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# Perceptions of Inclusivity and Sustainability in Urban Sanitation in Global South Cities

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**ABSTRACT:** Citywide Inclusive Sanitation (CWIS) calls for sustainable urban sanitation services for all, but the definitions of “inclusion” and “sustainability” within the framework leave room for interpretation. This study aims to provide an initial understanding of how these terms are currently interpreted by a range of sanitation actors in six cities of the Global South. Urban sanitation professionals from private (n = 16), public (n = 28), non-governmental (n = 43), and academic (n = 10) institutions were interviewed using a standardized tool, and data was analyzed to identify themes and trends. Terms such as “everyone” or “for all” shed little light on how to ensure inclusion, though disabled people, women, children, and the poor were all highlighted when probed. Greater specificity of beneficiary groups in policy is likely to enhance their visibility within sanitation service provision. All three pillars of sustainability identified within CWIS were referenced, with different stakeholders focusing more closely on environmental, social, or economic sustainability, based on their organizational goals and interests. Greater collaboration may foster a balanced view across the pillars, with different organizations acting as champions for each one. The findings can facilitate discussions on a shared understanding of multi-stakeholder engagement in achieving inclusive and sustainable sanitation service provision.

**KEYWORDS:** stakeholder engagement, service provision, definitions, urban WASH, inclusion, citywide inclusive sanitation, development

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## Introduction

Citywide Inclusive Sanitation (CWIS) looks to shift the urban sanitation paradigm by calling for better-designed and implemented sustainable urban sanitation services for all, through awareness raising, capacity building, capturing best practices, coordinating with complementary city services, and developing and adopting tools to support these approaches.<sup>1,2</sup> Services provided at a local level are critical to the achievement of the Sustainable Development Goals (SDG), which underpin CWIS, and this localization requires multi-stakeholder engagement.<sup>3</sup> This has been identified as a key driver for localization of the SDGs but requires a “common language,”<sup>4</sup> particularly for key terms such as “inclusion” and “sustainability” if we are to be successful<sup>5</sup> in meeting SDG 6 (Clean Water and Sanitation). Although these terms are used in multiple disciplines, each discipline interprets them differently.<sup>6</sup> An understanding of how these terms are interpreted by different actors may mitigate some of the challenges of multi-stakeholder engagement to achieve CWIS and SDG6.

The CWIS Service framework has 3 core outcomes of equity, safety, and sustainability.<sup>7</sup> Sustainability is defined as “services [that] are reliably and continually delivered based on effective management of human, financial and natural resources” and links to SDG 6 (Clean Water and Sanitation), 13 (Climate Action),<sup>8</sup> 3 (Good Health and Well-being), and 11 (Sustainable Cities and Communities).<sup>7</sup> Concepts of inclusion are captured in the framework as equity which is defined as “services [that] reflect fairness in distribution and prioritization of service quality, prices, and deployment of public finance/subsidies” and links to SDG 6 (Clean Water and Sanitation), 11 (Sustainable Cities and Communities), 5 (Gender Equality), and 3 (Good Health and Well-being). Inclusion is further captured in the first 2 principles of CWIS, with the first stating that “everyone in an urban area, including the urban poor, benefits from equitable safe sanitation services” and the second demanding that “gender and social equity are designed in,” with a focus on “those who are marginalized, without formal land tenure or access to sewers, women, and children.”<sup>1,2,7</sup>

The SDGs, which are seen as underpinning CWIS, define sustainability as “development that meets the needs of the present without compromising the ability of future generations to

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meet their own needs” and is broken down into 3 basic dimensions of environmental, economic, and social.<sup>9</sup> The preamble to the SDGs pledges that “no one will be left behind,” and further states that the Goals should be met “for all nations and peoples and for all segments of society” encapsulating the concept of inclusion. Certain groups are specifically mentioned within the wording of the goals, such as in SDG 6.2, which focuses on sanitation, where there is a specific reference to “equitable sanitation and hygiene for all . . . paying special attention to the needs of women and girls and those in vulnerable situations.”<sup>9</sup>

Common words associated with sustainability within the WASH sector include “durability” and “continuity.”<sup>10-12</sup> Generally, the sustainability of WASH services refers to the durability of services over time.<sup>11</sup> During a specified time, certain agreed characteristics are monitored, and these may address (among others) the quality, quantity, convenience, comfort, affordability, efficiency, equitable access, and reliability of the sanitation service.<sup>13,14</sup>

Similarly, inclusion within sanitation often translates to consideration of “marginalized” or “neglected” members of the population to achieve “equitable” service provision.<sup>15</sup> Again, the agreed characteristics of “marginalized” and “neglected” groups are further open to interpretations dependent on context<sup>16</sup> but may include consideration of some or all of the following groups: people living with physical disabilities, people engaged in stigmatized or insecure occupations, inhabitants of informal or illegal settlements, people with non-mainstream identities and cultures, people in refugee camps or institutions, chronically ill people, pregnant women, adolescent girls, and older people.<sup>15,17,18</sup> Equity, on the other hand, is characterized by recognizing that these groups of people are different and therefore may need different support and resources to ensure their WASH-related rights and needs are realized.<sup>19</sup>

While there is a significant drive toward the adoption of inclusive and sustainable urban sanitation globally, the terms “inclusive” and “sustainable” are open to interpretation by actors working toward these goals, and dependent on context. As such, this study aims to provide an initial understanding of how these terms are currently interpreted by a range of sanitation actors in 6 cities of the Global South, which represent different economic contexts and levels of advancement up the sanitation ladder. A better understanding of the local and global interpretation of these key terms can promote shared understanding for the multi-stakeholder engagement needed to achieve service provision through approaches such as CWIS and meet the targets of SDG6.

The study considers the potential shortcomings of existing definitions of inclusion that use vague catch-all terms like “everyone” or “for all,” which may result in some marginalized groups being left behind. It provides evidence of how countries and stakeholders interpret sustainability in line with their objectives and goals and highlights how, with great collaboration, this limitation can be leveraged to foster a balanced view

of sustainability, with different stakeholders acting as champions for different pillars of sustainability. The findings of the study also point to an opportunity for international cooperation in addressing urban sanitation, whereby countries which are low on the sanitation ladder learn from those further up.

## Methodology

### *Study sites*

Six cities in 5 countries in the Global South were selected for inclusion in the study, based on the geographic coverage of the research team to simplify participant identification. The cities covered a range of economic classifications<sup>20</sup> from low income (Blantyre, Malawi), through lower-middle income (Arusha and Dar Es Salaam, Tanzania and Bulawayo, Zimbabwe), to upper-middle income (Durban, South Africa and Mexico City, Mexico), and different levels of progress up the sanitation ladder. The distribution of cities’ economic classifications is largely representative of the share of world population living in low-income (9%), lower-middle-income (40%), and upper-middle-income countries (35%).<sup>21</sup> The African cities represented different economic situations in sub-Saharan Africa whilst Mexico City served as a point of reference as a densely populated city in the Global South which is further up the sanitation ladder and utilizing multiple sanitation technologies, which may offer learning opportunities for the other cities.<sup>20</sup>

To establish a profile of sanitation service provision in each of the study cities, as well as the complementary services of water supply and solid waste management (in line with CWIS), a desk-based study was conducted. The data categories in Table 1 were identified by the research team. The table was completed using Joint Monitoring Program (JMP) reports to provide country-level indicators of progress toward SDG6.<sup>22</sup> National population census reports, demographic health surveys, and city-level statistics published by local government were used to understand service provision at the more local level. In cities where a Shit Flow Diagram (SFD) was available, the SFD reports were also reviewed.

### *Identifying participants*

In each of the identified cities, the research team identified as many urban sanitation actors as they could, who were then asked to identify all organizations they worked with. Organizations that had not already been included were added to the stakeholder map and were similarly asked to identify their collaborators. This use of snowball sampling helped to ensure that all relevant sanitation actors were captured, including stakeholders (those with an interest in the process), decision-makers (those with the ability to make decisions about the process), players (those with regulatory or ownership powers over the process), and experts (those with knowledge to aid others in the process).<sup>23</sup> Citizens were not included in this study. The mapped actors were then categorized as:

**Table 1.** Sanitation profiles for countries and cities under study.

| NAME OF COUNTRY                                                     | MALAWI (%)           | ZIMBABWE (%)        | TANZANIA (%)          |                     | SOUTH AFRICA (%)       | MEXICO (%)              |
|---------------------------------------------------------------------|----------------------|---------------------|-----------------------|---------------------|------------------------|-------------------------|
| Access to basic and safely managed water service (urban areas)      | 86.0                 | 94.0                | 86.0                  |                     | 98.0                   | 91.6                    |
| Access to basic and safely managed sanitation service (urban areas) | 34.1                 | 46.2                | 42.6                  |                     | 76.3                   | 95.5                    |
| Name of city                                                        | Blantyre             | Bulawayo            | Dar Es Salam          | Arusha              | Durban                 | Mexico City             |
| Population                                                          | 800,265              | 738,601             | 4,279,032             | 1,662,618           | 3,442,361              | 9209,944                |
| Access to basic water service (%)                                   | 89.9                 | 98.0                | 93.0%                 | 73.9%               | -                      | 98.6%                   |
| Access to basic sanitation service (%)                              | 37.3                 | 56.0                | 43.4%                 | 55.4%               | -                      | 99.7%                   |
| Type of toilet used                                                 | Pop %<br>(n=800,265) | Hh %<br>(n=184,692) | Hh %<br>(n=1,083,381) | Hh %<br>(n=376,336) | Pop %<br>(n=3,442,361) | Pop %,<br>(n=8,912,820) |
| Flush toilet                                                        | 16.43                | 99                  | 37                    | 16.9                | 68                     | 94.2                    |
| Ventilated improved pit latrine                                     | 2.43                 | -                   | 2.1                   | 2.6                 | 5.2                    | -                       |
| Pit latrine with concrete slab                                      | 38.80                | 0.2                 | 52.2                  | 30.8                | 11.3                   | 5.5-0.26                |
| Pit latrine with earth/sand slab                                    | 28.88                | -                   | 4.5                   | 16.5                | -                      | -                       |
| Pit latrine without slab or open pit                                | 11.30                | 0.5                 | 3                     | 12.4                | -                      | -                       |
| Compost toilet                                                      | 1.03                 | -                   | -                     | 0.2                 | -                      | -                       |
| Other                                                               | 0.66                 | -                   | -                     | -                   | -                      | 1.01                    |
| No facility/Bush/Field                                              | 0.29                 | 0.3                 | 0.2                   | 20.6                | 3.0                    | 0.15                    |
| Presence of fecal sludge flow diagram (SFD)                         | Yes                  | -                   | Yes                   | -                   | Yes                    | -                       |
| Safely managed fecal sludge (%)                                     | 34                   | 30                  | 43                    | -                   | 74                     | -                       |
| Conveyed wastewater (%)                                             |                      |                     |                       |                     |                        | 90                      |
| Sewer treatment plants present                                      | 6, 1 working         | -                   | -                     | -                   | 104(all working)       | 29                      |
| Solid waste management method                                       | Pop %                | -                   | Hh%<br>(n=1,083,381)  | Hh %<br>(n=376,336) | Pop %                  | Pop (%),<br>n=2,599,081 |
| Collected regularly by authorized collectors                        | 6.40                 | -                   | 25.9                  | 9.6                 | 86.10                  | 88.1                    |
| Collected irregularly by authorized collectors                      | 1.09                 | -                   | 17.2                  | 6.3                 | 1.80                   | -                       |
| Collected by self-appointed collectors                              | 3.4                  | -                   | -                     | -                   | -                      | -                       |
| Local dump supervised by authorities                                | 3.6                  | -                   | -                     | -                   | -                      | 11.1                    |
| Local dump not supervised by authorities                            | 11.4                 | -                   | -                     | -                   | 1.30                   | -                       |
| Burn solid waste                                                    | 6.8                  | -                   | 16.8                  | 37.2                | -                      | -                       |
| Bury solid waste                                                    | 5.3                  | -                   | 16.7                  | 17.9                | -                      | 0.1                     |
| Open pit but not buried or burnt                                    | 27.9                 | -                   | 1.7                   | 0.8                 | -                      | 0.2                     |
| River, sea, creek, pond                                             | 21.3                 | -                   | -                     | -                   | -                      | -                       |
| compost solid waste                                                 | 0.87                 | -                   | -                     | -                   | -                      | -                       |
| Garden or near the house                                            | 8.76                 | -                   | -                     | -                   | 8.50                   | -                       |
| Other arrangement                                                   | 3.17                 | -                   | 21.7                  | 28.2                | 0.70                   | 0.5                     |

Non-Governmental Organizations (NGO), Civil Society Organizations (CSO), donors (DN), government departments (GOV), private sector (PS), academic institutions (AC), and others (OT) which included consultants and consortiums.

In each city, all identified actors were contacted and a study information sheet was delivered by hand or via email detailing the purpose of the study. Organizations that showed interest to participate were asked to select 2 people, 1 from management and another from field operations, with whom interviews would be conducted. This allowed the study to collect a range of perspectives from different levels within organizational hierarchies. The people targeted were those who had worked in the organization's sanitation department for at least 1 year or who were familiar with the sanitation projects that the organization was involved in.

### *Data collection*

Interviews were conducted using a standardized interview guide (Supplemental materials). The tool was developed in English and piloted with 2 to 3 stakeholders in each country before it was rolled out. Where amendments to the interview guide were necessary to address national contexts, these were shared with the wider research team to ensure the original objective of the study was not altered. In-country research teams had the choice to conduct interviews in English or to translate the interview guide into a local language as appropriate. Interviews were conducted by trained enumerators and completed either in person, virtually through internet-based meeting platforms, via phone calls, or through online surveys. This flexibility was necessary to accommodate the various COVID-19 restrictions which prevented face-to-face engagement across many of the study sites during the study period. All interviews were recorded using external voice recorders, phones, or in-built recording software on laptops, with the permission of the participants.

### *Data processing and analysis*

The recordings of the interviews were transcribed verbatim; where the interviews were in other languages, the transcripts were then translated into English. The recordings of the interviews remained in the country of origin. Transcripts from each country were de-identified and uploaded to a secured online repository. Information remaining on the de-identified transcripts included country of origin and organization type. The initial results were presented in a spreadsheet and each country was asked to validate the results; all anomalies were addressed before the validated data was recoded where necessary and analyzed to identify themes. Data were analyzed using NVIVO (version 12).

### *Ethical considerations*

The research was conducted in line with national ethical guidelines in each country, with ethical clearance provided by the following boards: Malawi; National Committee on Research in the Social Sciences and Humanities (reference number NCST/RTT/2/6), South Africa: University of KwaZulu Natal Humanities and Social Sciences Research Ethics Committee (reference number HSSREC/00001645/2020). The study was exempted from review in Zimbabwe, Tanzania, and Mexico. In all countries, written consent was sought from organizations and individuals before interviews were conducted and recorded. To ensure anonymity, transcripts used for the overall analysis were de-identified before being shared.

## **Results**

### *Service provision*

To aid the interpretation of how participants in different cities understand the terms “inclusion” and “sustainability,” background information about service provision within the CWIS framework was collected, including access to water supply, sanitation, and solid waste management.

Access to water and sanitation services across the study sites varied with a general correlation between higher economic bands and greater access to service provision (Table 1). The cities under investigation also varied in terms of population and the types of toilets used respectively (Table 1). The most common toilet type was flush toilets in Bulawayo,<sup>24</sup> Mexico City,<sup>25</sup> and Durban,<sup>26</sup> while pit latrines were the most common toilet type in Dar Es Salaam, Arusha,<sup>27</sup> and Blantyre<sup>28</sup> (Table 1).

Responsibility for the management of fecal waste in all cities lay primarily in the hands of the local government, though they often worked closely with Non-Governmental Organizations (NGOs) and the private sector to fulfill this responsibility. Still, safe management of fecal sludge varied considerably from 74% in Durban,<sup>29</sup> 30% in Bulawayo,<sup>30</sup> 34% in Blantyre,<sup>31</sup> and 43% in Dar Es Salaam.<sup>32</sup> No fecal sludge flow diagrams (SFDs) were available for Arusha and Mexico City.

It is important to interpret the figures relating to available water and sanitation services in each country or city cautiously; true access to services is harder to establish. Inconsistencies and disparities may exist in the statistics because of differing definitions of terms, techniques used for data collection, the functionality or non-functionality of known infrastructure; and poor distribution or management of the services among residents in different areas of the city.<sup>33,34</sup>

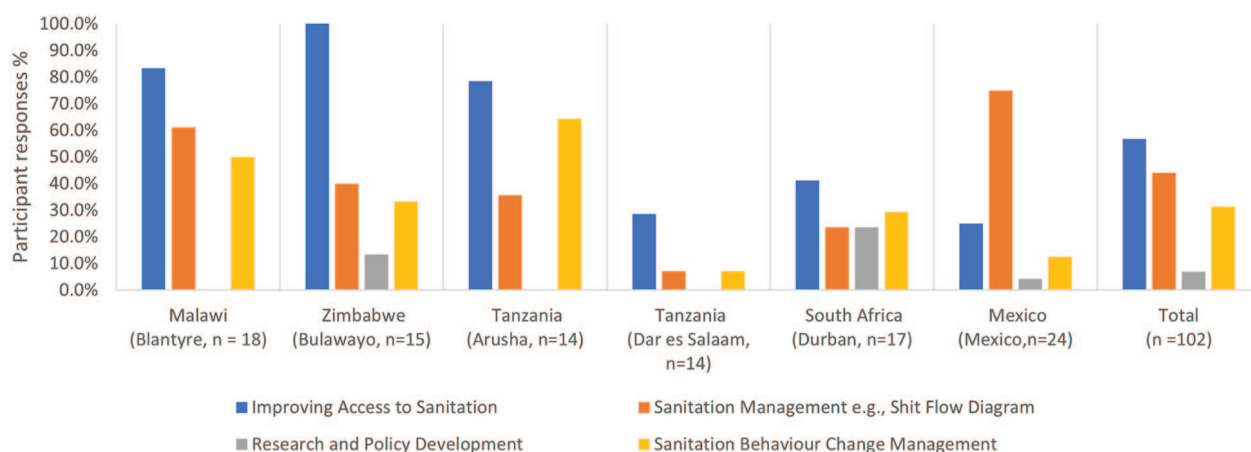
### *Participant backgrounds*

Participants (n = 102) were predominantly male (73.5%), and above 30 years of age (82.6%). Most had tertiary education

**Table 2.** Categorization of participants across the 5 countries.

| COUNTRY      | CITY          | GOV | NGO | PV | CSO | DN | AC | OT | TOTAL |
|--------------|---------------|-----|-----|----|-----|----|----|----|-------|
| Malawi       | Blantyre      | 3   | 7   | 6  | 2   | -  | -  | -  | 18    |
| Zimbabwe     | Bulawayo      | 8   | 6   | -  | -   | 1  | -  | -  | 15    |
| Tanzania     | Arusha        | 7   | 5   | 1  | -   | 1  | -  | -  | 14    |
| Tanzania     | Dar Es Salaam | 2   | 2   | 1  | 1   | 4  | -  | 4  | 14    |
| South Africa | Durban        | 7   | 1   | 3  | -   | -  | 5  | 1  | 17    |
| Mexico       | Mexico        | 1   | 4   | 5  | 9   | -  | 5  | -  | 24    |
| Total        |               | 28  | 25  | 16 | 12  | 6  | 10 | 5  | 102   |

Abbreviations: AC, Academic Institution; CSO, Civil Service Organizations; DN, donors; GOV, Government departments; NGO, Non-Governmental Organizations; OT=Others; PS, Private Sector.

**Figure 1.** Organizational goals for participants in different countries.

(91.8%) and had worked in the sanitation sector for more than a year at the time of the interview (89.2%), with 38.7% having over a decade of experience in the sector. Approximately a quarter of the participants worked for government departments (27.5%) and another quarter represented NGOs (24.5%), as shown in Table 2.

The goals of the different organizations involved are shown in Figure 1 and included improving access to sanitation (57%), managing generated wastes (44%), managing sanitation behavior change (31%), and developing research and policy (7%). The goals differed between countries, with Mexico mainly focusing on the management of sanitation and the sub-Saharan African countries focusing more on improving access to sanitation and behavior change management.

### Interpretation of “inclusion”

Participants had 3 main interpretations of “inclusion”: (1) a holistic approach to sanitation (17.6%), (2) the engagement of

all stakeholders (24.5%), and (3) consideration of different beneficiary groups (57.8%).

When inclusion was defined as “a holistic approach to sanitation,” participants mentioned access to services for, and management of, all types of wastes, including solid waste, and wastewater. A representative from the private sector in Malawi described this as “*doing everything about sanitation as a group or one. As sanitation is concerned, it should be done holistically.*”

When inclusion was used to mean “the engagement of all stakeholders in sanitation,” respondents mentioned actors across government, non-governmental, and private sector, with many highlighting the inclusion of communities, and putting an emphasis on a bottom-up approach, both of which strongly relate to the consideration of different beneficiary groups. One representative from the academic sector in South Africa said, “*when you say inclusion. . . we want our stakeholders to be inclusive of everybody who . . . can play a function and a role in sanitation.*”

**Table 3.** Beneficiary groups interpretation of inclusion by study site.

| DEMOGRAPHIC      | MALAWI<br>(BLANTYRE,<br>N = 18) (%) | ZIMBABWE<br>(BULAWAYO,<br>N = 15) (%) | TANZANIA<br>(ARUSHA,<br>N = 14) (%) | TANZANIA<br>(DAR ES SALAAM,<br>N = 14) (%) | SOUTH AFRICA<br>(DURBAN, N = 17)<br>(%) | MEXICO<br>(MEXICO,<br>N = 24) (%) | TOTAL<br>(N = 102) |
|------------------|-------------------------------------|---------------------------------------|-------------------------------------|--------------------------------------------|-----------------------------------------|-----------------------------------|--------------------|
| Everyone         | 94.4                                | 20.0                                  | 28.6                                | 64.3                                       | 70.6                                    | 41.7                              | 53.9               |
| Women            | <b>38.9</b>                         | <b>40.0</b>                           | <b>21.4</b>                         | <b>14.3</b>                                | <b>23.5</b>                             | <b>8.3</b>                        | 23.5               |
| Disabled         | <b>66.7</b>                         | <b>46.7</b>                           | <b>42.9</b>                         | <b>42.9</b>                                | <b>17.6</b>                             | <b>8.3</b>                        | 35.3               |
| Poor             | <b>27.8</b>                         | 6.7                                   | <b>28.6</b>                         | <b>21.4</b>                                | <b>23.5</b>                             | <b>12.5</b>                       | 19.6               |
| Children         | 16.7                                | <b>20.0</b>                           | 7.1                                 | 7.1                                        | <b>17.6</b>                             | 4.2                               | 11.8               |
| Men              | 5.6                                 | 13.3                                  | 0.0                                 | 0.0                                        | 11.8                                    | 0.0                               | 4.9                |
| Mental health    | 5.6                                 | 0.0                                   | 0.0                                 | 0.0                                        | 0.0                                     | 0.0                               | 1.0                |
| Elderly          | 16.7                                | 0.0                                   | 14.3                                | 7.1                                        | 5.9                                     | 4.2                               | 7.8                |
| Culture/religion | 0.0                                 | 6.7                                   | 0.0                                 | 0.0                                        | 11.8                                    | 4.2                               | 3.9                |

Bold figures depict the 3 highest values within the country, exclusive of “everyone.”

**Table 4.** Beneficiary groups interpretation of inclusion by organization type.

| DEMOGRAPHIC      | GOV (N=28) (%) | NGO (N=25) (%) | PV (N=16) (%) | CSO (N=12) (%) | DN (N=6) (%) | AC (N=10) (%) | OT (N=5) (%) |
|------------------|----------------|----------------|---------------|----------------|--------------|---------------|--------------|
| Everyone         | 57.1           | 56.0           | 56.3          | 50.0           | 83.3         | 40.0          | 20.0         |
| Women            | <b>14.3</b>    | <b>72.0</b>    | <b>6.3</b>    | <b>25.0</b>    | <b>16.7</b>  | <b>30.0</b>   | <b>20.0</b>  |
| Disabled         | <b>28.6</b>    | <b>68.0</b>    | <b>12.5</b>   | <b>25.0</b>    | <b>50.0</b>  | <b>20.0</b>   | <b>20.0</b>  |
| Poor             | <b>21.4</b>    | <b>20.0</b>    | 1.5           | 8.3            | <b>66.7</b>  | 10.0          | <b>20.0</b>  |
| Children         | <b>10.7</b>    | <b>20.0</b>    | <b>6.3</b>    | 8.3            | 0.0          | <b>20.0</b>   | 0.0          |
| Men              | 0.0            | 12.0           | 0.0           | 0.0            | 0.0          | <b>20.0</b>   | 0.0          |
| Mental Health    | 0.0            | 4.0            | 0.0           | 0.0            | 0.0          | 0.0           | 0.0          |
| Elderly          | 7.1            | 12.0           | 0.0           | <b>16.7</b>    | 0.0          | 10.0          | 0.0          |
| Culture/Religion | 3.6            | 8.0            | 0.0           | 0.0            | 0.0          | 10.0          | 0.0          |

Bold figures depict the 3 highest values within the country, exclusive of “everyone.”

Finally, inclusion as the “consideration of different beneficiary groups” was characterized by the word “everyone” or the phrase “leaving no one behind.” When asked to further specify demographic groups that needed to be considered in sanitation, the disabled, women, and the poor were the most identified groups across all countries except Zimbabwe where children replaced the poor in the top 3 (Table 3).

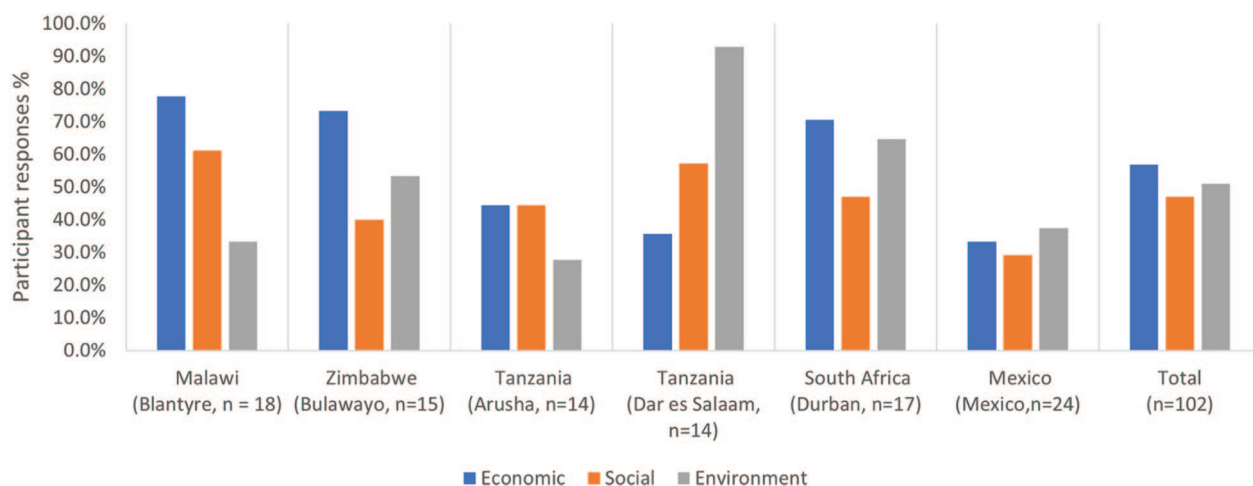
Analyzing responses by organizational type showed similar observations across government (GO), private sector (PV), academia (AC), donors (DN), and others (OT) (Table 4). The elderly replaced children in the top 3 for Civil Society Organizations (CSO), and Non-Governmental Organizations (NGO) respondents specifically highlighted consideration of menstrual hygiene alongside recognition of women as a beneficiary group that requires inclusion.

### *Interpretation of “sustainability”*

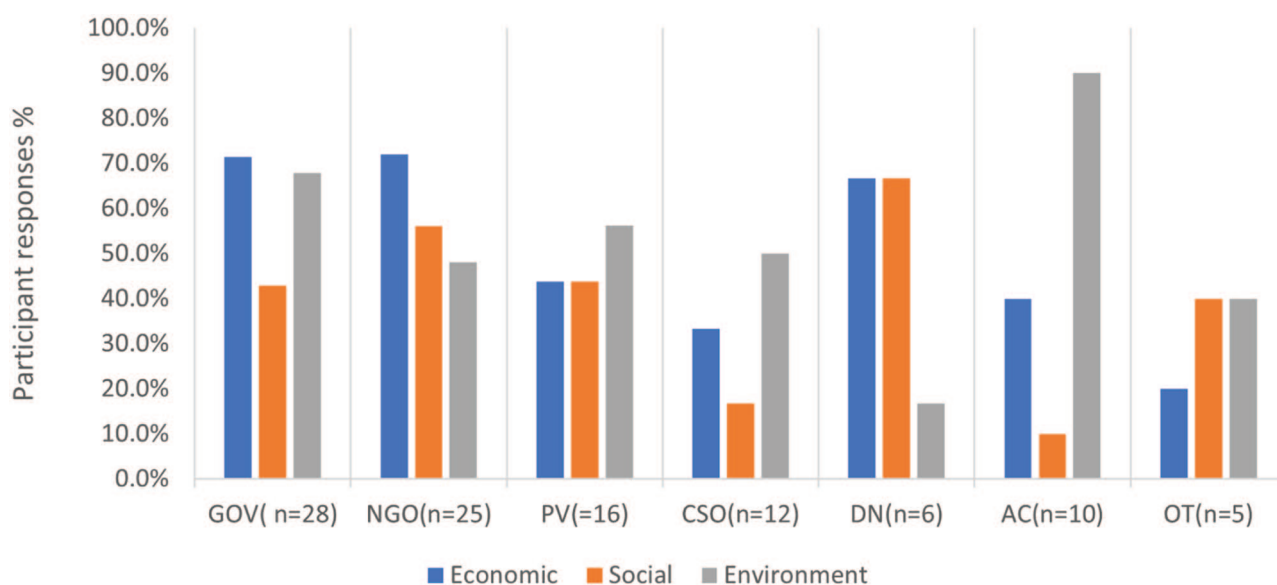
Definitions for “sustainability” generally revolved around the terms “longevity” and “continuity,” with all 3 pillars of sustainability (environment, economic, and social) being referenced.

Definitions that discussed environmental sustainability considered issues of reducing, reusing, or recycling materials and the use of resilient infrastructures. A representative from a CSO in Mexico described the environmental aspects of sustainability as “to reuse the water for something else because living in the city sometimes means waste.”

Definitions that mentioned aspects of economic sustainability included the affordability of technologies or projects, running sanitation as a business, and the financial independence of sanitation programs to continue without external



**Figure 2.** Emphasis of sustainability aspects by study site.



**Figure 3.** Emphasis of sustainability aspects by organization type.

funding or resources. A representative from the donor community in Tanzania explained *“there is the aspect of financial sustainability which is about how these services will be financed. . . who will pay for what. . . how the operational costs will be covered. . .”*

Where social sustainability concepts were mentioned, participants emphasized community engagement or ownership, management of resources and collaboration among stakeholders, and the adaptability, acceptability, and appropriateness of technologies for the intended users. One representative from the NGO sector in Malawi explained the social aspects of sustainability as *“providing services. . . that can be operated, maintained, and replaced or extended without external support. . . communities or households to be able to operate and maintain them. . .”*

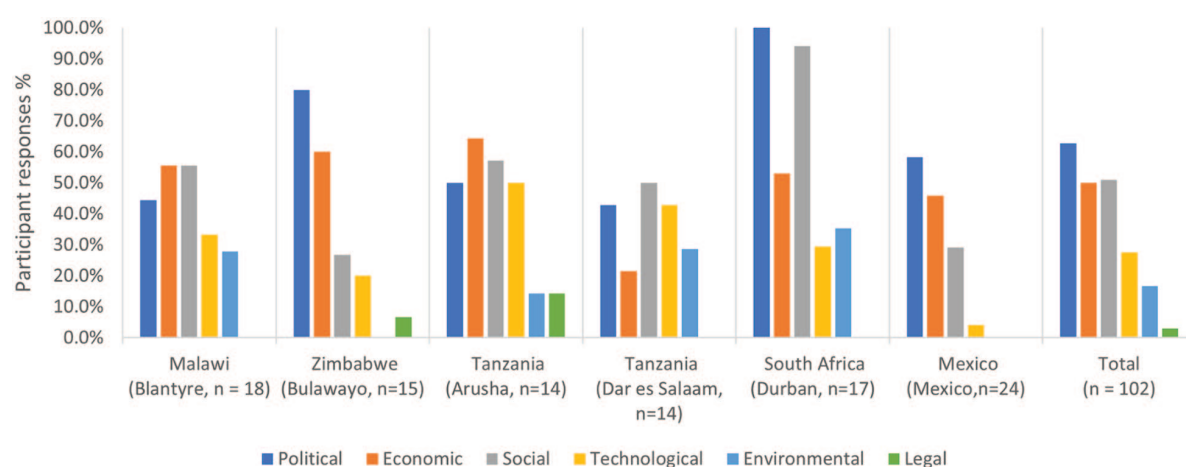
The emphasis on sustainability was different across the countries. Most respondents in Malawi (77.8%) and

Zimbabwe (73.3%) referenced economic sustainability. For Tanzania, environmental sustainability was the main concern in Dar Es Salaam (92.9%), whilst in Arusha economic (44.4%) and social (44.4%) sustainability were equally emphasized. In South Africa, economic and environmental sustainability were most referenced, and there was almost equal emphasis on all 3 of the pillars of sustainability in Mexico (Figure 2).

When responses were considered by organization type, donors, and NGOs both emphasized economic (66.7% and 72.0% respectively) and social (67.7% and 56.0% respectively) aspects of sustainability. The private sector (56.3%), academics (90%), and CSOs (50%) all stressed the importance of environmental sustainability. Governments on the other hand highlighted the economic (71.4%) and environmental aspects (67.9%) of sustainability (Figure 3).

**Table 5.** Specific opportunities and threats for promoting inclusive and sustainable urban sanitation.

| CATEGORIES    | SPECIFIC OPPORTUNITIES                                           | SPECIFIC THREATS (RISKS AND BARRIERS)                                                              |
|---------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Political     | Collaboration among internal and external partners/ stakeholders | Political interference; lack of political will or interest; corruption                             |
| Economic      | Business and funding opportunities; “sanitation as a business”   | Cost of sanitation; insufficient resources; poverty; sanitation business stability                 |
| Social        | Community engagement; inclusion; raising awareness or education  | People’s health; mindset; insufficient community engagement or dissemination of information        |
| Technological | Sanitation technologies; improving access; research; composting  | Rejection of technologies; urban sanitation planning and access to sanitation; poor infrastructure |
| Environmental | Reusing; recycling; Sustainable Development Goals                | Water and land pollution and their impacts on the environment                                      |
| Legal         | Policy and standard development                                  | Outdated or poor reinforcement of laws; policies and guidelines                                    |

**Figure 4.** Opportunities for promoting inclusive and sustainable urban sanitation.

### *Opportunities, risks, and barriers to inclusive and sustainable urban sanitation*

Participants were asked about opportunities and threats (separated as risks and barriers, though receiving similar responses) to inclusive and sustainable sanitation; these are categorized in Table 5.

The most identified opportunities overall were social (Figure 4) and included community engagement, inclusion, and raising awareness or education (Table 5). Other opportunities that were cited by more than 50% of respondents in a country included environmental (53.3%) for Zimbabwe, and social (94.1%) and technological (100%) for South Africa. Generally, factors identified as risks or barriers were equally identified as opportunities (Table 5). This linked closely to social opportunities:

*“I think a lot of it is to do with capacity building. . . there’s a need for people. . . in decision-making positions, to be exposed to new alternatives. . .”- Academic representative, South Africa*

Overall, barriers that were political (56.9%), social (51.0%), and economic (50.0%) in nature made up most of the responses given (Figure 5). Few respondents saw legal barriers as an issue.

There was less agreement on the types of risks though the most identified risks were political (34.3%) (Figure 6). However, political, social, and economic risks were all cited, and in Mexico, environmental risks (25.0%) were also important.

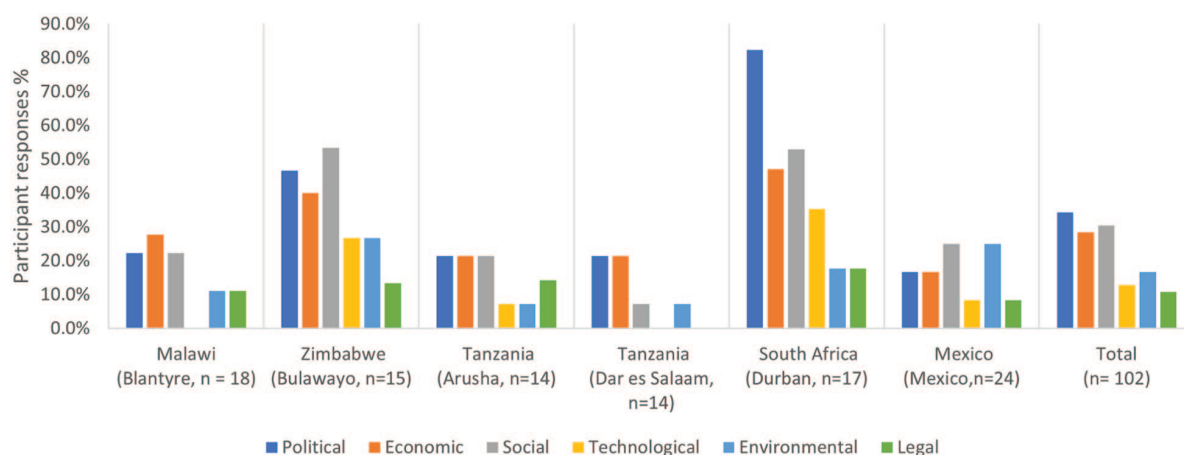
## **Discussion**

### *Participants*

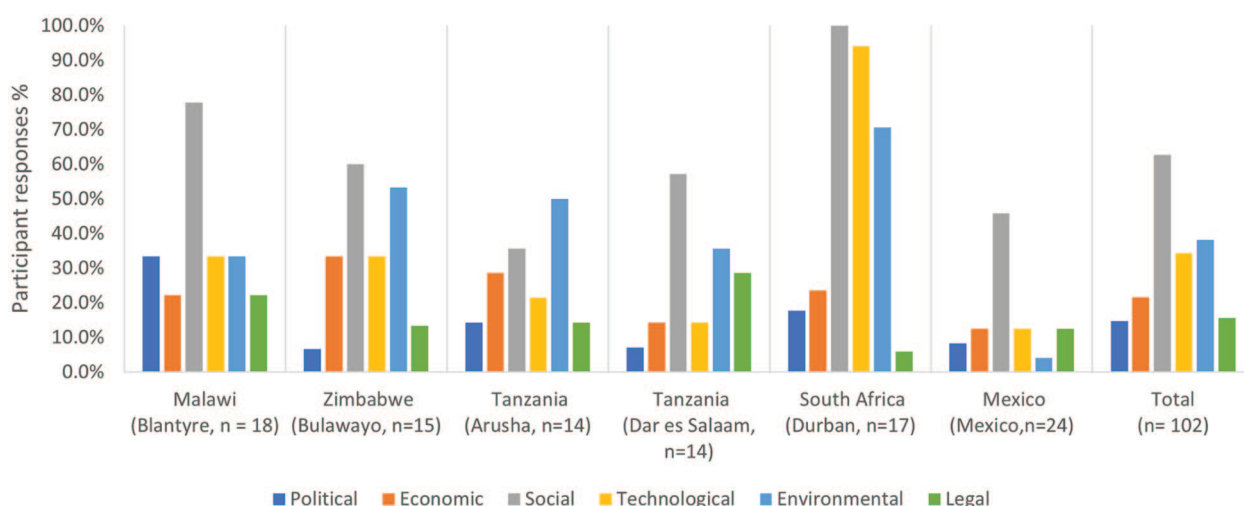
The mapping exercise revealed a range of organizational types participating in sanitation in the different countries, and the networks developed in the identification process (not shown here) suggest that there is collaboration between stakeholders. This agrees with best practice as laid out in the CWIS approach, which calls for representation from different sectors.<sup>16,35</sup>

Participants were predominantly male (73.5%) and well-educated (91.8% had tertiary education) which is representative of the WASH sector, as documented in a 2014 report which suggested that only 17% of WASH professionals are women (though this percentage was increasing), and tertiary education is required for most professional roles.<sup>36</sup>

The range of organizational goals of stakeholder organizations aligns with the principle that CWIS must go beyond infrastructure development; ensuring that there is a suitable



**Figure 5.** Barriers to promoting inclusive and sustainable urban sanitation.



**Figure 6.** Risks for promoting inclusive and sustainable urban sanitation.

enabling environment (including political will, regulations, and funding) and that people are educated about sanitation systems and their use are also key.<sup>16</sup> Differences in emphasis between the countries could be due to their progress up the sanitation ladder, with Mexico focused on the operational management of existing safely managed sanitation systems, and other countries focused on the design and implementation of new systems to increase access to safely managed sanitation and promote an associated behavior change.

### Interpretation of “inclusion”

The word “everyone” was frequently used (53.9% of respondents) when participants were asked to define “inclusion,” in line with the SDG goal to “leave no one behind.” This catch-all definition removes the focus from defining exactly which beneficiaries require focused attention, why they may currently be excluded, and methods to address this.<sup>16,37</sup> Further probing into who counts as “everyone” revealed that some groups were more frequently cited than others. Disabled

people, women, poor people, and children were all mentioned by participants, with 3 of these 4 (excluding the disabled) explicitly mentioned in the CWIS principles. Physically disabled people were the most cited focal group for Malawi, Zimbabwe, and Tanzania, which may relate to challenges with access and service provision which are still largely unimproved or limited. Women (who are explicitly referenced in SDG 6.2) were in the top 3 most cited groups in all sub-Saharan African countries, where many organizations have started to incorporate women’s empowerment into WASH programming.<sup>38</sup> In middle-income countries, like Mexico and South Africa, sanitation service provision is visibly unequal with richer neighborhoods having access whilst informal and economically marginalized settlements have only limited access,<sup>39</sup> leading to the poor being most cited.

This “leaves behind” men, people with mental health issues, and minority cultural or religious groups who were mentioned by less than 5% of respondents. We must also consider those without formal land tenure and sanitation workers, who are both explicitly referenced for inclusion by CWIS,

and those with limited legal status (eg, asylum seekers, or Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Asexual (LGBTQIA+) in countries where homosexuality is banned) who could be classed as marginalized by CWIS or “in vulnerable situations” by SDG 6.2. None of these groups were mentioned by respondents despite recent increase in advocacy campaigns to support their right.<sup>40</sup> This may be because they are already seen as being considered and included in decision-making (eg, non-poor working age men) or because they remain overlooked. This may be in part because of the lack of obvious visible cues of a person’s mental health, religion, and sexuality, or the challenges of interacting with people who are not recognized under national law. Existing literature explains that observed differences in inclusion priorities may stem from differences in institutional arrangements (lack of legislation, policies, and strategies regarding inclusive sanitation) or social and attitudinal differences (discrimination against or marginalization of some groups, stigma associated with certain conditions, experiences of living with shame or fear of embarrassment) in different locations.<sup>18,37</sup>

While these groups are differentiated, we acknowledge that marginalized communities will include a combination of these groups and that there is intersectionality between groups that are considered separately here. For example, in Mexico, indigenous women and children tend to be the most marginalized individuals and experience the highest levels of poverty and insecurity.<sup>41</sup>

Participants recognized community engagement and inclusion of beneficiaries as a key opportunity to achieve CWIS. This engagement must allow for the heterogeneity of populations, to prevent one-size-fits-all solutions that do not work.<sup>42</sup> Fortunately, citizens and CSOs are increasingly participating in urban planning activities and discussions.<sup>43</sup> In the case of Mexico City, the newly approved constitution promotes direct citizen participation in municipal councils through multiple avenues, such as participatory budgeting projects and the inclusion of initiatives at the neighborhood level.<sup>44</sup> While the reach and effectiveness of these modern participatory governance options is still to be proven, they have the potential to create more inclusive public policies or programs.

Alternative views of inclusion included a holistic approach to sanitation and the engagement of all stakeholders which are core to the CWIS. This may indicate that incentives for the operation and maintenance of the full sanitation service chain under CWIS is working or that there is a need to increase the efforts. The collaboration between different stakeholders in each city may in part explain why definitions of inclusion mentioned “different stakeholders” with an emphasis on taking a bottom-up approach.<sup>44</sup>

### *Interpretation of “sustainability”*

Different pillars of sustainability were emphasized in different locations. This appeared to partially reflect a country’s

economic status, with Malawi, Zimbabwe, and South Africa focusing on economic sustainability, while higher-income Mexico focused on balancing all 3 pillars of sustainability, in line with both the CWIS and SDG definitions.<sup>45</sup>

These findings point to an opportunity for international cooperation in addressing urban sanitation, whereby countries such as Malawi and Zimbabwe may be able to incorporate some lessons learned from countries like Mexico, to emulate effective approaches from countries that have faced rapid urbanization for decades. For example, improved access to sanitation may focus on costs and acceptability (aspects of economic and social sustainability). However, high levels of access to waterborne sanitation may be associated with significant environmental sustainability challenges, a situation typical of Mexico City and other Latin American cities. Urban sanitation planning has been recommended as a tool or approach for achieving sustainability<sup>2,45-47</sup> and could incorporate similar lessons through international cooperation. During such planning higher focus on funding for sanitation in areas with low population density (potential expansion areas for cities) have been recommended in recent studies.<sup>48,49</sup>

NGOs and donors both viewed economic and social sustainability to be of similar importance, which may be a result of donors supporting NGOs whose objectives most closely align with their own<sup>50</sup> as well as a focus on how services will be financed after a project ends. Meanwhile, governments had a clear focus on economic and environmental sustainability which may be driven by existing budgetary constraints and specific environmental legislation. The lack of focus on social sustainability from governments is concerning as they are major decision-makers in urban sanitation. This suggests that many government entities have still not managed to embed the CWIS principle that sanitation service delivery must meet user aspirations.<sup>50</sup> Political barriers to inclusive and sustainable sanitation were raised by nearly two-thirds of respondents, particularly in South Africa, Zimbabwe, and Mexico. Governments remain responsible for overseeing, regulating, and making decisions about urban sanitation which amplifies the impact of political barriers or risks when they cannot fulfill these roles.<sup>39</sup>

The focus on environmental sustainability by the private sector, CSOs, and academics may be a result of the need for research into resource recovery and the circular economy which is embodied in CWIS,<sup>1,7</sup> and the scope that this may hold for “sanitation as a business.” These were all identified as opportunities for urban sanitation. This drive for “sanitation as a business” was identified as an opportunity by 14.7% of respondents, with the view that it could increase the financial security of the sanitation sector and improve the quality of services whilst tending toward a more circular economy. Nevertheless, greater regulatory capacity on the part of local government to allow for efficient private sector involvement and operation may be lacking<sup>39</sup> and was identified as a risk by respondents.

With sufficient cooperation and coordination, the differences in focus on sustainability between sanitation actors may act as a strength to ensure that cities adopting CWIS can view the 3 pillars in balance. This requires community engagement, awareness raising, and education which were identified by respondents as opportunities.

However, it was concerning that climate change and the interdependence of water, energy, and food were not identified either in definitions of sustainability or as threats to inclusive and sustainable sanitation. Neither of these concepts are explicitly referred to by CWIS but oversight of these issues implies a lack of understanding of systems thinking around sanitation, and a failure to anticipate climate change impacts is likely to reinforce existing sanitation inequalities and vulnerabilities,<sup>51</sup> hindering progress toward SDG6.

### *Implications for policy and practice*

This study has shown that there is a wide range of different organizational actors collaborating in the urban sanitation space, in pursuit of CWIS. These organizations have a focus on CWIS beyond infrastructure which should be encouraged. However, organizations are more likely to collaborate with others who have similar definitions of sustainability and inclusion, despite the opportunity for improved outcomes when organizations can collaborate to achieve balance across the 3 pillars of sustainability. In this respect, different organizational types may act as “champions” for different aspects of sustainability. The circular economy and “sanitation as a business” concepts may offer new and creative long-term approaches to funding, as recommended by CWIS, to support the long-term environmental and social sustainability of urban sanitation, making the private sector a potentially under-valued actor in achieving CWIS. However, greater political engagement, long term partnerships with private operators, and policy attention to the circular economy will be required to ensure that these concepts are managed efficiently and serve citizen needs.<sup>48,49,52</sup>

When writing policy, vague catch-all terms relating to inclusion such as “everyone” or “for all” are not useful to the actors expected to implement that policy, and where possible, explicit terms stating which groups require focused attention for inclusion should be used. This study has shown that groups specified on CWIS and SDG definitions of inclusion were more likely to be highlighted by participants.

Community engagement and participatory governance are seen as key opportunities to foster inclusion in sanitation and are encapsulated within CWIS. However, visible attributes (such as physical disability, age, or gender) which clearly impact sanitation needs are more likely to be included in sanitation than less visible attributes; classing these less visible attributes as “vulnerable” or “marginalized” is insufficient for them to achieve practical recognition by implementers and decision-makers. As such, less visible

attributes that can result in groups being “vulnerable” or “marginalized” require careful attention from CSOs and NGOs, particularly if they are subject to social taboos or have limited legal status in the country of work. Without due attention, CWIS will continue to leave some groups behind in seeking to achieve SDG6.

### *Study limitations*

The organizational definitions of terms reported by participants matched their personal interpretations of inclusion and sustainability in almost all interviews. There is a limited likelihood that this is a result of individuals seeking to work at organizations that align with their values. Despite questions on inclusion and sustainability being asked in a specific order to ensure data reliability, the perspectives given by the stakeholders may still have been influenced by personal views on the topic and not their organizational policies. There was greater scope for irregularities in the data from Mexico, where online surveys had to be used and participants would have been able to go back and change their responses.

The sample size within each organizational type per city was small, which limits the ability to draw reliable comparisons between cities at this level. In many cases, there was no way to address this as there are limited numbers of certain organizations in any given city (eg, academic institutions or private sanitation businesses). However, given the small number of organizations in the sector, and the high proportion of those interviewed we do believe that we were able to achieve a degree of saturation in responses.

An important actor not included in the current study were the beneficiaries or citizens for whom sanitation services are provided. Execution of focus group discussions with citizens was not possible due to COVID-19 restrictions that prohibited public gatherings.

To address the current study limitations, future studies may consider verifying perspectives given by participants with their organizational policies and guidelines to validate the results further. Increasing the sample size for organizations within cities or across cities where possible may also be considered to allow in-city comparison. Future studies may also consider including citizens see how the concepts explored in this study translates into practice. Further consideration of how groups whose rights are not legally recognized, such as LGBTQIA+, asylum seekers, and those without land tenure, could be considered in urban sanitation provision would also be worthwhile.

### **Conclusion**

Citywide Inclusive Sanitation (CWIS) calls for sustainable urban sanitation services for all, but the definitions of “inclusion” and “sustainability” within the framework leave room for interpretation. Economic classification and progress up the

sanitation ladder in each city, as well as organizational type affected participants' focus in defining these terms. Inclusion tended to focus on the consideration of different beneficiary groups, though holistic approaches to sanitation, and the engagement of a wide range of stakeholders were both used to define inclusion as well. Vague terms such as "everyone" or services "for all" did little to shed light on which beneficiary groups required focused attention to ensure inclusion. This may be due to the greater visibility of some "marginalized" or "vulnerable" groups compared to others. Community engagement was seen by participants as the main opportunity to foster inclusion, and greater specificity in policy of which groups require focused attention is likely to enhance their visibility within sanitation service provision.

All three pillars of sustainability identified within CWIS were referenced, with different stakeholders focusing more closely on each one, in line with their organizational goals and interests. Greater collaboration between different organizational types may foster a balanced view of all three pillars, with different organizations acting as champions for each one. Governments had a concerning lack of emphasis on social sustainability, suggesting that NGOs and CSOs currently need to fill this gap while advocating for government to meet user aspirations in line with CWIS. The inclusion of the private sector and academics in sanitation networks through the adoption of concepts such as "sanitation as a business" and the circular economy could improve the focus on environmental sustainability. Greater policy attention to these concepts is needed to fully support their efficient implementation.

The study was limited by the exclusion of citizens, due to COVID-19 restrictions on public gatherings which prevented focus group discussions from being held. Personal interpretation of terms may have biased the results, though care was taken to avoid this. Nevertheless, the findings provide a good indication of how "inclusion" and "sustainability" are interpreted by different sanitation actors in the 6 cities included in the study, and this can facilitate discussions on a shared understanding of multi-stakeholder engagement in achieving sanitation service provision which is fully inclusive and sustainable.

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## Author Contributions

The research was conceptualised by RCS, FGB, AC, HK and TM, and the methodology was developed by KL, RCS, FGB and TM. Investigation was carried out by KL, AC, HL, FP, and HK with supervision from RCS, FGB and TM. Formal

analysis was carried out by CH and KL. The paper was drafted by KL, RCS and FGB, and all authors contributed to reviewing and editing. Funding was acquired by TM and project administration was carried out by KL, RCS and TM.

## Supplemental Material

Supplemental material for this article is available online.

## REFERENCES

- Gambrill M, Gilsdorf RJ, Kotwal N. Citywide inclusive sanitation—business as unusual: shifting the paradigm by shifting minds. *Front Environ Sci*. 2020;7:7.
- Luthi C. Citywide inclusive sanitation and SDG 6. 2019. Accessed November 22, 2022. [https://www.researchgate.net/publication/333652738\\_Citywide\\_Inclusive\\_Sanitation\\_and\\_SDG\\_6](https://www.researchgate.net/publication/333652738_Citywide_Inclusive_Sanitation_and_SDG_6)
- Annan-Aggrey E, Bandaiko E, Arku G. Localising the Sustainable Development Goals in Africa: implementation challenges and opportunities. *Commonw J Local Govern*. 2021;24:4-23.
- Mausser W, Klepper G, Rice M, et al. Transdisciplinary global change research: the co-creation of knowledge for sustainability. *Curr Opin Environ Sustain*. 2013;5:420-431.
- WHO. Systems thinking for noncommunicable disease prevention policy: guidance to bring systems approaches into practice. 2022. Accessed October 17, 2022. <https://link.springer.com/article/10.1186/s12992-019-0527-1>
- UNESCO. Transdisciplinarity: Stimulating synergies, integrating knowledge. Division of philosophy and ethics. 1998. Accessed March 28, 2022. <https://unesdoc.unesco.org/ark:/48223/pf0000114694>
- Schrecongost A, Pedi D, Rosenboom JW, Shrestha R, Ban R. Citywide inclusive sanitation: a public service approach for reaching the urban sanitation SDGs. *Front Environ Sci*. 2020;8:19.
- WaterAid. Climate change adaptation and resilience and water, sanitation and hygiene: links between SDG 13 and SDG 6. 2019.
- UN. Transforming our world: the 2030 agenda for sustainable development. 2015. Accessed March 15, 2022. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
- Andersson K, Dickin S, Rosemarin A. Towards "sustainable" sanitation: challenges and opportunities in urban areas. *Sustainability*. 2016;8:1289.
- Jiménez A, Jawara D, LeDeunff H, Naylor K, Scharp C. Sustainability in practice: experiences from rural water and sanitation services in West Africa. *Sustainability*. 2017;9:403.
- Cassivi A, Tilley E, Waygood EOD, Dorea C. Trends in access to water and sanitation in Malawi: Progress and inequalities (1992-2017). *J Water Health*. 2020;18:785-797.
- House S. How to make WASH projects sustainable and successfully disengage in vulnerable contexts: A practical manual of recommendations and good practices based on a case study of five ACF -IN water, sanitation and hygiene projects. 2007, 202.
- Brikké F. *Operation and Maintenance of Rural Water Supply and Sanitation Systems a Training Package*. For Managers and Planners; 2000.
- Hawkins P, Blackett I, Heymans C. Poor-inclusive urban sanitation: An overview targeting the urban poor and improving services in small towns. Water and Sanitation Program; 2013. Accessed November 22, 2022. <https://www.wsp.org/sites/wsp/files/publications/WSP-Poor-Inclusive-Urban-Sanitation-Overview.pdf>
- Guzmán N, Huuhtanen S, Katsui H, et al. Inclusive WASH activities in the global south. 2016.
- Kiyimba J. Uganda Inclusive WASH infrastructure design: Safe water, sanitation and hygiene. 2015, 7. [https://assets.publishing.service.gov.uk/media/57a0896ded915d3cfd00023c/Briefing\\_Note\\_Inclusive-WASH-Infrastructure-Design\\_Oct2015.pdf](https://assets.publishing.service.gov.uk/media/57a0896ded915d3cfd00023c/Briefing_Note_Inclusive-WASH-Infrastructure-Design_Oct2015.pdf)
- The Open University UK/WaterAid. Count me in! Inclusive WASH in Ethiopia. 2018.
- Ahrari S. Leaving no one behind in WASH alliance programme through adopting an inclusion lens. 2016.
- World Bank. World Bank Country and Lending Groups – World Bank Data Help Desk. 2021. Accessed March 16, 2022. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- Espen B, Wadhwa D. WDI - Classifying countries by income. The World Bank. 2019. Accessed October 17, 2022. <https://datatopics.worldbank.org/world-development-indicators/stories/the-classification-of-countries-by-income.html>
- WHO, UNICEF. Data | JMP. 2017. Accessed March 26, 2021. <https://wash-data.org/data>

23. Ferretti V. From stakeholders analysis to cognitive mapping and multi-attribute value theory: an integrated approach for policy support. *Eur J Oper Res.* 2016;253:524-541.
24. Zimbabwe National Statistics Agency. Inter-Censal Demographic Survey. 2017.
25. INEGI. Anuario estadístico y geográfico de La ciudad de México 2017. 2017. Accessed November 22, 2022. [https://www.inegi.org.mx/contenido/productos/prod\\_serv/contenidos/espanol/bvinegi/productos/nueva\\_estruc/anuarios\\_2017/702825094683.pdf](https://www.inegi.org.mx/contenido/productos/prod_serv/contenidos/espanol/bvinegi/productos/nueva_estruc/anuarios_2017/702825094683.pdf)
26. Statistics South Africa. Census 2011 Statistical release – P0301.4 / Statistics South Africa. Pretoria: Statistics South Africa, 2012. Accessed November 22, 2022. <https://www.statssa.gov.za/publications/P03014/P030142011.pdf>
27. URT. Thematic Report on Housing Condition, Household Amenities and Assets Monograph, 2012 Population and Housing Census Volume IV. 2015, 255.
28. National Statistical Office. 2018 Malawi Population and Housing Census. 2019.
29. Buckley C. Durban South Africa produced by: PRG executive summary. 2016. Accessed November 22, 2022. [https://www.susana.org/\\_resources/documents/default/3-2540-7-1462179297.pdf](https://www.susana.org/_resources/documents/default/3-2540-7-1462179297.pdf)
30. Bulawayo City Council. Bulawayo water and improvement project zimbabwe sewerage services. 2015, 18.
31. Collet S, Yesaya M, Tilley E. SFD Report Blantyre Malawi - Final Report. 2018. Accessed November 22, 2022. [https://www.susana.org/\\_resources/documents/default/3-3545-7-1550665329.pdf](https://www.susana.org/_resources/documents/default/3-3545-7-1550665329.pdf)
32. Brandes K, Schoebitz L, Kimwaga R, Strande L. SFD Promotion Initiative Dar es Salaam Tanzania Final Report. SFD Promotion Initiative. 2015.
33. Munamati M, Nhapi I, Misi SN. Impact of sanitation monitoring approaches on sanitation estimates in sub-Saharan Africa. *J Water Sanit Hyg Dev.* 2018;8:481-496.
34. Munamati M, Nhapi I, Misi SN. Monitoring sanitation performance: unpacking the figures on sanitation coverage. *J Water Sanit Hyg Dev.* 2015;5:341-350.
35. Scott P, Cotton AP. The Sanitation Cityscape – toward a conceptual framework for integrated and Citywide Urban Sanitation. *Front Environ Sci.* 2020;8:70. <https://doi.org/10.3389/FENV.S.2020.00070/BIBTEX>
36. IWA. WASH human resource capacity gaps in 15 developing economies. 2014. Accessed November 22, 2022. <https://iwa-network.org/wp-content/uploads/2016/03/1422745887-an-avoidable-crisis-wash-gaps.pdf>
37. Ahrari S, Remmers J. Social inclusion in the WASH strategy 2016-2030 of the Dutch ministry of foreign affairs. 2019, 19.
38. Dery F, Bisung E, Dickin S, Dyer M. Understanding empowerment in water, sanitation, and hygiene (WASH): a scoping review. *J Water Sanit Hyg Dev.* 2020;10:5-15.
39. Beard VA, Satterthwaite D, Mitlin D, Du J. Out of sight, out of mind: understanding the sanitation crisis in global South cities. *J Environ Manag.* 2022;306:114285.
40. World Bank, ILO, WaterAid, WHO. Health, safety and dignity of sanitation workers: an initial assessment. 2019. Accessed November 1, 2022. <http://hdl.handle.net/10986/32640>
41. González-Martell AD, Sánchez-Quintanilla EE, García-Aguilar N, Hernández-Contreras T, Cilia-López VG. Vulnerability for food insecurity: experiences of indigenous families in the Huasteca Potosina region, Mexico. *Estud Soc Rev Aliment Contemp Desarro Reg.* 2022. Accessed November 22, 2022. <https://doi.org/10.24836/es.v3i59.1162>
42. Banana E, Chikoti P, Harawa C, et al. Sharing reflections on inclusive sanitation. *Environ Urban.* 2015;27:19-34.
43. Munthe-Kaas P. Agonism and co-design of urban spaces. *Urban Res Pract.* 2015;8:1-20.
44. Mendoza AA, Gaona HT. La Constitución de la Ciudad de México, la ciudadanía y la participación. *Argument Estud Crit Soc.* 2020;1:13-33.
45. Weitz A. Urban sanitation planning and development. 2008.
46. Mtika WM, Tilley E. Environmental sanitation planning: feasibility of the CLUES framework in a Malawian Small Town. *Front Environ Sci.* 2020; 7:1-15.
47. Stockholm International Water Institute. City-wide sanitation: The role of planning. 2016.
48. Pereira MA, Marques RC. Sustainable water and sanitation for all: are we there yet? *Water Res.* 2021;207:117765.
49. Pereira MA, Marques RC. From a millennium to a sustainable water and sanitation development: were we there already? *J Water Supply Res Technol.* 2022;71:293-300.
50. Ismail Z. Advantages and value of funding NGOs in the global south. 2019.
51. Hyde-Smith L, Zhan Z, Roelich K, Mdee A, Evans B. Climate change impacts on urban sanitation: a systematic review and failure mode analysis. *Environ Sci Technol.* 2022;56:5306-5321.
52. Mallory A, Akrofi D, Dizon J, et al. Evaluating the circular economy for sanitation: findings from a multi-case approach. *Sci Total Environ.* 2020;744:140871.