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Do Livelihood Capitals Improve Household Welfare? An Ordered Logistic Analysis of Textile Workers in Pakistan

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ABSTRACT

In developing countries, household welfare of industrial workers is increasingly influenced by multidimensional constraints that are not limited to income such as health, quality of housing and availability of basic services. The textile industry in Pakistan is one of the largest providers of industrial jobs in the country, so it is critical to know how the resources available to workers in terms of livelihood are converted to welfare outcomes to inform evidence based social protection and labor policy. This paper considers how the sustainable livelihood capitals impact upon the household welfare status of textile worker families in Punjab in Pakistan. Based on the primary survey data of 410 textile workers, economic, health, and housing related indicators were used to create a multidimensional welfare index. To achieve increased robustness and less subjectivity, the weights of indicators were computed with a hybrid method that combines expert based subjective weights with entropy based objective weights. The resultant welfare index was made normalized and divided into three ordinal welfare groups: low (0.14-0.45), medium (0.45-0.60) and high (0.60-0.91). As explanatory variables, seven livelihood capital indices, i.e., human, natural, financial, physical, social, information, and psychological capital were determined. Ordered logistic regression model was estimated to determine the effects of change in each capital on the probability of being in higher welfare categories and marginal effects calculated to interpret the change in probability. The results demonstrate that upward welfare mobility is most closely related to financial and physical capital improvements, and human and natural capital also have a positive impact. Conversely, social and information resources demonstrate weaker or statistically unfounded relationships with higher welfare status, which indicates that not all types of capital produce similar welfare gains in industrial labor environments. The research emphasizes the significance of specific interventions to increase financial inclusion, stabilize linked benefits related to employment, and the housing and service conditions of workers. The findings provide policy-implication on how government and industry stakeholders can enhance welfare outcomes by designing livelihood-based policies.

Introduction

The textile industry is an important sector in the economy of Pakistan, accounting to almost 60 per cent of national exports and 8.5 per cent of GDP, and providing employment to about 4.67 million workers, around 40 per cent of all industrial workers (Nasir et al., 2025). Over 4,500 textile mills, with Faisalabad often called the Manchester of Pakistan, are directly dependent on the industry, with thousands of households relying on the industry (Dun & Bradstreet, 2025). Even though the textile workforce has a significant economic contribution, it faces multidimensional poverty, job insecurity, and insufficient access to basic services, indicating that there are chronic welfare shortfalls and social vulnerability.

Household welfare is not only monetary income but also encompasses aspects like education, healthcare, nutrition, and general living standards (Wan Mustapa et al., 2018; Kumar et al., 2020). The approach to welfare also highlights the fact that households are able to attain meaningful and desirable life outcomes using the resources and opportunities and not just incomes. The Sustainable Livelihood Framework (SLF) in this view offers an analytical framework that is comprehensive and categorizes assets into five main capitals: human, physical, natural, social, and financial. The current work is based on this premise but adds two more dimensions to the framework. Psychological capital embodies the emotional resilience, optimism and personal coping level (Avey et al., 2011), whereas information capital embodies the access to trustworthy information and the ability to utilize it in an effective manner to improve livelihood.

The Sustainable Livelihood Framework, which was initially developed by the Department for International Development (DFID) in 1997, is a systematic method of explaining how households use different types of capital in a larger framework of vulnerability, institutional settings, and policy conditions to attain livelihood results. The framework highlights that access to assets do not solely determine livelihood strategies and welfare outcomes but other external factors that include economic shocks, seasonality, and governance systems. Although the traditional DFID framework uses five main capitals, namely human, natural, financial, physical, and social (DFID, 2000), recent research brought more dimensions to the concept, with the aim of capturing the modern livelihood situation (Mach and Siders, 2021). Specifically, information capital and psychological capital have been increasingly recognized as critical factors that determine the capacity of households to access opportunities, adaption to changing conditions, and maintain well-being (Guo et al., 2022). These additions add more analytical utility to the framework, particularly in industrial and urban labor settings where information access and personal resilience are important factors influencing welfare outcomes. In this regard, the study uses the extended SLF model to analyze the combined effect of various livelihood capitals on the welfare of households in an industrial work environment.

The hypothesis of this study is that higher levels of composite livelihood capital in households lead to resilience and better welfare outcomes in various dimensions. This is supported by existing empirical evidence. Asfaw et al. (2019) indicated that livelihood diversification in Sub-Saharan Africa led to substantial household consumption and vulnerability reduction, whereas Cheng et al. (2021) reported similar welfare gains due to employment opportunities and productivity gains in rural China. Kumar et al. (2020) found that credit access makes a significant difference in the growth of household income in the South Asian context, but education has long been considered a key driver of economic and social mobility (Mincer, 1974; Niankara, 2019).

Social capital is another significant aspect of welfare improvement because it helps to collectively act and share information as well as to access higher positions. Chetty et al. (2022) also proved that social networks can help in inter-class mobility and Jha and Kelley (2023) also connected community participation and trust with better household well-being in India. But the welfare consequences of social capital do not apply equally across situations. İzmen and Ücözdoğruk Gurcel (2020) found that the power of social capital to affect well-being depends on socio-political divisions and rural-urban differences. Likewise, the study by Prayitno et al. (2022) identified that social capital can support welfare indirectly via digital and financial literacy channels in Indonesia. These results indicate that the connection between social capital and welfare benefits might not be uniform, especially in formal industrial work contexts.

The transformational nature of inclusive livelihood policies is further emphasized on gender-sensitive approaches towards welfare. Karimli et al. (2020) demonstrated that the empowerment of women with the integrated livelihood programs in Burkina Faso had a significant positive effect on the food security and the possessions of assets in women. Similarly, Raghunathan et al. (2023) reported a long-term rise in domestic spending and female agency within the National Rural Livelihoods Mission in India. Mahmud and Riley (2021) highlighted the increased vulnerability of women-led households in the COVID-19 pandemic, underscoring the role of gender-responsive welfare interventions.

In spite of these contributions, there is still limited of empirical research on the concerted effect of various livelihood capitals to welfare in an industrial labour context, especially among textile workers. Existing literature in Pakistan largely examines welfare determinants separately, with an emphasis on the individual factors of education, income, or access to credit (Mahmood et al., 2014; Kumar et al., 2020), without incorporating these determinants into a single multidimensional livelihood paradigm. This research fills this gap by developing hybrid weighted indices of seven livelihood capitals and a multidimensional welfare index using objective weights based on the entropy and subjective weights based on experts.

The main aim of this study is to assess how sustainable livelihood capitals such as human, physical, natural, social, financial, psychological and information capital affect the multidimensional welfare of textile worker families in Faisalabad, Punjab. Using a hybrid weighting method and ordered logistic regression model with marginal effects, the research quantitatively evaluates the role of composite livelihood capital in determining the level of household welfare status. This study presents evidence based on a combination of a multidimensional livelihood model and a rigorous empirical investigation to inform labor welfare policies, social protection policies, and urban development policies to improve worker welfare in the industrial sector in Pakistan. According to the extended Sustainable Livelihood Framework depicted in figure 1, the hypothesis in this study is that every livelihood capital has a direct impact on household welfare outcomes.

H1: Human capital has a significant impact on household welfare

H2: Natural capital has a significant impact on household welfare

H3: Physical capital has a significant impact on household welfare

H4: Financial capital has a significant impact on household welfare

H5: Social capital has a significant impact on household welfare

H6: Psychological capital has a significant impact on household welfare

H7: Information capital has a significant impact on household welfare

Literature Review

Household well-being has been traditionally viewed as a result of complicated social, economic, and environmental relationships. With time, researchers have tried to describe this complexity based on sustainable livelihoods, which focuses on the assets and capabilities that people can marshal in order to attain well-being. In this context, welfare is no longer viewed as a product of income, but a product of the interplay of various types of capital, such as social, human, financial, natural, physical, psychological and information resources.

An increasing number of empirical studies support the primacy of social capital in determining economic opportunity and upward mobility. Chetty et al. (2022) in one of the most impactful studies on social mobility proved that economic connectedness, which is interaction between low- and high-income populations in the United States, was a strong predictor of upward mobility. Similar trends exist in the developing economies. According to Jha and Kelley (2023), in India, those communities with a higher degree of trust and civic participation have higher household consumption and asset accumulation. Nonetheless, social capital is not evenly distributed or even equally effective. İzmen and Ücdoğru Gurel (2020) revealed that political affiliations and urban-rural differences in Turkey affect the degree to which social capital can be converted into well-being. In a related study, Prayitno et al. (2022) revealed that in Indonesia, social capital indirectly boosts welfare through increased entrepreneurship, financial literacy, and digital competence. Such results imply that, despite the fact that social networks offer significant support systems, institutional and structural contexts tend to mediate its welfare impacts.

When social capital offers the connective tissue of welfare, then human capital is its productive force. The positive correlation between education and income was formally established by Mincer (1974) who showed that the more years of schooling, the higher the earnings potential. Building on this premise, Mahmood et al. (2014) affirmed that education has always led to enhanced welfare outcomes in Asian economies. Niankara (2019) also added a gendered aspect, showing that the literacy gap in female-headed households in Burkina Faso significantly decreases food and non-food consumption. Taken together, these studies confirm that education, skills, and experience increase household capacity and decreases susceptibility to economic shocks.

Financial capital is equally vital in providing the liquidity that is required to kick-start and maintain these capabilities. Kumar et al. (2020) discovered that access to institutional credit in rural India not only raised household income but also provided latent productive skills. Evidence that supports this claim is provided by Thanh et al. (2019) in Vietnam and Raghunathan et al. (2023) in India which both showed that income, consumption, and the empowerment of women were improved by participation in microcredit programs and self-help groups. These results place financial capital as a stabilizing force that allows households to transform opportunities into welfare gains that can be measured.

Household resilience is also enhanced by income diversification. According to Watema (2023), in Uganda, even a small rise in income diversity has a considerable impact on increasing household consumption. Similarly, Asfaw et al. (2019) also showed that livelihood diversification in Sub-Saharan Africa makes people more resilient and less vulnerable to external shocks. These researches point out that flexibility and risk distribution among various sources of income are critical elements of long-term welfare.

More recently, attention has expanded to the psychological dimensions of welfare, recognizing emotional resilience as an integral component of sustainable livelihoods. As demonstrated by Mahmud and Riley (2021), crises like the COVID-19 pandemic exacerbate vulnerabilities, especially among women with food insecurity and debt pressures. Liu et al. (2019) and Comelli (2021) also demonstrated that indebtedness undermines subjective well-being, and positive welfare systems alleviate psychological stress. These lessons indicate that mental and emotional health are not just by-products of material wealth but core factors that support long-term welfare benefits.

The effectiveness of integrated livelihood strategies is also evidenced by institutional and programmatic interventions. Karimli et al. (2020) reported that in Burkina Faso, the model of graduation, based on transfers of assets, savings, and training, had a great impact on the food security and the decision-making power of women. Cheng et al. (2021) demonstrated that rural industrialization in China increased household income and consumption by creating jobs and increasing productivity. Theoretically, Putnam (2001) had it that institutionalized social capital is the source of such social capital as trust, cooperation and effective governance, which strengthens individual welfare outcomes.

The literature consistently portrays household welfare as multidimensional, shaped not only by material resources but also by social cohesion, psychological strength, and institutional support. Although a large part of the literature on livelihood and welfare literature is about rural families and agricultural society, welfare relations in the industrial labor relations are in some significant ways different. The instability of wages, occupational health hazards, less formal employment agreements, and the inability to live in urban areas are common to industrial workers and determine the way livelihood capitals are converted into welfare outcomes. The industrial worker households are not as dependent on land and agricultural diversification as rural households, and instead depend more on employment stability, financial liquidity, housing quality, and access to urban services. Thus, the relationship between livelihood capitals and welfare in manufacturing clusters can be transmitted by different mechanisms, which need empirical studies in a specific context. Such advances notwithstanding, there is a definite research gap. Although some studies have looked at individual factors like education, income, or access to credit, few studies have looked at the combined effect of multiple livelihood capitals on welfare outcomes in industrial labor settings. The industrial workers especially in the developing economies are still underrepresented in the multidimensional welfare research.

The multidimensional welfare measurement has some significant methodological issues concerning the weights of indicators and specification of the model. Purely subjective weighting could be biased in normative way and purely statistical methods could be contextually biased. The hybrid weighting methods which combine the entropy-based objective variation with the normative judgment of experts offer a balanced solution as they combine the statistical robustness with the context sensitivity. Moreover, econometric models like ordered logistic regression provide a suitable structure to estimate the likelihood of households moving between welfare categories when welfare is classified into ordered categories. This modeling technique allows a more policy-relevant interpretation of welfare mobility than continuous linear models.

This paper fills that gap by developing hybrid weighted indices of seven livelihood capitals and a multidimensional welfare index, which measures economic, health, and housing dimensions among textile workers in Faisalabad, Punjab. The study empirically tests the effects of composite livelihood assets on welfare status using a combined entropy-based objective weighting method and expert-based subjective weighting method, followed by an ordered logistic regression model with marginal effects. This way, it helps to create a more integrated and context-specific conceptualization of welfare in the industrial labor force in Pakistan.

Methodology

This study adopts a quantitative econometric approach to examine the impact of sustainable livelihood capitals on the welfare of textile worker households in Faisalabad, Punjab, Pakistan. The research area is one of the biggest textile industrial centers in the country, and the workforce is diversified and occupied with various forms of jobs. Multistage sampling method was used where major textile firms were selected purposely and random selection of workers in firms was done. The data of 410 respondents were collected through a structured questionnaire.

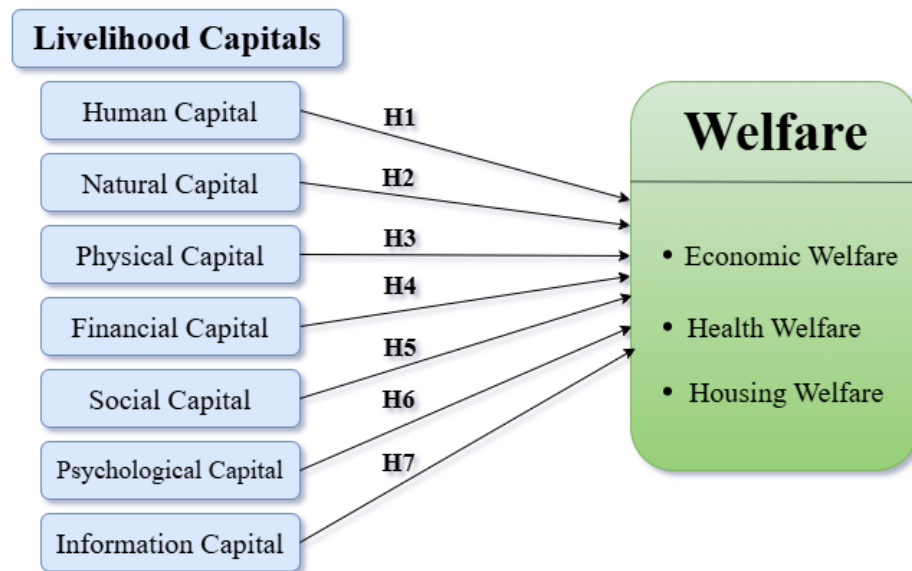


Figure 1: Conceptual Framework Illustrating Effects of Livelihood Capitals on Multidimensional Household Welfare

In Figure 1, the conceptual framework hypothesized that each livelihood capital, Specifically, human, natural, physical, financial, social, psychological, and information capitals have direct impact on welfare outcomes. Household welfare is formulated as a multidimensional concept with the dimensions of economic, health, and housing, which are combined into one composite welfare index. Based on this, the dependent variable of this study is the household welfare status whereby the status is categorized into three ordered levels, namely, low, medium, and high welfare. These groups are based on composite welfare index that shows the increasing level of total household well-being. The independent variables are seven indices of livelihood capital, each of which is built as a composite indicator of livelihood capital through both normalized indicators and weighted aggregation technique.

Measurement and Construction of Livelihood Capital Indices

Sustainable livelihood capitals used in this study are measured according to the Sustainable Livelihood Framework, which provides a conceptualization of household well-being as a multi-dimensional asset. Based on this, seven livelihood capitals human, natural, financial, physical, social, information and psychological were measured by a combination of context specific indicators specific to households of textile workers in Punjab, Pakistan. After the normalization, the indicators were assigned weights based on their contribution to the sustainable livelihood capacity. The paper has employed both expert judgment and statistical data by integrating both subjective and objective weighting techniques in assigning livelihood indicators their weights (Xu et al., 2015). This approach assists in enhancing robustness through matching the contextual expert knowledge and variability that is data-based, which reduces bias by employing a single weighting approach.

The subjective weights were obtained by using expert scoring, in which five experts participated who were experts and professionals in the area of labor economics and sustainable livelihoods (Ding et al., 2018). Each expert was asked to rate the relative score of the livelihood indicators on his or her own and the average of the expert scores was used to obtain subjective weight. The estimation of the objective weights was done with the assistance of the entropy method which gives more weight to indicators that vary in information more among the respondents and, thus, possess greater discriminatory ability (Jiang and Shen, 2013). The overall weights were then determined by taking into consideration the subjective and objective weights which had equal weight (50-50) as

shown in appendix Table A1. It is a combination model of weighting scheme that ensures the applicability of theory and the diversification of the empirical data in the construction of the index.

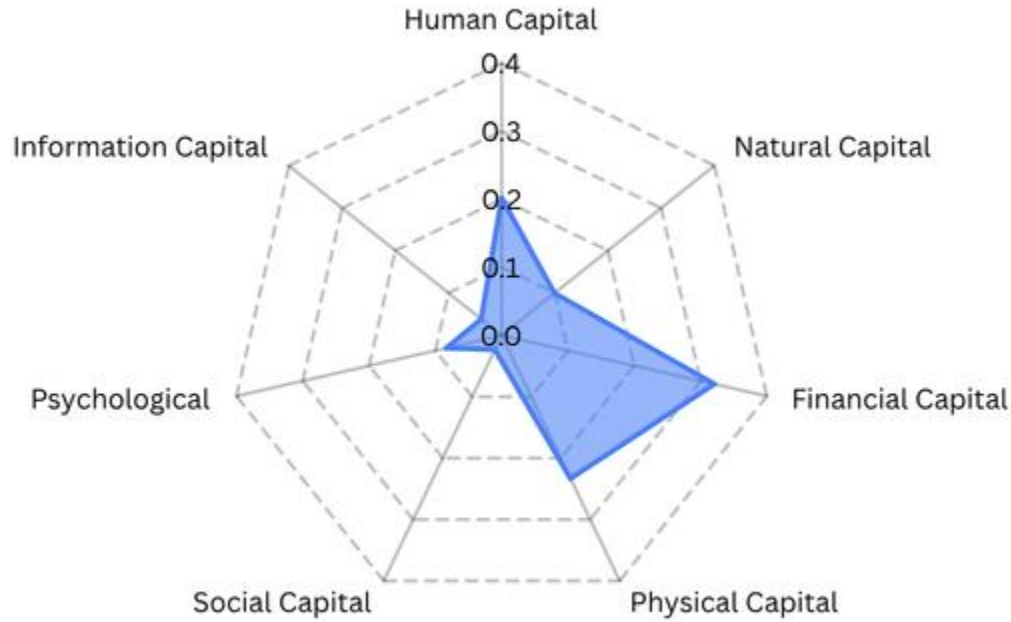


Figure 2: Relative Weights of Sustainable Livelihood Capitals

Welfare Index

A selection of indicators of economic, health, and housing conditions was made to create the welfare index based on theoretical relevance and available data as illustrated in appendix Table A2. After the normalization of indicators through min-max standardization method, a combined subjective-objective weighting method was used to give the welfare indicators weights (Gajera et al., 2016). This approach combines professional knowledge with the variability based on data to make it robust and minimize possible bias. The subjective weights were acquired in the form of expert judgment, which entailed the assessment of the relative significance of welfare indicators by experts in their respective domain. Objective weights were calculated by the entropy method whereby high weights were given to the indicators that had high variability among households, meaning greater information content. The overall weight of every indicator was computed by giving the same weight to both subjective and objective weight. Three distinct welfare indices were developed using a weighted aggregation method with the normalized indicators and the overall weights. The welfare index of each dimension was calculated as:

$$\text{Welfare}_{di} = \sum_{j=1}^{nd} X_{ij}^* \beta_j$$

where:

Welfare_{di} = Score of welfare dimension d (economic, health, or housing) for the ith household

X_{ij}^* = normalized value of indicator j

β_j = comprehensive weight of indicator j

nd = number of indicators included in welfare dimension d.

The result of this process is three continuous welfare indices, economic welfare, health welfare and housing welfare. Table A2 presents subjective and objective weights of each welfare index, as well as comprehensive weights.

Based on these comprehensive weights, economic, health and housing welfare dimension specific indices were computed by weighted aggregation and the welfare index was calculated as:

$$WI_i = \frac{1}{3} (EWI_i + HWI_i + HSI_i)$$

where:

WI_i = Overall Welfare Index of the the i th household

EWI_i = Economic Welfare Index

HWI_i = Health Welfare Index

HSI_i = Housing Welfare Index

The welfare index is a balanced measure of welfare in the household taking into consideration the economic, health, and housing aspects. Decancq and Lugo (2013) argued that a simple and equally weighted sum is a strong and clear technique in cases where dimensions are regarded as equally important to human well-being.

Model Specification

An ordered logistic regression model was used to test the relationships, depicted in Figure 1 empirically. The model estimates the likelihood of a household falling into higher welfare categories based on livelihood capital indices. The latent welfare model is defined as:

$$W_i^* = \beta_0 + \beta_1 HC_i + \beta_2 NC_i + \beta_3 PC_i + \beta_4 FC_i + \beta_5 SC_i + \beta_6 PsyC_i + \beta_7 IC_i + \varepsilon_i$$

Where HC_i , NC_i , PC_i , FC_i , SC_i , $PsyC_i$ and IC_i represent human, natural, physical, financial, social, psychological, and information capital indices, respectively, ε_i shows error term.

The maximum likelihood estimation was used to estimate model parameters. Model fit was evaluated using the likelihood ratio chi-square test and pseudo R-squared, and robust standard errors were used to guarantee accurate statistical inference. Proportional odds assumption was tested and satisfied, which proved the appropriateness of the ordered logit model. All these were determined with the use of Stata software. Marginal effects were calculated to aid interpretation by estimating the influence of changes in livelihood capital indices on the likelihood of households falling in various welfare categories, especially the high welfare category. The marginal effects give an intuitive and policy-relevant insight into the role of livelihood capital improvements in increasing household welfare.

Results and Discussion

Respondent Statistical Information

The demographic profile of the respondents in Table 1 reveals that the textile workforce is dominated by young and economically active people with 45.9% of the population under 30 years and 47.1% under the 30-45 years age brackets. The sample size of females constitutes a significant percentage of 45.9% which is an indication of rising female involvement in the industry. The majority of the workforce is medium-educated 55.5% with only 14% of the workers being highly educated, which means that they are not exposed to advanced skills. The income level is also low with 33.7 percent in low-income category and 40.2 percent in the middle-income group. Most of the respondents are married 55.4% and majority of them have 3-4 dependents 56.8% indicating that they have a lot of responsibilities at home. There is an equal division of family structures between nuclear (51.7 %) and joint (48.3 %) systems. In general, the demographic patterns indicate that there is a high economic pressure on labor force because of moderate income and high dependency rates, which directly affect the livelihood patterns and welfare achievement of workers.

Table 1: Characteristics of interviewed workers

Variable	Category	Percent (%)
Age Group	Young (<30 years)	45.9
	Middle-aged (30-45 years)	47.1

Gender	Older (≥ 46 years)	7.1
	Male	54.1
Education Level	Female	45.9
	Low Education (None–Middle)	30.5
	Medium Education (Secondary–Higher Secondary)	55.5
Income Group	High Education (Graduate–Postgraduate)	14.0
	Low Income ($\leq$ PKR 42,500)	33.7
	Middle Income (PKR 42,501–47,000)	40.2
Marital Status	High Income ($>$ PKR 47,000)	26.1
	Single	44.5
	Married	55.4
	Widow	2.4
Type of Family	Widower/Divorced	0.9
	Nuclear	51.7
Number of Dependents	Joint	48.3
	Low Dependents (0–2)	31.7
	Medium Dependents (3–4)	56.8
	High Dependents (≥ 5)	11.5

Welfare Categorization

The composite welfare index was categorized into three ordered groups based on its welfare levels, low welfare (0.14–0.45), medium welfare (0.45–0.60), and high welfare (0.60–0.91). Table 2 shows that 29.51% of households fall into the low welfare category, 35.61% into the medium welfare category, and 34.88% into the high welfare category.

Table 2: Distribution of Textile Worker Households by Welfare Category

Welfare Category	Frequency	Percent	Cumulative
Low Welfare	121	29.51%	29.51%
Medium Welfare	146	35.61%	65.12%
High Welfare	143	34.88%	100.00%

This distribution shows that there is a high degree of dispersion in the welfare levels of textile worker households. The distribution of households in the medium bracket indicates that a high percentage of workers are in moderate livelihoods with only almost a third in low welfare levels. The existence of a large high welfare group also proves the heterogeneity in livelihood outcomes. This difference justifies the use of the ordered logistic regression model.

Ordered Logistic Regression

Table 3: Ordered Logistic Regression Results for Household Welfare Status

Variable	Coefficient	Robust Std. Error	z-value	p-value
Human Capital	1.006**	0.444	2.27	0.023
Natural Capital	0.771**	0.319	2.41	0.016
Financial Capital	3.621***	0.417	8.68	0.000
Physical Capital	6.334***	0.479	13.22	0.000
Social Capital	−0.614	0.593	−1.03	0.301
Information Capital	0.146	0.427	0.34	0.732
Psychological Capital	0.213	0.394	0.54	0.588

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

The results of ordered logistic regression model are shown in Table 3. The hypotheses (H1–H7) on the influence of livelihood capitals on household welfare are measured based on the ordered logistic regression findings. The results show that the H1 (Human Capital), H2 (Natural Capital), H3 (Physical Capital), and H4 (Financial Capital) are supported because these variables have positive and

statistically significant impacts on welfare outcomes. Specifically, the strongest impact is exhibited by physical and financial capital, which point towards the predominance of material resources in enhancing household wellbeing. Conversely, H5 (Social Capital), H6 (Psychological Capital) and H7 (Information Capital) are not supported because these variables are not statistically significant in the ordered logit model. These results suggest that while intangible capitals may contribute to long-term resilience, they do not exert a direct measurable impact on welfare status within the current analytical framework. The results reveal that material and economic livelihood capitals play a decisive role in determining household welfare outcomes among textile workers, while intangible capitals show no statistically significant direct effects. The Human Capital Index exhibits a positive and statistically significant effect on household welfare at the 5 percent level ($\beta = 1.006$, $p = 0.023$). This finding implies that improvements in education, employment stability, health status, and job position significantly increase the likelihood of households transitioning to higher welfare categories. This result is consistent with ordered regression studies in livelihood research, which consistently identify education and human capital as key determinants of welfare and livelihood security (Chiphang and Singh, 2020; Hastuti et al., 2022). Similar evidence is reported by Shui et al. (2022), who found that human capital significantly enhances household participation and welfare outcomes in ordered livelihood categories.

The Natural Capital Index also demonstrates a positive and significant relationship with household welfare ($\beta = 0.771$, $p = 0.016$). This suggests that access to clean water, sanitation facilities, and a healthy living environment contributes meaningfully to improved household welfare status. This finding aligns with prior ordered regression studies emphasizing the role of environmental and natural assets in shaping household well-being and reducing vulnerability (Cele and Mudhara, 2024; Ndiwa et al., 2025). Adequate natural capital reduces health risks and living costs, thereby strengthening household welfare outcomes. The Financial Capital Index shows a strong and highly significant effect on household welfare ($\beta = 3.621$, $p < 0.01$), indicating that savings, income levels, access to loans, and firm-level financial support substantially increase the probability of households belonging to higher welfare categories. This finding is strongly supported by the livelihood literature, which consistently identifies financial capital as a central determinant of welfare and food security outcomes in ordered regression frameworks (Ojo, 2019; Borku et al., 2024). Financial capital enhances households' capacity to smooth consumption, cope with shocks, and invest in welfare-enhancing activities, thereby promoting upward welfare mobility. Among all livelihood capitals, Physical Capital exhibits the largest coefficient and the strongest statistical significance ($\beta = 6.334$, $p < 0.01$), underscoring its paramount importance in determining household welfare status. This result highlights the critical role of housing quality, sanitation infrastructure, and access to physical facilities in shaping welfare outcomes. Similar findings are reported by Shui et al. (2022) and Cele and Mudhara (2024), who demonstrate that physical assets significantly increase the likelihood of households attaining higher livelihood and welfare categories. The dominance of physical capital reflects the material nature of welfare measurement, which is closely tied to housing conditions and physical living standards.

In contrast, Social Capital, Information Capital, and Psychological Capital do not exhibit statistically significant effects on household welfare in the ordered logit model. While these capitals are theoretically important for livelihood resilience and long-term sustainability, their lack of direct significance suggests that intangible livelihood assets may influence welfare indirectly or through interaction with material and economic capitals rather than exerting immediate effects on welfare status. Similar patterns have been observed in ordered regression studies, where social and psychological factors often play supporting or mediating roles rather than direct determinants of welfare categories (Mahama and Maharjan, 2018; Sadyrtidinov et al., 2019).

Model Diagnostics

Table 4: Threshold (Cut-point) Parameters

Cut-point	Estimate	Robust Std. Error
Cut 1 (Low Medium)	3.820***	0.601
Cut 2 (Medium High)	6.474***	0.640

The threshold parameters presented in Table 4 are positive and statistically significant, confirming the validity of the ordered structure of the dependent variable. The estimated cut-points ($\mu_1 = 3.820$ and $\mu_2 = 6.474$) effectively distinguish between low, medium, and high welfare categories.

Table 5: Model Statistics

Statistic	Value
Wald χ^2 (7)	202.03***

Log Pseudo-Likelihood	-306.160
Pseudo R ²	0.3166

Model fit statistics in Table 5 further support the robustness of the model. The Wald chi-square value ($\chi^2 = 202.03$, $p < 0.01$) indicates that livelihood capital indices jointly explain variations in household welfare. The pseudo R² value of 0.3166 suggests a substantial explanatory power for the model.

Table 6: Proportional Odds (Parallel Lines) Assumption Test

Test	χ^2 Statistic	p-value	Decision
Likelihood Ratio Test	4.42	0.7305	Assumption satisfied

The proportional odds assumption was tested using the likelihood ratio test showed in Table 6, yielding a p-value of 0.7305, which confirms that the assumption holds. This validates the appropriateness of the ordered logistic regression model for the analysis.

Odds Ratio

Table 7 presents the odds ratios derived from the ordered logit model. The results indicate that a one-unit increase in human capital increases the likelihood of moving to a higher welfare category by approximately 2.7 times. Natural capital increases this likelihood by 2.16 times, while financial capital (OR = 37.39) and physical capital (OR = 56.29) exhibit exceptionally strong effects.

Table 7: Odds Ratios from Ordered Logit Model for Household Welfare Status

Variable	Odds Ratio	Std. Error	z-value	p-value
Human Capital	2.736 **	1.214	2.27	0.023
Natural Capital	2.161 **	0.690	2.41	0.016
Financial Capital	37.386***	15.602	8.68	0.000
Physical Capital	56.294***	26.787	13.22	0.000
Social Capital	0.541	0.321	-1.03	0.301
Information Capital	1.158	0.494	0.34	0.732
Psychological Capital	1.238	0.488	0.54	0.588

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

These findings emphasize the dominant role of financial and physical assets in determining welfare outcomes. Households with greater access to income, savings, housing, and infrastructure are significantly more likely to achieve higher welfare status.

Marginal Effects Analysis

To provide a more intuitive interpretation, marginal effects were estimated for the probability of being in the high welfare category.

Table 8: Marginal Effects of Livelihood Capitals on the Probability of High Welfare

Variable	dy/dx	Std. Error	z-value	p-value
Human Capital Index	0.129 **	0.057	2.27	0.023
Natural Capital Index	0.098 **	0.041	2.40	0.016
Financial Capital Index	0.463*	0.047	9.86	0.000
Physical Capital Index	0.809*	0.029	28.15	0.000
Social Capital Index	-0.078	0.076	-1.03	0.301
Information Capital Index	0.019	0.055	0.34	0.732
Psychological Capital Index	0.027	0.050	0.54	0.588

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

The results in Table 8 show that physical capital has the strongest effect, increasing the probability of high welfare by 80.9 percentage points. Financial capital follows with an increase of 46.3 percentage points, highlighting the importance of financial resources in improving living standards. Human capital contributes a 12.9 percentage point increase, while natural capital increases the probability by 9.8 percentage points.

In contrast, social, information, and psychological capitals do not exhibit statistically significant marginal effects. This indicates that these factors may influence welfare indirectly or through interaction with material assets rather than having a direct measurable impact.

Conclusion and Policy Implications

This paper investigated how sustainable livelihood capitals affect the multidimensional welfare of textile worker families in Faisalabad, Pakistan, with an ordered logistic regression model. The analysis offers a holistic view of the determinants of household well-being in an industrial labour environment by creating composite indices of seven livelihood capitals and a multidimensional welfare index that incorporates economic, health and housing dimensions.

The empirical results indicate that material and economic livelihood capitals dominate the outcome of household welfare. Specifically, physical capital becomes the most influential factor with financial capital coming in second and both play a significant role in enhancing the probability of households achieving higher welfare status. The positive and statistically significant impacts can also be seen in human capital and natural capital, which means that the increase in the level of education, working conditions, health status, and the availability of environmental resources can have a significant positive effect on welfare.

Social, information and psychological capitals, in contrast, do not exhibit statistically significant direct effects in the ordered logit framework. This indicates that although such intangible assets can contribute to long-term resilience and adaptive capacity, they are not likely to have a direct impact on welfare but rather are mediated by material and economic resources. All in all, the findings indicate that material livelihood resources continue to be the leading sources of welfare gains among households of textile workers.

Polymaking-wise, these findings highlight the importance of specific intervention measures that can enhance the material basis of household welfare. To begin with, the accessibility to affordable and quality housing, sanitation facilities, and simple physical infrastructure should be improved, as it is the most dominant among physical capital. Second, the policies that are designed to enhance financial inclusion, including access to formal credit, savings, and employer-provided financial assistance, can greatly boost welfare outcomes by allowing households to cope with risks and invest in productive opportunities.

Third, human capital development by way of education, vocational training, and occupational health programs should be invested in in order to enhance the productivity of workers and their long-term welfare opportunities. Moreover, the availability of clean water and environmental facilities can also be enhanced to enhance welfare outcomes through minimizing health risks and expenditures. The intangible capitals were not observed to have any direct impacts but the indirect contribution of the same should not be ignored. Social cohesion, access to information and psychological well-being policies can boost the efficiency of material capital investments and help to sustain livelihoods in the long-term.

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Appendix

Table A1: Weights of textile workers sustainable livelihood indicators

Capital	Capital weight	Indicator	Subjective weights	Objective weights	Comprehensive Weight
Human Capital	0.2016	Education	0.0692	0.0188	0.044
		laborers	0.0381	0.0307	0.0344
		Illness due to working	0.0692	0.0658	0.0675
		Employment type	0.0657	0.0172	0.0414
		Job role	0.0173	0.0113	0.0143
Natural Capital	0.0995	Clean water access	0.0657	0.0514	0.0586

Financial Capital	0.3208	Park near house	0.026	0.0557	0.0409
		Savings	0.0588	0.1127	0.0857
		Income	0.0761	0.149	0.1125
		Loan access	0.0588	0.0606	0.0597
		Firm financial support	0.0727	0.0531	0.0629
Physical Capital	0.2332	Physical equipment	0.0692	0.0459	0.0575
		House ownership	0.0675	0.0727	0.0701
		Sanitation facilities	0.0484	0.0459	0.0471
		Housing type	0.0554	0.0615	0.0585
Social Capital	0.0230	Social organization	0.0069	0.0091	0.008
		Community Participation	0.0208	0.0092	0.015
Psychological	0.0834	Performance in stress	0.0554	0.0329	0.0442
		Confidence in stress	0.0415	0.0369	0.0392
Information Capital	0.0385	Internet access	0.0104	0.0322	0.0213
		Information utilization	0.0069	0.0275	0.0172

Table A2: Weights of welfare indices Indicators

Index	Indicator	Subjective weights	Objective weights	Comprehensive Weight
Economic Index	Allowances children marriage	0.222222	0.206504	0.214363
	Education	0.222222	0.199707	0.210965
	Income	0.166667	0.198823	0.182745
	Medical allowance	0.166667	0.197593	0.18213
	Savings	0.222222	0.197373	0.209797
	Fruit per week	0.2	0.203285	0.201642
Health Index	Healthcare facilities	0.133333	0.203252	0.168293
	Meals per day	0.266667	0.203207	0.234937
	Meat per week	0.2	0.200299	0.20015
	Nutrition issues	0.2	0.189957	0.194979
	House ownership	0.214286	0.252931	0.233608
	Housing type	0.285714	0.252931	0.269323
	Physical equipment	0.214286	0.248079	0.231182
	Sanitation facilities	0.285714	0.246059	0.265887



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