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Contours of Rural Change in Chirwa Village: A Data-Driven Study of Socio-Economic Development and Rural Aspirations

Prof. Sandhya Pathania
Department of Geography,
Government Meera Girls College, Udaipur
(Rajasthan)

Dr. Savitri Patidar
(Corresponding- Author)
Associate Professor,
Department of Geography,
Government Meera Girls College, Udaipur
(Rajasthan)

Abstract:
The present study explores the changing socio-economic landscape and emerging rural aspirations in Chirwa Village through a data-driven analysis based on primary survey data collected from 108 respondents. The research investigates demographic structure, educational attainment, occupational patterns, agricultural practices, infrastructural facilities, healthcare accessibility, communication networks, Government welfare participation, and developmental challenges influencing rural transformation.

The study applies both descriptive and inferential statistical techniques, including frequency distribution, percentage analysis, and comparative sectoral analysis, Chi-Square Test, and Z-Test for proportion, to provide a scientific interpretation of rural development indicators. The findings reveal that agriculture continues to dominate the occupational structure of the village, while infrastructural facilities such as electricity, mobile connectivity, internet access, sanitation, schools, and healthcare services have expanded considerably. The Chi-Square Test confirms significant occupational concentration in agriculture, reflecting limited diversification of livelihood opportunities, whereas the Z-Test statistically validates improved access to sanitation and basic infrastructure facilities.

Comparative analysis highlights uneven patterns of rural transformation. While digital connectivity, educational accessibility, electrification, and institutional healthcare show considerable progress, challenges related to employment generation, irrigation insecurity, water scarcity, road infrastructure, and income diversification continue to affect sustainable rural development. The study further indicates growing awareness regarding government welfare schemes, women's participation, institutional healthcare services, and educational aspirations among rural households.

The paper concludes that Chirwa Village represents a transitional rural landscape where infrastructural modernization coexists with persistent economic and developmental inequalities. The study emphasises the importance of integrated rural planning, livelihood diversification, sustainable agricultural development, youth employment generation, and infrastructural strengthening for achieving inclusive and balanced rural transformation.

Keywords: - *Rural Transformation, Socio-Economic Development, Rural Infrastructure, Agricultural Economy, Rural Livelihoods, Sustainable Rural Development*

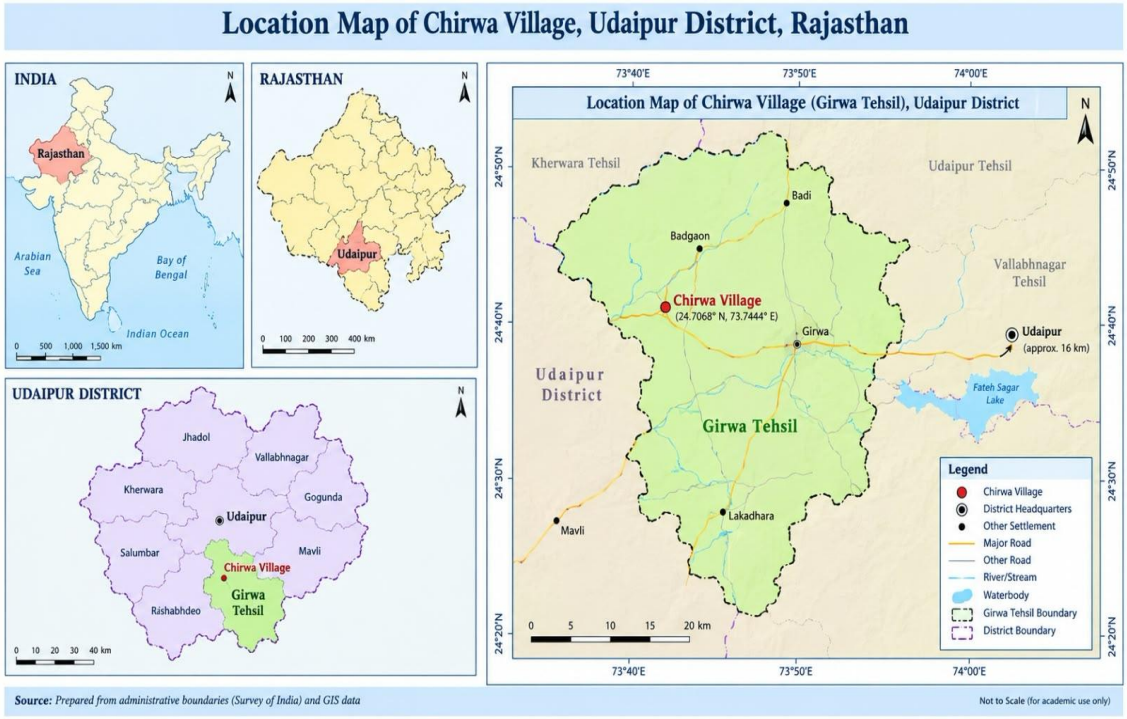
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I. Introduction:

Rural regions form the backbone of developing economies and continue to support a large proportion of the population through agriculture, livestock rearing, and traditional occupations. Despite rapid urbanisation and economic transformation, rural communities still face challenges related to poverty, unemployment, inadequate infrastructure, water scarcity, healthcare, and educational inequality. In India, rural development policies have focused on improving livelihood opportunities, social welfare, education, sanitation, irrigation, and communication infrastructure. The concept of rural development extends beyond agricultural productivity and includes social justice, gender empowerment, infrastructural development, human resource development, and environmental sustainability.

The present study seeks to examine the socio-economic conditions and developmental characteristics of Chirwa Village located in the periphery of Udaipur city of Rajasthan, India (Fig.1). This study accomplished on the basis of Primary village survey, data collected from 108 household respondents.

The study is significant because it provides empirical evidence regarding the changing rural landscape and identifies gaps between infrastructural availability and quality of life. Such analyses are important for policymakers, researchers, planners, and development agencies working in the field of rural transformation.



(Figure.1 represent the latitudinal and longitudinal location of Chirwa village that situated in the Girwa Block of Udaipur District of Rajasthan, India)

II. Literature Review:

Transformation of rural regions has been extensively studied by developmental scholars, Geographers and rural Sociologists. Rural transformation is a complex process that comprises a change in the structure of agriculture, livelihoods, infrastructure, education, health, technology and socio-economic aspirations. Based on the existing literature, the development of rural regions depends on the interplay between economic opportunities, institutions, availability of resources and regional imbalances (Ellis, 2000; World Bank, 2007). The review of international, national and regional literature will provide theoretical background for analysis of changing socio-economic and infrastructural conditions in rural areas.

2.1 International Perspective:

The international literature on rural development focuses on structural transformation, livelihood diversification and effects of globalization on rural economies. Todaro and Smith (2020) define development as not only economic growth, but also improvements in the quality of life, educational opportunities, health and social mobility. This point allows explaining the reason for uneven development of rural regions relative to urban centers. Additionally, Ellis (2000) draws attention to the significance of livelihood diversification and shows how rural households combine agricultural and non-agricultural activities.

According to the World Bank (2007), agricultural productivity, rural infrastructure, institutional support and increased market access are among the key components of rural development. Also, the evidence from developing countries demonstrates that such factors as education, health, access to electricity, transport and communications contribute to expansion of livelihood opportunities and improvement in living conditions. Uneven access to land, credit, jobs and productive resources constrains inclusive development. The recent discussions on the topic of rural transformation emphasize the increasing significance of digital connectivity, climate-resilient agricultural practices and participation of women in economic activity.

These perspectives indicate that any form of sustainable rural transformation must be approached through integration of economic opportunities and social inequalities.

2.2 National Perspective:
In India, there have been various approaches to studying rural transformation, which include agricultural development, regional planning, rural livelihoods, and socio-economic inequalities. Singh (1986) worked in Geography of Rural Development explores the issues and strategies of rural development stressing the importance of local considerations, resource management, people's participation, and regional development. In a similar way, Husain (2020) Geography of India outlines the geographical aspects of India's regional variations in natural resources, agriculture, irrigation, and infrastructure perspective.

The economic aspect is covered by Datt and Sundharam (2026), who explore the general problems of India's development in terms of poverty, employment, and socio-economic inequalities. These topics are especially relevant to the rural population as the dependence on agriculture, seasonality of employment, and the availability of productive resources impact household incomes. Census of India is important for gaining demographic and socio-economic statistics on changes in the rural population, literacy rate, employment, and settlements (Office of the Registrar General & Census Commissioner, India, 2011).

There were also several Government-led programmes aimed at the improvement of rural life conditions and infrastructure. Swachh Bharat Mission, rural electrification schemes, and digital connectivity initiatives are some examples of them. NITI Aayog's development indicators and Government administrative data can serve as other approaches to evaluate the state of infrastructure, sanitation, healthcare and basic service provision (NITI Aayog, n.d.; Ministry of Jal Shakti, n.d.). Yet, irrigation facilities, employment possibilities, income levels, and public service access vary in their impacts on the process of rural development.

In addition, the diversification of rural livelihoods has become an important feature of contemporary rural change. Households adopt a variety of livelihood strategies to cope with economic risks and to take advantage of changing opportunities (Ellis 2000). This perspective helps to understand the increasing significance of non-farm employment, migration, small businesses and service-sector activities in supplementing agricultural income in the Indian context. Thus, the rural transformation in India is an uneven process under the influence of infrastructure development, institutional support, livelihood diversification and changing aspirations.

2.3 Regional Analysis: Rajasthan and Western India:
Climatic factors exert a powerful influence on the rural transformation in Rajasthan and other semi-arid regions of western India Rural transformation in Rajasthan and other semi-arid regions of western India is largely affected by climatic conditions, availability of water, agricultural methods, and infrastructure distribution. Husain (2020) considers India geographically and describes differences in physical environment and agricultural resources and irrigation in different parts of the country. These factors are especially relevant for Rajasthan, where variability in rainfall and limited water resources impact agricultural productivity and rural livelihood security.

Another lens to understand the relationship between environmental constraints and livelihood diversification is the livelihood framework of Ellis (2000). Ellis explains how rural households combine different economic activities to reduce vulnerability and to respond to seasonal uncertainty.
This structure provides a useful basis for an analysis of the interaction of agriculture, livestock management, wage labor, migration and non-agricultural pursuits in Rajasthan. But the extent to which these efforts can improve household welfare depends on access to
land, water, education, transport and job opportunities.

A big part of changing a region is upgrading infrastructure. Improved market access and better quality of life in rural areas can be achieved through improved transportation infrastructure, electricity, telecommunications, sanitation facilities and public services. The accessibility and distribution of these facilities throughout Rajasthan can be assessed from the government statistical reports and developmental indicators.
(Registrar General and Census Commissioner's Office, India, 2011; NITI Aayog, nd). However, the existence of infrastructure does not guaranty equal access to services or economic opportunities, especially in remote communities.

Gender, educational aspirations and the presence of institutional support are important dimensions of rural change. Opportunities to engage in economic activities and community governance could be provided to women through diversification of income sources and expansion of rural organizations. The economic empowerment of women is a function of the availability of local jobs, the access to resources, and the family circumstances.
Thus, rural Rajasthan can be studied as a transitional terrain of modernization and emerging opportunities, juxtaposed with environmental constraints and socio-economic inequalities.

2.4 Research Gaps and Importance of the Present Study:

The literature reviewed indicates that rural transformation is a complex process involving changes in livelihoods, infrastructure, service delivery and socio-economic aspirations. Research at the global level provides a theoretical understanding of livelihood diversification and agricultural development (Ellis, 2000; World Bank, 2007). Indian geographical and economic literature provide a broader view of regional disparities and rural development challenges (Datt & Sundharam, 2026; Husain, 2020; Singh, 1986). However, broad national and regional perspectives alone cannot adequately explain the specific nature, intensity, and distribution of changes experienced by individual villages.

The present study addresses this need through a micro-level empirical investigation of Chirwa Village. It examines socio-economic transformation, infrastructural development, livelihood patterns, and changing rural aspirations using village-level data. By integrating descriptive and inferential statistical techniques, the study seeks to identify patterns of change, examine relationships among selected socio-economic variables, and understand differences in development outcomes within the village. This localized approach complements existing literature by connecting broader theories and development trends with empirical evidence from a specific rural settlement. It also provides a basis for understanding how regional environmental conditions, infrastructure, and livelihood opportunities influence the nature of rural transformation.

III. Objectives of the Study:

- To analyse the demographic and socio-economic characteristics of respondents.
- To examine educational attainment and occupational structure.
- To assess healthcare, sanitation, communication, and infrastructural facilities.
- To identify major developmental problems and suggest policy measures.

IV. Methodology:

The study is based on primary data collected through a structured questionnaire survey conducted among 108 households' respondents in Chirwa Village. Simple random sampling was used for selecting respondents. The collected data were classified, tabulated, and analysed using descriptive statistical techniques such as frequency distribution, percentage analysis and comparative interpretation.

The study primarily relies on socio-economic indicators including gender, education, occupation, income, agricultural landholding size, irrigation, health facilities, sanitation, communication infrastructure, employment, and government welfare schemes.

The study employs descriptive and inferential statistical techniques including percentage analysis, Chi-Square Test, t-test,Z-Test for proportion, comparative sectoral analysis, and association interpretation. These techniques were selected because the collected data are primarily categorical and frequency-based in nature. The statistical methods help evaluate the extent of socio-economic transformation, infrastructural development, and persistent developmental challenges within the rural community. The application of these techniques enhances the scientific validity, analytical depth, and empirical reliability of the study.

The data were interpreted through tables and graphs representations to provide clarity and analytical depth.

V. Results and Discussion:

The demographic structure of the respondents indicates female predominance (64.82%), reflecting substantial participation of women in household and community-level responses. Educational attainment remains concentrated at primary and secondary levels, while higher education participation is comparatively low.

Agriculture is the principal occupation, accounting for 48.15% of respondents, followed by labour work (25.93%). Most households belong to lower income categories, with 78.70% earning below ₹30,000 monthly, indicating economic vulnerability.

Sectoral Development Comparison:

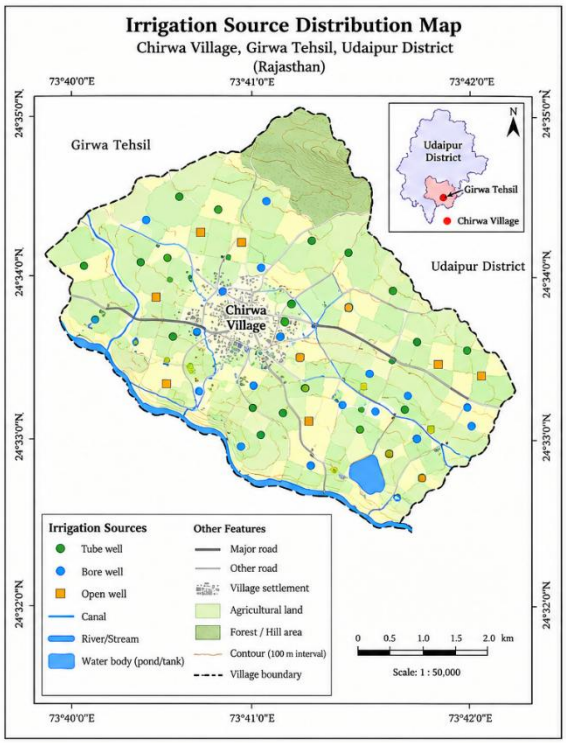
Comparative percentage analysis is applied to compare multiple development indicators across sectors.

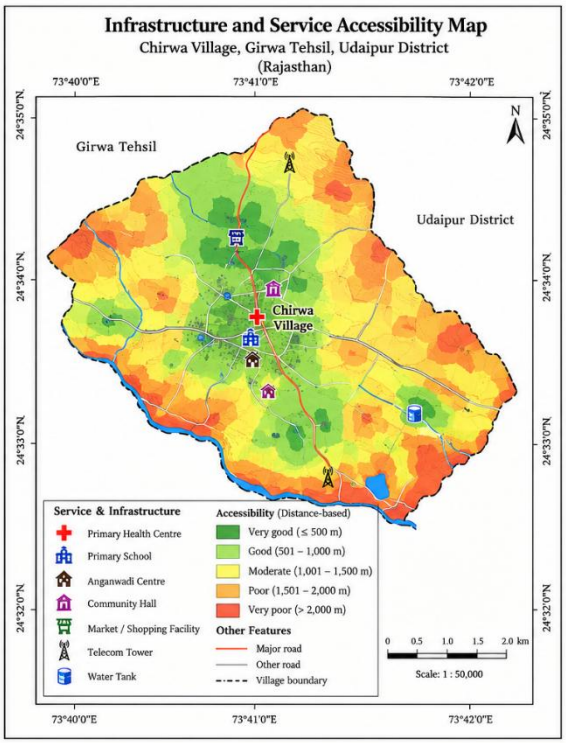
Table 1: Infrastructural Facilities at Households Level

No.	Infrastructural Facilities	Household Percentage
1.	Electricity Availability	98.15
2.	Internet Availability	90.74
3.	Adoption of Government School to Study	98.15

4.	Irrigation facilities	74.07
5.	Youth employment adequacy	37.96

Source: Field Survey, June-2026





Source: Field Survey, Chirwa Village; Handbook, (Rajasthan State GIS Portal; Census of India, 2011. GIS

Source: Field Survey; Census of India, District Census Udaipur, 2011; Rajasthan State GIS Portal; Author's analysis.)

The comparative analysis reveals that infrastructural development has progressed more rapidly than economic development. Communication and basic utilities show high accessibility, while employment and irrigation remain weak sectors.

This analysis identifies developmental imbalance between infrastructure and livelihood opportunities.

The study reveals significant agricultural dependence and widespread use of modern agricultural tools. However, irrigation-related constraints and water scarcity continue to affect crop productivity. Government schools, healthcare centers, electricity, internet connectivity, and mobile phone access are available in most households, indicating substantial infrastructural progress.

Infrastructure and Sanitation Analysis:

Z-Test for proportion is applied to analyse whether access to sanitation facilities is significantly high among respondents.

No. of Households with toilet facilities = 86
Total Respondents = 108
Sample Proportion = 0.79
Calculated Z-Value = 6.16

Since the calculated Z-value is greater than the critical value (1.96 at 5% significance level), the null hypothesis is rejected. This indicates that sanitation coverage is significantly higher than average expectations. The test statistically validates improvements in sanitation infrastructure and supports arguments related to rural development programmes.

The findings also suggest that government welfare schemes such as housing schemes, pension schemes, food security schemes, and MGNREGA have positively contributed to rural livelihoods. Nevertheless, inadequate employment opportunities, poor roads, and irrigation problems remain major developmental concerns.

Table 2: Gender-wise Distribution of Respondents

Gender	Frequency	Percentage
Male	38	35.19
Female	70	64.82

Source: Field Survey, June-2026

Table 3: Educational Status of Respondents

Education	Frequency	Percentage
Illiterate	28	25.93
Primary	32	29.63
Secondary	23	21.3
Higher Secondary	13	12.04
Graduate	4	3.7
Postgraduate	8	7.41

Source: Field Survey, Oct-2025





Table 4: Occupational Structure

Occupation	Frequency	Percentage
Agriculture	52	48.15
Animal Husbandry	9	8.33
Labour	28	25.93
Business	13	12.04
Service	1	0.93
Others	5	4.63

Source: Field Survey, Oct.-2025

Table 4: Income Distribution

Income Group	Frequency	Percentage
0-30 Thousand	85	78.7
30-60 Thousand	16	14.82
Above 60 Thousand	7	6.48

Source: Field Survey, Oct.-2025

1. Chi-Square Test:

Purpose:

The Chi-Square Test is used to determine whether occupational distribution among respondents differs significantly from an equal distribution pattern. Observed Occupational Frequencies.

Expected Frequency (Equal Distribution Assumption) = 18 for each category
Calculated Chi-Square Value = 101.11, P-Value = 0.0

The Chi-Square value is very high and the p-value is less than 0.05, indicating that occupational distribution is not evenly distributed among respondents. Agriculture dominates the occupational structure of the village economy. It strengthens the argument that the village economy is highly dependent on agriculture and lacks occupational diversification.

The test provides statistical evidence regarding occupational concentration and structural dependency in the rural economy.

Table 5: Factor wise Test Results

Factor	N	Mean Score	SD	T	Result
Socio-Economic Status	108	20.78	3.53	-5.05	NS
Infrastructure	108	4.19	0.86	-9.81	NS
Agriculture	108	5.91	1.89	-6.00	NS
Health	108	5.75	0.98	-18.60	NS
Empowerment	108	1.70	0.48	15.19	***
Awareness	108	1.50	0.62	8.39	***
Employment	108	1.23	0.66	3.62	***

Source: Field Survey, Calculation Oct.-2025

The survey questions were categorized into several factors based on the nature of questions. These factors were socio-economic status factor, infrastructure, agriculture factor, etc. Later factor scores were calculated for each factor and hypotheses tests were conducted to test whether observed scores are significantly high above average level or not the test results shows that regarding socio-economic factor ($t = -5.05$, $p > 0.05$), infrastructure factor ($t = -9.81$, $p > 0.05$), agriculture factor ($t = -6.00$, $p > 0.05$), and health factor ($t = -18.60$, $p > 0.05$) the mean observed scores were not significantly above average level. It indicates that the socio-economic status, health condition, infrastructure status, and benefits from agriculture of respondents were not significantly high above average level, which mean socio-economic condition and health status of respondents was at average level, neither very good, not very bad. The infrastructure at their villages was also not very good, rather it is at average level. The benefits from agriculture were also at average level.

On the other hand, as far as empowerment of people in the villages ($t = 15.19$, $p < 0.001$), their awareness level ($t = 8.39$, $p < 0.001$), and employment status ($t = 3.62$, $p < 0.001$) are concerned, the mean scores of respondents were significantly high above average level. It indicates that the respondents were well empowered, their awareness level was high, and their employment status was good.

The overall meaning of this analysis is that the socio-economic status of respondents (people in the village), infrastructure in the town or village, Agricultural condition, and health status of people (respondents), are not significantly better rather at an average level. Whereas empowerment, awareness level, and employment are significantly high and above average level.

After conducting test for individual factors, several meaningful relationships between some of these factor and some demographics variables were hypothetically tested. The test results are given below.

Table 5: Gender and Health Status

Gender	N	Mean	SD	t-Val	D f	p-val	Result
Male	38	5.71	1.01	0.09	106	0.759	NS
Female	70	5.77	0.97				

Source: Field Survey Calculations, Oct.-2025

The first relationship was tested hypothetically between gender and health status. It was tested that whether health status of respondents vary with gender or not. The test result given above was non-significant ($t = 0.09$, $p > 0.1$). Hence, hypothesis test revealed that health status of respondents is independent of gender, which means the

difference in health status of males and females was non-significant. Or males and females are at par as far as their health status is concerned.

Table 6: Marital Status and Health Status

Marital Status	N	Mean	S D	F-Val	D f	p-val	Result
Married	95	5.82	0.93	1.99	3, 104	0.121	N S
Unmarried	7	5.00	1.41				
Widow	4	5.75	0.96				
Divorcee	2	5.00	0.00				

Source: Field Survey Calculations, Oct.-2025

The next relationship was tested between health status and marital status. The test results given in the table above shows non-significant difference in the health status of respondents with different marital status ($F = 1.99$, $p > 0.05$). The results indicate that health status of respondents is independent of marital status too.

Finally, the relationship between socio-economic status and level of education was tested. The test result given in the table above shows highly significant relationship between socio-economic status and education ($F = 11.96$, $p < 0.001$). From the table it can be observed that with increase in the level of education the socio-economic status of family increases.

Table 6: Socio-Economic Status and Education

Group	N	Mean	SD	F-Val	Df	p-val	Result
Illiterate	28	18.75	1.92	11.96	5, 102	0.000	***
Primary	32	19.59	3.26				
Middle	23	21.30	2.69				
Upper Middle	13	22.81	3.04				
Graduate	4	24.50	5.74				
Post Graduate	8	26.00	2.51				

Source: Field Survey Calculations, Oct.-2025

Key Observations:

Infrastructure indicators such as electricity, schools, mobile phones, internet, and health centers show strong development levels, whereas economic indicators such as employment, irrigation security, and income levels remain comparatively weaker.

Interpretation:

The village demonstrates partial rural transformation characterized by infrastructural Modernization without complete economic diversification. The findings suggest that sustainable rural development requires integrated strategies focusing on irrigation management, employment generation, infrastructural improvement, agricultural modernization, women empowerment, and digital inclusion. Policy interventions should prioritize balanced regional development and participatory planning to improve rural quality of life.

Descriptive statistical analysis indicates strong dependence on agriculture and allied activities. The high proportion of respondents in low-income groups suggests limited economic diversification. Percentage analysis reveals that infrastructural services such as electricity (98.15%), mobile phones (93.52%), and internet access (90.74%), and primary healthcare centers (93.52%) are widely available Educational data indicate moderate literacy but limited access to higher education. Occupational concentration in agriculture and labour work reflects limited industrial and service-sector employment. Water scarcity affecting crops (74.07%) highlights environmental vulnerability and irrigation dependency.

The data further reveal positive social indicators such as institutional delivery, vaccination coverage, women's participation, and access to welfare schemes. However, unemployment among youth and inadequate road infrastructure remains critical developmental constraints.

Thus conclusion can be made that the Chi-Square Test confirms occupational concentration in agriculture, while the Z-Test validates improved sanitation conditions. Comparative analysis highlights developmental imbalances between infrastructure and livelihood opportunities.

VI. Policy Suggestions Based on Statistical Analysis:

- Diversification of rural occupations should be promoted to reduce agricultural dependency.
- Improving road connectivity and transportation facilities.
- Employment generation programmes for youth should be strengthened.
- Water conservation and irrigation management should be prioritised.
- Digital infrastructure should be integrated with employment and educational opportunities.
- Women-centred educational and livelihood programmes should be expanded.
- Strengthening irrigation infrastructure and water conservation programmes.
- Enhancing rural employment opportunities through skill development.
- Promoting higher education and vocational training among rural youth.
- Expanding agricultural subsidies and access to modern technologies.
- Strengthening institutional healthcare and permanent medical facilities.
- Encouraging women participation in economic and governance activities.

VII. Conclusions:

The study demonstrates that rural society is undergoing socio-economic transformation through improved access to education, communication, healthcare, and welfare schemes. Nevertheless, the persistence of low-income levels, dependence on agriculture, unemployment, irrigation constraints, and infrastructural deficiencies indicate uneven rural development besides being in the close proximity with the city that is Udaipur.

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