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RESEARCH PAPER

An Examination of Spatial Inequalities in Access to WASH Services in Pakistan

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ABSTRACT

The availability of water is one of the most fundamental and essential needs of any economy. However, the unequal distribution of nature's gifts, such as water, has become one of the major problems that developing countries like Pakistan are facing today. The unequal distribution and access to WASH (water, sanitation, and hygiene) must be addressed in order to minimize poverty in the country. UNICEF and WHO have developed a joint monitoring program to reduce inequalities and remove poverty all over the world. There are several goals in this Programed including goals 6.1 and 6.2 (equal distribution of WASH services). This study determines whether there is a spatial inequality in access to WASH services in Pakistan or not. The inequalities are studied between the regions of Pakistan as well as among the provinces. The study used cross-sectional data (2019 to 2020) from the PSLM survey. The sample size used in the study is 49, 510. One-way ANOVA and t-test techniques are used to analyze inequalities in this study. The results of the study indicate that there are significant inequalities in access to WASH services across provinces in Pakistan. The urban household has more equal access to WASH services than the rural areas. This study provides comprehensive information to policymakers for policy making. Encourage partnerships and collaboration among government agencies, civil society organizations, private sector entities, and communities in order to harness resources and knowledge. Engage the media, community leaders, and powerful figures to champion the cause and foster a gender-equal culture of access to WASH services.

Keywords: Hygiene, Pakistan WASH Services, Spatial Inequalities, Sanitation, Water

Introduction

Access to clean water and sanitation is directly related to increased productivity, especially in agriculture, manufacturing, and services. Improved water supply and sanitation facilities increase worker productivity and economic growth. Water is strongly associated with economic growth. As water is considered the key input factor and basic raw material in the production sector, equal distribution can lead to high growth rates (Girmay et al., 2022). Water-rich sectors have more industries, jobs, and large production scales. In contrast, unequal distribution of water resources can impede economic growth. Water-scarce areas have low growth rates and are less developed. It is very important to distribute water equally to achieve a high growth rate (Afifah et al., 2018; He et al., 2019).

It is estimated that over 144 million people still drink unsafe water and nearly one in ten people cannot access water and sanitation services, according to WHO. One-third of rural residents live in developing countries, and 2 billion people lack access to basic sanitation facilities. There are still 673 million people who practice open defecation in only 23 countries PHSP, (2023). Considering the importance of water in every sector of the economy, worldwide organizations have paid heavy attention to the provision of water. In its top 17 development goals, the UN added equal access to WASH for all by 2030. In SDGs 6.1 and 6.2, water and sanitation are addressed. Nearly 90% improvement is seen over the

globe as countries work together to achieve this goal Learning to Realize Education's Promise, (2018).

Economic development and individual well-being are critically dependent on WASH. Access to clean sanitary facilities improves health outcomes and economic productivity. UNICEF and WHO consider water sources improved if they are protected from solid waste, outside contamination, and fiscal constraints. Piped water system connected to the house, public tap, hand pump, motor pump, tube well, borehole, closed well, protected spring, public tap, standpipe. A distance of less than 0.5 km from the source is required to fetch these services within 30 minutes. Hygienically dispose of human faces, urine, and other waste through improved sanitation services. Toilets are flushed into public sewers, septic tanks, pits, and composite latrines. Hygiene practices focus on cleanliness and sanitation. In personal hygiene, you should keep your hands clean with soap and water, bathe properly, brush your teeth, wear clean clothes, and groom yourself. To prevent foodborne illness, food is handled, prepared, and stored correctly to prevent contamination and growth of harmful bacteria, viruses, and parasites. Water, Sanitation, and Hygiene (WASH) spatial inequality refers to the unjust distribution of WASH infrastructure and services across different regions or countries (Qurat-ul-Ann & Bibi, 2022).

A country in the southeast part of the world, Pakistan is officially recognized. Punjab and Sindh are mountainous regions, while the northern Himalayas are glacial. There are more than 225 million people in Pakistan. Young people under 30 make up a large part of the population. Agricultural, industrial, and service sectors all contribute to Pakistan's economy. Mineral deposits in the country include gas, coal, copper, and gold (Tahir et al., 2011).

There are still 53000 children under the age of 5 in Pakistan who die every year as a result of water and sanitation-related diseases (diarrhea). Over 70% of households still consume water that is contaminated with bacteria, which can be harmful to health. It is expected to be achieved by the year (UNICEF, 2021). According to the International Monetary Fund (IMF), Pakistan is the third number on the list of countries facing water stress. Around 20 percent of Pakistani citizens have access to safe drinking water, whereas the remaining 80 percent have to rely on hazardous water because it is out of reach of them (IMF August 2021). Water pollution and a lack of proper sanitation facilities are two of the many problems that affect access to safe drinking water.

Several national and international reports are available on the issue of drinking water, sanitation, and hygiene (WHO, UNCEF, World Bank), and some empirical studies are also available. It is to the best of my knowledge that there has never been a study before that has looked at the spatial inequalities of WASH services in Pakistan that have looked at; the existence of inequalities in terms of the availability of WASH services within the provinces of Pakistan (Ahmed et al., 2022; Qurat-ul-Ann & Bibi, 2022; Rauf et al., 2015)

As a result of spatial inequalities in WASH, we can uncover the specific needs of these marginalized groups. To achieve the Sustainable Development Goals (SDGs), analysis of WASH spatial inequalities can be used to monitor progress towards SDG 6 (clean water and sanitation). In general, when studying WASH spatial inequalities in Pakistan, it is possible for evidence-based decision-making to be made, targeted interventions to be implemented, and policy formulation to be developed to improve access to safe drinking water, sanitation facilities, and hygiene practices.

Literature Review

Unequal access to natural resources like water is a global concern. World Health Organization (WHO) and United Nations International Children Emergency Fund (UNICEF) joint monitory program gave high importance to maintaining equality in access to clean

water and sanitation. In order to conceal the issue, Cullis and Van Koppen (2007) used the terms equity and equality. Water resources are unequally distributed geographically (inequality). Additionally, these resources are inequitably distributed. Water resource discrepancies in South Africa were measured with the Gini coefficient. National Water Act (NWA) and Department of Water Affairs and Forestry (DWAF) data are used to calculate the Gini index (Mara & Evans, 2018). Rural households have unequal access to water resources where unequal distribution of resources is a problem. The Gini coefficient is a useful and applicable tool for analyzing and achieving equity, they say. Water services are combined for comprehensive analysis over time (Behera & Sethi, 2020; Tsesmelis et al., 2020)

The discussion on water inequalities becomes the major concern of economies. The partner countries of JMP are developing their data sites to analyze and maintain the progress in the water management department. Based on data availability of comparable indicators, Yang et al. (2013) selected Ethiopia, Nigeria, and Bangladesh to study the unequal distribution of improved water sources between economies. They used tube wells and piped water as indicators of clean water supply to households and called it an improved water source. Data was collected through annual surveys of the countries; Demographic Health Survey (DHS), and Multiple Indicator Cluster Surveys (MICS). They used Principal Component Analysis (PCA) and concentration curves for analysis. The results showed that there was greater inequality in access to safe water compared to improved water sources in Ethiopia, Nigeria, and Nicaragua. Many poor households have access to non-piped water sources that provide unsafe water. The study recommended that water quality should also be analyzed to provide clean and safe water equally.

The importance of the equal distribution of Water supply and sanitation services was studied by Pullan et al. (2014) studied 138 nations of Sub-Saharan Africa. They used the Mapping technique to highlight the area with inequalities. The results showed the existence of high geological disparities in to access water and sanitation in Sub-Saharan Africa. Despite the problem of unequal distribution of water resources, unequal access to water resources were also observed. Geological hurdles are not only the cause of unequal access to water resources. There were different reasons observed behind inequalities. Income is one of them, as Jemmali and Sullivan (2014) discussed the difference between inequalities in rich and poor economies. They developed the WPI index and introduced the association of economic welfare and physical accessibility of water resources in South Africa. By using the PCA technique they assigned the weights to five components; access, availability, use, capacity, and environment. They explained inequalities through the mapping technique. The study explained that more disparities and water scarcity are found in developed economies. However the lower-income countries are water-rich and have only unequal access to resources.

The water and sanitation services were collectively studied. The accessibility of these services was studied with the name of WASH facilities by (Chaudhuri & Roy, 2017). They analyzed regional inequality to access WASH facilities in India. Cross-sectional data is used to analyze the socio-economic infrastructure (toilet, tap water, clean water source, and water source at home). Unequal distribution of these facilities was observed between rural-urban regions. The disparities were studied through the (BCDI) approach, the Gini-Coefficient moral, and the (LISA) model. The study suggested that to attain the millennium development goal of "safe water" policies should be more focused on rural areas instead of common policies for the whole economy of India. There were several high inequalities observed. To attain a high growth rate, the study suggested that inequality patterns should be monitored to achieve a high growth rate. This is because, if the inequalities observed are not addressed, it could lead to a decrease in the overall economic growth rate, as those living in more rural areas with limited access to clean drinking water and sanitation facilities would not be able to fully contribute to the economy. Thus, it is important to monitor these inequalities in order to ensure that the country can attain its desired growth rate (Aleixo et al., 2019; Alfonso et al., 2022; Dorea et al., 2020; Ohwo, 2019).

Cole et al. (2018) examined the spatial inequality of per capita water use in South Africa. They measured accessibility to water and per capita water use (water resources, piped water, water in use, and water stress) at regional, district, province, and national levels. They used the Gini coefficient to measure inequality. The results indicate high inequality of water resources at the national level 0.36 value of the Gini index. National Per capita water use ranged from 0.26 at the Gini index.

The study by Anthonj et al. (2020) examined drinking water variables (source type, collection time, amount, use, perception of quality, storage, and treatment) and a composite index. The data were also mapped and contextualized by urban and rural areas. Rural and urban drinking water are substantially unequal in the Solomon Islands. Water access varies between provinces, with some relying on piped water while others use rainwater and surface water. It is not just inter-national inequalities that exist. Rural households lack basic drinking water services in 55% of the Solomon Islands.

The inequalities were also studied between the economies. Bain et al. (2018) monitored SDG 6.1 and 6.2 in 120 countries around the globe. They analyzed the "access to clean drinking water" by categorizing this facility into five groups; safely managed service, basic service of drinking water, limited access to the source, access to an unimproved water source, and household with no service. Both sanitation and hygiene were also defined under these five categories. The results showed that inequalities exist among countries in the world. There is a geographic disparity in access to water and sanitation in Nepal (He et al., 2019). Using Gaussian kernel density analysis, they were able to illustrate the heterogeneity of access to drinking water and sanitation across different regions. According to the results of the study, there are considerable heterogeneities in the access to drinking water and sanitation systems. Same the results were found in the studies by (Oskam et al., 2021)

The type of land is also a hurdle for equal distribution as Wang et al. (2019) analyzed the effect of demographic determinants on improved and unimproved water access, and sanitation services. In Nigeria, they studied geographic inequalities in access to water and sanitation facilities among households. They observed disparities among hill and mountain areas, among regions, and between developing zones. Moreover, Azage et al. (2020) described the inequalities in access to improved water and sanitation according to public health in Ethiopia. They analyzed 16650 households in 2016 and observed high inequalities in access to improved water and sanitation facilities in accordance with health. People with better health have more access to water.

Cha et al. (2021) collected the data from schools and households, to analyze the accessibility of WASH facilities in premises and schools in Sudan. The total data contained 105167 households and 1776 students were added to the study as the sample, they used the Gini coefficient to measure the unequal access to the latrine improved water source at the household level, and the restroom, water, and soap at the school level. Hernández-Vasquéz et al. (2021) defined inequalities according to city sizes in Latin America. They analyzed three categories of city sizes small (401-10,000), medium (10,001-100,000), and large (>101,000). As described in the study Lima metropolitans, high land, and jungle areas. The study described that inequality of access to drinking water also depends on per capita income and household size.

It was studied by Ghosh et al. (2022) that there are geographical differences in the WPI scores of Indians. This data has been collected from districts; site (NEHS) 2015-16 was used to collect the data. There were several inequality tests used in this study: Atkinson's test of inequality, (MORANS I), (LISA), and Gini coefficient. In this study, the inequalities in access to water were explained. The values of WPI were different among districts, and there were discrepancies between them. The results of the study showed that there were geographical differences in the WPI scores of Indians.

Malthus discussed over two centuries ago the food (natural resources) shortage, as its supply will be insufficient to fulfill the demand of the growing population. Because food grows arithmetically and the population is growing at an exponential rate, on the basis of scarcity assumption natural resources are limited and scarce. As in the case of water scarcity, the Malthusian approach, emphasizes the association of population growth and fixed water resources worldwide (Anderson et al., 2012). Water and population have a complicated and multifaceted relationship. As the population is increasing rapidly, stress on water resources is increasing. There are worries about the availability and sustainability of water resources. The growing population increased the water demand. As population density rises, there are fewer freshwater resources available per person (Biswas, 2008).

Material and Methods

To answer the research question; is there spatial inequality in access to water sanitation and hygiene services? The cross-sectional, secondary data is used. The data for the year 2019-2020 fetched from Pakistan Social and Living Standards Measurement (PSLM). Almost 49,836 households are the sample size in this study. The SPSS software is used for analysis.

WASH Services: The WASH services are composed of three dimensions. The dimensions are measured by a set of indicators, and each of the dimensions has its indicator (Alkire & Santos, 2010; Roszkowska, 2013). The data is recoded in binary form for all the questions as follows: has=1 or has not=0. This code is used to keep track of the facilities that have been improved in accordance with the WHO guidelines.

To give equal importance to all the services in WASH, the average weightage criteria have been used. Literature suggests that when there is only a little information available on the indicators equal weightage method can be used to assign weight to create the WASH services index. As we can see in our conceptual framework; WASH services have only three dimensions and 10 indicators. (Alkire & Jahan, 2018) Following the equation used $\mathbf{W_j\ (EW) = 1/\ N}$

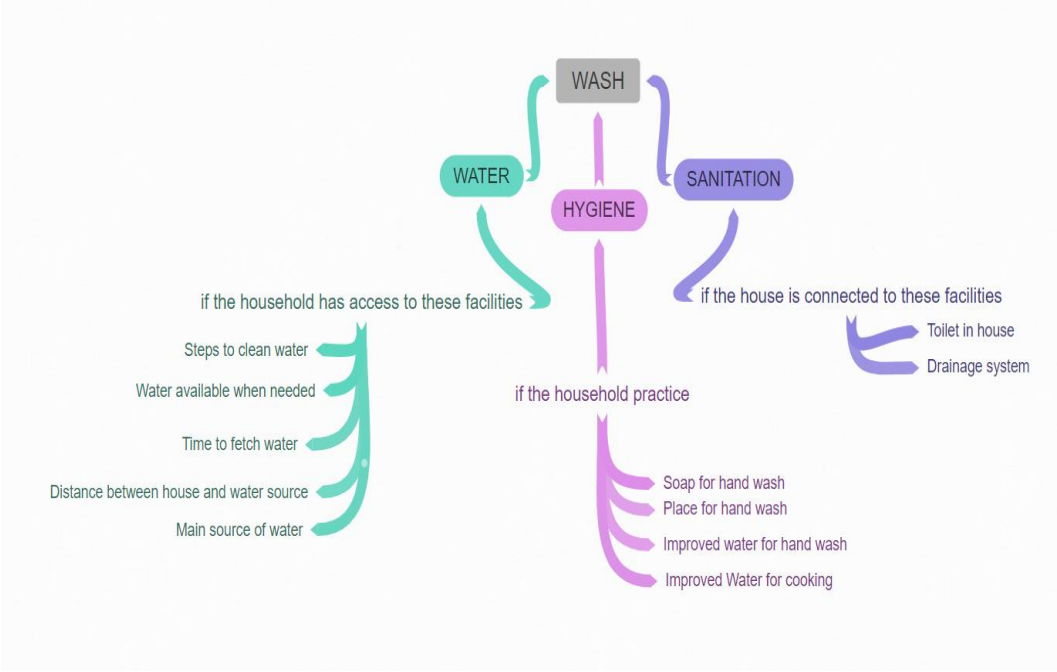

Figure 1 Conceptual framework for WASH services

In the figure above, we can see the indicators of the WASH services that have been taken in the study. The figure shows the three dimensions and the proxies that are used for analysis.

Spatial inequality

It has been observed that some provinces have limited access to WASH services, while others have better access (Anthonj et al., 2020; Oskam et al., 2021; Qurat-ul-Ann & Bibi, 2022; Rauf et al., 2015). Therefore, the purpose of this study is to provide empirical evidence supporting the hypotheses; H_1 = There are significant inequalities in access to WASH services among Pakistan's provinces**.** In order to determine the mean difference between the provinces of Pakistan, a one-way ANOVA is used.

One-way ANOVA; One-way ANOVA is used to compare the means of three or more independent groups on a continuous variable in order to determine if there are statistically significant differences between the groups on the variable. If the one-way ANOVA indicates that there is a significant difference between the means of the groups, post hoc tests (e.g., Tukey's HSD, Bonferroni, Scheffe) can be applied to identify which specific groups differ significantly from each other.

Results and Discussion

The frequency distribution of WASH services is presented in table 1. As shown in the table the number of households in each class presenting the access to the WASH services out of 10.

Table 1
Frequency distribution

Variable	WASH services	Freq	Percentage
Wash index	0	6	0
	1	365	0.7
	2	1377	2.8
	3	2842	5.7
	4	3682	7.4
	5	5099	10.2
	6	7161	14.4
	7	9986	20
	8	11434	22.9
	9	7278	14.6
	10	606	1.2
Total		49836	100

Here is a brief description of the frequencies of WASH services. As can be seen from the table, the frequencies are distributed into 10 classes. WASH services measure access to water, sanitation, and hygiene services. There are 10 determinants that describe the types of services available in a house. Based on the number of households that have WASH services out of ten, the frequency distribution is calculated. Almost 0% of the households in the first group do not have access to WASH services. Almost 0.7 of all households have access to at least one WASH facility. A household with two out of ten WASH facilities constitutes 2.8% of the household population. 5.7%, 7.4%, 10.2%, 14.4%, 20.0%, 22.2%, 14.6%, 1.2% are the percentages of households falling into classes 3 to 10.

Provincial inequality in access to WASH Services

An analysis of variance (one-way ANOVA) is used (Nadeem et al., 2018). A test for homogeneity of variance can be conducted using Levene's method. In the process of doing so, descriptive analysis is performed. Various statistical measures are computed for each

group, including the number of instances, the mean, the standard deviation, the standard error of the mean, as well as the minimum and maximum values for each of the dependent variables.

Table 2
Descriptive analysis for provincial inequality (ANOVA)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Khyber Pakhtunkhwa	7522	5.1434	2.02393	.02334	5.0977	5.1892	.00	10.00
Punjab	24465	7.5721	1.31691	.00842	7.5556	7.5886	1.00	10.00
Sindh	10335	6.2217	1.94279	.01911	6.1842	6.2591	1.00	10.00
Balochistan	7514	5.2606	1.81889	.02098	5.2194	5.3017	.00	10.00
Total	49836	6.5770	1.95827	.00877	6.5598	6.5942	.00	10.00

Moreover, we can see in table that the number of samples differs in all provinces as follows: 7522 in Khyber Pakhtunkhwa, 24465 in Punjab, 10335 in Sindh, and 7514 in Balochistan. In the subsequent stage of the procedure, the Levene statistic will be employed to ascertain the equality of variances among the groups. As a result, presented in Table 3, the significance level is less than .05 in this case.

Table 3
Homogeneity of variances (Levene Statistic)

Test	Value	Sig
Homogeneity of variances (Levene Statistic)	1344.719	0
F-stat	6544.084	0

A correlation coefficient of .000 was found between the Levene statistic and a comparison of medians. Based on the findings of our research, a notable disparity exists between the two cohorts. The variable F attains statistical significance at the value of 6544.084, implying that the corresponding p-value is below the threshold of 0.05, thus signifying a statistically significant outcome. The post hoc Tukey HSD test results in order to accomplish this. According to the Multiple Comparisons. The significance values calculated for Punjab, Sindh, Khaibar Pakhtoon Khuwaan, and Balochistan are determined by comparisons between mean differences between provinces.

An analysis of variance showed a statistically significant difference between the two groups (F = 6544.084, p = .001). In all Pakistani provinces, a significant variation was observed at the 0.05 level of significance.

Table 4
Post Hoc Test

(I) Province	(J) Province	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Khyber Pakhtunkhwa	Punjab	-2.42868*	.02187	.000	-2.4849	-2.3725
	Sindh	-1.07823*	.02514	.000	-1.1428	-1.0136
	Balochistan	-.11713*	.02705	.000	-.1866	-.0476
Punjab	Khyber Pakhtunkhwa	2.42868*	.02187	.000	2.3725	2.4849
	Sindh	1.35045*	.01946	.000	1.3005	1.4004
	Balochistan	2.31154*	.02188	.000	2.2553	2.3677
Sindh	Khyber Pakhtunkhwa	1.07823*	.02514	.000	1.0136	1.1428
	Punjab	-1.35045*	.01946	.000	-1.4004	-1.3005
	Balochistan	.96109*	.02515	.000	.8965	1.0257
Balochistan	Khyber Pakhtunkhwa	.11713*	.02705	.000	.0476	.1866
	Punjab	-2.31154*	.02188	.000	-2.3677	-2.2553

	Sindh	-.96109*	.02515	.000	-1.0257	-.8965

In the first block, the Khyber Pakhtunkhwa (KPK) is compared to Punjab, Sindh, and Balochistan. The negative sign showed that the WASH situation in KPK is worse compared to other provinces as; KPK is -2.42868% worse than Punjab, -1.07% worse than Sindh, and -0.117% worse than Balochistan. The second block in the table showed the condition of WASH access compared to KPK, Sindh, and Balochistan. The positive mean differences indicate that Punjab is better in equitable access to WASH as compared to KPK, Sindh, and Balochistan. Rauf et al. (2015) Punjab is 2.42868% better then KPK, 1.35045% better than Sindh, and 2.31154% is better than Balochistan.

In the third block, the province Sindh is compared to Punjab, Sindh, and Balochistan. The Sindh's comparison showed both the positive and negative values. The positive value indicates the better condition of WASH services in Sindh and negative values indicate the worst condition. In Sindh 1.078 % better access to WASH compared to KPK, -1.3505% worse situations in Sindh compared to Punjab, and 0.96109% better than Balochistan.

The fourth number, the province Balochistan compared to Sindh, KPK, and Punjab. Balochistan also showed a significant variation compared to other provinces. Balochistan is 0.11713% better than KPK towards access to WASH services. -2.31154% worst situation in Balochistan as compared to Punjab, and -0.96109% worse than Sindh.

Regional Inequality

There is an unequal distribution of WASH services between the rural and urban areas of Pakistan (IMF August 2021). The number of households in each area is described in table 9. As;

Table 5
Group statistics for regional inequalities

	Place of residence	N	Mean	Std. Dev	Std. Error Mean
WASH Services	Rural	32743	6.0554	2.03253	.01123
	Urban	17093	7.5761	1.32206	.01011

The descriptive information is presented in a table format, with the first column denoting the name of dependent variable. There are 32,743 observations for the group categorized as rural, and 17,093 observations for the group categorized as urban based on the region index. As a result, we observe that the mean WASH for the group with region = rural is 6.0554. The number is 7.5761 for the group within the region of urban.

There are two versions of the independent samples t-test, as shown in the table 6 depending on whether the variability of the dependent variable can be assumed to be equal between the two groups. When region = rural, the standard deviation of WASH is 2.03253, while when region = urban, it is 1.32206. Therefore, region = rural is more variable than region = urban. The standard error of the mean for WASH in rural regions is 0.01123, but in urban regions, it is 0.01011.

Table 6
Results of t-test for regional inequalities (Independent sample t-test)

		Leven's test for equality variances		t-test for equality of means						
		F	Sig	T	Df	Sig 2 tailed	Mean diff.	Std. Error Diff	95% confidence interval of the difference Lower	Upper
WASH inde	Equal variance assumed	3990.5	0	-88.527	49834	0	-1.52	0.01718	-1.554	-1.487

Equal variance not assumed	-100.61	47523.3	0	-1.52	0.01511	-1.55	-1.491

Table 6 contains two tests. First, there is a test known as Levene's test which tests whether the variance between two groups is equal. The test statistic proposed by Levene adheres to a commonly used statistical distribution known as the F distribution. The p-value associated with this statistic is also determined to be 3990.490. Based on the obtained p-value of less than 0.05. Accordingly, the bottom row of the table to the right should be referred to as the bottom row of numbers.

To commence our analysis, we shall investigate the column labelled "Mean Difference" located in the final row of numerical values. The parameter in question possesses a numerical value of -1.52068. It is negative since Group 0 corresponds to the rural group (lower mean) and Group 1 to the urban group (higher mean). Giving meaning to our results is that there is significance difference between rural and urban areas as studied by (Giné Garriga & Pérez Foguet, 2013; Irianti & Prasetyoputra, 2021). The mean difference between groups 0 and 1 is calculated by SPSS t-tests as the difference between their means. Thus, the t statistic is -1.52068 / 0.01718 = -100.616. The degrees of freedom is equal to two less than the total number of observations (N - 2, in this case, 49836). The value of 47523.313 is lower depending on the equality or inequality of variances.

Conclusion

This study focuses on spatial inequalities in WASH access in Pakistan at the provincial level. The findings indicate a notable disparity among the provinces. The provinces of Punjab and Sindh have the greatest access to WASH facilities (Nadeem et al., 2018). Nevertheless, Balochistan and Khyber Pakhtunkhwa are the provinces with the least developed access to WASH facilities. Targeted interventions are necessary to mitigate spatial inequities in access to water, sanitation, and hygiene (WASH) services in Pakistan. There is a need for government initiatives, such as the National Sanitation and Water Quality Program, to ensure that all provinces have access to sustainable WASH services (Qurat-ul-Ann & Bibi, 2022).

Also, the regional differences in access to WASH services (rural and urban) are discussed in detail. Several steps should be implemented to provide equitable access to Water, Sanitation, and Hygiene (WASH) services for marginalized groups, particularly those residing in distant and rural regions (Afifah et al., 2018; Chaudhuri & Roy, 2017; Cole et al., 2018). In addition, it is crucial to ensure that individuals with disabilities are provided with equitable access to Water, Sanitation, and Hygiene (WASH) services.

It is possible to improve WASH results by educating and promoting literacy among the public. A WASH initiative that promotes awareness, understanding, and behavioral changes in hygiene practices can play a critical role in improving access to and utilization of WASH services, particularly for those with limited access.

Encourage partnerships and collaboration among government agencies, civil society organizations, private sector entities, and communities in order to harness resources and knowledge. Engage the media, community leaders, and powerful figures to champion the cause and foster a gender-equal culture of access to WASH services implementing these policy proposals may help Pakistan eliminate gender gaps and provide inclusive WASH services (Adil et al., 2021). To improve Pakistan's WASH landscape, strong political commitment, adequate resources, and efficient coordination among all stakeholders are required (Dorea et al., 2020).

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