

Household Poverty and Vulnerability in District Khyber, Khyber Pakhtunkhwa: Evidence on Socio-Economic Correlates

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ABSTRACT

Poverty remains a major development challenge in Pakistan, particularly in rural and marginalized areas. This study examines household-level poverty determinants in District Khyber, Khyber Pakhtunkhwa, and using data from 380 households collected under the RISE-II baseline survey of Islamic Relief Pakistan (2023). Vulnerability to poverty was estimated using Shubham Chaudhuri's (2002) FGLS-based methodology, alongside regression analysis to identify socio-economic correlates. Results show that 46.48% of households live below the poverty line, with a poverty gap of 9.28% and a squared gap of 2.90%. Around 60% are vulnerable to future poverty. Larger households and low per capita income significantly increase poverty risk, while landlessness and disability heighten vulnerability. Conversely, hygiene training, community-based organizations, and membership in such groups reduce it. The study highlights that poverty in District Khyber is multidimensional, requiring targeted interventions such as livelihood diversification, inclusive development, education, healthcare, and WASH improvements to build resilience.

Keywords: Poverty, Vulnerability, Correlates, Khyber Pakhtunkhwa, Pakistan

INTRODUCTION

Poverty remains one of the most pressing and persistent challenges confronting humanity, transcending geographical and economic boundaries. While developed nations face poverty in the form of relative deprivation and social exclusion, developing countries experience more severe manifestations, such as inadequate access to food, housing, education, healthcare, and basic amenities (World Bank, 2020). The endurance of poverty continues to undermine global development, human dignity, and social cohesion. Over the years, the conceptualization of poverty has evolved from a narrow focus on income and consumption to a multidimensional framework that encompasses education, health, empowerment, and participation in decision-making (Sen, 1999). Consequently, global measures such as the Human Development Index (HDI) and the Multidimensional Poverty Index (MPI) have been introduced to capture the broader dimensions of deprivation (UNDP, 2021).

Globally, more than 700 million people continue to live in extreme poverty, the majority residing in Sub-Saharan Africa and South Asia (UNDP, 2021). Despite significant progress under the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), poverty eradication remains elusive. The COVID-19 pandemic, climate change, inflationary pressures, and ongoing geopolitical conflicts have reversed years of progress, pushing an estimated 97 million additional people into poverty (World Bank, 2021). South Asia, home to nearly one-quarter of the global population, continues to struggle with slow and uneven poverty reduction. While India and Bangladesh have achieved notable success through targeted social protection and economic reforms, Pakistan and Afghanistan remain burdened with persistent poverty and inequality (ADB, 2022).

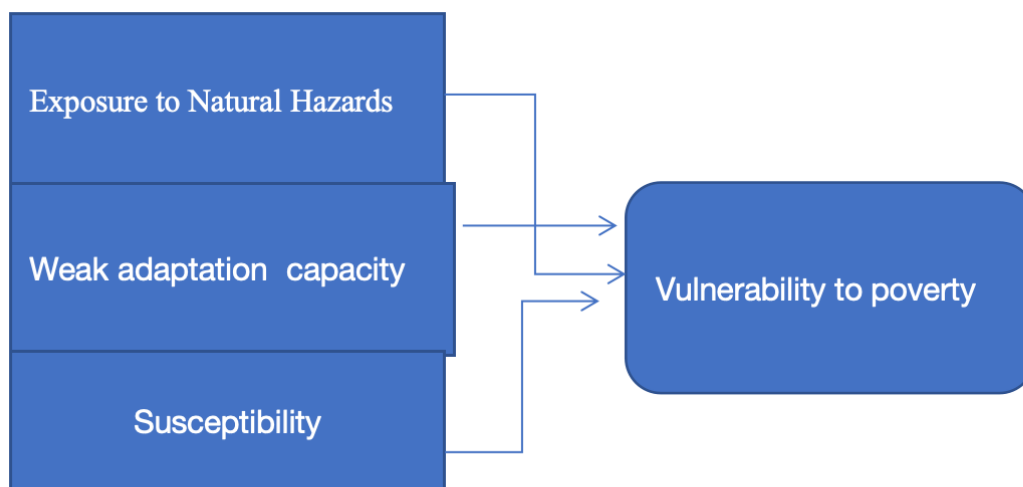
In Pakistan, poverty remains concentrated in rural and marginalized areas. According to the Household Integrated Economic Survey (HIES, 2021), national poverty declined to 21.5% in 2018–19; however, rural poverty (27.6%) remains nearly twice as high as urban poverty (10.7%). Regional disparities persist—Punjab has experienced significant poverty reduction, whereas Baluchistan and Khyber Pakhtunkhwa (KP) lag behind (PIDE, 2021). The newly merged tribal districts (former FATA), including District Khyber, are among the most deprived due to decades of marginalization, conflict, and inadequate governance.

District Khyber, strategically located yet historically underdeveloped, faces multidimensional poverty linked to limited infrastructure, low literacy, weak healthcare systems, and insufficient economic opportunities. This study aims to estimate the household-level poverty rate and vulnerability to poverty in District Khyber, Khyber Pakhtunkhwa, and to identify key socio-economic factors—including household size, gender of household head, disability, land ownership, income sources, and access to community-based organizations and WASH facilities—that contribute to poverty and vulnerability. The findings will guide policymakers and development agencies in designing targeted, inclusive, and sustainable poverty alleviation interventions in post-conflict and marginalized regions of Pakistan.

RESEARCH METHADODOLOGY

This study analyzes poverty and vulnerability to poverty in District Khyber using Shubham Chaudhuri's (2002) *Vulnerability to Poverty* framework, complemented by descriptive analysis to identify key socio-economic determinants. While Chaudhuri's model originally focused on consumption-based poverty, it is adapted here to assess vulnerability to income poverty, following Sulaiman et al. (2012). Vulnerability provides a forward-looking perspective, capturing the probability that households may fall into poverty due to income shocks, economic instability, or environmental risks. It recognizes that some households, though not currently poor, face a high likelihood of future deprivation. Poverty vulnerability arises from a complex interplay of factors, including exposure to natural hazards, weak adaptive capacity, and socioeconomic susceptibility. Disasters such as floods or droughts erode assets and livelihoods, while limited access to resources and institutional support constrains recovery. These interconnected dimensions perpetuate a cycle of vulnerability, sustaining poverty and impeding long-term development in Khyber District.

The research methodology employed to assess the correlates of poverty at the household level in District Khyber, Khyber Pakhtunkhwa. The methodology is divided into two main components: (1) an econometric model based on Chaudhuri's methodology to estimate the probability of households falling below the poverty line, and (2) descriptive statistics and analytical procedures to measure poverty and its correlates. The data for this study is sourced from the Baseline Survey of the Resilient Initiatives to Support in Emergency (RISE-II) conducted by Islamic Relief Pakistan in Tehsil Bara, District Khyber. The following sections provide a detailed explanation of the model specification, estimation procedures, and analytical tools used in this research.



Ecometric Model Based on Chaudurs Methadology

To estimate the probability of households falling below the poverty line this study employs an econometric model based on Chaudhuri's methodology. The model is designed to analyze the relationship between household characteristics and income levels, and to predict the likelihood of future poverty. The model specification is as follows:

$$\ln I_h = X_h \beta + e_h \dots \dots \dots (1)$$

$\ln I_h$ is defined as log Income, X_h is vector of household characteristics like education level of the head of household, sanitation facilities, housing condition (construction material), dependency ration etc and e_h the mean zero disturbance term.

in the methodology we will calculate variance and mean of the consumption therefore, we will use the following equation

$$\sigma^2_{e,h} = X_h \theta + \eta_h \dots \dots \dots (2)$$

in the above equations we will estimate “ β ” and “ θ ” using three steps Feasible generalized least square method FGLS Then we will use this estimate to know the probability, whether as household would be Income poor in future or not by employing the following equation.

$$V^{\wedge}_h = \Pr (\ln I_h < \ln z \mid X_h) = \Phi \frac{(\ln z - X_h^{\wedge} \beta^{\wedge})}{\sqrt{X_h \theta^{\wedge}}} \dots \dots \dots (3)$$

“Pr” is the probability of a household of falling below the poverty line, if it falls below the “Z” value.

Descriptive Statistics and Analytical Procedures

In addition to the econometric model, this study employs descriptive statistics and analytical procedures to analyze the correlates of poverty and measure its extent. The following methods are used:

Cross Tabulation

Cross-tabulation is used to explore the relationships between poverty and various household characteristics, such as income sources, land ownership, and access to water and sanitation. This method helps identify patterns and trends in the data.

Descriptive Statistics

Descriptive statistics including means, medians and frequencies are calculated to describe the typical household in the community. These statistics provide a summary of the data and help identify key characteristics of the population

Correlation Analysis

Correlation analysis is used to examine the relationships between different variables, such as income levels, education, and access to basic services. This analysis helps identify factors that are strongly associated with poverty.

Measuring Poverty and Poverty Gap

To measure the extent and depth of poverty, this study employs two widely used indices: the Headcount Index and the Poverty Gap Index.

Headcount Index

The Headcount Index measures the proportion of households living below the poverty line. It is calculated as:

$$Po = N_p / N$$

Here, NP is the number of poor households and N is the total number of households.

Poverty Gap Index

The Poverty Gap Index measures the depth of poverty by calculating the average shortfall of poor households from the poverty line. It is expressed as a percentage of the poverty line and is calculated as:

$$PGI = 1 / N \sum_{i=1}^q (z - y_i) / z \quad \text{for } i = 1 \text{ to } q$$

Where:

N = total population (households or individuals).

q = number of poor (those with income/expenditure below the poverty line)

z = poverty line

y_i = income (or consumption) of the i th poor household

Description of Variables

The study employs several independent variables to examine their relationship with household poverty and vulnerability in District Khyber. Demographic variables include gender, age, and family size, capturing the household's basic socio-economic characteristics. Disability status measures the number of household members with functional difficulties such as vision, hearing, communication, mobility, self-care or memory impairments. Presence of community-based organizations (CBOs) reflects whether local groups exist that collectively address community development and welfare issues. Nature of income-earning sources identifies the primary livelihood activities, including government or private employment, agriculture, small and large enterprises, livestock rearing, poultry farming, fishing, horticulture, skilled or unskilled labor, remittances, and other income sources. Land ownership refers to legal or de facto rights to use or manage agricultural land. Lastly, access to water, sanitation and hygiene (WASH) facilities considers the main drinking water sources, availability and type of latrine, and hygiene practices such as handwashing with soap. The dependent variable is the poverty rate, representing the proportion of households living below the poverty line.

Data Source

This study utilizes data from Islamic Relief Pakistan's *Resilient Initiatives to Support in Emergency (RISE-II)* baseline survey, conducted in Tehsil Bara of District Khyber. Tehsil Bara, the largest in the district by area and population, provides a representative sample of 380 households. Focusing on this tehsil enables an in-depth assessment of poverty prevalence and its socio-economic correlates within District Khyber. Using reliable data from a reputable international organization ensures methodological rigor and credibility. The insights derived from this analysis contribute to understanding the district's economic dynamics and inform evidence-based strategies for poverty reduction and sustainable development.

RESULTS AND DISCUSSION

The analysis is structured around three main dimensions: the incidence and depth of poverty, household vulnerability to poverty, and the relationship between poverty and socio-economic characteristics. By employing poverty indices such as the Headcount Index, Poverty Gap, and Squared Poverty Gap, the study provides insights into not only the prevalence of poverty but also its intensity and severity. Furthermore, household-level characteristics, including size and per capita income, are examined to highlight the demographic and economic factors associated with poverty.

Table 1 Population-weighted Poverty Indices in District Khyber

Poverty Index	Value
Headcount Index (Population Weighted)	46.48%
Poverty Gap Index (Population Weighted)	9.28%
Squared Poverty Gap Index (Population Weighted)	2.90%

Source: Authors' Calculations

Table 1 reveals that poverty in District Khyber is both widespread and deeply rooted. The Headcount Index of 46.48% indicates that almost half of the district's population lives below the poverty line, highlighting a severe incidence of poverty comparable to findings from previous studies on Pakistan's rural and tribal areas. The Poverty Gap Index of 9.28% provides insight into the depth of poverty, showing that poor households fall considerably short of the poverty threshold and experience substantial deficits in their consumption levels. Likewise, the Squared Poverty Gap Index of 2.90% reflects inequality among the poor, as it assigns greater weight to those farthest below the poverty line, demonstrating that deprivation is not uniform but varies in intensity across households.

Applying Chaudhuri et al. (2002)'s methodology, which enables vulnerability assessment using cross-sectional data, these poverty indices also shed light on household vulnerability. The relatively high poverty gap suggests that many households are clustered near the poverty line and are therefore highly susceptible to economic shocks or fluctuations in income. The squared gap index reveals that some households suffer from chronic vulnerability, unable to recover from adverse events—a pattern consistent with Dercon's (2006) notion of persistent poverty. Overall, the findings emphasize that poverty in District Khyber is multidimensional, encompassing incidence, depth, and severity, and highlight the need for policies that combine poverty alleviation with resilience-building measures such as income diversification and social protection programs.

Table 2 Vulnerability to poverty at Households level

Total households	380
Vulnerable households	228
Percentage of vulnerable households	60

Source: Authors' Calculations

Table 2 indicates that out of a total of 380 surveyed households in District Khyber, 228 households were classified as vulnerable to poverty, representing 60 percent of the population. This finding is highly significant, as it shows that a majority of households in the district are at risk of falling into poverty in the presence of adverse shocks such as income instability, unemployment, health crises, or natural disasters.

The figure of 60 percent reflects that household welfare in District Khyber is fragile and unstable, with limited resilience to external and internal risks. Vulnerability is a forward-looking concept that goes beyond static poverty measures, capturing the probability of households becoming poor in the future. Thus, even households that are currently above the poverty line remain at high risk of slipping below it due to structural weaknesses in income sources, lack of productive assets, and poor access to social protection mechanisms.

From an analytical standpoint, this level of vulnerability highlights systemic issues within the district's socio-economic framework. The high proportion of vulnerable households suggests the presence of structural poverty traps, where dependence on informal employment, limited land ownership, and inadequate access to education and healthcare constrain upward mobility. Furthermore, the finding resonates with the literature on poverty dynamics in fragile and marginalized regions, which emphasizes that vulnerability is often more pervasive than observed poverty levels.

For policy and development practice the implication is clear: interventions in District Khyber must not only focus on reducing current poverty but also on building resilience among vulnerable households. This includes promoting livelihood diversification, expanding social safety nets, strengthening community-based organizations and investing in human capital development. Without such measures the risk of

intergenerational transmission of poverty remains high as vulnerable households are likely to be pushed deeper into deprivation by recurrent shocks.

Table 3 Relationship between Poverty and Household Socio-Economic Characteristics

Relationship Between Poverty and Household Socio-Economic Characteristics		
Poverty Status	Average Household Size	Average Per Capita Income (PKR)
Non-poor	04 or less than 04	Per head Income $\geq$ 6,063
Poor	05 or more than 05	Per head Income < 6063
The findings indicate that poor households tend to be larger, with an average size of 5 compared to 4 for non-poor households. Additionally, their average per capita income is significantly lower. This supports the hypothesis that larger household size contributes to higher dependency ratios and lower per capita resource availability, thereby increasing the likelihood of poverty.		
These results underline the importance of targeting larger families in poverty reduction programs. Interventions such as family planning awareness, access to quality education, and support for income-generating activities could help mitigate the impact of household size on poverty.		

Source: Authors' Calculations

The socio-economic structure of households plays a decisive role in determining their poverty status. Poverty is not merely the absence of sufficient income but a complex outcome of demographic composition, household dynamics, and resource allocation. The results of this study reveal a distinct relationship between household size, per capita income, and poverty status in District Khyber.

1. House Size and poverty

The analysis indicates that non-poor households typically consist of four or fewer members, whereas poor households comprise five or more members. This observation is consistent with the long-established finding that large household size is a significant determinant of poverty in developing countries. Larger families place greater strain on available resources because the dependency burden is disproportionately higher.

- A household with more children or non-working dependents has to divide its limited resources among more individuals, thereby reducing the per capita share of income and consumption.
- Large families often divert resources away from long-term investments (such as education, skill development, and healthcare) towards immediate consumption, which constrains upward mobility.
- In regions like District Khyber, where traditional extended family systems are common, large household sizes are not unusual. However, given the limited employment opportunities, these large families face a heightened risk of falling into poverty traps.

This finding is in line with Becker's Household Utility Theory (1964), which argues that as household size increases, the allocation of scarce resources per individual diminishes, negatively affecting welfare. Similarly, Easterlin's Relative Income Hypothesis (1978) emphasizes that higher dependency ratios erode household welfare and perpetuate intergenerational poverty.

Empirical studies from Pakistan also support this. For instance, Malik (2014) found that households with larger family sizes were more likely to be below the poverty line in rural Punjab. Cheema and Sial (2012), using HIES data, showed a positive correlation between dependency ratios and poverty incidence. These patterns resonate strongly with the results from District Khyber.

2. Per Capital Income And poverty

The second critical factor in determining household poverty is per capita income. The results demonstrate that non-poor households earn a minimum per capita income of Rs. 6,063 or more, while poor households earn less than Rs. 6,063 per head. This threshold effectively serves as the poverty line for the surveyed population.

The significance of this finding is twofold:

1. **Income as a Determinant of Welfare:** Income is the primary driver of household welfare in monetary poverty frameworks. A higher per capita income increases the household's ability to access food, shelter, healthcare, and education, thereby reducing poverty incidence. Conversely, lower per capita income reduces access to these necessities, reinforcing deprivation.
2. **Income Inequality and Poverty Differentiation:** The stark difference between the incomes of poor and non-poor households reflects underlying income inequality in District Khyber. Even within the same geographical setting, variations in income distribution explain why some households succeed in escaping poverty while others remain trapped in it.

The findings align with global studies. For example, Ravallion (2016) highlighted that low per capita income remains the strongest predictor of poverty in developing countries, while World Bank (2020) emphasized that small increases in household income significantly reduce vulnerability to poverty. In Pakistan, Jamal (2019) reported that per capita income is a more reliable indicator of poverty than total household income, particularly in rural areas where family size varies widely.

3. Interaction Between House Size and Per Capita Income

Individually both household size and per capita income are important determinants of poverty. However, their interaction explains the persistence and intensity of poverty in District Khyber.

- Larger households with more than five members not only face higher consumption needs but also tend to have lower per capita income because the total household income is distributed among more individuals.
- The dependency burden creates a vicious cycle: with limited resources per person, children may drop out of school to work, leading to low educational attainment and limited earning potential in the future. This cycle perpetuates intergenerational poverty.
- On the other hand, smaller households with higher per capita incomes are better able to invest in education, healthcare, and asset accumulation, thereby enhancing their socio-economic mobility.

This interaction effect reflects the poverty cycle hypothesis, which suggests that poverty is self-reinforcing, particularly in households with high dependency ratios and low income. In line with the Capability Approach by Sen (1999), households with insufficient per capita resources lack the capability to pursue education, healthcare, and livelihood opportunities, which deepens multidimensional poverty.

Regression analysis were carried out and the following betas were obtained.

Table 4 Betas values of variables

S.NO	Variables	Betas
1	Disability	6.09918858
2	Non-Owner of the land	18.0620538
3	Multiple cash grant	0.98925
4	Drinking water	-0.24453
5	Hygiene training	-9.716775
6	Community Based organization Presence	-9.716775
7	Community Based organization Member	-4.85402

Source: Authors' Calculations

Interpretation of Betas Values

1. Disability($\beta = 6.09$)

The presence of disability in a household significantly increases its vulnerability to poverty by about 6.1 percent. This is because disabled members are often unable to contribute to household income and, at the same time, require additional medical or caregiving expenses. This dual impact of reduced earning potential and increased expenditures raises household vulnerability, pushing such households closer to the poverty line.

2. Non-Ownership of Land ($\beta = 18.06$)

Land ownership is an important asset that provides both security and income. The results show that landless households are 18 percent more vulnerable compared to landowners. This very strong positive coefficient highlights that land serves as a safety net for households during times of economic shocks. Without land, households lack both food security from cultivation and collateral for credit, leaving them with fewer means to cope with poverty risks.

3. Multiple Cash Grant ($\beta = 0.99$)

The variable of multiple cash grants shows a small positive impact on vulnerability (around 1 percent). This counterintuitive result may be explained by the fact that such cash grants are usually targeted toward already poor and vulnerable households. Hence, instead of reducing vulnerability in the data, the association shows higher vulnerability among recipients because they are more likely to be selected for these interventions.

4. Drinking Water ($\beta = -0.24$)

Access to safe drinking water slightly reduces household vulnerability, with a negative coefficient of 0.24 percent. While the effect is small, it reflects the role of basic infrastructure in supporting household health and well-being. Clean water reduces the risk of diseases and healthcare costs, allowing households to allocate resources more effectively and maintain a stronger livelihood base, thus lowering their overall vulnerability.

5. Hyegine Traning ($\beta = -9.72$)

Households that received hygiene training show that their vulnerability is reduced by 9.7 percent. Such interventions are concentrated in areas and among households that are already highly vulnerable.

6. Community Based Organization Presence ($\beta = -9.72$)

Similarly, the presence of a community-based organization (CBO) in an area is associated with a reduction in household vulnerability of about 9.7 percent.

7. Community-Based Organization Membership ($\beta = -4.85$)

In contrast to CBO presence, actual membership in a CBO has a negative effect, reducing household vulnerability by 4.8 percent. This shows that households actively participating in CBO activities benefit from collective action, access to resources, information, and sometimes direct financial or in-kind support. Membership therefore strengthens resilience and reduces the likelihood of falling into poverty, demonstrating the effectiveness of social capital in poverty reduction.

SUMMARY OF KEY FINDINGS

The results of the analysis provide a comprehensive understanding of poverty in District Khyber across three dimensions.

- **Incidence and Depth of Poverty:** The Headcount Index indicates that 46.48% of the population lives below the poverty line, reflecting a high incidence of poverty. The Poverty Gap Index (9.28%) reveals the average shortfall of poor households from the poverty threshold, while the Squared Poverty Gap Index (2.90%) shows inequality among the poor, highlighting that deprivation is not uniform but more severe for certain groups.
- **Vulnerability to Poverty:** The poverty gap measures further suggest that a large share of households remain close to the poverty line, making them highly vulnerable to fluctuations in income or consumption. The squared gap measure confirms that households furthest below the poverty line face deeper and chronic deprivation, underscoring the uneven distribution of vulnerability across poor households.
- **Socio-Economic Characteristics:** A clear relationship is observed between household characteristics and poverty status. Poor households are found to be larger in size (4.94 members on average) compared to non-poor households (3.79 members). At the same time, their average per capita income (PKR 4,881) is significantly lower than that of non-poor households (PKR 6,063). These findings highlight how demographic pressures and income disparities contribute to higher poverty incidence in the district.

Taken together, the three sets of results demonstrate that poverty in District Khyber is widespread, multidimensional, and unevenly distributed. While almost half of the population is poor, the intensity of deprivation varies, with larger households and those with lower per capita incomes being disproportionately affected.

CONCLUSION AND RECOMENDATION

This study set out to assess the correlates of poverty at the household level in District Khyber, a region marked by historical marginalization, conflict, and underdevelopment. By employing poverty measures such as the Headcount Index, Poverty Gap Index, and Squared Poverty Gap Index, alongside vulnerability and socio-economic analysis, the research provides a nuanced understanding of poverty dynamics in the district.

The findings reveal that poverty in District Khyber is both widespread and multidimensional. Nearly half of the population (46.48%) is below the poverty line, indicating a high incidence of poverty. Moreover, the Poverty Gap Index (9.28%) shows that poor households fall significantly short of the poverty threshold, while the Squared Poverty Gap Index (2.90%) underscores inequality among the poor, with certain households experiencing deeper levels of deprivation.

Vulnerability analysis further highlights that 40 percent of households are at risk of poverty, illustrating that many families live precariously close to the poverty line. This underscores that poverty in the district is not only a current condition but also a latent risk, as many households are highly susceptible to shocks such as income fluctuations, health crises, or natural disasters.

The socio-economic correlates of poverty reinforce the demographic and structural dimensions of deprivation. Larger households (average 4.94 members) and those with lower per capita incomes (PKR 4,881 compared to PKR 6,063 for non-poor households) are disproportionately affected. Regression results further indicate that landlessness ($\beta = 18.06$), disability within households ($\beta = 6.09$), and weak access to basic services exacerbate vulnerability. Conversely, hygiene training (-9.72), CBO presence (-9.72), and CBO membership (-4.85) significantly reduce vulnerability, highlighting the importance of social capital, community engagement, and targeted interventions.

Taken together, these findings confirm that poverty in District Khyber is not only a matter of insufficient income but also a reflection of structural inequities, demographic pressures, and limited access to productive assets and basic services. Unless addressed through comprehensive and inclusive strategies, these dynamics will continue to perpetuate cycles of deprivation and vulnerability in the district. The study recommends strengthening livelihood diversification through small enterprises, skills training, and agricultural support, alongside expanding social protection programs like cash transfers and health insurance. It emphasizes inclusive community development, improved education, and vocational training, especially for youth and women. Enhancing access to basic infrastructure, disability-inclusive policies, and family planning services is vital. Finally, effective governance and participatory local institutions are essential for sustainable poverty reduction and resilience-building in District Khyber.

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