A DESCRIPTIVE ANALYSIS USING CHI-SQUARE TEST TO UNDERSTAND KEY PARAMETERS FOR SAVING BEHAVIOR OF PEOPLE LIVING IN SLUM AREA

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ABSTRACT

People living in slum often referred as 'slum dwellers' end up with self-employed jobs such as street vendors, rag pickers, waste pickers, rickshaw/auto-rickshaw pullers or doing low-wage jobs such as labor force in surrounding industries/factories, private security person and driver etc. Although earning of people living in slum is just sufficient to meet their daily expenses, but still, these people have developed a strong habit of making savings, however small it may seem. The study was carried out on people living in slum area of sector 25, Chandigarh. Descriptive analysis of the collected data was done using Chi-square test to establish the interdependence between monthly income and educational level of the populace with the gender of the respondents. Later, Correlation analysis was performed to determine the direction and level of correlation between income and education level of the populace. Thereafter, Multinomial logistic regression method was applied to assess the effect of different saving determinants on different saving motives of the targeted population. It was deduced from the study that the parameters studied had an association with each other. Gender, Marital status, Age, Education level, Income and Financial Awareness index were found to be significantly affecting the saving motives of the respondents.

Keywords: Slum Dwellers, Saving Behavior, Chi-square Test, Pearson Correlation, and Gender

INTRODUCTION

The word 'slum dwellers' is generally used for people living in densely populated and substandard/poorly-build housing units with no regular source of income for their livelihood (Harris, 2009; Olotuah, 2012 and Brien, 2014). However, they play a significant role in the urban economies as they represent a major share of informal labor force. Although earning of people living in slum is just sufficient to meet their daily expenses, but still, these people have developed a strong habit of making savings, however small it may seem. The sole purpose of savings is to accumulate wealth for 'n' number of different reasons as per the future needs of an individual. People generallyset aside money for some

unknown emergency situation or making future purchases. The wealth accumulated this way help an individual or its dependents a source to meet his future goals or aspirations. Some refer 'Savings' as a kind of investment, wherein you save a part of your earning on regular basis, invest in some tools such as FDs, money-back policies, recurring deposits, stock market etc. so as to earn handsome profit which may be utilized for varying purpose. George et al., (2019) conducted a household survey to determine the health conditions of people living in Devarjeevanahalli slum area of Bangalore, South India. Different parameters such as hypertension, diabetes mellitus, anaemia and malnutrition relevant to study were selected. Little or no security of regular income and massive burden of health issues were reported among the inhabitants of slum area. Slum population was found to highly infect with hypertension (35.5%), diabetes (16.6%) and anaemia (70.9%).

Kishorand Ramachandran (2021) performed survey among 200 women workers of handloom weaving societies working on daily wage system, situated in Kannur, Kerala. The study was aimed to analyze the role of financial inclusion and financial literacy among workers. Data collected was subjected to different statistical test such as independent sample Z test, one way ANOVA and chi-square test and important findings of the study can be summarized as there is insignificant difference among educational qualification for the variables such as online banking and locker facility and there is significant difference for variables relating to banking facilities such as banking services, banking charges, mobile banking, debit/credit card, over draft and KYC norms among workers. Syed et al., (2017) conducted a study to analyze the household saving and investment behavior among different income groups of the urban households of Hayatabad subjected to number of parameters such as income, education, employment status and family size etc. Chi-square test was employed to determine the dependency among different parameters, it was concluded that low-cost education, and higher job opportunities would create a significant shift in the saving behaviour of people and their earning. Bhatia and Singh (2019) investigated the relationship between financial

inclusion and women empowerment living in the urban slum of Industrial city of Ludhiana. The study took into account 737 females living in urban slums with PMJDY bank accounts. It was observed that women with access to PMSBY and PMJJBY have higher overall social, political, and economic empowerment, but suffered from different risks such as financial, economic and social risks. Thus, for formulation of effective financial strategies, expenditure, saving, and credit pattern among urban poor should be kept in mind for higher women empowerment.

Latif et al. (2016) conducted study to analyze the living conditions and socio-economic status of slum people living in Kalyanpur slum area situated in Dhaka city, Bangladesh. Low literacy, poor housing and inadequate sanitary services were found to be major factors leading to higher morbidity among the slum inhabitants. Ghosh and Bhardwaj (2020) did a detailed analysis of finding correlation of educational status with income and socio economic conditions of the slum dwellers of Kharagpur city. Positive correlation was found between the average monthly income and educational level of the slum dwellers. Another important observation of the study was that more than half of the earning of the individual was being spent on direct household expenditure and health. Desmet (2000) investigated in detail the spending patterns and the strategies slum dwellers apply to cope with the economic consequences of sudden illness. The overall poor financial conditions along with insecurity and violence in the slums were reflected as major determinants in non-chronic illness profile. Females were found to be less educated and receiving lower earning than their male counterparts for the similar kind of work.

OBJECTIVES OF THE STUDY

1. To determine the interdependence between monthly income and gender of the respondents.

2. To study the association between educational level of the populace with the gender of the respondents.

3. To find out the correlation between education level and income of the populace.

4. To identify the determinants of saving behaviour of the targeted population using multinomial logistic technique.

RESEARCH METHODOLOGY

Slum dwellers living in Sector 25, Chandigarh are considered as sample for the present study. An initial sample size of 250 includes both male as well as female respondents in nearly equal proportions. The age groups have been categorized between 25-50 years with class interval of 5 years and above 50 years have been made a cumulative group for the purpose of study. Data related to above study was collected from concerned respondents in person as this method was sought to provide more reliable information required for the data analysis. Participants were asked to fill the demographic details such as age, gender and marital status and other details related to educational qualification, total earning such as income, expenditure and savings etc were also collected from the respondents.

Data Analysis

Table 1: Cross-tabulation of Age and Gender of Respondents

Age Group (in yrs.)		Male	Female	Total
20-25	Count	23	18	41
	Percentage within group	56%	44%	100%
	Share of Total	9.6%	7.5%	17.1%
25-30	Count	30	25	55
	Percentage within group	54.5%	45.5%	100%
	Share of Total	12.5%	10.4%	22.9%
30-35	Count	25	20	45
	Percentage within group	55%	45%	100%
	Share of Total	10.4%	8.33%	18.73%
35-40	Count	23	18	41
	Percentage within group	56%	44%	100%
	Share of Total	9.6%	7.5%	17.1
40-45	Count	16	10	26
	Percentage within group	61.5%	39.5%	100%
	Share of Total	6.7%	4.2%	10.9%
45-50	Count	15	10	25
	Percentage within group	60%	40%	100%
	Share of Total	6.25%	4.2%	10.45%
Above 50	Count	5	2	7
	Percentage within group	72%	28%	100%
	Share of Total	2.1%	0.83%	2.93%

Source: Author' work

It can be observed from the Table 1 that people with lower age group (20-30 yrs) were more aware and participated in the poll with great zeal comprising 40% share of the total respondents. Out of total 240 respondents, 137 male (57%) and 103 female (43%) were polled in the questionnaire.

However, female proportion seemed to be higher in the younger age group in comparison to older age group. Similarly, share of male respondents decrease with age and females also follow the same trend. People with higher age group were reluctant and less receptive to the questionnaire and were seem to be less interested towards knowing the benefits of savings for future use. However, on the other hand, younger age group people shown keen interest and were more aware of the significance of savings for better future.

Table 2 represents the cross tabulation of monthly income level (in Rupees) with gender.

Table 2: Cross-tabulation of Income Level of Respondents with Gender

Income Level in Rupees (Per month)		Male	Female	Total
0-5000	Count	40	55	95
	Percentage within group	42.5%	58.5%	100%
	Share of Total	16.7%	22.9%	39.6%
5000-10000	Count	67	26	93
	Percentage within group	72%	28%	100%
	Share of Total	27.9%	10.8%	38.7%
10000-15000	Count	27	8	35
	Percentage within group	77%	23%	100%
	Share of Total	11.25%	3.33%	14.58%
15000-20000	Count	10	1	11
	Percentage within group	91%	9%	100%
	Share of Total	4.2%	0.42%	4.62%
20000-25000	Count	4	0	4
	Percentage within group	100%	Nil	100%
	Share of Total	1.67%	Nil	1.67%
≥ 25000	Count	2	0	2
	Percentage within group	100%	Nil	100%
	Share of Total	0.83%	Nil	0.83%

Source: Author' work

From Table 2, it can be concluded that significant number of respondents (39.6%) have monthly earning of less than Rs 5000/- and only in this salary band, there are higher number of female members than male. Rest of the income bands has higher male respondents than their counterpart. It can also be observed that about 78% of the people (including both male and female) earn less than Rs 10000/- pm, which is quite less amount for living a standard urban life. However, still people save a bit of their earning in some or other saving instrument so that it can be used in case of emergency situation. None of the female members figure out in pay band greater than Rs 20000/-pm and only 90 out of 103 female respondents were working. Rest of them were not earning and simply busy in daily house-hold activities or didn't get time to go out as

they have to take care of their children or aged people at their home, who need attention and medical care. In order to determine whether the income level and gender of the respondents are independent of each other, Mann-Whitney U test followed by Chi-square test of independence was sought to be applied on the sampled data. The following section describes the hypothesis formed and conclusion drawn from the test.

Mann-Whitney U test

A non-parametric test, called Mann-Whitney U test is employed to compare the differences between two sample means that come from the same population, and used to assess the equality of two sample means. The test is being used in the present study to investigate whether the income earned by the population have same shape or not.

Table 3: Significance of Income between Male and Female using Mann-Whitney Test

	N	Mean	SD	Mann-Whitney U	p-value
Male	137	9155.5	5585.2	2863.000	0.00**
Female	103	4265.0	3716.5		

Source: Author' work

High Mann-Whitney U value is indicative of the fact that there is significant difference between the average/mean income earned by male and female (Table 3).

Chi-square Analysis

Chi-square test is a non-parametric test usually applied to test the hypothesis of association/non-association of two or more groups or to find whether the two variables are independent of each other (Rana and Singhal, 2015; McHugh, 2013; Greenwood and Nikulin, 1996; Yates et al., 1999; Singh et al., 2018; Verma and Mangla 2017-18).

Hypotheses

Following hypothesis was formed:

Null Hypothesis (Ho): Income level and gender are independent of each other.

Alternate Hypothesis (Ha): There is association between Income levels, gender i.e. gender, and income level of the respondents are not independent of each other.

Decision Rule followed: If p-value < 0.05 level of significance, reject the null hypothesis.

Table 4: Chi-square Test of Independence for Gender v/s Income Level

Chi-Square Test	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	31.063[a]	5	<.001	<.001
Likelihood Ratio	33.687	5	<.001	<.001
Fisher-Freeman-Halton Exact Test	29.590			<.001
N of Valid Cases	240			

Source: Author's work

This implies that there is association between Income level of the populace and Gender as p-values are less than 0.05. Male respondents can perform tougher jobs and for longer duration in comparison to their counterpart, so earn higher wages.

To further test whether an association exists between educational level of the respondents and gender, chi-square test was applied on the sampled data and results have been presented in the following section. Table 5 presents the cross tabulation of education level of the populace and gender.

Table 5: Cross Tabulation of Education Level of the Respondents and Gender

Educational Qualification		Male	Female	Total
up to 5th	Count	35	40	75
	Percentage within group	47%	53%	100%
	Share of Total	14.6%	16.7%	31.3%
up to 8th	Count	53	36	89
	Percentage within group	59.5%	40.5%	100%
	Share of Total	22 %	15%	37%
up to Matric	Count	24	15	39
	Percentage within group	61.5%	38.5%	100%
	Share of Total	10%	6.25%	16.25%
up to Sr. Secondary	Count	15	7	22
	Percentage within group	68.2%	31.8%	100%
	Share of Total	6.25%	2.92%	9.17
Graduation	Count	5	2	7
	Percentage within group	71.4%	28.6%	100%
	Share of Total	2%	0.83	2.83%
Total		137	103	240

Source: Author' work

Out of the total respondents, 35 male respondents are only fifth standard pass, 53 passed eighth standard examination, and the count follows decreasing trend towards the higher qualification level. Similar trend was also noticed in female candidates. It can also be deduced from the study that significant number of parents of the girl child didn't send their ward for schooling beyond 8th standard and instead prefer them to either help in daily work with their mother like job of maid etc. or to look after their younger sibling at home while the parents are away at job. This finding was really disturbing that the parents are not willing to send their wards to school for primary education at such an age. Very few children were given the opportunity to go ahead to study further after senior secondary examination. Soaring school fees, low-income level and desire for extra source of income were the few key reason cited by the parents for not continuing their ward for further study. Even free school education and other benefits such as free books, free uniforms and free lunch service provided at government schools fail to change their mindset, which need to be deliberateupon by the policymakers. More surprising is the fact that female respondents were not allowed by their parents to study after class 5th, rather they prefer them to help in winning bread for their family.

Correlation Analysis

Pearson's Correlation has been applied in the current study to explore the relationship between education level and income of the populace using SPSS software.

Mathematically, Pearson correlation coefficient (r) is given by:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Table 6 presents the correlation analysis about the education level and income of the populace.

Table 6: Analysis Result of Pearson Correlation Coefficient

N=240

Correlations		Education Level	Income
Education Level	Pearson Correlation	1	.819**
	Sig. (2-tailed)		0
Income	Pearson Correlation	.819**	1
	Sig. (2-tailed)	0	

Note- **. Correlation is significant at the 0.01 level (2-tailed).

As can be observed from the Table 6, the correlation coefficient (r) value between education level and income is 0.819, which suggest a strong considerable positive association between the two variables. The p-value is less than 0.01 which means the relationship is statistically significant. Thus, it can be stated that increase in education level of the pupil result in growth of income for both the genders.

Saving Objectives of Respondents

Table 7 depicts the share of different motives for savings in total and presents an insight of preference of saving motive as per gender of the respondents. Among all the reasons cited for savings, respondents prefer to save largely for education of their children. The second most sought reason for savings is child marriage followed by purchasing new vehicle. It was also worthwhile to note from the table that people are not much giving due importance to their health issues or not giving priority to savings to meet up expenses for emergency hospitalization.

Table 7: Cross Tabulation of Saving Motive and Gender

SAVING_MOTIVE	Gender		Total	Percent
	F	M		
Child Education	59	17	76	31.7
Child Marriage	34	23	57	23.8
Business/New Venture	6	30	36	21.3
Emergency Illness	4	16	20	15
Vehicle Purchase	0	51	51	8.3
Total	103	137	240	100

Source: Author's work

Table 8 illustrates the different investment tools employed by the respondents to attain their saving objectives.

Table 8: Investment Tools of Respondents

Investment Tools	Frequency	Percent
Child Plans/PPF/SSA	121	50.4
Bank/PO FDs	90	37.5
Personal Savings	29	12.1
Total	240	100.0

Source: Author's work

Although, the earning of the targeted population is quite less, but still nearly half of the respondents manage and prefer to invest in saving schemes such as PPF/SSA/Child plans to fulfil their long term goals like child education and their marriages. About 1/3rd of the respondents like to invest in FDs/RDs on to meet their short term goals such as purchase of vehicles or for starting a new venture in near future. Respondents were also involved in personal savings to meet everyday expenses and unforeseen health problems due to easy accessibility to savings for immediate use.

Multinomial Logistic Regression Model

In order to investigate the association of saving determinants i.e. age, gender, marital status, education level, income and financial awareness index with different saving objectives/motives, multinomial logistic regression analysis technique was employed. The multinomial logistic model estimates the relationship between the set of independent variables and the multi-category dependent variable. For the purpose of analysis, gender was categorized as 0 for female and 1 for male respondent. Marital status was categorized as 0 for married and 1 for unmarried, Age was grouped into two categories '0' for age between 20-40 years and '1'for age between 41-60 years. Financial awareness index was categorized into 3 groups i.e. 'low', 'medium' and 'high' depending upon the score obtained by the respondents related to queries like awareness about saving/reoccurring deposit account, ATM/credit card, internet banking, mobile wallet, awareness about different schemes such as PPF, SSA, child plans, health plans. The dependent variable 'Saving Motives' was divided into following five categories: '0' for Child education, '1'for Child marriage, and '2' for Business/New Venture, '3' for Emergency illness & other unforeseen needs and '4' for purchasing a vehicle in near future. Five different models were created considering different saving motives as dependent variable. Child education (Model '0') was considered as base/ reference model.

The collected data was analyzed using multinomial logistic regression to identify the major determinants of saving behavior of people living in slum and results have been presented in Table 9.

Table 9: Multinomial Logistic Analysis

SAVING_MOTIVES[a]	Parameter Estimates (Variables)	B	Sig.
Model 1 (CHILD MARRIAGE)	Income	-1.964	0.009
	Financial_Awareness_Index	-0.177	0.092
	Education_Level	-1.535	0.02
	[GENDER=0]	1.358	0.201
	[GENDER=1]	0[b]	
	[MARITAL_STATUS=0]	2.484	0.06
	[MARITAL_STATUS=1]	0[b]	
	[AGE_INTERVAL=0]	-0.753	0.22
	[AGE_INTERVAL=1]	0[b]	
	Intercept	-2.28	
Model 2 (BUSINESS)	Income	-2.368	0.016
	Financial_Awareness_Index	1.567	0.06
	Education_Level	1.201	0.031
	[GENDER=0]	-7.293	0.001
	[GENDER=1]	0[b]	
	[MARITAL_STATUS=0]	1.164	0.307
	[MARITAL_STATUS=1]	0[b]	
	[AGE_INTERVAL=0]	4.66	0.002
	[AGE_INTERVAL=1]	0[b]	
	Intercept	-3.816	
Model 3 (EMERGENCY ILLNESS)	Income	-2.853	0.002
	Financial_Awareness_Index	-1.036	0.043
	Education_Level	2.644	0.061
	[GENDER=0]	-7.368	0.089
	[GENDER=1]	0[b]	
	[MARITAL_STATUS=0]	1.467	0.024
	[MARITAL_STATUS=1]	0[b]	
	[AGE_INTERVAL=0]	2.423	0.134
	[AGE_INTERVAL=1]	0[b]	
	Intercept	-6.356	
Model 4 (VEHICLE PURCHASE)	Income	-3.182	0.048
	Financial_Awareness_Index	-0.448	0.746
	Education_Level	0.692	0.617
	[GENDER=0]	-26.413	0.045
	[GENDER=1]	0[b]	
	[MARITAL_STATUS=0]	0.353	0.034
	[MARITAL_STATUS=1]	0[b]	
	[AGE_INTERVAL=0]	3.701	0.015
	[AGE_INTERVAL=1]	0[b]	
	Intercept	-0.217	

Note- Pseudo R-Square (Cox and Snell) = 0.723

a. The reference category is CHILD EDUCATION; b. This parameter is set to zero because it is redundant.

Results of the Model-1 shows that Income, Education Level and Marital Status (to an extent) are significantly affecting the saving motive-Child Marriage (Model-1) as corresponding p values are less than 0.05. From the perspective of Model-2 (Business/New Venture) Income, education, age of the population and gender are significant parameters while marital status and financial

awareness index are not having significant impact on the model 2 saving motive. Income, financial awareness index and marital status are significantly affecting the Model-3 saving motive- Emergency illness. However, income, age, marital status and gender are important determinants of Model-4 saving motive (Vehicle purchase).

It is also worthwhile to note that Income has positive correlation with all the saving motives. Respondents with higher income aspire for better life and they do work hard to attain it. Higher preference is given to saving for unforeseen health emergencies and to start new venture compared to savings for child marriage and their education. Similar trend is also being observed with another saving determinant-Education level. As education level of the respondents increase, they are less likely to save for child marriage and child education. People with higher education level earn more than their counterparts and more aware of the earning opportunities. Thus, they prefer to save for other saving objectives such as Business, Emergency illness and purchase of new vehicle.

Married people give higher preference to saving for future marriages of their wards compared to the base category and other saving motives. Females tend to save more for the marriage of their children in comparison to rest of the saving motives. Younger People in the age bracket (20-40 years) tend to save more for setting up a new business/start-up followed by vehicle purchase and emergency illness. Targeted population with high financial index is quite aware of the financial opportunities and can better understand the risk involved in financial matters. Thus, they can think wisely and take better decisions for their life.

CONCLUSION AND RECOMMENDATIONS

Slum inhabitants' face numerous challenges related to their livelihood as they do not have regular source of income (Banerjee and Goswami2020; Renzaho et al., 2020; Lilford et al., 2017; Bloom et al., 2008). Moreover, lack of employability skills, weak financial status, poor educational background and low unhygienic surroundings further add to their woes.

Following inferences could be drawn from the present study:

Income level of the respondents and gender has strong association with each other as concluded from Mann-Whitney U test and Chi-square test of independence. It also goes well with the common belief that men being more muscular and physically strong, can do tougher jobs compared to their counterpart. Since, wage has a direct relation with the level of the job, earning of male respondents are higher than women respondents. Besides, female respondents have to look after their children and aged parents at home (Panigrahi et al., 2017; Bag and Sugata, 2020) which limit their work timings also. Higher wages also lead to higher savings.

Significant number of parents of the girl child prefers not to send their ward for schooling beyond 8th standard and instead prefer them to either help in daily work with their mother or to look after their younger sibling at home while the parents are away at job. Soaring school fees, low-income level (Bag and Seth, 2018) and desire for extra source of income were the few key reason cited by the parents for not continuing their ward for further study.

Study of saving behavior of the respondents lead to conclusion that respondents prefer to save largely for education of their children followed by child marriage and then purchasing new vehicle. These people although are living in unhealthy and unhygienic conditions, but still they are not much giving due importance to their health issues or not giving priority to savings to meet up expenses for emergency hospitalization.

Large value of Pearson correlation coefficient (r) equal to 0.819 between education level and income of the populace is indicative of the fact that there exists strong positive correlation between the two variables. The relationship is also statistically significant as the p-value is less than 0.01.

Income has positive correlation with all the saving motives. Higher income lead to better quality of life and individuals can also save in multiple saving options in order to fulfill their desired goals. In spite of living in slum area, targeted population was

quite well aware of financial attributes, which can help them understand financial problems and help in solving financial woes. Age, Gender and Education level were also observed to be significant parameters contributing to different saving motives of the respondents.

Following suggestions could be implemented for the welfare and upliftment of slum inhabitants:

Freebies offered by state and central agencies such as free school education of poor/low income group even in private institutions by reserving some seats, free books, free uniforms and free stationary etc. fail to change the conventional mindset of people, which need to be deliberate upon by the policymakers. Local administration should conduct skill development workshops periodically to enhance the employability, leading to better job opportunities, higher wages and better standard of living among the slum dwellers. Small sessions/Workshops should be conducted by NGOs or non-profit organizations on regular basis for people living in slum areas to help them understand and follow the practice of maintaining clean surroundings and thus, healthy living. Financial institutions can play a big role in educating poor people so that they should not fall prey to chit fund companies and lose their hard-earned money. People should be made aware of different saving tools and it should be made accessible also in order to develop habit of savings among such individuals so that they may lead better quality of life and plan judiciously for their future.

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