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Understanding the Socio Economic and Demographic Trends of Nandesari Industrial Area and The Nearby Villages of Vadodara Gujarat.

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Abstract

Demographic research provides critical insights into the composition, distribution, and trends within a population, which in turn shape economic, social, and policy environments. Understanding the demographic landscape is essential for planning and resource allocation, as population characteristics like age structure, education, income, and employment patterns significantly influence sectors such as healthcare, housing, labor markets, and social welfare systems.

This study analyzes socio-economic and demographic trends in the Nandesari Industrial Area of Vadodara, Gujarat.

The research focuses on key indicators such as socio demographic profile, living conditions, Water and sanitation, Economic, Education and employment status, Agriculture and animal husbandry exploring how these metrics have evolved in response to local industrialization and economic activities.

A cross-sectional study design was used to conduct the census-based household survey. Quantitative data was collected from the households using structured questionnaires.

The study tool was designed after careful in-depth interaction with stakeholders from different development sectors. Structured pre-tested questionnaire was administered through Android / Computer Assisted Personal Interviews (CAPI). The Field team was trained on study objectives, purpose and CAPI handling. The participants were informed about the study. The confidentiality and privacy of all participants was maintained during the study. Quantitative data from participants was collected using CAPI. Spot checks and back checks were conducted as a measure of quality control. Data was entered into CSPro, and the exported file was further analyzed using Statistical Package for the Social Sciences (SPSS) software. An analysis of quantitative data was done after data cleaning using SPSS software version 28.0.

Key findings highlight how industrial expansion has influenced population composition, workforce demographics, and access to basic needs and education workforce demographics, and access to basic needs and education. Some of these local trends are juxtaposed with NFHS-5 data to provide broader context and comparative insights.

Around 54.7% Households were found to be nuclear.

The mean family size was 4.6.

Though LPG was found to be the main cooking fuel in NFHS 5 but in the Nandesari area it was found that only 48% of the household uses LPG as the main cooking fuel.
Over 99% of the Household had access to safe drinking water and sanitation.
Still 11.5% of people reported to be illiterate though there is shift in primary occupation from contractual labor to Salaried employee.
In spite of being an industrial area 25% of the Household reported to have livestock and use that as a secondary source of income.
This research offers stakeholders valuable insights into policy formulation. By understanding the distinct needs and challenges of the population of Nandesari, policymakers can create targeted interventions that address gaps in health services, education, employment opportunities, and living standards, contributing to balanced regional development in Gujarat.

Keywords: Socio economic trends, demographic research, Nandesari industrial area, economic condition, education, health etc.

1. Introduction:

Demographic research is essential for understanding population dynamics, which are fundamental to planning, policymaking, and development. Demographic research provides critical insights into the composition, distribution, and trends within a population, which in turn shape economic, social, and policy environments. Understanding the demographic landscape is essential for planning and resource allocation, as population characteristics like age structure, education, income, and employment patterns significantly influence sectors such as healthcare, housing, labor markets, and social welfare systems .Moreover Demographic research plays a crucial role in achieving the United Nations Sustainable Development Goals (SDGs) by providing essential data to monitor progress, identify gaps, and design effective interventions.
The Nandesari Industrial Area, located in Gujarat, is a significant hub for industrial activities, particularly in the chemical and pharmaceutical sectors. The industrial area's workforce comprises individuals from diverse regions, particularly local communities and migrant workers from other states like Rajasthan, Maharashtra, and Uttar Pradesh. **Demographic research** is vital for understanding and planning in industrial areas like the **Nandesari Industrial Area**. Given its economic significance and socio-environmental dynamics, demographic insights can help stakeholders address challenges, optimize resource allocation, and drive sustainable development.

2. Background and Objective:

Nandesari is a semi-rural area. This being a semi-rural area, the villages are densely populated. Over a period of time, the population has expanded, and various hamlets are formed within each village.
This study covered 10 villages in and around the Nandesari industrial area and analyzes socio-economic and demographic trends in the Nandesari Industrial Area and the nearby villages of Vadodara, Gujarat. Industrial development provides better job opportunities to the people and improves the overall infrastructure of the region. On the contrary of these positive impacts, there are some negative impacts also. Industrialization affects the traditional local economic pattern, creates health hazards by polluting the environment and alters

the demographic orientation by inviting skilled labor from outside followed by income inequality among the people. Related to this, there is mining activity which may generate employment but on the other hand causes instability of the ground surface and causes pollution (contamination of soil, groundwater and surface water by chemicals from mining processes). Behera PK (2015).

The research focuses on key indicators such as socio demographic profile, living conditions, Water and sanitation, Economic, Education and employment status, Agriculture and animal husbandry exploring how these metrics have evolved in response to local industrialization and economic activities.

3. Methodology:

A cross-sectional study design was used to conduct the census-based household survey. Quantitative data was collected from the households using structured questionnaires

The study tool was designed after careful in-depth interaction with stakeholders from different development sectors. Structured pre-tested questionnaire was administered through Android / Computer Assisted Personal Interviews (CAPI). The designed study tool - included - different domains of development and assessment of utilization of services provided by Deepak Foundation.

The study tool was developed by using Census and Survey Processing System (CSpro) software version 7.7.3 and included the following sectors:

- Socio-demographic profile
- Living conditions
- Water and Sanitation
- Economic, Education and Employment status
- Agriculture and Animal Husbandry
- Effect of industrialization, where applicable

The questionnaire was pretested in a similar community which was not a part of the study to finalize the questionnaire in terms of domains, flow of the questions, type of answers to be pre coded etc.

The field team was oriented and trained on the study objectives, its purpose; study design and sampling strategy; and various techniques and tools developed for data collection during five days of training session. The ethical considerations to be followed during data collection like taking the informed consent prior to initiation of interview, protection of confidentiality as per the ethical protocol were also an important component of this training. The importance and methods of ensuring data quality and quality control were also discussed.

Data collection was done with the help of trained field interviewers and supervisors. Per day at least 10-15 households (HHs) were covered by each interviewer investigators were deployed for data collection. Eligible participants were explained about the purpose of the study and a verbal informed consent was taken from each participant in local language.

The participants were informed about the study. The confidentiality and privacy of all participants was maintained during the study. Quantitative data from participants was collected using CAPI. Spot checks and back checks were conducted as a measure of quality control. Data was entered in CSPro, and the exported file was further analyzed using Statistical Package for the Social Sciences (SPSS) software. An analysis of quantitative data was done after data cleaning using SPSS software version 28.0. Descriptive characteristics,

frequencies, proportions and means using univariate and bi-variate analysis were used to arrive at indicator values.

Coverage of Household and Population	
Time of data collection	Feb 2024
Total villages covered	10
Total households	11000
Total individuals	50117

4. Result:

Table1 shows that the residents of Nandesari are majorly Hindu (99.7%) amongst them majority belongs to general caste (89%). Almost 55% families are nuclear families which is close to the finding of NFHS-5 for Vadodara district.

95% of the families live in own houses with two dwelling rooms per household on an average.13.37% households are owned by female. Sex ration (Figure 1) of the total population is 960 which is slightly better than the sex ration of Vadodara district (NFHS 5)**.**

Near 75% of the household reported having separate kitchen. 3.35% reported to be still dwelling in kachha houses which is a little higher than the data came out in NFHS 5 for rural Gujarat.

Wood (49.18%) and LPG (47.88%) came out as main cooking fuel even if 89.25% reported to have LPG connection which is little bit varying from the NFHS 5 data where around 78% of HHS mentioned LPG as main cooking fuel. This might be the impact of stopping subsidies on LPG.

It is evident from the data that almost 99% of the households had access to improved drinking water sources and nearly 95% of the households have access to clean water sources within or near (<1/2 KM) the household or yard itself.

But 13% have reported that they face problems with drinking water citing irregular or dirty water supply which is a common problem in Nandesari being an industrial area.

Similarly, for sanitation facilities, over 95% of households reported to have proper sanitation facilities. A few households have discontinued the use of sanitation facilities due to maintenance and water supply issues. These households were on the outskirts of the villages or residing on their farms.

However, it is evident from the data that the household faces significant problems with waste management which might be the result of unplanned urbanization and lack of support of the local govt. 17.45% reported it to be BPL Households.

Coming to the educational status of the population (Table 2) only 81% female above 5 years of age have ever attended school (82% in NFHS 5). And the percentage of people who attend school

(over 5 years of age) is 95.7%. The findings of NFHS 5 is also ratifying the significant difference in the male and female literacy.

Similarly, is the current school or college going status (5 to 24 years) that is 61% and 56% for male and female respectively.

Marriage and required for household work is major reason for school drop out in case of female and lack of interest in formal education in men.

The dependency ratio is [the dependency ratio relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old).] found out to be 38% which is quite less than the national ratio of 47%.

The major occupation of male population is doing either being salaried employee or contractual worker in the nearby industries. Only 2.7% have said agriculture to be their main occupation. The mean household income was nearly one lakh rupees per annum.

Amongst women around 5% has reported to be working in industries and 2.5% has reported animal husbandry to be their main occupation rest are majorly housewives. (Table 3)

Nearly 32% of the households have reported that some members of the household are working in the industries of the nearby Nandesari GIDC (Gujarat industrial area corporation) and several others are working in other GIDCs. Only 1% of these households have reported that those members who are engaged in the nearby industry are suffering from any occupational health problem. Silicosis, asbestosis, Pneumonia, Byssinosis, Metal fume fever and dermatitis have emerged as the main occupational health problems of that area.

Less than 1% of Migrated families have been found in the study. 60% of them have migrated from outside the state. And the main reason for migration is livelihood.

Figure 1. Population Pyramid:

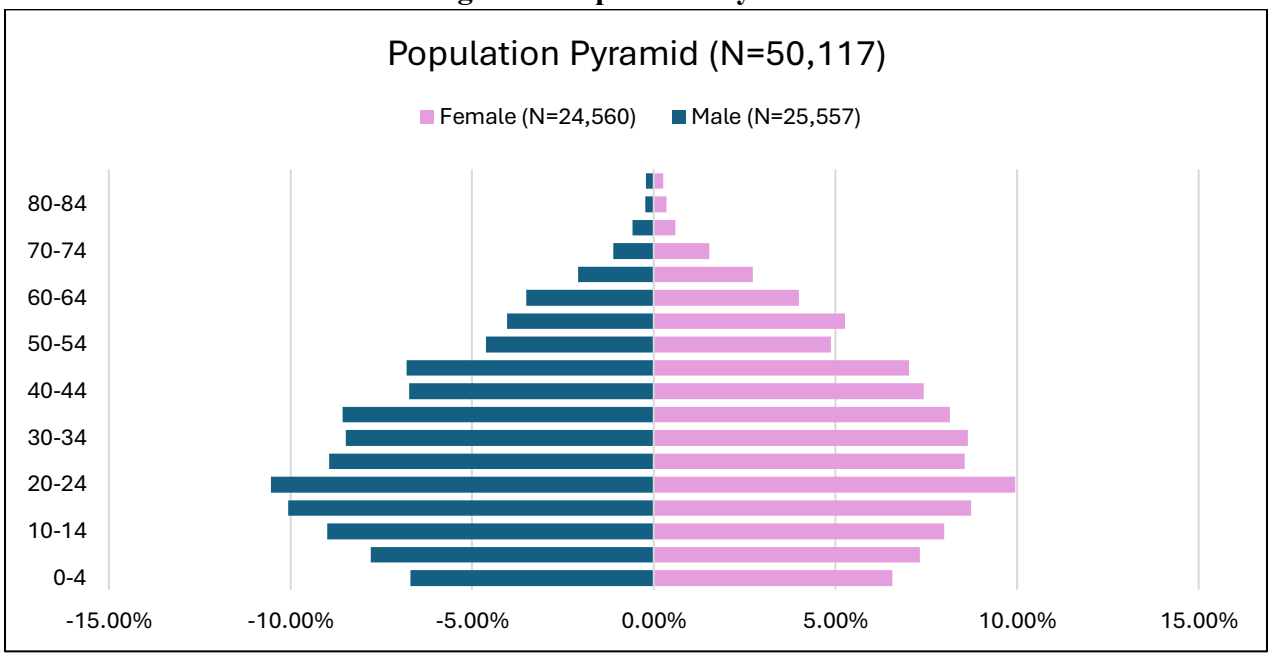

Table 1. Housing conditions.

Variable		Nandesari	Gujarat Rural	Gujarat Urban	Vadodara
Religion of the head of the household	Hindu	99.77	93.2	82.2	-
	Muslim	0.10	6.2	16.2	-
	Christian	0.04	0.6	0.6	-

	Sikh	0.05	-	-	-
	Buddhist	0.01			-
	Parsi	0.03			
	Jain	0.01			
	Total	100.00			
Social Category	Scheduled Caste	2.63	14.2	12.9	
	Scheduled tribes	0.87	23.3	5.2	
	Other backward Caste	6.75	44.2	44.2	
	General	89.70			
	Total	100.00			
Type of family	Joint	44.25	50.6	43.8	
	Nuclear	54.69	49.4	56.2	49.4
	Extended	1.06			
	Total	100.00			
Does your family own this house?	Yes	94.72			
	No	5.28			
	Total	100.00			
Gender of the household members own this house	Male	86.52	87.2	87.3	
	Female	13.37	12.8	12.7	
	Both Male and Female	0.10			
	Total	100.00			
Do you have a separate Kitchen?	Yes	74.69			
	No	25.31			
	Total	100.00			
Type of House	Kachcha	3.35	2.8	0.2	
	Semi Pucca	44.19	32.2	5.3	
	Pucca	52.45	64.5	94.1	
	Total	100.00			
What is the main source of lighting?	Electricity/	97.97			
	Kerosene/gas/oil	0.25			
	Solar energy	0.60			
	No lighting	0.80			
	Other oil	0.28			
	Other (specify)*	0.09			
	Total	100.00			
	Electricity	2.28	0.6	0.3	

Which is the main cooking fuel?	LPG/Natural Gas Pipeline	47.88	45.2	94	78.1
	Biogas	0.57	0.3	0	
	Charcoal	0.04			
	Wood	49.18	49.9	4.3	
	Shrubs/ Grass	0.02			
	Dung Cakes	0.01			
	Other	0.02			
	Total	100.00			
Do you have LPG connection in your household?	Yes	89.25			
	No	10.75			
	Total	100.00			
What is the main source of drinking water?	Piped water	61.26	53.7	78.7	
	Public tap/hand pump	33.27	1.6	1.1	
	Tube well or borehole	4.88	22.3	5.1	
	Dug well	0.11			
	Bottled water	0.35			
	Community RO Plant	0.07			
	Other	0.05			
	Total	100.00			
Where is the drinking water source	Within house/premises	59.91	80.8	95.4	
	Near the house/premises (<½ Km)	33.45	14.8	3.9	
	Away (>½ Km)	6.65	4.3	0.6	
	Total	100.00			
Do you face any problem with drinking water?	Yes	12.76			
	No	87.24			
	Total	100.00			
What kind of problem do you face? (N=1,404)	Irregular supply	54.63			
	Dirty water supplied	23.90			
	Hard water / difficult to drink	18.90			
	Others*	2.50			

	Total(N=1,404)	100.00			
What kind of toilet facilities do the family members use?	Own flush toilet	28.35			
	Own pit latrine	66.75			
	Shared/public flush toilet	1.06			
	Shared/public pit latrine/Sulabh Sauchalaya	0.19			
	Dry toilet/ composting toilet	0.01			
	No facility/uses open space	3.61			
	Nonfunctional toilets	0.01			
	Total	100.00			
What type of WASTEWATER system do you have in your house?	Common sewerage system	52.55			
	Discharged directly to a river / land	45.49			
	Open drainage	1.94			
	Other (specify)	0.02			
	Total	100.00			
How are solid wastes disposed?	Collected by Gram Panchayat/ MC	35.22			
	Disposed to a landfill	6.55			
	Disposed on open land/water source	33.21			
	Burning	25.01			
	Total	100.00			
Electricity	Yes	98.45	95.6	91.3	
	No	1.55	4.4	0.7	
	Total	100.00			
What type of PDS/Ration card does your household possess?	APL CARD	76.20			
	BPL CARD	17.45			
	BPL Antyodaya	0.83			
	No Ration Card	5.52			
	Total	100.00			

Table 2: Educational status of Household members.

variables		Male		Female		Vadodara
		N	%	N	%	
Ever attended school (Above 5 years)	Yes	22395	95.7	18255	81.0	82%
	No	995	4.3	4279	19.0	
Presently attending school or college (only for 5 to 24 years)	Yes	5511	61.2	4423	56.5	
	No	3501	38.8	3400	43.5	

Table 3: Occupational status of Household members.

		Male		**Female**	
What is your primary occupation (above 15 years)		N	%	N	%
	Agricultural Labour	171	0.90	73	0.39
	Wage/ casual Labour	4045	20.92	415	2.18
	Salaried employee/ Service	8587	44.99	436	2.32
	Agriculture	519	2.72	17	0.09
	Business	867	4.54	131	0.70
	Animal husbandry	128	0.67	472	2.51
	Fishing/ Fishery related	12	0.06	0	0.00
	Elderly/Retired	1349	7.07	1444	7.69
	Unemployed	1712	8.97	284	1.51
	Housewife/Household chores/Work	323	1.69	14691	78.23
	Student	1301	6.82	800	4.26
	Apprentice/Intern	2	0.01	0	0.00
	Others	71	0.37	17	0.09
	Total	19087	100.00	18780	100.00

5. Discussion:

The Nandesari Industrial Area (NIA) has exhibited a complex interplay of socio-economic and demographic trends, reflecting both the advantages and challenges of industrial development in the region. This discussion aims to synthesize the key findings of the study and their broader implications.

1. Economic Growth and Industrial Development

NIA has seen significant economic growth driven by the expansion of various industries, particularly chemical manufacturing. This growth has contributed to increased employment opportunities and the overall economic improvement of the region. However, this industrial boom has also led to a concentration of economic activities, often overshadowing other sectors like agriculture.

2. Demographic Changes

The influx of workers from various parts of the state and country has transformed the demographic landscape of NIA. This migration has led to a diverse population mix, which in turn has enriched the cultural fabric of the area. However, this has also posed challenges in terms of providing adequate housing, healthcare, and educational facilities for the growing population.

3. Socio-Economic Impact on Local Communities

While industrialization has brought economic benefits, it has also had mixed socio-economic impacts on local communities. On the one hand, increased job opportunities have led to improved living standards for many families. On the other hand, there have been concerns about environmental degradation and health issues resulting from industrial pollution. Moreover, the benefits of industrialization have not been uniformly distributed, leading to socio-economic disparities within the region. The status of air quality in every part of the world always parallels the changes in development of surrounding area. Agarwal, S.K. (1986)

4. Infrastructure and Public Services

The rapid industrial growth has put a strain on the existing infrastructure and public services in NIA. Issues such as traffic congestion, inadequate waste management, and insufficient public transportation are becoming increasingly prevalent. There is a need for comprehensive urban planning and investment in infrastructure to ensure sustainable development.

5. Condition of women.

In the Nandesari industrial area, several initiatives have focused on empowering women, particularly through skill development and access to economic opportunities. One prominent example is the Deepak Foundation's efforts to support women's dairy cooperatives, where women have gained new skills and improved their livelihoods. This initiative, which benefits women in small communities like Nandesari, helps them become more economically self-sufficient by enhancing milk production using advanced reproductive technologies.

Despite these advancements, challenges remain, including access to resources, fair wages, and overcoming socio-cultural barriers to women's full participation in the economy. Government schemes such as the Mahila-E-Haat project and various state-level programs are designed to provide women with tools to succeed as entrepreneurs.

However, more work is needed to close the gender gap, especially in industrial hubs like Nandesari, where women continue to face obstacles in fully capitalizing on opportunities.

6. Conclusion:

The socio-economic and demographic trends in NIA underscore the transformative impact of industrialization on the region. While the economic benefits are significant, including increased employment opportunities and overall economic upliftment, they are accompanied by substantial challenges. These challenges include environmental degradation, health issues, infrastructural strain, and socio-economic disparities.

The rapid industrial growth has led to a diverse population mix and enriched the cultural fabric of the area. However, this has also necessitated improved urban planning and public services to accommodate the growing population's needs. The mixed socio-economic impacts on local communities highlight the necessity for a balanced approach to regional development.

Organizations like the Deepak Foundation have been active in the region, focusing on education and skill development.

In the last 50 years, Vadodara's industrial sector has expanded significantly. Industrial buildings have largely replaced agricultural fields as the predominant form of land use. Prior to 20 years ago, greater regions near the industries were utilized as landfills for solid garbage. Some of the sites were recently closed off, while new industrial buildings sprouted up at other locations. In this area, discontinuing solid waste disposal or closing solid waste disposal plants has not actually reduced pollution. (Verma Seema, "Qualitative analysis of ground water from GIDC (Gujarat Industrial Development Corporation") area, Vadodara, Gujarat

To ensure sustainable and inclusive growth, it is essential to adopt policies that integrate economic, social, and environmental considerations. Enhancing infrastructure, enforcing stringent environmental regulations, and promoting equitable distribution of economic benefits are crucial steps. Additionally, investing in education and skill development programs will be vital to adapt to the changing industrial demands.

By addressing these pressing challenges with a holistic approach, policymakers can better manage the development trajectory of NIA, ensuring a prosperous and sustainable future for all its inhabitants.

Policy Implications and Recommendations

The findings highlight the importance of balanced regional development policies that address both economic growth and social well-being. Policy recommendations include:

- Enhancing the infrastructure to support the growing population and industrial activities.
- Implementing stringent environmental regulations to mitigate pollution and its health impacts.
- Promoting equitable distribution of economic benefits to reduce socio-economic disparities
- Investing in education and skill development programs to ensure the local workforce can adapt to changing industrial demands.

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