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Urban Water Access, Social Inequality, and Public Health Outcomes in Formal Settlements of Sargodha City

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ABSTRACT

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Access to safe and reliable water is generally considered to be a social determinant of health, especially in the fast-urbanizing cities of developing countries. In Pakistan, the access to water in even formally planned urban settlements is still unequal, and the water quality is low, as well as the governance arrangements, which has led to poor health outcomes on the population. This paper will examine the connection among urban water, social inequality and public health in the formal settlements of Sargodha City. Quantitative research design was used and primary data were gathered on the basis of a household survey conducted among 155 respondents, who were chosen with the help of stratified random sampling in five formal urban localities. Statistic and inference analysis were done in Statistical Package For Social Sciences (SPSS). The results show that the use of Canned water and other water resources is high, people are dissatisfied with the quality of water, and the level of water-borne diseases in households is also significant. The findings indicate that social inequality, lack of policy awareness and infrastructural gaps are the combined factors that increase health susceptibility in cities. The research also identifies the necessity to discuss the sociological and structural problem of urban water access as not a purely technical problem, but the significance of community involvement, equal distribution of resources, and health-oriented urban water management.

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1.0 Introduction

Water is essential to human survival and a precondition of health, wellbeing, and social development (Abbas et al., 2022). The right to safe drinking water is considered one of the most fundamental human rights and a primary element of the population health protection on the international level (National Water Policy, 2018; WASA, 2020). In addition to being a biological resource, water is a social and economic asset that is directly related to productivity, prosperity, and quality of life (Pakistan Bureau of Statistics, 2017). Nonetheless, sudden urbanization, industrialization, population explosion, and altered socio-economic trends have aggravated the issue of water scarcity across the world causing a greater threat to human health and development (Government of Pakistan, 2024; Sustainable Development Goals [SDGs], 2015).

The rate of global per capita consumption of blue water has increased to 230 cubic meters in 2000s following the 209 cubic meters in the early twentieth century (Institute of Public Opinion and Research, 2020). Over 40 percent of the global population is likely to be living in water-stressed river basins by 2050 (Burn et al., 2012). As a result, a freshwater shortage and water security are significant environmental and population health concerns (Pearson et al., 2009). Food security, economic stability, and population health are at risk due to looming scarcities in the future as over fifty percent of renewable freshwater resources are already used (SDGs, 2015).

In reaction, Sustainable Development Goal 6 focuses on a universal access to free and clean drinking water and sustainable water management (Blackmore et al., 2018). With such commitment, the water access to clean drinking water is very unequal with over 2.5 billion people having no access to safe and reliable water in the world (Wong and Brown, 2019). The chronic infrastructural constraints, poor governance, and socio-economic disparities are still seen to cripple water supply both in the developed and developing world (Vlachos & Braga, 2021).

Pakistan is a very extreme example of water insecurity. The country is currently facing a high rate of water depletion, as previously it had been rich in water (Rajkumar, 2015). The available water per capita dropped to about 1,050 cubic meters in 2010 compared to 5,260 cubic meters in 1951 which put Pakistan close to total water scarcity (Thomas and Gibbons, 2018). The overconsumption of ground water has far exceeded the sustainable rates and groundwater meets more than 90 percent of urban water demand and is one of the causes in the extensive depletion of aquifers (Hunter, 2023; Schaffer and Vollmer, 2010). Though the Indus River System is an important water source with a significant flow of water per year, it is still limited by mismanagement and infrastructural inefficiencies (Greenway, 2021).

These are some of the problems that are witnessed in Sargodha City which is a big urban center in Punjab. The water supply system of the city is highly dependent on ground water and canal which have a hard time covering the growing population. An old system of infrastructure and sewage pollution is a significant threat to the population (Abbas et al., 2022). Even though the infrastructure is planned, most neighborhoods rely on public taps and communal water sources that are generally untrustworthy in supply and have a low water quality, which leads to health disparities and waterborne diseases (Ahmed et al., 2022).

The issue of water access becomes one of the most important social determinants of health

in the sociology of health and is defined by inequality, governance, and power relations. This paper thus looks at the connection between city water access, social inequity and social health outcome in the formal settlements in Sargodha City.

2.0 Literature Review

2.1 Water, Urbanization, and Social Inequality

The water access is becoming increasingly acknowledged as a multidimensional challenge influenced by social, economic, institutional, and spatial aspects but not a technical one. Urbanization, increase in population and changing patterns of settlement have put the urban water systems in the Global South under tremendous pressure. The literature on urban water sustainability highlights the entrenched nature of disparities in the availability of water as a part of wider systems of social inequality, failure in governance, and space disparities (Ali, 2007; Garcia et al., 2019). Even in officially laid out urban settlements, the problem of uneven water distribution is experienced as a result of the old water infrastructure, poor maintenance programs and unequal distribution of resources.

Spatial and socio-economic inequality has a very significant implication on access to water in Pakistan. According to Ali (2007), Sargodha, like other cities, presents current hierarchies in the provision of services in the city, using income, locality, and position to mediate access to basic services, including water. Such disparities have the effect of creating a disparity in exposure to health risks, a phenomenon that strengthens the susceptibility of lower-income families. On the same note, Chaudhry (2021) observes that marginalized communities suffer most because of scarcity of water since they do not have the financial capacity to find other sources of water or invest in household water purification.

2.2 Watershed Urban Management and Governance Issues

Efficient management of urban water should not only rely on physical infrastructures, but also on the governance systems, the level of institutional coordination and citizen involvement. Both the Integrated Water Resources Management and sustainable urban water management frameworks highlight that there is a need to be able to match the technical systems to the social and institutional processes (Andrea, 2019; David et al., 2013). Nevertheless, the cities, which have a challenge in implementing these models, do so because of the weak institutional capacity, divided governance and poor stakeholder involvement.

In Pakistan, the process of urban water governance is highly centralized and the communities are not much involved in the planning and decision-making processes. Ahmed et al. (2022) emphasizes that ineffective interactions between the water services and the population lead to the lack of satisfaction with water services, as well as the lack of trust towards the institutions of the state. This is further enhanced by the lack of proper participatory systems like Water User Associations thereby reducing accountability and decreasing the government in responsiveness of the water delivery systems (Casey et al., 2023). Consequently, urban water management does not serve local needs and socio-economic realities.

The same thing is highlighted in international studies that state that sustainable water governance is an issue that needs adaptive and participatory practices. An example of the cities

including Bogota and Los Angeles indicates that settlement patterns may be made more resilient and equitable when water management strategies are included (Bruno and Kelly, 2023; Garcia et al., 2019). Nevertheless, the implementation of these models in the developing situations is limited because of the lack of resources and institutional deficiencies.

2.3 Water Quality, Health and the Sociology of Health

The unclean water remains a major threat to the population health in the developing nations such as Pakistan. The polluted water has been cited as one of the top causes of morbidity and mortality with estimates of United Nations showing that about 40 percent of deaths in Pakistan are attributed to this water (UN, 2013). Poor water quality, weak sanitation as well as weak monitoring systems are strongly associated with waterborne diseases like diarrhea, typhoid and skin infections.

Sociological determinants like income, education, and access to infrastructure affect the health outcomes related to water in a sociology of health perspective. As Shaikh et al. (2022) reveal, knowledge, attitudes and practices differing with respect to safe drinking water profoundly impact on exposure to health hazards. Poor households that lack awareness have a high likelihood of using unsafe water sources due to their relative poverty, which makes them vulnerable to diseases.

Water systems within urban areas which heavily rely on groundwater are the most susceptible to contamination through over extraction and poor regulation. Rajkumar et al. (2015) suppose that irrational consumption of groundwater impairs the quantity of water and quality and has direct effects on human health. The climate variability and the degradation of nature contribute to the intensification of these challenges (Greenway, 2021).

2.4 Research Gap

Even though there is a wealth of literature on the topic of urban water management and sustainability, few studies focus on the access to water through the prism of both social inequality and health in formal urban settlements. Much of the current research is area-technical or informal settlements based, without thoroughly examining some long-term vulnerabilities within formally planned areas. Sociologically informed research is evident to investigate the interaction of water access, governance, and inequality to determine the influence on the population health in secondary cities like Sargodha. This paper aims at sealing this gap through analyzing urban water access as a social determinant of health within the formal settlements of Sargodha City.

2.5 Research Hypotheses

H_1: There is a significant positive relationship between social factors and access to safe drinking water in formal urban settlements.

H_2: Economic constraints are significantly negatively associated with access to safe drinking water among urban households.

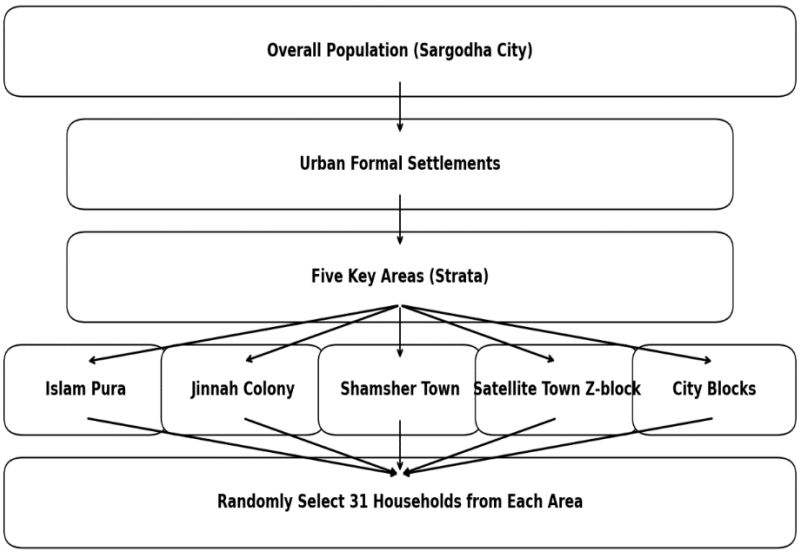
H_3: Poor access to safe drinking water is significantly associated with adverse public health outcomes.

3.0 Methodology

A quantitative research design was used in this study to determine the relationship between urban water access, social inequality, and public health outcomes in the formal settlements of

Sargodha City. Primary data was obtained with the help of a cross-sectional household survey since it is the appropriate method to analyze social trends, perceptions, and health-related outcomes in urban residents. The quantitative design was used to allow making systematic measurements of the variables and statistical analysis of the relationship between water access, socio-economic conditions, and health outcomes.

The study was done in Sargodha City a capital city in the state of Punjab in Pakistan. The city was chosen because it is quickly growing urban and developing, thus putting more pressure on water resources, and it is dependent on groundwater and water supply systems. Although Sargodha is a formally planned city, it experiences long-term issues with water quality, infrastructure and its unreliability, as well as service delivery, which makes it a reasonable place to analyse the concept of water access as a social determinant of health.



A stratified random sampling strategy was used, in order to obtain representation of various formal urban localities. Five settlements were chosen, including Islam Pura, Jinnah Colony, Shamsher Town, Satellite Town (Z-Block), and City Blocks. A total of 31 households were chosen randomly in each locality and the sample was made up of 155 respondents. The unit of analysis was the household with one adult member of the household being interviewed so as to capture differences in socio-economic status, water access conditions and health experiences.

The structured questionnaire with close-ended and Likert-scale questions was used to collect the data. The instrument included the socio-demographic attributes, water source, attitudes on the quality of water, practices on water management, social and economic aspects influencing access, understanding of water policies and self-reported health outcomes of water. The internal consistency was high because the Cronbach's alpha value was 0.948, and was obtained through the reliability test. The analysis of data was performed in SPSS with the help of descriptive statistics and Pearson correlation analysis. Informed consent, confidentiality and voluntary participation

were used as ethical standards.

4.0 Findings and Results

4.1 Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency (n=155)	Percentage (%)
Gender	Male	92	59.4%
	Female	63	40.6%
Age	15-20	38	24.5%
	21-25	87	56.1%
	26-30	23	14.8%
	31-35	6	3.9%
	36-40	1	.6%
Household member's	1-2 people	3	1.9%
	3-4 people	48	31.0%
	5-6 people	94	60.6%
	7 or more	10	6.5%
Educational Status	Matric	49	31.6%
	Intermediate	84	54.2%
	BS	12	7.7%
	MPhil	8	5.2%
	Other	2	1.3%
Occupation	Student	12	7.7%
	Businessmen	91	58.7%
	Govt/ Private	25	16.1%
	employee	27	17.4%
	Other		
Monthly Household	25000 to 45000 Rs	25	16.13%
Income	45,001 to 65,000	37	23.87%
	Rs	34	22.94%
	65,001 to 85,000	47	27.74%
	Rs	16	10.32%
	85,001 to 105,000		
	Rs		
	Above 105,000 Rs		

The study included a total of 155 respondents from formal settlements of Sargodha City. Of these, 59.4 percent were male and 40.6 percent were female. The majority of respondents belonged to the younger age group, with a large proportion falling between 21 and 25 years. Most households reported small to medium family sizes, indicating nuclear family structures common in urban settings. Educational attainment varied across respondents, although a considerable number had completed intermediate or higher levels of education. Household income levels reflected socio-economic diversity within formal settlements, ranging from low- to middle-income groups.

4.2 Sources of Drinking Water & Access

Variable	Category	Frequency (n=155)	Percentage (%)
Primary source of drinking water	Public tap	23	14.8
	Piped water supply	28	18.1
	Filtered water	32	20.6
	Bottled / Canned water	72	46.5
Frequency of water supply	Once daily	49	31.6
	More than once daily	37	23.9
	Irregular	69	44.5
Time spent fetching water	Less than 30 minutes	58	37.4
	30–60 minutes	61	39.4
	More than 1 hour	36	23.2

The results indicate that commercially bottled (canned) water is the most commonly consumed source of drinking water by households in the study area. The secondary source of water is still relevant since public taps are used by a substantial number of people, and filtered water is consumed by a significant percentage of respondents. Conversely, water supply on piped household water is minimal meaning that these settlements still rely on other water sources and the shared one even though they have the formal planning status.

4.3 Water Quality and Public Health Outcomes

Indicator	Item	Frequency (n=155)	Percentage (%)	Mean	SD
Primary drinking water perceived as safe	Unsatisfactory	107	69.0	3.82	0.91
Presence of taste, odor, or color issues	Yes	102	65.8	3.74	0.88
Household treats water before drinking	Yes	96	61.9	3.41	1.02
Water quality tested by authorities	Irregular / None	126	81.3	2.11	0.97
Awareness of health risks from unsafe water	Yes	94	60.6	3.57	0.94
Occurrence of water-related illness (past year)	High	101	65.2	3.69	0.89
Perceived health risk due to unsafe water	Unsatisfactory	107	69.0	3.82	0.91

The findings show that there is general concern about the safety of drinking water, as most of the households reported a low drinking water quality and a lack of official monitoring. Low preventive awareness was exhibited by majority of the respondents who did not treat water prior to consumption in spite of high dependence on water cans. The percentage of households with water related diseases was predominant, showing that there was a high level of vulnerability of the population in terms of bad water use habits and poor governance.

4.4 Pearson Correlation Matrix between Water Access, Social Inequality, Governance, and Health Outcomes:

	Water Access	Social Factors	Economic Constraints	Governance Factors	Health Outcomes
Water Access	1.00	0.61**	-0.54**	0.49**	0.58**
Social Factors	0.61**	1.00	-0.47**	0.52**	0.46**
Economic Constraints	-0.54**	-0.47**	1.00	-0.41**	0.55**
Governance Factors	0.49**	0.52**	-0.41**	1.00	0.44**
Health Outcomes	-0.58**	-0.46**	0.55**	-0.44**	1.00

Note. $p < .01$ (two-tailed)

The correlation analysis depicts that water access and social factors have a significant positive relationship, which implies that the higher the community cooperation, the better the access to water. The governance factors also have positive relationship with water access, implying that the better the water provision the better are the institutional arrangements. Water access and economic constraints have a significant negative relationship and, as such, show that financial constraints limit access to safe drinking water. There is a significant association between water access and health outcomes and the lower the water access, the worse the health outcomes. The economic factors also indicate a positive correlation with poor health outcomes, with the issue of social inequality playing a significant role in determining poor health in formal urban settlements.

5.0 Discussion and Conclusion

The results of this research reveal that the availability of urban water within the formal settlements of Sargodha City is conditioned by the interconnection of social, economic and institutional determinants, directly affecting population health. Although these settlements are planned, unequal water access, unequal water quality, and unequal water management remains a fact in these settlements. This undermines the fact that formal urban status guarantees equitable access to safe drinking water and draws attention to the visage of structural shortcomings that remain in planned urban localities.

The findings demonstrate that families use commercially bottled (canned) water and communal sources of water extensively, and piped residential water is unavailable to many. Such

reliance indicates a lack of household level water systems and untrustworthy city supply. The same trends have been observed in other Pakistani urban areas, as centralized water supplies cannot sustain the rising urban growth, leading to periodic water supply and joint access (Ahmed et al., 2022). Considering the sociology of health, there is an augmented exposure to contamination and the risk of waterborne diseases since of dependence on common water supply.

The water quality issues identified during the research are aligned with the national and global data that associate the unsafe drinking water with the negative health outcomes. The prevalence of water-related disease in the households is high, which substantiates the United Nations estimates on water-related morbidity in Pakistan and substantiates the importance of water access as a significant social determinant of health. Despite the widespread use of bottled water, household water treatment is low, and the agencies are weak in monitoring this situation which means that households have less awareness about preventing water-related matters as well as gaps in governance.

The correlation study also shows that social factors have a positive relationship with increased water access whereas economic constraints play a major role in hindering access to safe drinking water by households. Lack of water has been closely linked with poor health conditions and this fact proves that the economically disadvantaged are the most vulnerable in terms of health. Even though community collaboration leads to enhanced access in certain regions, poor institutional level and low policy literacy make it less effective (Chaudhry, 2013; David et al., 2013). The results in general prove that the problem of urban water access in Sargodha City is a socially organized phenomenon with severe implications on the public health.

5.1 Recommendations

Based on the study findings, the following recommendations are proposed:

- Improving urban water access in Sargodha City requires socially inclusive and health-oriented interventions. Water management authorities should strengthen community participation by involving residents in planning, monitoring, and decision-making processes. Establishing community-based water committees in formal settlements can enhance collective responsibility, improve communication, and support inclusive water governance.
- Clear and accessible communication of water policies and institutional responsibilities is essential. Public awareness campaigns and community meetings can improve understanding of water rights and strengthen public trust and accountability. Policy interventions should also prioritize low-income households by providing targeted financial support for household water treatment technologies to reduce health risks and inequalities in access to safe drinking water.
- Public health considerations must be integrated into urban water governance through regular water quality monitoring, timely dissemination of results, and coordination between water and health authorities. Finally, investment in sustainable and decentralized water solutions, such as rainwater harvesting and localized filtration, can improve system resilience and reduce dependence on over-exploited groundwater resources. .

Contribution

Hanzala: Problem Identification and Theoretical Framework
Zarqa Azhar: Data Analysis, Supervision and Drafting
Ume Farwa: Methodology and Revision

Conflict of Interests/Disclosures

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References

Ahmed, O., Siddiqui, A., Riaz, F., Fahad, A., Abdullah, U., & Rashid, T. (2022). *Water Supply & Sanitation Sector: Sargodha Regional Development Plan*.

Contaminated water contributes to 40% deaths in Pakistan: UN. (2013). In *UN Report*. Urban water sustainability: framework and application. (2016). *Ecology and Society*, 4. http://www.ecologyandsociety.org/vol21/iss4/art4/

Ali. (2007). *A look at the Spatial Inequality in Pakistan: Case study of District Sargodha*. https://escholarship.org/content/qt4hd5n6pr/qt4hd5n6pr.pdf

Andrea. (2019). *Integrated water resources optimization models: an assessment of a multidisciplinary tool for sustainable water resources management strategies*. https://compass.onlinelibrary.wiley.com/doi/abs/10.1111/j.1749-8198.2009.00239.x

Bruno, & Kelly. (2023). *Water urbanism in Bogotá. Exploring the potentials of an interplay between settlement patterns and water management*. https://www.sciencedirect.com/science/article/pii/S019739751500065X

Casey, Jay, Ximing, Patrick, Edith, Avi, Jim, Gregory, Winston, & Levi. (2023). *The future of water resources systems analysis: Toward a scientific framework for sustainable water management*. https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2015wr017114

Chaudhry. (2021). *Water Users Associations in Pakistan*. https://core.ac.uk/download/pdf/150148173.pdf

Daene. (n.d.). *A modeling framework for sustainable water resources management*. https://repositories.lib.utexas.edu/bitstreams/28195aac-8bc3-46d5-adbb-69f1648760d9/download

David, Magnus, Stephen, & David. (2013). *Towards sustainable urban water management: A critical reassessment*. https://www.sciencedirect.com/science/article/pii/S0043135413008208

Di, Lourdes, Gabriella, & Rosa. (2021). *Water governance models for meeting sustainable development Goals: A structured literature review*. https://www.sciencedirect.com/science/article/pii/S0957178721000898

Helena, Aonghus, P., & Modesto. (2019). *Smart water management towards future water sustainable networks*. https://www.mdpi.com/2073-4441/12/1/58

Hunt. (2023). *Thirsty planet: Strategies for sustainable water management*. Academic Foundation. https://books.google.com/books?hl=en&lr=&id=YpUA_KRqO8wC&oi=fnd&pg=PR11&dq=Sustainable+models+for+water+access+and+management+&ots=utWpV0c2xU&sig=pByIwhu0sU0vM5W30sCzOLr96Bs

Julia, Karlijn, Robinah, Sampson, Philip, Hans, & Roel. (2018). *Transition management for improving the sustainability of WASH services in informal settlements in Sub-Saharan Africa—An exploration*. https://www.mdpi.com/2071-1050/10/11/4052

Katherine, Joshua, & natural. (2014). *Sustainable water management in urban, agricultural, and natural systems*. https://www.mdpi.com/2073-4441/6/12/3934

Patience. (2019). *Examining urban water management practices–Challenges and possibilities for transitions to sustainable urban water management in Sub-Saharan cities*. https://www.sciencedirect.com/science/article/pii/S2210670719300721

Sarah, Chris, Maryam, Kegong, Raziyeh, Guangtao, & lient. (2017). *Reliable, resilient and sustainable water management: the Safe & SuRe approach*. https://onlinelibrary.wiley.com/doi/abs/10.1002/gch2.1010

Shaikh, G., Butt, A. M., & Shafiq, M. (2022). Knowledge Attitude and Practice about Safe Drinking Water among High School Teachers of Rawalpindi, Pakistan. *Journal of University College of Medicine & Dentistry*, 1(1). https://doi.org/10.51846/jucmd.v1i1.1361

Rajkumar, G. A., Srinivas, M. K., Ranganath, L. R., & Kudale, M. D. (2015). WATER RESOURCES MANAGEMENT IN URBAN AREAS – A SUSTAINABLE SOLUTION THROUGH IBWT. In *IJRET: International Journal of Research in Engineering and Technology* (Vol. 04). http://www.ijret.org

Greenway, J. (2021). Water resources management versus the world. *AIMS Geosciences*, *7*(4), 589–604. https://doi.org/10.3934/geosci.2021035

Garcia, M., Koebele, E., Deslatte, A., Ernst, K., Manago, K. F., & Treuer, G. (2019). Towards urban water sustainability: Analyzing management transitions in Miami, Las Vegas, and Los Angeles. *Global Environmental Change*, *58*, 101967. https://doi.org/10.1016/j.gloenvcha.2019.101967.