Measuring inequalities in access to water and sanitation: A literature review of the quantitative studies published in 2015-2020

Urangoo BULGAMAA[13]

Abstract

Research students who are interested in the topic of inequalities in water and sanitation are often interested in getting familiar with the most recent methods applied in empirical research. To address this need, this study aims to provide an overview of contemporary quantitative measures by synthesising the most recent empirical studies conducted on inequalities in access to water and sanitation across and within countries over time. The study aims to cover neither comprehensive nor exhaustive statistical details of the measures. Rather, it asks what measures were used recently in which type of studies and why. To this end, the paper adopted a content analysis technique framed by the three classifications of inequalities to review the selected empirical academic papers that were published in peer-reviewed, Scopus-indexed journals in 2015-2020 in the English language and were accessible by the author. Findings revealed that geographic, economic, and individual- and group-related inequalities in access to water and sanitation have been studied by applying the simple and sophisticated measures in both absolute and relative terms. However, their techniques were varied. In the end, the review suggests two possible directions for further research.

Keywords: *inequality, water, sanitation, measurement, quantitative technique*.

1. Introduction

In July 2010, the United Nations General Assembly declared that equitable access to water and sanitation is a human right, and that as such, ensuring such access to everyone plays an important role in the realisation of all human rights (UN GENERAL ASSEMBLY 2010). Furthermore, it plays an important role in public health by preventing people from catching infectious diseases (LOCAL BURDEN OF DISEASE WASH COLLABORATORS 2020). However, inequalities in access to water and sanitation continue to face a great deal of challenges, particularly in developing countries (WWAP UNESCO 2019). Lacking access to these services makes people even more vulnerable during the current COVID-19 pandemic, as hand hygiene is the first line-defence in fighting against this infectious disease, which is potentially fatal and has no cure presently proven to be effective (VIJAYVARGIYA et al. 2020).

In tackling the problem of inequality, UN-led global efforts have been made since the 1990s and have escalated since the 2000s through major programmes including the Millennium Development Goals (2000-2015) and Sustainable Development Goals (2016-2030). To measure progress towards the targets, scientific research plays an important role by providing

[13] Corvinus University of Budapest, Doctoral School of International Relations and Political Science, PhD candidate urangoo.corvinus@gmail.com

policymakers relevant evidence to inform related decisions at both national and multilateral levels. The same is true in the case of water and sanitation. For those who are interested in applied research within the UN framework, particularly focusing on the SDG 6 (WWAP UNESCO 2019), knowing practical methodologies being applied in the practice is extremely important.

In attempting to address this need, I chose the period 2015-2020 to review what measures are being used in research tackling various types of inequalities in access to water and sanitation. Since comparative study is of interest, the chapter discusses the quantitative studies due to their methodological rigour. However, this review is neither a comprehensive summary nor does it provide exhaustive statistical details of these measures. Building on the three classifications of income inequality that pertain to the conditions of 'within-countries', 'between-countries' and 'global inequality among peoples' (UNDP 2003), I look at the measures being applied to the selected studies.

Findings revealed that geographic and economic inequalities in access to water and sanitation have mostly been estimated by a quantitative method based on cross-sectional and panel designs covering the sub-national, national, regional[14] and global scales rather than the individual and group related inequalities that may still have an important policy relevance. These studies have applied both simple and sophisticated measures adapted to inequalities in access to water and sanitation in both absolute[15] and relative terms[16]. The further details can be found in section 3.

The structure of the paper is as follows: in the following section, the methods and materials used in this analysis will be briefly introduced, and then section 3 directs you to the main findings. Finally, the paper will be concluded.

2. Materials and methods

2.1. Data

This paper asks what measures were used for quantifying what type of inequalities in water and sanitation between 2015 and 2020, and why. To answer this question, I reviewed the recent relevant literatures. I first surveyed the selected papers for the review and then analysed

[14] Regional scale refers to the studies that analyzed the issue under analysis at the regional level such as Latin America. It is worth noting that some studies used data disaggregated into the regions (such as East, West…) at the sub-national level such as western or eastern regions within a country. Therefore, these two should not be mixed and misunderstood.
[15] In terms of absolute measures: the variance.
[16] In terms of relative measures: the Gini coefficient, Lorenz curve, Theil coefficient, Slop index etc.

its content by mapping the inequality measures as to the three classification of inequalities (UNDP 2003) as informed by GREIG et al. (2007). Then I looked in detail how the different types of inequalities have been studied with respect to applied measures, scales, data, whether a causality was established. Lastly, I drew my conclusions.

The Scopus database was used to identify the relevant literatures in English language, available to date under the term described (inequality OR inequalities AND "water and sanitation"). Data was collected between September 20 – October 16. 2020. Taking the reliability and replicability of the sources relevant to the issue under scrutiny into consideration, the Scopus database was selected. CRESWELL (2003, p. 8) highlighted that considering standards of validity and reliability is crucial when it comes to quantitative research. Furthermore, there are systematic reviews using only Scopus database among the high-quality studies published in top-ranking journals such as Policy Sciences[17], for example: DERWORT and his colleagues (2019) published such a work. I therefore consider that using Scopus database is sufficient for this paper. For making sure the sample size, the pool of 5 years old papers was checked against the pool of 10 years old papers in the same category in the same database. The result showed that the initially selected data pool weighs 78 per cent of the total published papers over the past decade. Therefore, it is assumed to be sufficient.

2.2. Study selection

I coded all the papers extracted (n=125) from the Scopus following the keyword search[18] under the search term previously described. They are classified by the sub-categories that can reflect the inclusion and exclusion criteria.

In surveying the literature, I followed the three-stages screening strategy (keyword search, title and abstract level analysis, and in-depth review) and included the articles, if that qualifies the inclusion criteria. The process of selection and the number of the articles were illustrated by *Figure 4.* Firstly, the screening was conducted by applying the following inclusion criteria (1, 2), which left 67 studies for further screening and excluded 58 studies due to the type and date of publication (1, 2). Then, the title and abstract level analysis used to narrow the 67 articles into 14 for the final stage by applying the inclusion (3, 4, 5) and exclusion

[17] Policy Sciences is a journal which was ranked at the Q1 in 2019 by Scimago Journal Ranking. Retrieved from https://www.scimagojr.com/journalrank.php?area=3300&min=0&min_type=cd (09.25.2020).

[18] Database used: https://www.scopus.com/search/form.uri?display=basic; keywords used in search: (TITLE-ABS-KEY (inequality) OR TITLE-ABS-KEY (inequalities) AND TITLE-ABS-KEY ("water and sanitation")).

criteria (1, 2, 3). At this stage, 53 articles were excluded with the reasons. Finally, the papers selected (n=14) were reviewed in-depth.

2.3. Inclusion and exclusion criteria

The inclusion criteria were the following:

1. Peer-reviewed journal articles (not the review articles)
2. Published between January 2015 and October 2020
3. If a paper addressed any type of inequalities in access to water and sanitation, regardless causality was established in its scope
4. If a quantitative method was applied to an empirical study
5. Whether the paper (full text) is accessible by the author.

The exclusion criteria were the following:

1. Review articles published in peer-reviewed journals
2. Published before 2015
3. If the scope of study did not cover an issue of inequalities in access to “water and sanitation" at one point,
4. If qualitative methods were applied,
5. If a full text of the paper is not available to the author.

3. Results

This chapter seeks to understand what type of summary measures being applied in recent international research in measuring what type of inequalities in access to water and sanitation by reviewing the relevant literature. In addition, the advantages and disadvantages of these measures under their categories were discussed.

The review immediately illustrates three types of inequalities in access to those services such as geographic inequalities (1), economic inequalities (2) and individual and group related inequalities (3). Among these, geographic and economic inequalities have been more widely studied in a quantitative fashion than that of the individual and group-related inequalities such as health condition and race. In particular, spatial inequalities and wealth or income-based inequalities have been dominant because the data is the strongest in this particular direction (ODI 2017).

These studies, in general, have evaluated the progress towards realisation of the global water and sanitation goals in the framework of MDGs and SDGs in the different scales using

various measures in order to highlight the gaps in access to water and sanitation facilities between the different groups by rural and urban areas, by wealth, by regions, by the groups such as health status and race with the different resolutions depending on the basic unit of data that were used in the analyses.

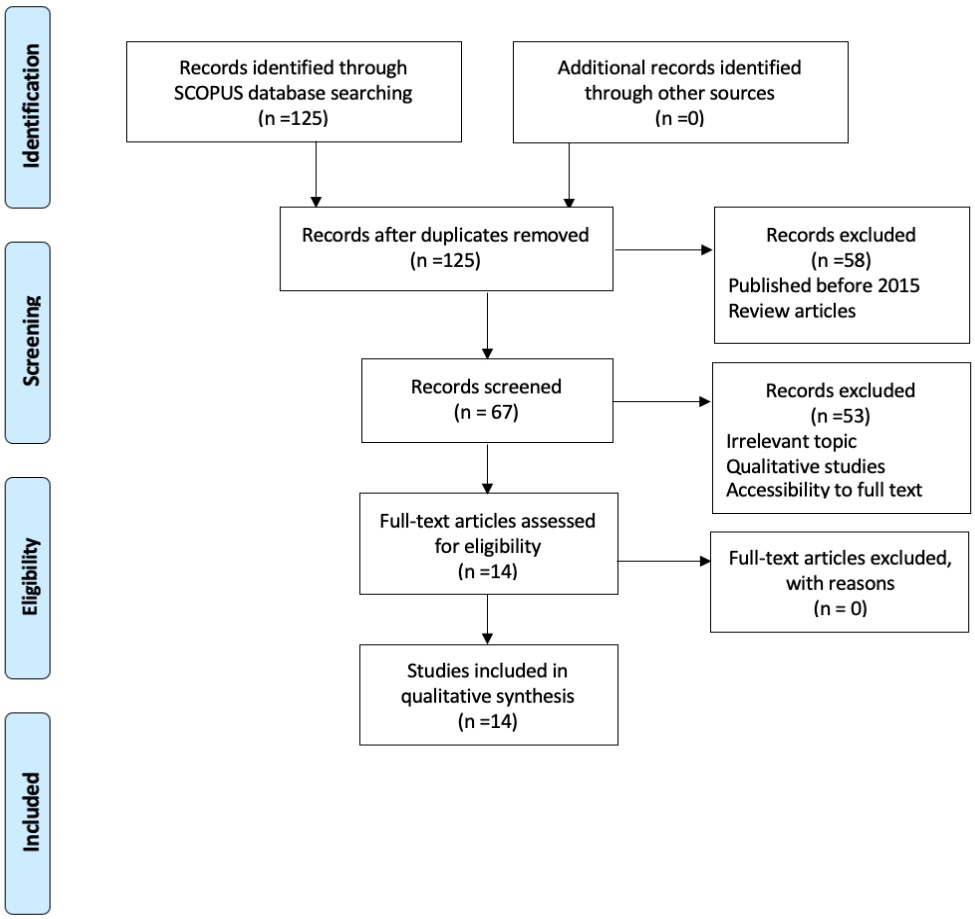

Figure 4: Flow diagram of the selection process of the papers
Note: Adapted from the PRISMA flow diagram
Source: http://prisma-statement.org/PRISMAStatement/FlowDiagram.aspx

All studies under review estimated various types of inequalities in access to water and sanitation using various techniques in the different scales. Most of these studies further established some sort of causality in which the various estimates of inequalities in an issue of interest were considered either a dependent or an independent variable. For example, CHA and the colleagues (2017) analysed the impact of official development assistance on the inequalities in access to water and sanitation across developing countries by applying simple linear regression, on the basis of multiple international datasets. In this study the inequalities were estimated by the simple disaggregation (*Table 1, No. 8*).

A few methodological discussions were found that sought to propose alternative methods (QUEIROZ et al. 2020) or look for a better measure that can be adapted to inequalities in access to water research (CETRULO et al. 2020). These studies shared a common rationale with respect to seeking that the principles of non-discrimination and equality[19] to be better imbedded in the measurement – which lack in the current dominant JMP method[20,21] in terms of equity perspective. However, it should be noted that the JMP method still provides valuable understanding on wealth-based inequalities through JMP wealth quintile approach[22] (ODI 2017, p. 14), and the JMP wealth quintile datasets (see BAYU et al. 2020) were still utilised in recent research published.

QUEIROZ and colleagues (2020, p. 3) elaborated on this issue in terms of their suggested approach. They stated that there is lack of necessary data available to feed the explanatory variables in their suggested approach which goes beyond access related inequalities. This point addresses an intersection of inequalities in water and sanitation. It may explain why it is rare to observe quantitative studies that explore individual and group related inequalities in access to water and sanitation in comparison to the quantitative studies ODI (2017). This suggests a new opportunity for research if one can solve the associated data gap. However, it is worth noting that having comparable data on the multiple countries for this purpose will require an immense amount of resources and capacity, an obstacle which is extremely hard to tackle.

A number of different summary measurement techniques were used in the literature under review, with several of them repeatedly used in the same estimation. These are summarised under (*Table 1).*

[19] Which is the basis of SDG 6 - access to water and sanitation for all.

[20] It is important to note that the JMP is not a focus of our study and not dominantly used in the studies under this review, although it has been a dominant global monitoring strategy. However, some of the studies that addressed its limitations were discussed in this literature review.

[21] JMP method is the UN global monitoring strategy that is used to monitor progress on water, sanitation, and hygiene. To measure inequalities in access to water and sanitation facilities, it disaggregates household data by rural and urban areas (1), and by wealth status (2). This, the simple disaggregation method, allows both spatial inequalities between rural and urban areas, while the JMP wealth quintile analysis provides valuable understanding on the differential access among the groups based on their economic status. The further details can be consulted in the latest version of the methodology document available at https://washdata.org/sites/default/files/documents/reports/2018-04/JMP-2017-update-methodology.pdf.

[22] The JMP Wealth Quintile Analysis is a widely used approach in accounting geographic and economic inequalities in water and sanitation research. You can read its advantages and disadvantages in the ODI Report (ODI 2017).

No	Inequality of what?	Within country	Between countries	Global inequality	Region	Causal vs Descriptive	Measures	Data	Author
1	geographic (spatial), economic inequalities	x			Brazil	D	Comparison of 5 measures made: simple disaggregation, Concentration coefficient and concentration curve, Dissimilarity index, Generalised Entropy measure and Atkinson´s index.	Census, NSO Brazil	CETRULO et al. (2020)
2	individual and group-related inequalities (race)	x			USA	C	OLS linear regression	Census housing, U.S.- ACS	GASTEYER et al. (2016)
3	individual and group-related inequalities (health conditions)	x			Ethiopia, Wukro	C	Pearson´s Chi-squares, Logistic regression	Primary data	JIMENEZ-REDAL et al. (2018)
4	individual and group-related inequalities (intersecting)	x	x		Latin America and the Caribbean	C	Simple linear regression	Census IPUMS project	QUEIROZ et al. (2020)
5	geographical (temporal)	x	x		Developing countries	C	Non-linear trajectory	DHS, MICS, nationally representative household survey - JMP data	FULLER et al. (2016)
6	geographical (spatial)	x			India	D	5 different measures: simple disaggregation, adapted Gini coefficient, Dissimilarity index, Spatial correlation, Analysis of agglomerative hierarchical clusters	Census, India	CHAUDHURI and ROY (2017)
7	geographic (spatial), economic	x			India	C	Gini coefficient, Spatial correlation, Percentage point difference, a composite index developed was used to measure the effect.	Census, India	CHAUDHURI et al. (2020)
8	economic (income based)		x		Developing countries	C	Simple disaggregations, Simple linear regression	WHO coverage data, OECD CRC database	CHA et al. (2017)
9	economic (income based)		x		Developing countries	C	Adapted Gini-coefficient, Multivariate regression	JMP wealth quintile data, WGI-World Bank	BAYU et al. (2020)
10	geographic (spatial), economic		x		Sub-Saharan Africa	D	Concentration index, frequency ratios, percentage point differences	MICS, DHS	ROCHE et al. (2017)
11	geographical (spatial)	x			Indonesia	D	WHO-the mean difference from mean (MDM), WHO-the weighted index of disparity (IDIS – W)	SUSENAS, Indonesia	AFIFAH et al. (2018)
12	geographical (spatial)	x			Ethiopia	D	WHO-the mean difference from mean (MDM), WHO-the weighted index of disparity (IDIS – W)	EDHS, Ethiopia CSA, nationally, regionally representative	AZAGE et al. (2020)
13	geographical (spatial)	x			Nepal	C	Complex survey design method, Pearson´s Chi-squares, Simple regression	DHS Nepal survey	WANG et al. (2019)
14	geographical (spatial)	x	x	x	LMIC (Low-middle income countries)	C	Adapted Gini-coefficient, Bayesian geostatistical model, ordinal regression,	MICS, DHS and other household surveys, census	Local Burden of Disease WaSH Collaborators (2020)

Table 1: List of inequality measures in access to water and sanitation applied to the studies under review
Source: Edited by the author.
Note: These studies were published between 2015 and 2020.

The studies under review estimated inequalities in access to water and sanitation at the sub-national, national, regional, and global levels[23]. Global and regional scale studies mostly looked at inequalities 'within countries' and 'between countries' based on the country level data and sub-national data in which they were disaggregated by rural and urban areas (CHA et al. 2017; BAYU et al. 2020; FULLER et al. 2016; QUEIROZ et al. 2020; ROCHE et al. 2017; LOCAL BURDEN OF DISEASE WASH COLLABORATORS 2020).

Among these, recently published study conducted by the Local Burden of Disease WaSH Collaborators (2020) managed to disaggregate geographical inequalities globally by the first and second local administrative units – which is a high-resolution geospatial estimate[24]. This study, notably, was funded by the Gates Foundation among others and conducted in collaboration with hundreds of international researchers.

Moving on a country level analysis, 8 papers were identified in this category that covered both developed and developing countries. It is notable to reveal that the inequalities in access to water and sanitation are not only existing in the countries that are economically weak (CETRULO et al. 2020; AZAGE et al. 2020; AFIFAH et al. 2018; CHAUDHURI et al. 2017; CHAUDHURI et al. 2020; JIMENEZ-REDAL et al. 2018; WANG et al. 2019) but also in an advanced economy such as the United States of America (GASTEYER et al. 2016).

Why are these measures? What are the advantages/disadvantages of these measures?

Some of these measures were adapted from the other research areas such income and health inequalities, which has a relatively longer tradition than that of water and sanitation research. For example, adapted Gini coefficient, Concentration Index and summary measures of inequalities in relative and absolute terms (ODI 2017). In general, summary measures of inequalities in access to water and sanitation that were reviewed in this chapter can be grouped into three categories: simple measures (1), regression-based measures (2) and complex measures (3) as most of them overlap what were used in the literatures in health inequalities (LKHAGVASUREN 2018).

In their work of 1997, MACKENBACH and KUNST (pp. 759-760) noted that *the simple measures* such as rate difference and rate ratio, have advantages of easier calculation, straight

[23] Those scales of analysis – the sub-national, national, regional and global levels – have no special correlation on selection of the measures. On the contrary, which have a strong relevance to the level of disaggregation and coverage of the data.

[24] For more information, see: GeoNetwork The Global Administrative Unit Layers (GAUL). http://www.fao.org/geonetwork/srv/en/main.home as informed by the Local Burden of Disease WaSH Collaborators (2020).

forward interpretation, having less restriction to justify the data to be used in analyses, and measurement of the independent variables can be on ordinal or nominal scales. They also have disadvantages of misinforming parts of available information in data. On the contrary, although *the regression-based measures* can better address the problem of miscommunicating already available information in data, these measures still face disadvantages of more complexity in calculation and the restrictions on the data to be used in analysis. Furthermore, a regression-based index would need the variables on an interval scale – that can cause an additional burden.

As LKHAGVASUREN explained in her work (2018, p. 58) *the regression-based measures* are used to analyse the association between the dependent and independent variables of interest, while complex measures such as concentration index, Atkinson´s index and Thiel Index reflect socioeconomic dimension to health inequalities. These measures were also compared in CETRULO and colleagues' work (2020) in searching for a better measure for estimating inequalities in access to water within the SDG 6 framework as an alternative to the JMP method.

Furthermore, more than a half of the studies (n=9/14) under review further established a causality, thus they used the different types of regression-based analysis that include linear regression, non-linear trajectory, OLS linear regression, logistic regression and multivariate regression (GASTEYER et al. 2016; JIMENEZ-REDAL et al. 2018; QUEIROZ et al. 2020; FULLER et al. 2016; CHA et al. 2017; BAYU et al. 2020; WANG et al. 2019; and LOCAL BURDEN OF DISEASE WASH COLLABORATORS 2020), while one study developed and applied a specific index to measure the effect (CHAUDHURI et al. 2020). The selection of the type of measure reflects the number of variables and the design of the study. For example, linear regression was used to test an association between a dependent variable and an independent variable, while logistic regression was used when there is a binary variable. Therefore, I found no single measure but a variety of techniques which are consistent with the context and design of the study.

This is also worth mentioning the types of data and database. These studies utilised mostly were cross-sectional and panel datasets. Which were obtained from the open-access datasets (i) that are maintained and stored by the international organisations such as the WHO, UN, USAID and OECD (FULLER et al. 2016; CHA et al. 2017; BAYU et al. 2020; ROCHE et al. 2017; WANG et al. 2019) or an international project such as IPUMS (QUEIROZ et al. 2020); data from the national statistical offices (ii) (CETRULO et al. 2020; AFIFAH et al. 2018; GASTEYER et al. 2016; CHAUDHURI et al. 2020; CHAUDHURI et al. 2017; AZAGE et al. 2020) or combination of all (LOCAL BURDEN OF DISEASE WASH

COLLABORATORS 2020). These were all secondary data utilised in these studies. However, only one study used primary data by collecting it during the research (JIMENEZ-REDAL et al. 2018).

4. Conclusion

The chapter presents an overview of the recent quantitative measures applied in research on inequalities in access to water and sanitation based on the synthesis of the most relevant empirical literature. The advantages and disadvantages of these measures were briefly discussed. Findings revealed that the multiple techniques framed by the statistical models were utilised to report the progress towards tackling inequalities in access to water and sanitation and analysing a causality established. Both simple and sophisticated measures were used in relative and absolute terms for the studies covering different regions, scales, and the types of inequalities. A few papers offered alternative methods and a possibility to adapt a better measurement technique that may address some of the limitations of the JMP method. The data gap is one of the major challenges involved in addressing such a problem. This information is hopefully helpful to the research students and professionals who are interested in the water and sanitation topic and being in the stage of designing their projects. As a recommendation for further research, I would suggest two directions. First, group and individual related inequalities have rarely been quantified, partly because of the data gap and partly because of the methodological challenges. Second, there is certainly a need for a methodological contribution to measuring different types of inequalities in access to water and sanitation that takes account of the principle of non-discrimination and inequality, which is consistent with working towards achieving universal access.

5. Funding

The present publication is the outcome of the project “From Talent to Young Researcher project aimed at activities supporting the research career model in higher education”, identifier EFOP-3.6.3-VEKOP-16-2017-00007 co-supported by the European Union, Hungary and the European Social Fund.

6. References

AFIFAH, T. – NURYETTY, M.T. – CAHYORINI – MUSADAD, D.A. – SCHLOTHEUBER. A. – BERGEN. N – JOHNSTON, R. 2018: Subnational regional inequality in access to improved drinking water and sanitation in Indonesia: results from the 2015 Indonesian National Socioeconomic Survey (SUSENAS). Global Health Action 11(1): pp. 31-40. https://doi.org/10.1080/16549716.2018.1496972

AZAGE, M. – MOTBAINOR, A. – NIGATU, D. 2020: Exploring geographical variations and inequalities in access to improved water and sanitation in Ethiopia: mapping and spatial analysis. Heliyon 6(4): p.e03828. https://doi.org/10.1016/j.heliyon.2020.e03828

BAYU, T. – KIM, H. – OKI, T. 2020: Water Governance Contribution to Water and Sanitation Access Equality in Developing Countries. Water Resources Research 56(4): https://doi.org/10.1029/2019WR025330

CAWTHORNE, K.R. – COOKE, R.P. 2020: Innovative technologies for hand hygiene monitoring are urgently needed in the fight against COVID-19. Journal of Hospital Infection 105(2): pp. 362-363. https://doi.org/10.1016/j.jhin.2020.04.005

CETRULO, T.B. – MARQUES, R.C. – MALHEIROS, T.F. – CETRULO, N.M. 2020: Monitoring inequality in water access: Challenges for the 2030 Agenda for Sustainable Development. Science of The Total Environment 727, p. 138746. https://doi.org/10.1016/j.scitotenv.2020.138746

CHA, S. – MANKADI, P.M. – ELHAG, M.S. – LEE, Y. – JIN, Y. 2017: Trends of improved water and sanitation coverage around the globe between 1990 and 2010: inequality among countries and performance of official development assistance. Global Health Action 10(1): p. 1327170. https://doi.org/10.1080/16549716.2017.1327170

CHAUDHURI, S. – ROY, M. 2017: Rural-urban spatial inequality in water and sanitation facilities in India: A cross-sectional study from household to national level. Applied Geography 85: pp. 27-38. https://doi.org/10.1016/j.apgeog.2017.05.003

CHAUDHURI, S. – ROY, M. – JAIN, A. 2020: Appraisal of WaSH (Water-Sanitation-Hygiene) Infrastructure using a Composite Index, Spatial Algorithms and Sociodemographic Correlates in Rural India. Journal of Environmental Informatics 35(1): https://doi.org/10.1177/0973005220946661

CRESWELL, J.W. 2003: Research design: Qualitative, quantitative, and mixed methods approaches. California– London– New Delhi: Sage publications.

DERWORT, P. – JAGER, N. – NEWIG, J. 2019: Towards productive functions? A systematic review of institutional failure, its causes and consequences. Policy Sciences 52(2): pp. 281-298. https://doi.org/10.1007/s11077-018-9339-z

FULLER, J.A. – GOLDSTICK, J. – BARTRAM, J. – EISENBERG, J.N. 2016: Tracking progress towards global drinking water and sanitation targets: A within and among country analysis. Science of the Total Environment 541: pp. 857-864. https://doi.org/10.1016/j.scitotenv.2015.09.130

GASTEYER, S.P. – LAI, J. – TUCKER, B. – CARRERA, J. – MOSS, J. 2016: Basics inequality: Race and access to complete plumbing facilities in the United States. Du Bois Review: Social Science Research on Race 13(2): pp. 305-325. https://doi.org/10.1017/S1742058X16000242

GREIG, A. – HULME, D. – TURNER, M. 2007: Challenging global inequality: Development theory and practice in the 21st century. London: Macmillan International Higher Education

JIMENEZ-REDAL, R. – HOLOWKO, N. –ALMANDOZ, J. – ARREGUI, F. –MAGRINYA, F. 2018: Evaluating equity and inclusion in access to water and sanitation for persons living with HIV/AIDS in Wukro, Ethiopia. Water 10(9), p.1237. https://doi.org/10.3390/w10091237

LOCAL BURDEN OF DISEASE WASH COLLABORATORS. 2020: Mapping geographical inequalities in access to drinking water and sanitation facilities in low-income and middle-income countries, 2000–17. The Lancet. Global health 8(9): p.1162. https://doi.org/10.1016/S2214-109X(20)30278-3

LKHAGVASUREN, K. 2018: Essays on health inequalities and utilization of health service in low-and middle-income countries. Retrieved from: https://archives.kdischool.ac.kr/handle/11125/31249 (09.20.2020).

MACKENBACH, J.P. – KUNST, A.E. 1997: Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. Soc Sci Med. 44(6): pp 757-71. PMID: 9080560. doi: 10.1016/s0277-9536(96)00073-1.

MOHER, D. – LIBERATI, A. – TETZLAFF, J. – ALTMAN, D.G. – PRISMA GROUP. 2009: Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS medicine 6(7): p.e1000097. doi:10.1371/journal.pmed1000097

ODI (Overseas Development Institute). 2017: How to Reduce Inequalities in Access to WASH. Synthesis report. Retrieved from: https://cdn.odi.org/media/documents/11604.pdf (09.20.2020).

QUEIROZ, V.C. – CARVALHO, R.C.D. – HELLER, L. 2020: New approaches to monitor inequalities in access to water and sanitation: The SDGs in Latin America and the Caribbean. Water 12(4): p. 931. https://doi.org/10.3390/w12040931

ROCHE, R. – BAIN, R. – CUMMING, O. 2017: A long way to go–Estimates of combined water, sanitation and hygiene coverage for 25 sub-Saharan African countries. PloS one 12(2): p. 0171783. https://doi.org/10.1371/journal.pone.0171783

UNDP. 2003: Human Development Report: Millennium Development Goals - A Compact Among Nations to End Human Poverty. Retrieved from: http://hdr.undp.org/en/content/human-development-report-2003 (09.20.2020).

UNITED NATIONS GENERAL ASSEMBLY. 2010: Resolution A/RES/64/292: The human right to water and sanitation. Retrieved from: https://undocs.org/A/RES/64/292 (09.20.2020).

UNICEF, WHO. 2018: JMP Methodology – 2017 update, SDG baselines. Retrieved from: https://washdata.org/sites/default/files/documents/reports/2018-04/JMP-2017-update-methodology.pdf (05.01.2021).

VIJAYVARGIYA, P. – GARRIGOS, Z.E. – ALMEIDA, N.E.C. – STEVENS, R.W. – RAZONABLE, R.R. 2020: Treatment considerations for COVID-19: A critical review of the evidence (or lack thereof). Mayo Clinic Proceedings, Elsevier. Retrieved from: https://els-jbs-prod-cdn.jbs.elsevierhealth.com/pb/assets/raw/Health%20Advance/journals/jmcp/jmcp_ft95_5_11.pdf (05.01.2021).

WAGSTAFF, A.– PACI, P. – VAN DOORSLAER, E. 1991: On the measurement of inequalities in health. Social Science & Medicine, 33(5): pp. 545-557. https://doi.org/10.1016/0277-9536(91)90212-U

WANG, C. – PAN, J. – YADAC, R.B. – YAO, D. 2019: Geographic inequalities in accessing improved water and sanitation facilities in Nepal. International journal of environmental research and public health, 16(7): p.1269. https://doi.org/10.3390/ijerph16071269

WWAP UNESCO World Water Assessment Programme. 2019: The United Nations World Water Development Report: Leaving No One Behind. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000367306 (09.20.2020).