Univerzita Karlova

Přírodovědecká fakulta

Studijní program: Sociální geografie a regionální rozvoj

Mgr. František Ficek

Pokrok ve zlepšování sanitačních podmínek: poznatky z Indie

Disertační práce

Školitel: prof. RNDr. Josef Novotný, PhD.

Praha, 2024

Charles University

Faculty of Science

Study programme: Regional and Political Geography

Mgr. František Ficek

Advancing efforts to improve sanitation conditions: insights from India

Doctoral thesis

Supervisor: prof. RNDr. Josef Novotný, PhD.

Prague, 2024

Prohlášení

Prohlašuji, že jsem tuto disertační práci vypracoval samostatně a výhradně s použitím citovaných pramenů, literatury a dalších odborných zdrojů. Tato práce nebyla využita k získání jiného nebo stejného titulu.

Součástí disertační práce jsou čtyři odborné články. Konkrétně se jedná o jeden článek v roli hlavního autora, jeden článek v roli hlavního spoluautora a dva články v roli spoluautora.

1) **FICEK, F**., NOVOTNÝ, J. (2019): Comprehending practitioners' assessments of community-led total sanitation. Health Promotion International, 34, 6, e129–e138. **Autorský podíl 80 %**

2) HUMŇALOVÁ, H., FICEK, F. (2023): Sanitation strategies for reducing open defecation in rural areas of India and Ethiopia. AUC Geographica, 58, 1, 51–63. **Autorský podíl 50 %**

3) NOVOTNÝ, J., **FICEK, F**., Hill, J., KUMAR, A. (2018): Social determinants of environmental health: A case of sanitation in rural Jharkhand. Science of the Total Environment, 643, 762–774. **Autorský podíl 35 %**

4) NOVOTNÝ, J., BORDE, R., **FICEK, F.**, KUMAR, A. (2024) The Process, Outcomes and Context of the Sanitation Change Induced by the Swachh Bharat Mission in Rural Jharkhand. BMC Public Health, 24, 994. **Autorský podíl 30 %**

V Denpasaru dne 22. 5. 2024

……
Mgr. František Ficek

Acknowledgements

First and foremost, I would like to thank Josef Novotný, whose patience, scientific expertise, and dry sense of humor supported me throughout the years, and I am forever grateful for the opportunity to be part of Josef's team. I would also like to thank Radhika Borde and Joe Hill for the opportunity to learn so much from them. I want to express my deepest gratitude to my family, especially my father for his unending support, my sister for sharing the uneasy burden of being a PhD student with me, and finally my wife for her perseverance. Lastly, I would like to dedicate this doctoral thesis to my mum with the hope that she would be proud.

Abstract

Inadequate sanitation is a significant global challenge, impacting the lives of billions of people. It has serious implications for human health and impedes progress towards development targets. Among the countries most affected, India stands out, having until recently recorded an especially low percentage of the population practicing hygienic sanitation. In response to previous underperformances of national-level campaigns, the Indian government launched the Swachh Bharat (Clean India) Mission in 2014, as the largest sanitation program worldwide, with the goal of eliminating open defecation by 2019. This dissertation project, initiated in 2016, aims to examine sanitation change in India. Through contextually sensitive case studies it analyzes national sanitation policies and trends in sanitation interventions. The research involved analyzing the situation in rural Jharkhand through repeated cross-sectional household surveys supplemented by qualitative interviews with the data collection conducted in 2016 and 2019. Additionally, the research included a qualitative study examining the perspectives of practitioners on a specific sanitation intervention and a comparative study of national sanitation policies implemented in India and Ethiopia. The research revealed that the Swachh Bharat Mission succeeded in rapidly increasing toilet coverage through subsidies for construction in the surveyed area, but it did not completely eradicate open defecation. Significant concerns also remain regarding the sustainability of the sanitation change achieved. This is attributed to technical and ecological constraints, such as toilets not being connected to piped water, and a lack of emphasis on education and behavior change to effectively raise awareness about hygienic sanitation practices. The context in which sanitation change takes place is also crucial and must be considered during sanitation interventions. This involves the analysis of whether and how sanitation inequalities interplay with structural inequalities and differences in psychosocial factors in a given context. The research also suggests that targeted subsidies are important and often necessary for reducing the impact of structural barriers on ensuring access to hygienic infrastructure. However, it should be supplemented by effective behavioral change approaches that go beyond simple messaging to involve appropriate awareness creation as well.

Key words: Sanitation, Toilet, India, Swachh Bharat Mission, SDG 6, Behavior change

Abstrakt

Nedostatečná sanitace je významnou globální výzvou s dalekosáhlými následky na životy miliard lidí. Má závažné implikace pro zdraví lidí a brzdí pokrok k rozvojovým cílům. Mezi nejvíce zasaženými zeměmi je Indie speciálním případem, kde až do nedávna pouze velmi malá část populace využívala hygienickou sanitaci. Po předchozích neúspěších na to Indická vláda reagovala spuštěním Swachh Bharat Mission (Mise čistá Indie) v roce 2014. Jedná se o nejrozsáhlejší sanitační program na světě a měl do roku 2019 kompletně zamezit defekaci ve volném prostoru (open defecation). Tato disertační práce započatá v roce 2016 má za cíl porozumět sanitační změně v Indii skrze kontextuálně-citlivé případové studie zaměřené na národní sanitační politiky a trendy v sanitačních intervencích. Tento výzkum zahrnuje analýzu situace v rurálních oblastech státu Džhárkhand skrze opakované dotazníkové šetření doplněné o kvalitativní rozhovory. Data byla sbírána v letech 2016 a 2019. Dále tento výzkum obsahuje kvalitativní studii specifické sanitační intervence a komparativní studii národních politik Indie a Etiopie. Závěry výzkumu jsou, že ačkoliv Swachh Bharat Mission uspěla ve zvýšení přístupu k záchodům skrze poskytování dotací na jejich výstavbu, nezdařilo se během ní zamezit defekaci ve volném prostoru, a také nadále přetrvávají nejasnosti ohledně udržitelnosti dosažených výsledků. Toto je přičítáno technickým a ekologickým omezením, jako je například chybějící připojení k vodovodu a nedostatečný důraz na změnu chování a zvyšování povědomí o hygienické sanitaci. Kontext, ve kterém sanitační změny probíhají, je také velmi důležitý a intervence ho musí brát na zřetel. To zahrnuje analýzu, zda a jak nerovnosti v přístupu k sanitaci souvisí se strukturálními nerovnostmi a rozdíly v psychosociálních faktorech v daném kontextu. Tento výzkum také naznačuje, že cílené dotace na výstavbu záchodů jsou důležité a často nutné pro překonání strukturálních bariér, které jinak zabraňují přístupu k hygienické sanitační infrastruktuře. To je ale nutné doplnit efektivním přístupem zaměřeným na změnu chování, který vede ke skutečnému zvyšování povědomí o významu hygienické sanitace.

Klíčová slova: Sanitace, Záchod, Indie, Swachh Bharat Mission, SDG 6, Změna chování

List of Abbreviations

CLTS	Community-led Total Sanitation
PAIT	Plans to Adopt or Improve Toilet
SBM	Swachh Bharat Mission
UN	United Nations
UNDP	United Nations Development Programme
UN DESA	United Nations Department of Economic and Social Affairs
UNICEF	United Nations International Children's Emergency Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WTP	Willingness to Pay

Table of Contents

Published articles that are part of this doctoral thesis are submitted as a separate attachment.

1 Introduction

So called developing countries continue to grapple with inadequate sanitation, a persistent and critical challenge that impedes their progress. The global community has recognized the severity and prevalence of lack of access to safe sanitation across the world, as reflected by targets in both the Millennium Development Goals (MDGs), and in the second incarnation, the Sustainable Development Goals (SDGs). Under the MDGs, providing sustainable access to safe sanitation was categorized under goal no. 7: Ensure environmental sustainability (UN 2015), while in SDGs, water, sanitation, and hygiene (WASH), received their own goal no. 6: Ensure availability and sustainable management of water and sanitation for all (UN DESA 2016). According to data from 2022 published by the Joint Monitoring Program overseen by the World Health Organization (WHO) and United Nations Children's Fund (UNICEF), 3.4 billion people lacked access to safely managed sanitation and 419 million people practiced open defecation (OD) (WHO/UNICEF 2023). While this is a significant reduction from the 2015 figure of 892 million (WHO/UNICEF 2017), no global region is on track to achieve universal access to safely managed sanitation by 2030, a looming deadline set by the SDG agenda.

The term 'sanitation' is broad and encompasses a variety of services, actions, and behaviors. However, in the context of this dissertation sanitation shall be defined as disposal, management, and possible reuse of human excreta (Brikké and Bredero 2003). Access to safe sanitation is not only a basic human need but is also recognized as a human right (Rosenqvist et al. 2016). It is typically associated with improvements in health, although it can lead to wider socioeconomic benefits, especially regarding social and gender equality (e.g. Jewitt 2011; Wolf et al. 2014).

Sanitation takes place in what Shiell et al. (2008) define as complex systems. These systems manifest themselves by adapting to changes experienced by the local environment, consisting of other complex systems, and nonlinear behavior. Simply put, it means that sanitation conditions result from an interplay of a complex set of factors that are often context specific. Public health interventions, including sanitation interventions, are then often described as complex interventions. These are defined by involving multiple interacting components, like strategies, behaviors, and contextual factors,

operating on multiple levels from individual to organizational (Craig et al. 2008; Datta and Petticrew 2013).

Sanitation drivers that influence sanitation preferences operate on multiple scales, and their multiscalar essence needs to be reflected during research. When analyzing sanitation, it is necessary to consider not only the level of individuals manifested through the personal sanitation-related behavior and health status, but also the community level, as improving sanitation is a joint effort towards a healthier environment. Potential health benefits can only be realized if all members use safe sanitation facilities, as pathogens are not particularly selective in their spreading. The next scales are the local, national, or international levels, in which sanitation policies are implemented and created. The local level is usually responsible for implementation of a policy, that was crafted on national or international levels (Hueso et al. 2018).

Safe sanitation, or lack thereof, affects health of individuals, while depending on not only individual but also community-level behavior. Human feces that are not safely managed serve as a source of pathogens that can be transmitted to foodstuff or water, and eventually new human host, causing the spread of various diseases (Kumar and Vollmer 2013). Furthermore, while the protective element of a toilet is essentially undisputed, the recorded health impacts of sanitation interventions are to a large degree heterogenous, and causal impacts of sanitation interventions are difficult to assess. Practitioners often assume a direct link between improvements in sanitation and health outcomes. However, the relationship between them is actually much less straightforward (Ficek and Novotný 2019; Freeman et al. 2017).

The central focus of sanitation research is the change towards hygienic sanitation practices and sustainable sanitation environments, known as sanitation change. This process is defined as a transition from the prevalence of OD practices to safer sanitation conditions characterized by a wide and ultimately universal access to hygienic toilets. These toilets must be consistently used, the feces must be safely separated from human contact and the surrounding environment, and subsequently safely managed through either decentralized (on-site) or centralized sanitation systems. It is a normative concept in the sense that it is seen as a desirable process since successful sanitation change can bring about positive health outcomes and significant knock-on, non-health benefits. Although the isolation of causal impacts of specific interventions and health is difficult,

this normative view is supported by the strong biological plausibility of the relationship between better sanitation and individual or communal health (Mehta et al. 2007; Mara et al. 2010; Novotný et al. 2018a).

While many studies focus solely on outcomes related to toilet access or usage, the various health and non-health-related outcomes induced by sanitation change also deserve a closer examination. Primary outcomes are the immediate goals of sanitation change, and interventions designed to promote such change merely serve as preconditions for achieving secondary or ultimate outcomes. Primary outcomes, such as access to and use of sanitation facilities, along with their subjective antecedents, knowledge of hygienic sanitation practices, perceived norms about sanitation, and willingness to pay for sanitation infrastructure or services, are crucial. These factors condition secondary outcomes like disease incidence, safety and comfort, school attendance, economic activity, gender equality, and dignity (Dreibelbis et al. 2013; Wolf et al. 2014; Garn et al. 2017; Novotný et al. 2018a).

Despite recent improvements in sanitation conditions, rapid economic growth, and generally high socioeconomic developments, India was, and, in many ways, continues to be an outlier among countries facing significant sanitation challenges, contributing the highest amount to the global OD burden. This contrast becomes even starker when compared to countries at similar or lower levels of socioeconomic development (see Table 1) (Drèze and Sen 2013, p. 19–23). In 2022, an estimated 157 million people (11% of the Indian population) practiced OD, which is a notable decrease from the 524 million people (30% of the population) reported at the beginning of the SDG period in 2015. During the same timeframe, the percentage of people with access to at least basic sanitation increased from 58% to 78% (WHO/UNICEF 2024).

Table 1: Comparison of sanitation situation and HDI in India and selected countries

Country	2000			2022		
	OD Rate	Safely managed services	HDI	OD Rate	Safely managed services	HDI
India	73,3	6,1	0,490	11,1	52,1	0,644
Bangladesh	16,9	11,0	0,491	0,0	31,0	0,670
China	2,5	13,4	0,586	0,1	67,2	0,788
Ethiopia	75,5	2,2	0,286	17,6	7,2	0,492
Kenya	18,4	24,5	0,487	6,5	31,5	0,601

Data sources: WHO/UNICEF 2024; UNDP 2024

India has made remarkable progress in addressing its sanitation crisis, which used to be and, in many aspects, remains a great challenge for Indian policy makers. Dating back to the 1980s, the Indian government has implemented a number of large-scale national initiatives to improve the country's sanitation situation. The latest initiative, Swachh Bharat Mission (SBM) or Mission Clean India, was officially implemented between 2014 and autumn of 2019. And it was under this program, the aforementioned improvements in sanitation conditions were reported (Routray et al. 2017; Novotný et al. 2018; Humňalová and Ficek 2023). SBM took place during a culmination of a major conceptual shift experienced by approaches to sanitation interventions that started at the end of the 1990s and continued during the 2000s. A key aspect of this shift was a departure from sanitation interventions that were primarily or exclusively focused on delivering infrastructure, mostly by the means of subsidies to individual households, in order to overcome material and financial constraints and the unaffordability of hygienic sanitation infrastructures. Instead, efforts to influence sanitation behavior and to establish new societal norms around sanitation, especially deeming OD socially unacceptable, were promoted as a central or even sole principle of sanitation interventions. Presumably the most popular approach that was formed at the beginning of this shift is called Community-led Total Sanitation (CLTS) (Chambers and Kar 2008). This shift took place internationally, including in India. Even national sanitation schemes preceding the most recent SBM were 'on paper' supposed to have components related to behavior change. However, these directions never truly materialized, and the schemes were typically primarily concerned with delivering toilets or subsidies officially intended for their

construction to individual households (Hueso and Bell 2013; Routray et al. 2017). This caused concerns that SBM would again fall short on its policy directions, and that by omitting behavior change components it would fail to achieve sustainable sanitation change, even as sanitation coverage and use might have increased (Novotný et al. 2018; Humňalová and Ficek 2023; Novotný et al. 2024). Beyond material constraints and social norms, there are broad sets of factors influencing sanitation uptake in India, such as general structural inequalities (O'Reilly et al. 2017) and deeply embedded socio-cultural beliefs about purity and pollution (Coffey et al. 2017.

Against this background, and in a field still dominated by 'epidemiological' studies and epistemologies, this dissertation makes a case for a 'geographical' approach to sanitation research. By this, I generally mean an approach that not only considers the local sanitation situation and measures how it is changed by an intervention, but also aims to understand the sanitation drivers that operate alongside, or at times independently of, the specific interventions. It includes the emphasis on local contextual specifics as well as a wider context outlined by political economy and political ecology. This approach will inherently lack some of the focus on isolating and quantifying effects of sanitation interventions on the key outcomes, which is central to most common epidemiological studies (i.e., emphasis on attribution of observed changes in sanitation outcomes to the intervention). However, it will inform about how the intervention contributes to the observed changes in various outcomes and what was the role of various contextual factors operating at multiple levels. Ultimately, this approach may be useful for development practitioners. This is because, based on my research experience, they are often less concerned with the exact estimates of intervention effectiveness because of the substantial challenges of generalizing the studies' results and transferring them to other contexts. They tend to be more interested in the understanding of the enabling mechanisms of sanitation change and identifying key influencing factors. This includes those related to the intervention implementation and those operating independently of the intervention (Ficek and Novotný 2019; Joyce and Cartwright 2020; Novotný et al. 2024).

The overarching goal of my dissertation is to apply the geographical approach to analyze the efforts to improve sanitation conditions in India and put them into a global perspective of achieving universal access to safely managed sanitation. To accomplish this, I employ the following specific goals:

1. *Analyze the experiences, attitudes, and opinions of development practitioners towards a specific sanitation intervention.*

2. *Explore sanitation policies of India and compare them with typologically distinct sanitation policies employed in Ethiopia.*

3. *Understand sanitation conditions and its influencing factors in rural Jharkhand.*

4. *Examine the extent, process, and context of sanitation change induced by SBM implementation in rural Jharkhand.*

My dissertation and the underlining body of published research articles explores sanitation issues from several different angles. The individual goals outlined above correspond to specific articles within the dissertation. While the papers vary in terms of thematic focus, research design, and data, they are interconnected through their examination of complementary aspects of the sanitation phenomena (see Table 2 for a general overview). Therefore, rather than being narrowly focused on a single thematic aspect of sanitation research, the research articles and consequently the dissertation aim to link several aspects into one comprehensive narrative. I believe this offers a more complex perspective on the problem at hand and is especially relevant for the application of the 'geographical' approach to sanitation research.

Specifically, the first goal and respective research article associated with it (Ficek and Novotný 2019) explores development practitioners' experiences and opinions towards CLTS. Analysis of this approach was chosen due to its then popularity, often uncritical perception, and (largely successful) advocacy efforts of the proponents of this intervention to spread it globally, including in India. As a strictly behavior-change oriented intervention, it is primarily oriented on the demand-side as contrasted with the supply-side or 'hardware-provision' strategies. The perspectives and experiences of development practitioners (field–level implementers) are crucial yet often

underrepresented in both research on sanitation interventions and the design of higher-level sanitation policies.

The second goal is connected to a critical comparison between Indian sanitation policies and sanitation strategies implemented in Ethiopia, where policies were primarily derived from CLTS. This goal provides wider global context to the localized research on sanitation conditions and change in rural Jharkhand, with a special focus on the use of demand inducing or behavior change methods during sanitation interventions. This is particularly relevant due to the common critique that Indian sanitation schemes often omit these methods (Hueso and Bell 2013; Routray et al. 2017; Novotný et al. 2018; Novotný et al. 2024). Yet, the dissertation aims to go beyond the demand and supply side dichotomy in sanitation change, as at this point it seems to be obvious that these approaches should not be exclusionary but rather complimentary (Humňalová and Ficek 2023). It is important to study how these approaches can be combined and implemented. This will depend on the broader social, cultural, or political contexts, and can have decisive influence on the long-term sustainability of the sanitation change attained.

The last two goals and their underlying research articles then bring forth the localized examination of sanitation conditions and SBM implementation in rural Jharkhand. This allows the dissertation to achieve its overarching goal and illustrates the application of the geographical approach to sanitation research in practice. These specific goals are based on two cross-sectional studies of the implementation of SBM in rural areas of Ranchi district in Jharkhand. The first was conducted at the beginning of SBM implementation in 2016 and the second as a direct follow-up conducted at the end of SBM implementation in 2019. The former article focuses more directly on determinants of sanitation conditions and preferences specified in goal no. 3, while the latter study highlights the actual SBM implementation processes and results, as outlined in goal no. 4. To fully capture the complexity and context of the SBM implementation, this research effort uses mixed methods and is based on two household surveys, key informant interviews, and group discussions. It is important to note that OD rates and influencing factors tend to be geographically varied and spatially clustered (Chakraborty et al. 2023). Therefore, these results have to be interpreted in the context of Jharkhand, which is a specific region with overall large sociocultural diversity and a significant tribal population (Novotný et al. 2018).

In the remainder of this introduction, I will first discuss the differences between epidemiological and critical sanitation research to further explore the differing approaches to understand sanitation change. This is followed by an explanation of global sanitation targets, an overview of factors affecting sanitation change as identified in academic literature and an overview of developments of sanitation policies both on the global level and specifically in India. These chapters represent a theoretical background of the dissertation research. From Chapter 5 onwards, I present the main findings of my dissertation research, its contribution to contemporary knowledge, and finally the research articles that serve as a base of the dissertation.

Table 2: Overview of underlining research articles

Article (cit.)	Overarching goal	Specific goals	Methods
Ficek and Novotný (2019)	To examine the assessments of CLTS by development practitioners.	Analyze within the context of CLTS implementation: • Contextual modalities and reasons for implementation, • Complementary tools and strategies used, • Perceived strengths and constraints, • CLTS controversies • Provide overall assessments of the approach.	Semi-structured interviews with development practitioners and their thematic analysis.
Humňalová and Ficek (2023)	To compare national sanitation policies of India and Ethiopia, as two diametrically different approaches to sanitation change.	Compare sanitation policies of India and Ethiopia across four domains: • Political framing and support • Main narratives and legal ground • Financing • Sanitation approach	Comparative analysis of policies.
Novotný, Ficek, Hill, Kumar (2018)	To examine and compare the role of structural factors emphasized by the latrine-first narrative and psychosocial drivers stressed in the demand-first narrative.	• Understand which structural and psychosocial factors are associated with toilet ownership prior to SBM and reported sanitation preferences. • Is perceived unaffordability of toilets dependent on socioeconomic and educational inequalities or is it socially constructed? • What are the effects of perceived descriptive and injunctive social norms on analyzed sanitation outcomes? • Does the perception of social norms interact with psychosocial variables in the effects on sanitation preferences?	Cross-sectional analysis of household-level sanitation drivers.
Novotný, Borde, Ficek, Kumar (2024)	To understand sanitation change in the study area across its multiple domains	• Scrutinize the process of the SBM implementation in the study area, focusing primarily on its grassroots-level implementation, key agents, and beneficiaries of the SBM. • Examine the changes in sanitation conditions in the study area, including the extent to which they can be attributed to the implementation of the SBM, particularly its impacts on the main outcomes of toilet coverage and use. • Analyze the role of local contextual drivers, focusing on the measurable situational variables of individuals, households, or their communities that can influence the targeted main sanitation outcomes.	Repeated cross-sectional household surveys conducted at the beginning and at the end of the SBM, supplemented by key informant interviews with SBM stakeholders.

2 Epidemiological versus Critical sanitation research

With some obvious simplification, there are two general types of approaches or perspectives used in the available sanitation change research. The first one comprises of studies inclining towards an epidemiological approach, and they typically examine relationships between sanitation measures and health and disease outcomes (often in the context of sanitation interventions) and their patterns in populations. The second approach concentrates on understanding inequalities in sanitation conditions, while acknowledging the role of wider social, economic, political, and environmental context. This second approach can be referred to as critical sanitation research and it recognizes that sustainable sanitation change will be difficult to achieve without addressing structural inequalities and sustaining general socioeconomic development.

I found it useful to briefly overview this, albeit necessarily schematic, distinction as my dissertation navigates between these two perspectives. It sets out to demonstrate the importance of understanding the wider context in which sanitation change is taking place and therefore is more closely connected to the critical sanitation research. At the same time, it also involves analyses of the patterns in sanitation conditions and their associated factors as well as quantification of the effects of a large-scale sanitation intervention. Although it does not focus on establishing relationships between observed sanitation and measures of health.

2.1 Epidemiological perspective

The epidemiological perspective can be further divided into two groups. The first consists of largely a-theoretical research describing empirical relationships between changes in sanitation conditions (usually in association with interventions), presence of pathogens in soil or water, and human health (e.g. prevalence of certain diseases). A distinctive characteristic of this approach is a strong empiricism. The second group also contains research concerned with sanitation interventions, but in this case the research is theoretically informed. Though the theory is typically viewed as the theory of change conceptualizing the logic of an intervention in terms of the presumed causal pathways between the intervention and targeted outcomes.

In both instances, epidemiological studies typically focus on isolating the relationship between changes in sanitation conditions due to an intervention and changes in examined outcomes in a given context. They tend to be preoccupied with how the study is designed and conducted with respect to the internal validity of results and, therefore, various methodological aspects are often stressed. (Cairncross et al. 2010; Freeman et al. 2017; Dearden et al. 2017). The motivation behind examining intervention logic and theory of change remains crucial as there is a long-standing conclusion that interventions that employ these frameworks yield better results (Rimer and Glanz 2005). Evidence on the effectiveness of specific interventions may not be transferable to different settings unless the mechanisms underlying the change and the role of various contextual factors are adequately understood. Still, too often the epidemiological perspective emphasizes the former. Moreover, the designers and implementers of sanitation interventions also commonly disregard the theories behind these interventions. For example, an analysis of this issue that focused on behavior change techniques and their corresponding behavior change theories in the CLTS interventions yielded that the most used techniques correspond to Transtheoretical Model, Social Cognitive Theory, and Health Belief Model. All of which are designed for behavior change on individual level, even as CLTS should operate at a community level (Sigler et al. 2014).

2.2 Political ecology and critical sanitation research

With the interventional research studies that still represent a vast majority of sanitation-related research, obstacles to improving sanitation conditions are characteristically viewed as if they were amalgamated only at individual, household, or community level. Critical sanitation research emerged to counter this narrative and put broader social, economic, and political aspects into the spotlight. Critical sanitation research is theoretically bounded to political ecology, linking environmental and socioeconomic inequalities with power differentials and other sociopolitical issues operating at various scales. Gender is likewise often accentuated in sanitation research as deserving of systematic approach. Political ecology utilizes a multidisciplinary, less technical study of the environment. Acknowledging the porous essence of traditional structural approaches and shift to a more interactionist view. Preference for uncertainties,

subjective interpretations of reality, and a distrust of strong normative statements distinguish it from interventionist research (Bryant 1992; Blaikie 1995; O'Reilly and Louis 2014). There are political and economic agendas, both past and present, that shape disease transmission, and also discrepancies in understanding and knowledge of health risks on institutional and local level. Institutions might be in control of narratives surrounding diseases, creating taboos and false rumors, exaggerating, or downplaying their health factor. People interpret diseases in socio-cultural narrative as an erosion of their society, while disease actually erodes their livelihood practices (King 2010). Applying political ecology on the issue of sanitation change, a deeply personal act of defecation is now broadened to a community effort to achieve sanitation change which in turn is affected by political and economic processes far distant form the defecation site. For successful sanitation change access to environmental, economic, political, and social resources must be granted. This renders the supply and demand dichotomy in many areas useless (see Chapter 4.2), as both aspects are important and structural constraints, often disregarded by interventions utilizing CLTS, need to be addressed (Ficek and Novotný 2019; Humňalová and Ficek 2023). And according to proponents of the critical sanitation approach, the structural constraints deserve extra attention since they tend to be overshadowed by the pervasive focus on technical or infrastructural issues and individual psychosocial factors as explanators of unsuccessful sanitation change. Structural issues, manifested through poverty and underdevelopment, are further amplified by social and physical distance, that can be addressed mostly with good governance. Political ecology also presents arguments for alterations to poverty narrative deeply affected by privilege and power relationships. Poor people often lack agency that is assigned to them under interventionist approaches, also they often fall victim to interventions promoting only low-cost sanitation solutions, that are unsuitable due to contextual factors and serve as a further marginalization tool by being assign only to poor individuals (O'Reilly and Louis 2014; Bardosh 2015; O'Reilly et al. 2017).

The critical sanitation framework is also informed by anthropology-leaning literature, often based in Mary Douglas' theories designating shit as 'Matter out of place', connecting hygiene with religious practices. Common ideas of western purity concerned with eliminating germs are disconnected from religious purity concerned with cleansing spirits. Contact with feces affects spiritual purity which in turn lowers social status

(Douglas 1966, p. 31, p. 33, p. 116). These propositions were applied to contemporary India by Doron and Raja (2015). They describe SBM and the surrounding rhetoric embraced by the Prime minister Modi as preoccupied with humanitarianism and modernization while paying no attention to social, economic, cultural, and political factors, that brought about current unhygienic behavior. There are immense differences in imaginaries of sanitation in the West and in India. The caste system governs both private and public life and ritual hierarchy play an important role. Indian public spaces could be left impure until the designated caste comes along and cleans them. But with the drive for modernization, OD was labeled as a problem, but since proposed solutions tend to reflect values of upper caste Indians, the needs of the poor are effectively excluded from them, even though they are the most affected (Doron and Raja 2015).

Next concept connecting structural issues with health is Biopolitics which also shifts focus from individuals to how exercising power affects health outcomes. Sanitation policies are often designed in a form of an authoritative governance with public health claims regarding cleanliness emerging alongside prescribed technologies and behaviors. Local cultures and their everyday behaviors are then designed as incompetent and obstructionist. In this sense sanitation can function as a tool of exclusion rendering a portion of the population dirty, unclean, and disposable. But this narrative misses the point that people who exercise it are also not satisfied with their conditions and would improve them if they had the necessary resources. The authoritative framework is further sustained by governments which are quick to blame the poor for their unsafe sanitation condition while crediting their policies with successful sanitation change (Kotsila and Saravanan 2017).

When comparing perspectives based in political ecology and critical sanitation with epidemiological perspective from previous subchapter, it is abundantly clear that they are seriously lacking behind in practical recommendations for sanitation interventions. There is no doubt that they provide important insight into key processes influencing sanitation change on various levels with their critical appraisal. But they often do not exceed vague, abstract, and typically normative implication for concrete realizable sanitation solutions. So, where epidemiological approaches focus almost too much on the practical side of sanitation change, critical approaches do not reflect practical implications enough. For

these reasons, this dissertation project is not theoretically bounded to exclusively either of these approaches, but instead seeks to combine elements from both.

3 Overview of sanitation interventions and recent trends

3.1 Overview of sanitation targets in global strategic frameworks, especially SDG 6

During the 20th century the global development agenda, which was in large part overseen and spearheaded by the UN, was prepared and implemented separately by individual agencies working across three dimensions: economic, social, and environmental. Convergence was only brought about by the MDGs and was later strengthened by the SDGs, that continue to guide the development agenda today and include for the first time a standalone sanitation target (Kumar et al. 2016). But the road to the SDG goal 6 (see Table 3) was not straightforward. Sanitation as a development topic was struggling with lack of attention, low priority, insufficient funds, and questionable definitions of targets (Lenton et al. 2008; Jewitt 2011; Weststrate et al. 2018). An embodiment of this disinterest is that the sanitation part of the MDG goal 7c was only belatedly added after the 2005 World Summit (Weststrate et al. 2018). And while earlier declarations touch upon sanitation vaguely and abstractly (UN 2000; UN 2002), a document called Indicators for Monitoring the Millennium Development Goals mentions the target of halving the percentage of people without basic sanitation (UN 2003). The sanitation target is then again firmly mentioned in the resolution adopted at the 2005 World Summit. This resolution describes policies to secure sufficient sustainable investments into, among other things, health, clean water, and sanitation, and also a commitment to assist developing countries with strategies to improve their water and sanitation conditions (UN 2005). According to Fukuda et al. (2019) a key factor in establishing both MDGs and SDGs water and sanitation goals was the Water Supply and Sanitation Collaborative Council, which had suggested at the beginning of the MDGs era in their Vision 21 document the targets of halving the proportion on people without access

to safe water and sanitation by 2015 and securing access to them for everyone by 2025 (WSSCC 2000).

Both development goals initiative could be rejected as nothing but political proclamations but that would be a mischaracterization. They principally influence donor strategies and national policies throughout the world. However, the indicators set out by the MDGs are considered weak and lacking many important nuances like treatment and disposal of wastewater or fecal sludge, handwashing, and facility maintenance (Bartram 2008; Weststrate et al. 2018). And although access to sanitation improved massively between 1990 and 2015, only 95 countries met the MDGs sanitation target, with rural populations of Sub-Saharan Africa, Oceania, and South Asia lacking behind the most (WHO/UNICEF 2015).

The initial research on SDGs suggests that some of these issues were fixed and they represent an overall improvement regarding WASH issues. Treatment of wastewater was added as one of the sub-targets, along with means to prevent contamination of water sources and management of fecal sludge in general. But commitment to upgrade infrastructure, especially investment into piped infrastructure, which is particularly relevant for India and other water-scarce areas (Novotný et al. 2018; Novotný et al. 2024), is still missing. Also unsolved remained political dimension of sanitation improvement, i.e. governments can still promote cheap low-impact solutions which tend to translate into political gains but have limited impact (Weststrate et al. 2018). From MDGs to SDGs there was also a successful shift from attention to basic sanitation embodied by health objectives to incorporation of social and environmental dimensions, epitomized by protecting water quality, wastewater treatment, recycling, and reuse (Andersson et al. 2018). Fulfilling the sanitation SDG 6 can also significantly contribute to reaching other goals through resource recovery and sustainable management of resources. But this is largely dependent on the technology used, and most of the low-cost solutions like pour-flush pit latrine would require additional steps for this potential to be realized. Lack of political will to achieve the best possible cross-sectoral outcomes results in less impactful nevertheless politically popular solutions (Orner and Mihelcic 2018). Untapped potential synergies also remain in cooperation with private companies (Andersson et al. 2018).

Table 3: Overview of the SDG goal no. 6

SDG 6	Ensure availability and sustainable management of water and sanitation for all
6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2	**By 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations**
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and at least doubling recycling and safe reuse globally
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of fresh water to address water scarcity, and substantially reduce the number of people suffering from water scarcity
6.5	By 2030 implement integrated water resources management at all levels, including through transboundary co-operation as appropriate
6.6	By 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.6a	By 2030, expand international co-operation and capacity-building support to developing countries in water and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.6b	Support and strengthen the participation of local communities for improving water and sanitation

Source: UN DESA 2016

4 Conceptual frameworks and factors affecting sanitation change

Not only with respect to the wider, and admittedly simplified, distinction between 'epidemiological' and 'critical' sanitation research explained above, the debate concerning the understanding of key drivers behind adoption of toilets or preferences for OD is far from settled. Various researchers and practitioners stress different factors at various scales ranging from global perspectives to specific contextual local aspects (Hyun et al. 2019). There is a general agreement that sanitation conditions and sanitation change is largely context-dependent and influenced by complex human-environment interactions. Conceptual models or frameworks are thus typically used in literature rather

than causal theories. Available conceptual frameworks are helpful in organizing the potentially relevant factors into logical structures.

The Integrated Behavioural Model for WASH by Dreibelbis et al. (2013) expands the understanding of the types of drivers of WASH behavior classifying them into a matrix organized according to three domains (contextual, psychosocial, and technology factors) and levels (societal, community, household/interpersonal, individual, and habitual). It is more comprehensive than some earlier frameworks but provides only the classification. The Risk, Attitudes, Norms, Abilities, Self-regulation or RANAS model by Mosler (2012) is another useful framework based on a synthesis of multiple behavioral theories. It provides a more explicit guidance for its practical applications, identifying key drivers and designing appropriate behavior-change interventions. O'Reilly and Louis (2014) present a simple model referred to as the Toilet Tripod model, based on a sanitation change research among marginalized groups in rural India. It highlights three general key conditions that should be in place for successful sanitation change: multi-scalar political will, proximate social pressure, and political ecology (access to water, compatible soil type, and land use change). Worth mentioning is also the Appropriate Technology framework (Murphy et al. 2009) that advocates for technological solutions that are contextually suitable, emphasizing capacity development and the importance of addressing users' needs over wants, ensuring sustainability, and engaging all stakeholders in the design process. However, this is not always the case as exemplified by the Indian sanitation schemes. These schemes usually promoted subsidized toilets uniform in design without adequately considering user priorities and preferences. This often resulted in toilets unsatisfactory for the users that sooner or later became unused due to low quality, technical deficiencies, (e.g., absence of piped water), or inappropriateness for cultural reasons (Humňalová and Ficek 2023; Chakraborty et al. 2023).

Finally, Novotný at al. (2018a) conducted a systematic review of contextual factors and motivations influencing community sanitation, coming up with a comprehensive classification of the types of drivers referred to as the sanitation nexus. Unlike previous frameworks, they not only classified drivers but also examined how these drivers align with particular types of sanitation outcomes, providing a more explicit guidance for researchers and practitioners.

4.1 Examples of sanitation drivers discussed with respect to sanitation in India

Sanitation practices in India are often linked to cultural traditions, religious beliefs and associated social norms. In a Hindu environment, purity and pollution pays an important role in both physical and spiritual sense. This is interrelated with issues surrounding the caste system and untouchability. Toilets manifest a clash between physical purity and ritual purity. OD is traditionally perceived as a clean, healthy, wholesome activity, while using a toilet close to your home is considered ritually polluting, regardless of how physically clean the toilet might be. Low-cost toilets are often described by Hindus as 'smelly' which is a secular substitution for ritually polluted. These notions about purity are conveyed from parents to children and a change in toilets' perception on generational level is needed. Water availability represents a further barrier in this regard, as there are certain purification practices and rituals connected to daily sanitation needs that necessitate water. As such, toilets without adequate water connection might be rejected by the communities since the required water collection might for them might be perceived as an added burden. Education is very important to counter these narratives and a generational shift seems to be necessary. Once a generation who no longer objects toilets for ritual reasons is brought up, it will be easier for the community to eradicate OD (Coffey et al. 2017; Kumar 2017; Novotný et al. 2018; Roy 2023; Roy et al. 2023).

On the other hand, Muslims are often reported to practice less OD than other religious communities, which is usually also explained by sociocultural reasons, and it holds true not only for India but also for other countries as well. There are ritual practices and cultural norms that emphasize cleanliness, hygiene, and privacy or modesty, which can potentially decrease the prevalence of OD and drive higher rates of toilet construction and usage within these communities. At the same time, the presence of Muslim communities can positively influence neighboring non-Muslim communities through spatial externalities. This could mean that the practices and successes in sanitation within Muslim neighborhoods contributes to improved health outcomes not only within Muslim communities but also in adjacent non-Muslim areas (Coffey et al. 2017; Novotný et al. 2018; Geruso and Spears 2018; Chakraborty et al. 2022).

Technological solution and overall design of the facilities are also important drivers behind toilet adoption. If toilets offer privacy, are easy to maintain, provide amenities for hygienic behavior like anal cleansing or menstrual hygiene, it contributes to their acceptance by the community (Thys et al. 2015; Garn et al. 2017; Lahiri et al. 2017; Novotný et al. 2018a). There are of course more nuanced requirements for sanitation technologies. In Hindu societies people strongly prefer toilets with large septic tanks because they want to avoid emptying them at all costs. This is one of the reasons behind rejection of low-cost toilets with small tanks built during government sanitation programs. The motivation behind this requirement is again cultural as handling of feces is designated to the constantly ritually polluted Dalits, who are consequently disconnected from public life (Coffey et al. 2017).

Consequences of structural inequalities and associated issues on sanitation in the context of India are explored by O'Reilly et al. (2017). There is an intrinsic urban bias, that put remote and rural places at political margins. Structural inequalities are amplified at both physically and socially remote places and different socio-spatial relationships are behind preferences for OD. Agrarian livelihood forces people to be far away from home and their potential toilet most of the day, thus they opt out for OD. Remote and rural spaces are also out of interest of political power, receive less attention and less investments. Through this, structural inequalities are tied up to technology as a common prejudice dictates that the poor should not want a tailored solution for their need but should accept whatever is provided for them. This perception comes from a position of power and privilege and misses how poverty and ownership of low-cost toilets perpetuate social division. This holds true especially in places like India where operating a low-cost toilet requires exercising ritually unclean work.

Affordability and material constraints represent another major factor which significantly influence OD rates in India and beyond. In areas with limited access to suitable building materials and basic sanitation infrastructure OD is more prevalent and logistical issues connected to acquiring and transporting construction materials compound these difficulties, particularly in rural or underdeveloped regions. Furthermore, the economic burden of constructing toilets is often prohibitive for low-income families, despite government subsidies aimed at easing this burden. The perception of these costs can often be exaggerated by a lack of awareness about more

cost-effective, sustainable sanitation solutions. Where financial support programs are available, they often fail to cover all the associated costs or do not reach all segments of the population equally. This selective availability can lead to uneven improvements in sanitation coverage across different communities (Chakraborty et al. 2023).

4.2 Developments in sanitation policies

The general approach to sanitation programs experienced an important paradigm shift in the last two decades, as calls for abandonment of top down, material provision-based programs transformed into actual policy changes. The shift was in focus from toilets and their provision, i.e. supply side, to people and their behavior that should be altered, i.e. demand side. As of now behavior change components are usually present in sanitation programs. One of the most well-known and widely used approach that appeared during this period is Community-led Total Sanitation (CLTS). Developed by Kamal Kar and Robert Chambers, and theory-wise based on previous work by Chambers and his Participatory Rural Appraisal, the main goal of CLTS is to empower and ignite communities through participatory activities to create new social norms around unacceptability of OD and in a collective effort build toilets for themselves or community members who cannot afford it. Local leaders are purposely trained to help advance this cause, while outside facilitators facilitate the activities and conduct follow-up visits to ensure sustainability. Activities inducing disgust and shame are used during the interventions to strengthen the unacceptability of OD, but the main decision-making powers should be in the hands of the community (Chambers 1994; Chambers 1997; Kar and Chambers 2008; Chambers 2009; Sah and Negussie 2009; Aboud and Singla 2012). And while behavior change contains unprecedented potential for development efforts, it is much more complicated and difficult to achieve. Behaviors are deeply rooted in social, cultural, habitual, and individual preferences, and as such are hard to modify, especially under shorter timeframes (Sigler et al. 2014; Aboud and Singla 2012). There are a number of limitations that behavior change approaches have and that severely limit their use in many environments (Crocker et al. 2017; Venkataramanan et al. 2018).

One clear outcome of recent studies is that CLTS and similar CLTS-based behavior change interventions do not provide overwhelmingly convincing and conclusive

results. The impacts of CLTS interventions tend to be exaggerated and sustainability of reached outcomes is often questioned. But this should not be interpreted as evidence of ineffectiveness of behavior change approaches, but rather as a call for their more realistic appraisal (Sigler et al. 2014; Crocker et al. 2017; Venkataramanan et al. 2018; Ficek and Novotný 2018). CLTS interventions proved to work better in communities with high levels of social cohesion, high baseline OD rate, good access to markets, or active local leaders. Successful interventions also take place in the communities over an extended period and include regular follow-up visits (Sigler et al. 2014; Crocker et al. 2017; Garn et al. 2017). The most substantial critique of this approach concerns inclusion of activities that incite negative emotions like disgust and shame. Although use of these activities is defended as a powerful tool for behavior change and norm creation, there are severe risks attached to it. Inducing shame in people who cannot afford a toilet can lead to their further marginalization and social rejection based not on fears of possible contamination but social judgment. Shaming might also lead to use of punishments like denial of material and financial benefits, loss of livelihood, and loss of protection under law (Bartram et al. 2012; Brewis et al. 2018). Use of coercive tactics is particularly sensitive in India, as it is inherently bound to caste relationships and graded inequality, and usually people from lower castes and below poverty households are the most affected by them. Coercive measures in form of denial of subsidies delivered under SBM that occurred in India can also be criticized from a rights perspective, as poor or missing sanitation is used a basis for a suppression of a right to sanitation (Cullet 2018; Gupta et al. 2020; Humňalová and Ficek 2023; Novotný et al. 2024).

Another quite strong consensus found in literature is that CLTS should not be used as a standalone approach but rather combined with other approaches, especially with some form of technical or material assistance, even if that goes against one of its core principles. The original idea was that communities themselves should decide on both the design and materials used for construction, but that proved to be largely detrimental to the whole process. Communities usually lack the skills required to construct toilets that are of sufficient quality, durability, and sustainability (Papafilippou et al. 2011; Crocker et al. 2017; Ficek and Novotný 2018a). In this regard India is hypothetically an excellent example of good practice as their guidelines for SBM clearly states their focus on behavior change and communication activities, but also provide individual household

subsidies for construction of toilets, which are constructed by qualified masons (Ministry of Drinking Water and Sanitation 2018). But this notion is easily contested as the Indian government made similar claims in previous iterations of its sanitation programs during which behavior change activities were marginalized in favor of simple latrine construction. Which eventually led to failure of these programs (e.g. Hueso and Bell 2013; Routray et al. 2017).

4.3 Sanitation policy developments in India

India has extensive experience with large sanitation interventions. The government's attention on sanitation can be traced back to the 1980s with the first large scale intervention called the Central Rural Sanitation Programme starting in 1986. This program, based solely on subsidized latrine construction, failed in what would eventually become a trend. It was restructured into a new scheme called Total Sanitation Campaign in 1999 (Routray et al. 2017). The main goal was to eradicate OD and an incentive in the form of a cash prize, called the Clean Village Award, was offered since 2003. Because the campaign was initially again based mostly on material motivation, it was unsuccessfully remodeled in 2007 to include more bottom-up community-led principles. The community programs were facilitated by government officials who were severely underpaid, unmotivated, understaffed, and concerned only with rising indicators in their reports. This behavior by people who were ultimately responsible for eradicating OD in India led only to grossly inflated statistics suggesting that the number of people with access to safe sanitation are skyrocketing. All the while there were only modest improvements at best. And because of population growth the number of people practicing OD increased (Hueso and Bell 2013). The importance of behavior change components and lack thereof during the implementation is also documented across Indian regions and in both initial and later phases of Total Sanitation Campaign (Cairncross et al. 2005; Sinha et al. 2017).

The Total Sanitation Campaign was eventually swapped for a new intervention called Nirmal Bharat Abhiyan in 2012. Community-led, bottom-up, behavior change aspects were sustained, but so were financial subsidies for households both above and below the poverty line. Information, education, and communication activities, which is a term used by the Indian government to designate behavior change activities, were

supposed to be the corner stone of Nirmal Bharat Abhiyan and it was in the authority of every state do develop their own behavior change strategy, which would be further developed into detailed district level plans, with a goal to engage all key actors of the local sociopolitical life. Financial incentives, which remained part of the program, were transferred to a household account after they had their constructed toilet verified by the government. All below poverty line and above poverty line households belonging to scheduled caste or scheduled tribe categories were given 4600 rupees, with additional 4500 rupees available through alignment of Nirmal Bharat Abhiyan with Mahatma Gandhi National Rural Employment Guarantee Act. But as evidenced by a study from Odisha, Nirmal Bharat Abhiyan suffered from similar issues as previous programs. Implementation was organized by several NGOs on various levels which consequently led to lack of coordination, improper division of responsibility, and inadequate training of staff, that again resulted in emphasis on latrine construction. Participatory activities then often ran into structural and sociocultural difficulties. While door-to-door visits were viewed as successful, village meetings to discuss the sanitation situation of the community and to devise possible solutions were a failure. Many people were not motivated to allocate their time, women, the poor, and lower caste people were excluded from the discussions with staff or other members not encouraging them to engage. Villagers also already knew about the dangers of OD and perceived meetings as useless. Village mapping on the other hand proved useful. In general mobilization activities were perceived as a waste of time and resources that could be otherwise used on latrine construction. Nirmal Bharat Abhiyan was in the end analogous to the Total Sanitation Campaign and was unable to go beyond basic latrine construction (Routray et al. 2017).

The latest reiteration of the Indian national sanitation program called SBM was launched in 2014 on 2nd October, the day of Mahatma Gandhi's birthday (Gosh 2016). SBM was conceived as a direct follow up of Nirmal Bharat Abhiyan and as such continued with the already set in stone policy of combining both the behavioral and infrastructural approaches to sanitation change. Though from the onset there were casts of doubt whether the behavior change aspects will make their way into implementation or whether they remain only inscribed into policy documents. Compared to Nirmal Bharat Abhiyan the monetary incentive was increased to 12 000 rupees per household (Novotný et al. 2018). And even though India's long experience allowed for collection of new,

innovative ideas and good practice (Thakur and Mishra 2016), initial research suggested that similarly to previous schemes SBM will again primarily accomplish construction of an enormous number of new toilets (Kumar 2017; Yogananth and Bhatnagar 2018; Novotný et al. 2018). However, SBM has something that the previous sanitation schemes lacked. The Indian government, led by prime minister Narendra Modi and his Bharatiya Janata Party, wholeheartedly supported the endeavor, fully aligned itself behind the goal of achieving OD, and in general took an incredible pride in SBM. This did not take place only at the highest levels but actually trickled down to local political representatives. There were also politics in play since the governing Bharatiya Janata Party realized that there are votes in toilets (Curtis 2019; Humňalová and Ficek 2023).

However, sanitation change generated by SBM, and the scheme's performance is seemingly better when compared to its predecessors (Curtis 2019; Hutton et al. 2020; Novotný et al. 2024), even as it did not manage to reach its goal of making India ODF at its conclusion. As even official government data published in the National Family Health Survey 2019-2021 show that 69% of the Indian population uses improved sanitation facilities and 19% practices OD, with the remaining 12% uses unimproved or shared facilities. These numbers change to 64% and 26%, respectively, just for rural regions (International Institute for Population Sciences and ICF 2021). The increase in sanitation coverage achieved under SBM is nonetheless impressive and it can be argued that together with the political support, endorsement of the scheme by celebrities, and sanitation messaging communicated through mass media, SBM reached a critical momentum that has the potential to kick off a sustainable sanitation change (Pakhtigian et al. 2022; Ficek and Humňalová 2023; Novotný et al. 2024). Still, there are two aspects that are a source of concerns and that could hinder the long-term sustainability of sanitation change that occurred under SBM. First is the low priority given to education and behavior change activities during SBM. This means that while many households now own a functioning hygienic toilet, they might not be properly maintained, which could lead to lower usage or eventually OD slippage. Second is water stress which is very common in many regions across India and could lead to OD slippage. The government plans to address these shortcomings with a second round of SBM and a parallel scheme called Jal Jeevan Mission that aims to provide piped water to every rural household by 2024 (Sarkar and Bharat 2021; Humňalová and Ficek 2023; Novotný et al. 2024).

5 General idea, contribution to current knowledge, main research findings:

From a global perspective, the sanitation situation improved rapidly since the beginning of the 21st century. Despite this, significant challenges, disparities, and substantial gap remain in achieving SDG 6.2. During the majority of the SDG period, Asian countries, and India in particular experienced higher rates of sanitation coverage. At the same time, rural areas globally are facing more sanitation-related challenges than urban areas, with wealth disparities and overall poverty being a key hindrance in progress (WHO/UNICEF 2021; Swe et al. 2021; Nasim et al. 2022; WHO/UNICEF 2023). To accelerate global progress and close the sanitation access gap, it is important to fully understand which factors influence sanitation preferences and the uptake of safe sanitation behavior, how to ensure that current progress is sustainable in the long run, and what are the lessons learned from implemented sanitation interventions, regardless of their overall success. This, of course, is not a straightforward process. Circling back to the focus point of my dissertation, the progress experienced by India took place in a very specific social, political, and economic context, characterized among others by unprecedented political support and strong financial backing that might not be available to other countries (Humňalová and Ficek 2023). However, there were also a number of common factors present that are not just limited to an Indian context, like the importance of social norms, influence of structural and psychosocial determinants, or key agents managing the grassroot-level implementation (Novotný et al. 2018; Novotný et al. 2024) Analysis and description of these components in their context then serve to not only explain the dimensions of sanitation change in India but can provide important insights that could be utilized across geographies and contexts. The overarching goal of my dissertation is aligned with this notion. The remainder of this chapter will first present the results of the four specific goals and will conclude with the summarizing outcomes of the overarching goal. Therefore, while the previous chapters offered a largely theoretical discussion based on published research, this chapter details the key outcomes of my dissertation – the actual finding of my research endeavors.

The results of the specific research goals and their corresponding published articles are presented in almost a chronological order with just the last and second to last articles being switched around to create a more logical narrative which better reflects the structure and arguments presented in this thesis. The first study presented is a critical qualitative assessment of CLTS from the standpoint of development practitioners. It introduces their opinions, attitudes, and experiences with this popular approach. It also discusses shortcomings of CLTS and how it needs to be adapted to the local context. This article corresponds to specific research goal no. 1. The following text offers a critical comparative analysis of contrasting national sanitation strategies. It examines policies implemented in Ethiopia, which are based upon CLTS, and Indian SBM, which on paper should also use behavior change and community mobilization activities but was still mostly dominated by the construction of subsidized household toilets. The corresponding research goal for this article is goal no. 2. The remainder of Chapter 5 will present two quantitative studies that form one collective research effort. This analyzed the determinants of sanitation change in India under the SBM, with the first study using data collected in 2016 during the initial phases of SBM, while the follow up article uses data collected in 2019 shortly after the official conclusion of the program. These studies correspond to specific research goals no. 3 and 4. The dissertation then continues with a brief overview of the methods used in my research, and finally the overarching goal is discussed in the Chapter 7.

5.1 Analyze the experiences, attitudes, and opinions of development practitioners towards sanitation interventions that use primarily behavior change methods.

Examining sanitation interventions that utilize behavior change approaches is relevant in the context of Indian sanitation schemes, as an excessive focus on material constraints and an absence of behavior change methods is a common critique of each subsequent national scheme (Humňalová and Ficek 2023). CLTS was chosen as an approach for this analysis due to its large popularity, widespread application, and almost unquestioned acceptance within the international development community. The results of this specific goal are based on qualitative interviews with development practitioners who

participated on implementation of CLTS-based sanitation intervention (Ficek and Novotný 2019). While this study is not explicitly about India, it is still relevant for the Indian context. Before and during the time when the study was being conceived and written, CLTS was considered for implementation in India (in the end CLTS or CLTS-inspired interventions were implemented in various small-scale projects as covered by e.g. Orgill-Meyer et al. [2019] or Hammer and Spears [2016]). And even though it later became apparent that it is not the most suitable approach for India, SBM is still to a large part informed by CLTS. As such, the approach is part of various training materials distributed by the Indian government (e.g. Ministry of Drinking Water and Sanitation 2017)

Based on the interviews, CLTS is generally considered a successful method for rapidly eliminating OD. However, the guidelines provided by its founders (see Kar and Chambers 2008) cannot be taken at face value, and the methodologies must be aligned with the specific cultural, societal, or environmental contexts. This includes considering modifications that not only stray away from the original principles of CLTS but might even go strictly against them, such as the principle of not providing any individual household subsidies or direct technical and material assistance for construction of household toilets. This is to prevent the construction of low-quality latrines that are generally disliked by the communities and do not fulfill their purpose. CLTS often resulted in the construction of non-durable latrines that often do not last beyond the first monsoon season or toilets that did not adequately separate feces from the environment. Related to that were concerns voiced by the practitioners about the overall sustainability of the achieved sanitation change. Among other criticisms highlighted in the interviews were ethical issues related to the use of coercive tactics and shaming as a 'motivational' tool to force community members to use the toilets during the triggering phase. However, several practitioners mentioned that they avoid shaming and rather try to elicit empowering emotions during the interventions (Ficek and Novotný 2019).

Lastly, the research uncovered a disconnect between development practitioners and academic literature, especially epidemiological studies, which are usually not reflected, which highlights a lack of engagement with empirical evidence on the actual health impacts of sanitation interventions. Practitioners mainly focus on immediate outcomes like increased sanitation coverage and achieving ODF status, but seldom incorporate

findings from academic research into their strategies. This oversight results in missed opportunities to improve CLTS implementation and effectiveness. Despite the generally recognized and acknowledged importance of improved sanitation for health, there is little to no practical application of evidence from epidemiological studies in the field, underscoring a need for better integration of academic insights to enhance the design and outcomes of sanitation programs (Ficek and Novotný 2019).

5.2 Explore sanitation policies of India and compare them with policies less reliant on subsidies for individual household toilets.

Following up on the chronological evolution of the Indian sanitation schemes described in Chapter 4.3, this results section provides a more critical outlook on Indian sanitation policies, with a special focus on SBM as described in Humňalová and Ficek (2023). To provide a comparison with a diametrically opposing policy context, Ethiopia is used as a parallel country for India to be compared to, as Ethiopian sanitation policies are principally based on CLTS.

Since the first national sanitation scheme, the Central Rural Sanitation Programme, was introduced in 1986 in India, the defining characteristic of every sanitation program was a focus on toilet construction. Even as progressively with the Total Sanitation Campaign and following schemes each had a strategy which outlined a stronger focus on behavior change aspects, these only materialized in a very limited fashion. This was also among the most important critiques during the implementation of SBM. SBM is reported to perform more effectively than previous schemes and shows a rapid increase in toilet coverage. Nevertheless, the quality of the toilets constructed, and their sustained use raised concerns. Initial reports suggested that while SBM was successful in increasing toilet coverage, its focus on construction led to challenges in ensuring consistent use and sustainable changes in sanitation behaviors. This should be addressed in the second phase of SBM, commenced after the first phase's conclusion in 2019. This should once again shift the focus towards sustainability and the behavioral aspects of sanitation, recognizing the need for more than just infrastructure to achieve lasting sanitation improvements. This includes efforts like the Jal Jeevan Mission to provide water at the household level, addressing a major barrier to toilet use. However, the Indian context presented challenges

for community-focused interventions due to structural disadvantages and caste hierarchies, which were not properly addressed during SBM. This led to social stigma towards disadvantaged groups, which were often blamed for failing to adopt safe sanitation practices. At the same time, it is important to highlight the behavior change that occurred outside of the rural settings in the governmental establishment, where not only politicians but also officials working on sanitation fully embraced the cause and worked on dismantling taboos associated with sanitation, hygiene, and cleanliness (Humňalová and Ficek 2023).

Comparing the Indian and Ethiopian approaches reveals important insights for the global efforts to achieve universal access to safe sanitation, as their disproportionate focus on either the supply-side or the demand-side uncovers the shortcomings of these narrowly implemented strategies. Whereas both countries achieved remarkable reduction in reported OD rates, they failed to achieve their overarching objective of eliminating the practice. Ethiopia's CLTS-based approach resulted in a widespread use of low-quality and often non-durable sanitation facilities that do not ensure safe separation of fecal material from human contact, posing health risks and potential for slippage back to open defecation. Meanwhile, India's focus on infrastructure has increased access to toilets, but their consistent use remains uncertain. One of the issues associated with low acceptance of the toilets built in India is the fact the uniform design used during SBM does not reflect sociocultural factors and can lead to further stigmatization of marginalized households. This is a relevant finding for sanitation projects not only in India, but across the world, as effective sanitation strategies must consider local socioeconomic, budgetary, historical, institutional, sociocultural, and geographical specifics when designing a sanitation intervention. The type and extent of both subsidies and behavior change activities will vary depending on the local context. In most cases, a carefully planned combination of both will be the most effective strategy. Material constraints are a major factor that hinder sanitation uptake by low-income households, and education and information campaigns can strengthen the sustainability of safe sanitation behavior even for households without available resources for toilet construction. Conversely, it can be wasteful or even counterproductive to simply subsidize all rural households without any prior assessment of their capacity to construct safe sanitation facilities, while explaining the benefits of

safely managed sanitation to people with no means to attain it will also be in vain (Humňalová and Ficek 2023).

It would be foolish that if both countries used less narrowly focused approaches and combined some financial or material assistance with behavior change activities, they would certainly achieve their sanitation targets. However, a compelling case can be made that they would get better results or set up a better environment for continued efforts to eliminate OD in the future. In concordance with the first specific research question, my research advocates for policies that carefully assess the local context and based on the results combine both approaches to address the complex factors influencing sanitation practices effectively.

5.3 Understand sanitation conditions and its influencing factors in rural Jharkhand

The third specific goal employs a detailed analysis of sanitation conditions and their underlying determinants in rural Jharkhand. It is based on a study conducted in the autumn of 2016, which marked the beginning of SBM implementation in Jharkhand. This offers a unique snapshot of the sanitation situation during the transitionary period. The study distinguishes between structural factors (socioeconomic and ecological characteristics) and psychosocial drivers (such as attitudes and social norms) affecting sanitation. It demonstrates that both sets of factors are crucial to understanding toilet ownership and sanitation behavior. Prior to SBM, the sanitation conditions in rural Jharkhand were rather unsatisfactory, with only about 15% of households having toilets constructed prior to the intervention. While these toilets varied in quality, they were generally used more consistently compared to toilets built during SBM. Toilet ownership prior to the SBM was highly associated with several socioeconomic factors like the age, income, education level, or type of house, showing the importance of structural predictors. There was a notable impact of religious and cultural factors on toilet ownership prior to SBM, as Muslim and Christian households were more likely to own toilets compared to Hindu and Sarna households, reflecting diverse cultural attitudes towards sanitation (Novotný et al. 2018).

However, during the implementation of SBM, psychosocial factors became more prominent in influencing sanitation behavior. Perceptions of the benefits of toilet use, the disadvantages of OD, and social norms around sanitation were significant predictors of toilet ownership and intentions to improve sanitation. Descriptive social norms were particularly crucial, indicating that what people believe others are doing significantly impacts their own sanitation choices. The study also explored factors affecting households' willingness to pay for toilets (WTP) and plans to adopt or improve toilet (PAIT). The results revealed that both structural and psychosocial predictors influenced WTP and PAIT, with psychosocial factors having a stronger impact. This suggests that while economic capacity is important, perceptions and attitudes towards sanitation are more critical in determining whether households are willing to invest in toilets. Notably, the perception of toilet benefits and OD disadvantages, along with descriptive social norms played a significant role in shaping sanitation preferences. At the same time, the data indicates that general knowledge about sanitation and health risks is not a strong predictor of sanitation behavior, which challenges strategies focused solely on information dissemination and education. Nevertheless, the findings support the use of community-led interventions that focus on changing actual practices (descriptive norms) rather than just perceptions of approval (injunctive norms) (Novotný et al. 2018).

These results underscore that addressing structural inequalities alone may not suffice to improve sanitation safety. It is equally crucial to target relevant psychosocial drivers that can influence sanitation preferences towards sustained behavior change. It is also a call for policies that address both structural barriers and psychosocial factors, as successful interventions must tailor their strategies to the specific cultural and social contexts of the target communities.

5.4 Examine the process of SBM implementation and its outcomes on a case study from rural Jharkhand.

To fully paint the picture of sanitation change attained under SBM, the last specific goal is based on data collected at the conclusion of SBM in the autumn of 2019. This was a direct follow up on the 2016 study, as it took place in the same region. Although the survey covered the same villages as in the 2016 study, different households were typically

visited as personal information such as house location and names of respondents were not recorded for privacy reasons.

An important factor for the whole process of SBM implementation was the large political support that the scheme received, particularly from the central and state governments, which were politically aligned during the implementation. This meant that SBM received adequate priority and support, and the strong political and bureaucratic push helped accelerate the SBM's implementation process. There was, however, a notable lack of coordination among the involved governmental departments. The implementation was overseen by the Jharkhand Drinking Water and Sanitation Department, whose grassroots-level community workers were more technically oriented and mostly lacked capacity for implementation of behavior change and education activities. This might have been avoided and the behavior change component of the mission could have been enriched, if there was a better integration with the Health Department and the Department of Women, Child Development, and Social Security. Despite the lack of coordination, the female community workers, called Jal Sahiyas, played pivotal roles in the grassroots implementation of SBM. Initially tasked with technical roles like water quality testing, their responsibilities expanded to include organizing toilet construction and monitoring sanitation practices. The training provided to these female workers was however primarily focused on toilet construction rather than on broader aspects of sanitation and hygiene education. Additionally, while they were generally proud of their contributions to SBM's goals, the community workers faced multiple challenges, including inadequate financial remuneration and high work demands. Nonetheless, their work was crucial in pushing the SBM's agenda at the local level (Novotný et al. 2024).

From the perspective of sanitation coverage SBM can be considered very successful, as toilet coverage increased from 15% to 85%, while OD rates plummeted from 93% to 26% during the program period. This means that the government fell short of its initial goal of achieving full coverage and a full ODF status, but an overly ambitious goal should not diminish the actual scale in which the toilet coverage was improved. A cause for concern is long-term sustainability, as 31% of respondents expressed unwillingness to invest into toilet maintenance. Even a preference for OD, which was previously reported, does not seem to be present in the population anymore. At the same time, SBM toilets were built at a lower quality compared to privately constructed toilets,

meaning they will probably have higher maintenance requirements and could fall into disuse without adequate care, highlighting the risk of OD slippage. Psychosocial determinants of sanitation remain a strong predictor of sanitation outcomes. This means that even as further sanitation-related education and behavior change campaigns will be necessary, SBM and related messaging was able to establish both descriptive and injunctive norms around safe sanitation. However, actual understanding and knowledge about sanitation remained low. Similarly, attendance at village meetings where hygiene and sanitation were discussed was also low, which might have been influenced by a relative popularity of witch doctors and herbalists as sources of health information in rural Jharkhand. In general, the ever-present critique of Indian sanitation schemes continues to be valid for SBM as well, as behavior change aspects were again sidelined in favor of toilet construction. Though at least in the statistical sense, SBM eliminated structural inequalities that determined toilet adoption prior to SBM. Some of the surveyed households claimed that they would construct a toilet even without SBM but given the sanitation situation before the implementation, as outlined in the previous specific goal, the increase in toilet coverage can be largely attributed to SBM.

6 Methods

6.1 Overview of methods used in the articles.

The methodology applied across this dissertation and the underlying research endeavors uses a mix of quantitative and qualitative methods. This approach was selected to properly capture the overall complexity of sanitation and the necessity to fully understand the context in which the researched sanitation interventions and subsequent sanitation change occurred. Mixed methods also provide much better understanding of what kind of conditions would be necessary to recreate to successfully expand or adapt development projects in other regions (Protheroe et al. 2007; Woolcock 2019). While detailed descriptions of methods are available in individual articles, a brief overview will be provided here:

Ficek and Novotný (2019) used a qualitative analysis based on semi-structured interviews conducted with 19 practitioners experienced in the implementation of CLTS across multiple countries. The responses of the interviewees were categorized by codes and subcodes based on common topics mentioned by multiple practitioners. The emergent main topics were then juxtaposed with existing theoretical frameworks on CLTS to extract the predominant attitudes and opinions and the approach.

Humňalová and Ficek (2023) performed a critical comparative study to assess the effectiveness of varied sanitation strategies, emphasizing supply-side vs. demand-side interventions, based on the strategies applied in India and Ethiopia. The comparison was done across four domains that are usually contested in academic literature: political framing and support, main narratives and legal ground, financing, and sanitation approach.

Lastly, both Novotný et al. (2018) and Novotný et al. (2024) used methods of quantitative analysis to study data collected through household surveys. Beyond basic descriptive statistics, the studies employed binary logistic regression analysis to explore the relationship between structural and psychosocial factors and sanitation preferences and outcomes. This statistical method allowed for the assessment of relationships between multiple independent variables and a binary dependent variable, providing insights into factors influencing toilet ownership and sanitation practices. Complementary to that, both studies used qualitative approaches to truly capture the broader context of the study. In Novotný et al. (2018) qualitative methods were used in a rather limited way, with only several semi-structured interviews being conducted, while for Novotný et al. (2024) an extensive number of key informant interviews and several focus group discussions were conducted.

7 Conclusion

Sanitation as a topic will remain extremely relevant in the upcoming years, although the most pressing challenges around sanitation may gradually change. Sanitation and WASH more generally will continue to be among the policy priorities of many countries. And even though the progress on sanitation and its financial investments are still too low to accomplish the SDG 6.2 by 2030, and in some regions of Sub-Saharan Africa the sanitation access gap is still growing (WHO/UNICEF 2023a; WHO/UNICEF 2024), the goal of achieving universal access to safely managed sanitation is attainable in the foreseeable future. However, it will be a strenuous journey which will require not only increased financing but especially improvement in policies and concentrated research efforts.

I believe that the geographical approach to sanitation research should play an important part of these efforts. Such an approach seeks to account for spatial variations, temporal dynamics and attempts for understanding of sanitation change and its underlying mechanisms in a given situation, both in terms of local specifics and wider context. The geographical approach thus promotes a holistic understanding of sanitation change as a complex, adaptive process influenced by a wide range of factors and interactions at different levels. The approach has some known limitations, such as that its endeavor for a wide breadth may come at the cost of its depth, exemplified by among others the preference of observational over experimental research designs.

This holistic approach calls for addressing of structural inequalities as determinants of sanitation change, but it is important to plan out how is this addressing realized. In this aspect, my dissertation research makes a case for including at least some and preferably targeted financial assistance in sanitation programs to help overcome some of the sanitation barriers related to these structural inequalities. As the research on SBM implementation in Jharkhand showed, subsidies for toilet construction can help to reduce these inequalities play regarding the access to sanitation facilities (Novotný et al. 2024).

At the same time, promoting the most affordable low-cost sanitation solutions and force it onto those who cannot afford anything better may be problematic (O'Reilly and

Louis 2014; O'Reilly et al. 2017). Staying within the notions of political ecology, it is important to provide agency to the people whose sanitation situation is being addressed, allowing them to choose infrastructure and solution based on their own needs. This was not the case during SBM implementation in Jharkhand and could potentially harm the sustainability of the results achieved (Novotný et al. 2018; Novotný et al. 2024).

Empowering communities should also be the ultimate goal of behavior change activities during sanitation interventions. Based on the research presented, and specifically pointed out in Humňalová and Ficek (2023), sanitation intervention should combine some sort of financial or technical assistance with behavior change approaches to ensure sustainable results. Together with empowerment, these activities should focus on enhancing actual understanding and knowledge of sanitation issues. On the other hand, coercive methods that aim at inducing shame in the intervention population should be avoided. This holds especially true in the Indian context, where the society is still to a large degree suffering from graded inequalities, and any coercive mechanism usually tends to be directed at members of the lowest castes. This also constitutes a general critique towards CLTS, as it in its pure form prohibits any individual material or financial assistance and coercive tactics are used during CLTS interventions (Ficek and Novotný 2019).

A large takeaway from applying the geographical approach to sanitation research is also that sanitation is highly context-specific and there are no 'one size fits all' solutions. From a policy perspective, large-scale interventions can lead to impressive results, particularly when it comes to increasing sanitation coverage. Yet, localization, contextualization and inputs from communities are necessary, especially for long-term sustainability (Ficek and Humňalová 2023; Novotný et al. 2024). Similar results in the Indian context are described in Chakraborty et al. (2023).

There are, of course, some limitations related to this dissertation. Besides the above-described limitations of the geographical approach itself, there are issues like the reliance on household surveys that are susceptible to social desirability bias that can skew the results (Novotný et al. 2018). Sanitation has also a very strong gendered dimension (Ficek and Novotný 2019) and it is generally recommended to collect and analyze gender disaggregated data. However, studies presented in this dissertation mainly deal with

aggregated household data (although some gendered data were collected), which means that inherently some gender dimensions were not reflected.

For future research it will be crucial to further study the sustainability of sanitation change reached under SBM, especially regarding usage and maintenance of the newly constructed toilets. This goes together with another huge step in safely managed sanitation, which is fecal sludge management. There are still a lot of unknowns regarding how fecal sludge management will be conducted, what technologies and business models can be used, and how fecal sludge can be further utilized. To do this properly, the processes around fecal sludge management should be set up with structural inequalities in mind, as in the Indian and similar contexts the handling of feces designated to the lowest standing social classes (Jewitt 2011; Doron and Raja 2015). Subsequently, it is crucial to bear this in mind so not to set up systems that would further aggravate social inequalities.

This dissertation attempts to lay a strong foundation for future research efforts by using a geographical approach to examine sanitation change and its drivers in Jharkhand under SBM, while putting it into a wider context of the global sanitation action. I hope that my research can not only assist policy makers improve sanitation policies but will support the current global efforts to achieve universal access to safely managed sanitation for all.

References:

ABOUD, F. E., SINGLA, D. R. (2012): Challenges to changing health behaviours in developing countries: a critical overview. Social Science & Medicine, 75, 589–594.

ANDERSSON, K., OTOO, M., NOLASCO, M. (2018): Innovative sanitation approaches could address multiple development challenges. Water Science and Technology, 77, 4, 855–858.

BARBER, H., DICKSON-ANDERSON, S., SCHUSTER-WALLACE, C., ELLIOTT, S., TEMA, S. (2018): Designing a Mixed-Methods Approach for Collaborative Local Water Security: Findings from a Kenyan Case Study. Exposure and Health, 10, 145–153.

BARDOSH, K. (2015): Achieving "Total Sanitation" in Rural African Geographies: Poverty, Participation and Pit Latrines in Eastern Zambia. Geoforum, 66, 53–63.

BARTRAM, J., CHARLES, K., EVANS, B., O'HANLON, L., PEDLEY, S. (2012): Commentary on community–led total sanitation and human rights: should the right to community–wide health be won at the cost of individual rights? Journal of Water and Health, 10, 4, 499–503.

BATEL, S., CASTRO, P., DEVINE-WRIGHT, P., HOWARTH, C. (2016): Developing a critical agenda to understand pro-environmental actions: contributions from Social Representations and Social Practices Theories. Wiley Interdisciplinary Reviews: Climate Change, 7, 5, 727–745.

BLAIKIE, P. (1995): Changing environments or changing views? A political ecology for developing countries. Geography, 80, 348, 203–214.

BOBBINS, K., DIEP, L., HOFMANN, P., OKOWILLIAMS, A., CAMPOS, L. C., STEENMANS, I., LAKHANPAUL, M., MATE-KODJO, D. W., PARIKH, P. (2023): Accelerating progress towards the SDGs: Collaborative policymaking in sanitation for integrated benefits in Sub-Saharan Africa. World Development Sustainability, 2, 100037.

BREWIS, A., WUTICH, A., DU BRAY, M. V., MAUPIN, J., SCHUSTER, R. C., GERVAIS, M. M. (2018): Community hygiene norm violators are consistently stigmatized: Evidence from four global sites and implications for sanitation interventions. Social Science & Medicine, 220, 12–21.

BRIKKÉ, F., BREDERO, M. (2003): Linking technology choice with operation and maintenance in the context of community water supply and sanitation: A reference document for planners and project staff. World Health Organization and IRC Water and Sanitation Centre. Available online at: https://apps.who.int/iris/bitstream/handle/10665/42538/9241562153.pdf [cit. 17. 5. 2024]

BRYANT, R. L. (1992): Political ecology: an emerging research agenda in Third–World studies. Political geography, 11, 1, 12–36.

CAIRNCROSS S., SHORDT K., ZACHARIA S., GOVINDAN B. K. (2005): What causes sustainable changes in hygiene behaviour? A cross–sectional study from Kerala, India. Social Science & Medicine, 61, 2212–2220.

CAIRNCROSS, S., HUNT, C., BOISSON, S., BOSTOEN, K., CURTIS, V., FUNG, I. C., SCHMIDT, W. P. (2010): Water, sanitation and hygiene for the prevention of diarrhoea. International journal of epidemiology, 39, 193–205.

CHAKRABORTY, S., NOVOTNÝ, J., DAS, J., BARDAHN, A., ROY, S., MONDAL, S., PATEL, P. P., SANTRA, S., MAITY, I., BISWAS, R., MAJI, A., & PRAMANIK, S. (2022): Geography matters for sanitation! Spatial heterogeneity of the district-Level correlates of open defecation in India. Singapore Journal of Tropical Geography, 43, 1, 62–84.

CHAKRABORTY, S., NOVOTNÝ, J., DAS, J., PATEL, P. P., MAITY, I., ROY, U. (2023): Spatial Environment and Open Defecation: In Pursuit of Social Valuation of Sanitation Ecosystem Services. The Professional Geographer, 1–15.

CHAMBERS, R. (1994): Participatory Rural Appraisal (PRA): Analysis of Experience. World Development, 22, 9, 1253–1268.

CHAMBERS, R. (1997): Whose Reality Counts? Putting the First Last. Intermediate Technology Publications, London.

CHAMBERS, R. (2009): Going to Scale with Community–Led Total Sanitation: Reflections on Experience, Issues and Ways Forward. IDS Practice Paper 1, Institute of Development Studies, Brighton.

COFFEY, D., GUPTA, A., HATHI, P., SPEARS, D., SRIVASTAV, N., VYAS, S. (2017): Understanding open defecation in rural India: Untouchability, pollution, and latrine pits. Economic and Political Weekly, 52, 1, 59–66.

CRAIG, P., DIEPPE, P., MACINTYRE, S., MICHIE, S., NAZARETH, I., PETTICREW, M., M. R. C. (2008): Developing and evaluating complex interventions: the new Medical Research Council guidance. BMJ, 337, a1655.

CROCKER, J., SAYWELL, D., BARTRAM, J. (2017): Sustainability of community–led total sanitation outcomes: Evidence from Ethiopia and Ghana. International journal of hygiene and environmental health, 220, 3, 551–557.

CULLET, P. (2018): Policy as Law: Lessons from Sanitation Interventions in Rural India. Stan. J. Int'l L., 54, 241.

CURTIS, V. (2019): Explaining the outcomes of the 'Clean India' campaign: institutional behaviour and sanitation transformation in India. BMJ global health, 4, 5, e001892.

DATTA, J., PETTICREW, M. (2013): Challenges to evaluating complex interventions: A content analysis of published papers. BMC Public Health, 13, 568.

DEARDEN, K. A., SCHOTT, W., CROOKSTON, B. T., HUMPHRIES, D. L., PENNY, M. E., & BEHRMAN, J. R. (2017): Children with access to improved sanitation but not improved water are at lower risk of stunting compared to children without access: a cohort study in Ethiopia, India, Peru, and Vietnam. BMC Public Health, 17, 110.

DORON, A., RAJA, I. (2015): The cultural politics of shit: class, gender and public space in India. Postcolonial Studies, 18, 2, 189–207.

DOUGLAS, M. (1966): Purity and Danger: an analysis of concepts of pollution and taboo. Routledge & Keagan Paul, London and New York.

DRÈZE, J., SEN, A. (2013): An uncertain glory: India and its contradictions. Princeton University Press, Princeton.

DREIBELBIS, R., WINCH, P. J., LEONTSINI, E., HULLAND, K. R., RAM, P. K., UNICOMB, L., LUBY, S. P. (2013): The integrated behavioural model for water, sanitation, and hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure–restricted settings. BMC public health, 13, 1.

FUKUDA, S., NODA, K., OKI, T. (2019): How global targets on drinking water were developed and achieved. Nature Sustainability, 2, 429–434.

FELEKE, B. E., BEYENE, M. B., FELEKE, T. E., JEMBER, T. H., ABERA, B. (2019): Intestinal parasitic infection among household contacts of primary cases, a comparative cross-sectional study. PloS ONE, 14, 10, e0221190.

FREEMAN, M. C., GARN, J. V., SCLAR, G. D., BOISSON, S., MEDLICOTT, K., ALEXANDER, K. T., PENAKALAPATI, G., ANDERSON, D., MAHTANI, A., GRIMES, J. E. T., REHFUESS, E. A., CLASEN T. F. (2017): The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis. International journal of hygiene and environmental health, 220, 6, 928–949.

GARN, J. V., SCLAR, G. D., FREEMAN, M. C., PENAKALAPATI, G., ALEXANDER, K. T., BROOKS, P., REHFUESS, E. A., BOISSON, S., MEDLICOTT, K. O. AND CLASEN, T. F. (2017): The impact of sanitation interventions on latrine coverage and latrine use: A systematic review and meta–analysis. International journal of hygiene and environmental health, 220, 2, 329–340.

GERUSO, M., AND SPEARS, D. (2018): Neighborhood sanitation and infant mortality. American Economic Journal: Applied Economics, 10, 2, 125–162.

GHOSH, S. K. (2016): Swachh Bharat Mission (SBM)–A Paradigm Shift in Waste Management and Cleanliness in India. Procedia Environmental Sciences, 35, 15–27.

GUPTA, A., KHALID, N., HATHI, P., SRIVASTAV, N., SANGITA VYAS, DIANE COFFEY (2019): Coercion, construction, and 'ODF paper pe': The Swachh Bharat Mission, according to local government officials. Rice institute. Available online at: https://riceinstitute.org/research/odf-mukt-the-swachh-bharat-mission-according-to-local-government-officials/ [cit. 13. 7. 2023]

HAMMER, J., SPEARS, D. (2016): Village sanitation and child health: Effects and external validity in a randomized field experiment in rural India. Journal of health economics, 48, 135–148.

HUESO, A., BELL, B. (2013): An untold story of policy failure: the total sanitation campaign in India. Water Policy, 15, 6.

HUESO, A., BONI, A., FERNÁNDEZ-BALDOR, Á. (2018): Embracing the complexity of policy processes in sanitation: Insights from India. Development Policy Review, 36, 2, 203–219.

HUTTON, G., BARTRAM, J. (2008). Global costs of attaining the Millennium Development Goal for water supply and sanitation. Bulletin of the World Health Organization, 86, 13–19.

HUTTON, G., PATIL, S., KUMAR, A., OSBERT, N., ODHIAMBO, F. (2020): Comparison of the costs and benefits of the Clean India Mission. World Development, 134, 105052.

HYUN, C., BURT, Z., CRIDER, Y., NELSON, K. L., PRASAD, C. S., RAYASAM, S. D., TARPEH, W., RAY, I. (2019). Sanitation for Low–Income Regions: A Cross–Disciplinary Review. Annual Review of Environment and Resources, 44.

INTERNATIONAL INSTITUTE FOR POPULATION SCIENCES AND ICF (2021): National Family Health Survey (NFHS-5), 2019-21: India: Volume I. Mumbai, IIPS.

JEWITT, S. (2011): Geographies of shit: Spatial and temporal variation in attitudes toward human waste. Progress in Human Geography, 35, 5, 608–626.

JOYCE, K. E., CARTWRIGHT, N. (2020): Bridging the gap between research and practice: Predicting what will work locally. American Educational Research Journal, 57, 3, 1045–1082.

KAR, K., CHAMBERS, R. (2008): Handbook on community-led total sanitation. Plan International (UK). Available online at: http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/cltshandbook.pdf [cit. 25. 2. 2023]

KING, B. (2010): Political ecologies of health. Progress in Human Geography, 34, 1, 38–55.

KLOOS, H. (1998): Primary health care in Ethiopia under three political systems: Community participation in a war-torn society. Social Science & Medicine, 46, 4–5, 505–522.

KOTSILA, P., SARAVANAN, V. S. (2017): Biopolitics gone to shit? State narratives versus everyday realities of water and sanitation in the Mekong Delta. World Development, 93, 374–388.

KUMAR, A. (2017): Beyond toilets and targets: sanitation mission in India. Development in Practice, 27, 3, 408–413.

KUMAR, S., VOLLMER, S. (2013): Does access to improved sanitation reduce childhood diarrhea in rural India? Health Economics, 22, 4, 410–427.

KUMAR, S., KUMAR, N., VIVEKADHISH, S. (2016): Millennium development goals (MDGS) to sustainable development goals (SDGS): Addressing unfinished agenda and strengthening sustainable development and partnership. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 41, 1.

LAHIRI, S., YEGBEMEY, R. N., GOEL, N., MATHEW, L., PURI, J., (2017): Promoting latrine use in rural India. 3ie Scoping Paper 8. New Delhi: International Initiative for Impact Evaluation (3ie). Available online at:https://www.3ieimpact.org/sites/default/files/2019-01/sp8-latrine-use-india.pdf [cit. 2. 7. 2021].

LANTAGNE, D., LEHMANN, L., YATES, T., GALLANDAT, K., SIKDER, M., DOMINI, M., & STRING, G. M. (2021): Lessons learned from conducting six multi-country mixed-methods effectiveness research studies on water, sanitation, and hygiene (WASH) interventions in humanitarian response. BMC Public Health, 21.

LENTON, R., LEWIS, K., WRIGHT, A. M. (2008): Water, sanitation and the millennium development goals. Journal of International affairs, 247–258.

MARA, D., LANE, J., SCOTT, B., TROUBA, D. (2010): Sanitation and health. PloS medicine, 7, 11.

MEHROTRA, S. (2021): Monitoring India's National Sanitation Campaign (2014–2020). Institute of Development Studies. Available online at: - https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/16714/INDIA_case_study_FINAL_VERSION.pdf?sequence=5&isAllowed=y [cit. 12. 10. 2023]

MEHTA, L., MARSHALL, F., MOVIK, S., STIRLING, A., SHAH, E., SMITH, A., THOMPSON, J. (2007): Liquid Dynamics: challenges for sustainability in water and sanitation, STEPS Working Paper 6, Brighton: STEPS Centre.

MINISTRY OF DRINKING WATER AND SANITATON (2018): Guidelines for Swachh Bharat Mission (Gramin). Available online at: https://jalshakti-ddws.gov.in/sites/default/files/SBM%28G%29_Guidelines.pdf [cit. 15. 6. 2023].

MINISTRY OF DRINKING WATER AND SANITATION (2017): Community Approaches to Sanitation. Available online at: https://jalshakti-ddws.gov.in/sites/default/files/CAS%201-daymoduleforseniomanagers.pdf [cit. 6. 6. 2023]

MOSLER, H. J. (2012): A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: a conceptual model, a review, and a guideline. International journal of environmental health research, 22, 5, 431–449.

MURPHY, H. M., MCBEAN, E. A., FARAHBAKHSH, K. (2009): Appropriate technology–A comprehensive approach for water and sanitation in the developing world. Technology in Society, 31, 2, 158–167.

NASIM, N., EL-ZEIN, A., THOMAS, J. (2022): A review of rural and peri-urban sanitation infrastructure in South-East Asia and the Western Pacific: Highlighting regional inequalities and limited data. International Journal of Hygiene and Environmental Health, 244, 113992.

NOVOTNÝ, J., FICEK, F., HILL, J. K., KUMAR, A. (2018): Social determinants of environmental health: A case of sanitation in rural Jharkhand. Science of The Total Environment, 643, 762–774.

NOVOTNÝ, J., HASMAN, J., LEPIČ, M. (2018a): Contextual factors and motivations affecting rural community sanitation in low–and middle–income countries: A systematic review. International journal of hygiene and environmental health, 221, 2, 121–133.

ORGILL-MEYER, J., PATTANAYAK, S. K., CHINDARKAR, N., DICKINSON, K. L., PANDA, U., RAI, S., SAHOO, B., SINGHA, A., JEULAND, M. (2019): Long-term impact of a community-led sanitation campaign in India, 2005–2016. Bulletin of the World Health Organization, 97, 8, 523–533.

O'REILLY, K., DHANJU, R., GOEL, A. (2017): Exploring “the remote” and “the rural”: open defecation and latrine use in Uttarakhand, India. World Development, 93, 193–205.

O’REILLY, K., LOUIS, E. (2014): The toilet tripod: Understanding successful sanitation in rural India. Health & place, 29, 43–51.

ORNER, K. D., MIHELCIC, J. R. (2018): A review of sanitation technologies to achieve multiple sustainable development goals that promote resource recovery. Environmental Science: Water Research & Technology, 4, 1, 16–32.

PAKHTIGIAN, E. L., DICKINSON, K. L., ORGILL-MEYER, J., PATTANAYAK, S. K. (2022): Sustaining latrine use: Peers, policies, and sanitation behaviors. Journal of Economic Behavior & Organization, 200, 223–242.

PAPAFILIPPOU, N., TEMPLETON M. R., ALI, M. (2011): Is there a role for external technical support in the Community–Led Total Sanitation (CLTS) approach? International Development Planning Review, 33, 1, 81–94.

PROTHEROE, J., BOWER, P., & CHEW-GRAHAM, C. (2007): The use of mixed methodology in evaluating complex interventions: identifying patient factors that moderate the effects of a decision aid. Family Practice, 24, 6, 594–600.

RIMER, B. K., GLANZ, K. (2005): Theory at a glance: a guide for health promotion practice. Available online at: https://cancercontrol.cancer.gov/brp/research/theories_project/theory.pdf [cit. 10. 7. 2023].

ROSENQVIST, T., MITCHELL, C., WILLETTS, J. (2016): A short history of how we think and talk about sanitation services and why it matters. Journal of Water, Sanitation and Hygiene for Development, 6, 2, 298–312.

ROUTRAY, P., TORONDEL, B., JENKINS, M. W., CLASEN, T., SCHMIDT, W. P. (2017): Processes and challenges of community mobilisation for latrine promotion under Nirmal Bharat Abhiyan in rural Odisha, India. BMC public health, 17, 1.

ROY, A., RAHAMAN, M., ADHIKARY, M., KAPASIA, N., CHOUHAN, P., & DAS, K. C. (2023): Unveiling the spatial divide in open defecation practices across India: an application of spatial regression and Fairlie decomposition model. BMJ open, 13, 7, e072507.

ROY, C. (2023): Spatial distribution and determinants of limited access to drinking water and sanitation services of households in India. Journal of Water, Sanitation and Hygiene for Development, 13, 11, 893–909.

SAH, S., NEGUSSIE, A. (2009): Community led total sanitation (CLTS): Addressing the challenges of scale and sustainability in rural Africa. Desalination, 248, 1–3), 666–672.

SARKAR, S. K., BHARAT, G. K. (2021): Achieving Sustainable Development Goals in water and sanitation sectors in India. Journal of Water, Sanitation and Hygiene for Development 11, 5, 693–705.

SHIELL, A., HAWE, P., GOLD, L. (2008): Complex interventions or complex systems? Implications for health economic evaluation. BMJ, 336, 7656, 1281–1283.

SIGLER, R., MAHMOUD, I L., GRAHAM, J. P. (2014): Analysis of behavioral changes techniques in community–led total sanitation programs. Health Promotional International, 30, 3, 1–13.

SINHA, A., NAGEL, C. L., SCHMIDT, W. P., TORONDEL, B., BOISSON, S., ROUTRAY, P., CLASEN, T. F. (2017): Assessing patterns and determinants of latrine use in rural settings: a longitudinal study in Odisha, India. International journal of hygiene and environmental health, 220, 5, 906–915.

SWE, K. T., RAHMAN, M. M., RAHMAN, M. S., TENG, Y., ABE, S. K., HASHIZUME, M., SHIBUYA, K. (2021): Impact of poverty reduction on access to water and sanitation in low-and lower-middle-income countries: country-specific Bayesian projections to 2030. Tropical Medicine & International Health, 26, 7, 760–774.

THYS, S., MWAPE, K. E., LEFÈVRE, P., DORNY, P., MARCOTTY, T., PHIRI, A. M., PHIRI, I. K., GABRIËL, S. (2015): Why latrines are not used: communities' perceptions and practices regarding latrines in a Taenia solium endemic rural area in Eastern Zambia. PLoS neglected tropical diseases, 9, 3.

THAKUR, B., MISHRA V. (2016): Practical ideas and experiences for Swachh Bharat Mission (Gramin) campaigns. A living sourcebook. Available online at: http://sbm.gov.in/SBMGUpload/SBM(G)%20Campaigns%20Collectors%20Handbook–%2002.03.2016%20(1).pdf [cit. 5. 5. 2023].

UNITED NATIONS (2000): United Nations Millennium Declaration. Available online at: https://www.un.org/millennium/declaration/ares552e.htm [cit. 11. 6. 2023]

UNITED NATIONS (2002): Johannesburg Declaration on Sustainable Development. Available online at: http://www.un–documents.net/jburgdec.htm [cit. 11. 6. 2023]

UNITED NATIONS (2003): Indicators for Monitoring the Millennium Development Goals. Available online at: https://unstats.un.org/unsd/publication/seriesf/Seriesf_95E.pdf [cit. 11. 6. 2023]

UNITED NATIONS (2005): 2005 World Summit Outcome. Available online at: https://www.un.org/womenwatch/ods/A–RES–60–1–E.pdf [cit. 11. 6. 2022].

UNITED NATIONS (2015): The Millennium Development Goals Report 2015. United Nations, New York. Available online at: http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20%28July%201%29.pdf [cit 21. 5. 2022]

UNITED NATIONS DEVELOPMENT PROGRAMME (2024): Human Development Report 2023-24: Breaking the gridlock: Reimagining cooperation in a polarized world. New York.

UN DESA (2016): Sustainable development knowledge platform, Goal 6. Available online at: https://sustainabledevelopment.un.org/sdg6 [cit 1. 5. 2022]

VENKATARAMANAN, V., CROCKER, J., KARON, A., BARTRAM, J. (2018): Community–led total sanitation: a mixed–methods systematic review of evidence and its quality. Environmental health perspectives, 126, 2, 1–17.

WESTSTRATE, J., DIJKSTRA, G., ESHUIS, J., GIANOLI, A., RUSCA, M. (2018): The Sustainable Development Goal on Water and Sanitation: Learning from the Millennium Development Goals. Social Indicators Research, 1–16.

WHO/UNICEF 2015. Progress on Sanitation and Drinking Water – 2015 update and MDG assessment. Available online at https://data.unicef.org/wp-

content/uploads/2015/12/Progress-on-Sanitation-and-Drinking-Water_234.pdf [cit. 10. 5. 2022]

WHO/UNICEF (2017): Progress on Household Drinking Water, Sanitation and Hygiene 2017. New York.

WHO/UNICEF (2021): Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs. New York.

WHO/UNICEF (2023): Progress on Sanitation and Hygiene in Africa 2000-2022. New York.

WHO/UNICEF (2023a): Progress on Household Drinking Water, Sanitation and Hygiene 2000-2022. New York.

WHO/UNICEF (2024): Household data. WHO/UNICEF, New York. Available online at: https://washdata.org/data [cit. 20. 4. 2024]

WOLF J., PRÜSS-USTÜN, A., CUMMING, O, BARTRAM, J., BONJOUR, S., CAIRNCROSS, S., CLASEN, T., COLFORD, J. M., CURTIS, V., DE FRANCE, J., FEWTRELL, L., FREEMAN, M. C., GORDON, B., HUNTER, P. R., JEANDRON, A., JOHNSTON, R. B., MÄUSEZAHL, D., MATHERS, C., NEIRA, M., HIGGINS, J. P. T. (2014): Systematic review: assessing the impact of drinking water and sanitation on diarrhoeal disease in low-and middle-income settings: systematic review and meta-regression. Tropical Medicine & International Health, 19, 8, 928–942.

WOOLCOCK, M. (2019): Reasons for using mixed methods in the evaluation of complex projects. Contemporary philosophy and social science: An interdisciplinary dialogue, 147–171.

WSSCC (2000): Vision 21: A Shared Vision for Hygiene, Sanitation and Water Supply and A Framework for Action. Accessible online at: https://www.wsscc.org/wp–content/uploads/2016/04/Vision–21–A–Shared–Vision–for–Hygiene–Sanitation–and–Water–Supply–and–a–Framework–for–Action.pdf [cit. 14. 6. 2019].

YOGANANTH, N., BHATNAGAR, T. (2018): Prevalence of open defecation among households with toilets and associated factors in rural south India: an analytical cross–sectional study. Transactions of The Royal Society of Tropical Medicine and Hygiene, 112, 7, 349–360.