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Household Income and Income Inequality Analysis: A Comparative Study Among Cities of Punjab Pakistan

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***Abstract* – Household income and per capita household income inequalities refer a gap between the incomes of households. Economics disparities persist between the districts of Punjab, Pakistan. Household and per capita income inequalities are increasing year to year within and between the cities of Punjab. Such inequalities clearly describe that gap between high, middle and low income is widening in these areas. These inequalities create many serious mental conflicts between populations. This paper tries to evaluate the household income inequality within and between small and large cities of Punjab. For this purpose, it uses the primary data of 1500 household. With the help of Gini coefficient and Theil Index, it is found that the income inequality is high in Small cities with relative to Medium and Big cities (district). These inequalities are ranging from 30% to 50%. Average household income is found to be significant between cities. Regression result of household income for each cities level differentiate that small and medium cities have lower coefficient of industrial sector and private services sector and other sector dummies relative to large cities. These sectors are needed to be developed and improve in these areas. Industrial promotion and improvement is necessary. Government has lot of challenges and many districts needs attention to develop.**

***Keywords* – Income Inequality, Regional Diversity and Household at Cities Level.**

I. INTRODUCTION

Household income and household inequalities are growing rapidly among the masses due to increasing trend of socio-economic activities in all over the word. The World is converting into a global village but household disparities are increasing globally or between countries, states, provinces, cities and with respect to geography. As USA, UK and Asian Countries comprise of different resource and market structure. Their regional economic discrimination is significant like in USA 20% region have more than average national income. Of the 50 US states, only 20 percent states have a per capita GDP greater than the national average of $45,845. Delaware and Mississippi have a per capita $60,000 and $20,000 these regions display the highest and the lowest growth rates, respectively. Also the regions in UK (average per capita GDP US $45,574) demonstrate a similar pattern with South East UK at the pinnacle of growth (above 5.5 per cent) while North East lags behind at less than 4.25 per cent. While in Asia situation is more critical and states as well as cities have wide economic disparities. The majority of all urban population was living in small urban settlements whereas less than 5 per cent of the world population is living in mega-cities [15]. Demographic transition and aging group of household describe worsen income inequality measures compared with other household group [21]. Migrant Household is one of the sources of overall income inequality [8]. The existence of household income inequality is due to regional diversity [17]. Urbanization creates regional diversity which creates gap between urban and rural areas but for urban areas it causes household income inequalities [2]. Regional disparities like interprovincial Rural and urban confirmed by [5] and [3]. Provinces differences also have household income inequalities [8]. Different zone also are considerable in country because household income inequalities in different zone are significant [12]. With the regional discrimination source of income also have significant impact on household income inequalities [1], [1], [2] and [2].

According to united nation estimate in December 2016 total population of Pakistan is 192 million about which 38.9% population live in urban areas and population density is 250/km^2. Such estimates describe that urban population will increase up to 50% in 2050. The population in metropolitan areas is consistently increasing by two ways once due to population growth and second due to inflow of population from rural to urban. Such population differences creates discrimination between cities (district) because government increases their spending in these areas for development like education infrastructure medical and industry but cannot concentrate on least urban area of the country. These activities increases job opportunities and better wage earning in metropolitan areas but small cities cannot enjoy this fruit due to these major difference the resident of metropolitan area have higher average income than small cities resident In Pakistan most recent.

Household Integrated Economic survey is constructed in 2014-15 according to survey average monthly household income by quintile is estimated. In this survey, no any information is available on city basis separately but it provides us urban and rural wise average monthly income by quintile. The differences between quintile and area can be observed clearly. From year 2011-12 to 2013-14 it can be observe that there is increase in average monthly income (Table 1). Monthly income of the household of 5th quintile in urban area earning approximately 4 time of 1st quintile and in rural area it is almost the same. These are the income disparities within corresponding area while between urban and rural income disparities are also considerable by quintile. Household income analysis among cities level will present clearer picture of disparities.

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Table 1. Average monthly household income by quintiles and Region

Quintile	*2011-12*			*2013-14*		
	Urban	*Rural*	*Total*	*Urban*	*Rural*	*Total*
1st	13845	13221	13307	17414	16428	16583
2nd	17674	16578	16815	21744	20015	20436
3rd	21307	19342	19928	26228	23273	24188
4th	26755	23204	24531	29225	29275	29255
5th	51484	33978	43859	57850	46424	53001
Total	34780	20877	25679	38923	26452	30999

Source: Household Integrated Economic survey of Pakistan 2013-14

Household income is mostly depending on persons who are employed in different sector. HIES integrated economic survey depicted the share by source of income (Table 3). Here highest share of household income is wages and salaries, it is observed that wages and salaries have always played significant role towards the total household income i.e. 37.45% and it is also true for urban and rural areas with 46.99% and 29.39% respectively. The second largest share is from non agri. Activities. The third major share of income is Crop production which increased to 11.48 % from 11.05% in 2011-12.The share of income from foreign remittances has slightly increased to 4.77% in 2013-14 from 3.79% in 2011-12. However, there is a decline in the share of income from gift and assistance; to 2.52% in 2013-14 from 2.65% in 2011-12. Trend in both urban and rural areas are same and also for total but here we cannot analyze which sector is more significant and employment intensive.

Table 2. Percentage of monthly household income share by source and region

Income source	*2011-12*			*2013-14*		
	Urban	*Rural*	*Total*	*Urban*	*Rural*	*Total*
Wage and salaries	46.8	31	38.4	46.9	29.3	37.4
Crop productions	1.9	19	11	2.5	19	11.4
Livestock activities	1	13.2	7.5	1.2	13.4	7.8
non-agri. activities	25.4	12	18.3	24	12	17.5
Property other occupied	2.9	3.4	3.2	3.4	2.6	3
Owner occupied	12.73	6.07	9.19	11.84	6.34	8.86
Insurance & pension	2.31	1.58	1.92	2.63	1.84	2.20
Gift and assistance	1.4	3.7	2.6	1.2	3.6	2.5
Foreign remittances	3.5	4	3.7	3.5	5.8	4.7
Domestic remittances	1.8	5.4	3.7	2.2	5.5	3.9
Other sources	0.02	0.3	0.2	0.3	0.4	0.3

Source: Household Integrated Economic survey of Pakistan 2013-14

In Pakistan there are few cities where educational, medical, mean of communication, transportation; industrial and other facilities are abounded. UNDP (March 2014)[15] report says some Pakistani cities are as well off as any developed country while others are on par with the poorest in sub-Saharan Africa. LUMS-Oxfam (2015) research describes that disparity between least and most developed cities of Punjab, Pakistan measured by asset index ranges from 7.61 to -6.23 for Lahore and Rajanpoor respectively. Cities having low asset score are greater in number than a high asset score. Out of 36 cities, nearly 69 percent fall below the average, suggesting that households in these cities generally suffer from low levels of well-being. Income inequalities between less and well developed cities have average result as developed cities income inequalities are lesser than small cities. In small cities there are only few fields where job opportunities exist here income inequalities are greater. Well-developed cities have lot of job availabilities here income inequality is high. But when collectively inequalities are measured then income inequalities presented different picture. In big cities average income of household is greater than small cities household. On the other hand, agriculture sector causes also income inequalities because landlord own more land, while small former own small plot there production is not enough to get lot of income. So land lord receive higher profits on their cultivation while they exploit their labor and give them very low wage.

About 56% of total population of Pakistan living in Punjab, Punjab has 36 cities (Districts) including 142 tehsils and other small cities. These cities further divided into small administrative unite called union councils. There is 3464 union council in Punjab out of which 28% union councils are situated in urban areas and remaining 72% in rural areas. The big cities or urbanize areas are 22% of total cities which are totally different than economic point of view. More than 25 % of total population of Punjab lived in big cities. Big cities education, employment, industries, infrastructure and medical level is quite different than other cities. Like 90% universities of Punjab are situated in these cities, job opportunities business environment, financial sector, road and railways line, transportation, mean of communication, health facilities and all kind of big and small industries are located in these cities. Middle level cities are 31% of total which are enjoying few facilities but rest of the 47% small cities do not have enough facilities. Small cities contained higher proportion of rural union councils. Until resident of small cities have strong desire to basic necessities of life.

This study contributes to the description of the ground realities which are not ever evaluated. In this analyses differences can be made that how the resident of same country are treated in different manners. Contribution is important for researcher to make their study on these issues which are discussed in this study because in Pakistan such kind of discrimination analysis is not presented. This study helps government to make their pattern of expenses at social welfare and to overcome inequalities between the cities. With the help of this study government can define his policy matters according to region or cities.

The income inequality and the reasons of income difference are found by many researchers in different level of the world. However, the literature of income inequality at Pakistan level is scarce. Keeping in view the research gape, the main aim of this study is to estimate the income inequality and the reasons of the income disparities in Pakistan. More specially, this study has two objectives:

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- To describe household income inequalities within and between the cities.
- To describe regional and Sectors on household income's variation.

II. Data and Methodology

Household income inequality within and between the cities of Punjab is an immense challenge. This study tries to address this concern with the help of the primary data of big medium and small cities of Punjab. The data is collected in different cities of Punjab with the help of appropriate questionnaire. This questionnaire contains household income related information, which helps to analyze average household income and income inequality between the cities of Punjab.

Regional Classification and Sample Size

In Pakistan small cities (districts) consist on about 1.5 million people, medium cities about 1.5 to 3 million and big cities having more than 3 million people (Table 3). Small districts have about 4, medium have 5 to 7 and big districts have more than 7 representatives in the provincial assemble. The data set classify as big, medium and small cities level samples which were randomly selected. The number of sample size is different in cities based on the overall size of the city level. Out of all Punjab cities only 12 district are selected for data collection it consisted the sample of 1500 household, which covers almost all level of household in these cities.

Table 3. Number of Sample Selected in Cities

City level	***Big***	***Medium***	***Small***
Sample Size	600	500	400

Descriptive Statistics and Graphical Analysis

Average household income relative to region and sector's proportion is analyzed with descriptive statistics like me, standard deviation and graphical technique.

Test Statistics and Formulation of Hypothesis

Big cities and small cities have different level of average income. Household income distribution between cities is not identical. Tyler & Zhang [18] used test statistics like T-test, F-test (One-way ANOVA) and Chi-test to describe income inequality within and between ethnic groups. Massey, A., & Miller, S. J. [13] in his article, test of hypothesis using statistics gives some example in which same test are used to compare income group. In this article we also adopt such technique to meet our first objective and to test whether average household income between cities level is equal or not. To test equality of mean income t-test is adopted and to test distribution of household income of cities level f-test selected because these test are used to test equality of variances. These entire tests are used in One-way ANOVA. It means we are going to test household income variation within Cities levels and between cities level. So for this purpose our hypothesis is defined as:

H0=Average household income of all cities level are equal

H1=There is significant differences in average household income &

H0=Household income distribution of all cities level is same

H1=There is significant differences in household income distribution

Usually T-test is used to compare equality of two or more independent sample mean from a random population with large sample size and unknown population variance. T-test statistics define as:

$$T = \frac{(\bar{Y}1-\bar{Y}2)-(\mu1-\mu2)}{\sqrt{\frac{\sigma1^2}{n1}+\frac{\sigma2^2}{n2}}}$$

Where:

δ^2 is the variance for the ith distribution and n_i is the ith sample size. If we don't know the population variances, we may substitute the sample variances s^2 estimated and ni are large enough (larger than 30). Sample variance formula defines as:

$$S^2 = \frac{\sum(Y-\bar{Y})^2}{N}$$

F-test statistics is used to test equality of variance between two or more sample of population f-test statistics define as:

$$F = \frac{\text{Greater Sample Variance}}{\text{Smaller Sample Variance}}$$

Sample variance formula is given above.

The Measurement of Income Inequality

A large number of indices have been suggested to measure the income inequality by available literature but some are commonly used. Out of this range, the four measures of income inequality i.e. Coefficient of variation, Lorenz curve, Gini coefficient and Thiel Index are selected to measure the income inequality in the selected cities of Punjab. These measures help to evaluate income equality level in the area and comparison. Also liner regression model is used to describe which sector playing significant variation in household income.

Lorenz Curve

The Lorenz curve is considered very useful technique to provide complete information on the distribution of incomes as a proportion of the mean. It gives a comprehensive and comparative description of the income standard of various groups of households. With the help of this measure we can differentiate regional income inequality. As in this paper our first objective is to measure income inequality within and between cities of Punjab. So we can compare all Lorenz curve all together.

It makes our analysis more comprehensive.

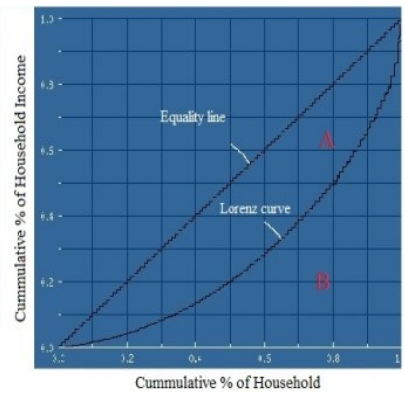

Fig. 1. Graph of the Lorenz curve

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In the above given diagram of Lorenz curve horizontal axis show cumulative % of household members and vertical axis show cumulative % share of household income. Lorenz curve that is at a larger distance from the 45° line show higher level of income inequality than the one close to perfect equality line.

The Gini Coefficient

The most famous index, which is used to measure income inequality is Gini coefficient developed by Gini in 1912. It is lies between 0 to 1 where 0 corresponds with perfect equality (where everyone has the same income) and 1 corresponds with perfect inequality (where one person has all the income, and everyone else has zero income). There are many forms of formula for calculating the Gini coefficient, although the basic principle is the same. The Gini coefficient is defined as a ratio of the areas on the Lorenz curve diagram. If the area between the line of perfect equality and Lorenz curve is A as shown in the above picture grey shaded area, and the area shaded with color blue under the Lorenz curve is B, so Gini coefficient can be calculated in relation with Lorenz curve as:

$$\text{Gini coefficient} = \frac{A}{A+B}$$

Where

A = Area between Perfect equality line and Lorenz curve

A+B = Total area of triangle

If the Lorenz curve is approximated on each interval as a line between consecutive points, then the area B can be approximated with trapezoids and:

$$\textbf{\textit{Gini-Coefficient}} = 1 - \sum(X_k - X_{k-1})(Y_k - Y_{k-1})$$

Where:

X_k = Cumulative No. of household

Y_k = Cumulative Household income.

Coefficient of Variation

The coefficient of variation is a very basic measure of variation in a given set of data. It is a descriptive measure and it describe average variation in given set of data with relative to its mean of the data, denoted by CV and defined as:

$$CV = \frac{\sigma}{\mu} * 100$$

Where: $\mu = \frac{\sum x}{N}$ & $\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$

Here "x" represent Household income and N is total number of house hold.

The Theil Index

Actually Theil index is calculation entropy within and between the give groups of data which is defined by Theil in1967. If a population have N observation and each with the characteristic x, the situation may be represented by the list xi (i=1…....N) where xi is the characteristic of observation i. For example, if the characteristic is income or household then xi is the income of individual or household i.

Then Theil index is defined as:

$$T = \frac{1}{N}\sum_{i=1}^{n}\left\{\left(\frac{xi}{\mu}\right) * \ln\left(\frac{xi}{\mu}\right)\right\}$$

Where: $\mu = \frac{\sum x}{N}$

Ordinary Least Square Method

OLS is very common and useful technique to solve many econometrics problems and also it is used to elaborate relationship between variables. Here we are also taking help from this technique to find sector or source of income which is playing significant role to explain variation in household's income of different cities of Punjab. Source of income is also used by [14]. The econometric model of the selected variables used in this current study is given as under.

$$\mathbf{Y = f\,(X_1, X_2, X_3 \ldots\ldots X_k)}$$

Y is dependent variable and X_1, X_2, X_3 and X_k are the explanatory variables.

By following the econometric model above our functional form of economic model is define as under.

HH Income = f (EMP, LRG, MDM, SML)

Where:

HH Income = Total Household Income (Dependent Variable)

EMP = No. of Employed Household (Independent Variable)

LRG = Large City (by coding large city respondent as 1 and everyone else as 0)

MDM = Medium city (by coding Medium city respondent as 1 and everyone else 0)

SML= Small city (by coding Small city respondent as1 and everyone else as 0)

And

Income of EHH = f (EDU, AGR, GOV, PVT, IND, RMT, PEN, LSE, HSE)

Where:

Income of EHH = Income of per Employed Household (Dependent Variable)

EDU = Education level of employed Household (by maintaining original coding)

AGR = Agriculture Sector Dummy (by coding 1 if employed Household person employed in agriculture sector, everyone else as 0)

GOV = Government Sector Dummy (by coding 1 if employed Household person employed in government sector, everyone else as 0)

PVT = Private sector Dummy other than Industrial (by coding 1 if employed Household person employed in private sector, everyone else as 0)

IND = Industrial sector Dummy (by coding 1 if employed Household person employed in industrial sector, everyone else as 0)

RMT = Remittances Dummy (by coding 1 if the source of income of employed Household person is Remittances, everyone else as 0)

PEN = Pension Dummy (by coding 1 if the source of income of employed Household person is Pension, everyone else as 0).

LSE = Low Income (Lower than PKR.25000/) self-employed Dummy (by coding 1 if the source of income of employed Household person is LSE, everyone else as 0).

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HSE = High Income (Above than PKR.25000/) self-employed Dummy (by coding 1 if the source of income of employed Household person is HSE, everyone else as 0).

Economist believes that income have a skewed distribution to cop this problem we transform income variable into Log (income) as Benoit, K. in[2] in his study he describe that such transformation make this variable normally distribute. After the variable specification our formulated models define as:

$$\textbf{Log (HH income)} = \alpha_0 + \alpha_1(EMP) + \alpha_2(LRG) + \alpha_3(MDM) + \alpha_4(SML) + \mu$$

And

$$\textbf{Log (Income of EHH)} = \beta_0 + \beta_1(EDU) + \beta_2(AGR) + \beta_3(GOV) + \beta_4(PVT) + \beta_5(IND) + \beta_6(RMT) + \beta_7(PEN) + \beta_8(LSE) + \beta_9(HSE) + €$$

Where,

Log have base e = 2.71828 μ and € are error term while variable are define with detail above.

III. Results and Discussion

Income inequality is, sever in Pakistan and a big challenge for the government to eradicate this problem. In our study we measure such variation of the income inequality at household level in different cities of Punjab with help of graphical, descriptive and inferential statistics techniques.

Summary of Household Size, Employed Household and Average Income

According to HIES (2013-2014) average household size in all Pakistan was 6.41, in urban 6.22 and in rural 6.58; while, employed person per household all Pakistan 1.93, in rural 1.73 and urban 2.01. According to survey, the average household size in Punjab was 6.08 numbers of head and average employed person in household were 1.91. The results of study followed by the same trend for province Punjab Pakistan (Table 4). Like average household size in Punjab is 6.05 and average employed household are 2.19. But different level of cities has different household size and different number of employed person. Big cities level have average smaller household size than other two level of cities but larger number of employed person per household relatively. On an average, small cities have larger household size; however, numbers of employed person per household are smaller relatively. It is the main reason that average household income is high in big cities because comparatively large number of household includes their share in his household income while average household income is low in small level cities because lesser person includes their share in total household income. On the other hand, number of earners per household varies family to family and city to city, was the main reason of the variation of household income in intra-city and inter-city. De Hans Hruijk [11] also found the same results of variation in income of household, where he described income inequality between household is due to different number of earner in per household.

Within cities level and between cities level average household income and average household income standard deviation are not identical. These differences indicate that household income is unequal. This inequality increase when it is estimated between the household as a whole Punjab but when it is calculated by subpart its intensity decreases. Furthermore, we observed that with increasing number of employed persons per household, the average household income also increased, however the variation among them has same trends. While, average household income for all level of Punjab present average of all household's income but their standard deviation represent more deviation from the mean household income. According to integrated economics survey (HIES) 2013-2014 of Pakistan it is estimated that monthly household income for all Pakistan is about PKR. 25670. It is depicted that difference is a lot because Punjab is more populous and urbanized province and its average income is higher than other provinces.

Table 4. Summary of Household and results for descriptive statistics

Cities Level	Sample Size	HH Size	Employed HH	Mean Income (PKR)
Small	400	7.4	1.61	37552
Medium	500	6.6	2.06	76770
Big	600	6.1	2.67	155665
All	1500	6.6	2.19	97870

Employment in Different Sectors

Relative frequency bar chat of sector wise employment is about city wise proportion of employed household who are employed in different sector (Figure 2). Firstly, in large city about 34% employed household are engage in government sector, about 27% are doing job in private sector other than industries, about 18% employed household have their own business, about 15% employed person are part of industrial sector remaining about 6% employed household earning their income from agriculture, remittances and pension. Secondly, average household incomes of medium level cities are lower than big cities household and relative to big cities number of employed household in respective sector are also different.

As agricultural employed household are 8%. It is about 6% greater than big cities but in industrial employed are approximately 4% less. Out of about 14% employed in industrial employment work in adjacent big cities to medium cities because medium cities do not have enough industries as in big cities. Government sector absorbed more employed relative big and small cities household in medium cities. Private sector other than industries engages 14% of employed household of medium cities. Approximately 2% are those who are those whose source of income is pension or doing job in other countries. Thirdly, small cities level employed household are earning less the average income because they working in low paying sector with compare to other.

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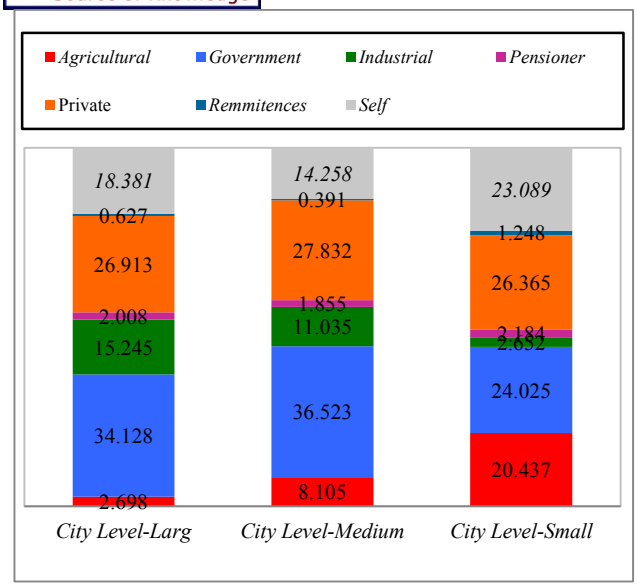

Fig. 2. Relative frequency bar chart of Sector wise employed household proportion in Cities

About 20% employed belonging agriculture sector because mostly household member are uneducated and do not have professional skills so they work as a labor in agriculture sector. Private sector in small cities does not have enough potential until 26% household employed I this sector but low paying as private school, bricks making business employed and salesman at shops etc. government sector jobs are also relatively less in small cities. Only 24% household got job in this sector but mostly at low rank. Until in government colleges and universities campuses professors and lecturer are belong to large or medium cities which are appointed by the government intentionally. Government administration department of Punjab appointed the resident of large and medium cities for small cities. Such appointments are high rank and high paying in nature. While low rank job like clerical staff, peon and office boy job are reserve for the resident of small cities. 23% self-employed have also small level business only fewer percentage of household engage in large level business. Industrial sector's employment in small cities is only 2% because in small cities there is no any big or employment oriented industries are located only few districts have one or two industries. With relative to big and medium level cities the proportion of employment in industrial sector is very low. While in big cities many industries are situated and lot of people belong to big cities are employed in this sector.

Education Level of Employed Person (relative frequencies comparison by region)

Education level and percentage of employed household is comparing in figure 13 also relieve city wise difference can be made in this chart. Result in large city level show that 35% employed house hold has master level qualification and 38% has graduation level of education. About 10% employed household are those who got higher secondary school certificate. Higher studies degree holders are only 5% and remaining 12% employed house hold have lower level of education. Such results reflect educational facilities in large are very satisfactory. Medium level cities results followed by the large cities level because about 60% employed house have more than higher secondary school education level. However difference between big and medium level cities 23%. It means still 23% employed households are more qualified in large cities. About 41% employed household have lower level of education including 18% employed who have higher secondary school certificate. At the end in small cities education level of employed household facts are not satisfactory because in small cities level only 12% employed person have master level qualification or above.

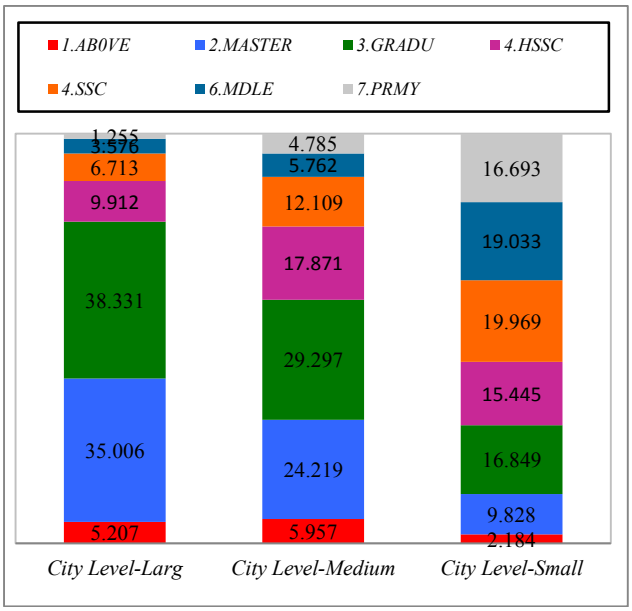

Fig. 3. Relative frequency bar chat of Education level of Employed Household in Cities

It is 28% lower than big cities and about 18% lower than medium level cities for same higher level of education. 66% employed person in small cities have lower than higher secondary school education level it is the main reason behind lower average household income of small cities. Income is an increasing function of education level. So in small cities mostly employed person have low paid jobs because their education level is low. Percentages of employed person who have graduate degree are only 17% in small cities. It is also 18% and 10% lower than big and small cities respectively. Only higher school certificate holders are not much different than other two city levels.

Result of Test Statistics

In (Table 5) results for T- statistics and F-statistics are summarized. Result clearly showed that all cities level household have different average income and their variances between each other are also significant different. Such results support our hypothesis that big cities, small cities and medium cities have different average household income and when we calculated average of all Punjab it present some different result. Same situation refers household income inequality or variation because combine estimate are significant different than separate estimate. T-statistics is used to compare mean of every household total income with each cities level in such as fist all level cities mean tested with separately with other three level of cities

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then all level is exempted then big city average house hold income is tested with medium and small level averages and at the end medium and small cities level's average house hold income tested. All mean are found to be significant different. At significance level 1% all critical values lies in the rejection region. As shown in the last two column of above table.

Table 5. Test statistics

Cities Level	Mean Diff	F- statistics			T-statistics		
		DF	F cal	F tab	DF	T cal	T tab
Medium		499					
Small	39217	399	2.67	1.28	898	9.20	2.58
Large		599					
Small	118113	399	10.73	1.26	998	15.29	2.58
Large		599					
Medium	78895	499	4.02	1.25	1098	10.71	2.58
Large		599					
All	57795	1499	1.62	1.20	2098	9.37	2.58
All		1499					
Medium	21100	499	2.48	1.21	1998	3.76	2.58
All		1499					
Small	60317	399	6.62	1.23	1898	10.05	2.58

F-statistic is used to compare variances of total household income between cities level. At the same level of significance all cities level have different household income variation between each cities level. Same method is adopted to compare total household income variances for each level of cities. Column 4 and 5 presented calculated and critical values of F- Statistics. It confirms that household income variation between regions are not identical and the basis of result our Null hypothesis is rejected at 5 % level of significance.

Measurement of Income Inequality

Lorenz Curve

Household income inequalities trend are explicit within and between all level, large level, medium level and small level cities of Punjab (Figure 4). The trend shows that between all cities level household income inequality is very high because Lorenz curve of all level cities is wider than other level of cities. And Lorenz curve of small level cities have very minuet differences with the curve of all level cities. It means that inequality in small cities is same as in overall Punjab. It is the clear that the residents of small cities are facing unequal distribution of income. Only aristocrats and land lord have lot of income and some businessman while remaining majority has not enough money to fulfill their basic needs. But Lorenz curve of big level cities is near to perfect equality Line with compare to other. Comparatively big level cities have lower household income inequality while Lorenz curve of medium level cities lie between other two levels.

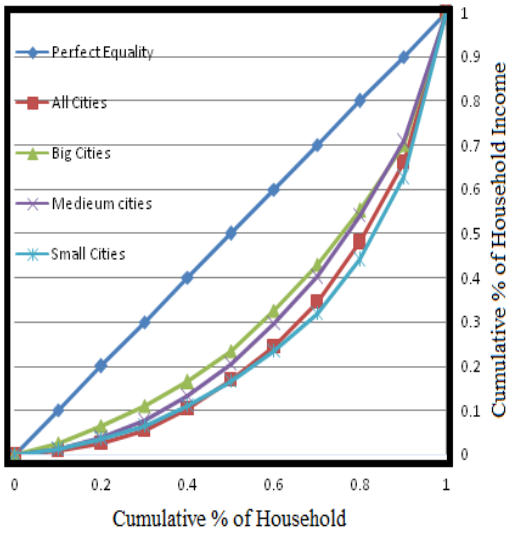

Fig. 4. LC for regional Household Income inequalities

CV, Gini Coefficient and Theil Index

Results of Gini coefficient, Theil Index and coefficient of variation for all cities level have same trend of disparities (Table 6). Comparing the Gini coefficient and Theil Index of all cities in Punjab, we find that the values of both estimates show high household income inequality overall in Punjab and Small level cities. While Medium and big level cities have low household income inequality relatively. Over all household income inequality is high in Punjab it is because different level if inequalities between cities level. A lot of theoretical evidences are available like [20] prove that high income inequality in urban area of china is due to small and large cities. Hans De Kruuk [11] and Hina Amir and Kanwal Bilal [8] confirm that over all income inequality in Pakistan is due to inequality in provinces. In the light of these references we can say that household income inequality in Punjab is due to household income inequality between Big, medium and small cities.

Table 6. HH income inequalities within Region

Cities level	Theil Index	Gini Coefficient Value (%)	CV
All City level	*52.21*	*50.15*	*120.25*
Big City level	*29.96*	*39.58*	*96.28*
Medium City level	*33.77*	*43.46*	*97.38*
Small Cities level	*49.12*	*51.53*	*121.84*

At the same set of data Theil index also present same picture. Household income inequality have same trend but Theil index also describe the intensity of poverty. Accordance with Theil index 52.51% for all Punjab tell us that poverty level in Punjab is also high. In big cities intensity of poverty is lower as Theil value is lowest like 29.96% with compare to small cities where intensity of poverty is highest and its Theil value is 49.92%. Medium level cities have average Theil index of 33.77% it mean poverty level and inequality level is average in these cities. However, on the basis of the Gini coefficients and Theil Index of these levels of cities, we can say that the province Punjab is facing a high deprivation in form of household income inequality.

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Coefficient of variation measure gives relative household income variation. It has also same trend like theil index and gini coefficient for these areas. Results show that between all cities household income varies about 120.25 % and almost same pattern of variation is present with in small level cities it is 121.84 % On the other hand big and medium level cities have same pattern of variation. Like 96.28% and 97.38% respectively. Actually this measure is ratio between mean income and standard deviation. Interpretation can be made that if 1% household income very then 120.25%, 121.84%, 96.28% and 97.38% total income will vary for respective level of cities.

HH Income Inequalities Between Regions

Theil decomposition results within city and between cities are presented in (Table 7). Total household income inequality and employed household income inequality evaluated separately. Total household income inequality within all sampled cities is found about 52 %, small level cities followed it with 49% theil value. But big cities total house hold income inequality is lower than other levels and medium level cities also have lower theil value except big cities. While between cities inequalities measure describe that between all and large cities total household income is more unequal.

Table 7. HH Income Inequalities between Regions

City level	*Total Income Within*	*Household Inequalities Between*	*Employed HH inequalities Within*	*Income Between*

All	0.5221	---------	0.3873	-
Large	0.2996	0.167	0.3487	0.295
Medium	0.3377	-0.048	0.3135	-0.064
Small	0.4912	-0.067	0.3801	-0.098

Theil value 0.167 show that about 17% average household income of large cities level in higher than all level cities. Between large and medium or small level cities these difference widen more. Theil coefficient between All and medium level cities is -0.048 it mean only 4.8% inequality exist between two level while such inequality increase between small level. Medium level cities and small level cities average total household income lower than average total household income of sampled cities.

Employed household income analysis have same inequalities trend like total household income inequalities for different cities level but within cities proportion of income inequalities of employed household income are lower than total household income like all level have 38.73% large cities level have 34% and medium level cities have 31% small level have 38.01 % on the other hand between all cities and large cities employed household income is more unequal relative to all level cities large level employed household average income is about 30% high while this gape increases more with other cities levels between all level and other two level have same result like total household income inequalities.

Results for Multiple Log Linear Regression

Multiple log linear models are utilized to estimate total household income. First we take log of total household income as independent variable and number of employed house hold as independent variable. Different cities levels are taken as dummies in this model. Regression result like coefficients are given in column 2 and standard error are presented in column 3 t-cal and p-value is given in column 4 and 5 respectively (Table 8). We can notice that there is left over one category of regional dummy called small cities level in compares with estimated and formulated model. Logic behind the left out dummy is that the value of such dummy would be correlated with other dummies or may cause problem of multi-collinearity to cop this problem we intentionally drop out one dummy variable. The omitted variable will be considered as the reference category for other estimated values of variable and we can differentiate the estimator of included variable with omitted one and also with each other as well.

Regression result shows that estimated estimator are significant. The R-Square value depicted that 52.5% variation in total household income is explained by number of employed household and regional dummies. Coefficient of No of Employed household determine that as well as number of employed household change by 1 unit there will be change in 42.4% in total household income. It further indicate that higher the number of employed person in a household there will be greater the total household income.

Table 8. Regression results for Total HH Income

Source	*Coefficient*	*Standard error*	*T cal*	*Pr> |t|*
Intercept	9.357	0.048	194.326	0.0001
No of Employed HH	0.424	0.018	23.287	0.0001
Large cities level	1.183	0.053	22.410	0.0001
Medium cites level	0.636	0.052	12.299	0.0001
				R^2=0.525

Independent variable: Total household Income

Estimators for the regional dummies indicate that total household income of large cities and medium cities resident is greater than total household income of small cities resident. Household of Large cities earn about 1.183 and 0.547 of income more than small and medium cities household respectively. Household of medium level cities earn 0.636 of income more than small cities Household. Results of t-calculated and p-value indicate those estimators are Significant.

Regression Results for Income of Employed HH

Same technique is adopted to estimate formulated model for income of per employed household. This model is estimated for different level of cities separately. The purpose of this model is to describe the sector which is more significant impact on income of employed person. Also education is considered as independent variable with originally maintained rank which has impact on income of employed household. But here we would like to differentiate impact of education on income of employed household in different region by estimating identical model for each region. Other sector's comparison is also considered to differentiate region wise employment sector and their estimated values.

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Formulated model is estimated by adopting same method to drop out one dummy category to overcome regression problem. Same dummy category is omitted for all region estimation to make our comparison expressive.

The values of goodness of fit predict that about 61.7%variation in income of household employed person is explained by education and sectors dummy (Table 9). With compare to other region like large cities region it is 8.8% lower but it is higher than medium and small city about 10% to 20%. It is because there is different level of education and source of income persist in different region.

Estimator for education indicates there is positive relation with education and income of employed household it mean that employed household have high income if he has higher level of education and vice versa. But here the differences are considerable for different region because the estimated value of education in the large cities level shows income of employed household increases 0.29 with the increase in unit rank of education. But for the medium level cities and small level cities income change is 0.165 and 0.113. these differences indicate that education have high impact over income of employed household who belong to large cities while medium and small cities employed household have lower impact of education on their income relative to large cities. It is because large cities employed person have high proportion of higher level of education relative to other region. If all regions have equal educational facilities then such differences can be overcome. While all cities level result depicted average trend in all cities. Education has significant impact on income and inequality [2].

The β values of sector or source of income dummies indicate that income of employed household earned from government, agriculture, industrial, private, remittances, pension and low income self-employed source is lower than reference category called high income self-employed. Such results are identical with all level of region but proportion of reference category is different for every region. On the average employed household earned lowest income share from low income self-employed source. It is also having identical estimated result for all regions but further we can observe that estimator trend is not identical with other dummies estimator in all regions.

The second largest share of income comes from industrial sector for employed household in large cities. Industrial sector share of income is less 0.661 of income share than reference category for the employed household. But in the medium and small level cities income share of employed household is on forth. These are 0.818 and 1.014 of income less than their respective reference dummy for medium and small level respectively. In small cities income share from industrial sector is less than medium cities (-1.014 versus -0.818). Here we can understand that industrial sector in big cities is well developed. Household in large cities are mostly employed in this sector but rest of the region industrial sector is not enough developed some time household move toward big cities as [2] confirms that industrialization and business environment encourage labor to move toward industrialized area as a result labor migration taken place.

Household of small level cities and on the average for all cities earn second largest share of household income which comes from remittances. Whereas small cities and all cities employed household earn about 0.601 and 0.672 of income less than high income self-employed. The most of the household member move from least develop to developed region within country or out of country for better job because in their region there are not enough opportunities. Employed household in big and medium cities get their third biggest income share from remittances.

For medium level cities second largest share of income of employed household comes from government job. While small cities and large cities followed by it respectively. Income of household having source high income self-employed is 0.572 of income higher than government job holder household in medium level cities. Small cities and big cities are at third and fourth place respectively in queue according to their corresponding estimate. Income of Household earnings from government jobs is relatively less 0.803 and 0.793 of income than omitted one for small and large cities respectively. Big cities household have high average income than small cities household with same source of income (-0.793 versus -0.803).

Agriculture sector dummies has the fifth rank in small cities according to earning of household income until agriculture sector is the largest sector in Pakistan were highest proportion of our labor force employed but earning share is very low relative to other sector. The income shares of household whose belong to large and medium cities are the second last. With relative to reference category household of big and medium cities earn less 0.958 and 0.924 of income respectively.

But it is relative to other region income is low as it is less 1.179 of income to omitted one. Result describe that category sectors or source of income have significant impact on income of employed household bur there is differences in values of estimator with compare to region. In Punjab every sector has average impact it reflects overall trend like Pakistan economy as in Pakistan highest share in GDP is services sector then agriculture and then industrial but regionally these trend are little bit different. Such differences are the main reason which creates income deviation between household of different region. In large cities household are engage in high paying sector while in small cities household are engage in low paying sector. While resident of medium level cities have proportional source of income.

The reason of including education level of employed person is to differentiate regional differences in responsiveness of level of education here we can clearly observe that coefficient of level of education estimated for large cities is higher with relative to other two level of cities. Literacy rate and proportion of higher level of education is greater in metropolitan areas while these ratios are low in other cities.

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Table 9. Regression result for income of Employed Household

Variables	*Coefficient*	*Std. Error*	*t-cal*	*Sig*
	All Level Cities R^2***=0.617***			
Intercept	10.261	0.053	194.052	0.0001
Education level of employed	0.207	0.009	23.909	0.0001
Agriculture Sector employed	-1.116	0.057	-19.633	0.0001
Government Sector Employed	-0.796	0.041	-19.242	0.0001
Industrial Sector employed	-0.755	0.050	-15.061	0.0001
Private(without industrial) sector Employed	-1.205	0.091	-13.239	0.0001
Pension as source of income	-1.072	0.042	-25.401	0.0001
Remittances as income source	-0.672	0.148	-4.530	0.0001
Low Income Self Employed	-1.497	0.058	-25.611	0.0001
	Big Level Cities R^2***=0.705***			
Intercept	10.597	0.079	134.759	0.0001
Education level of employed	0.290	0.050	6.096	0.0001
Agriculture Sector employed	-0.958	0.105	-9.124	0.0001
Government Sector Employed	-0.793	0.049	-16.316	0.0001
Industrial Sector employed	-0.661	0.058	-11.475	0.0001
Private(without industrial) sector Employed	-1.048	0.118	-8.905	0.0001
Pension as source of income	-0.912	0.050	-18.094	0.0001
Remittances as income source	-0.666	0.201	-3.308	0.001
Low Income Self Employed	-1.526	0.095	-16.086	0.0001
	Medium Level Cities R^2***=0.495***			
Intercept	10.302	0.099	103.952	0.0001
Education level of employed	0.165	0.017	9.487	0.0001
Agriculture Sector employed	-0.924	0.108	-8.522	0.0001
Government Sector Employed	-0.572	0.088	-6.539	0.0001
Industrial Sector employed	-0.818	0.101	-8.078	0.0001
Private(without industrial) sector Employed	-1.236	0.174	-7.097	0.0001
Pension as source of income	-1.018	0.089	-11.496	0.0001
Remittances as income source	-0.582	0.148	-3.932	0.001
Low Income Self Employed	-1.468	0.112	-13.060	0.0001
	Small Level Cities R^2***=0.405***			
Intercept	10.186	0.115	88.762	0.0001
Education level of employed	0.113	0.014	8.071	0.0001
Agriculture Sector employed	-1.179	0.112	-10.519	0.0001
Government Sector Employed	-0.803	0.108	-7.407	0.0001
Industrial Sector employed	-1.014	0.182	-5.588	0.0001
Private(without industrial) sector Employed	-1.354	0.195	-6.929	0.0001
Pension as source of income	-1.219	0.107	-11.446	0.0001
Remittances as income source	-0.601	0.245	-2.450	0.015
Low Income Self Employed	-1.301	0.116	-11.217	0.0001
Dependent variable: Income of Employed Household				

IV. Conclusion and Recommendation

Conclusion

In this article primary data is used to analyze household income inequalities between cities of Punjab. First of all I was interested to found average household income is different in big and small cities. So I conclude that my hypothesis was correct because collected data proved that average household income in different region of Punjab are not identical. Different cities level household's also have different level of variances. Within cities income variances have same trend as household have average income level in their corresponding cities level but between cities household income variances are very big. It is very alarming situation because it creates lot of regional problems among the resident.

Secondly our objective was to compare household income inequalities between cities of Punjab. Monthly household income data was collected for different cities. On the basis of Lorenz curve, Gini coefficient and Theil index our conclusion are very interesting because big cities household have low level of income inequalities. Actually in big cities source of income are abandon while in small cities not enough. So in big cities more and more people are engage in different sector so their household total income is high and employed person do not have much differences in their monthly wages on the other hand small and medium level cities household member have limited job and earning opportunities so in these areas some people have low wage while other have very high and their average income differences are greater. So income inequalities in these areas are high. As land lord and big farmer earn lot money

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from their crops while labor hired in agriculture receive low wage. Other sectors also have low employment level and average household income become lower than big cities. Inequalities between cities increase gap between low earner and high earner. Due to this income inequalities between cities are high.

Second objective was to differentiate household income factors in cities level. As above mention household income is derived from many sectors in big cities all these sources playing actively role that's why result were significant in big cities analysis but in small level and medium cities all sectors have not proportional impact on household income. Some sectors have higher impact on income relative to other. Government should concentrate on all level cities at equality basis.

Policies

Following recommendations are mandatory to develop backward cities and medium level cities.

- The government of Punjab and ministry of education should honestly allocate resources in the province. It requires the diversion of thoughts towards the distinction in the universal human rights.
- Government should start education base project to increase literacy in these area where it is needed.
- Industrial promotion should be included in first preferences.
- Infrastructure development is base for agriculture sector and industrial sector it also boast up employment level.
- Services sector is more important and it has highest GDP share in Pakistan Economy but unfortunately services sector limited in big cities small level cities and medium level cities household do not have enough opportunities to take part. So it is need to be developing services sector as a whole.
- Government should start Household survey on yearly basis at cities level. It is helpful for research and for policy makers.
- According to different cities average household income level tax policies should be revised.

REFERENCES

[1] Adams, R. H. "Non-Farm Income and Inequality in Rural Pakistan: A Decomposition Analysis Vol-31." (1994).
[2] Adams, Richard H., and Harold Alderman. "Sources of income inequality in rural Pakistan: a decomposition analysis." Oxford Bulletin of Economics and Statistics 54, no. 4 (1992): 591-608.
[3] ALI, LR, MI RAMAY, and Z. NAS. "Analysis of the determinants of income and income gap between urban and rural Pakistan." Interdisciplinary Journal of Contemporary Research in Business 5, no. 1 (2013): 858-885.
[4] Anwar, Talat, and Faiz Bilquees. "Trends in Inequality in Pakistan between 1998-99 and 2001-02 [with Comments]." The Pakistan Development Review (2003): 809-821.
[5] Benoit, K. "Linear regression models with logarithmic transformations, Methodology Institute, London School of Economics." (2011).
[6] Chongvilaivan, Aekapol, and Jungsuk Kim. "Individual income inequality and its drivers in Indonesia: A theil decomposition reassessment." Social Indicators Research 126, no. 1 (2016): 79-98.
[7] Division, S. "Household Integrated Economics Survey (HIES)" Statistics Division Pakistan Bureau of Statistics. (2013).
[8] Dai, Erbiao. Income inequality in urban China: a case study of Beijing. Vol. 2005. Working Paper Series, 2005.
[9] Amir, Hina, and Kanwal Bilal. "Income Inequality measurement in Pakistan and its four provinces by Lorenz curve. " Journal of Asian Scientific Research 1, no. 4 (2011): 204.
[10] HTTP://DATA.UN.ORG/COUNTRYPROFILE.ASPX?CRNAME=PAKISTAN.
[11] Jamal, Haroom. "Income Inequality in Pakistan: Trends, Determinants and Impact." United Nations Development Programme (2009).
[12] Kruijk, Hans, and S. M. Naseem. "Inequality in the Four Provinces of Pakistan [with Comments]." The Pakistan Development Review 25, no. 4 (1986): 685-706.
[13] Lazarus, Brenda. "A Study of Household Income Determinants and Income Inequality in the Tominian and Koutiala Zones of Mali." PhD diss., Michigan State University, 2013.
[14] Massey, Adam, and Steven J. Miller. "Tests of hypotheses using statistics." Mathematics Department, Brown University, Providence, RI 2912 (2006).
[15] Merz, Joachim. "The Distribution of Income of Self-employed, Entrepreneurs and Professions as Revealed from Micro Income Tax Statistics in Germany." In The Personal Distribution of Income in an International Perspective, pp. 99-128. Springer Berlin Heidelberg, 2000.
[16] Muhammad, S.S. "UNDP of Pakistan" Annual Report 2014.
[17] Muller, Andreas. "Education, income inequality, and mortality: a multiple regression analysis." Bmj 324, no. 7328 (2002): 23.
[18] Mveyange, Anthony. Night lights and regional income inequality in Africa. No. 2015/085. WIDER Working Paper, 2015.
[19] Tyler, T. Yu, and Miranda M. Zhang. "Income inequality among races: A statistical analysis." (2005).
[20] Wan, Guanghua, and Zhangyue Zhou. "Income Inequality in Rural China: Regression-based Decomposition Using Household Data." Review of development economics 9, no. 1 (2005): 107-120.
[21] Wang, Meiyan, and Fang Cai. Gender wage differentials in China's urban labour market. No. 2006/146. Research Paper, UNU-WIDER, United Nations University (UNU), 2006.
[22] Wang, X., Chen, K. Z., Robinson, S. & Huang, Z. "Will China's demographic transition exacerbate its income inequality?–CGE modeling with top-down micro simulation" Journal of the Asia Pacific Economy, 1-26 (2016).
[23] Zahra, Kanwal, Afzal Mahmood, and Sami Ullah. "Poverty and Income inequality in urban Punjab: a case study of five large cities of Punjab (Pakistan)." (2011).

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