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HOW DEMOGRAPHIC, ECONOMIC, AND ENVIRONMENTAL CIRCUMSTANCES SHAPE LABOUR’S PRODUCTIVITY IN RURAL SETTING: A CASE STUDY OF CHITRAL

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	Abstract
Nahida Noor PhD Scholar, Department of Economics, University of Peshawar, Pakistan. naheeda.noor5@gmail.com Dr. Zilakat Khan Malik Professor, Department of Economics, University of Peshawar. zilakat@uop.edu.pk Dr. Nadeem Iqbal Assistant Professor, Department of Economics, University of Peshawar, Pakistan. nadeemiqbal@uop.edu.pk Ashiq Hussain MS Management Science, Department of Management Science, Karakoram International University, Gilgit-Baltistan, Pakistan. ashiq.hussain5@gmail.com	This study explains how labour’s productivity is influenced by various circumstances like demographic, environmental, economic circumstances in rural areas of Chitral a District of Khyber Pakhtunkhwa, Pakistan. The study used community based purposive sampling method to collect data from 381 workers from scattered regions and workplaces. Before proceeding to formal tests, reliability test and collinearity assessment tests were applied. The data turned out reliable and no serious collinearity was detected among regressors. To achieve the objectives of the study, multiple linear regression analysis was applied on the collected data. The theoretical foundations of this study lied in the Sen’s Capability approach theory, which captures the important external factors and individual’s capabilities in determining worker’s productivity. The results showed that human capital is the strongest predictor of labour’s productivity in Chitral. Whereas, the environmental circumstances, discrimination, economic instability have negative impacts on productivity. The demographics and housing quality also played important impact on labour’s outcomes. Overall, this study explains that the labour’s productivity in rural settings is not only impacted by personal efforts rather, it is influenced by a combination of structural, contextual and demographic circumstances which either limit or support the labour’s performance and efficiency. This study has significantly contributed to the literature of regional development and labour economics by providing in dept and context-specific identification of determinants of labour’s productivity in geographically isolated, remote and marginalized area of Pakistan. The study also provide policy recommendations based on the findings of the study. Moreover, the study highlighted the limitation of the study and also provide future research directions.
Keywords:	Circumstances, Productivity, Capability Approach theory, Human capital, collinearity.

Introduction

In today's challenging and technologically rapidly developing world, a worker's productivity is very crucial and significant component not only for himself but also for the success of the organization. Therefore, it is necessary to know what factors are affecting worker's productivity. It is pertinent mention that that workers productivity relies on different factors. These factors can increase or decrease the workers' productivity depending on the factor's nature of the impact. Most of the time, the workers' productivity is determined using an accumulation of different factors.

Worker's productivity is mainly calculated in output units and the defined timeframe for workers (Moussa, Bright and Varua, 2017). The calculation of workers productivity is crucial in the organization because it provides the organization with a result about the workers contribution to the production process. Moreover, workers productivity is also important because it provides evident information about the workers' existence in the organization. Worker's productivity can increase or decrease workers value within the organization. Workers with higher productivity are considered to be an important factor/asset for the organization. On the other hand, workers with low productivity can turn into a burden on the organization. Most of the workers in the organization are engaged in improving their productivity. Worker's productivity is mainly aligned with the organization's internal culture. Effective and cooperative organizational culture can increase workers productivity because it enhances cooperation among employees (Drucker, 2018). In general terms, workers productivity is linked with manufacturing the organization outputs, however, workers productivity also determines workers engagement and commitment towards performing different tasks. The factor of workers efficiency is one key factor in the workers' productivity. Worker's productivity varies from industry to industry (Kazaz et al., 2016). Worker's productivity is mainly calculated in output units and the defined timeframe for workers (Moussa, Bright and Varua, 2017). The calculation of workers productivity is crucial in the organization because it provides the organization with a result about the employee or workers contribution to the production process. Moreover, workers productivity is also important because it provides evident information about the workers' existence in the organization. Worker's productivity can increase or decrease workers value within the organization. Workers with higher productivity are considered to be an important factor/asset for the organization. On the other hand, workers with low productivity can turn into a burden on the organization. Most of the workers in the organization are engaged in improving their productivity. Worker's productivity is mainly aligned with the organization internal culture. Effective and cooperative organizational culture can increase workers productivity because it enhances cooperation among employees (Drucker, 2018). In general terms, workers productivity is linked with manufacturing the organization outputs, however, workers productivity also determines workers engagement and commitment towards performing different tasks. The factor of workers efficiency is one key factor in the workers' productivity. Worker's productivity varies from industry to industry (Kazaz et al., 2016).

Similarly, the study has also discussed circumstances to provide a comprehensive understanding of the concept. Circumstances are different factors that every individual can experience from birth. The circumstances are a diverse set of different factors that impact individual life at different ages. Circumstances are the formation of unavoidable situation that affects individual life performance (Kazaz et al., 2016). This unavoidable situation shapes the individual performance in both domestic and professional manner. Circumstances can also be called special circumstances. Special circumstances are mainly associated with special situations that carry a massive impact on the individual life. One special circumstance can be climate change. The change in the global weather pattern is changing the social, economic, political and structural approach of individuals, organizations and institutes across the world (Turhan et al., 2016). The common circumstances example includes family background, religion, race, individual residence, norms and values, culture and tradition, language and surrounding environment (Almond, Currie and Duque, 2018). Circumstances can be a life-long event established from a childhood influenced by the parental approach towards the individual. These life-long events can be the accumulated set of different activities that direct and indirect influence individual performance. Circumstances can be the set of different factors that affect individual educational life and academic achievement from childhood (Sisk et al., 2018). The complexities of different situations that bounds individuals to act according to the situation are considered circumstances.

Considering a remote a mountainous region for this case study itself makes the study unique because the region geographic isolated with tough climatic and extreme environmental conditions, limited access to health services, infrastructure and formal employment. The only good thing about this region is that it has literacy rate which is higher than the KP provincial average (Census 2023). These are the daily challenges which affects the mental and physical health of workers in Chitral. Therefore, studying productivity in Chitral is important for both the local government and policy makers. It is also important for the readers and researcher that how extreme environments and circumstances affect the outcomes of workers in mountainous regions. Moreover, the structural challenges like limited informal employments, vocational training centers,



unstable incomes, rapid climatic challenges, and gender disparities in the labour markets of Pakistan. Such constraints do not allow workers to perform better and compete in the labour markets. Therefore, analyzing productivity in Pakistan and particularly in rural settings would contribute in the literature related to remote region.

Keeping the above discussion into consideration the study is mainly focusing on workers productivity in different circumstances i.e. demographic circumstances, socioeconomic circumstances, environmental and workplace circumstances etc. in a mountainous and rural region.

The objective of the study is to find the effect of labour's circumstances on labor's productivity with an aim to support United Nations' Sustainable Development Goals. This study aims to support SDG 8 which is "Decent Work and Economic Growth" by identifying the factors which influence and are important for labour's productivity.

Methodology

This is a quantity study following the positivism paradigm to achieve the objectives of the study, because Labour's productivity seems a social fact that is unchanged with the people perception. It is considered a social fact (Adler, Fulton and Hoegeman, 2020). The reality of unchanged social facts cannot be denied; therefore, the study is following the positivism philosophical paradigm. Furthermore, the study approach is positivist because as a researcher, it is firmly believed that circumstances that impact the workers' productivity are a social fact.

The community assisted purposive sampling method is used to collect the data because in rural areas it is difficult to reach population as the workplaces and houses are spread across mountain, small villages and valleys. Therefore, the study often relies on local knowledge to identify eligible respondents. Such sampling methods are useful when the data collection is difficult because of the population, which is geographically dispersed (Etikan, Musa & Alkassim, 2016; Palinkas et al., 2015). The community assisted purposive sampling helps to consider a greater sample of workers across Chitral to achieve reliable results.

The study used Krejcie and Morgan's (1970) table for sample size and the sample turned out to be 381. The study has opted for a close-ended questionnaire as a data collection technique. The use of a close-ended questionnaire can be an effective technique to collect data from the sample space in the Chitral region. Moreover, the use of questionnaires is a cost-effective and time-efficient way to target a larger population (Boparai, Singh and Kathuria, 2018).

Theoretical Framework

The study has proposed the Capability Approach (1979) to analyze labour's circumstances and their productivity. This theory was presented by Amartya Sen, which explains that a person's circumstances like family demographics, living and housing condition, education, socioeconomic environmental circumstances shape their ability to convert resources into meaningful achievements. Thus, this Capability Approach theory present better theoretical foundation for analyzing the said variables.

Econometric Model

This study used multiple linear regression model to analyze how circumstances influence Labour's productivity.

This model estimates the direct relationship between circumstances and labor productivity.

$$Y_i = \alpha_0 + \alpha_1 C_i + \alpha_2 C_i + \alpha_3 C_i + e_1 \dots \dots \dots (1)$$

Here,

Y = worker's productivity, (e.g., Personal Income / Self Assessed Productivity)

i represent the no of individuals

α_0 = the intercept of model

e_1 = the error term of the model

α_i = the coefficient of the variables of the model

C= Vector of worker's circumstances, (demographic, economic, environmental, health, social, discrimination, etc.)

Table 1: *Summary table of Variables, their Description and Measurement*

Variable	Description	Unit / Measurement		References
Demographic	age, gender, marial status, education, work type, occupation, place of birth,	Categorical	(Nominal	Akram, Pervaiz & Jan (2021);
Circumstances	educational background, religion, language, and migration status etc	Data)		Galanti et al. (2021)



Advance Journal of Econometrics and Finance

Vol-4, Issue-1, 2026

Economic Status	Circumstances/	assessed by household assets (land, vehicle, motorcycle, laptop, smartphone, etc.), monthly income and expenditures, and subjective socioeconomic position utilizing a 1–10 scale	Mixed Indicators	Al-Mamun & Hasan (2017); Breza, Kaur & Shamdasani (2018)
Social and Cultural Circumstances		cultural traditions, preferences for traditional food and clothing, and perspectives on early marriage	Mixed Indicators	Breza, Kaur & Shamdasani (2018)
Environmental and work place Circumstances		were workplace temperature, humidity, lighting, noise, air quality, climate-related challenges, comfortable and supportive working place, transportation barriers, relationship with immediate boss, and colleagues.	Mixed Indicators	Chang et al. (2019)
Discrimination Circumstances		Whether the worker experiences discrimination at work or in society.	Mixed Indicators	Rasool et al. (2019)
Family Background and Housing Circumstances		parental education and occupation, house ownership (owned/rented), building quality (pakka/kacha), household size, and the number of earning members	Mixed Indicators	Black & Devereux, (2011)
Subjective (Self- Assessed)	Productivity	Worker’s own perception of productivity, focus, task completion.	Likert scale (1–5)	Choudhury, Foroughi & Larson (2021)
Objective (Income)	Productivity	Monthly income as a proxy for productivity.	PKR (Monthly Income)	Mahy, Rycx & Vermeylen (2015)

Results and Discussion

The reliability of the data is very important is studies where primary data is used. Therefore, to check the reliability of the data Cronbach’s alpha test is applied and is one of the most reliable tests used to check the reliability of Likert scale item in primary data, (Tavakol & Dennick, 2011).

Table 2: Reliability Test and Interpretation

Variables	Cronbach's Alpha Value	Interpretation
Working Environment Circumstance	.77	Acceptable
Work Place Discrimination	.69	Moderately Acceptable
Self-Assessed Productivity	.70	Moderately Acceptable

Cronbach’s Alpha against each variable given in table 2 demonstrate that the two scales exhibit good internal consistency, with Cronbach’s Alpha values above 0.70. However, the work place discrimination scale is slightly below the threshold, but still provide moderate reliability and remain suitable for further analysis.

Assessment of Multicollinearity in the Model

Before carrying out the formal regression analysis, a multicollinearity test was conducted to check whether the independent variables are correlated with each other or not. The Variance Inflation Factor (VIF) is widely used to check collinearity among variables in regression analysis, (Hair et al., 2019; Field, 2013). The values of VIF indicated no serious collinearity issue between variables and the table of VIF is presented in appendix.

Regression Analysis Interpretation and Discussion

In the regression model the labour’s productivity is dependent variable and circumstances are independent variables. The circumstances include demographic, socio-economic, working environment, environmental, household characteristics, etc. which are shown in detail in the table 3. This table explains the impact of each variable separately, overall model significance and also critically analyze the findings with reference to the literature and in the context of Chitral.

The coefficient of gender is positive and statistically significant which indicates that there is income disparity between men and women in this sample. It means the male labours and getting higher income as compare to their female counterparts. This result is aligned with numerous studies Nguyen et al., 2023; Kundi et al., 2021; Akram, Pervaiz

& Jan 2021, that men usually get such positions where they have greater authority, autonomy, physical mobility and decision-making power which ultimately improves their income and productivity. On the other hand, women have limited leadership opportunities, training and skill development, mentorship and growth opportunities thus, they lack behind in terms of productivity and it limit their earning. There is another evidence in support of this result that the income disparity between men and women is because of women's other responsibilities, such as domestic and family caregiving, which diminishes their time, energy, and psychological resources for professional tasks, leading to reduced earnings compared to men (Galanti et al. 2021).

According to (Khan & Bano, 2022; ILO, 2024) studies, in Chitral women's participation in formal employment is very limited because of mobility issues, safety concerns and cultural norms. Even though, this data set does not directly measure these factors but the result seems why there is income disparity among men and women in this region. The coefficient of father's education is positive and is statistically significant which indicates that the labours whose fathers have higher education demonstrate better income levels as compare to those labours whose fathers have no or less education. According to the intergenerational human capital theory, when the parents are more educated then they are more equipped to facilitate their children's education, by offering them good facilities and advices about career and education, and also provide them a conducive environment to discipline and success (Becker & Tomes, 1986). Another study (Carneiro & Heckman, 2003) also demonstrates same findings that educated fathers have good problem-solving skills, good ethics and are well aware of opportunities for their children. Such elements can impact positively on children's attitude and abilities once they grow. In regional studies it is explained that the parental education plays a significant role in shaping children's life, (Khan & Bano, 2022; ILO, 2024). The children belong to educated parents have better career plans, educational guidance, a supportive home environment and also access to good financial resources. These early advantages play an important role in their shaping their academic and carer life, which ultimately improves their higher productivity in the labour market. Therefore, parental education is considered one of the important variables which is linked with children long term development.

The variable maternal education is not statistically significant which indicated that the maternal education has no impact on labour's productivity in this sample. The result is consistent with studies carried out in rural regions where father's role is dominant or male dominating cultures, most of the decision of children like decision about their educational career, profession choices, marriage decision are taken by either the father or male member of the family (Becker & Tomes, 1986). Therefore, in such settings the mother's role is very limited and their involvement in their children's education and career development is almost zero. Thus, these structural and cultural barriers diminish the quantifiable effect of maternal education, (Saeed & Ali, 2024). Moreover, in regional and rural researches from northern areas of Pakistan (Khan & Bano, 2022; ILO, 2024) also find similar finding which show that how women's role in a society are restricted by cultural and social norms, mobility constraints and very few formal employment opportunities. Even though this dataset does not directly measure these facts but these facts try to explain why maternal education is insignificant and why the impact of maternal education is limited in rural setting like Chitral.

The coefficient of father's occupation as farmer is positive and statistically significant. It indicates that the labours whose fathers are farmers have higher productivity and can earn higher income then those labours whose fathers have other occupations. This finding is aligned with several studies conducted in similar setting (Becker & Tomes, 1986; Carter & Barrett, 2006), which showed that the children of farmers have early exposure to labour market, they are familiar with work discipline, they have access to land and stable resources etc. all these elements are contributed to the upward socioeconomic mobility. Moreover, the labours whose fathers are daily wage labours also have positive coefficient and significant but the relation is weak as compare to those labours whose fathers are farmer. It indicates the daily wage labours have no stable employment and no stable income and they are in a vulnerable position. They do not provide better household facilities, education, health and nutrition to their children because of their unstable income (Banerjee & Duflo, 2011; Fields, 2011). However, the "other occupations" category in the variable of father's occupation have various job categories and combining them into one group may hide the important differences between them, and then their impact and association on labour's productivity is less clear (Erikson & Goldthorpe, 1992). Furthermore, in rural areas, farming is the most common livelihood and similarly in Chitral it is considered as family based activity and people carry this activity since very long. The studies conducted in rural settings showed that farming activities provide shared responsibilities, resource and skill transfer across generation and it also show stability (Khan & Bano, 2022; ILO, 2024). These attributes indicate why the labours belong to farming household earn higher income and show higher productivity in remote areas like Chitral. However, the daily wage labour job is considered as seasonal job with limited opportunities, facilities and pay.

The coefficient of mother's occupation is statistically significant. It indicates both the labours whose mothers are working women and those whose mothers are housewives have no difference in their income and productivity. This finding is aligned with the studies conducted in patriarchal setting (Becker & Tomes, 1986; Saeed & Ali,

2024), where mothers and women are suppressed and fathers and males are dominant. Then the role of mother is confined by societal and cultural norms, their participation in formal employment is limited and their involvement in decision making in household and in their children career and education is also very low.

Women's participation in labour market is very low in rural areas of Pakistan. Even, if a mother is employed, the nature of her employment is homebased or informal or with lower wagers (Khan & Bano, 2022; ILO, 2024). These facts may help here to explain why mother's occupation is insignificant in rural areas like Chitral but her emotional support and household management is always seen and felt.

The coefficient of education in years is positive and statistically significant in association with labour productivity and income. It means with each additional year of education is linked with improved income and better productivity. Most of the studies (Becker, 1993; Psacharopoulos & Patrinos, 2018), showed similar findings that education bring discipline, improve different skills like intellectual skills, communication skills and problem-solving skills, all these are the attributes if a person possess can be successful in workplace. Moreover, according to the human capital theory, education bring good habits, skills and abilities which makes an individual unique and creative thus they became efficient in their work place (Becker, 1993).

Many studies (Psacharopoulos & Patrinos, 2018; Khan & Rehman, 2023). conducted in developing countries context also showed that even with a slight improvement in education can bring a huge difference in workers, particularly in those areas where formal education is limited and skill development is minimal. Thus, it is concluded that education is one of the most important variables of productivity in this sample as it plays a very significant role in shaping labours' skills, abilities, performance, confidence and workplace outcome.

The variable region of residency is not statistically significant. It means that there is no significant difference in labour's productivity among labours residing in rural and urban areas in this sample. This result is aligned with studies (Psacharopoulos & Patrinos, 2018) which showed that the regional income differences lower when labour's invest in human capital. The recent studies (Khan & Bano, 2022; ILO, 2024) conducted in remote areas showed that workers usually move from rural to urban and from urban to rural areas for work and they easily adjust to similar working conditions without any hurdle and difficulty. It can be said that because of labours migration and their easily adjustment to rural and urban areas, the region of residency variable in this sample do not possess any significant relationship with labour's productivity. Furthermore, the variable ownership of the building is also insignificant. It means there is no such income and productivity differences between labours residing in rented or owned houses in this sample. Several studies have shown that the housing ownership or status is an indirect indicator of socioeconomic status, the effect of this variable becomes minimal once more direct and strong predictors are included in the model like human capital (Filmer & Pritchett, 2001).

The regional studies have shown that labours usually rent a house either because of migration and convenience or seasonal movement rather than any financial problem, (Khan & Bano, 2022; ILO, 2024). Similarly, when someone rent a house, it does not reflect poverty. Owning a house or renting a house does not indicate socioeconomic status. That is why it is possible that in this sample these contextual factors are the reason behind the insignificant relationship between the variables. The coefficient of variable quality of the building is positive and statistically significant. It means that the labours residing in pakka houses have higher income and greater productivity than those residing in kacha houses in this sample. This indicates that the good quality of building is associated with stable housing, better living condition which are essential for good health, peace and safety. This result is aligned with studies (Filmer & Pritchett, 2001; ILO, 2024) which showed similar findings like the quality of house is linked with cognitive development and performance, wellbeing and workplace outcomes particularly in developing regions where, housing quality affects labours health and daily activities.

In traditional and rural settings like Chitral the difference in quality of the building (Pakka vs Kacha) reflects the difference in sanitation, heating, access to resources and entire house stability. Workers living in kacha houses face difficulties, like lack of comfort, limited basic facilities, and congestion which ultimately affect their health, sleep and focus and lead to reduction productivity at workplace (Khan & Bano, 2022). While the workers residing in pakka houses are in better position having stable housing, good financial position, strong social networks and better education. That is why this variable reflects a significant impact on the labour earnings and productivity in this sample. The coefficient of the gender of household head is not statistically significant. It means there is no significant difference in labours productivity of labours whose household head is male or female. These findings are also aligned with studies (Quisumbing & Maluccio, 2003) which showed that the labours' productivity is influenced by the labours individual qualities like skills, education, and working conditions rather than the characteristics of household alone.

Regional research (Khan & Bano, 2022; ILO, 2024) showed that in rural settings female headed households are usually result of widowhood, migration or men working away from home. These household lead by females have very impressive resource and household management, internal resilience to deal with situations. These factors might be the reason why productivity and income outcomes are indifferent between male-headed and female-headed households in this sample.

The variable of family type is negative but statistically significant. It indicates that there is significant income and productivity difference among labours living in joint family vs nuclear family system. Those workers living in joint family system have lower income and productivity as compare to those workers living in nuclear family system. This result is consistent with studies conducted in Asian context, which explored that the benefits of a joint family system is the provision of emotional support and shared roles and responsibilities but even then, it affects individual's performances (Bloom et al., 2014).

Moreover, the joint family system includes larger no of family members living under one roof, complex interpersonal relationships, shared living spaces etc. Thus, this affects their privacy, and peace, their responsibilities increased and they distracted from the goals and ultimately affect their performance and efficiency at workspaces and leading to reduced earnings and lower productivity (Bloom et al., 2014; Saeed & Ali, 2024). While on the other hand, in nuclear family system individuals have limited roles and responsibilities, freedom and free personal space, no or fewer domestic interruptions. These factors helped them to utilize their time and energy in more effective way. The studies conducted in traditional settings of Pakistan also provide same findings that the performance and productivity is greater among those workers who are having nuclear family system because in such family system they have limited shared obligations and flexible routine which help them to put their efforts productively in work places (Khan & Bano, 2022; ILO, 2024). Thus, it can be observed that the family type is not just a random variable rather it has some importance as it influences labours productivity.

The coefficient of the variable household size is not statistically significant. It means there is no significant difference in labour outcomes in a household having either larger no of family members or smaller no of family members. This finding is aligned with the study of (Filmer & Pritchett, 2001) which showed that in the impact of household size becomes insignificant when the direct measures of socioeconomic outcomes are also included in the model then the impact becomes weaker. Moreover, there are many other important variables like human capital thus, there impact is much stronger on productivity that is why these variables become less influential to labor's productivity.

The variable environmental circumstance is not statistically significant. It indicates that the changes in environmental conditions like weather, air quality, lightning, and other workplace surroundings do not influence worker's productivity in this sample. It does not mean that environment is an unimportant factor. It is suggested that the effect of this variable is either overshadowed by other strong regressor or indirect. However, many studies explained that how environmental conditions have influenced labours like in extreme temperatures, highly polluted areas, severe heat etc. these conditions have strong impacts on labours efficiency and performance, (Bloom et al., 2015). But when workers are used to their surroundings with time and the changes in environment is moderate then the effect becomes very small. Furthermore, in Chitral context both the workplace and household environmental conditions are same no difference in the climatic environment across these two places (Khan & Bano, 2022; ILO, 2024). This can be concluded from this analysis that I might be possible due to uniformity across these work place and household environments the impact of environmental condition does not possess any significant influence on worker's productivity.

The working environmental condition variable is also statistically insignificant. It indicates that the changes in interpersonal relationships, general workplace surroundings, workplace comfort, interaction with boss and colleagues does not significantly influencing labour's productivity. This result is different from previous studies Amabile and Kramer (2011) on the importance and effectiveness of a good and supportive work place environment. They showed that how the supportive supervision, daily positive interactions, encouragements can bring motivation and improvement in performances of workers. Whereas, another study also suggests that when work place is conducive then the satisfaction and performances of workers are very high (Raziq and Maulabakhsh 2015). But in this sample the findings are different because it might be possible that the other regressors like human capital in the model have overshadow the impact of this variable or the impact of those regressors might be stronger than this variable.

The regional study carried out in northern areas of Pakistan has explored that the job market is very limited offering limited formal employment so to secure the jobs and income, the workers in such remote areas usually ignore the workplace hardships (Khan & Bano, 2022; ILO, 2024). Thus, in this sample it might be possible that because of these contextual aspects this variable does not possess significant influence on labour's productivity.

The variable workplace harassment is also not statistically significant indicating that there is no difference in productivity of labours either who experience harassment or who do not experience harassment in this sample. This variable is not appeared as significant predictor of labour's productivity. According to Herscovis & Barling (2010), workers are scared of losing job and income that is why even with experiencing harassment they are performing their duties, tasks just to protect their jobs. The research



Advance Journal of Econometrics and Finance

Vol-4, Issue-1, 2026

conducted by Khan & Bano (2022) and ILO (2024) suggest that the women in rural settings are reluctant to address harassment due to fear of retaliation, due to stigma and protect the honor of their family, worried for mobility restrictions by family. These are the factors due to which the harassment in this sample has limited and insignificant influence in this context.

The coefficient of physical health is positive and statistically significant. It indicates that the labours with good physical health have better income and higher productivity in this data set. It means workers with good health have consistency and greater energy to meet the cognitive and physical demand of the position or job. This result is consistent with previous studies Bloom et al., (2019) showing that good health is highly related to efficiency, focus, stamina and better job performance. Furthermore, the studies conducted by Khan & Bano (2022) and ILO (2024), explored that in remote areas of Pakistan the poor health is associated with inadequate nutrition, poor living condition and limited or no access to medical services. These challenges reduce the motivation and performances of workers in remote regions. While on the other hand, the workers with good physical health are more resilient, they do not feel fatigue, are able to concentrate and maintain better performances and show higher efficiency in workplace. This data set does not directly estimate these facts but these facts may help to explain how physical health is significantly influencing productivity in this sample.

The coefficient of workplace discrimination is negative and is statistically significant. It indicates that there is significant difference in workers productivity and income between those who experience discrimination and those who do not face any discrimination at work place. This result is aligned with organizational psychology research explaining that discrimination can affect workers inversely by demotivating, increasing stress, and affect their sense of belonging which unlimitedly affect their worker's performances (Triana, Jayasinghe, & Pieper, 2015). Furthermore, it is also showed that in many work places specially in developing region, discrimination is referred to biased supervision, exclusion from various opportunities, unfair treatment and unfair work burden. All these factors affect individual mental strain and lead to reduced productivity, performance, inefficiency and demotivation.

The variable family income is positive and statistically significant. It indicates that labours belonging to wealthier families have higher income and productivity as compare to labours belonging to lower income families. It means the family income plays a significant role in shaping labours productivity and job outcomes. The research study of Banerjee & Duflo (2011) explained that those families who are financially strong have good access to education, health care facilities, nutrition, safe and good living condition, all these are essential elements which positively impact a labour performance and efficiency at work place.

According to Khan & Bano (2022) and ILO (2024) the families with low income usually face financial pressure, limited or no access to basic facilities like health, education, nutrition. These challenges affect workers negatively and they are not able to invest in skill development, unable to focus and also unable to put full energy on tasks at workplace. Whereas, the families with strong financial base are in better position in terms of access to health, education, nutrition and are fully able to put efforts and energy at workplace thus leading to improved income and better productivity. These factors might be helpful to explain why there is strong influence of family income of productivity in this context however, this data set does not directly measure these facts but the above facts are explored from remote and regional study. The R-square value indicates that the model has tries to explain a meaningful portion of the variation in labour's income and productivity is explained by independent variables in the model. Although the value of R square is minimum but usually in social science researches when we are dealing with complex human outcomes where the human behaviour is affected by various unobserved factors which are not measure directly then such a low R square value is common and acceptable in such studies, and it does not referee to weak model Wooldridge (2020). Moreover, the value of F statistic is significant indicating the overall significance level of the model. It means the regressors used in the model have provide a valid explanation of worker's productivity and income in various circumstances.

Table 3: Determinants of Labor Productivity

Independent Variables	Labor Productivity (Self Assessed Productivity)	Labor Productivity (Personal Income)
	Unstandardized Beta	Unstandardized Beta
(Constant)	1.49 (0.74)	8.25 (0.72)
Gender	0.11 (0.07)	0.21*** (0.07)
Father's Education	-0.01	0.03**



Advance Journal of Econometrics and Finance

Vol-4, Issue-1, 2026

	(0.01)	(0.01)
Mother's Education	0.003	0.002
	(0.02)	(0.02)
Father's occupation – Farmer	0.008	0.36***
	(0.08)	(0.08)
Father's occupation - Daily Wage Labor	-0.12	0.14*
	(0.11)	(0.11)
Mother's occupation	-0.06	0.14
	(0.15)	(0.15)
Education in years	0.018**	0.04***
	(0.008)	(0.008)
Region of Residency	0.01	0.01
	(0.06)	(0.06)
Ownership of Building	0.03	-0.13
	(0.11)	(0.11)
Quality of Building	-0.009	0.21***
	(0.06)	(0.06)
Gender of Household Head	-0.07	0.07
	(0.15)	(0.15)
Family Type	0.04	-0.19***
	(0.07)	(0.07)
Household Size	-0.01	0.009
	(0.01)	(0.01)
Environmental Circumstances	-0.39***	0.03
	(0.10)	(0.09)
Working Environment Circumstances	0.66***	-0.03
	(0.12)	(0.11)
Work Place Harassment	-0.10	0.12
	(0.11)	(0.10)
Physical Health	0.71*	1.70***
	(0.44)	(0.43)
Work Place Discrimination	-0.07***	-0.04*
	(0.02)	(0.02)
Family Income	0.13***	0.13***
	(0.04)	(0.04)
R Square	0.23	0.35
Adjusted R Square	0.17	0.30
F	3.99	7.12



Sig.	.000	.000
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*** 1%, ** 5% & * 10% indicates significance level

Conclusion:

This study analyzes the impact of various circumstances on labour's productivity in a remote district of Chitral. The results show that the productivity of labours is influenced strongly by human capital that is education and physical health and also some other important socioeconomic circumstances. The variable family income reduces financial stress and quality of building provides supporting and better living conditions, both have positively affect the over all performance and efficiency of labour in Chitral. The family structure also plays a vital role. The workers of joint family system have lower income and productivity because of the burden of responsibilities on their shoulder, no peace of mind and focus thus, they left with distraction and performed poorly in workplaces as compare to those who are from nuclear family system.

Moreover, the workplace discrimination has also significant negative impact on workers productivity, while the remining workplace factors which were also important but have no direct influence on labour's productivity, most probably because their impact is overshadowed by other stronger variables like human capital or their impact is indirect. Overall, the labour's productivity in remote region Chitral is influenced by specific human and economic factors rather than by general household characteristics.

Recommendations

This study provides some policy recommendation based on the results of this study and are mentioned below:

- As the strong predictor of productivity in remote areas is human capital so the policy maker should put greater emphasis on improving education and health sector in remote regions of Pakistan by expanding basic health care facilities, education and vocational training centers.
- The quality of building also has greater impact on productivity in rural areas, so the policy makers, NGOs, stakeholders should ensure or make it necessary to everyone living in these regions to improve their housing quality.
- The work place discrimination has significant negative impact on productivity therefore; the policy makers should ensure or create policy related to counter discrimination that should be implemented and monitored in workplaces.

Limitations

The study has some limitations and that are explain below:

- It is a cross-sectional design and it only provide associations not causality.
- Some data on subjective productivity and mental and physical health were self-reported so there might be chances of biasness.
- This study focused on Chitral District so it cannot fully represent other rural setting with diverse socioeconomic and cultural conditions.

Future Research

This study also provides directions for future researchers and are as follow:

- Researchers can use longitudinal data to better explore the circumstances and determinants of productivity over time.
- Researchers can also use sector wise analysis like productivity across agriculture, informal work, services etc.
- Qualitative research methos can also be used to explore the determinants of productivity
- Researchers can also do comparative study among different remote region of Pakistan to explain the structural and contextual patterns.

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Advance Journal of Econometrics and Finance

Vol-4, Issue-1, 2026

Appendix

Multicollinearity Test Applied on Regression Analysis

Table 1A: *Regression Model*

Variable	VIF	Interpretation
Gender	1.25	Excellent (no multicollinearity)
Father’s Education	1.93	Excellent
Mother’s Education	2.002	Excellent
Father’s Occupation	1.54	Excellent
Mother’s Occupation	1.60	Excellent
Education in Years	1.45	Excellent
Place of Birth	1.23	Excellent
Region of Residency	1.08	Excellent
Family Type	1.71	Excellent
Ownership of Building	1.16	Excellent
Quality of Building	1.26	Excellent
Gender of Household Head	1.09	Excellent
Household Size	1.66	Excellent
Environmental Circumstances	4.88	Acceptable
Working Environment Circumstances	5.15	Acceptable
Work Place Harassment	1.20	Excellent
Physical Health	1.15	Excellent
Family Income	1.42	Excellent
Workplace Discrimination	1.24	Excellent