

The Effect of Rural Population Density on Socio-economic Characteristics of Rural Communities- Review of Literature

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Abstract-Rural population density has a very significant independent influence over important demographic and socio-economic characteristics of world rural communities. That's why, this paper try to explain the concept of population density and determine later the factors that affect it. Then it attempt to find out the specific significance of rural population density as an important variable in understanding the demographic and socio-economic characteristic of settled rural regions, where rural density and characteristic presents both practical and conceptual problems for rural planners. In conclusion, the paper demonstrated that rural population density is an important phenomenon in rural communities.

Keywords: Rural population density; rural communities; Socio-economic characteristic

1-INTRODUCTION

The interface between population and development has been a subject of varied interpretations in development thinking for a long time. The Malthusian theory state's that population growth cause's resource scarcity leading to economic decline and poverty. Other theory, however, regards population growth as a favorable condition to develop new technologies and intensify production that would ultimately result in development. Evidence with regard to these two suppositions is mixed. It seems that the pace of population growth and the role of other scope modifiers such as type of the economy and the institutional variables are all important. The population is an important resource for development. Population affects resource base in many ways:

- Increasing number of people causes increased demand for food, water, arable land, fuel wood, and other essential materials from the natural resource pool. Over-exploitation of resources from the natural environment results from excess demand from the expanding population.
- Expanding agricultural activities encourages deforestation. The increase of population and expansion of agricultural activities intensifies land use conflicts and rapid urbanization.
- Population growth expands and accelerates the demand for energy; especially from fuel wood which is the most commonly source of energy in rural and urban areas.
- The growth and distribution of the population determines the demand for essential social services (e.g. education, health, water, transport, housing, etc.), hence influences the sect oral budgetary allocation.

The influence of population on both the natural resources and socio-economic environments make it important to examine the trends in population distribution and density. This is particularly important in the planning and implementation of development programs in any country. Analysis of population distribution and density requires periodic and systematic information on population size and its spatial distribution over time. However, this exercise is difficult to achieve due to lack of reliable data other from the census data. Census data are often used to estimate the population growth and its distribution over the inter censual periods.

2-The concept of density

The density of human population forms a crucial link between human populations and their physical environments, acting as a principal factor mediating the extent and intensity of their mutual impact (Argent *et al*, 2002). Even though it's apparent simplicity, density is a complex concept, closely entwined with a wide range of people/environment/economy/technology interrelationships whose links can be difficult to separate out for analysis (Fonseca & Wong, 2000).

Population density is commonly used to refer to the number of people per land area (square kilometer). It is the ratio of the population to the land area. Population density gives the average number of people who occupy are certain piece of land. It also shows the concentration of the population over a land area. Though population density is a good indicator of aerial population distribution, it conceals many of the internal disparities in population concentration and its spatial distribution.

A useful definition of the term of density has been provided by Saglie (1987) who distinguishes in the first instance between measured and perceived density (the latter a qualitative measure of subjectively perceived crowding, privacy, contact potential, isolation, loneliness and the like). The present paper is concerned only with measured density, a quantifiable ratio of population units (persons, families, households) per unit area, which may be expressed at many different scales of resolution from the national to the local, and may be either gross (including the entire spatial unit and the whole population) or net (excluding certain areas, e.g. significant water bodies, and/or certain population elements, e.g. urban residents).

Rural density is a very specific measurement of the population of a rural area -which includes regional open space, agriculture and water-bodies- excluding urban land-uses. And the term is used in rural planning to refer to the number of people inhabiting a given rural area. As such it is to be distinguished from other measures of population density, rural density is considered an important factor in understanding how settlements function. Research related to rural density occurs across diverse areas, including economics, health, innovation, psychology and geography as well as sustainability. However there are a variety of other ways of measuring the density of rural areas:

Residential density: the number of dwelling units in any given area.

Agricultural density: The total rural population / area of agricultural land

Employment density: the number of jobs in any given area

Gross density: any density figure for a given area of land that includes uses not necessarily directly relevant to the figure (usually roads and other transport infrastructure)

Net density: a density figure for a given area of land that excludes land not directly related to the figure.

3. Rural population density

Although population density is an important element in population and settlement geography, yet a search of the literature reveals few analyses in depth; and of the work that has been done, the majority has been concerned with urban areas. For specifically rural areas, an early contribution by Robinson et al. (1961) observed the relationship between rural farm densities and rainfall, percentage of land under crop, and distance from urban centers in the Great Plains, while Aangebrug and Caspell

(1970) categorize Kansas counties by their pattern of density change over time. Arguably the first work systematically to investigate the impact of density variations on an entire settlement system, however, was that of Berry (1967). Although working within the constraints of the rather rigid theoretical framework of central place theory, Berry was able to show that the size of rural service centers and their surrounding trade areas is systematically related to the broad regional population density in which they are embedded. Whatever the density, centers tend to form a discrete spatial hierarchy, but as density drops, the absolute size of places at each level falls, while trade areas increase in size to compensate partly—but only partly—for the falling density. As a result, particular types of service found at the lowest hierarchical level under high-density conditions will move up to the next higher order when density falls. Berry also introduced the concept of a ‘phase shift’ in the spatial patterning of trade centers with abrupt discontinuities in density, as between suburban areas and the pre-urban countryside, or between irrigation areas and broad-acre farming. Beavon (1977) later introduced the concept of density changes over time to central place theory, but only in an intra-metropolitan context. An extremely interesting but little known paper (Irving and Davidson, 1973) on density in an urban context (but with strong rural relevance) introduced the idea of social density, expressing the amount of person to-person interaction taking place in a given unit of area per unit of time. This was found not to be a simple function of physical density of population.

Holmes (1977, 1981) introduced the idea of critical density thresholds for particular kinds of service centre network, relating density levels to broad types of primary production land use, e.g. the marginal density zone where normal daily schooling of children using buses becomes impracticable, and gives way to distance education and ‘school of the air’, and normal ambulance coverage of patients gives way to the Flying Doctor service. These contributions apart the analysis of specifically rural population density has had limited attention. Fitzpatrick (1983) examined the concept of density in relation to isolation, with particular reference to education. Smailes and Mason (1995) extended the Hagerstrand and Oberg mapping approach to examine densities of either total population, or population subgroups (e.g. school age children, total workforce, pensioners) in relation to service provision in Eyre Peninsula, South Australia. Smailes (1996) showed that total population growth/decline over a period is better predicted by rural population density at the outset of the period, than by the absolute population size at the outset.

In the United States, Rank and Hirschl (1993) examined the link between population density and welfare participation, but only in the context of comparing urban, mixed and rural US counties. Lester (1995) finds a negative relationship at the level of whole States between density and suicide rates ($r = -0.5$) while Fonseca and Wong (2000) find that 1980–1990 density increase by State is positively related to the 1980 density. In the British context, a paper by Coombes and Raybould (2001) provides a review and critique of the formulae used for the allocation of funding to local government. They are particularly critical of the use of gross population density as an indicator in such formulae, arguing that it subsumes a number of important characteristics that are better measured separately.

An important recent paper by Smailes et al (2002) hypothesized causal relationships between rural density (used as an independent variable) and many important characteristics of rural communities, treated as dependent variables. Using the state of South Australia as a case study, significantly positive correlations ($p > .01$) were found between density and total community population, industrial diversity of the workforce, residential mobility rate, and proportion of the population overseas born; significant negative correlations were found with the spatial extent of the community, the proportion employed in primary industry, the masculinity ratio, and the fertility ratio. Thus, the credentials of density as a causal factor impacting on the nature of communities have been established: but what of the factors that create density itself? Well, in this context, a paper by Argent et al (2005) treat rural density itself as a dependent variable produced by a wide variety of more fundamental conditions. They recognize that the causal chain(s) between these conditions and social outcomes are long, complex and interlinked. Density is itself reflective of the potential of the local environment to yield a living to a local population, and/or the residential attractiveness of a given environmental setting to people drawing income from elsewhere.

In summary, then, while the above review is certainly incomplete, the literature on the density of population and settlement in rural areas therefore appears to have been fragmented (spatially and by discipline) and desultory (over time), whether density is treated as a dependent or as an independent variable. As an independent variable, its influence on social, economic and demographic qualities of rural districts has often been implied, but rarely subjected to detailed investigation. A number of authors have recognized its intrinsic importance as a fundamental aspect of settlement systems, with some

exploring its practical significance for planning, but to date there appears to have been no systematic or concerted investigation of how net rural densities influence the socio-economic and demographic composition of communities.

4. Factors affecting population density

To understand the explanatory factors we treat rural density itself as a dependent variable produced by wide variety of more fundamental conditions. Density is itself reflective of the potential of the local environment to yield a living to a local population, and/or the residential attractiveness of a given environmental setting to people drawing income from elsewhere. There are two main factors that affect on the rural population density, the first one is physical factors and the second is human factors. The table below shows the effect of each of them on the density:

TABLE 1.
Factors effect on population density

| Factors | Element | High Density | Low Density |
|------------------|-----------------------------------|---|--|
| Physical Factors | Relief (shape and height of land) | Low land which is flat e.g. Ganges Valley in India | High land that is mountainous e.g. Himalayas |
| | Resources | Areas rich in resources (e.g. coal, oil, wood, fishing etc.) tend to densely populated e.g. Western Europe | Areas with few resources tend to be sparsely populated e.g. The Sahel |
| | Climate | Areas with temperate climates tend to be densely populated as there is enough rain and heat to grow crops e.g. UK | Areas with extreme climates of hot and cold tend to be sparsely populated e.g. the Sahara Desert |
| Human Factors | Political | Countries with stable governments tend to have a high population density e.g. Singapore | Unstable countries tend to have lower population densities as people immigrate e.g. Afghanistan. |
| | Social | Groups of people want to live close to each other for security e.g. USA | Other groups of people prefer to be isolated e.g. Scandinavians |
| | Economic | Good job opportunities encourage high population densities | Limited job opportunities cause some areas to be sparsely populated e.g. Amazon Rainforest |

5. Rural population density and socio-economic characteristics of rural communities

Rural population density has a very significant independent influence over important socio-economic and demographic characteristics of rural communities, both through time and at a single point in time. Socioeconomics or socio-economic is an umbrella term with different usages, in many cases socioeconomics focus on the social impact of some sort of economic change. Such changes might include a closing factory, market manipulation, the signing of international trade treaties, new natural resource regulation, etc. The goal of socioeconomic study is generally to bring about socioeconomic development, usually in terms of improvements in metrics such as life expectancy, literacy, levels of employment, etc.

While specific research in Rural population have on the immigration and movement remains a priority, attempts at improving the understanding of community socio-economic systems and policies concerned should not be overlooked. Models may have been developed to analyze various community approaches, but the basic data on the underlying aspects affecting the whole system and understanding of the role of population structure, socio-economic backgrounds, and community behaviors and perceptions of the public on rural studies should be of equal importance. Smailes et al (2002) in their paper tested a series of hypotheses on the empirical relationship between rural density as independent variable and selected demographic and socio-economic indicators (Spatial extent of community- Total population of community- Workforce participation- Employed in agriculture- Industrial diversity index- Unemployed- Masculinity (males/100 females)- Born overseas- Changed address- Fertility index- Population aged <15) as dependent variables and they demonstrate that rural density is found to be a significant explanatory variable in understanding the socio-economic characteristics of rural community as below:

- 1-The lower the rural population density, the greater will be the spatial extent of communities and the distance between neighboring towns.
- 2- The lower the density, the smaller will be the total population size of communities.
- 3- Low density associated with a low labor force participation rate.
- 4- Low density will tend to be associated with a low number, but a high proportion of the labor force engaged in agriculture.
- 5- High rural densities will be associated with high levels of both occupational and industrial diversity of the population.

6- Low rural density will be linked with a low proportion of the workforce unemployed

7- In areas of low rural density the masculinity ratio of the population (males per 100 females) will tend to be high.

8- Low population density will be associated with a low proportion of the population born overseas

9- In areas of low rural density the proportion of the population who has changed address in the last 5 years will also be low

10- Low rural density will tend to be associated with a high fertility ratio (children under 5 per 100 women aged 15–44).

11- Low rural density will be associated with a low proportion of the population aged fewer than 15.

6. Conclusion

This paper attempted to review the literature about rural population density and its effect on socio-economic characteristic of rural communities. And it is demonstrate that rural population density, quite strongly associated with a large range of important demographic and socio-economic indicators in rural areas. However, a great deal remains to be investigated. The density figures that have been used by the researchers are still relatively simple, and more work is required to refine a concept of ‘effective density’, which will take account of the regional unevenness of settlement within local communities, the presence of population concentrations in places of less than 200 persons, and the compensation that linearity of settlements can provide in very sparsely peopled areas.

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