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Socio-Economic Challenges for Sustainable Community Development and WASH: A study from Gujrat, Pakistan

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Abstract: *Sustainable community development is an interactive and continuous process that manages human natural, financial and capital needs to ensure availability of adequate resources for current and future generations. Throughout the world, the sustainability challenges within the community context are multilayered and present serious threats to socio-economic and health conditions of people. In developing countries like Pakistan, a vicious cycle of socio-economic burden significantly associated with unhealthy water, sanitation and hygiene conditions & practices that largely impacted the process of sustainable community development. To understand the socio-economic impacts of WASH this quantitative study applied a stratified random sampling technique to obtain the primary data from the target population. The data analyzed through SPSS 21 and smartPLS 3 which indicate the goodness of excellent fit model values and within prescribed limits such as Chi-square (5217.391), d_ULS (1.791), d_G (0.651), SRMS (0.052) and RMS-Theta (0.123). Furthermore, the study hypothesis (H1, H2, H3) were also supported that the higher level of knowledge, attitude and practice regarding WASH have significant socio-economic impacts on sustainable community development. Study strongly recommended that to attain sustainable community development, it is the need of time that such discourses may start at core level for better understanding and achieve targets at individual, family and community level.*

Keywords: *Sustainable community development, water sanitation and hygiene, WASH, socio economic development*

Introduction

Community development is a continuous and interactive process with diversity of stakeholders that incorporates transformations deep into the structure with the aspiration to improve community life collectively (Budge et al., 2022). Sustainable community is the kind of situation that all human desire for themselves, for their children, families and for future generations, so that the quality of life is equal or even better, as we hereditary received from our ancestors (Kiama et al., 2023). The sustainability challenges of 21st century are unprecedented and multilayered; especially developing countries like Pakistan. Continual population growth, shrinking natural resources, decreasing economic conditions, scarcity and contaminations of food and water sources, rising rate of obesity, environmental pollutions, waste management issues and rapid spread pandemic diseases presents serious threats (Yazie et al., 2019; Calderón et al., 2022).

Sustainable development of communities and improved quality of life for inhabitants is the

utmost objective of numerous development programmes and interventions world widely. One among the largest initiatives for development of communities has been taken by the United Nations in the form of Sustainable Development Goals (Moreno et al., 2020). Sustainable development goals (SDGs) assure not only the urgent necessity of sustainability in communities, but also focus that this process must prosper (Bennett et al., 2020). Sustainable development goals links to bottom up local action on the part of communities with integrated behavior change interventions and collaborative actions with various stakeholders (Gerizim, 2019). Behavior change interventions are fundamental to achieve sustainability in communities through the identification of new, and strengthening the existing positive practices. It is considered central to the quest for sustainable future and solves multidimensional community problems, which require large scale shift in human behavior with regard to their health, social, physical activities and long held habits (Muniyapillai et al., 2022).

A large portion of the world population, especially developing countries like Pakistan are far behind in achieving the targets of sustainable development goals. The United Nations revealed that, even in this era of science and technology, a large proportion of the world's population, mostly in developing countries like Pakistan have significant gap in their knowledge and practices. Out of total, there are about half of the world population, who lack basic access to safe drinking water and improved sanitation facilities in their living environment (UNICEF, 2019). Every year, with an estimated 80% of human waste being discharged untreated into the environment (United Nations, 2020), and about 3.5 billion people have meager water, sanitation and hygiene access. Globally, 2.2 billion people lacking access to safe drinking water, and becomes the major reasons of 1.7 billion diarrheal diseases. Every year 5.2 million children under five die from preventable WASH related diseases and among them 1.9 million child deaths accrued only due to diarrhea (WHO-UNICEF, 2021).

Pakistan is among the top three countries, where high incidences of child mortality and morbidity are reported annually (UNICEF, 2020; Tseole et al., 2022). Less than five mortality rate is 74 deaths per 1000 live births. This means that approximately one in every 14 children in Pakistan do not survive to their fifth birthday. However, this irreversible loss of young lives could be reduced or saved every year if mothers have awareness, improved knowledge, attitude, practice and behaviour regarding WASH (Cooper, 2019). Nearly all of the most pressing community development issues could be prevented or improved if individuals change their behaviour and long held habit regarding WASH in everyday life (Sands et al., 2021).

Pakistan lagging behind on sustainable development goals related to water sanitation and hygiene due to a lot of multilayered problems and obstacles. WASH contribute a major portion of economic burdens, and are strongly associated with avoidable social, health & wellbeing issues. The vicious cycle of WASH related diseases become the major challenge for social and economic capital, potentials and numerous valuable lives every year. Therefore it is a major concern for policy makers, national and international organizations working on sustainable development goals that the comprehensive situation analysis available with regard to WASH, practice and behaviour of individuals in low, middle and even well established communities (UNICEF, 2020). This study tries to address the challenges of socio-economic impacts of WASH on sustainable community development.

Sustainable Community Development and WASH conditions in Pakistan

Pakistan hosted the second South Asia conference on sanitation (SACOSAN II) in 2006, which brought the agenda of sanitation at national level. At the end of conference the national sanitation policy was formulated by the federal government of Pakistan. National sanitation policy provides a broad guideline and framework to the federal, provincial and local government to enhance sanitation coverage. Policy strongly recommended that formulation of strategies at all respective levels and

behaviour change through social mobilization is the key component to address the sanitation issue at household level especially in rural areas.

In accordance with the implementation of policy, numerous interventions were adopted by the governments according to the nature of their local context. Similarly, Government of the Punjab and UNICEF carried out an integrated behaviour change programme regarding WASH for rural areas. The program targets the rural communities with clear emphasis towards individual's behaviour change regarding WASH and its impacts on human health and sustainable community development.

It also examines the role of various socio-demographic and background factors such as living conditions, gender role, available resources and facilities, education and income among others, and their direct and indirect relationship with WASH practices in daily life. To attain the targets and set objectives, it is necessary to have empirical and primary information regarding ground realities, stumbling blocks, interrelated connections of aspects and better socio-cultural, demographic and geographical understandings. This study provides imperative opportunities to contribute to understand the socio-economic impacts of water, sanitation and hygiene on sustainable community development. The prime objectives of this study are as follows:

- To understand the existing water, sanitation and hygiene conditions and practice among communities.
- To examine the impacts of water, sanitation and hygiene on socio-economic conditions of individuals and families.
- To check the socio-economic impacts of water, sanitation and hygiene on sustainable community development.

Conceptual Framework

Adequate knowledge and awareness regarding safe water, sanitation and hygiene practices and conditions have significant socio-economic impacts on sustainable community development. This study variable such as knowledge, attitude and practice; water, sanitation and hygiene and sustainable community development were considered and a conceptual framework (Figure-1) highlighted the flow relationships.

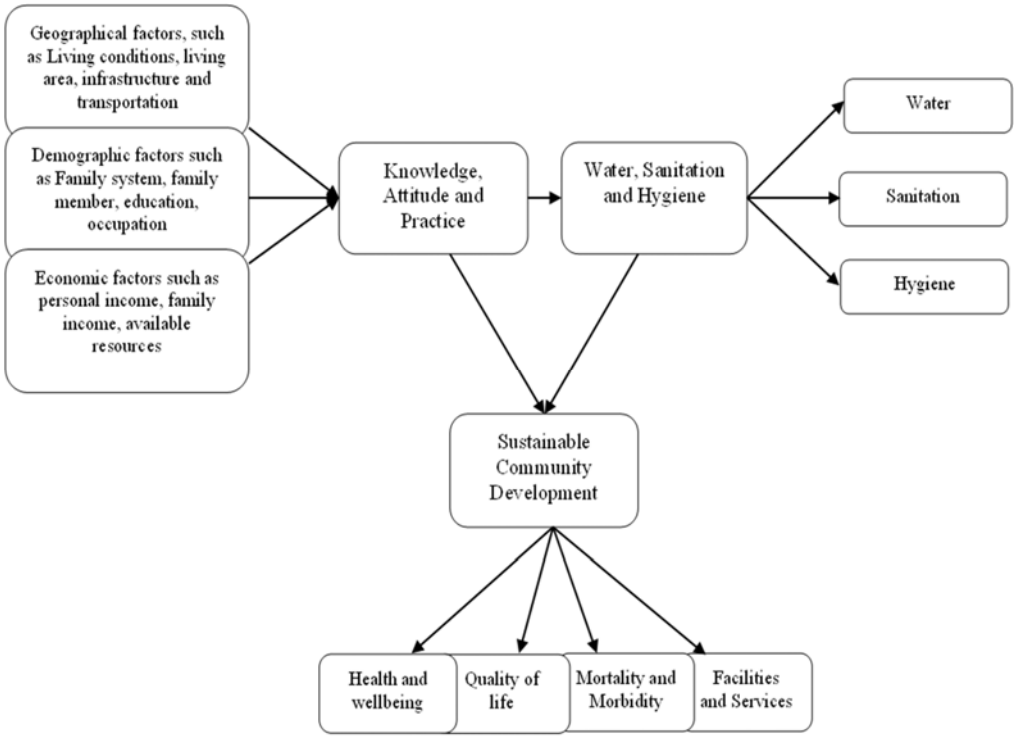

Figure 1: *Conceptual Framework of the Study*

Hypotheses for this study

Traditionally women (mothers) are the primary caregiver to their families, and the care largely depends on their knowledge, attitude and practice in daily life. In general, women have put their best efforts and form a positive attitude towards water, sanitation and hygiene practice at personal and domestic level. Mostly, women understand the best practices regarding WASH but there is a significant gap (Martínez-Santos et al. 2017, Webb and Cabada 2018, Moreno et al. 2020, Ghosh et al. 2021, Khan, & Ximei, 2022) observed between their knowledge and practices due to various reasons. By retaining the focus on mother's knowledge, attitude and practice regarding water, sanitation and hygiene and its impacts on socio-economic development following hypotheses were proposed.

H1. Higher the level of knowledge, attitude and practices of mothers higher the level of safe water, sanitation and hygiene conditions

H2. Higher the level of improved water, sanitation and hygiene practice higherthe level of socio-economic impacts on individuals and families

H3. Higher the levels of improved water, sanitation and hygiene practices, higher level of sustainable community development.

Materials and Methods

For the selection of participants from target communities a stratified multistage random sampling strategy was applied. The data was collected from the district Gujrat (Urban & Rural) and for this purpose 129 union councils of district Gujrat are stratified into three strata according to their characteristics. The target population/participants for this study were the mothers who have one child and living in district Gujrat since one year at least. The selection of the respondents was taken by a list of child birth registration obtained from Local Government and Community Development Department Gujrat (LG & CD, 2022) Gujrat (January 2017–December 2021). Total 13 union councils were proportionally selected from the above said stratum. From the selected 13 union councils, one ward of these union councils was randomly considered and was completely investigated. Sample size determine through Yamane formula (1967) and a total sample of 400 is selected with 5% margin of error.

Table1 Sampling flowchart

	Strata	**1st stage/Primary sampling units, through proportional allocation**	**Secondary sampling units**
Total 129 UCs of District Gujrat (Urban & Rural)	26 Rural UCs with WASH interventions	→ 3 UCs	→ 3 Wards
	28 urban UCs without WASH interventions	→ 3 UCs	→ 3 Wards
	75 Rural UCs without WASH interventions	→ 7 UCs	→ 7 Wards

The research instrument was the structure questionnaire and primary data was collected through household survey methods. The questions were measured by a five point Likert scale where 5 means strongly agreed and 1 means strongly disagreed. The process of primary data collection was completed during the period of December 2021 to May 2022. Subsequent to the completion of data collection procedure, collected data was edited, coded and entered in SPSS-21 for further descriptive and inferential analysis. The preliminary techniques which were utilized in the study to explore the nature of data and its suitability are descriptive analysis, which elaborate the basic feature, nature and detail insight of collected data.

Results / Major Findings

The reliability and validity of variables were checked through composite reliability (CR) and Cronbach's alpha. At the beginning, study indicators were tested through smart PLS-3 software and the item with smaller values than 0.600 were discarded. The data for this were collected from three participant groups, the results of reliability and validity of all groups were greater than 0.61. The CRs and Alpha values from all groups of respondents were greater than the recommended parameters value as 0.700. Fornell & Larcker (1981) also recommended the criterion to test the Discriminant validity as presented below in Table-2.In the same way the composite reliability and average variance extracted were also greater to the 0.600 and 0.800 respectively, and also corroborates convergent validity.

Table 2 Discriminant validity by Fornell & Larcker

	Overall Sample			**Urban Sample**			**Rural (Intervened)**			**Rural (Non-Intervened)**		
	KAP	**SCD**	**WASH**	**KAP**	**SCD**	**WASH**	**KAP**	**SCD**	**WASH**	**KAP**	**SCD**	**WASH**
KAP	**0.866**			**0.812**			**0.909**			**0.859**		
SCD	0.148	**0.908**		0.175	**0.902**		0.196	**0.932**		0.154	**0.916**	
WASH	0.250	0.079	**0.825**	0.205	0.204	**0.864**	0.289	0.193	**0.810**	0.249	0.024	**0.828**

Descriptive Results

The study examines the direct impacts of knowledge and practice (KAP) of individuals (mothers) on water, sanitation and hygiene (WASH) practices and on sustainable community development (SCD). In the meanwhile, researchers try to highlight socio-economic impacts of WASH on SCD. For the rational discussion and coherent explanation of the study findings, it is necessary to have deep understandings regarding socio-demographic and background factors.

Table 3 Distribution of demographic characteristic

Demographic characteristics	**Description of Characteristic**	**N**	**%**
Age	18-24	54	10.8
	25-34	254	50.6
	35-44	165	32.9
	45-54	29	5.8
	Total	**502**	**100**
Qualification	1-5	56	11.2
	6-10	190	37.8
	11-12	120	23.9
	13-14	81	16.1
	15-16 or Above	55	11.0
	Total	**502**	**100**
Occupation	House Wife	363	72.3
	Job (Govt/Private)	98	19.5
	Agricultural/ Labour	29	5.8
	Personal Business	12	2.4
	Total	**502**	**100**
Respondent's Monthly income	Nil	363	72.3
	Below 10000-20000	56	11.2
	20001-40000	58	11.6

	40001-60000	25	3.0
	60001 or above	20	2.0
	Total	**502**	**100**
Health issues faced by family members during last 12 month	Nil	67	13.4
	Children	304	60.5
	Elder Family Member (Male, Female)	78	15.5
	Adult Family Member (Male, Female)	48	9.6
	Any other	5	1.0
	Total	**502**	**100**
Expenditures on medication in rupees over 12 months	Nil	194	38.6
	10000-25000	196	39.0
	25001-50000	86	17.1
	50001-100000	16	3.2
	100001 or above	10	2.0
	Total	**502**	**100**

Table 3 highlighted the distribution of demographic characteristics of participants as the major portion 83.5% of respondents fall in the age group of 25 to 44. Most of the respondents 37.8% have matriculation or below education and 72.3% were housewives without any personal income. Out of total 60.5% reported that their children faced health issues during the period of last 12 months and 39.0% people spent amounting to Rs 10000 to 25000 on medication.

Measures of Association

The measurement of considered values among various variables such as knowledge, attitude and practice has positive association with water, sanitation and hygiene and sustainable community development. Details presented in tables below

Table 4 Economic conditions and its relationship with KAP, WASH and SCD

		10000-20000		**20001-40000**		**40001-60000 or above**		**Total**		**Asymp. Sig. (2-sided)**
		N	%	N	%	N	%	N	%	
Knowledge, attitude and practice	High	114	45.1	131	65.2	41	74.6	283	56.4	0.001
	Medium	79	32.9	63	31.3	13	23.6	157	31.3	
	Low	53	22.0	7	3.5	1	1.8	62	12.3	
	Total	246	100	201	100	55	100	502	100	
Pearson x^2 (16.970), significant at p<.05										
Water, sanitation and hygiene	High	104	41.9	102	50.7	34	61.8	239	47.6	0.009
	Medium	102	41.0	69	34.4	12	21.8	182	36.3	
	Low	40	17.1	30	14.9	9	16.4	81	16.1	
	Total	246	100	201	100	55	100	502	100	
Pearson x^2 (14.432), significant at p<.05										
Sustainable Community Development	High	47	19.1	53	26.4	37	67.2	137	27.3	0.051
	Medium	97	39.4	129	64.1	14	25.5	240	47.8	
	Low	102	41.5	19	9.5	4	7.3	125	24.9	
	Total	246	100	201	100	55	100	502	100	
Pearson x^2 (37.775), significant at p<.05										

The results presented in Table-4 which shows that the monthly household income as background variable has significant association on all dependent variables. With the higher level of household income mothers had better facilities regarding WASH. The higher level the KAP of the mother was improved safe WASH practices and significance with p-value 0.001 relationship. The findings present that WASH have positive relation with monthly income and significance with p-value 0.009 impacts. Similarly, household income has impacts on sustainable community development. The result indicates that with the increase of monthly

income of respondents has positive significance with p-value 0.051 relations.

Table 5 Participation in awareness programs and WASH related diseases

	Participation		Not participation		Total		F	T	Asymp. Sig. (2-sided)
	N	%	N	%	N	%			
WASH	36	39.6	154	72.3	190	62.5			
Seasonal /Weather born	29	31.8	37	17.4	66	21.7	.123	22.369	0.000
Inherited, accidental etc	26	28.6	22	10.3	48	15.8			
Total	91	100	213	100	304	100			
Pearson x^2, significant at p<.05									

The result from table 5 shows that there is a significant relationship among the respondents who have participated in behaviour change interventions and among those who did not participate. The results highlighted that out of total 502 respondents; there are 60.55% respondents who reported that their children faced health issues in the last one year. Out of total affected respondents 304, there are 91 respondents who participated in behaviour change intervention and 213 were non-participant respondents. The table 5, shows that the difference in participants who faced diseases in the last 12 month from both groups as 39.6% respondents who face WASH related issues as diarrhea, viral infections among many others, while 72.3% respondents reported that they faced WASH related health issues during the period of last 12 months. This indicated that there is significance relationship (P-value, 0.000) among participants in behaviour change intervention and WASH related diseases and also prove through "F" values as 0.123 and "T" 22.369. The results also supported study hypothesis the findings in table 5 proved the assumption as such the higher the level of participation in behaviour change interventions leads towards safe and healthy growth of their children.

Table 6 Economic impacts and participation in behavior change

	Participation		Not participation		Total		F	T	Asymp. Sig. (2-sided)
	N	%	N	%	N	%			
Nil	109	68.1	80	23.4	189	37.6			
Up to 50000	46	28.7	173	50.6	219	43.7	.392	36.997	0.000
50001-100000	3	1.9	61	17.8	64	12.7			
100000 and above	2	1.3	28	8.2	30	6.0			
Total	160	100	342	100	502	100			
Pearson x^2, significant at p<.05									

Results in Table-6 presents differences among those who have participated and not participated in awareness programs and explored how these interventions can decrease or increase the economic burden of medication. Out of total respondents who participated in awareness programs 68.1% reported that they don't spend any money on WASH related diseases while 28.7% reported that they spend about 0-50000 on medication. The test statistics ``F" (0.392) and "T" (36.997) also prove the significance with p-value 0.000 relationships among participation in awareness programs and economic impacts as expenditures on medication.

Analysis of Variance

In most of the cases the analysis of variance (ANOVA) was used to check and compare the equality of three or more than three means, however when the test is used for the means from only two samples, it is considered a t-test. This type of ANOVA test is based on the comparison of variation among the data sample to variance within every particular sample of the study. If the between variance is larger than the

within variance, the means of various samples will be considered not equal. Similarly when the within and between variance are approximately the same then we can say that there is not any significance difference among the means of variables. With the addition of anova test assumption regarding population involved, it falls in the parametric test or into the category of hypothesis testing.

In the case when the population distribution is not normal, an ANOVA test could not be applied to estimate the equality variable means, instead researcher used non-parametric test, which is considered more general from the testing of hypothesis and does not rely on distributional assumptions. In this study ANOVA test is used to understand whether all variables considered in this study are equally important according to the living areas of the respondents or not. The hypothesis of ANOVA test is that "Ho" is considered that all the types of living areas have equal effect on considered variables and "Ha" is that there is different effect on overall variables.

The table 7 presented the results according to the participation in awareness program and its impacts. On the basis of results, we can see that the significant with the P-value of all considered variables is significant which less than assumed "P" value is so the "Ho" is rejected and the "Ha" is considered accepted. We conclude that the observed averages of respondents who participated are not the same as the respondents who did not participate and also do not have equal impacts.

Table 7 Participation in awareness program as predictor

		Yes **Mean (SD)**	**No** **Mean (SD)**	**F**	**P**
Attend awareness program	KAP	1.6 (0.51)	1.5 (0.47)	7.34	0.007
	WASH	1.7 (0.56)	2.4 (0.94)	71.15	0.000
	SCD	1.9 (0.46)	1.8 (0.46)	7.27	0.009

Structural Equation Model

Before the application of inferential statistical analysis such as structural equation models, confirmation of factors is compulsory. Most suitable indicators were confirmed through confirmatory factor analysis and remove all indicators which have weak or less result outputs in the study. Only the most appropriate indicators which have strong impacts are considered for further analysis. Proposed theoretical model was examined through a variance based structural equation model (VBSEM) and it also assists in calculating hypothesis results. The results of the fitted model indicated that knowledge, attitude and practice of mothers have significant socio-economic impacts of WASH on sustainable community development. The findings indicated that the observed values of KAP, WASH and SCD are most suitable (β-values more than 0.60) for each variable.

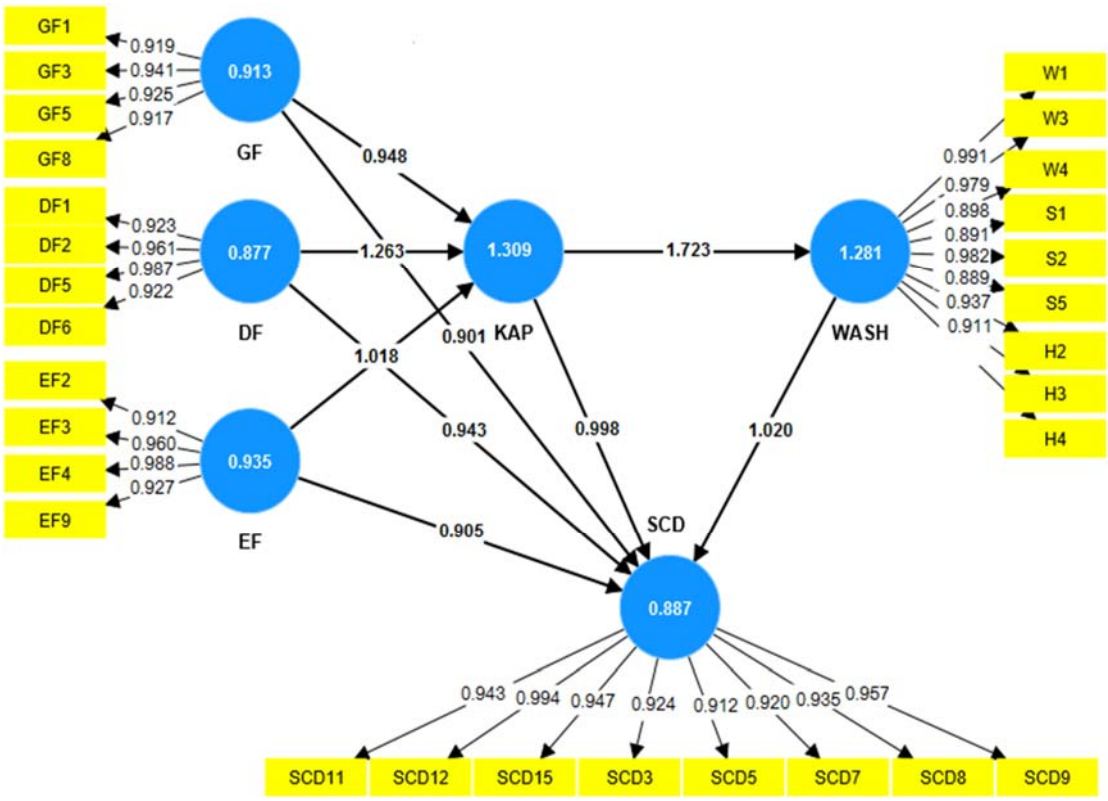

Figure 2 *Fitted model and path results (β-values)*

The difference of impacts on the said factors arises from each subsample to the overall sample of the study and the aggregation effects make significant impacts when all responses are considered together. The calculation of variables and their impact level is highlighted in figure-1. This also shows the appropriate loadings of all indicators which are theoretically advised with the variables. The model of the study is calculated for confirmation that item measures the variable they were expected to measure and ascertaining the study instrument is reliable. The prime aim of model testing is to evaluate and diagnose socio-economic impacts between underlying and observable variables. It becomes very important to finalize the most suitable indicators for ensuring accuracy of study variables which include for further validity and justification.

There is a positive association between KAP and safe water, sanitation and hygiene practices. Structural equation modeling results endorse that the knowledge, attitude and practices of mothers have a significant influence on WASH practices. Results also endorsed the assumptions of the theoretical model. Findings of the study also in line with the existing literature (Seymour et al., 2021), this leads to suggest that individuals who have participated in behavior change interventions regarding WASH can positively impact on SCD. This leads to suggest that individuals who have knowledge, awareness and positive attitude can positively play their role in socio-economic development of communities.

Table 8 Confirmation of factors with loadings and Goodness of fit measures

	Item	Loading	VIF	% of variance
Knowledge, Attitude and Practice (KAP)	GF1	0.919	1.672	37.498
	GF3	0.941	1.982	Harman one factor test <50%
	GF5	0.925	1.786	**SRMR**

	GF8	0.917	1.912	Saturated Estimated
	Df1	0.923	1.769	0.051 0.052
	DF2	0.961	1.985	SRMR < 0.10
	DF5	0.987	1.784	**RMS-Theta**
	DF6	0.922	1.873	0.123
	EF2	0.912	I.881	**Global Fit measures (GoF)**
	EF3	0.960	I.971	0.561
	EF4	0.988	I.891	GoF ≥0.36
	EF9	0.927	I.998	**Chi-square**
	W1	0.991	1.817	Saturated Estimated
	W3	0.979	1.923	5217.391 5309.417
	W4	0.898	1.811	Chi-square (p-value) ≤0.05
Water, Sanitation and Hygiene(WASH)	S1	0.891	1.957	**Squared Euclidean Distance**
	S2	0.982	1.862	Saturated Model
	S5	0.889	1.913	d_ULS 95% 99%
	H2	0.937	1.863	1.791 2.091 2.220
	H3	0.911	1.910	Estimated Model
	H4	0.859	1.906	2.001 2.361 2.641
	SCD3	0.924	1.833	**Geodesic distance**
	SCD5	0.912	1.982	Structured Model
	SCD7	0.920	1.885	d_G 95% 99%
Sustainable Community Development (SCD)	SCD8	0.935	1.937	0.651 2.071 2.243
	SCD9	0.957	1.961	Estimated Model
	SCD11	0.943	1.854	0.654 0.742 0.873
	SCD12	0.994	1.903	d_ULS & d_G ≤99%
	SCD15	0.947	1.927	

Variance based structural equation modeling; attain facilitation by SmartPLS and deriving the model fit statistics from the discrepancy exist among approximated and observed calculations of the dependent variable. The estimating the goodness of fit value which is found fit and within prescribed limits. The observed values for goodness of fit model such as Chi-square (5217.391), d_ULS (1.791), d_G (0.651), SRMS (0.052) and RMS-Theta (0.123) were found within prescribed limits. The results from goodness of fit analysis strongly suggested that the higher level of KAP of mothers regarding WASH have significant socio-economic impacts on sustainable community development.

Hypotheses Testing Results

To generate the path coefficients and hypothesis testing, the algorithm was preceded through smartPLS software. Bootstrapping with 5000 bootstrap sample was run, this is basically bigger than the actual sample size for generate the t-values and meeting the suggested conditions by (Hair et al., 2012; Hashim et al., 2012; Lowry et al., 2014; Wilson, 2011).The results from bootstrapping technique indicated that the first hypothesis (H1) have positive significant relationship among KAP of mother with WASH. Results proved that mother knowledge positively impacted their attitude that leads to safe practice regarding water, sanitary and hygienic. The second hypothesis (H2) also has positive relationships and supports our assumptions as KAP has direct socio-economic impacts on sustainable community development. Findings endorsed the flow relationship presented in the conceptual model of the study and revealed that (H3) WASH practices have direct and significant relation with socio-economic development of communities and the change in one variable have significantly impacted the other one.

Table 9 Hypothesis testing results

Sr. No	Hypothesized Effect	Path coefficient	Standard Error	T-Value	P-Value	Decision
H1	KAP>WASH	1.723	0.050	5.987	0.000***	Supported
H2	KAP>SCD	0.998	0.068	4.812	0.000***	Supported
H3	WASH>SCD	1.020	0.057	5.732	0.000***	Supported

i. ***: P<0.01
ii. **:P<0.05
iii. iii. *:P<0.1

Mediation Analysis

Mediator variable in studies is in the causal sequence among dependent and independent variables. The method of bootstrapping is considered rigorous for calculation of mediation effects. The findings of this research study explained the role of water and sanitation, hygiene as a noteworthy mediator between knowledge, attitude practices and sustainable community development. This basic information led to assume that WASH may play a role more effectively to enrich the socio-economic conditions of communities. As discussed earlier in the introduction section, behaviour change remained the center of attention for a long time. This process considered as central to the quest for sustainable future and solves multidimensional community problems, which require large scale shift in human behaviour with regard to their health, social, physical activities and long held habits

Table 10 Mediation Effect of WASH

Mediation Effect	Path coefficient	Standard Error	T-Value	P-Value	Decision
KAP > WASH > SCD	0.907	0.063	5.953	0.000***	Mediation

i. ***: P<0.01 ii. **:P<0.05 iii. *:P<0

Conclusions and Discussion

Water, sanitation and hygiene (WASH) refers to the essential aspects for humans psycho-social and health that every community should have access to. It is the evident in existing literature (Nwokoro et al. 2020; Ross et al. 2021; Tseole et al., 2022; Afzal, A., 2023) the process of sustainable community development is largely associated with improved WASH conditions and practices. In communities, socio-economic, cultural and behavioral transformation is observed at a massive level especially in developing countries like Pakistan. Findings of this study supporting previous studies (Harris et al., 2020; Chauque et al., 2021; Manisha et al., 2023) and indicated various socio-economic impacts of WASH on sustainable community development:

Improved health conditions; access to safe drinking water along with improved sanitation and good hygiene practices can significantly reduce the risk of waterborne, viral and infectious diseases such as diarrhea, typhoid, cholera, polio, hepatitis among others. Findings of this thesis were in-line with existing research (Cooper, 2019; Weston et al., 2020; Afzal, A., 2022; Azupogo et al. 2023), and highlighted that improving WASH knowledge and practices impacted on psycho-social and physical health especially in their under five children. This leads to healthier individuals, families and communities eliminating or reducing health care costs and improved efficiency in all aspects of life as prescribed in the previous studies

(Slekiene et al., 2021; Kumar et al., 2022; Perveen, 2023).

Economic growth and development; availability of safe WASH conditions and practices by individuals and families can help to reduce healthcare and medication expenses, prevent missed work days due to illness, ensure efficiency and productivity among others. This can lead the community towards economic growth and stability like already discussed (Moreno et al., 2020; Rehman et al., 2021; Shrestha et al., 2023). Environmental protection and sustainability; environmental degradation strongly associated with poor sanitary and hygienic conditions such as stagnant water in populated areas, contamination of natural resources and water, soil and air pollution among others (Dillon et al., 2021; Voisinet, 2023). Better management of waste water along with drinking water and hygiene can mitigate these environmental impacts of WASH and promote sustainable practices in communities.

In conclusion overall water, sanitation and hygiene are a critical component and have significant socio-economic and health impacts on sustainable community development. Findings from an overall sample of all stratum considered in this study endorsed the assumption and have significant direct and mediation impacts on dependent variables. There are not any research studies found in the context of Pakistani society who checked the role of WASH as a mediator variable with context to sustainable community development, as comprehensively examined in this study. In order to attain sustainable community development, numerous initiatives would be focused such as individuals, knowledge, behavior, available resources and facilities among others at community level.

Recommendations

It is evident that billions of funds, time, skills and resources are spent on the sustainable development of communities globally. But unfortunately the required results could not be achieved yet. Therefore, it is the need of time that such discourses, researches and discussions may start at core level for better understanding and achieve required results at individual, family and community level. Public, private, national and international organizations should prioritize awareness regarding safe WASH practices in daily life along with empowering women through independent decision making and infrastructural (toilets) development with respect to specific (menstrual needs) needs. A comprehensive curriculum (short term and long term courses) with practical implications should be introduced in educational institutes and training programs. Availability and affordability of WASH related components such as latrine, wash basin, soap and hygiene environment can provide and promote at individual, family and community level

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