

Assessing Income Inequality in Rural and Urban Areas of Khyber Pakhtunkhwa: A Comparative Analysis Using Lorenz Curve and Gini Index Approaches

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Abstract

Income inequality remains a substantial issue for both developed and developing economies, as it has correlation with poverty and economic growth. This central theme of research study is to assess the income disparities between rural and urban areas of Khyber Pakhtunkhwa (KP), Pakistan, using the Lorenz Curve and Gini Index approaches. The major analysis encompasses a comparative assessment of income and expenditure patterns to compute the extent of inequality in the region. Data was gleaned from the Household Integrated Economic Survey (HIES), which included with a specific focus on 1,352 households in KP. The findings reveal significant income disparities in KP, with a Gini Coefficient of 0.38 through the income approach, indicating a 38% income inequality level. In contrast, the expenditure approach yielded a lower Gini Coefficient of 0.32, suggesting that expenditure data may provide a more accurate reflection of economic disparities in KP, where individuals are often hesitant to disclose actual income levels. The Lorenz Curve analysis further corroborates these findings, showing a pronounced deviation from the line of equality, particularly in urban areas. The research also underscores the interlinkage between income inequality and poverty, emphasizing that reducing income disparities can lead to poverty alleviation and enhanced economic development. The study concludes with policy recommendations aimed at addressing to policymakers who should prioritize increasing access to quality education for the lower-income population in Khyber Pakhtunkhwa to enhance their skill sets and job prospects. This study recommends that the government may introduce targeted economic policies and social safety nets, such as conditional cash transfers and subsidized healthcare, to bridge the rural-urban income gap and ensure more equitable development across the KP province.

Keywords: Income inequality, Lorenz Curve, Gini Index, rural-urban disparity, Khyber Pakhtunkhwa, expenditure approach, income approach, poverty alleviation.

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Introduction

Income distribution is one of the terminal concern in present century for developed and developing nations and economies (Qureshi, 2016). Income disparity which is commonly known as income disparity is the jagged distribution of income among the individuals of the society where the lowest income group is not getting their income share equally within the society (Kemal, 2005). The sky-scraping income disparity in the society consequently plunged the developed and developing economy to more poverty and less economic development. The prime objective of economic development is to eradicate income disparity and poverty from the society (Rehman *et al*, 2008). Poverty and income disparity are intermixed by some school of thoughts but from literature related to income disparity one may conclude that reducing income disparity fallout in reducing the poverty. On the other hand, sky-scraping economic growth can lessen poverty but not to a greater extent (Awan 2007, Rehman *et al*, 2008; Sheikh *et al.*, 2020). Pakistan, a developing economy has faced economic expansion in 1960s and 1980s and economic contraction in the 1990s (Awan 2007). Income disparity is one of the significant issues that Pakistan is confronting with. Variation in income is greatly perceptible in developing economies of the third world nations mainly Pakistan (Idrees and Eatazaz, 2010; Shah *et al.*, 2021). The pattern of income disparity is a major uneasiness to economists. Unpredictability in income distribution is also familiar to have been come along under the rural/urban fragments in the society (Clarke *et al*, 2003). It is evident from literature review that in urban fragment of the society income disparity is more whereas in rural fragment of the society income disparity is low (Qureshi and Sadozai, 2016; Munir *et al.*, 2022). The explicit objectives of the research endeavor covers: To evaluate income disparity of rural and urban fragments of KP Province, To determine income disparity of KP province using two approaches i.e. income and expenditure approach, to formulate deciles on the basis of different income groups of KP province and To propose policy implications to the concerned policy makers.

The major outcome of the various research endeavors is evident that the income disparity is significant tool to figure out the overall scenario of the poverty in the society. It is precedent from previous research studies that Gini index technique is one of the momentous tools to measure income disparity. In addition, the income and expenditure approach is also practice in vogue to estimate the Lorenz curve and Gini Coefficient. From literature review one may conclude that different research studies used different techniques using data based on House Hold Integrated Economic Survey HIES and Expenditure survey while some may be based on tax data. However, some of the studies splice the two data sets to perform their research studies. In Pakistan, some of the research studies shows disparity in consumption (Asad and Mehboob 2011, Idrees and Eatazaz, 2010) while some research endeavor gives fondness to income disparity. The literature reviewed is also evident for other modus-operandi utilized to estimate income disparity such as coefficient of variation, polarization, Theil's index.

Materials and Methods

This research study has used secondary data of the household survey namely Household Integrated Economic Survey (HIES), 2011-12 conducted by the Pakistan Bureau of Statistics (PBS), Government of Pakistan, Islamabad. HIES gives insights about the essential information about income and expenditure of household as well as a widespread insights about their social

services. The universe of this survey consists of almost all rural and urban areas of the four provinces of Pakistan. However, the sample of this research endeavor comprises of elected rural and urban areas of various districts of Khyber Pakhtunkhwa, Pakistan. The fragment of rural areas includes Swat, Upper Dir, Lower Dir, Chitral, Shangla, Malakand, Bonair, Kohat, Karak, Hangu, and D.I. Khan, Peshawar, Charsada, Nowshera, Mardan and Swabi. While on the other hand the fragment of urban area includes Malakand, Peshawar, Kohat, D.I. Khan, Hazara, Bannu, and Mardan.

Sampling Design and Sample size

The research endeavor was carried out by using the population of 13659 individual household across Pakistan by House Integrated Economic Survey (HIES), Pakistan. This research endeavor includes sample of the selected rural and urban areas of Pakistan. However, in the province of Khyber Pakhtunkhwa total number of individual household selected by HIES were 1352. The sampled respondent of KP province was consisting of 926 House Hold from rural fragment areas and 426 individual household from urban fragment areas of Khyber Pakhtunkhwa.

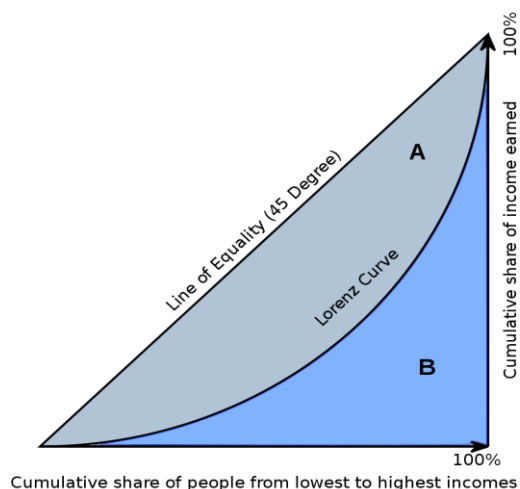
Analytical Framework

There are many techniques to estimate income disparity. Furthermore, in this research study a statistical approach of Lorenz curve and Gini coefficients is selected, that is frequently used for estimating income disparities in Pakistan and many developed and developing nations.

Lorenz Curve

The Lorenz Curve is a graphical picture that depicts income disparity as proposed by Lorenz in (1905). Lorenz Curve is drawn using the cumulative proportion of income to the cumulative proportion of house hold individuals. The Lorenz curve provides an easy way to embody income disparity graphically. Given below is the graphical picture of Lorenz curve

Figure 1: Lorenz Curve



Gini Index

Gini index was formulated by *Corrado Gini* in 1912. The Gini index is a measure of statistical dispersion projected to depict the income distribution of a nation's population, and is the one of the commonly used techniques to estimate income disparity. It is consequential from the Lorenz curve and is represented as an index, where the region between the line of equality and the Lorenz Curve is the numerator and the total region below the line of equality is the denominator. Therefore, perfect income equality is equal to zero, perfect income disparity is equal to one, and all other values are somewhere between. The value of Gini index lies between 0 and 1.

Results and Discussion

Descriptive Statistics of Income and expenditure of KP Province

The information about income and expenditure is valuable to determine the income disparity. Mostly in developing nations income approach is not a reliable gadget to measure the income disparity therefore for more accurate results expenditure approach is used. The table below depicts that the minimum annual expenditure of KP that is Rs.3350 well maximum annual expenditure is quite high that is Rs.2147574 which is a sign of disparity. Furthermore the annual minimum and maximum incomes are given in the table as well the minimum annual level of income is Rs.4000 while the maximum level of income is Rs.6000000 which gives us a hint of income disparity in KP province. Also the mean annual income values and standard deviation values are given in the table

Table 1: Annual Incomes and Expenditure of KP

	Minimum	Maximum	Mean	Std. Deviation
Income (In Rs.)	4000	6000000	262000	317777.917
Expenditure (In Rs.)	3350	2147574	224000	173742.148

Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Distribution of income and expenditure for urban region of KP

Similarly for the urban region of KP annual expenditure and incomes values are listed in the table as well. There are diversified fields of profession in urban region so the minimum annual expenditure in urban region of KP is Rs.8520 well maximum annual expenditure is rs.2110096. Likewise for incomes, the minimum annual income is Rs.15000 in urban region ok KP well the maximum annual income is high that is Rs.600000. The values are listed in the table

Table 2: Annual Incomes and Expenditure of urban Region of KP

	Minimum	Maximum	Mean	Std. Deviation
Income (In Rs.)	15000	6000000	323000	470041.016
Expenditure (In Rs.)	8520	2110096	267000	222798.102

Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Distribution of income and expenditure for rural region of KP

This table will give us the insights about the annual maximum and minimum incomes and expenditures of rural region of KP where majority of the people are involved in agriculture activities. The table 4.3 shows that the minimum annual expenditure is Rs.3350 while maximum annual expenditure is Rs.2147574. Furthermore, the annual income values both minimum and maximum are listed in the table giving a hint of disparity. Minimum annual income is Rs.4000 well maximum annual income is Rs.3112500. also the values of mean and standard deviation are also mentioned in the table.

Table 3: Annual Incomes and Expenditure of Rural region of KP

	Minimum	Maximum	Mean	Std. Deviation
Income (In Rs.)	4000	3125000	234000	208460.342
Expenditure (In Rs.)	3350	2147574	2040005	141521.298

Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Lorenz Curve and Gini Coefficient Estimation of Khyber Pakhtunkhwa Province through Income Approach

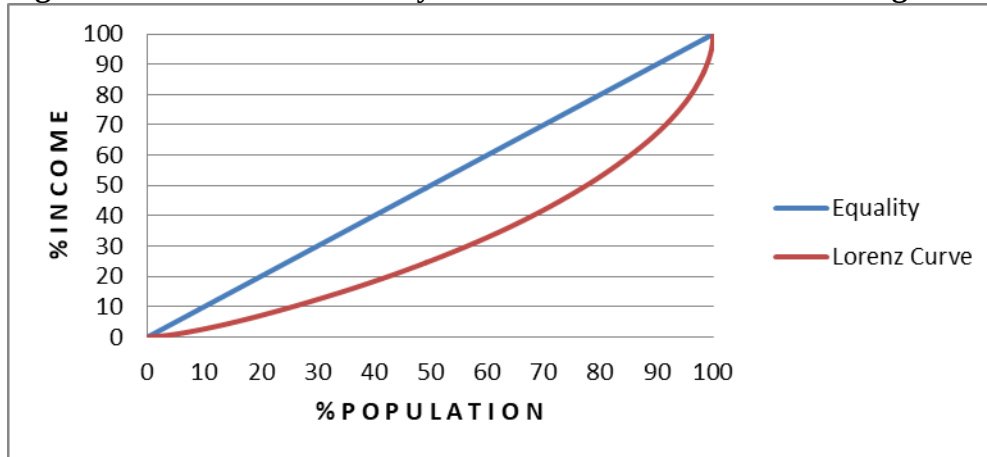
The Lorenz Curve is a graphical representation of income distribution which illustrates that either income is distributed uniformly or disparity persists in income distribution (Lorenz 1905). However, the statistical and numeric representation of the income distribution is usually demonstrated through Gini-Coefficient index. Therefore, the Lorenz curve of Khyber Pakhtunkhwa (KP) Province, Pakistan is graphically illustrated at Figure 2 followed by Gini Coefficient value. The income and expenditure are two common approaches which are utilized by overwhelming majority of researchers to estimate the Lorenz Curve followed by Gini Coefficient Index. The Figure 2 is demonstrating the Lorenz Curve through income approach of aforesaid Province, Pakistan. The apparent wideness of the Lorenz Curve from line of equality is certainly depicting that income disparity exists in the KP Province. The Gini Coefficient value of overall KP province is estimated as 0.38 which implies that 38 percent income disparity prevails in province KP-Pakistan. The same trend has been observed by Haq and Zia (2006) using income approach for overall Pakistan.

Lorenz Curve and Gini Coefficient Estimation through Expenditure Approach of Khyber Pakhtunkhwa Province

While the Lorenz Curve estimated for KP Province through expenditure approach is less wide as compared to income approach. The less wideness of Lorenz Curve under expenditure approach implies relatively less income disparity in KP Province. The similar findings are corroborated through Gini Coefficient value which is observed as 0.32 through expenditure approach and is relatively less as compared to Gini Coefficient value through income approach. The Gini Coefficient value through income approach divulge that there is 38 percent income disparity in KP Province, however expenditure approach is revealing less income disparity with the

estimated value of 32 percent. The difference between Gini Coefficient values through income and expenditure approach are unearthing the fact that usually in developing countries such as Pakistan, people are hesitant to share their actual level of income. While, expenditure incurred by the individuals is representing more accurate data in the study area. These results are similar with Zia and Haq (2006) when measuring income disparity through expenditure approach which is a more reliable approach in developing nations like Pakistan.

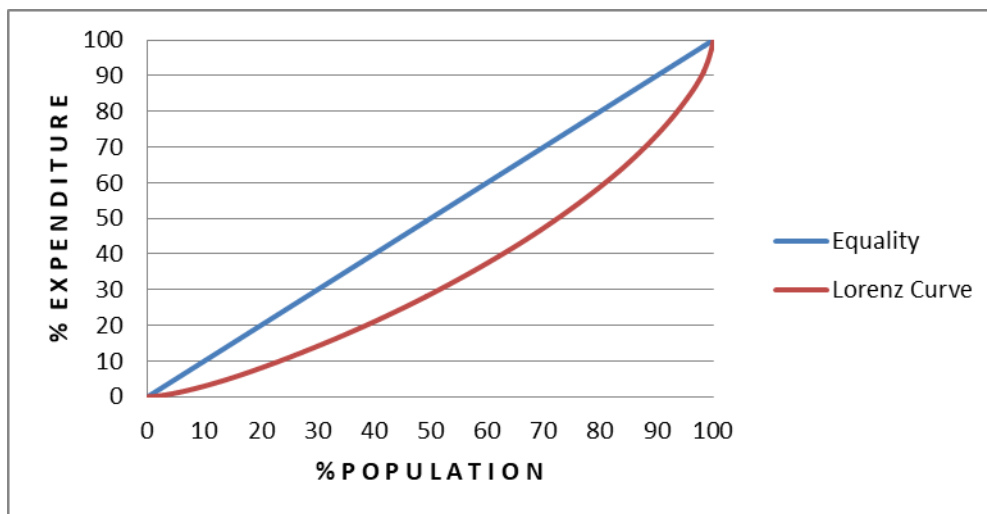
Figure 2: Lorenz Curve of Khyber Pakhtunkhwa Province through Income Approach



Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Gini Coefficient Value of Khyber Pakhtunkhwa through Income Approach: **0.38**

Figure 3: Lorenz Curve of Khyber Pakhtunkhwa through Expenditure Approach



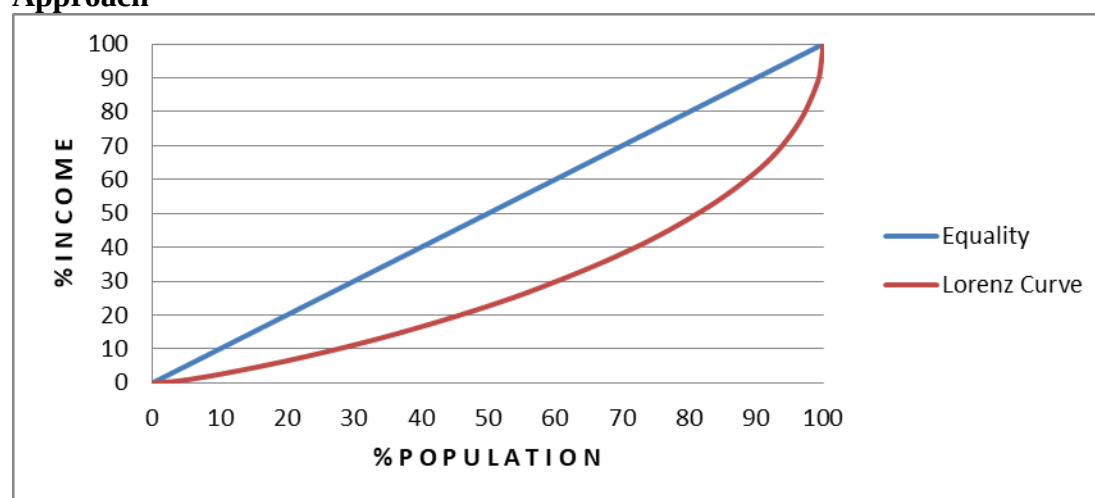
Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Gini Coefficient Value of Khyber Pakhtunkhwa through Expenditure Approach: **0.32**

Lorenz Curve and Gini Coefficient Estimation of Urban Region of Khyber Pakhtunkhwa Province through Income Approach

The Khyber Pakhtunkhwa Province is further divided into Urban and Rural region to obtain the more clear glimpses of income disparity which can demonstrate the indication of poverty level in both regions of KP Province. The Figure 4 depicting the Lorenz Curve of Urban Region of the KP Province. The estimation of Lorenz Curve for urban region is implying that there is more income disparity as the Lorenz Curve is pretty away from line of equality. The Lorenz Curve estimation is followed by determination of Gini coefficient value which is calculated as 0.42, implies 42 percent income disparity in Urban Region of KP Province. The high income disparity in the urban region is validating the fact that owing to more professions which employing people from all walks of life from poor class to richer class leading to high income disparity. The same trend also been reported by Anwar (2005) using House Hold Integrated Economic Survey HIES data 2004-05.

Figure 4: Lorenz Curve of Urban Region of Khyber Pakhtunkhwa through Income Approach



Source: Cross Sectional Data, Pakistan Bureau of Statistics.

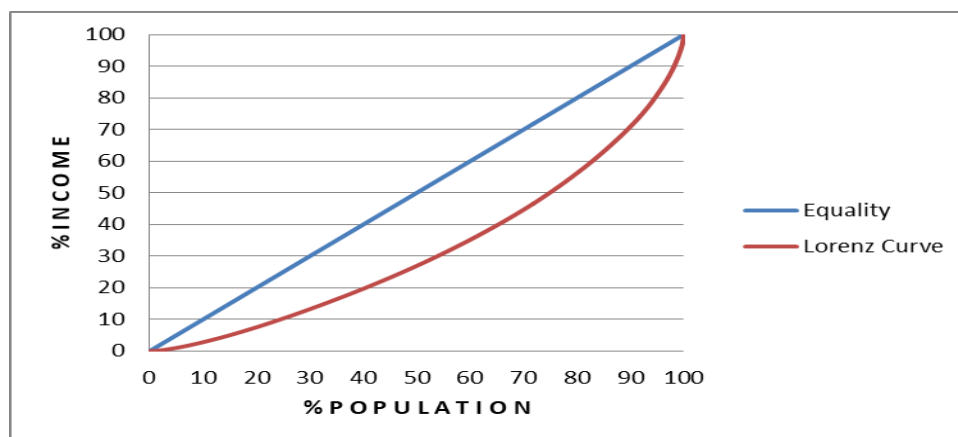
Gini Coefficient value of urban region of Khyber Pakhtunkhwa through Income approach: **0.42**

Lorenz Curve and Gini Coefficient Estimation of Rural Region of Khyber Pakhtunkhwa Province through Income Approach

In the similar perspective the income disparity of KP province is also measured for rural region. The Lorenz curve estimation for rural region is illustrated at Figure 5. This portrayed a relatively less income disparity in the rural region as compared to the urban region. As we are cognizant and literature is evident that rural region of Pakistan in general and of KP province in particular is more agriculture based. Therefore, the majority of the people are employed in agriculture sector, which can subsequently leads to less income disparity. The Gini Coefficient value was observed as 0.35 which reveals that income disparity is 35 percent in rural region of KP. The

income disparity (35 Percent) of rural region was pretty less as compared to the urban region of KP province which was estimated as 42 percent.

Figure 5: Lorenz Curve of Rural Region of Khyber Pakhtunkhwa through Income Approach



Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Gini Coefficient value of rural region of Khyber Pakhtunkhwa through Income approach: **0.35**.

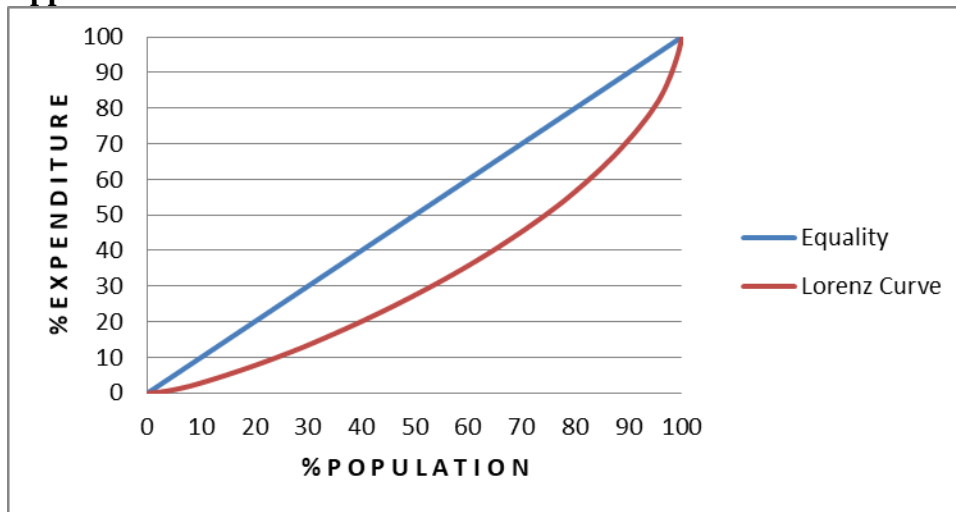
Lorenz Curve and Gini Coefficient Estimation of Urban Region of Khyber Pakhtunkhwa Province through Expenditure Approach

The comparison of income and expenditure approach for estimation of Lorenz curve as well as Gini coefficient can be worth full to describe the income disparity through various dimensions. In this regard, urban and rural regions of KP province are further assessed for income disparity through expenditure approach. The slightly different result of Gini Coefficient value for urban region of KP Province under expenditure approach has been observed. The Gini coefficient was estimated as 0.34 for urban region of KP province through expenditure approach which is slightly low from income approach that was calculated at 0.42. The Lorenz curve showing income disparity is given at Figure 6.

Lorenz Curve and Gini Coefficient Estimation of Rural Region of Khyber Pakhtunkhwa Province through Expenditure Approach

The Lorenz curve followed by Gini Coefficient is again computed for rural region though cross-sectional data set of expenditure of the sampled individual of KP residing in rural region. The interesting findings have been observed through expenditure approach for rural region as Lorenz curve and Gini Coefficient value both demonstrates contradictory results of income disparity in rural region of KP as compared to income approach. It is precedent through literature that expenditure approach is more appropriate (Anwar 2009) so one can conclude that the income disparity in rural region of KP Province was 30 percent as revealed by Gini Coefficient value. The wideness of Lorenz curve presented as Figure 7 also depicts the less income disparity as to income approach's Lorenz curve of Urban region.

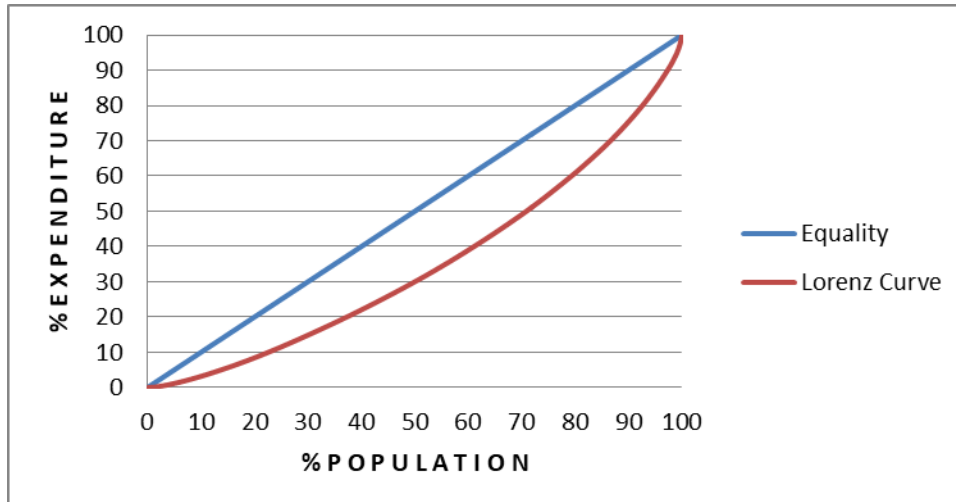
Figure 6: Lorenz Curve of Urban Region of Khyber Pakhtunkhwa through Expenditure Approach



Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Gini Coefficient value of urban region of Khyber Pakhtunkhwa through Expenditure approach:
0.34

Figure 7: Lorenz Curve of Rural Region of Khyber Pakhtunkhwa through Expenditure Approach



Source: Cross Sectional Data, Pakistan Bureau of Statistics.

Gini Coefficient value of rural region of Khyber Pakhtunkhwa through Expenditure approach:
0.30

Conclusion & Recommendations

It is concluded from this research endeavor that the overall income disparity prevails in KP province was witnessed at 38 percent through income approach and 32 percent through expenditure approach. The major findings also underscored that income inequality in rural region was less as compared to urban region in KP through income approach. The similar trend has

been observed in urban and rural region of KP through expenditure approach. The major finding illustrates that that income inequality exists in the KP Province. The estimation of Lorenz curve followed by Gini Coefficient value of overall KP province which is estimated as 0.38 implies that 38 percent income inequality prevails in province KP-Pakistan. While the Lorenz Curve estimated for KP Province through expenditure approach is less wide as compared to income approach which shows relatively less income inequality in KP Province. This research endeavor recommends that the poor class of the KP province should be provided more education opportunities so that they can escalate their job opportunity which will leads to income equality across the society.

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