

Psychosocial impacts of the lack of access to water and sanitation in low- and middle-income countries: a scoping review

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ABSTRACT

The lack of access to safe water and adequate sanitation has implications for the psychosocial well-being of individuals and households. To review the literature on psychosocial impacts, we completed a scoping review of the published literature using Medline, Embase, and Scopus. Fifteen studies met the inclusion criteria and were reviewed in detail. Of the included studies, six were conducted in India, one in Nepal, one in Mexico, one in Bolivia, two in Ethiopia, one in Zimbabwe, one in South Africa, and two in Kenya. Four interrelated groups of stressors emerged from the review: physical stressors, financial stressors, social stressors, and stressors related to (perceived) inequities. Further, gender differences were observed, with women carrying a disproportionate psychosocial burden. We argue that failure to incorporate psychosocial stressors when estimating the burden or benefits of safe water and sanitation may mask an important driver of health and well-being for many households in low- and middle-income countries. We propose further research on water-related stressors with particular attention to unique cultural norms around water and sanitation, short and long term psychosocial outcomes, and individual and collective coping strategies. These may help practitioners better understand cumulative impacts and mechanisms for addressing water and sanitation challenges.

Key words | health, psychosocial impacts, scoping review, water and sanitation

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INTRODUCTION

In September 2015, the global community embarked on an ambitious collective journey toward implementing the Sustainable Development Goals (SDGs). Targets 6.1 and 6.2 of the goals call for universal and equitable access to safe drinking water, access to adequate and equitable sanitation and hygiene, and an end to open defecation by 2030. Recognizing the disproportionate social and health burden of inadequate sanitation on women, target 6.2 particularly emphasizes the need to pay ‘special attention to the needs of women and girls and those in vulnerable situations’. These targets, are in part meant to continue the unfinished Millennium Development Goals (MDG) agenda and provide the most sustainable access to water and sanitation

for all persons irrespective of social status, economic status or geographic location.

During the MDG era, impact evaluations of water and sanitation interventions were largely focused on direct health benefits, with limited attention paid to indirect – and non-health – benefits. Frameworks and evidence linking water and sanitation to direct health outcomes such as diarrhoea (Gundry *et al.* 2004; Wolf *et al.* 2014), maternal and child health (Benova *et al.* 2014) and soil helminths diseases (Strunz *et al.* 2014) became widespread. However, few empirical studies examined other important areas that affect the health and well-being of individuals and communities. For example, limited understanding on the nature and extent of

psychosocial impacts associated with water insecurity is a major area of concern (Wutich 2009; Stevenson *et al.* 2012). Though evidence has shown that water insecurity – just as food insecurity – is linked to emotional distress, anxiety, depression and other mental health outcomes (Ennis-McMillan 2001; Aihara *et al.* 2015), not much attention has been paid to psychosocial impacts within the context of impact assessments or evaluations.

Water, sanitation and psychosocial health

Psychosocial health generally emphasizes individuals' perceptions of – and responses to – social and environmental conditions and status (Krieger 2011). A key component of psychosocial health is how individuals and communities appraise their environments in relation to current and anticipated living conditions. Of interest in this appraisal process is how people perceive both the harm and suffering caused by stressors in the environment as well as the stock of resources they use to buffer against such harm and suffering (Sapolsky 2004). Thus, psychosocial distress is considered a relational concept that reflects a dynamic relationship between environmental demands, individual resources to cope with these demands, and appraisal of this relationship (Evans & Cohen 1987). With regard to water, distress can manifest from stressful experiences that arise from individuals' everyday roles and experiences. Such roles and experiences related to water and sanitation extend beyond physical inadequacy to include burden of collection, negotiating access and opportunity cost of buying from informal sources (Wutich 2009; Bisung & Elliott 2016). In most instances, these experiences and the associated distress are produced through everyday realities of (lack of) access, negotiations, use, control over water resources, and inequalities in the ownership and distribution of water (Ennis-McMillan 2006; Sultana 2011). Thus, psychosocial stress is conceptualized as an outcome that arises through cultural and social norms, responsibilities and expectations regarding water and sanitation use, as well as physical barriers that limit adequate access or use (Stevenson *et al.* 2012; Hurland *et al.* 2015). Recognizing that sanitation is inextricably linked to water, some studies have argued for extending empirical investigations beyond water security to include sanitation, particularly where evidence suggests that

psychosocial distress is associated with sanitation practices such as open defecation (Abrahams *et al.* 2006; Bisung & Elliott 2016).

Further, understanding the long-term implications of psychosocial outcomes on mental health and physical well-being is important. For example, continuous imbalance between one's water and sanitation challenges and coping capacity can result in long-term mental and physical health issues. Some researchers have suggested the use of additional measures of psychological health such as the Hopkins Symptom Checklist (Derogatis *et al.* 1974) and the Perceived Stress Scale (Cohen *et al.* 1983) to determine such long-term effects (Wutich & Ragsdale 2008; Aihara *et al.* 2015). However, since the literature on water-related psychosocial outcomes emerged fairly recently and remains limited, it is important to review the evidence in order to provide informed direction for future research. This paper reviews the published literature that explore psychosocial outcomes associated with the lack of access to safe water and/or adequate sanitation at the individual, household and community levels. The objectives are to: (1) summarize the breadth of evidence linking water and sanitation to psychosocial distress; (2) explore the theoretical frameworks and methods that have been employed in water-related psychosocial research; and (3) identify gaps and challenges for future research. As the global community begins to take stock of SDG interventions in the coming years, mapping evidence on psychosocial outcomes, which were largely under-explored during the MDG era, will help raise awareness of the critical role access to water and sanitation play in fostering and promoting both health and well-being.

METHOD

This review was informed by Arksey & O'Malley's (2005) framework for conducting scoping reviews. A scoping review was chosen for a number of reasons. First, scoping reviews are appropriate for summarizing studies with different designs and methods (Arksey & O'Malley 2005). Second, scoping reviews are often used for mapping evidence, highlighting gaps and directions for future research (Levac *et al.* 2010). Third, scoping reviews allow the use of broad definitions and terms to capture a wide breadth of evidence (Pulver *et al.*

2016). Finally, they are particularly useful when the literature has not yet been comprehensively reviewed (Pham *et al.* 2014).

Search strategy

This review was conducted through systematic searches of three main electronic databases (Medline, Embase, and Scopus). The electronic search was limited to published peer-reviewed articles from 1980 to March 2016. Language of publication was restricted to English. The search strategy was developed by the first author in collaboration with a health sciences librarian. Two main concepts were used to develop the strategy: water and sanitation; and psychosocial impacts (Table 1). Titles and abstracts were searched in Embase and Medline, while titles, abstracts and keywords were searched in Scopus. In addition, subject areas were restricted to medicine and social science in Scopus. All searches were conducted between 1–13 April 2016. Further, reference lists of included studies were manually searched for studies; these were also subjected to the same inclusion criteria. Detailed search terms are provided in Table 1.

Inclusion criteria and screening

Published peer-reviewed literature that document psychosocial outcomes related to (lack of) access to safe water and adequate sanitation in low- and middle-income countries (LMICs) were selected. Articles were included without methodological restriction. This was particularly important for

identifying a wide range of evidence related to psychosocial impacts. We excluded papers that were focused solely on hygiene and menstrual management (see Hennegan & Montgomery (2016) for a systematic review that focuses on water and sanitation and menstrual hygiene management). We also excluded studies that broadly explored the impacts of water and sanitation as part of the neighbourhood/built/sociocultural environment (e.g. Parkar *et al.* 2003; Perera *et al.* 2009; Arku *et al.* 2011; Gruebner *et al.* 2012; Henley *et al.* 2014; Ochodo *et al.* 2014; Zhou *et al.* 2014; Kang *et al.* 2016).

An adapted version of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram was used to guide data collection and extraction (Figure 1). A hierarchical procedure was used to determine eligible studies for inclusion. First, EB (the first author) screened the titles and abstracts of all the studies after removal of duplicates. Second, the full text of 31 articles was screened. Studies that reported water and sanitation as part of neighbourhood/built/sociocultural environment variables were excluded at this point. Highly similar articles (e.g. articles from the same author(s) published in different journals) were included if different results or methods were reported.

Data management and extraction

Titles and citations were extracted from the various databases to Refworks (a reference management software). Excel was used to build a 'data charting form'. A common framework was applied to all the studies to summarize standard information

Table 1 | Detailed search terms

Database	Water and sanitation	Psychosocial impacts
Medline (via Ovid)	<i>Keyword terms:</i> 'water supply' or 'water *security' or 'water access' or 'access to water' or 'water distribution*' or 'water availabilit*' or 'water quan*' or 'sanitation' or 'toilet facilit*' or 'latrine*' or 'open defecation'	<i>Keyword terms:</i> 'psychosocial' or 'stress' or 'stressor*' or 'emotion*' or 'distress' or 'psychology' or 'mental health' <i>Subject heading:</i> exp Stress, Psychological
Embase (via Ovid)	<i>Keyword terms:</i> 'water supply' or 'water *security' or 'water access' or 'access to water' or 'water distribution*' or 'water availabilit*' or 'water quan*' or 'sanitation' or 'toilet facilit*' or 'latrine*' or 'open defecation'	<i>Keyword terms:</i> 'psychosocial' or 'stress' or 'stressor*' or 'emotion*' or 'distress' or 'psychology' or 'mental health' <i>Subject headings:</i> exp depression/ or exp emotion/ or exp stress/ or exp social psychology/ or exp psychology/ or exp mental stress/
Scopus	<i>Keyword terms:</i> 'water supply' or 'water *security' or 'water access' or 'access to water' or 'water distribution*' or 'water availabilit*' or 'water quan*' or 'sanitation' or 'toilet facilit*' or 'latrine*' or 'open defecation'	<i>Keyword terms:</i> 'psychosocial' or 'stress' or 'stressor*' or 'emotion*' or 'distress' or 'psychology' or 'mental health'

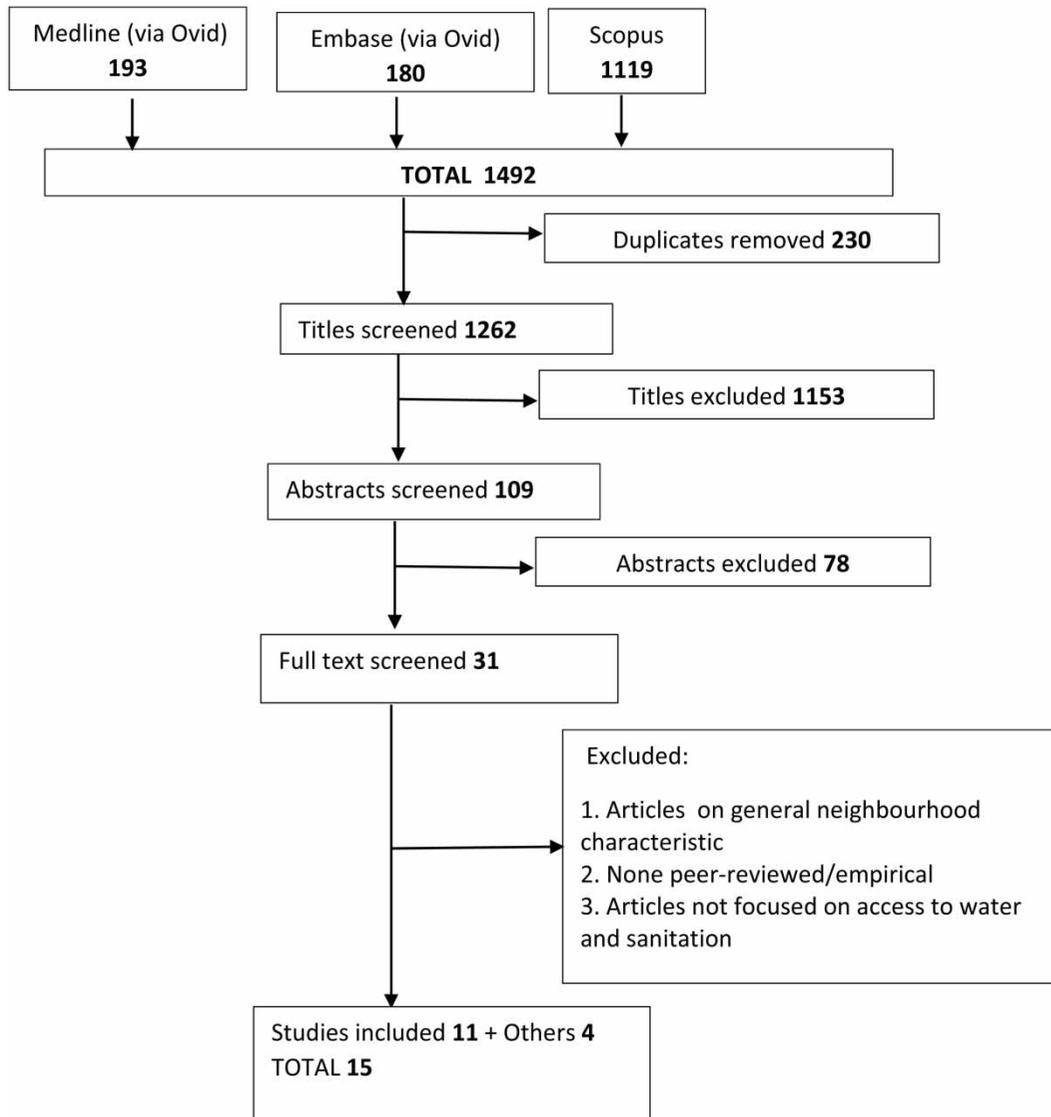


Figure 1 | Flow diagram.

and evidence including the citation, study location, study objective, study method, and psychosocial outcomes reported.

RESULTS

A summary of the charted data is presented in [Table 2](#). Eleven studies met the inclusion criteria from a total of 1,492 studies identified through the database searches. [Nalari \(2015\)](#) was added based on a review of the references. A study known to the authors that was in press at the time of the review was also added ([Bisung & Elliott 2016](#)). Further,

two studies published when this paper was under review were added during revision ([Krumdieck *et al.* 2016](#); [Stevenson *et al.* 2016](#)). These two studies were identified through a google scholar search. These additions yielded a final sample of 15 peer-reviewed articles.

Characteristics of studies

The final sample included both quantitative (three), qualitative (seven), and mixed-method (five) studies. Six studies were conducted in India; one in Nepal; one in Mexico; one in Bolivia; two in Ethiopia; one in Zimbabwe; one in South Africa; and

Table 2 | Summary of results

Author, year, country	Study objective	Study population, location	Methodology	Examples of psychosocial outcomes
Abrahams <i>et al.</i> (2006); South Africa	To explore how girls perceive and negotiate dangers and risks with the use of school toilets	Girls 16 years and older, and other school personnel	Qualitative: focus group discussions, in-depth interviews, participant observation, mapping and photography	Lack of privacy and being scared of boys loitering around toilets were some of the psychosocial concerns reported. Others included discomfort from using 'filthy', 'dark', 'smelly' and 'blocked' toilets.
Aihara <i>et al.</i> (2015); Nepal	To test a household water insecurity scale, and assess the impact of household water insecurity on psychological distress	Women living in urban Nepal	Quantitative: household surveys	Multivariate regression analysis showed that domains of water insecurity such as 'lost opportunity costs and social interactions', 'difficulties in house-work' and 'difficulties in basic activities' were associated with high levels of stress ^a . Women living in better serviced areas were more likely to experience lower levels of stress than those living in poorly serviced areas.
Bisung & Elliott (2016); Kenya*	To explore psychosocial concerns related to water and sanitation	Residents of Usoma	Qualitative: focus groups and key informant interviews	Reported psychosocial concerns related to lack of access to safe water and adequate sanitation included anxiety, frustration, negative place identity, marginalization, embarrassment.
Ennis-McMillan (2001); Mexico	To examine how people experience bodily distress associated with water scarcity	General population of La Purificación	Qualitative: participant observation and interviews	Psychosocial stressors included frustration, anguish, bother, worry, anger over social injustices in distribution, burden of water collection, discomfort from lack of water to bath and perform other customary obligations, and conflicts and negotiations between established residents and new residents.
Hirve <i>et al.</i> (2015); India	To examine sources of psychosocial stress related to the use of toilet facilities or open defecation	Women and adolescent girls in Pune	Mixed-methods: focus group discussions, key informant interviews, free listing and a community survey	Women reported fear or threats to their personal security during open defecation. These fears were related to being verbally, physically or sexually abused by men or attacked by reptiles and insects. 40% of open defecators reported some level of stress related to privacy. 47% of the open defecators reported stress due to insufficient cleanliness compared to 5% of latrine users. Young migrant workers expressed a sense of shame and helplessness over lack of toilets.
Hulland <i>et al.</i> (2015); India	To examine sanitation-related psychosocial stress across women's reproductive lives in three distinct geographic sites	Women in four life stages in urban, rural and indigenous villages in Odisha	Qualitative: interviews and pile sorting	Sanitation stressors commonly mentioned included rain (e.g. getting wet, walking through mud), walking through darkness, and attacks from animals, with 87% or more of women indicating these were problems they faced. Lack of space was also predominantly considered a persistent and severe concern. Rape was often considered salient, frequent, and severe among adolescents.

(continued)

Table 2 | continued

Author, year, country	Study objective	Study population, location	Methodology	Examples of psychosocial outcomes
Krumdieck <i>et al.</i> (2016); Kenya*	To assess experiences of water insecurity among pregnant women of mixed HIV status	Women in Nyanza province	Quantitative: household surveys	Psychosocial outcomes included worry over insufficient water quantities, water arguments with neighbours and household members, and concern over safety during water collection.
Mukhlani & Nyamupingidza (2014); Zimbabwe	To explore the impacts of water scarcity on residents	General population of Bulawayo	Qualitative: key informant interviews, observations, and content analysis of newspaper articles, journals and council minutes	Women were frustrated with standing in long queues waiting to get water. Sexual assaults at boreholes during early hours of the morning were also reported as well as conflict over community boreholes.
Nallari (2015); India	To describe how lack of access to adequate sanitation facilities affect the lives of adolescent girls	Adolescent girls in Bengaluru	Qualitative: interviews, walking tours with groups of women and children separately, and focus groups	Reported stressors included risk of attack from snakes and dogs, harassment from boys when caught in the 'act', and queuing to use toilet. Girls also reported shame and embarrassment caused by men loitering around defecation sites; discomfort from using dirty public toilets; and fear of sexual assault and increased anxiety.
Sahoo <i>et al.</i> (2015); India	To examine psychosocial stressors during routine sanitation practices	Women in four life stages in urban, rural and indigenous villages in Odisha	Qualitative: in-depth interviews	Three broad stressors were reported: environmental stressors: attacks from animals and discomfort at defecation sites; social stressors: lack of privacy, social restrictions and conflicts; and sexual stressors: fear of rape and sexual assault.
Stevenson <i>et al.</i> (2012); Ethiopia	To assess the utility of a locally developed water insecurity scale in predicting women's psychosocial distress	Women in Gondar, Ethiopia	Mixed methods: free listing, ranking, focus group discussions, and a household survey	Women reported direct stressors related to lengthy queues and risk of accidents. They also reported abuse from husbands and domestic disputes over water. Other stressors include shame and exclusion due to uncleanliness, use of undesirable sources of water and opportunity cost of water collection. In multivariate analysis, quantity of water available remained a significant predictor of distress.
Stevenson <i>et al.</i> (2016); Ethiopia	To assess the impacts of improvements to community water supply on household water insecurity and women's psychological distress	Women in South Wello, Ethiopia	Quantitative: household surveys	Household water insecurity remained a significant predictor of psychological distress even when food insecurity, socio-economic status, and the quality of the previous year's harvest were controlled. However, the study did not find evidence of a substantial impact of the water intervention on psychological distress.

(continued)

Table 2 | continued

Author, year, country	Study objective	Study population, location	Methodology	Examples of psychosocial outcomes
Subbaraman <i>et al.</i> (2015); India	To measure deficiencies in water service delivery indicators and their adverse life impacts	Slum residents in Mumbai	Mixed-methods: focus group discussions, qualitative interviews and household surveys	Women expressed distress over inability to complete chores. Distress resulted from estranged relationships with relatives, conflicts over water, compromised community cohesion, and resentment against water vendors and government officials.
Wutich (2009); Bolivia	To examine the links between water insecurity, gender, and emotional distress	Households in Villa Israel	Mixed-methods: participant observations and household interviews/surveys	Women were significantly more likely than men to report that they wasted time because of water scarcity. There was no significant difference in men's and women's last-ditch attempts to acquire water. Commonly reported stressful experiences included worry, fear, bother or annoyance and anger.
Wutich & Ragsdale (2008); Bolivia	To examine the prevalence of water-related emotional distress and the process through which it develops	Households in Villa Israel	Mixed-methods: participant observation and household interviews/surveys	Four emotions were related to water insecurity and progressed as follows: fear, worry, anger, and bother. In regression analysis, there was no evidence that inadequate water supply or reliance on rainwater or river water was associated with emotional distress. However, entitlements to distribution systems was significantly associated with water-related emotional distress. There was also a significant tendency for women to report feelings of emotional distress than men.

^aStress measured using the Perceived Stress Scale.

*Studies in press at the time of review.

two in Kenya. With regard to issues explored, the majority of studies (nine) focused on water insecurity and deficiencies in water distribution (Ennis-McMillan 2001; Wutich & Ragsdale 2008; Wutich 2009; Stevenson *et al.* 2012; Mukhlani & Nyamupingidza 2014; Aihara *et al.* 2015; Subbaraman *et al.* 2015; Krumdieck *et al.* 2016; Stevenson *et al.* 2016). Five studies focused on sanitation and sanitation related practices (Hirve *et al.* 2015; Hulland *et al.* 2015; Nallari 2015; Sahoo *et al.* 2015) while one study examined both access to water and sanitation (Bisung & Elliott 2016).

Water related stressors and psychosocial outcomes

Based on the results, we classified psychosocial outcomes into four inter-related categories: financial stressors,

stressors related to physical (lack of) access, social stressors, and stressors related to (perceived) inequities. Examples of stressors under each category are summarized below.

Financial stressors

Financial stressors were direct and indirect economic costs and pressures associated with access to safe water and sanitation. In the absence of reliable sources of water, many households tend to buy water from vendors who usually charge higher amounts. This leads to reduced household budgets for other necessities. Such direct financial pressures were reported in Kenya (Bisung & Elliott 2016), India (Subbaraman *et al.* 2015), and Bolivia (Wutich & Ragsdale 2008). Some studies also reported that people who accessed water through

vendors were sometimes worried, annoyed and frustrated because they had to shout, beg, chase, and argue with water vendors (Ennis-McMillan 2001; Wutich & Ragsdale 2008; Wutich 2009). Some residents also harboured resentments against vendors for price gouging (Subbaraman *et al.* 2015). Further, opportunity costs related to water fetching such as less time available for work (Stevenson *et al.* 2012; Mukuhani & Nyamupingidza 2014; Subbaraman *et al.* 2015; Bisung & Elliott 2016), missed opportunities to engage in income-generating activities (Wutich & Ragsdale 2008; Wutich 2009; Aihara *et al.* 2015), and reporting at work late (Wutich & Ragsdale 2008; Subbaraman *et al.* 2015) resulted in distress. With regard to sanitation, reported financial stressors included concerns over prohibitive user fees for public toilets (Sahoo *et al.* 2015) and anxiety over the rising cost of construction materials and emptying pit latrines (Nallari 2015; Bisung & Elliott 2016).

Stressors related to physical (lack of) access

With regard to sanitation, examples of stressors included discomfort at open defecation sites; risk and trauma associated with attacks from insects, stray dogs and reptiles; risks and fear of injury from poorly constructed latrines; fear of using deplorable and unclean latrines; limited operating time of public facilities; and frustration from long waiting times or queues at public toilets (Abrahams *et al.* 2006; Hirve *et al.* 2015; Hulland *et al.* 2015; Nallari 2015; Sahoo *et al.* 2015; Bisung & Elliott 2016). Physical stressors related to water included unsafe water sources, long distance to water source, inadequate supplies for daily needs, queuing for water, and insufficient water supply for hygiene (Ennis-McMillan 2001; Stevenson *et al.* 2012; Bisung & Elliott 2016; Krumdieck *et al.* 2016; Stevenson *et al.* 2016). These stressors resulted in psychosocial outcomes such as shame for being unable to provide water to visitors and not appearing clean in public (Ennis-McMillan 2001; Stevenson *et al.* 2012; Bisung & Elliott 2016). However, in a multiple linear regression analysis conducted by Wutich & Ragsdale (2008), inadequate water supply was not significantly associated with emotional distress (Wutich & Ragsdale 2008).

Social stressors

Social stressors were issues that tend to affect social relationships and interactions at the household and community

levels. With regard to sanitation, the lack of privacy, fear of rape and sexual assault, conflicts over few facilities, restrictions on where and when to practice open defecation, and shame over being unable to provide visitors with toilet facilities were commonly reported social stressors (Abrahams *et al.* 2006; Hulland *et al.* 2015; Nallari 2015; Sahoo *et al.* 2015; Bisung & Elliott 2016). Women particularly felt embarrassed, tensed and helpless when they encountered men at open defecation sites (Abrahams *et al.* 2006; Nallari 2015; Sahoo *et al.* 2015; Bisung & Elliott 2016).

With regard to water, Subbaraman *et al.* (2015) showed that insufficient quantities of water were related to estranged family relationships in India. For example, relatives could cut short their visit because of insufficient water and festivals could sometimes turn into crises because of water shortages. Deficiencies in the water delivery systems also created distrust and resentment against water officials and vendors (Subbaraman *et al.* 2015). In addition, accusations of water theft by neighbours, fighting each other in water queues, domestic abuse over water, and inability to provide visitors with water, manifested into bother, frustration, worry, anger and helplessness (Ennis-McMillan 2001; Wutich & Ragsdale 2008; Stevenson *et al.* 2012; Subbaraman *et al.* 2015; Bisung & Elliott 2016; Krumdieck *et al.* 2016; Stevenson *et al.* 2016). Similarly, Aihara *et al.* (2015) in a regression analysis found a positive association between lost opportunity cost and social interactions (e.g. disputes with neighbours over water collection) and higher levels of psychosocial well-being.

Gender. An important and widespread concern reported among women in most studies was sexual assault. Though sexual assault is often associated with sanitation, a number of studies reported fear of sexual assault during water collection (Stevenson *et al.* 2012; Mukuhani & Nyamupingidza 2014). Other psychosocial concerns disproportionately felt by women included shame, embarrassment and distress over men 'peeping' or loitering around defecation sites (Abrahams *et al.* 2006; Hirve *et al.* 2015; Nallari 2015; Sahoo *et al.* 2015). Further, Hulland *et al.* (2015) reported that concerns over sexual assault or rape were more heightened, frequent and severe among adolescents than newly married, pregnant, and adult women. There were also concerns over restrictions on when, how and where to practice open defecation (Nallari 2015; Sahoo *et al.* 2015).

For example, [Sahoo *et al.* \(2015\)](#) reported that adolescent girls faced an abrupt end to their freedom after marriage or during pregnancy, having to negotiate the time and place for sanitation. Further, fear of punitive action (e.g. fines and social humiliation), particularly in communities where leaders enforce strict laws against open defecation, contributed to stress among women ([Hirve *et al.* 2015](#)).

Stressors associated with (perceived) inequities

Access to water and sanitation is sometimes influenced by broader socio-economic and political processes ([Swyngedouw 2009](#); [Bisung *et al.* 2015](#)). Outcomes from these processes – in terms of who gets access and at what price – lead to feelings of marginalization and neglect, anger, annoyance, frustration and resentment against water officials ([Wutich 2009](#); [Subbaraman *et al.* 2015](#); [Bisung & Elliott 2016](#)). For example, in Bolivia, evidence showed that people were often annoyed and angry with structural inequities and geographical patterns of access ([Wutich 2009](#)). In addition, communities and households sometimes develop distrust and feelings of neglect by government when water shortages occur ([Subbaraman *et al.* 2015](#)). These feelings could intensify if some sections of the population do not experience similar shortages or lack of access ([Ennis-McMillan 2001](#); [Wutich & Ragsdale 2008](#); [Bisung & Elliott 2016](#)).

Similarly, concerns around inequities have been expressed around lack of access to sanitation. Even where sanitation stressors are widespread, the frequency or severity of stressors can be magnified by geographical disparities (e.g. urban vs. rural vs. indigenous villages) ([Hulland *et al.* 2015](#)). For example, seasonal migrant workers in Pune, India expressed helplessness over their inability to demand toilet facilities from their employers ([Hirve *et al.* 2015](#)). Further, [Nallari \(2015\)](#) suggested that poor women could face alienation if they continued to highlight inequalities or push for toilets in their neighbourhoods.

Coping

Individuals and communities employed a number of strategies to cope with water and sanitation challenges. At the community level, actions were usually taken to collectively

address or cope with water related concerns. These actions included forming water committees to mobilize, contributing cash or labour towards construction of public facilities, and cutting off water bill defaulters to encourage payments ([Ennis-McMillan 2001](#); [Wutich 2009](#); [Mukuhani & Nyamupingidza 2014](#); [Bisung & Elliott 2016](#)). At the household level, strategies employed to cope with water shortages or insufficient quantities included economizing or cutting back on water usage, begging for water from neighbours, and water conservation and reuse ([Ennis-McMillan 2001](#); [Wutich 2009](#); [Stevenson *et al.* 2012](#); [Mukuhani & Nyamupingidza 2014](#)). With respect to sanitation, behavioural strategies such as cutting back on defecation, having someone stand by the door of public toilets, waking up early to avoid the ‘morning toilet rush’, and going to toilets in groups were often employed by women to protect their privacy ([Abrahams *et al.* 2006](#); [Nallari 2015](#); [Sahoo *et al.* 2015](#)). Other strategies involved toilet sharing among neighbours and going to defecation sites at night ([Nallari 2015](#); [Bisung & Elliott 2016](#)). Further, some studies reported a sense of pragmatic acceptance among vulnerable populations as a way of coping with prolonged concerns ([Hirve *et al.* 2015](#); [Bisung & Elliott 2016](#)).

DISCUSSION

The purpose of this review was to summarize the evidence around psychosocial impacts of water and sanitation. The review included studies from Kenya, Zimbabwe, South Africa, Bolivia, Ethiopia, India and Mexico. Findings from these studies showed that both inadequate access and the process of negotiating access led to distress. In addition, women bear a disproportionate burden of stress as compared to men in many situations. The stressors identified in this review included physical stressors (e.g. attacks from animals), financial stressors (e.g. worry over buying water from vendors), social stressors (e.g. quarrels over water), and perceived inequities (e.g. feeling marginalized and neglected). In line with the objectives of the review, the rest of this section will focus on the implications of the evidence presented, review methods and theories used in the studies, identify gaps and make recommendations for future research.

Evidence linking psychosocial outcomes to water and sanitation

In the emerging SDG era, understanding psychosocial outcomes is vital for accurately evaluating the success of interventions. Though many studies have quantified health and economic benefits from water and sanitation interventions, they mostly employ 'biomedical' and 'economic' approaches. Such approaches can underestimate either the socio-cultural burden of lack of access or the impact of interventions on limiting distress. The study by [Stevenson *et al.* \(2016\)](#) provides important direction on how psychosocial outcomes can be included in intervention studies. Results from this review highlight socio-cultural dimensions to water insecurity and sanitation practices that operate through complex social interactions and relationships to generate distress. For example, being unable to perform normative standards of propriety and hospitality – by providing water to visitors or appearing clean – resulted in strained relationships and embarrassment ([Stevenson *et al.* 2012](#); [Subbaraman *et al.* 2015](#); [Bisung & Elliott 2016](#)). Thus, households with insufficient quantities of water were sometimes more bothered and worried about failing to meet such cultural obligations than meeting their own needs.

In addition, most of the studies were conducted in settings where gender-specific cultural norms, values and expectations place water collection burden and responsibilities on women and girls. Because of these cultural issues, the majority of concerns and psychosocial outcomes are often more intense or widespread among women. For example, [Wutich \(2009\)](#) explains that 'female household heads felt more emotional distress than male household heads because they had to work more to acquire water, had more responsibility for water use tasks and child supervision, and had more knowledge of water inadequacies than men' ([Wutich 2009](#), p. 449). However, it was suggested that such experiences did not significantly differ between men and women during household water emergencies, indicating a likely mitigation of intrahousehold gender disparities during emergency water situations ([Wutich 2009](#)).

Aside from these cultural normative practices and obligations, the review shows that emotional distress sometimes developed as a by-product of economic and social negotiations employed by households and individuals

to cope with inadequate water supplies or lack of sanitation. [Wutich & Ragsdale \(2008\)](#) revealed that circumstances that required households to negotiate for water (e.g. appealing to authorities) were more related to distress than other aspects of water insecurity such as inadequate supplies or dependence on unreliable sources. Similar findings have been reported in Kenya and Mexico ([Ennis-McMillan 2001](#); [Bisung & Elliott 2016](#)). Thus, distress can manifest as an expression of dissatisfaction with the process of negotiating for water within a context of social and economic inequalities ([Ennis-McMillan 2001](#)).

Theoretical considerations

Studies included in this review were informed by diverse theoretical perspectives including environmental stress theory and embodiment theory ([Bisung & Elliott 2016](#)), basic needs approach ([Mukuhani & Nyamupingidza 2014](#)), entitlement theory ([Wutich & Ragsdale 2008](#)), and assets vulnerability theory ([Wutich & Ragsdale 2008](#)). These theories were broadly used in two ways: (i) to inform researchers' understanding of 'access' to water and sanitation or water insecurity and (ii) to shape observation and measurement of psychosocial outcomes. A review of these theories reveals some commonalities though they have different disciplinary backgrounds. First, they all affirm that the absence, lack of, or inadequacy of resources or basic needs such as water and sanitation poses a significant threat to the well-being of individuals and societies. Second, factors that affect societal well-being (e.g. distress) cannot be understood without considering the social context in which people grow, live and work. Third, as societies change economically, the benefits and harms from the development process are not evenly distributed among geographic areas and societal groups.

Further, these theoretical perspectives have different strengths when it comes to offering conceptual clarity for observing and measuring water related psychosocial stress. For example, basic needs, assets vulnerability and entitlement theories ([International Labor Organization 1976](#); [Sen 1981](#); [Moser 1998](#)) offer important contributions for conceptualizing and defining what access – or adequacy or insecurity or safe – means in the context of physical and socio-cultural attributes of water and sanitation. However, understanding the

pathways through which the (lack of) access or insecurity lead to distress may call for critical engagement with environmental stress and embodiment literature. Since the literature is still developing, rigorous engagement with these theories is important for understanding how both the *exposures* (lack of access) and *outcomes* (distress) are defined, observed and measured. Particularly, integrating social science theories with epidemiologic theories (particularly those that reject individualistic and reductionist approaches to health) will prove useful for understanding the determinants of – and pathways to – water related psychosocial outcomes.

Methodological challenges and considerations

This review identified many methodological challenges. First, though most of the studies with quantitative data used culturally grounded tools in measuring psychosocial stress, their transferability and applicability to other settings have not been tested (Wutich & Ragsdale 2008; Wutich 2009; Hirve *et al.* 2015; Subbaraman *et al.* 2015). The use of locally grounded tools however created opportunities to adequately reflect ethnographic and lived realities of the local settings. Second, some studies used validated tools to measure psychosocial stress. For example, Stevenson *et al.* (2012) used the Falk Self-Reporting Questionnaire (SRQ-F) to measure psychosocial distress related to water insecurity in Gondar, Ethiopia, while Aihara *et al.* (2015) assessed psychosocial stress in Nepal using the Perceived Stress Scale (Cohen *et al.* 1983). The use of these tools has limitations (e.g. the SRQ was developed for psychiatric screening in primary health care settings, and may be inappropriate for population surveys). However, we suggest their continued use in different cultural and ecological contexts for further validation and application to water research. Third, the cross-sectional nature of most of the study designs limits researchers' ability to adequately assess the impacts of water or sanitation provision on psychosocial outcomes. The study by Stevenson *et al.* (2016) provides a useful example of how other designs (e.g. case control) can be employed to overcome this challenge.

Fourth, as stakeholders work towards achieving universal access to water and sanitation, defining and empirically measuring what *access* or *insecurity* means, taking into consideration people's cultures, livelihoods, lifestyles and

economic status is of critical importance. The studies in this review provide interesting and innovative directions. For example, lessons were drawn from food security literature to conceptualize and develop scales for water security (Ennis-McMillan 2001; Wutich & Ragsdale 2008; Wutich 2009; Stevenson *et al.* 2012; Aihara *et al.* 2015). Further, Subbaraman *et al.* (2015) expand on the water poverty index proposed by Sullivan *et al.* (2003) to develop and empirically test a multidimensional framework of water poverty with a broader set of household-level indicators – quality, quantity, access, reliability, affordability, and equity. Though these methodological developments are timely, they are mostly related to water, with limited work being done on sanitation. Thus, it is important for researchers to (re)dedicate efforts toward conceptualizing 'access' for not only water, but sanitation as well.

Gaps and directions for future research

Most of the studies identified important gaps and raised far reaching questions for both research and practice. First, several socio-cultural dimensions of water and sanitation, ranging from social restriction to normative behavioural practices, were highlighted in the studies (Stevenson *et al.* 2012; Nallari 2015; Sahoo *et al.* 2015). However, the extent to which community-based interventions (particularly public facilities) overcome such cultural norms and practices to facilitate access and reduce psychosocial outcomes remains a major gap and promising area for future research. Second, there are indications that individuals may appraise aspects of water insecurity in the context of other 'insecurities' (e.g. food insecurity). However, only two studies examined water related stressors in the context of other stressors (Stevenson *et al.* 2012, 2016). Thus, future studies that explore the cumulative and interactive effects of stressors from water, sanitation, food and other basic needs, will be important for broader poverty reduction strategies and interventions. Third, in settings where water or sanitation remains a contested resource, future research that focuses on how social differentiations and structures (such as class, landholding, gender, and wealth) shape access and use of facilities will add another layer of evidence to what is already known (Wutich 2009; Hirve *et al.* 2015).

Fourth, questions remain on the ability of households to effectively cope with water insecurity without compromising other household needs and assets. For example, what are the effects of buying water from vendors on household savings? How do households minimize their water vulnerability through the use of economic, social and cultural capitals? Fifth, it is important to note that many of the studies did not distinguish between short term and long term responses to water and sanitation challenges. In the food literature, Davies (1993) for instance makes a distinction between coping – a short term response to an immediate food shortage and lack of access – and adapting, explained as a permanent change in livelihood strategies and ways in which food is accessed (Davies 1993, p. 60). Making similar distinctions in future research will be helpful for understanding short- and long-term vulnerabilities and responses to the lack of access to water and sanitation. Finally, it is important to apply other methodologically rigorous study designs (e.g. randomized control trials) that evaluate the impacts of water and sanitation interventions on psychosocial distress (Subbaraman *et al.* 2015). The study by Stevenson *et al.* (2016) demonstrates the promise of such study designs.

Strengths and limitations

This scoping review, to the best of our knowledge, is the first study that seeks to map the evidence linking water and sanitation to psychosocial outcomes. There are a number of strengths and limitations worth acknowledging. In terms of strengths, the use of broad search terms as recommended by Arksey & O'Malley (2005) ensured an extensive search of the literature. In addition, the use of peer-reviewed articles enhanced the quality of evidence presented, though we were more interested in the breadth of evidence. Further, including both qualitative and quantitative studies added both breadth and depth to the evidence presented.

Limitations

First, we did not perform quality assessment of the individual studies. However, as stated above, the use of peer-reviewed literature will significantly reduce the likelihood of using studies of low quality. Second, we recognize that the level of bias could have been reduced if two reviewers

had conducted the screening and extraction. However, multiple screening was done in order to minimize any biases. In addition, the second author reviewed the methods and charted data. Third, included articles were restricted to those published in English, and in peer-reviewed journals. This may have led to other important studies being excluded. Finally, the heterogeneity in study designs limited our ability to make adequate comparisons. However, as the number of empirical studies increase in the future, it will be feasible to conduct systematic reviews and meta-analysis to compare and synthesize evidence across studies with similar designs.

CONCLUSION

This review demonstrates that there are psychosocial outcomes associated with the lack of access to safe water and adequate sanitation for both individuals and households in deprived settings. However, many studies fail to incorporate these outcomes when estimating the burden or benefits of water and sanitation. Neglecting to incorporate these outcomes may mask a potentially important driver of health and well-being for many individuals and households in LMICs. Further, evidence from this review, and results from future research are important to help policy-makers and practitioners address some of the social and cultural dimensions that influence access and use of sanitation facilities, particularly among women.

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REFERENCES

- Abrahams, N., Mathews, S. & Ramela, P. 2006 *Intersections of 'sanitation, sexual coercion and girls' safety in schools'*. *Tropical Medicine International Health* **11**, 751–756.

- Aihara, Y., Shrestha, S., Kazama, F. & Nashida, K. 2015 Validation of household water insecurity scale in urban Nepal. *Water Policy* **17**, 1019–1032.
- Arksey, H. & O'Malley, L. 2005 Scoping studies: towards a methodological framework. *International Journal Social Research Methodology* **8**, 19–32.
- Arku, G., Luginaah, I., Mkandawire, P., Baiden, P. & Asiedu, A. B. 2011 Housing and health in three contrasting neighborhoods in Accra, Ghana. *Social Science and Medicine* **72**, 1864–1872.
- Benova, L., Cumming, O. & Campbell, O. M. R. 2014 Systematic review and meta-analysis: association between water and sanitation environment and maternal mortality. *Tropical Medicine and International Health* **19**, 368–387.
- Bisung, E. & Elliott, S. 2016 'Everyone is exhausted and frustrated': exploring psychosocial impacts of the lack of access to safe water and adequate sanitation in Usoma, Kenya. *Journal of Water, Sanitation and Hygiene for Development* **6** (2), 205–214. doi:10.2166/washdev.2016.122.
- Bisung, E., Elliott, S. J., Abudho, B., Schuster-Wallace, C. J. & Karanja, D. M. 2015 Dreaming of toilets: using photovoice to explore knowledge, attitudes and practices around water–health linkages in rural Kenya. *Health & Place* **31**, 208–215.
- Cohen, S., Kamarck, T. & Mermelstein, R. 1983 A global measure of perceived stress. *Journal of Health & Social Behaviour* **24**, 385–396.
- Davies, S. 1993 Are coping strategies a cop out? *Institute of Development Studies Bulletin* **24** (4), 60–72.
- Derogatis, L. R., Lipman, R. S., Rickels, K., Uhlenhuth, E. H. & Covi, L. 1974 The Hopkins symptom checklist (HSCL). *Modern Problems in Pharmacopsychiatry* **7**, 79–110.
- Ennis-McMillan, M. C. 2001 Suffering from water: social origins of bodily distress in a Mexican community. *Medical Anthropology Quarterly* **15** (3), 368–390.
- Ennis-McMillan, M. C. 2006 *A Precious Liquid: Drinking Water and Culture in the Valley of Mexico*. Thomson Wadsworth, Belmont.
- Evans, G. W. & Cohen, S. 1987 Environmental stress. In: *Handbook of Environmental Psychology* (D. Stokols & I. Altman, eds). Wiley, New York, USA, pp. 571–660.
- Gruebner, O., Khan, M. M. H., Lautenbach, S., Muller, D., Kramer, A., Lakes, T. & Hostert, P. 2012 Mental health in the slums of Dhaka – a geo-epidemiological study. *BMC Public Health* **12**, 177.
- Gundry, S., Wright, J. & Conroy, R. 2004 A systematic review of the health outcomes related to household water quality in developing countries. *Journal of Water and Health* **2**, 1–15.
- Henley, P., Lowthers, M., Koren, G., Fedha, P. T., Russell, E., VanUum, S., Arya, S., Darnell, R., Creed, I. F., Trick, C. G. & Bend, J. R. 2014 Cultural and socio-economic conditions as factors contributing to chronic stress in sub-Saharan African communities. *Canadian Journal of Physiology and Pharmacology* **92**, 725–732.
- Hennegan, J. & Montgomery, P. 2016 Do menstrual hygiene management interventions improve education and psychosocial outcomes for women and girls in low and middle income countries? A systematic review. *PLoS ONE* **11** (2), e0146985. doi:10.1371/journal.pone.0146985.
- Hirve, S., Lele, P., Sundaram, N., Chavan, U., Weiss, M., Steinman, P. & Juvekar, S. 2015 Psychosocial stress associated with sanitation practices: experiences of women in a rural community in India. *Journal of Water Sanitation Hygiene for Development* **5** (1), 115–126.
- Hulland, K. R. S., Chase, R. P., Caruso, B. A., Swain, R., Biswal, B., Sahoo, K. C., Panigrahi, P. & Dreifelbis, R. 2015 Sanitation, stress, and life stage: a systematic data collection study among women in Odisha, India. *PLoS ONE* **10** (11), e0141883. doi:10.1371/journal.pone.0141883.
- International Labor Organization 1976 *Employment, Growth and Basic Need: A One World Problem*. ILO, Geneva.
- Kang, E., Delzell, A. P. D., McNamara, E. P., Cuffey, J., Cherian, A. & Matthew, S. 2016 Poverty indicators and mental health functioning among adults living with HIV in Delhi, India. *AIDS Care* **28** (4), 416–442.
- Krieger, N. 2011 *Epidemiology and the People's Health*. Oxford University Press, New York, USA.
- Krumdieck, N., Collins, S., Wekesa, P., Mbullo, P., Boateng, G., Onono, G. & Young, S. L. 2016 Household water insecurity is associated with a range of negative consequences among pregnant Kenyan women of mixed HIV status. *Journal of Water and Health*. <http://jwh.iwaponline.com/content/ppiwajwh/early/2016/08/27/wh.2016.079.full.pdf>.
- Levac, D., Colquhoun, H. & O'Brien, K. K. 2010 Scoping studies: advancing the methodology. *Implementation Science* **5** (1), 69. doi:10.1186/1748-5908-5-69.
- Moser, C. 1998 The asset vulnerability framework: reassessing urban poverty reduction strategies. *World Development* **26**, 1–19.
- Mukuhani, T. & Nyamupingidza, T. M. 2014 Water scarcity in communities, coping strategies and mitigation measures: the case of Baluwayo. *Journal of Sustainable Development* **7** (1), 144–160.
- Nallari, A. 2015 "All we want are toilets inside our homes!" The critical role of sanitation in the lives of urban poor adolescent girls in Bengaluru, India. *Environment & Urbanization* **27** (1), 1–16.
- Ochodo, C., Ndeti, D. M., Moturi, W. N. & Otieno, J. O. 2014 External built residential environment characteristics that affect mental health of adults. *Journal of Urban Health* **91**, 908–927.
- Parkar, R. S., Fernandez, J. & Weiss, G. M. S. 2003 Contextualizing mental health: gendered experiences in a Mumbai slum. *Anthropology and Medicine* **10** (3), 291–308. doi: 10.1080/1364847032000133825.
- Perera, B., Ostbye, T. & Jayawardana, C. 2009 Neighbourhood environment and self-rated health among adults in southern Sri Lanka. *International Journal of Environmental Research Public Health* **6**, 2102–2112. 10.3390/ijerph6082102.
- Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A. & McEwen, S. A. 2014 A scoping review of scoping reviews: advancing the approach and enhancing the consistency. *Research Synthesis Methods* **5**, 371–385.

- Pulver, A., Ramraj, C., Ray, J. G., O'Campo, P. & Urquia, M. L. 2016 A scoping review of female disadvantage in health care use among very young children of immigrant families. *Social Science & Medicine* **152**, 50–60.
- Sahoo, C. K., Hulland, R. S. K., Caruso, A. B. & Swain, R. 2015 Sanitation-related psychosocial stress: a grounded theory study of women across the life-course in Odisha, India. *Social Science and Medicine* **139**, 80–89.
- Sapolsky, R. M. 2004 Social status and health in humans and other animals. *Annual Review of Anthropology* **33**, 393–418.
- Sen, A. 1981 *Famines and Poverty*. Oxford University Press, London.
- Stevenson, E. G. J., Greene, L. E., Maes, K. C. & Ambelu, A. 2012 Water insecurity in 3 dimensions: an anthropological perspective on water and women's psychosocial distress in Ethiopia. *Social Science and Medicine* **75** (2), 392–400.
- Stevenson, E. G. J., Ambelu, A., Caruso, B. A., Tesfaye, Y. & Freeman, M. C. 2016 Community water improvement, household water insecurity, and women's psychological distress: an intervention and control study in Ethiopia. *PLoS ONE* **11** (4), e0153432. doi:10.1371/journal.pone.0153432.
- Strunz, E. C., Addiss, D. G., Stocks, M., Ogden, S., Utzinger, J. & Freeman, M. C. 2014 Water, sanitation, hygiene, and soil-transmitted helminth infection: a systematic review and meta-analysis. *PLoS Medicine* **11**, e1001620. doi: 10.1371/journal.pmed.1001620.
- Subbaraman, R., Nolan, L., Sawant, K., Shitole, S., Shitole, T., Nanarkar, M., Patil-Deshmukh, A. & Bloom, D. E. 2015 Multidimensional measurement of household water poverty in a Mumbai slum: looking beyond water quality. *PLoS ONE* **10** (7), e0133241. doi:10.1371/journal.pone.0133241.
- Sullivan, C., Meigh, J., Giacomello, A., Fediw, T., Lawrence, P., Samad, M., Mlote, S., Hutton, C., Allan, J. A., Schulze, R. E., Dlamini, D. J. M., Cosgrove, W., Delli Priscoli, J., Gleick, P., Smout, I., Cobbing, J., Calow, R., Hunt, C., Hussain, A., Acreman, M. C., King, J., Malamo, S., Tate, E. L., Q'Regan, D., Milner, S. & Steyl, I. 2003 The water poverty index: development and application at the community scale. *Natural Resources Forum* **27**, 189–199.
- Sultana, F. 2011 Suffering for water, suffering from water: emotional geographies of resource access, control and conflict. *Geoforum* **42**, 163–172.
- Swyngedouw, E. 2009 The political economy and political ecology of the hydro-social cycle. *Journal of Contemporary Water Research & Education* **142** (1), 56–60.
- Wolf, J., Pruss-Ustun, 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**, 928–942.
- Wutich, A. 2009 Intrahousehold disparities in women and men's experiences of water insecurity and emotional distress in urban Bolivia. *Medical Anthropology Quarterly* **23** (4), 436–454.
- Wutich, A. & Ragsdale, K. 2008 Water insecurity and emotional distress: coping with supply, access, and seasonal variability of water in a Bolivian squatter settlement. *Social Science and Medicine* **67**, 2116–2125.
- Zhou, J., Ru, X. & Hearst, N. 2014 Individual and household-level predictors of health related quality of life among middle-aged people in rural mid-east China: a cross-sectional study. *BMC Public Health* **14**, 660.

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