

Neutrosophic statistical techniques to find migration pattern in Jaipur

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ABSTRACT This paper is principally focused on the factors and effect of migration in Jaipur city. With the help of neutrosophical graphical and diagrammatic representation we study the main reason of migration.

INTRODUCTION

Migration is the movement of people across a specified boundary for the purpose of establishing a new or semi-permanent residence. On the basis of its nature, migration is sub-divided into internal migration and international migration. Internal migration is much more powerful as compared to the international migration. However, the international external migration is where residence changes between a residential unit in the country and one outside it, and internal migration is where residence changes from one residential unit to another in the same country.

Neutrosophic Statistics means statistical analysis of population or sample that has indeterminate (imprecise, ambiguous, vague, incomplete, unknown) data. For example, the population or sample size might not be exactly determinate because of some individuals that partially belong to the population or sample, and partially they do not belong, or individuals whose appurtenance is completely unknown. Also, there are population or sample individuals whose data could be indeterminate. It is possible to define the neutrosophic statistics in many ways, because there are various types of indeterminacies, depending on the problem to solve. [Smarandache, 1995]

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OBJECTIVES

- To Study the main reason of migration and to study the migrated peoples neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction with the help of graphical representation.
- To test the independency between the neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration and the occupation of migrated people.

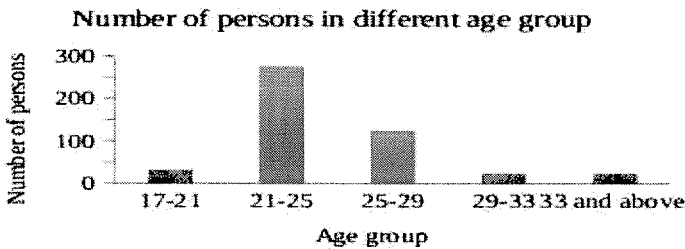
Neutrosophic Data Source. For neutrosophic data collection, primary data collection technique was used and questionnaire method was applied. In this study, multistage sampling is used for data collection on migration. By applying neutrosophic sampling technique, we selected a sample which is approximately representing our population and fulfilling the objectives of the study. A neutrosophic sample is a sample whose size is not known exactly, or its individuals do not 100% belong to the sample; for example an individual may belong to the sample in a degree (t,i,f) , where t = degree of appurtenance, i = degree of indeterminate-appurtenance, and f = degree of non-appurtenance with t,i,f in $[0, 1]$. In this survey the population is from Jaipur city. Total number of wards in Jaipur city is 77.

Now, at the first stage, purposive sampling was used and we classified the population in two groups. First group has zero migration or negligible migration and second group covers those areas from the population which fulfill our objective of migration. By the prior information we got 39 wards in first group in which zero and negligible migration and 38 wards in second group. Now, keeping in view the objective of the survey we selected second group because this group fulfill our object of the survey. Now, at the second stage we applied simple random neutrosophic sampling without replacement for selecting 4 wards out of 38 wards. For selection of 4 wards, we used lottery method and the wards are - Sanganer, University area, Mansarover area and Vidhyadhar Nagar. Now, at third stage we used acceptance sampling and we decided on same day and same time for doing survey. We collected the data of about 120 from each area. Thus, we got the sample of 479-480.

GRAPHICAL REPRESENTATION

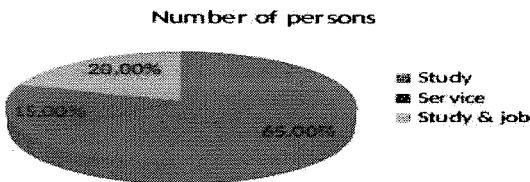
1. No. of persons in different age groups (Figure 1)

Age Group	No of persons
17-21	31-32
21-25	273-276
25-29	124
29-33	24
33 and above	24
Total	476-480



2. Reason of Migration (Figure 2)

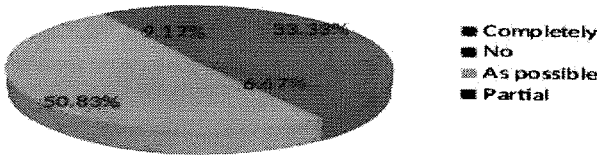
Reason	No of person
Study	311-312
Service	72
Study & job	94-96
Total	477-80



3. Respondents helped their family after migration: (Figure 3)

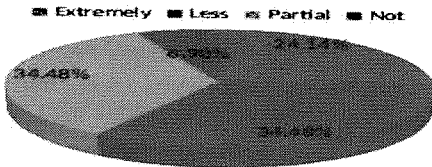
Response	No of persons
Completely	160
No	30-32
As possible	244
Partial	43-44
Total	47-80

Respondents. helped their family after migration



4. Satisfaction level of job among migrated persons (Figure 4)

Satisfaction level	No of persons
Extremely	28
Less	40
Partial	40
Not	7-8
Total	115-116



Neutrosophic Statistical test for the association of neutrosophic degree of migration satisfaction/indeterminacy/nonsatisfaction with different demographic variables.

Chi-square is a test formula for exact sampling distribution. To test two attributes which are independent or dependent to each other, we used chi-square test. This is one of the very important applications of Chi-square distribution.

To apply this test, first we arranged frequencies in a contingency table. Test statistic is

$$X^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where O_i is observed frequency; E_i is expected frequency. In a previous paper (2017), when dealing with indeterminate numbers, this has been

extended to neutrosophic Chi-square distribution.

1). To test the independency between the neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction level of migration and male female ratio of migrated persons.

Null Hypothesis, HO: The neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration is independent from the sex of migrated person. Vs

Alternative Hypothesis, H1: The satisfaction level of migration is dependent to sex of migrated person.

Now, from our data we get a 2*2 contingency table as follow:

Sex	Satisfied	Not Satisfied	Total
Male	212	80	291-292
Female	148	40	187-188
Total	360	120	478-480

By apply the SPSS Statistics, we get the following results:

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SEX * Satisfaction level for migration	478-	98-	0	0.0-	478-	98-
	480	100.0%		2.0%	480	100.0%

SEX * Satisfaction level for migration Cross tabulation							
Chi-Square Tests				Satisfaction level for migration			
	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Total	
SEX		0	Count	40	148	188	
Pearson Chi-Square	2.285 ^a	1	Expected Count	47.0	141.0	188.0	
	2.2-2.3 ^a	1	Count	80	211-212	291-292	
			Expected Count	73.0	219.0	292.0	
Total			Count	120	360	479-480	
			Expected Count	120.0	359-360.0	479-480.0	

2). To test the independence between neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration and reason of migration.

Null hypothesis, H_0 : The neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration is independent from the reason of migration. Vs

Alternative Hypothesis, H_1 : The neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration is dependent to the reason of migration.

Now, from our data we get a 3*2 contingency table as follow:

Reason	Satisfied	Not satisfied	Total
Study	235	77	312
Study & job	88	7-8	95-96
Service	36-37	35	71-72
Total	360	120	478-480

By applying the SPSS Statistics, results are

REASON * Neutrosophic Degree of Satisfaction/Indeterminacy/Nonsatisfaction for migration Cross tabulation					
		Satisfaction level for migration			Total
		0	1		
REASON	0	Count	77	235	312
		Expected Count	78.0	234.0	312.0
	1	Count	7-8	88	95-96
		Expected Count	24.0	72.0	96.0
	2	Count	35	36-37	71-72
		Expected Count	18.0	54.0	72.0
Total	Count	120	360	480	
	Expected Count	1119.0-120.0	359.0-360.0	478.0-480.0	

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.647*	2	.000
Neutrosophic Chi-Square	34.997-35.779*	1.92-2.02	.000-.020

3). To test the independence between the neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration and occupation of migrated person.

Null hypothesis, H_0 : The neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration are independent to occupation of migrated person. Vs

Alternative Hypothesis, H_1 : The neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migration are dependent to occupation of migrated person. Now, from our data we get a 2*2 contingency table as follow:

Occupation	Satisfied	Not satisfied	Total
Student	287	80-81	367-368
Service class	71-73	39	110-112
Total	358-360	119-120	477-480

By apply the SPSS Statistics, we get the following results:

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
OCCUPATION * Neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction for migration	480	100.0 %	0	0.0%	480	100.0 %

OCCUPATION * Neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction for migration Cross tabulation

		Neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction for migration		Total	
		0	1		
OCCUPATION	0	Count	81	287	368
		Expected Count	91.0-92.0	276.0	367.0-368.0
	1	Count	39	73	112
		Expected Count	28.0	84.0	112.0
Total	Count	119-120	360	478-480	
	Expected Count	119.0-120.0	360.0	478.0-480.0	

Chi-Square Tests					
	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.516 ^a	1	.006		
Neutrosophic Chi-Square	7.426-7.632 ^a	1-2	.005-.007		

CONCLUSION

- According to the survey three reasons are found for migration in Jaipur city. First is study, second is service, and the third one is study & job both. According to our survey, highest proportion of migrants (65-66%) was engaged in the study group. Thus, we concluded that the main reason of human migration in Jaipur city is study.
- 51-53% Migrated persons told that they helped their family after their migration.
- According to our survey, we found that 45-48% migrated persons are extremely satisfied, 27% migrated persons are partial satisfied, 12-17% migrated persons are unsatisfied and 8% migrated persons are very unsatisfied from their migration. So, on the basis of this study we can say that migrants who come from less developed area near to Jaipur for study, are satisfied from their migration.
- According to Figure 1, we conclude that the maximum migrated persons belong to the age group between 21 to 25.

By testing the hypothesis we got the following result

- According to our study we conclude that the neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction is independent from the sex or gender of migrated persons, which shows that sex of migrated person, does not affect their neutrosophic satisfaction degree at any level.
- Occupation has its impact on the neutrosophic degree of satisfaction/indeterminacy/nonsatisfaction of migrated person.

REFERENCES

- [1] De Haan, A. 1999. 'Livelihoods and Poverty: The Role of Migration - A Critical Review of the Migration Literature', Journal of Development Studies, Vol. 36, No. 2.
- [2] King, R., Lulle, A., Conti, F., Mueller, S. and Scotto, G. (2014) The Lure of London: A Comparative Study of Recent Graduate Migration from Germany, Italy and Latvia. Brighton: University of Sussex, Sussex Centre for Migration Research Working Paper 75.
- [3]Kofman, E. (2004) Family-related migration: a critical review of European studies, Journal of Ethnic and Migration Studies, 30(2): 243262.
- [4] Kraler, A., Kofman, E., Kohli, M. and Schmoll, C. (eds) (2011) Gender, Generations and the Family in International Migration. Amsterdam: Amsterdam University Press.

- [5] Kulu, H. and Milewski, N. Research17k, 567-590 (2006) ,Introduction. Demographic Migration in Bhattacharya, P. 1998 The informal sector and Weekly, 33(21).
- [6] Smarandache, Florentin, (2014). Introduction to Neutrosophic Statistics, Sitech and Education Publisher, Craiova, 123 pages.
- [7] Deepesh Kunwar, Jayant Singh, Florentin Smarandache. (2017) Neutrosophic Statistical Evaluation of Migration with particular Reference to Jaipur, submitted mss.

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