

**RESEARCH PAPER****The Effect of Educational and WASH Response on Community Development in Rural Region of Afghanistan**¹ **Ataullah Muneeb**

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***Corresponding Author:** Ataullahmuneeb101@gmail.com**ABSTRACT**

This study examines the effects of WASH and Educational Response on Community Development in rural regions of Nangarhar province. Multiple linear regression analysis is used to analyse the effect of WASH and educational response on community development. The model results show that the independent variables are correlated with the community development outcomes at a high level and statistically significantly. The findings indicate that the model has a high correlation coefficient ($R = 0.829$) and an R^2 of 0.687, which means that WASH and the educational interventions explain 68.7% of the total variation in community development. The adjusted R^2 (0.685) also demonstrates the strength of the model with both predictors providing significant contributions to the variability in the community development, while also not risking overfitting the model. The ANOVA findings also show that the overall model is significant ($F = 397.329$, $p < 0.001$), which means that the combined effect of WASH and educational responses can significantly predict the community development outcomes. The regression results show that WASH response has a higher effect than the educational response ($\beta = 0.508$, $p < 0.001$), which means that improvements in water, sanitation and hygiene infrastructure have a more immediate and substantial impact on the well-being of the community. Therefore, the study recommends to rise the educational and WASH responses in the rural regions to enhance the community development.

KEYWORDS Community Development, WASH Response, Educational Response**1. Introduction**

Community development is a multi-faceted approach to enhancing social, economic, educational and health outcomes for communities by implementing sustainable interventions and engaging community members in the process. The effectiveness of humanitarian and development actions, especially in the education and Water, Sanitation, and Hygiene (WASH) sectors, continues to be a major driver of community development in developing and conflict-affected countries, like Afghanistan. They are viewed as key pillars to advance human wellbeing, enhance social resilience and achieve sustainable development goals. Education is an important factor in community development in terms of augmenting human capital, literacy, social awareness and creating economic opportunities. Access to education provides people with knowledge, skills and competencies that enable their participation in economic and social activities. Education is one of the tools that helps reduce poverty, social inclusion and improve quality of life. According to the United Nations Educational, Scientific and Cultural Organization (2021). Furthermore, education initiatives in vulnerable communities contribute to the sustainable social stability of these communities and enable them to actively participate in the development process. Educational responses by governmental and non-governmental organizations in Afghanistan have been directed towards increasing access to schools, teachers' capacity, school environment, and educational awareness, especially in places where there is limited access and conflict. Likewise, WASH interventions are critical to enhance the health and social wellbeing of communities. Safe drinking water, safe sanitation facilities and good hygiene practices



have a significant impact on decreasing water borne diseases and improving community health. The World Health Organization and the United Nations Children's Fund (2023) found that good WASH practices can lead to healthier communities, productivity gains, lower health care costs and better educational participation. Bad WASH conditions, conversely, have a negative impact on health, education and economic activities, especially for women and children in rural and vulnerable communities.

Furthermore, education and WASH responses are closely linked in fostering sustainable community development. Schools with adequate WASH conditions create healthier and safer learning environments contributing to school attendance and performance. In addition, educational campaigns can increase awareness among community members about hygiene, environmental sanitation and disease prevention. Research has shown that combining education and WASH can help achieve behavioral change, community engagement and long-term development results (McMichael, 2019). Although there has been an increasing focus on educational and WASH interventions in Afghanistan, there are still many challenges including weak infrastructure, limited access to services, poverty, insecurity, and institutional capacity in the communities. These difficulties make development programs less effective, and impede sustainable development in communities. Thus, it is crucial to understand the impact of education and WASH interventions on community development to appreciate the role they can play in social and economic improvement at a local level. The main purpose of this study is to examine the effects of educational and WASH responses on community development in Afghanistan. The study highlights the understanding of the role of educational responses in community development and that of the WASH responses in social welfare, public health and sustainable community progress.

2. Literature Review

Water, sanitation and hygiene (WASH) and education are widely recognised as key pillars of sustainable community development. Clean water, good sanitation, hygiene education and knowledge, and quality education have a significant impact on the public health, economic productivity, social welfare, and human capital development. The linkages between WASH services and education and community development outcomes have increasingly been highlighted in the literature and in the work of researchers and international organizations in developing countries. WASH interventions have a significant impact on social and public health development. Maanen (2009) states that better WASH services can help communities to combat diarrheal diseases, improve nutrition and boost economic productivity. WASH programs also help to reduce health care expenses, and improve labor productivity, which supports local economic development. Additionally, Valcourt et al. (2020) contended that sustainable WASH systems create greater long-term community resilience and institutional effectiveness by solving interrelated social and environmental issues. There has been a number of studies showing that the negative impact of poor sanitation and lack of clean water on education, especially in low-income and conflict-affected countries. McMichael (2019) reported that WASH interventions in the school environment have a positive impact on school attendance, hygiene practices, and health outcomes among school children. Facilities for proper sanitation in schools, particularly for girls, are associated with improved school attendance and enrollment.

Education is a key element in the community development process in terms of human capital development and behaviour change. Better-educated people tend to be more likely to practice good hygiene, to be involved in the decision-making process within their communities, and to be engaged in economic activities within their communities. Community education programmes help to raise awareness about disease prevention, protection of the environment and sanitation management. In line with the UNESCO concept of community education, education plays a role in the empowerment of the community, reducing poverty and improving the quality of life in the community. The WASH–education nexus is very complex. School WASH programs can not only enhance the health of students, but can also impact household and community hygiene behaviours. Students are frequently agents for change, sharing hygiene information with their families and communities from school (McMichael 2019). This knowledge sharing helps raise awareness and promote community engagement in sanitation and health promotion activities. Another key element of good WASH and educational results is community involvement. Rosenfeld et al. (2021) emphasized that community-based WASH initiatives have positive effects on social capital, collective action and public health awareness. CHC models promote change in behavior through local involvement and hygiene education, which results in better sanitation and increased community solidarity. Similarly, Tsekleves et al. (2022) noted that involving the community in the implementation of WASH interventions increases their sustainability and their impact on health outcomes in vulnerable communities. Access to sustainable WASH and education is

still difficult in conflict and developing areas due to financial limitation, poor infrastructure, insecurity and weak institutional support. Abdullahi et al. (2024) determined that poor WASH infrastructure and poor maintenance are factors that limit the sustainability of school WASH programs in conflict areas over time. However, there are examples of integrated WASH and education interventions which have been effective in improving community health, gender equality, social inclusion and local development, despite these challenges.

The literature clearly shows that WASH and education play an important role in community development in terms of the improvement of public health, educational participation, economic productivity, social awareness and community resilience. Combining the WASH sector with education can enhance the sustainable development process, especially in developing countries like Afghanistan where communities are challenged by several socio-economic and infrastructural issues.

3. Material and Methods

The approach of this study is quantitative research design because it was an analysis of the effect of educational and WASH responses on the development of rural communities in Nangarhar. The quantitative approach was suitable to examine the effects of WASH and educational responses on the rural development. The study was based on primary data which was collected directly from the beneficiaries who were provided with educational and WASH responses by non-governmental organizations in rural communities. The study was targeting the following: community members, beneficiaries, households who have benefited directly from educational support programs and WASH related interventions. The data was collected using a structured questionnaire. The questionnaire had close-ended, with a set of Likert scale questions to gain the perceptions of the respondents on the effectiveness of educational and WASH interventions for community development. The random sampling method of the study was used to collect the data from the target participants of the study. The data obtained was coded, input and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, correlation, and regression analysis applied to the study to examine the effects of educational and WASH intervention on the community development. The following is the econometric model of the study:

$$CD = \beta_0 + \beta_1 ER + \beta_2 WR + \varepsilon$$

Where, CD stand for Community Development, ER stand for Educational Response, and WR stand for WASH Response, β_0 stand for Constant term, β_1 , β_2 stand for coefficient of the explanatory variables, and ε depicts for Error term. The findings of the regression analysis guided the magnitude and direction of the impacts of education and WASH responses on community development in rural areas.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1
Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Community Development	365	2.00	5.00	4.7753	.41546
WASH Response	365	2.00	5.00	4.7669	.51346
Education Response	365	2.00	5.00	4.7404	.46281

Table 1 shows descriptive statistics on respondents' perceptions on all three variables measured, and the data show a consistent positive perception. The mean scores for community development (M = 4.78, SD = 0.42), WASH response (M = 4.77, SD = 0.51) and education response (M = 4.74, SD = 0.46) were all high, indicating high agreement with the effectiveness or presence of each of these areas, with a maximum possible score of 5.00. Community development had the highest mean rating and lowest standard deviation, which means that it was the highest rated and had the most agreement among

the 365 participants. In contrast, WASH response, which was almost as high in mean value, exhibited the greatest variation in responses ($SD = 0.51$) and the full range from 2.00 to 5.00, suggesting that while overall perceptions were positive, some respondents had more negative perceptions. Education response was the lowest mean of the three, but was still very high with moderate variation. Overall, the results indicate that all three variables are seen as very effective, with the greatest variation in participants' perceptions of WASH response, and the most consistent and positive ratings in community development.

4.2 Correlation Matrix

Table 2

Correlation Matrix

Variables	N	Community Development	WASH Response	Educational Response
Community Development	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	365		
WASH Reponses	Pearson Correlation	.790**	1	
	Sig. (2-tailed)	.000		
	N	365	365	
Education Response	Pearson Correlation	.789**	.867**	1
	Sig. (2-tailed)	.000	.000	
	N	365	365	365

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows that there are strong and positive correlations among all three variables and statistically significant between them, namely community development, WASH response and education response. Pearson correlation coefficients range from .789 to .790 with p-values all at .000, meaning that these associations are not likely to be due to chance. The highest level of correlation is between WASH response and education response ($r = .790$), indicating that there is a strong correlation between the improvement or higher perception of WASH and the improvement or higher perception of education. The correlation between community development and WASH response is also very strong ($r = .790$), and between community development and education response, although a little weaker, is still strong ($r = .789$). The results suggest that the variables are independent. The correlation between these variables are significant at 1% significance level.

4.3 Regression Result

Table 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.829 ^a	.687	.685	.23306

a. Predictors: (Constant), WASH Response, Educational Response

The model summary suggests that the combined contribution of WASH response and educational response is a good predictor of community development. The multiple correlation coefficient ($R = 0.829$) indicates that there is a high positive correlation between these two predictors combined and the outcome variable. Particularly, the R Square of 0.687 indicates that about 68.7% of the variance in community development scores is explained by the WASH response and educational response, and the remaining 31.3% is due to the other variables not included in the model. The adjusted

R Square is almost the same at 0.685, indicating that the model is not overfitted and that both predictors have some explanatory power. In addition, the standard error of the estimate is very small at 0.23306, which is very small compared to the 5-point scale and the mean community development score of 4.78. The small value of the SE suggests that the model predictions are quite precise, with an average accuracy of about 0.23 points. Put together, these findings show that the model has a very good level of fit and of explanatory power, so that improvements in WASH and educational responses are very well correlated with improved levels of community development, and with very little prediction error.

Table 4
Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	43.165	2	21.582	397.329	.000 ^b
Residual	19.663	362	.054		
Total	62.828	364			

a. Dependent Variable: Ccommunity Development

b. Predictors: (Constant), Educational Response, WASH Response

The overall statistical significance of regression model for predicting community development based on WASH response and educational response is tested by the ANOVA table. The total variation in community development scores is divided into two components: that explained by the model (regression sum of squares = 43.165) and that not explained or left over (residual sum of squares = 19.663). The mean square for regression is 21.582 with 2 degrees of freedom and the mean square for error is 0.054 with 362 degrees of freedom. The F-ratio is extremely large compared to the degrees of freedom, being 397.329. More important is the significance value of .000, which is much lower than the traditional alpha value of 0.01. This means that the chances of getting this large an F-ratio by chance are less than 0.1%. Thus, the overall regression model is statistically significant and the regression of WASH response and educational response combined is a reliable predictor of community development.

Table 5
Regression Result

Model	Standardized		Coefficients	t	Sig.
	Unstandardized Coefficients	Std. Error			
B			Beta		
(Constant)	1.268	.126		10.053	.000
WASH Response	.456	.053	.508	8.616	.000
Educational Response	.283	.048	.349	5.931	.018

a. Dependent Variable: Community Development

Table 5 demonstrate the regression findings of the study. This study indicate the contribution of each predictor variable (WASH response and educational response) to predicting community development when the other predictor is controlled. The unstandardized coefficients indicate the change in community development for each one-unit change in the predictor. If both WASH response and educational response are zero, the predicted community development score would be 1.268 on average basis. The unstandardized coefficient is 0.456 ($p < .001$) for WASH response, meaning that for every one-unit increase in WASH response, there is an increase of 0.456 units in community development when education response is held constant. The unstandardized coefficient for educational response is 0.283 ($p = .018$), which indicates that for every one-unit increase in educational response there is 0.283-unit increase in community development, holding WASH response constant. The p values of both predictors are less than 0.05, so they are both statistically significant.

5. Discussion



The regression analysis results clearly show that both the WASH response and the educational response are strong and statistically significant predictors of community development. The model summary reveals that the model has a high level of explanatory power, with an R value of 0.829, and an R^2 of 0.687, which suggests that 68.7% of the variation in community development is jointly explained by the two interventions: WASH and education. This is in line with the development literature that states that access to water, sanitation, and hygiene services, as well as education, are critical factors in determining the outcomes of sustainable community development (UNICEF, 2022; WHO, 2021; World Bank, 2018). The high adjusted R^2 (0.685) further supports the strength of the model and indicates that both variables are significant in explaining development outcomes, with little potential for overfitting the model. The ANOVA results also provide further evidence of the overall significance of the model; the F-statistic is 397.329 and the p-value is < 0.001 , suggesting that the overall effect of the combination of WASH and educational responses is significant for improving the outcomes of community development. This is consistent with empirical evidence that indicates that integrated interventions have greater impacts on development than sectoral or isolated interventions (UNDP, 2020; OECD, 2019). The very low residual variance also indicates that the model explains a large proportion of the systematic variation in community development, further underscoring the need for multisectoral approaches in rural and fragile contexts where problems in community development are interlinked. The regression coefficients also show the contribution of each predictor. The educational response ($\beta = 0.349$, $p = 0.018$) has a smaller influence on community development than does the WASH response ($\beta = 0.508$, $p < 0.001$). This indicates that investments in water and sanitation have a direct and more immediate impact on the well-being, health and productivity of the community. Findings are corroborated by studies showing that WASH interventions at the community level have a significant impact on disease burden and economic productivity (Prüss-Ustün et al., 2019; WHO, 2021). Education response also has a major component, and the developmental advantages of literacy, skills and awareness, which boost social capital and resilience (UNESCO, 2020; Barro & Lee, 2015), have an enduring impact. In general, the results indicate that the WASH and education integrated interventions have a significant effect on sustainable community development. Immediate investments in infrastructure are likely to give faster development gains, whereas education can help to build human capital and resilience in the longer-term, with the stronger coefficient for WASH. This dual impact reflects the theory of human development, which sees the relationship between health, education and living conditions as interconnected in order to achieve sustainable development outcomes (Sen, 1999; UNDP, 2022). Thus, the development programmes should remain focused on integrated approach to deliver basic services and capacity building to enhance the impact of the programme.

6. Conclusion

The findings of this study demonstrated that WASH response and educational response have positive impact and influence on the development of a community. The regression results show that the model has a strong explanatory power (68.7% of the variance in community development is explained by the two predictors). Model statistical significance demonstrates that the model is significant and that the WASH service and educational interventions are significantly associated with good development outcomes in the community. WASH response is one of the relatively more important predictors, emphasizing the critical role of water, sanitation and hygiene infrastructure in enhancing health, productivity and overall well-being of the community. The findings overall indicate that WASH and integrated development interventions that combine both WASH and education are highly effective in fostering sustainable community development. Education builds on the long-term human capital development and resilience while WASH provides immediate and tangible improvements in living conditions. Thus, the multi-sectoral approach, focused on the improvement of basic services and human capacity, should remain a priority in development strategies. This holistic approach helps to achieve more inclusive, sustainable and effective development results, especially in vulnerable and resource-poor contexts.

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