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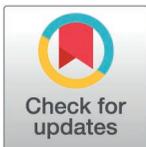
Disciplining sanitation: Interrogating disciplinary narratives of inequalities in access to sanitation

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Infrastructure is rarely broken for everyone [1].



Introduction

This essay explores how narratives on sanitation and inequalities are shaped by academic disciplines and the impact this has on how different actors engage to address inequalities in access to sanitation for people living in informal settlements. It is based on research using the Bacchi Framework [2] to examine how academic disciplines problematise inequalities in access to sanitation.

Universal access to sanitation is written into constitutions, legislation, policies and strategies in many countries around the world, as well as being embedded in target 6.2 of the Sustainable Development Goals [3]. Despite this wealth of intention, enjoyment of the human right to sanitation remains a pipe dream for most people living in informal settlements around the world [4].

The theoretical underpinning of ‘leaving no-one behind’ is the human rights principle of non-discrimination and equality and the prioritisation of the most vulnerable and marginalised individuals and groups. This is embedded within the United Nations 2030 Development Agenda: “As we embark on this great collective journey, we pledge that no one will be left behind” [3]. Further, the aim is to achieve, “[a] just, equitable, tolerant, open and socially inclusive world in which the needs of the most vulnerable are met” [3].

These are rousing words, but the obligation to leave no one behind is interpreted and implemented to some extent dependent on disciplinary narratives, without necessarily integrating the prioritisation of marginalised and vulnerable individuals and groups. Social scientists, in attempting to understand underlying reasons for exclusion, focus on social, cultural and political marginalisation and vulnerabilities [5]. However, other perspectives may brush concerns of systemic inequalities under the carpet within a broader narrative of achieving universal access to sanitation without an explicit focus on eliminating inequalities. For example, WHO [6] states that, ‘investment is needed in incremental improvements where they can have the greatest impact for the most people’. This utilitarian expression of ‘universal access’ can be interpreted by service providers as encouragement to reach as many as people as quickly as possible using

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available resources. This is then often supplemented with an undefined plan to ‘reach the last mile’ [7,8], or ‘the bottom of the pyramid’ [9] or some other negative euphemism for vulnerable and marginalised individuals and groups. In reality, it can be difficult to reach even middle-income residents, so the goal of ‘universal access’ is never achieved, leaving a consistent minority, even in high-income countries, without services [10,11].

Increasingly, academics, researchers and practitioners are urged to approach their work using transdisciplinary methods and processes [12]. This requires those based in one school to engage with actors from other relevant disciplines, who may espouse different rationales, scientific methods and narratives, to resolve intractable real-world wicked problems. However, given different disciplinary understandings of the same problem, this process of bringing disciplines together can be challenging, despite good intentions.

Sanitation, particularly for urban marginalised populations, presents one of these wicked problems [13]. Recent research has identified a broad range of failures in achieving safely managed sanitation, including limited funding, unsuitable technologies, poor hygiene habits, poverty, and weak political support [14]. Traditionally, these individual failures have been resolved by the appropriate discipline, but a transdisciplinary approach provides opportunities for deeper engagement with each of these failures.

The disciplines explored in this essay include those essential for the process of ensuring access to sanitation, including engineering, economics and finance, public health and social sciences. Within these broadly defined disciplines, this essay focuses on public health engineering; the economics of sanitation and financing for sanitation; sanitary public health; and under the rubric of social sciences - the sub-disciplines of human rights, political economy, governance and social justice.

Engineering is perhaps the discipline most commonly associated with sanitation service provision, for the technical and managerial skills necessary for creating the physical infrastructure, and for its operation and maintenance. Economics discusses how sanitation is critical for broader social and economic development and the benefits of sanitation to the individual, household and society, and how and by whom sanitation can and should be financed. Epidemiological public health research provides evidence for how sanitation protects individual and societal health, and how people’s behaviour impacts these outcomes. Finally, whether from a political economy, participatory governance or social justice perspective, social sciences explore decision-making processes, power relations between different stakeholders, and the economic, social and cultural contexts that create systemic inequalities in access to sanitation.

In examining how different academic disciplines discuss inequalities in access to sanitation, and how they identify challenges and barriers, we can see whether disciplinary understandings, rationales and motivations may ease, challenge or limit collaboration through conflicting narratives and representations. This essay provides insights into why a transdisciplinary approach to understanding and resolving this wicked problem can lead to more equitable sanitation outcomes. It starts with a brief

explanation of what is meant by problematisations and then explores how inequalities in access to sanitation have been problematised by different disciplinary traditions. It also briefly explores ‘*epistemic communities*’ [15], which represent a common narrative that exists across academic disciplines. These epistemic communities can influence ideas, opinions and worldviews more broadly, going beyond disciplinary problematisations.

Problematisations

Disciplinary traditions each have their own approaches, or narratives to explain the world [16]. These narratives contain within them the representation of a problem, or problematisation, which defines what solutions a particular discipline is able to propose. This in turn influences what policies are defined and how decisions are made [2].

Following a review of articles and reports written from the perspectives of the identified disciplines and subdisciplines, this essay uses the Bacchi Framework to provide the theoretical basis of the analysis [2]. This framework was originally developed for critical policy analysis [17] and has since been used more broadly to explore political discourse and power (for example, [18] on whistleblowing and [19] on social justice). The framework demands that we examine not only the problematisations, but also the assumptions that support the problematisations, and the silences within the problematisations, what is left out in the analysis of the problem. This essay applies this framework to disciplinary narratives on inequalities in access to sanitation.

Probably the most common narrative of why improved access to sanitation is essential is stated by the WHO [6]: “*The underlying purpose of sanitation systems is to protect public health*”. This is the basis of much of the rhetoric by engineers and others working towards improving access to sanitation, also providing an argument for ensuring universal access.

When discussing the societal health benefits of universal access to sanitation, the sanitation revolution of mid-nineteenth century Europe is frequently cited. The scientific evidence of how cholera is spread through water systems, combined with the availability of sufficient public resources and strong political convictions of the economic and social benefits of access to safe water and sanitation led to improved housing and services. Much of the public health debate has sought to replicate this sanitation revolution in developing countries [20]. However, it is also argued that that the European sanitation revolution was an anomaly, where scientific knowledge, political interest in public health and the availability of the necessary public funding coincided [21]. Further, in the nineteenth century, adequate sanitation was the only available way of improving public health [22]. This suggests that the underlying assumption that sanitation is required for public health is an overstatement. It remains generally unspoken that in the twenty-first century, the elite are both able to afford their own safely managed sanitation, and can protect themselves from others’ ill-health and poor sanitation through medical advances, including antibiotics and vaccinations [23,24]. This has arguably removed the political urgency for many governments to protect public health for the entire population [25–27].

Further, while the evidence is clear of how pathogens are transferred and cause ill-health [28], the ability of sanitation and hygiene programmes to achieve the necessary separation between pathogens and humans, and the impact of these interventions on public health is still being debated. A recent umbrella review of the impact of public health interventions on health inequalities, including sanitation showed that: “*For all other interventions [including sanitation], the effects were either unclear, unknown or detrimental, either at the overall population level or regarding health inequalities... ..the quality of the evidence base was generally low*” [29]. In other words, the assumption that sanitation interventions are improving public health cannot be proven.

The World Health Organization also recognises that public health is not dependent only on the presence of adequate sanitation, as “*the combination of technologies, behaviour change and management approaches used in these interventions does not systematically interrupt transmission of locally relevant diseases*” [6]. Further, as Oberg [30] observes, “*the risks shit and open defecation pose to human health are relative to many other human practices, such as development of dense human settlements.*” There is a silence in the public health argument of sanitation improving public health, in that

there are other inequalities present in urban settlements, not least that of high population densities, that have a critical impact on public health.

While this public health problematisation provides valuable societal rationales for ensuring access to sanitation, individuals and households may have other reasons for adopting sanitation, or not. These include mental well-being, which may be as important to the individual as protection from physical disease. Despite mental well-being also being part of the human right to an adequate standard of living, this is not problematised by WHO in their recent Sanitation Safety Planning Guidelines. These place value on “*systematically identifying and prioritizing health risks along the sanitation chain*” [6] without mentioning the mental health risks that accompany inadequate sanitation [31,32].

Oberg [30], who also uses the Bacchi framework to discuss narratives relating to sanitation, notes that: “*Inconvenience was the problematization invoked most frequently by slum residents, but never by governance groups, meaning that issues of inconvenience were absent from formal planning processes.*” She also notes that, “*none of the respondents expressed embarrassment about open defecation in general. They did not characterize going to the field as inherently undignified as problematized by international aid organizations*” [30]. This demonstrates an interesting counterpoint to the problematisations of public health risk and economic development, introducing the perspective of the individual and the household, rather than society. Other articles contradict this, finding that open defecation is felt to be undignified by those who practice it. The relevance to this discussion of problematisation may therefore be the social science perspective of the impact of inadequate sanitation on the individual and user, rather than of the society-wide perspective more common of the public health narrative.

A problematisation stemming from the discipline of economics are the negative economic and environmental impacts of inadequate sanitation, in that, “*poor sanitation discourages investment and economic development, undermines tourism, and damages the natural environment and the water resources that support human life*” [33].

This economic benefits of sanitation [34] are meant to be understood as ‘costs averted’ by individuals and society as a whole rather than as a business case for sanitation service providers. Unfortunately, this economic case is often misconstrued and conflated with the opportunity for profit-making [35]. As Igarashi et al. [36] have demonstrated, there are no specifically ‘pro-poor’ or ‘low-cost’ safely-managed sanitation systems available. The complexities of sanitation service provision mean that there is often limited potential for financial returns on investments, particularly for sanitation delivery in informal settlements. Given the choice, investors and donors would rather invest in roads or water, which have a more demonstrable return on investment. Howe et al. [1] confirm that other interventions such as bed nets for malaria are preferred by investors over sanitation, and OECD [37] concede that, “*Provision of sanitation services is basically not a very attractive business case; (...) There are high levels of unwillingness to pay and collection of tariffs is cumbersome (...) financing rather flows to sectors that are more easily accessible (...) have a higher political profile*”. This confirms the finding that it is easier to find investment for curative than preventative health measures [38].

Despite these clear indications that the business case for sanitation is limited, many global and other financial institutions place faith in the private sector being able to improve both investments in and access to sanitation, through bringing in, “*more efficient and effective management techniques so as to improve operations*”, with the caveat that “*only with a solid business case, the private sector can survive*” [37]. This assumption of private sector efficiency, while originating from an economic perspective, has been pushed for the last half century to become an accepted truth, promoted by influential actors such as the World Bank and others [15].

Engaging with Bacchi’s Framework to consider the silences hidden within this economic problematisation identifies that the market does not respond to the needs of people living in poverty, particularly as “*the private sector will... .. focus on increasing revenues*” [37] through “*strengthen[ing] the payment regime*” [37]. Efficiency, particularly in payment processes and collection rates, is generally the most significant aspect of engagement with the private sector. As Brugger [39] states, currently “*...the prominent solutions proposed to achieve SDG 6.2, (...) predominantly target private actors and the household scale. Such approaches are at high risk to only marginally improve access to safe sanitation and, more worryingly,*

only for those with the willingness and the ability to pay.” Overall, the move towards economic efficiency and individual choice limits the focus on inequalities [40].

The majority of articles on sanitation in urban settlements are written by public health engineers, some of whom discuss the piloting of technologies without consideration of the context, as noted by van Vliet et al. [41] “a wider set of criteria, rather than technical criteria only, needs to be applied to assess the feasibility of new sanitation technologies.”

Partly because of an emphasis on technologies, the blame for behaviour is sometimes still placed with the users: “Users may also value the perceived status of a particular system, such as a flush toilet, over interest in sustainability of the systems” [42]. There is also an oft-repeated comparison between users failing to prioritise sanitation over mobile phones, as if these services are comparable to the user, or in terms of delivery process [22]. However, the majority of articles by public health engineers recognise that even the best technologies are not sufficient to resolve problems of sanitation in densely populated urban settlements, and that other disciplines must be engaged [43,44]. Technologies are not a silver bullet [45], in part because, “resource-limited communities face high sanitation failure rates (...) often because systems do not adequately address local priorities or operational needs” [46].

The governance sub-discipline, linked predominantly to social sciences, problematises the economic and other resource challenges that local governments face in ensuring access to sanitation, particularly as, “the severe decline, or even collapse, in state capacities which followed the economic crises of the 1980s and the subsequent structural adjustment programmes made the idea of a radically downsized state seem the only viable option” [47]. This has led to a situation where governments no longer provide basic services but are still expected to play a regulatory role. However, as Grindle [48] states, ‘it is not at all clear that governments unable to provide basic services to the poor will be any better at providing and implementing satisfactory regulatory regimes’. As little formal sanitation is provided to informal settlements, this risks governments no longer engaging with sanitation for people living in informal settlements, and the residents become invisible [49,50], or in some cases, criminalised [51].

Blackett [52] places the emphasis of problematisation on governance structures, stating that, “uncoordinated and unregulated actions of individual customers and informal service providers” arise because of “weak, unclear or non-existent institutional mandates”. The difficulty of creating the necessary institutional mandates in a resource-poor environment are acknowledged, but as there are no easy solutions, this becomes a silence in much of the literature.

This problematisation can be seen in the development concept of ‘good governance’ and the current focus on ‘systems strengthening’, which has identified so many areas of government action, that, “[t]his is a tall order for any government, let alone for poor ones with major deficits on all these counts. Such expectations have done much to abstract the discussion from consideration of the institutions and processes that are at the heart of the concept of governance—pointing instead to endpoints of performance with little understanding of how to get there” [53]. This problematisation is critiqued by Molle [15] who writes about ‘nirvana concepts’ of good governance, unattainable by most local authorities.

Social science researchers and practitioners are well placed to understand the complexities of working with local authorities as they attempt to realise all their obligations, agreeing that, “[t]his list of the responsibilities of the city in monitoring and maintenance keeps gradually growing” [54]. They also recognise the “capacity of municipal politics to complicate situations” [54], referring to the ability of politicians to stop programmes that do not serve their own political aims.

A significant complexity in understanding governance are the layers of reality that governments and residents must manage. Bylaws set a particular standard, but a blind eye will be turned to ensure that the limited sanitation services available are affordable: “In many urban contexts, these have to rely on shared or communal provision (...) But this often means having to contravene official regulations, and doing that while keeping local government on board is never easy” [55].

Lemanski [56] comments that there is often a mutual lack of trust and respect between governments and the population: “While the state criticises citizens for their uncivic, unmodern, ungrateful and disruptive actions in informally extending housing capacity and destroying the networked settlement through over-demand and inappropriate behaviour (e.g.,

refuse dumping, external sanitation), citizens view their actions very differently.” This exposes the discomfort felt by governments between their obligations to ensure that everyone has access to sanitation, and their failure to recognise how inequalities prevent people from behaving in the way that governments expect.

This is reflected in the often sweeping assumptions about how people live in informal settlements, for example, “*populations are often transient due to changes in income, employment, or flooding, hindering capacity for sustained technology operation and equitable decision-making*” [46]. Many cities’ informal settlements have existed for decades, and this rhetoric of disorganisation and transience provides an excuse to further exclude their residents from service provision [57]. Additionally there is a paternalistic attitude to behaviour change messaging, which often focus on educating people on “*the biological dangers of shit, assuming that lack of scientific knowledge is the problem*” [30].

Deepening the problematisation of poverty in the social science discipline, Hutchings et al. [58] in their study of pro-poor investments in sanitation question how the “*slippery concept*” of poverty is defined, and whether there is any real intention of overcoming apathy towards the poor: “*lenders and service providers will continue to treat it [pro-poor considerations] as a ‘nice-to-have’ rather than a fundamental performance indicator like the more universally understood ones related to financial and technical performance*” [58]. This insight highlights that the (more) quantifiable questions of what sanitation costs and what pipes are required are preferred to the politicised questions of who benefits, and who does not benefit.

Informality as a counterpoint to formality is seen as a negative characteristic. However informal settlements also provide essential accommodation to key workers within a city and have generally arisen due to a wide range of inequalities. As Scott et al. [49] comment: “*Informal settlements are the response to the gap between the cost of the cheapest ‘legal’ accommodation and what large sections of the growing urban population can afford to pay.*” According to the OECD [37], part of the problem is that “*urban growth is hard to forecast also because of unpredictable urban migration*”, but this inability to forecast urban growth may also be a symptom of a lack of interest and a refusal to accept the realities of increasing urbanisation.

Lemanski [56] comments on the problematisation of informality compared to formality, noting that there is not a simple line between one and the other: “*in practice hybrid practices are dominant, whereby urban dwellers simultaneously access networked and non-networked infrastructure, even in fully-serviced state-subsidised housing settlements.*” Roy [59] echoes this in identifying that informality is no longer the exception but the norm in many cities and therefore planning for service provision must include planning within informal settlements and with informal service providers.

Some of this problematisation of informality is identified as a lack of tenure preventing investment by both households and by other potential funders, the absence of formal planning limiting what technologies can be used. This is explored in detail by Scott et al. [60]: “*Urban sanitation development is complex (...) particularly for those without access to even basic services whose lack of property rights, tenure security and official recognition disincentivises investment in, for example, upgrading a toilet.*” Scott et al. [49] make the same point: “*Tenure and home ownership are identified as key determinants of demand for sanitation, as fear of eviction discourages households from investing in good sanitation facilities.*”

However, in other instances, “*regulations were relaxed, allowing services to be delivered to areas without legal title*” [49] suggesting that the problem may not actually be legal tenure, but other limitations are at play, such as political barriers, which are seldom explored or mentioned. Further, in relaxing regulatory processes, there is often a silence around the impact of lowering the standard of sanitation, which may increase access to sanitation for people living in informal settlements [61], but risks the acceptance of double standards and increasing inequalities in access to sanitation. Here there is an assumption that people who live in informal settlements should be prepared to accept lower standards than people living in formal settlements, in direct contravention of the human right to sanitation [62]. Lerebours et al. [63] also comment on the additional cost of fully regulating services, which makes informal service provision unaffordable.

Gender is also problematised in access to sanitation, with Patel et al. [54] commenting that existing systems are not designed for marginalised people, and that efforts must be made to respond to the needs of women, placing exclusion at the centre of the discussion. However, gender problematisations can be over simplified [64]. For example, the lack of access to sanitation has been identified as providing opportunities for gender-based violence [65] but as Oberg [30] states, “*the problem is represented as a lack of toilets rather than a culture of gender-based violence*”, which Koli-paka et al. [64] argue leads to ‘...reinforcing patriarchal controls, neglecting women’s right to public spaces and male accountability’.

Using a more transdisciplinary lens, Mills et al. [66] problematise political prioritisation, with the most significant needs for sustainability or improvements in access to sanitation by people living in informal settlements overturned by politicians and funding agencies. This highlights the silence that exists within the engineering and public health problematisations regarding the influence of political decision-making. Political influence tends to prioritise the haves over the have-nots, and this is deepened by the ability of financiers and richer residents to buy preferential treatment in the absence of sufficient funding for all needs. As observed by Rosenqvist et al. [67], “*the funding challenge has largely shaped the sanitation debate over the last five decades.*” Likewise, in [68] Evans states, “*Decision making is money-driven*”.

Drawing on Bacchi’s work, this essay has discussed how different academic disciplines broadly problematise sanitation and inequalities in access to sanitation, particularly for people living in informal settlements. These problematisations from public health, economics, engineering and the social sciences exist simultaneously, reflecting many perceptions of what needs to be done to improve access to sanitation.

Engaging with problematisations across disciplines challenges all actors to consider different narratives leading to solutions that may otherwise not be identified. The language of the technological and management systems reinforces the engineering and economic problematisations, while the language of social sciences can reinforce understandings of systemic inequalities. However, if the goal of “leaving no-one behind” is to be taken seriously, this needs to be brought into economic, engineering and public health problematisations more strongly. As Bhatt [69] states, inequalities cannot be eliminated if the focus is on ‘efficiency’. A clear link between unsafely managed sanitation and disease is not sufficient for creating the kind of changes in sanitation governance and the changes in behaviour that are required to reduce the burden of disease exacerbated by inadequate sanitation.

Notwithstanding the prevalence of disciplinary problematisations, they do not always strictly follow disciplinary lines, but intersect, overlap and contradict within and between disciplines, sometimes following wider societal beliefs and assumptions [15]. Problematisations reflect disciplinary language but also embedded in the narratives are political orientations and world-views. As Molle [15] comments, ‘*epistemic communities*’ can extend beyond an academic discipline to policy and law-makers, which he examines regarding the assumption that the private sector offers efficiency, not borne out by the evidence. Importantly, some disciplines have more resources to build these communities than others, for example political elites and oligarchs can fund think tanks that popularise the neoliberal economic thinking that supports their material interests. This imbalance of power is one obstacle to collaborative transdisciplinary approaches.

This essay is not the first to advocate for the integration of disciplinary thinking into how the sanitation challenge is tackled. Hyun et al. [13] make a similar plea to engage environmental scientists, health scientists, engineers, economists, planners, urban geographers and gender specialists. Further, van Vliet et al. [41] call for social sciences to be more embedded in discussions on sanitation. However, as suggested by the Bacchi Framework, to provide insights into how challenges and barriers to accessing sanitation can be alleviated, these transdisciplinary discussions must engage more deeply with the different disciplinary problematisations, assumptions and silences. This essay has revealed that currently there is no common narrative on how to tackle the sanitation challenges of inequalities in access to sanitation, in part due to differences in presentations of the problem. Armed with this deeper understanding of why different disciplines hold these presuppositions and representations, it will be possible to disrupt entrenched disciplinary approaches to provide more comprehensive and equitable solutions.

Author contributions

Formal analysis: Virginia Roaf.

Writing – original draft: Virginia Roaf.

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References

1. Howe C, Lockrem J, Appel H, Hackett E, Boyer D, Hall R. Paradoxical infrastructures: ruins, retrofit, and risk. *Science, Technology, & Human Values*. 2016;41(3):547–65.
2. Bacchi CL, Goodwin S. *Poststructural policy analysis: A guide to practice*. Basingstoke: Palgrave Macmillan; 2016.
3. United Nations. *Transforming our world: The 2030 Agenda for Sustainable Development*. A/RES/70/1. New York: United Nations General Assembly; 2015.
4. UN-Habitat. *Global Report on Sanitation and Wastewater Management in Cities and Human Settlements*. UN-Habitat; 2023.
5. Anand N, Gupta A, Appel H. *The promise of infrastructure*. Durham: Duke University Press; 2018.
6. WHO. *Sanitation Safety Planning Manual*. Geneva: WHO; 2022.
7. Russek K. Water as a human right: A “last mile” problem? Or a “first mile” problem? *Water Center at Penn*; 2025. <https://watercenter.sas.upenn.edu/splash/water-human-right-last-mile-problem-or-first-mile-problem>
8. Rieiro F. Reaching the last mile: notions and innovations from the 41st WEDC Conference. 2018. [Cited 2025]. <https://archive.ids.ac.uk/clts/blog/reaching-last-mile-notions-and-innovations-41st-wedc-conference.html>
9. Baskovich MR. Promoting sanitation markets at the bottom of the pyramid in Peru: A win-win scenario for government, the private sector, and communities. *World Bank*. 2010. <https://documents1.worldbank.org/curated/en/160541468296415717/pdf/601940BRI0Box31keting0in0Peru1FINAL.pdf>
10. Brown J, Acey CS, Anthonj C, Barrington DJ, Beal CD, Capone D, et al. The effects of racism, social exclusion, and discrimination on achieving universal safe water and sanitation in high-income countries. *Lancet Glob Health*. 2023;11(4):e606–14. [https://doi.org/10.1016/S2214-109X\(23\)00006-2](https://doi.org/10.1016/S2214-109X(23)00006-2) PMID: 36925180
11. Roaf V, Winkler IT. Challenging exclusion: bringing the human rights to water and sanitation to Europe. *Journal of Water, Sanitation and Hygiene for Development*. 2024;14(10):971–5. <https://doi.org/10.2166/washdev.2024.179>
12. Fam D, Clarke E, Freeth R, Derwort P, Klaniecki K, Kater-Wettstädt L, et al. Interdisciplinary and transdisciplinary research and practice: Balancing expectations of the ‘old’ academy with the future model of universities as ‘problem solvers’. *Higher Education Quarterly*. 2019;74(1):19–34. <https://doi.org/10.1111/hequ.12225>
13. Hyun C, Burt Z, Crider Y, Nelson KL, Sharada Prasad CS, Rayasam SDG, et al. Sanitation for Low-Income Regions: A Cross-Disciplinary Review. *Annu Rev Environ Resour*. 2019;44(1):287–318. <https://doi.org/10.1146/annurev-environ-101718-033327> PMID: 32587484
14. Barrington DJ, Sindall RC, Chinyama A, Morse T, Sule MN, Beale J, et al. The persistence of failure in water, sanitation and hygiene programming: a qualitative study. *BMJ Glob Health*. 2025;10(2):e016354. <https://doi.org/10.1136/bmjgh-2024-016354> PMID: 40000060
15. Molle F. Nirvana concepts, narratives and policy models: Insights from the water sector. *Water Alternatives*. 2008;1(1):131–56.
16. Trowler P, Saunders M, Bamber V. *Tribes and territories in the 21st century: rethinking the significance of disciplines in higher education*. Taylor & Francis; 2012.
17. Bacchi CL. *Analysing policy: what’s the problem represented to be?*. Frenchs Forest, NSW: Pearson Australia; 2009.
18. Zimmermann P. Staging debates in Whistleblowing research: a problematizing literature review. *J Bus Ethics*. 2025;202(4):677–89. <https://doi.org/10.1007/s10551-025-05990-2>
19. McMahon S. *Using poststructural policy analysis for social justice*. Policy Press; 2024.
20. Maggie Black MB. The experience of the first sanitary revolution: Are there lessons for today’s global sanitation crisis?. *Waterlines*. 2008;27(1):62–70. <https://doi.org/10.3362/1756-3488.2008.006>
21. Inikori JE. The slave trade, imperialism, colonialism and neocolonialism: The rise of the western and world economy, and unjust enrichment. In: America RF, editor. *Accounting for colonialism: Measuring unjust enrichment and damages in Africa*. Springer International Publishing; 2023. p. 9–45.
22. Cairncross S, Mehta D, Zerah M, Cess S, Mbeguere M, Lüthi C, et al. *Challenges in sanitation*. Agence Francais de Development (AFD), AgroParisTech, SUEZ; 2018.
23. Khan AI, Levin A, Chao DL, DeRoock D, Dimitrov DT, Khan JAM, et al. The impact and cost-effectiveness of controlling cholera through the use of oral cholera vaccines in urban Bangladesh: A disease modeling and economic analysis. *PLoS Negl Trop Dis*. 2018;12(10):e0006652. <https://doi.org/10.1371/journal.pntd.0006652> PMID: 30300420

24. Tembo K. Decolonizing sanitation: Reflecting on the effects of sanitary colonialism in Africa. <https://www.linkedin.com/pulse/decolonizing-sanitation-reflecting-effects-sanitary-khuzwayo/>
25. Gallardo-Albarrán D. The global sanitary revolution in historical perspective. *Journal of Economic Surveys*. 2024;39(2):567–98. <https://doi.org/10.1111/joes.12607>
26. Harvey PA. Environmental Sanitation Crisis: More than just a health issue. *Environ Health Insights*. 2008;2:77–81. <https://doi.org/10.4137/ehi.s1047> PMID: 21572832
27. Aiello AE, Larson EL, Sedlak R. Hidden heroes of the health revolution. Sanitation and personal hygiene. *Am J Infect Control*. 2008;36(10 Suppl):S128-51. <https://doi.org/10.1016/j.ajic.2008.09.008> PMID: 19081496
28. Wolf J, Johnston RB, Ambelu A, Arnold BF, Bain R, Brauer M, et al. Burden of disease attributable to unsafe drinking water, sanitation, and hygiene in domestic settings: a global analysis for selected adverse health outcomes. *Lancet*. 2023;401(10393):2060–71. [https://doi.org/10.1016/S0140-6736\(23\)00458-0](https://doi.org/10.1016/S0140-6736(23)00458-0) PMID: 37290458
29. Besnier E, Thomson K, Stonkute D, Mohammad T, Akhter N, Todd A, et al. Which public health interventions are effective in reducing morbidity, mortality and health inequalities from infectious diseases amongst children in low- and middle-income countries (LMICs): An umbrella review. *PLoS One*. 2021;16(6):e0251905. <https://doi.org/10.1371/journal.pone.0251905> PMID: 34111134
30. Oberg A. Problematizing Urban Shit(ting): Representing Human Waste as a Problem. *Int J Urban Regional Res*. 2019;43(2):377–92. <https://doi.org/10.1111/1468-2427.12744>
31. Ross I, Cumming O, Dreibelbis R, Adriano Z, Nala R, Greco G. How does sanitation influence people's quality of life? Qualitative research in low-income areas of Maputo, Mozambique. *Soc Sci Med*. 2021;272:113709. <https://doi.org/10.1016/j.socscimed.2021.113709> PMID: 33517125
32. Sclar GD, Penakalapati G, Caruso BA, Rehfuess EA, Garn JV, Alexander KT, et al. Exploring the relationship between sanitation and mental and social well-being: A systematic review and qualitative synthesis. *Soc Sci Med*. 2018;217:121–34. <https://doi.org/10.1016/j.socscimed.2018.09.016> PMID: 30316053
33. AMCOW. African Sanitation Policy Guidelines. African Ministers Council on Water; 2021.
34. Hutton G. Global costs and benefits of reaching universal coverage of sanitation and drinking-water supply. *J Water Health*. 2013;11(1):1–12. <https://doi.org/10.2166/wh.2012.105> PMID: 23428544
35. Schaub-Jones D. Financing urban sanitation in Africa: A role for sustainable infrastructure finance and innovation. Cape Town. 2022.
36. Igarashi J, Evans B, Sleight A, Tarkash DN, Kennedy R, Rosenberg R, et al. Does "Low Cost" Urban Sanitation Exist? Lessons from a Global Data Set. *Environ Sci Technol*. 2023;57(45):17237–45. <https://doi.org/10.1021/acs.est.3c05731> PMID: 37921339
37. OECD. Background note: How to attract new sources of financing to sanitation. OECD; 2023.
38. Jacques O, Noël A. The politics of public health investments. *Soc Sci Med*. 2022;309:115272. <https://doi.org/10.1016/j.socscimed.2022.115272> PMID: 35985243
39. Brugger A. Unbundling the urban sanitation crisis: A territorial history of the development of urban sanitation. University of Neuchatel; 2021.
40. Rusca M, Alda-Vidal C, Kooy M. Sanitation justice?: The multiple dimensions of urban sanitation inequalities. In: Boelens R, Perreault T, Vos J, editors. *Water justice*. Cambridge: Cambridge University Press; 2018. p. 210–25.
41. van Vliet BJM, Spaargaren G, Oosterveer P. Sanitation under challenge: contributions from the social sciences. *Water Policy*. 2011;13(6):797–809. <https://doi.org/10.2166/wp.2011.089>
42. Andersson K, Dickin S, Rosemarin A. Towards "sustainable" sanitation: challenges and opportunities in urban areas. *Sustainability*. 2016;8(12).
43. Mara D. Sanitation: what's the real problem? *IDS Bulletin*. 2012;43.
44. Templeton MR. Pitfalls and progress: a perspective on achieving sustainable sanitation for all. *Environ Sci: Water Res Technol*. 2015;1(1):17–21. <https://doi.org/10.1039/c4ew00087k>
45. Ofori AD, Awolorinke AC, Amankwaah GA. Appropriate technologies or appropriating technologies? Technopolitics within artisanal and small-scale mining in Ghana. *Resources Policy*. 2025;106:105641. <https://doi.org/10.1016/j.resourpol.2025.105641>
46. Trimmer JT, Lohman HAC, Byrne DM, Houser SA, Jjuuko F, Katende D, et al. Navigating multidimensional social-ecological system trade-offs across sanitation alternatives in an urban informal settlement. *Environ Sci Technol*. 2020;54(19):12641–53. <https://doi.org/10.1021/acs.est.0c03296> PMID: 32822180
47. Crook R, Ayee J. Urban service partnerships, 'street-level bureaucrats' and environmental sanitation in Kumasi and Accra, Ghana: Coping with organisational change in the public bureaucracy. *Development Policy Review*. 2006;24(1):51–73. <https://doi.org/10.1111/j.1467-7679.2006.00313.x>
48. Grindle M. First in the Queue? Mainstreaming the Poor in Service Delivery. Kennedy School of Government, Harvard University; 2002.
49. Scott P, Cotton A, Sohail M. Using tenure to build a "sanitation cityscape": narrowing decisions for targeted sanitation interventions. *Environment and Urbanization*. 2015;27(2):389–406. <https://doi.org/10.1177/0956247815569415>
50. Mdee A, Ofori AD, Barrington D, Anciano F, Dube M, Hutchings P, et al. On a journey to citywide inclusive sanitation (CWIS)? A political economy analysis of container-based sanitation (CBS) in the fragmented (in)formal city. *Globalizations*. 2024;22(5):875–95. <https://doi.org/10.1080/14747731.2024.2434302>

51. Roaf V, Potter A, Ngunjiri I, Schreiner B. Human rights and water integrity: implications for informal settlements, water and sanitation. Socio-Economic Rights Institute of South Africa (SERI) and the Water Integrity Network; 2020.
52. Blackett I, Hawkins P. FSM Innovation: Case Studies on the Business, Policy and Technology of Faecal Sludge Management. Bill and Melinda Gates Foundation; 2017.
53. Grindle MS. Good Governance, R.I.P.: A Critique and an Alternative. *Governance*. 2016;30(1):17–22. <https://doi.org/10.1111/gove.12223>
54. Patel S. The 20-year sanitation partnership of Mumbai and the Indian Alliance. *Environment and Urbanization*. 2015;27(1):55–72. <https://doi.org/10.1177/0956247815569698>
55. Satterthwaite D, Mitlin D, Bartlett S. Is it possible to reach low-income urban dwellers with good-quality sanitation?. *Environment and Urbanization*. 2015;27(1):3–18. <https://doi.org/10.1177/0956247815576286>
56. Lemanski C. Infrastructural citizenship: (de)constructing state–society relations. *International Development Planning Review*. 2020;42(2):115–25. <https://doi.org/10.3828/idpr.2019.39>
57. Mpfou B. Perpetual ‘Outcasts’? Squatters in peri-urban Bulawayo, Zimbabwe. *AF*. 2012;25(2). <https://doi.org/10.21825/af.v25i2.4946>
58. Hutchings P, Johns M, Jornet D, Scott C, Van den Bossche Z. A systematic assessment of the pro-poor reach of development bank investments in urban sanitation. *Journal of Water, Sanitation and Hygiene for Development*. 2018;8(3):402–14. <https://doi.org/10.2166/washdev.2018.147>
59. Roy A. Urban informality: toward an epistemology of planning. *Journal of the American Planning Association*. 2005;71(2):147–58. <https://doi.org/10.1080/01944360508976689>
60. Scott RE, Ross I, Hawkins P, Blackett I, Smith MD. Diagnostics for assessing city-wide sanitation services. *Journal of Water, Sanitation and Hygiene for Development*. 2018;9(1):111–8. <https://doi.org/10.2166/washdev.2018.113>
61. Wilcox J, Rutayisire B, Kuria N, Evans B, Bartram J, Sklar R. Developing formal pit-latrines emptying businesses for hard-to-serve customers: resources, methods, and pricing structures. *Journal of Water, Sanitation and Hygiene for Development*. 2023;13(12):941–51. <https://doi.org/10.2166/washdev.2023.110>
62. de Albuquerque C, Roaf V. On the right track: Good practices in realising the rights to water and sanitation. United Nations Special Rapporteur; 2012.
63. Lerebours A, Scott R, Sansom K, Kayaga S. Regulating sanitation services in sub-saharan africa: An overview of the regulation of emptying and transport of faecal sludge in 20 cities and its implementation. *Utilities Policy*. 2021;73:101315. <https://doi.org/10.1016/j.jup.2021.101315>
64. Kolipaka S, Hutchings P, Mdee A. WASHed in Stereotypes: A rigorous review of water - Gender narratives in LMICs. Pre-print. 2025.
65. Pommells M, Schuster-Wallace C, Watt S, Mulawa Z. Gender violence as a water, sanitation, and hygiene risk: uncovering violence against women and girls as it pertains to poor WaSH access. *Violence Against Women*. 2018;24(15):1851–62. <https://doi.org/10.1177/1077801218754410> PMID: [29546802](https://pubmed.ncbi.nlm.nih.gov/29546802/)
66. Mills F, Willetts J, Evans B, Carrard N, Kohlitz J. Costs, Climate and contamination: three drivers for citywide sanitation investment decisions. *Front Environ Sci*. 2020;8. <https://doi.org/10.3389/fenvs.2020.00130>
67. Rosenqvist T, Mitchell C, Willetts J. A short history of how we think and talk about sanitation services and why it matters. *Journal of Water, Sanitation and Hygiene for Development*. 2016;6(2):298–312. <https://doi.org/10.2166/washdev.2016.118>
68. Hueso A. Is ‘access to adequate and equitable sanitation’ for all by 2030 achievable? Perspectives from sector experts on what needs to change to realise the Sustainable Development Goal. *Journal of Water, Sanitation and Hygiene for Development*. 2016;6(4):650–7. <https://doi.org/10.2166/washdev.2016.078>
69. Bhatt JD. The politics of performance benchmarking in urban water supply: sacrificing equity on the altar of efficiency. *Water Alternatives*. 2024;17(2):415–36.