; Robins 2014; Redfield & Robins 2016) and how creative ways are found for coping with them (Seeliger & Turok 2013).

Acknowledging this gap in our understanding of the everyday realities of constrained access to sanitation, this research among informal settlement dwellers in Kayamandi sought to determine the risks associated with the use of shared ablution facilities and how people cope with and adapt to them. Growing numbers of service delivery protests in South Africa around issues of inadequate sanitation infrastructure are cause for concern and are daily reported in the media. This has simultaneously driven a strongly 'rights-based' research agenda among academics seeking to understand the issues and seek solutions (McFarlane & Silver 2017; Redfield & Robins 2016; Robins 2017).

Field research undertaken in Kayamandi among residents using the sanitation facilities, documented their daily experiences and adaptation strategies. This information, together with current service provision, enumeration and spatial data, was used to develop a risk-rating model to determine spatial differences in sanitation-related risks in Kayamandi.

Beginning with a brief historical overview of the development of Kayamandi, situating the generation of public health problems there over time, this chapter introduces the context of informal settlements before reviewing the risks associated with shared ablution facilities in these marginalised urban areas. The risk-rating model developed in the study for assessing differential sanitation risk across Kayamandi is explained, and the findings of the study are then discussed, describing sanitation facilities in Kayamandi and the practices residents have adopted in relation to their use. The chapter concludes by considering the risks identified in the study and how they might be addressed.

A brief history of Kayamandi

Officially established in 1941, although first settled several decades earlier, Kayamandi has developed gradually in several stages (Rock 2011). Perhaps somewhat ironically, the first development of formal housing supply in Kayamandi was shaped by public health concerns. Following outbreaks of the plague in nearby Cape Town that led to the establishment of Ndabeni in 1901, and the 1918 influenza outbreak that motivated the construction of Langa in 1927 (Saunders 1979; Swanson 1977), there was a very real concern to ensure that formal housing development would reduce the health risks commonly associated with so-called 'slum' development.

Originally intended to accommodate single men providing labour to fledgling industries in the area, mostly in purpose-built hostels, Kayamandi soon attracted the settlement of families, stimulating the development of other types of housing. By 1948, the area had developed significantly and was in fact considered a model of good development (Rock 2011). Indeed, it is only since 1980, in the most recent phase of its history, that living conditions in Kayamandi have significantly deteriorated (*ibid*).

After the rescinding of repressive apartheid laws limiting the movement of Black people to urban areas from 1986 onwards, Stellenbosch, like many other urban areas, experienced a rapid influx of new settlers, particularly from rural areas of the Eastern Cape, many of whom settled in informal housing in Kayamandi. As informal areas proliferated, the boundary of Kayamandi expanded, placing increasing strain on existing municipal services. Currently home to more than 33 000 people (Sebitosi 2012), Kayamandi continues to frustrate efforts by the local authorities to provide and maintain adequate basic services. This, even though public health concerns influenced its initial design and development.

Placing informal settlements in context

Informal settlements in the global South are generally characterised by a lack of planning and basic services (Freire, et al. 2014; Mitlin & Satterthwaite 2013; UN Habitat

2003), making residents particularly vulnerable to many environmental and other hazards (Bull-Kamanga, et al. 2003; Dodman, et al. 2017; McGranahan, et al. 2001; Pelling & Wisner 2009), but particularly risks to their health (Seeliger & Turok 2013). McGranahan et al. (2001) suggest that despite the *Water and Sanitation Decade* of the 1980s, which aimed to “provide all people with water and safe quality and adequate quantity and basic sanitary facilities” (2001, p.46), by the early 1990s a fifth of global urban dwellers still had inadequate access to safe water supply, while a third remained without sufficient sanitation. At the turn of the century, over three million people still died annually from avoidable diseases related to water and sanitation deficiencies (McGranahan, et al. 2001). Today, such deficits continue to be an everyday reality for growing numbers of urban dwellers living in informal housing.

Despite the focus of Sustainable Development Goal (SDG) 6, which calls explicitly for improvements in water and sanitation provision, the global pace of sanitation reform remains pitifully slow. But there have been some notable successes. Asokan (2017), for example notes how efforts to improve sanitation in Mumbai, India have progressed by engaging with slum dwellers in both the design and implementation of communal facilities. Closer to home in Africa, Sahiledengle et al. (2018) conducted a survey among users of communal ablution facilities in Addis Ababa in Ethiopia, finding that those who received improved facilities derived additional benefits, such as increased sanitation awareness and better household hygiene practices.

The links between poverty and health have been known for centuries. In the nineteenth century, scientists were beginning to understand the relationship between disease transmission, human waste and contaminated water supply, stimulating the ‘environmental health movement’ which drew attention to the hazards associated with urbanisation (McGranahan, et al. 2001). Subsequently, there has been growing interest in understanding the social determinants of health (Braveman & Gottlieb 2014; WHO 2008), such as overcrowded living conditions and ignorance regarding appropriate use of ablution facilities that results in poor sanitation behaviour and increasing risk of disease (Govender, et al. 2011).

Govender et al. (2011) have found that ablution facilities typically found in crowded low-income households contribute significantly to the spread of infection and disease, while Lewin et al. (2007) determined that in 2000 alone, more than thirteen thousand deaths in South Africa were attributable to unsafe sources of water, inadequate sanitation and poor hygiene. The potential for contamination is driven by both physical and social factors.

The key to reducing risk and building resilience is to understand the risk creation process, by determining both the nature of hazards and the associated human vulnerability context. The best way to determine the factors that shape human vulnerability is through grounded research, speaking to those most at-risk who are best placed to explain the issues and help find solutions.

In South Africa, the National Disaster Management Framework (2005) calls for increased efforts to reduce risks developmentally, adopting a proactive approach to risk management, rather than dealing reactively with risk outcomes. Risk assessment,

a systematic process for describing risks in relation to potential threats (Pelling 2003), is a fundamental step in risk management, providing critical insights into how risks are created and how they can be reduced. This study, adopting a disaster risk lens and risk assessment methodology, sought to develop deeper insights into the human vulnerability context associated with the use of shared ablution facilities in informal areas of Kayamandi by engaging directly with local residents who make use of them.

Despite attempts by the South African government to provide formal housing to those unable to afford shelter of their own, the proliferation of informal settlements continues. By conservative estimates, they currently house 13.1% of South African households, accommodating over three million people (StatsSA 2018). The South African Constitution (1996) entrenches the rights of citizens to access basic services. But in practice this is hard to achieve, given the pace of population growth in urban centres that is outstripping the capacity of local authorities to provide adequate services. Section 3 of the South African Water Services Act (Act 108/1997) reiterates these rights, although acknowledging that given the differential capacity of local municipalities, provision is subject to available resources.

Although access to piped water and improvements in sanitation have improved significantly under the post-apartheid democratic government, it has been estimated that almost 2.3 million people still only access water from communal facilities, while improvements in sanitation have not met global targets (Hemson 2016). The provision of services in the City of Cape Town, for example, where the target is to provide informal settlement communities with one water tap for every 25 households, and one toilet for every five (SERI 2018), provision of improved services is constantly thwarted by population growth, outpacing service provision. Despite their efforts, however, the provision of sanitation has often become a politicised issue, such as in May 2011, when protests in Khayelitsha erupted into the so-called 'toilet wars' (Redfield & Robins 2016). McFarlane and Silver (2017, p.125) examined "four key tactics through which sanitation is pooliticized in Cape Town - or poolitics: spectacle, auditing, sabotage, and blockage." Highlighting what they deemed to be the continued 'racialisation' of infrastructure, protesters insisted that the nature of sanitation facilities one had access to was in fact a proxy for the strength of one's citizenship. More recently, Gous (2019) drawing on Municipal IQ data, reported that the incidence of service delivery protests was continuing to rise.

In Kayamandi, where informal areas are scattered in between formal housing developments, the struggle to provide residents of the informal areas with adequate access to water and sanitation is exacerbated, as it is in other urban areas of South Africa, by a constantly growing population.

Methodology

A range of methods was employed in the study (Moreland 2012). Primary data was collected by means of semi-structured and focus group interviews conducted with residents using the communal ablution facilities. With a Kayamandi resident assisting as a field guide and interpreter, interviews were conducted over several weeks. With at

least five individuals interviewed at each sanitation block, the research sample finally included 172 people, two thirds of whom were women, with men being less in evidence during the day.

Beginning with structured interviews using a questionnaire, fieldwork gradually shifted to lengthier informal discussions with groups of residents at sanitation blocks. The latter process, while not deriving quantifiable information, delivered deeper insights into the use of the facilities and the daily challenges experienced in using them. Qualitative data collection also included interviews with Stellenbosch municipal officials and field observations noted during transect walks in each zone. Quantitative data comprised counts of the number of toilets in each facility and per each administrative zone, municipal enumeration data and the measured extent of each zone. This information was contextualized by reviewing relevant literature, focusing on health and other risks associated with informal urban living environments.

Communal ablution facilities in Kayamandi – a risk assessment

The population growth rate in Stellenbosch is higher than the national average (Seeliger & Turok 2013), increasing by over a third between the 2001 and 2011 censuses (StatsSA 2011). Much of this growth is to be found in Kayamandi, which today comprises a mixture of formal, semi-formal and informal areas, one of several low-income residential areas in the municipality that is growing unsustainably, putting increasing pressure on existing infrastructure and service provision. While informal dwellings are most densely clustered in the informal areas of the suburb, they are also increasingly found in the backyards of formalised housing areas.

Only a fifth of Kayamandi residents live in brick and mortar houses with in-house ablutions, with the remainder living in informal shacks (Sebitosi 2012), and many of the poorest residing in dilapidated hostel blocks. Despite their poor condition, however, they remain densely inhabited, and lacking in service provision. Currently the number of those living in informal dwellings in Kayamandi is estimated to be around 16 700, but this figure continues to grow. They are provided by the municipal authorities with communal ablution facilities, blocks comprising rows of toilets, a water tap, while some also have a shower. There are thirty-nine such toilet blocks serving those living in the informal areas. Due to excessive usage, the conditions generally encountered at these communal facilities are sub-optimal, frequently dirty and contaminated with human and other waste, both inside the toilet cubicles and spread around the facility and nearby environs.

While it is easy to attribute blame for the polluted environments typically found in informal areas of Kayamandi on the behaviour of residents, it is important to understand the context and motivations for their actions. As the next subsections reveal, their behaviour is related both to the nature of the provision of services and other social determinants.

Allocation of toilets

Community leaders in Kayamandi are responsible for allocating toilets among households in the informal areas. The allocation process reportedly creates conflicts between residents, resulting in deliberate acts of vandalism. Although the recommended ratio of households to each toilet is 1:5, on average twelve households were reportedly sharing each toilet cubicle. According to residents, the doors of cubicles are generally secured by allocated households to maintain hygiene and prevent vandalism. These households are responsible for cleaning their toilet, rotating cleaning duties and sharing the cost of cleaning products between them. Some toilet cubicles, however, are not allocated and are left open for general use, quickly becoming dirty and broken. These are cleaned and maintained by the municipality.

Infrastructural issues and adaptive responses

Public toilets in Kayamandi frequently break down, primarily because of overuse, but also due to blockages caused by the materials placed in them. Toilet paper is a luxury item for poor households, who seldom purchase it, preferring instead to make use of alternative materials like newspapers, that frequently causes the system to break down. In addition, in the absence of nearby drains or refuse bins, informal dwellers typically dispose of other household waste in the toilets, including plucked chicken feathers, vegetable peels, cooked leftovers, cut hair and used nappies. Those living in informal housing typically dispose of any household liquid waste either by pouring it down toilets, into the street or nearby storm water drains, the latter course of action directly impacting the environmental health of the Plankenburg River into which the drains flow (Barnes 2003, 2012). Ecoli counts in excess of 13 million per 100ml in the river have driven increasing concerns about public health risk and environmental impacts on the river system (Barnes 2012; Seeliger & Turok 2013).

When toilets become blocked and unusable, those making use of them respond in a variety of ways, often using toilets allocated to other households by forcibly breaking off locks to gain entry. Others may resort to using buckets inside their dwellings, typically emptying them in open spaces, or merely conducting 'their business' in public spaces, driving up the risk of contamination to others. Some residents, however, may attempt to remedy plumbing problems themselves, rather than waiting for the municipality to respond.

In the absence of other options, stormwater drains are also commonly used to dispose of unwanted waste and, given that discarded rubbish is also often blown or washed into drain openings, these tend to become blocked, resulting in standing pools of contaminated water. During heavy rainfall, blocked storm water drains frequently cause flooding, often inundating the dwellings of those living nearby, or downhill given the steep topography of the area.

Public health risks

Many pathogens are transmitted from human waste through the environment, for example through contaminated water runoff from toilet blocks, flooded drains, standing

pools of water and discarded rubbish, aiding the spread of diarrhoea and other infectious diseases (ibid). Diarrheal diseases account for 3.1% of deaths nationally, the eighth most frequent cause of death (Govender, et al. 2011). The nature of illnesses experienced in households in weeks prior to the study were also investigated (Figure 7.1).

Common Symptoms

Figure 7.1 Recent ailments reported by respondents

While diarrhoea was the most common affliction identified, other health-related problems such as itchy skin, worm infestations and respiratory ailments were also mentioned, all afflictions associated with conditions typically found in low-income areas where ablution facilities are shared among many people (Govender, et al. 2011; McGranahan 2001). Although cleaned and maintained by municipal staff on weekdays, the condition of communal ablution facilities rapidly deteriorates over weekends, when usage increases significantly. These conditions are often associated with alcohol-related behaviour, including public urination and even defecation in and around the facilities, as well as random acts of vandalism, for example the deliberate cutting of locks during forced entry, smashing of toilet bowls, theft of taps and de-struction of sewage outflow pipes (Figure 7.2).

The public ablution facilities were considered unsafe areas by the majority of those interviewed due to their fear of crime. Using communal facilities usually necessitates walking some distance from one's home, increasing the risk of crime (Brown-Luthango 2018; Meth 2009; Sebitosi 2012), particularly for women and children, who statistically use toilets more often and also tend to collect water for household use (SERI 2018). This is an even more dangerous undertaking at night when the lack of street lighting creates perfect cover for criminals to lie in ambush. Most toilet blocks in Kayamandi lack lighting, thus attracting criminal activity.

Figure 7.2 Typical conditions in vandalised toilets (Photo: Authors 2012)

In response to the threat of crime, many people have developed simple coping mechanisms, such as walking in groups and imposing curfews on children after dark. Many avoid visiting ablution facilities at night, instead using a bucket as a makeshift toilet inside their dwelling. These, however, are often emptied indiscriminately, particularly in areas surrounding the public toilets or down stormwater drains, creating transmission pathways for diseases that pose a direct threat to the health of the surrounding community (Govender, et al. 2011).

It is evident that communal ablution facilities present a variety of risks to those who use them. However, their unique situational knowledge and experiential insights about daily life in these marginalised living environments present opportunities for informing more risk-averse planning and design.

Development of a risk-rating model

Risk can be presented in a variety of ways, expressed either in absolute or relative terms (Birkmann 2006). Various risk-rating models have been developed, for example the SMUG index and the FEMA model (Lunn 2003; Islam, et al. 2013) among others. To determine the nature of risks associated with the use of communal ablution facilities in Kayamandi, a risk-rating model was developed for calculating a risk level for each zone, enabling comparative analysis. Incorporating multiple variables into a formula, the model revealed how risk is uniquely characterised at a local level (Zweig & Pharoah 2017).

The Stellenbosch Municipal housing department provided their most recent enumeration data, detailing the number of informal dwellings in each zone. Although collected in 2010 and a little dated, a scan of aerial imagery between 2010 and 2012 when the research was undertaken, suggested there had been limited growth in the number of informal dwellings since the last enumeration. The only areas that had experienced any visible increase were Zones A and L, suggesting that the population data for these areas was an underestimation. The enumeration data indicated a total of 4 070 informal dwellings, with an average household size of 4.1 persons. Based on these figures it was estimated that the total number of informal inhabitants was around 16 687. However, this does not include the informal hostel dwellers for whom no data was available. In addition, as informal settlements are known to be dynamic, this can only be considered a rough population estimate.

The risk assessment investigated the risks associated with the informal sanitation blocks in each administrative zone, namely Zones A & C, Zone D, Zones F & I, Zone J, Zone K, Zone M, Zone O, and Zone P (Figure 7.3).

The qualitative values for the model were derived from information provided by inhabitants of the informal areas of Kayamandi and Stellenbosch municipal officials during interviews and group discussions, together with the noted observations of the researcher. The qualitative values assigned to each zone ranged from 1-10, with one being the highest risk level and ten the lowest. Although this is a purely subjective measure, if the same person allocates the rating level across the landscape, the rating

will be consistent and should not affect the outcome of the analysis, which is only intended as a comparative scale.

Figure 7.3 Zones of Kayamandi mentioned in the study (Source: Authors)

Quantitative data used in the model included information about (1) density of dwellings, (2) availability of sanitation facilities in relation to the number of households in each zone, and (3) the measured extent of each zone. Formulas were then derived for the rating system as follows:

1. Density = geographical area divided by total dwellings = total dwellings per zone
- a = area (Geographical area measured in m^2)
- Z = specific zone area
- d = number of dwelling units

$$a_z \div \sum d_z = \sum d_{za}$$

Where:

a_z = geographical area (m²) according to zone

$\sum d_z$ = total number of dwelling units within specific zone

$\sum d_{za}$ = total number of dwelling units per zone area (geographical area = m²)

2) **Toilet ratios** = number of dwellings / toilets = ratio of dwellings per toilet

$$d_z \div t_z = d:t$$

Where:

d_z = number of dwelling units within specific zone

t_z = number of toilets in specific zone

$d:t$ = ratio of dwelling units per toilet

The calculations derived using the formula are shown in Table 7.1.

Table 7.1 Property sales in Jamestown, 2012 to mid-2019

Zones	Dwellings	$\sum d_{za}$	d:t	Qualitative	Risk Rating
A and C	1039	5.364004m ²	1:6.259036	2	1
F and I	371	6.015116m ²	1:6.745455	4	2
D	22	12.99209m ²	1:7.333333	6	3
J	377	7.981011m ²	1:5.385714	8	3
K	113	11.45935m ²	1:11.3	8	3
L	165	6.063891m ²	1:8.25	6	4
M	91	10.52244m ²	1:3.033333	8	5
O	1 877	4.050875m ²	1:9.385	2	1
P	15	27.114	*	6	4
Total	4070				

The following section describes the results of the risk-rating model according to each zone, demonstrating how it was usefully applied in identifying site-specific risk conditions influencing ablution behaviours.

Application of the risk-rating model

Zones A and C consisted of 1039 densely compacted informal dwellings, averaging a dwelling area of 5.36m². There were seven sanitation blocks in this zone, providing

166 toilets. The toilet to dwelling ratio was calculated as 1:6.25, but this excluded the households living in thirty-nine hostel blocks also located in this zone, who contribute significantly to the densification of the zone. Both hostel inhabitants and shack dwellers made use of the ablution blocks, exacerbating the ratio of households per toilet. Sanitation facilities in Zones A and C were therefore exceptionally overcrowded, though this was not evident in the risk rating.

Zones F and I, on the other hand only accommodated 371 informal dwellings, averaging an area of 6m² per dwelling, with a toilet to dwelling ratio of 1:6.7. Facilities in this area were frequently vandalised and according to local community members were used by pupils of the nearby high school, with one sanitation block in particular frequented by pupils selling and consuming illegal substances.

Zone D was much smaller, consisting of only twenty-two informal structures, averaging an area of 12.99m² each, so that it appeared to be less densely populated. Transect walks in this area revealed, however, that the dwellings consist of several large overlapping structures shared by many people. Although this Zone was provided with three toilets, only one toilet and one tap were functioning at the time of the research, with all residents reliant on a single toilet. Inhabitants in this zone had adapted to the limited facilities by rationing periods of usage as a way of maintaining the condition of the facilities. Despite these efforts, however, the toilets were still regularly blocked.

Zone K included 113 informal dwellings and eight 'formal' hostels each with an average area of 11.45m². Provided with only one ablution facility, this zone had a dwelling to toilet ratio of 1:11.3. The presence of hostels complicated the application of the model in this zone too, with those living in informal dwellings also making use of sanitation facilities located in the hostels, reportedly creating conflict between them and the hostel inhabitants.

Zone M had only two sanitation facilities serving 91 informal dwellings. With an average dwelling area of 10.52m², and a toilet to dwelling ratio of 1:3, Zone M scored the highest (best) rating in the model. Zone O, by comparison covered a much larger area comprising 1 877 informal dwellings. With an average area of 4.05m² per dwelling, it had the highest dwelling density level in Kayamandi, and the highest dwelling to toilet ratio of 1:9.3, scoring a risk rating of 1 (worst) in the model.

Lastly, Zone P consisted of only 15 dwellings, abandoned houses originally constructed for farm labourers, with a large average dwelling area of 27.11m². Not considered an informal area, the sanitation block located in this zone was apparently meant to supplement the sanitation needs in adjacent Zones F & I, revealing an additional complexity not accounted for in the model when calculating a risk rating for that zone.

Summary of findings

The risk-rating model provided a relative measure of risk in relation to sanitation facilities in Kayamandi informal settlement areas (Birkmann 2006), demonstrating how this varied across the landscape, differing from zone to zone. It established, for example, that inhabitants of Zones A, C and O were most vulnerable due to high dwelling densities

and toilet-to-person ratios, while Zone M, was least vulnerable. The qualitative variables employed in the model allowed for the unique situational complexities noted during fieldwork, to be factored into the formula, albeit as a subjective measure, capturing subtle contributing risk factors in each zone that quantitative measures typically miss.

Among the limitations identified in the application of the model were that it assumed an average household number of 4.1 persons, while in reality this is probably quite variable. In addition, while the projected ratio of dwellings to toilets was based on the number of toilets in each zone, the availability of toilets fluctuates almost daily according to how many are functional, while it could not be ascertained how many hostel dwellers also made use of the facilities. Another limitation was that the measured extent of each zone did not consider the space taken up by roads and pathways, influencing the density calculation for each zone.

The realities of everyday life in informal settlements, the constant change and inherent fluidity of occupancy, suggests that while the risk-rating model is useful, at best it only offers a snapshot in time, requiring constant revision. Generating data for the model is a time-consuming process, impractical for local officials lacking time or the requisite skills for collecting the qualitative information required in its application. However, it is a useful tool for quantifying risk at a local level for the purposes of comparative analysis.

The assessment revealed how risks associated with the use of public ablution facilities in each zone are shaped by a range of context-specific factors, illustrating their uniqueness (Zweig & Pharoah 2017), from the inclusion of hostel dwellers in several areas to the proximity of a high school in another. In response, residents have developed strategies for coping with shared facilities that are not obvious to outsiders but were explained in conversations with them.

The findings suggest that future planning and management of sanitation facilities should incorporate the participation of community members who have experiential knowledge and deeper insights about the lived realities of using them, ensuring that their needs are appropriately catered for. Internationally acclaimed sanitation implementation programs, such as the Slum Sanitation Programme (SSP) run by the Indian government, aim to address sanitation needs of those who live in informal forms of housing based on the development of partnerships and participation (McFarlane 2008). Incorporating inputs from slum dwellers, the SSP provides them with opportunities to contribute to the design, planning and implementation of sanitation infrastructure most suited to their needs. Their involvement continues after implementation, forming part of a maintenance program, creating a sense of ownership and local agency.

Similar initiatives may be implemented in Kayamandi. During interviews, local inhabitants made suggestions for improvements to the current sanitation conditions. These included the provision of additional toilets and taps, a need which is supported by the risk assessment, improved maintenance and the provision of toilet paper (to reduce toilet blockages). They stressed that ablution facilities should be made wheelchair accessible, while safety and security measures should be enhanced, as in the provision of tamper-proof lighting at ablution facilities.

Generally, sanitation infrastructure planning requires estimations of the demand for services, construction costs and likely impacts on existing infrastructure. Incorporating risk-averse measures into planning, however, also requires the implementation of other more socially prescribed solutions, involving the participation of residents in an integrated and holistic approach (Frazer, et al. 2017). Reducing risks associated with everyday life in marginalised urban communities, such as those that have been described in the informal areas of Kayamandi, requires local insights and understanding (Mercer, et al. 2008; Pelling 2007).

Conclusion

Globally, citizen participation has been shown to improve service delivery, ensuring that members of the community take ownership of development interventions by forming part of more risk-sensitive solutions. As Sen (1999) has argued, people must be actively involved in shaping their own future and guiding development planning. Engaging directly with those who use the ablution facilities in Kayamandi has delivered deep insights into the risks they face on a daily basis. As the risk-rating model has revealed, sanitation facilities in Kayamandi are unevenly distributed and out of sync with current everyday realities, both in terms of their spatial distribution and risk-averse design. While it is becoming increasingly imperative to focus on reducing risk in today's complex urbanising world, perhaps even more importantly, as Wisner (2019) has suggested, we also need to understand how risks are created and how people cope with them, in order to find holistic solutions.

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