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The Nexus between Microfinance, Income Inequality and Sustainable Development: Cross-Sectional Evidence from Central Karakoram National Park (CKNP) Region of Gilgit-Baltistan, Pakistan

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ABSTRACT

The presence of two major sustainable developments leaks i.e. economic poverty and income inequality among the people living in Central Karakoram national Park (CKNP) are the serious threats to environmental degradation for a developing country like Pakistan. Keeping in view these serious socio-economic and environmental concerns in mind the focus of present research was to examine the connections between microfinance, income inequality and sustainable development in mountainous (CKNP) region of Gilgit-Baltistan Pakistan. Three approaches of income inequality; Gini coefficient, Robbin Hood Index and Quintiles Analysis were applied to investigate the microfinance bias in favor of the income inequality among mountain poor. Empirical investigations are made using cross sectional data collected from four valleys; Bagrote, Haramosh, Rundo and Shigar among two districts; Gilgit and Skardu) of CKNP region applying multi-stage sampling technique to assess the nexus between microfinance, income inequality and sustainable development. The findings of the study demonstrate a positive connection between microfinance, income inequality and sustainable development

Introduction

In today's environmental economics research income inequality as a major determinant of environmental degradation has been widely discussed and became the core issue of concern among environmental scientists and economists (Baloch et al., 2018).While examining Environmental Kuznets Curve (EKC) which graphs the

relationship between environmental degradation and per-capita income growth, studies (e.g., Grossman and Krueger,1991; Shafik, 1994) initially relied on environmental quality and income, ignoring the role of income inequality in environmental degradation. Boyce and Gweisah, (1998) discussed the significance of income inequality as a determining factor to environmental degradation and argued that income inequality contributes to society's demand for environmental quality significantly. Recently, Baek and Gweisah (2013) found the positive relationship between income inequality and environmental degradation i.e. greater inequality of income distribution among society leads to higher levels of environmental degradation. On the other hand, Baloch et al. (2018) argued that income redistribution in the society positively affects environmental quality. Economic Poverty is another major cause of environmental degradation and a big obstacle in the way of achieving sustainable socio economic and environmental development (Nwagbara, et al., 2012; Alam, 2010). Economic poverty leads to many socio economic and environmental concerns like poor sanitary conditions, weak sewerage system, and limited access to clean water resources, increased exposure to environmental risks (Hope, 2007).

Pakistan being a developing country of the world faces many socio-economic and environmental concerns at the same time. On one side it faces slow economic growth, high levels of economic poverty and income inequality while climate change environmental degradation on the other. Degradation of forests and fisheries, increased use of pesticides and fertilizers, poor human health and rapid urbanization etc. in the country had created serious environmental issues and are the major constraints in the path of rapid and sustainable economic development (Baig et al., 2019; Imaran et al., 2019; Alam, 2010).The country lies among those countries whose income distribution is highly unequal as the value of Gini coefficient of income distribution has risen by 90% from 0.22 in 1960 to 0.42 in 2015 (Baloch et al., 2018).The rising trend in the unequal distribution of income and environmental degradation are top issues of concern at policy level in Pakistan.

Microfinance has played a crucial role in the socio-economic development of a nation by reducing poverty, income inequality through the route of finical inclusion, therefore it has strongly recognized by 2030 Development Agenda. For Sustainable development reorganization, it is mandatory that all people living in the society should have the opportunity to fulfill their basic needs of life (e.g., food, clothing and shelter), enjoy equity and equality in resources distribution and should actively participate in the course of social and economic development (Ramaswamy & Krishnamoorthy, 2016).The development of sustainable fiancé leads to sustainable social economic and environmental development (Muñoz-Torres et al., 2019). It is playing a leading role to achieve sustainable development by providing access to financial resources and by creating productive opportunities to poor and marginalized people who are usually excluded by conventional banking system (Mazumder, 2015).Microcredit loans provided under the umbrella term microfinance have successfully pushed back people out poverty by increasing their income and

consumption levels (Al Mamun, Mamun, & Ibrahim, 2018; Agbola, Acupan, &Mehmood, 2017; Samer et al., 2015). Participation in microfinance program has significantly reduced income inequality among poor and rich people (Lacalle-Calderon, Larrú,& Perez-Trujillo, 2019;Hermes, 2014).Participation in microfinance program has reduced both economic poverty and income inequality (Arif, Ismail, & Santoso, 2019).

Notwithstanding the significance of microfinance as a tool for reducing income inequality among poor and rich people, it has not been studied in the context of sustainable development in Pakistan. A limited number of studies have considered the effect of microfinance on income inequality and sustainable development. Microfinance sector in Pakistan has mainly focused on the big cities and urban areas whereas the poverty levels are higher in rural areas (Ahmad, Ilysa, &Nisar, 2019).Therefore, the question remains: whether participation of the poor in microfinance program contributes to reducing income inequality in rural mountainous areas of Pakistan? It is the central issue that this study addresses, and the main objective was to analyze the effectiveness of microfinance on reducing income inequality among the beneficiary population of microfinance program and non-beneficiary population in CKNP region. Since the CKNP region (study area) is neither explored by any empirical study nor any national or international survey is carried out to explore its socio-economic status, therefore availability of the base line data about socio-economic indicators and application of difference in difference method considered as superior method (Ravallion, 2005), was the first limitation of the study. In order to counter this limitation, the study relied on primary data collected by the researcher themselves in the study area and applied simple difference method to explore the impact of microfinance. The second limitation was the non-availability of female's entrepreneurial data. The reason was that females entrepreneurial were limited in numbers and researcher could not contact with them because of strict tribal traditions.

Materials and Methods

While assessing the micro finance performance on poverty, income inequality and sustainable development, we need to know not only its impact on beneficiary population but at the same time we must also be aware that what would happen on the beneficiary population if the program did not exist i.e. the counter factual (Leary et al., 2011). This can be achieved through the application of Quasi-Experimental approach, through the formulation of a treatment group which should be as similar as possible to the control group, and testing what happens to the former over the same period of time in the presence of identical conditions (Janjua, Muhammad, &Ullah 2013; Muhammad, Janjua, &Ullah, 2011; Ravallion, 2005).While deciding a counterfactual group researcher should care that treatment and control groups must share common characteristics and they should not be exposed any other intervention during the process of evaluation (Gertler et al.,2011).To address the issue of selection biases and to make sample more representative researchers frequently used Poverty Score Card (PSC) in impact evaluation studies developed by

world for match comparison (Muhammad et al., 2011; Ravallion, 2005).We also used this technique to avoid selection biases in our study.

Furthermore, to explore the role of microfinance on economic poverty in the study area, we need a differentiation among poor population and non-poor population of treatment and control groups. For this we used incidence of poverty criterion i.e." the ratio of poor population to total population in the society" (Ullah, Khan,& Ahmed, 2014; Chowdhury,2009).National Poverty Report of Pakistan 2015-16 reported official poverty line of Pakistan as PKR, 3250.28 per adult equivalent per month (Haider, 2016). Thisis used as base poverty line and adjusted over time (e.g., 4.2 and 3.9 for the year 2016-17 and 2017-18 respectively)by the researcher's on the basis of Consumer Price Index (CPI) values taken from the Pakistan Economic Survey, 2018-19 (Wasti, 2019).Finally, we calculated a threshold level of PKR, 3518.87 to measure and analyze economic poverty in the study area.

For deeper understanding of economic poverty in the study area, it is also mandatory to calculate and analyze both the intensity and severity of economic poverty (Foster, Greer, & Thorbecke, 1984).Intensity of Poverty/Poverty Gap Index (PGI)measures the average income transfer required to push back poor people from the poverty (Hashmi et al., 2008). To develop Severity of Poverty Index/Squared Poverty Gap Index (SPI), PGI values are squared (Ullah et al., 2014).

The term "Income inequality" refers to unequal distribution of income, among different sections or groups of the society (Todaro & Smith, 2015). To measure income inequality among treatment and control groups, we used Gini Index, Robbin Hood index along with Quantile Analysis. Gini index is widely used measure of income inequality, therefore it is favored over other alternatives because this index can be applied both time series and cross sectional data simultaneously (Hermas, 2014;Arif, Ismail & Santoso,2019). The value of Gini-Index ranges from 0 to 1. With the value 1,Gini coefficient represents perfect unequal distribution income in the society while with the value 0 it represents perfect equality of income (Todaro& Smith, 2015).

The study was conducted in four valleys (Bagrote, Haramosh, Rundo & Shigar) among two districts (Gilgit & Skardu) of CKNP region in Gilgit-Baltistan Pakistan. The target population included both microfinance institutions (MFIs) operating in the study area i.e. "The First Microfinance Bank (FMFB) and The Karakoram Cooperative Bank (KCBL)" and the beneficiary population of the microfinance program.

Sampling Technique

Multi-stage sampling technique was used to collect micro data from the study area.At first stage two districts from the study area (Gilgit &Skardu) were chosen purposely while two valleys in each district (Bagrote and Haramosh from district Gilgit) and (Rundo & Shigar) from Skarduwere chosen purposely at second

stage. Purposive sampling is under taken because of two reasons. First the study is focused on CKNP region and large area of CKNP region falls in the selected districts. Secondly majority of the microfinance beneficiaries are in these districts and valleys. Treatment samples in the study area were drawn through random sampling technique following Yamen's sample determination formula at third stage. At the last stage, following (PSC) of experimental group similar numbers of sample from control group were selected.

Sample Size

Representative sampling is mandatory for unbiased estimation of a population (eg., Singh & Masuku, 2014) in survey research therefore, the study employed Yamane's (1967) method to determine representative sample from the population. With 95% confidence level and p = 0.5, this method calculates sample size as under:

$$n = \frac{N}{1 + N(e)^2}$$

where, (N) denotes size of the population and (e) is the level of precision.

Through this method we selected 212 representative samples from the experimental group in the study area. To assess the performance of any program or policy minimum three to five years are required after its execution(e.g., Janjua et al., 2013;Muhammad et al., 2011; Ravallion, 2005), therefore the study relied only on those microfinance beneficiaries among experimental group who had availed the microfinance loans facility (e.g., microcredit) five years before the study conduction year 2019.For this purpose, we contacted concerned (MFIs)which were engaged to the research area for the collection of beneficiary population list who had availed microfinance loans facility/microcredit in the year 2014.To avoid selection biases and to make our sample more representative similar number of respondents were selected for control group from the study area following score card of treatment group. Poverty scorecard is a technique used in impact evaluation literature to control observable selection biases (Ravallion, 2005). It ensures treatment and control group comparison in all aspects except that the later has not availed the same opportunity (Muhammad et al., 2011. It is cheaper and most reliable method for match comparison of treatment and control groups (Janjua et al., 2013).Finally, a sample size 424 respondents in total from both the groups have been chosen final analysis.

Results and Discussion

Age, Marital Status and Education of the Respondents

Total number of participants was 424 with 100 % percent response rate. The survey results showed relatively middle aged respondents for both control and

treatment groups. In our study all the respondents were male. The average age for the sample treatment group households was 34.43 while for control group it was 33.60 years. For treatment group 33% of the respondents had their age between 18-30 years and 67% were aged between 31-55 years. For treatment group 34.9 % respondents were in the age bracket of 18-30 years and 65.1.2% of the respondents was in the age bracket of 31-55 years. No respondent was found above 55 years in both treatment and control groups. The marital status of the respondents showed that10.1 % respondents in treatment group were never married while 89. 6 % respondents were married. Marital status statics for control group showed that 7.5 % respondents were never married while 92.5 % were married. No respondent was found in the divorced and widowed category of marital status in both groups. 2.8% respondents were holding a master's degree, 4.7% were holding bachelor degree 22.2 were having higher secondary and rest of the respondents had education level up to not literate in treatment group. Similarly, the literacy levels of control group households were, 3.3% households had master degree, 9.4 % household had bachelors and higher secondary degree and rest of them had a literacy levels up to non-literate.

Demographic Composition of Households, Profession and Major Sources of Respondents Income

Demographic structure for 212 treatment households showed a population of 1440 with 728 (50.56%) male population and 712 (49.44) female population. The average household size comprised in this group was 6.79 persons. Similarly, for 212 control group households the total population were 1489 with 739 (49.63%) male and 750 (50.37) female population. Average household size for control group was 7.02 persons. Off –farm skilled labor is the major profession of treatment respondents as (37.7%) respondents were associated to this profession following with own farming (35.4 5%) and business 21 % respectively while in control group majority of the respondents were engaged with the profession of own farming following (29.2 %) off-farm unskilled labor and only 7.1 % were engaged with business profession.

Average annual household income and per-capita income for treatment group was PKR 331331.56 and PKR 52687.35 respectively. Empirical results showed that labor is the major source of treatment income contributing (34.19%) of the treatment income followed by business (21.94 %) and crops (21.67 %). Other treatment income sources were livestock, services, fruit/forest, pensions, remittances and cash gifts etc. Similarly, average annual household income and per-capita income for control group was PKR 312916.33 and PKR 47457.27 respectively. Labor is the single largest source of control group income (42.83 %), followed by crops (20.6 %), and services (10.03 %). Only (7.90 %) of the control income were generated from business source. The higher earnings of treatment group from crops and business is an indication of microfinance impact because micro finance institutions target mostly small entrepreneurs and small farmers to quit them out of poverty. It is also evident from the survey results that annual household income and per capita income of

treatment group were higher than the control group (PKR 331331.56 > PKR 312916.33) and PKR (52687.35 > PKR 47457.27) which further acknowledged the positive role of microfinance on the growth of treatment income. These results are also in lined with some previous studies (e.g., Ali, Islam, & Hatta, 2015: Janjua et al., 2013).

Expenditures Pattern of Treatment and Control Groups Households

Average annual household expenditures and per-capita expenditures for treatment groups were PKR 258541.46 and PKR 41339.16 respectively. The expenditures pattern of the treatment group households showed that (39.19 %) expenditures were made on food consumption, (14.51%) on housing, (14.39%) on education, (11.88%) on clothing, (7.95%) on health care, (4.47%) on fuel, (2.53%) on transport and reaming on other purposes. Similarly average annual household expenditures and per-capita expenditures for control group was PKR244163.33andPKR 37010.08 respectively. The expenditures pattern of control group households in the study area were;(36.84%) expenditures were made on food, (22.12%) on housing, (12.64%) on education, (11.34%) on clothing (7.54 %) on health care, (3.52%) on fuel, (1.52%) on transport and rest of them were made on other purposes.

A comparison of expenditures between control and treatment groups showed important and interesting results regarding the impact of microfinance program on household's standards of living. Both average annual household expenditures and per-capita expenditures of the treatment group were higher than the control group (PKR 258541.46 > PKR 244163.33andPKR41339.16>37010.08).The pattern of expenditures also showed that treatment households are relatively spending higher amounts of income on education which showed treatment group awareness regarding quality education in the study area. Similarly, higher fuel and transport expenditures from the treatment group further confirmed business activity and enterprise development generating higher employment which is the first step towards sustainable development.

The positive effects of microfinance have now been verified. There is a real progress for clients in terms of increased incomes and expenditures access to health care an increase in self-confidence and esteem. All these contribute to sustainable development.

Impact of Microfinance on Economic Poverty in the Study Area

Table 1
Poverty status among treatment and control groups in the study area

	Treatment Group	Control Group
Incidence of Poverty	25.47	37.26
Poverty Gap Ratio	22.53	30.53
Squired Poverty Gap Ratio	7.78	12.02

The study used PKR, 3518.87 thresholds to investigate the performance of microfinance program on economic poverty in the research area. Results reported in table 1 showed reduced poverty headcount, intensity and severity in experimental group than control group indicating the positive role of microfinance on the reduction of economic poverty in CKNP region of Pakistan. Headcount ratio for treatment group was lower than control group (25.47 < 37.26). Obviously credit goes to microfinance institutions operating in the study for this tremendous reduction in the incidence of economic poverty. Not only this, poverty gap ratio and squired poverty gap ratio were also reduced drastically i.e. intensity and severity of poverty in control group were far higher than the treatment group (19.77 > 9.88 and 6.94 > 2.44). These results further endorsed the success story of the microfinance program in the study area. These results are also in lined with various studies (eg., Janjua et al., 2013; Nawaz, 2010).

Impact of microfinance Income Inequality in Mountainous CKNP Region of Gilgit-Baltistan, Pakistan

Income inequality can be measured via Gini Index, Robbin Hood Index, Quantile Analysis. Table 2 given below highlighted Gini Index and Robbin hood index values calculated from the survey data.

Table 2
Gini and Robbin Hood Indices in the study area

	Treatment Group	**Control Group**
Gini Index	16.75	18.01
Robin Hood Index	11.64	12.61

The value of Gini Index lies between (0) and(1), (e.g., Todaro & Smith, 2015) with (0) represents perfect equal distribution and (1) represents perfect unequal distribution of income among the society. The concentration value calculated through Gini-coefficient for treatment group (16.75) was lower than the control group (18.01). It implied that income was fairly distributed among this group of households. Robbin-Hood Index also showed similar type of results for both groups. Lorenz Curve is a graphical representation of Gini-Index. It shows the deviation of income from the perfect equality (45 degree) income line (Todaro & Smith, 2015). Higher deviation of Lorenz curve from the perfect equality line shows higher inequality in the distribution while lower deviation shows lower inequality or more equality of the distribution. Fig. 2 given below showed graphical distribution of treatment households income and demonstrated slightly less deviation from the perfect equality line as compared to fig.3 which showed income distribution of control group. The results derived from the income inequality measured through Gini and Robbin Hood index confirmed the hypothesis that higher participation in the microfinance program reduces economic inequality.

Fig. 2: Lorenz Curve (Treatment Group)

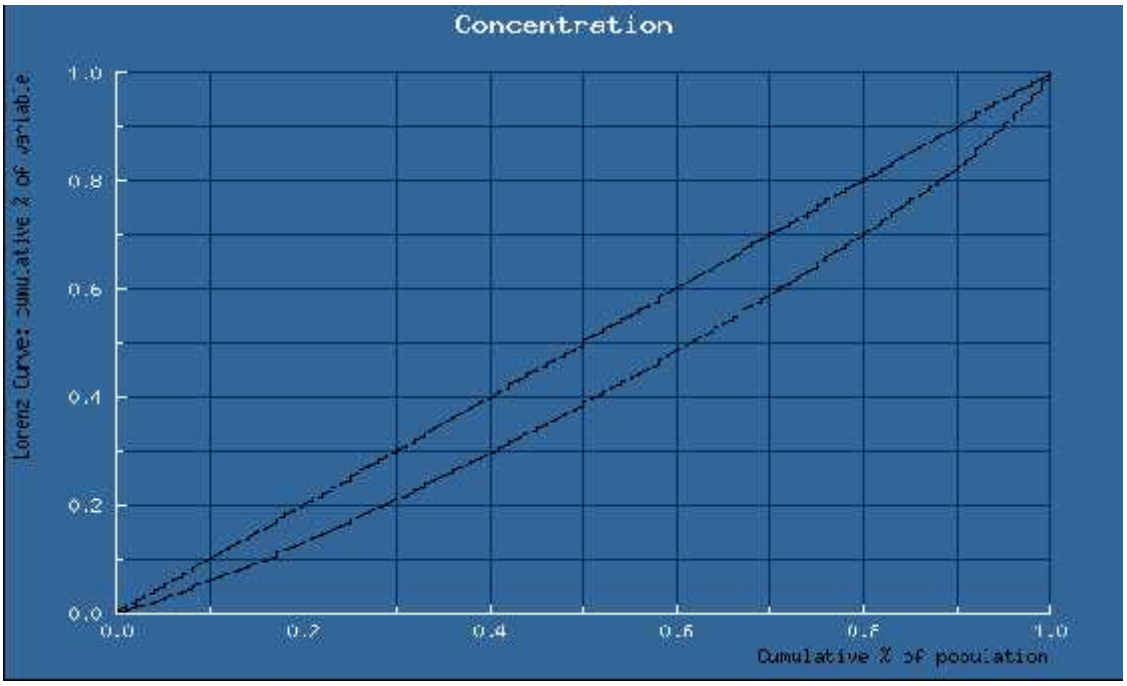
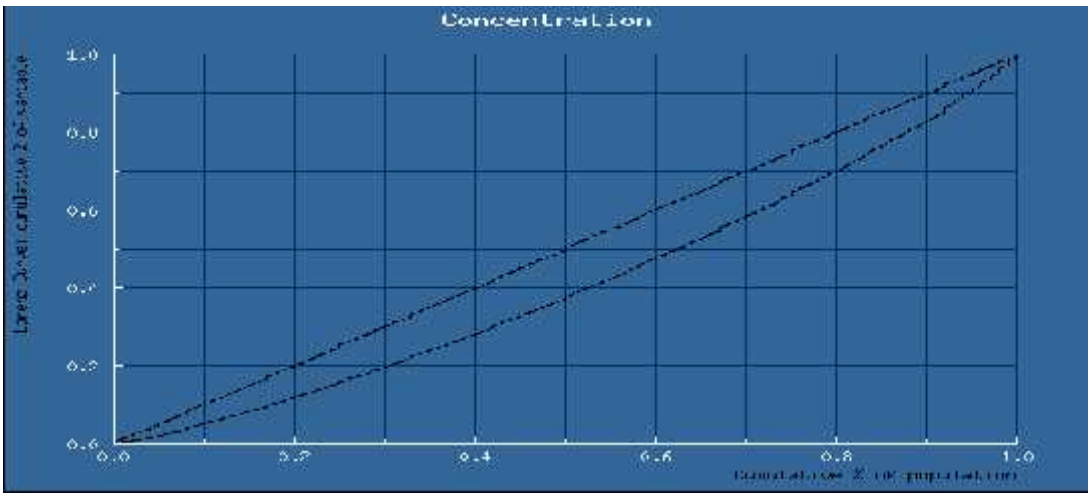


Fig. 3: Lorenz Curve (Control Group)



Quintiles Analysis

Gini and Robbin Hood indices show total concentration of income in a given set of population. For deeper understanding of income distribution, a decomposition of this concentration is necessary. Quintiles are values that partition a finite set of

values into 5subsets of (nearly) equal sizes. Table 3 given below showed the results of quantile analysis in the study area.

Table 3
Quintiles Analysis

	Treatment Group	Control Group
First Quintile (Bottom 20 %)	13.03	12.13
Second Quintile	16.86	16.52
Third Quintile	19.23	19.40
Fourth Quintile	22.32	22.42
Fifth Quintile (Top 20 %)	28.56	29.52

Quintiles analysis showed that bottom (20 %) of the treatment group population owned an income share of (13.02 %) while the same group of population in control group owned (12.13 %) income share. This showed a higher income share of hardcore poor in treatment income and lower income inequality than control group. Similarly, top (20 %) treatment group households owned (28.56 %) income share and the same group in control side occupied (29.52 %) income share. It implied that slightly well off class in control group were own larger income share than treatment group.

If we looked inter group disparities among treatment and control groups, we found that in treatment group bottom (20 %) population has owned(13.02%) income share while top (20 %) population has owned (28.56 %) income share. The difference in income shares in this group was (15.53%). The same inter group income difference share in control group was (17.39 %). From the quintiles analysis results, we observed higher income inequality between hardcore poor's and slightly well off population in control group than the treatment group. So we concluded that higher share of hardcore poor's in treatment income was because of their participation in the microfinance program.

Conclusion

This paper provides a cross sectional empirical study by collecting data of 424 households and applying Quasi Experimental design, concerning the impact of microfinance on two major Sustainable Development Goals (SDGs) i.e. poverty (SDG1) and income inequality (SDG10) in CKNP region of Pakistan because presence of these two sustainable development leaks in a country cause to another leak of sustainable development i.e. environmental degradation. Microfinance specially targets poor and marginalized segment of the society who are usually excluded financially by conventional banking system. This method provides financial access to this financially excluded population to start their own businesses to improve their income and living standard levels. The study results confirmed positive correlation among microfinance participation incidence of poverty and income inequality. Our analysis concluded that microfinance is an effective

redistribution tool and serves the poor's directly, by enabling them to engage in income generating activities which in return enhance their income levels, build their asset base and enables them to quit out of poverty. The study recommends the need to increase the outreach of microfinance program on one hand, while on other hand it suggests female participation in the said program to policy makers and other stake holders for further reduction in the poverty incidence, income inequality and environmental degradation in the country.

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