CHAPTER VII

SOME HYPOTHESES ON URBAN-RURAL RELATIONS: A STATISTICAL TESTING

After an examination of the spatio-temporal patterns in the earlier chapters, this chapter aims to find out an association between the independent (urban-rural interaction) and dependent variables (population size, scheduled castes population, distance from the city and road accessibility). Given the qualitative nature of available data used here, a non-parametric test, the Chi-square test has been pressed into service to understand the degree of association.

The hypotheses put to test may be listed as follows.

Level of interaction of a rural settlement is positively related to its:

1. Population size
2. Percentage of Scheduled Castes population
3. Distance from the city
4. Accessibility by road

Data on the above stated parameters was picked up from the District Census Handbooks, Village and Town Directories. Census of India (1991), for individual villages. As regards data on levels of interaction, these had already been calculated and have been used in the earlier chapter.

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1 Urban-rural interaction has been taken as synonymous with urban-rural relations
Methodology

The relationship between the above listed village attributes and the level of urban-rural interaction was worked out by grouping the villages into various class categories. The two attributes were then cross-classified into a contingency table, and a value of Chi-square ($\chi^2$) was computed under the assumption of the independence of the two attributes of rows and columns. If the row and column attributes are independent, the estimated frequency of the cell in the $i^{th}$ row and the $j^{th}$ column in a contingency table is equal to $R_i \times C_j / N$ where $R_i$ and $C_j$ are the totals of the row $i^{th}$ and $j^{th}$ column respectively and $N$ is the total number of frequencies. The degrees of freedom in case of a contingency table of $r$ rows and $c$ columns is $(r - 1) (c - 1)$. If the computed Chi-square value is statistically significant, the initially framed null-hypothesis is rejected and vice-versa.

1. Population Size and Urban-Rural Interaction

Statement

A positive relationship between the size of a settlement and its urban-rural interaction index was hypothesised. Bigger the village, higher would be the level of its interaction with towns in the region. The underlying assumption was that the bigger settlements not only consumed and produced more than the smaller ones but also served the smaller settlements, lower in hierarchy. For establishing any social and economic infrastructural facility, the government also selects the larger villages for the purpose.

Results and Discussion

The relationship between population size and level of urban-rural interaction was worked out by grouping villages into six population size categories.
Inter-State Chandigarh Region
Distribution of Villages by Size, 1991

Persons

Size category

5000
3500
2000
500
200 - Small
Medium
Large

Regional average: 931
Smallest population size: 12 (Aujala)
Largest population size: 10,270 (Palsaura)

Fig. 7.1
Then using the contingency table, the value of Chi-square was computed by cross-classifying the values of the level of urban-rural interaction into six rows and six columns (Table 7.1).

Table 7.1

ISCR: Association between population size category and interaction index, 1991

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. &lt; 200 persons</td>
<td>32*</td>
<td>24</td>
<td>31</td>
<td>25</td>
<td>08</td>
<td>05</td>
<td>125</td>
</tr>
<tr>
<td>II. 200-500 persons</td>
<td>20</td>
<td>41</td>
<td>65</td>
<td>67</td>
<td>23</td>
<td>04</td>
<td>220</td>
</tr>
<tr>
<td>III. 500-2000 persons</td>
<td>22</td>
<td>43</td>
<td>137</td>
<td>172</td>
<td>86</td>
<td>18</td>
<td>478</td>
</tr>
<tr>
<td>IV. 2000-3500 persons</td>
<td>05</td>
<td>02</td>
<td>04</td>
<td>17</td>
<td>20</td>
<td>08</td>
<td>56</td>
</tr>
<tr>
<td>V. 3500 - 5000 persons</td>
<td>00</td>
<td>00</td>
<td>03</td>
<td>06</td>
<td>04</td>
<td>01</td>
<td>14</td>
</tr>
<tr>
<td>VI. 5000-10000 persons</td>
<td>00</td>
<td>00</td>
<td>02</td>
<td>01</td>
<td>02</td>
<td>06</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>110</td>
<td>242</td>
<td>288</td>
<td>143</td>
<td>42</td>
<td>904</td>
</tr>
</tbody>
</table>

* Number of villages

\[ \chi^2 = 197.76 \]

Degree of Freedom (d.f.) = \((r - 1) (c - 1)\) = \((6 - 1)(6 - 1) = 25\)

Level of Confidence = 99%

The value of \(\chi^2\) for 25 d.f. (degrees of freedom) at 1% level of significance in the table was 44.31, which was much lower than the computed value (197.76).

Since the computed value of Chi-square was statistically significant at 1 percent level, the null hypothesis that population size and level of urban-rural interaction were independent, was rejected. Hence, the hypothesis stood strongly validated.
2. Percentage of Scheduled Castes Population and Urban-Rural Interaction

Statement

The level of interaction in a rural settlement was positively associated with the proportion of Scheduled Castes population in it. Scheduled Castes population is the most vulnerable section of Indian society. There is a greater propensity of this section of society to work as daily-wage labourers in construction sites, as scavenging, sweeping and indulging in other such menial activities in urban areas. Reservation of government jobs for this section of society has also helped them to get jobs in urban areas. Therefore, it is expected that in villages where Scheduled Castes population has a large share in total population, large number of persons commute to work in urban areas. Chandigarh being the most potential centre of this region, such a population is supposed to work there in greater numbers.

Results and Discussion

The relationship between proportion of the Scheduled Castes population in a village and its level in urban-rural interaction was worked out by grouping the villages into six categories on the basis of percentage of Scheduled Castes as compared to the total population (Fig. 7.2).

The values of level of urban-rural interaction were cross classified using a contingency table to compute Chi-Square value (Table 7.2).
Inter-State Chandigarh Region
Distance Zones

Village distance from Chandigarh Bus Stand (Kms.)

- Zone I
- Zone II
- Zone III
- Zone IV
- Zone V
- Zone VI

Note (1) Distance zones have been demarcated on the basis of travel distance rather than straight line distance.

Note (2) Only major roads have been shown. Link roads have not been mapped to avoid complexity.
### Table 7.2

**ISCR: Association between Scheduled Castes population and urban-rural interaction, 1991**

<table>
<thead>
<tr>
<th>Interaction Index (SC Pop. %)</th>
<th>Cat. I (&lt;10)</th>
<th>Cat. II (10-15)</th>
<th>Cat. III (15-20)</th>
<th>Cat. IV (20-25)</th>
<th>Cat. V (25-30)</th>
<th>Cat. VI (&gt; 30)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat. I (Less than 10)</td>
<td>43</td>
<td>48</td>
<td>64</td>
<td>51</td>
<td>20</td>
<td>07</td>
<td>233</td>
</tr>
<tr>
<td>Cat. II (10-20)</td>
<td>09</td>
<td>17</td>
<td>52</td>
<td>62</td>
<td>27</td>
<td>18</td>
<td>185</td>
</tr>
<tr>
<td>Cat. III (20-30)</td>
<td>10</td>
<td>14</td>
<td>37</td>
<td>51</td>
<td>33</td>
<td>10</td>
<td>155</td>
</tr>
<tr>
<td>Cat. IV (30-40)</td>
<td>06</td>
<td>11</td>
<td>45</td>
<td>65</td>
<td>38</td>
<td>04</td>
<td>171</td>
</tr>
<tr>
<td>Cat. V (40-50)</td>
<td>03</td>
<td>12</td>
<td>20</td>
<td>34</td>
<td>15</td>
<td>01</td>
<td>85</td>
</tr>
<tr>
<td>Cat. VI (More than 50)</td>
<td>06</td>
<td>09</td>
<td>23</td>
<td>25</td>
<td>10</td>
<td>02</td>
<td>75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79</strong></td>
<td><strong>111</strong></td>
<td><strong>241</strong></td>
<td><strong>288</strong></td>
<td><strong>143</strong></td>
<td><strong>42</strong></td>
<td><strong>904</strong></td>
</tr>
</tbody>
</table>

\[ \chi^2 = 102.13 \]

Degree of Freedom (d.f.) = \( (r - 1) (c - 1) \) = \((6 - 1) (6 - 1) = 25\)

Level of Confidence = 99%

The value of \( \chi^2 \) for 25 d.f. (degrees of freedom) at 1% level of significance in the Table was 44.31 but the computed value of \( \chi^2 \) was much higher (102.13) than this tabulated value. Since the computed value of Chi-Square was statistically significant at 1 per cent level, the initial null hypothesis that percentage of Scheduled Castes and level of urban-rural interaction were independent was rejected i.e. we might conclude that the proportion of Scheduled Castes population in a village was positively correlated with its level of urban-rural interaction. Hence, the hypothesis stood strongly validated.

### 3. Distance From the City and Urban-Rural Interaction

**Statement**

It was hypothesised that the level of urban-rural interaction of a village was positively related to its distance by road from Chandigarh. Distance involved cost, effort and time. Taking a cue from this, several distance decay models...
such as agricultural land use model by Von Thunen and gravity model by Reilly were constructed and tested in different parts of the world. Further, the concept of distance decay as enshrined in Tobler’s famous First Law of Geography stated that “everything is related to everything else, but near things are more related than distant things” (Tobler, 1970 pp. 234-40). In the same vein, it was hypothesised that with an increase in the distance of a village from the city there would be a decrease in the intensity and magnitude of its functional relations with the city.

**Results and Discussion**

The relationship between the distance of a village from Chandigarh and level of urban-rural interaction was worked out by grouping the villages into six zones on the basis of distance travelled from Chandigarh bus stand (Fig. 7.3).

The values of level of urban-rural interaction were cross classified using a contingency table of six rows and six columns. The value of Chi-Square was computed (Table 7.3).

**Table 7.3**

<table>
<thead>
<tr>
<th>Interaction Index Distance (kms)</th>
<th>Cat. I (&lt; 10)</th>
<th>Cat. II (10-15)</th>
<th>Cat. III (15-20)</th>
<th>Cat. IV (20-25)</th>
<th>Cat. V (25-30)</th>
<th>Cat. VI (&gt; 30)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone I (up to 5 kms)</td>
<td>55</td>
<td>26</td>
<td>87</td>
<td>133</td>
<td>34</td>
<td>24</td>
<td>409</td>
</tr>
<tr>
<td>Zone II (6-10 kms)</td>
<td>06</td>
<td>30</td>
<td>55</td>
<td>78</td>
<td>32</td>
<td>13</td>
<td>214</td>
</tr>
<tr>
<td>Zone III (11-15 kms)</td>
<td>11</td>
<td>22</td>
<td>64</td>
<td>58</td>
<td>20</td>
<td>04</td>
<td>179</td>
</tr>
<tr>
<td>Zone IV (16-20 kms)</td>
<td>04</td>
<td>08</td>
<td>14</td>
<td>15</td>
<td>05</td>
<td>00</td>
<td>46</td>
</tr>
<tr>
<td>Zone V (21-25 kms)</td>
<td>02</td>
<td>10</td>
<td>11</td>
<td>03</td>
<td>02</td>
<td>01</td>
<td>29</td>
</tr>
<tr>
<td>Zone VI (more than 25 kms)</td>
<td>01</td>
<td>15</td>
<td>10</td>
<td>01</td>
<td>00</td>
<td>00</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>111</td>
<td>241</td>
<td>288</td>
<td>143</td>
<td>42</td>
<td>904</td>
</tr>
</tbody>
</table>

χ² = 76.26

Degree of Freedom (d.f.) = (r - 1) (c - 1) = (6 - 1) (6 - 1) = 25

Level of Confidence = 99%
Inter-State Chandigarh R.
Scheduled Castes Population
Per cent to Total Population, (Data by Villages)

Regional average: 25-50 per cent
Lowest share: 1-27 (Sukhdarshanpur)
Highest share: 100 per cent (Khoi, Ramgbagh, Sans Mara, Shapur)

Fig. 7.2
The value of $\chi^2$ for 25 d.f. (degrees of freedom) at 1% level of significance in the Table was 44.31 while the computed value of $\chi^2$ comes to 76.26 which was quite higher than the tabulated value. Hence, it is statistically significant at 1 per cent level. We might conclude that the distance of the village from the city was positively correlated with its level of urban-rural interaction, and the hypothesis stood validated.

4. Road Accessibility and Urban-Rural Interaction

Statement

A positive relationship was hypothesized between the level of urban-rural interaction of a village and its accessibility by road. A road plays an important role in the movement of goods and people between and among settlements.

Results and Discussion

The relationship between road accessibility of a village and level of urban-rural interaction was worked out by grouping the villages into two categories viz. villages having road facility and secondly villages without road. The value of levels of urban-rural interaction were cross-classified using a contingency table of 2 rows and three columns and Chi-Square value computed (Table 7.4).

<table>
<thead>
<tr>
<th>Interaction Index</th>
<th>Cat. I (&lt; 20)</th>
<th>Cat. II (20-40)</th>
<th>Cat. III (&gt; 40)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having road</td>
<td>161</td>
<td>587</td>
<td>63</td>
<td>811</td>
</tr>
<tr>
<td>Without road</td>
<td>67</td>
<td>25</td>
<td>01</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>228</td>
<td>612</td>
<td>64</td>
<td>904</td>
</tr>
</tbody>
</table>

$\chi^2 = 151.13$

Degree of Freedom (d.f.) = $(r - 1) (c - 1) = (2 - 1) (3 - 1) = 2$

Level of Confidence = 99%
The value of $\chi^2$ for 2 d.f. (degrees of freedom) at 1% level of significance in the Table was 9.21. Because our computed value (151.13) of $\chi^2$ was more than the tabulated value, it was statistically significant. Since the computed value of Chi-Square was statistically significant, the initial null hypothesis that road accessibility and level of urban-rural interaction were independent was rejected, i.e. it might be concluded that the accessibility by road of a village was positively correlated with its level of urban-rural interaction. Hence, the hypothesis stood strongly validated.

Briefly, all the four hypotheses have been validated by the empirical analysis of the data. The statistical results of the analysis suggest a highly strong positive correlation of independent variables viz. population size, proportion of Scheduled Castes population, distance from the city and accessibility by road of rural settlements with Chandigarh city in the Inter-State Chandigarh Region. Although, all the hypotheses are significant at one per cent level, which is very high, yet in relative terms road accessibility finds the strongest association with the urban-rural interaction index. This is followed by the population size of a rural settlement, its distance from the city and the proportion of Scheduled Castes population, in sequential order.