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Understanding Demographic Dynamics: A Case of Chinhat, Lucknow

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Abstract: ***Demographics play a vital role in the development of any area. Demographic dynamics depict the decision-making capacity of governance, hence it's a vital part of predicting the future growth of an area in terms of its socio-economic context. The demography of an area can also help in understanding the cultural aspect and how it is being oriented in the built environment. The paper talks about the demographic dynamics of Lucknow and its ward level of integration to help understand the local area-specific ward-level population change concerning the city. Different mapping techniques are used to understand the population distribution along ward 35 which is a peri-urban region of the city where the rural context was available within the municipal boundary such as agricultural fields as well as semi-pucca houses and its context in an urban area are the most difficult to segregate in terms of urban planning development scenario. In local area planning of any ward level integration demography becomes the most vulnerable topic to analyse due to lack of data on population from the past resources due to a mismatch of ward numbers from the district census handbook of Lucknow from 1991 to 2011 and planning for 2022 with lack of 2021 data has become a huge difficulty. So, the paper analyses every data with proper alignment and manual survey conducted in ward 35 in favour of local area development proposals. This concludes the paper with the way forward to investigate the population dynamic for every ward of Lucknow for the urban planning community.***
Keywords: Population, Demography, Census, DCHB, Lucknow, Local Area planning.

I. INTRODUCTION

Demography is the study of the human population of a country or a place. Demographer uses census data, surveys, and statistical models to analyse the size, and movement of the population over spaces and time and to study the structure of the population.(*Demography | National Geographic Society*, n.d.). Population is dynamic and keeps on changing depending upon the major factors which are fertility, mortality, migration, change in administrative city limits and change in job opportunities. The population is generally recorded under government-registered birth and death records. In India, the Census of India is the largest and single source of a variety of statistical information available for collecting and keeping records of different characteristics of the people of India. The first census calculation was conducted in 1881 under the classification of demographic, economic and social characteristics of the entire continent of India except Kashmir and French and Portuguese colonies. For planning purposes knowing and understanding the population structure is very crucial. The number of people in a given boundary can increase and decrease which may affect the capacity of that given boundary. Knowing factors like age range, dynamics of migrations, and homogeneity of the population is very 1important for planners for planning different types of services. For planning purposes, to know the future population or the upcoming expected population; methods of population estimations are carried forward. Generally, Population projections are calculations of the future birth rate, death rate and migration of the population based on their past and present conditions. Here the population projection for the planning of Ward 35- CHINHAT arithmetic increase method has been used.

Population Size: The most elementary demographic parameter is the number of individuals within a population. The population size is defined as the number of individuals present in a subjectively designated geographical range. Despite the simplicity of its concept, locating all individuals during a census (a full count of every individual) is nearly impossible, so ecologists usually estimate population size by counting individuals within a small sample area and extrapolating that sample to the larger population. Regardless of the challenges in measuring population size, it is an important characteristic of a population with significant implications for the dynamics of the population as a whole. Populations display distinctive behaviours based on their size. Small populations face a greater risk of extinction. Large populations experience their problems. As they approach the maximum sustainable population size, known as carrying capacity, large populations show characteristic behaviour. Populations nearing their carrying capacity experience greater competition for resources(Lucknow Industrial Development Authority, 2015).

Population Density:It is a complete description of a population's size including the population density - the size of a population about the amount of space that it occupies.

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Density is usually expressed as the number of individuals per unit area. Birth and immigration — the influx of new individuals from other areas — can increase a population's density, while death and emigration — the movement of individuals out of a population to other areas — can decrease its density(*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.).

Age Structure:Not all individuals contribute equally to a population. Occasionally, researchers find it useful to characterize the different contributions made by different individuals. This data can provide information on preferences and trends among age groups and help policymakers to orient social programs, like healthcare or child support(Handbook, 2011).

Sex Ratio:The measure of several males and females within a population constructs a sex ratio, which helps to predict population growth or decline. Much like population size, sex ratio is a simple concept with major implications for population dynamics. Number of females per 1,000 males in a population(*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.).

Literacy Rate:The literacy rate of the population is defined as the percentage of literates in the age group seven years and above. For different age groups the percentage of literates in that age group gives the literacy rate(*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.). A person age 7 years and above who can both read and write with understanding in any language is taken as literate. A person who can only read but cannot write is not literate. It is not necessary that to be considered literate, a person should have received any formal education or passed any minimum educational standard. Literacy could also have been achieved through adult literacy classes or any non-formal educational system. People who are blind and can read in Braille are treated as literate. (*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.).

Work Force participation rate:A person who worked for less than six months of the reference period (i.e. in the last year preceding the date of enumeration) in any economic activity is termed a 'Marginal worker'. A person who has worked for a major part of the reference period (i.e. six months or more during the last year preceding the date of enumeration) in any economically productive activity is termed as a 'Main worker'. Therefore percentage of workers (main + marginal) to the total population. (*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.)

II. DISCUSSION

A. Population Distribution of the City

As per Census of India 2011, Lucknow City's total population is 28.17 lakh(Handbook, 2011). The population of the study area as per Census of India 2011 is 0.31 lakh. The total study area of Lucknow Municipal Corporation is 350 sq. km and the population density is 8049 P/sq.km ward 35 is 5.03 sq. km and the population density is 63.03 P/sq.km.

The population projection of Lucknow Municipal Corporation has been projected through the arithmetical increase method to forecast the population for the upcoming three decades.

Area, Population, Density of Lucknow District, LMC

Description	AREA (SqKm)	POPULATION (IN LAKHS)	DENSITY (P/Sq.Km)
Lucknow District	2528	45.89	1816
Planning Area	1050	35.48	3379
Urban Agglomeration	377.5	28.8	7629
LMC Area	350	28.17	8049
Ward No 35	5.03	0.31	63.03

Source: Lucknow Master Plan 2031 and Census of India 2011

Figure 1a: Population distribution of Lucknow and Ward 35.

POPULATION DISTRIBUTION OF LUCKNOW

Year	LMC	area (HA)	Increase in area (HA)	Density (PPH)	Growth Rate %
1971	774644	10100		77	25.85
1981	947990	11800	1700(16.8%)	80	22.38
1991	1619116	35000	23200(3 time)	46	70.8
2001	2154049	35000		62	35
2011	2817105	35000		80	30.78
2021(Projected)	3440143	56800		60	22
2031(Projected)	4063182	56800		71	18
2041(Projected)	4686220	56800		82	15

Source: Lucknow Master plan 2031, Census 2011, SWM Action Plan Lucknow, Author 2022

Figure 1b: Population distribution of Lucknow.

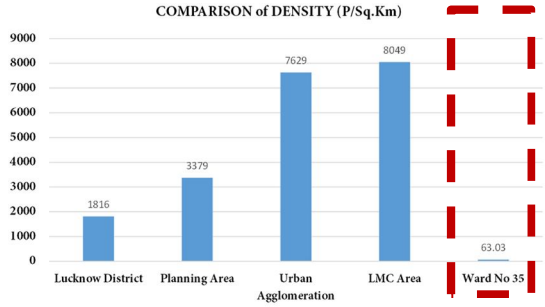

Figure 1c: Population comparison of Density(P/sq.km) of Lucknow and Ward 35.
Source: Census 2001,2011

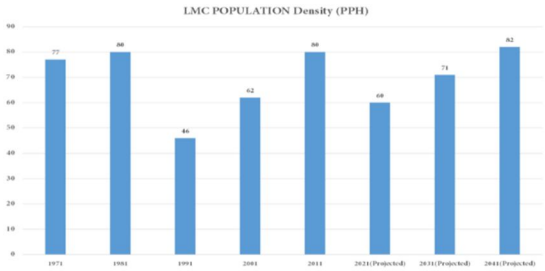

Figure 1d: Population comparison of Density(PPH) of Lucknow.
Source: 2001,2011

From 1971 to 1991 it is observed the area and population of LMC increased by 3 times. The area of LMC is assumed to be fixed and hence the density of people per hectare of LMC is projected to be 71.PPH by the year 2031 and 82 Population Per Hectare by 2041 hence forecasting LMC to be a saturated city.The city has faced a rapid growth between the decades of 1981-91 due to the change in municipal boundary area. The last decade's growth rate is less than that of the country's rate i.e., 31.80% and is slightly higher than the state's urban population rate of 28.75%.

B. Population Distribution of Ward 35

POPULATION AND DENSITY OF WARD NO. 35					
YEAR	CENSUS POPULATION	AVERAGE	GROWTH RATE	AREA	DENSITY
2001	15660				
2011	31756	16096	102.7	503.8	63
2021	47852	16096	50.68	503.8	94.98
2027	57510	16096	33.6	503.8	114.15
2031	63948	16096	33.6	503.8	126.93
2041	80044	16096	25.17	503.8	158.88

Figure 2a: Population of Ward 35
Source: Census 2001,2011 and Author 2022

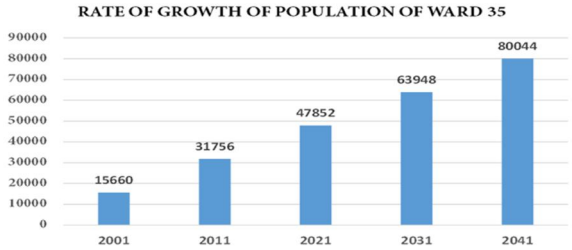

Figure 2b: Population of Ward 35
Source: Census 2001, 2011 and Author 2022

The population of ward 35 is extracted from the Census of India 2001 and 2011. The population projection of Ward 35 is projected by using the arithmetic increase method. The total population of Ward 35 of 2021 is 47852 and the projection of the upcoming five years is estimated for Local Area Planning which is 57510. Therefore the decadal growth rate is observed to be 33.6% for 2027

C. Population density distribution of Lucknow Municipal Corporation

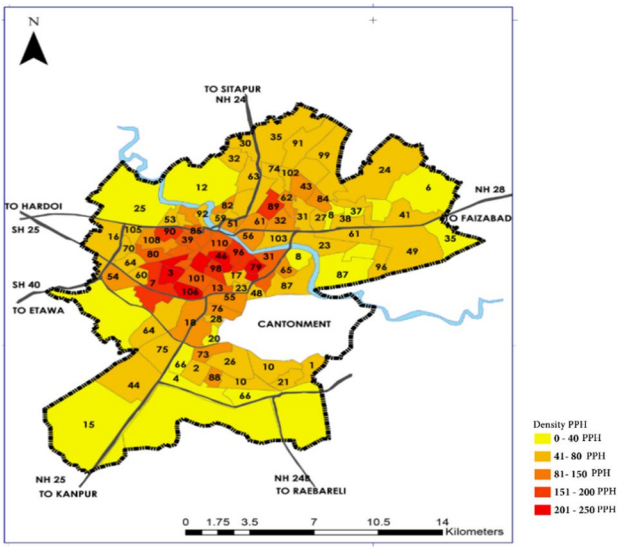

Figure 3: Population Density(PPH) of Lucknow.
Source: Master Plan 2031

The population density of Lucknow city has remained almost the same between the years 1951 and 1991 due to continuous increases in the municipal corporation boundary(Handbook, 2011). After the last expansion of city areas which took place in the year 1987, the population density has increased manifold from 4262 persons per sq. km (46 pph) in 1991 to 8049 persons per sq. km (approx. 80 pph) in 2011 due to continuous growth in the population. From 1951 to 2011 changes in population density figures and area in Lucknow city(*January 2015*, 2015).

Ward 35 falls under zone 4 ranging with population density of people per hectare as 0-40 people per hectare. Ward 35 falls under the sub-urban region of Lucknow where it is observed to have a very scarcely densified area as per population density mapping of Master Plan 2031.Ward 35 seem to be added recently into the municipal corporation which was previously part of Lucknow Tehsil.Three village named Semra, Sarai Sekh Sahapur has been added into Ward 35 in 2019.

D. Urban Sprawl

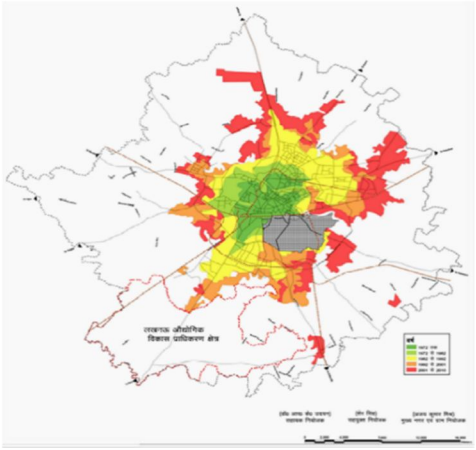

Figure 4a: Urban sprawl.
Source: Master Plan 2031

Urban sprawl has been the subject of concern in many recent debates. Cities may often experience urban sprawl due to sudden changes in population, expansion of municipal limits, addition of political boundaries etc. Lucknow is located at the centre of the state and is known as the administration state for Uttar Pradesh. The city grew because of their land use pattern and functions and these different kind of functions laid the formation of its morphological development. In Nawabian period residential colonies developed around Chowk with peripheral areas in the surroundings (Classical Chowk Model), Baradari, Rumi Darwaja, Gol Darwaja, Akbari Darwaja, Bazar Ghaulal, China Bazar, Aminabad, Terahi Bazar, Aminaganj, Fatehganj, etc. were other markets along the river Gomti(Kumari, 2015). The morphology of Lucknow is the result of different phases of its evolution and growth following the internal structure, i.e., layout and form and the spatial-functional development of the urban landscape in the city(Kumari, 2015). The city grew due to different land use patterns, political boundary administrative changes etc.
Our study area falls under sprawl from 2001 to 2010. Urban sprawl is dynamics and it is seen that there is a change in land use pattern near our study area.

SPRAWL OF LUCKNOW CITY				
YEAR	AREA IN SQ. KM	GROWTH RATE	AVERAGE GROWTH RATE	FUTURE GROWTH in SQ.KM
1901	44.03	-	3.178	15.98534
1961	79.16	1.32		
1974	80	0.08		
1986	132.75	5.49		
1988	143.32	3.98		
1992	159.26	2.78		
1997	196.5	4.67		
2001	212.24	2		
2005	243.8	3.72		
2011	304	4.12		
2021	350	3.62		
WARD 35 AREA 2022	5.03	3.178		

Figure 4b: Urban sprawl of : Lucknow city and Ward 35.

Source: Master Plan 2031and Author 2022

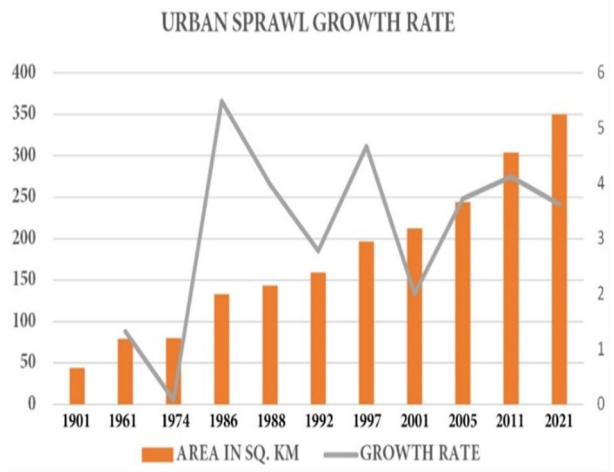

Figure 4c: Urban sprawl of: Lucknow city and Ward 35.
Source: Master Plan 2031and Author 2022

The urban sprawl is observed to be between 2001 to 2010.It is inferred that the growth rate of urban sprawl of Ward 35 is projected to be 15.9 where it is assumed that the ward may increase in area.

E. Population density of Ward 35

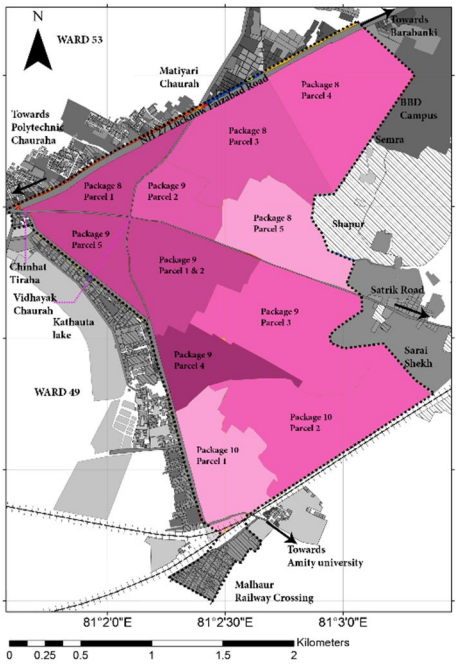

Figure 5a: Density mapping of Ward 35 as per survey.
Source: Author 2022

LOCATION of WARD 35	POPULATION	AREA IN HA	DENSITY (PPH)	STANDARD POPULATION DENSITY URDPFI (123-175 PPH)
Package 8 parcel 1	4600	23.06	199	Over Standard
Package 8 parcel 2	4025	22.1	182	Over Standard
Package 8 parcel 3	7475	50	149	Satified the criteria
Package 8 parcel 4	5750	68.54	83	Below Standard
Package 8 parcel 5	1150	29.49	39	Below Standard
Package 9 parcel 1&2	7475	43.11	173	Satified the criteria
Package 9 parcel 3	5750	67.04	85	Below Standard
Package 9 parcel 4	6900	26	265	Over Standard
Package 9 parcel 5	5175	24.32	212	Over Standard
Package 10 parcel 1	1725	43.53	39	Below Standard
Package 10 parcel 2	7475	106.6	70	Below Standard
TOTAL AREA	57500	503.79	114	Below Standard

Figure 5b: Table showing population, area and density of Ward 35 as per parcel.
Source: Author 2011

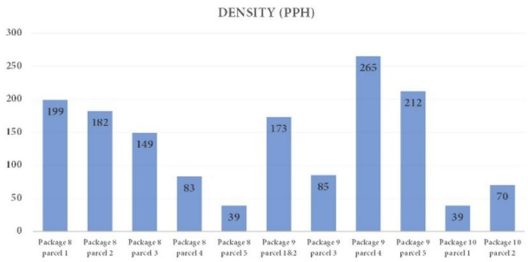

Figure 5b: Graph showing the population, area and density of Ward 35 as per parcel.
Source: Author 2011

The total area of our study is 5.03 sq. km. The study of the ward is executed very minutely by dividing the whole Ward into different parcels. These parcels are studied thoroughly into different focus areas like demographic profile, socio-economic profile etc. Figure 5a shows the study of the population density of the whole ward as per the primary survey. Figure 5b and 5c shows the detail of this parcel's area and population.The highest density is of parcel 9 packet 4 which is near Kathauta Jhil and was predominating part of the municipal corporation area.

This parcel has almost all the services available and the population belongs to the HIG type.The lowest density is of packet 10 parcel 1 and packet 10 parcel 2; since these two parcels have been recently added to the municipal corporation. These two packets lack in almost every service and settlement seems to be due to urban sprawl. The settlement is sparse and dispersed.

F. Household Size

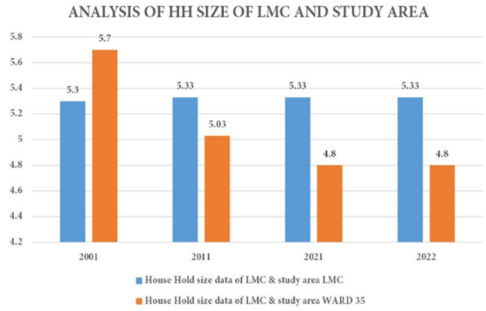

Figure 6: Household size of LMC and Ward 35
Source: Census 2011 and Author 2022

The total household size of Lucknow as per Census 2011 is 5.33. The household size of the study area Ward 35 is abstracted from a primary survey which has been executed and is observed to be 4.8. The majority/minority of the population in Lucknow (55%) uses offsite sanitation systems and there is no practice of open defecation. 72% of the excreta in Lucknow is safely managed, leaving 28% unsafely managed(*Lucknow*, n.d.).It is inferred that the HH size of Ward 35 is obtained from a primary survey of households and is constant for further projection.

G. Literacy Rate

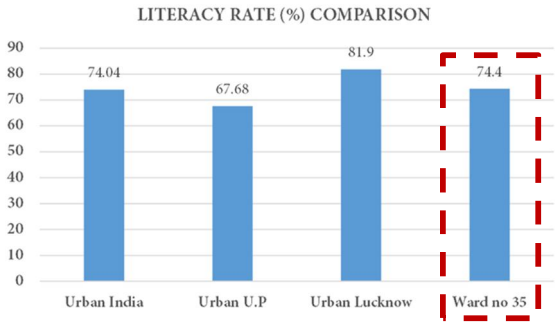

Figure 7a: Literacy rate of LMC and study area
Source: Census 2001 and 2011

LITERACY RATE		
AREA	**POPULATION**	**LITERACY RATE (%)**
Urban India	89,65,17,024	74.04
Urban U.P	13,52,32,992	67.68
Urban Lucknow	24,88,937	81.9
Ward no 35	23,628	74.4
Source:census2011		

Figure 7a: Comparative study of literacy rate of LMC and WARD 35
Source: Census 2001 and 2011

As per Census 2011, Lucknow district ranks 6th in literacy with 77.3 per cent which is higher than the state average of 67.7 % (Handbook, 2011). The literacy rate reflects the socio-economic development of any region. Lucknow city has the highest literacy rate of 82.50% in comparison to Uttar Pradesh. The literacy rate of Lucknow city has increased from 77.11% in 2001 to 85.20% in 2011(Handbook, 2011)(*Final-Report-of-Lucknow.Pdf*, n.d.).

The male population has an 86.04% literacy rate and females have 78.70% (*Final-Report-of-Lucknow.Pdf*, n.d.). There is increase in female literacy by 5424 i.e. by 50%. The literacy rate of Ward 35 is 74.4% whereas LMC has a rate of 81.9% hence the literacy rate is lower than the standard Lucknow literacy rate

H. Sex Ratio

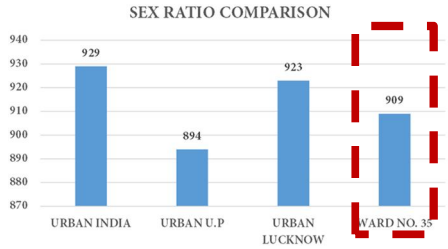

Figure 8: Comparative study of the sex ratio of Ward 35 concerning Lucknow Municipal Corporation.
Source: Census 2001 and 2011

The sex ratio is defined as the number of females per 1000 males(*LUCKNOW CENSUS OF INDIA 2001 LUCKNOW*, n.d.). As per Census 2011, the sex ratio of LMC is 928 females per 1000 males which is higher than the district (917) and state (908) but lower than the national level which is 940. The sex ratio in the city has improved in the last decade from 893 females per 1000 males in 2001 to 928 females per 1000 males in 2011(*January 2015*, 2015).therefore it is seen that there is increase in female population by 909 females per 1000 male.

I. Economic Profile

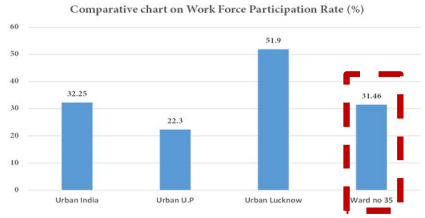

Figure 9a: Comparative study of the economic profile of LMC and Ward 35.
Source: Census 2001 and 2011

MAIN AND MARGINAL WORKERS IN WARD NO 35			
YEAR	WORKERS	MAIN WORKERS	MARGINAL WORKERS
2001	Male	3112	289
	Female	352	41
2011	Male	6963	1037
	Female	1397	596

Source:census2001,2011

Figure 9b : Marginal and Main Workers of WARD 35
Source: 2001,2011

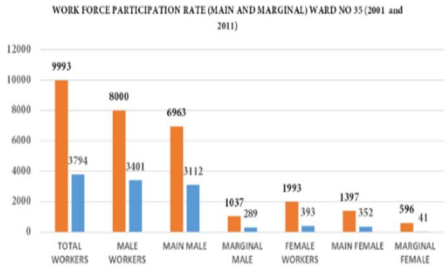

Figure 9c: Comparative study of the economic profile of LMC and Ward 35.
Source: Census 2001,2011

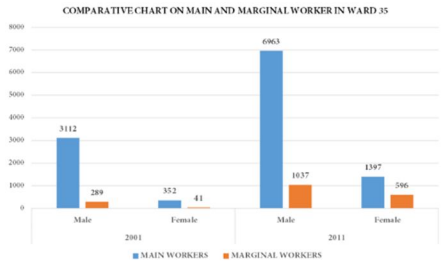

Figure 9d : WorkForce participation rate of WARD 35

Source: Census 2001,2011

Lucknow has always been the centre of administration, trade and culture, hence being the epitome of industrial development. Lucknow is known for household and small industries however lacks in attracting large and medium-scale industries. There are nearly six major industrial industries in Lucknow city based on agro base, cotton textile, jute base, leather etc(*January 2015*, 2015).

List of the units in Lucknow & nearby Area:

1) Hindustan Aeronautics Limited, Faizabad Road, Lucknow.
2) Scooter India Ltd. (Govt. of India Undertaking), Sarojini Nagar Industrial Estate, Lucknow.
3) Tata Motors Ltd., Deva Road, Chinhat, Lucknow.

List of the units in Lucknow and near By Area:

1) UP Asbestos Ltd., Mohanlalganj, Lucknow.
2) Varuna Spinning Mills (P) Ltd., Kanpur Road, Lucknow.
3) Eveready Industries (India) Ltd., Talkatora Road, Lucknow.
4) Shyam Vanaspati Ltd., Industrial Area, Amausi, Lucknow.
5) Organics India (P) Ltd., Kamta, Faizabad Road, Chinhat, Lucknow.
6) Omax Auto Ltd., Tata Vendor Park, Chinhat, Lucknow.
7) Amar Ujala Publication Ltd., B-5 Industrial Area, Amausi, Lucknow.
8) Samradhi Cement Ltd., Raibereilly Road, Lucknow
9) Tata Marcopolo Motor Ltd., Chinhat Industrial Area, Lucknow.
10) PTC Industries, Alambagh, Lucknow.

((Micro, 2016)

Ward 35 and nearby areas have dominant small-scale businesses like pottery, cooler making, utensil manufacture, folding bed, bedding materials etc. The major economic indulgence is in agriculture.

III. CONCLUSION

Demographic dynamics plays a vital role in the development of a city. It is very important to understand the population of a city for the developmental purpose of infrastructure. As a matter of fact infrastructure planning gets disrupted without the proper understanding of the demographic profile of a city. Lucknow being the capital of Uttar Pradesh has its unique culture and historic background. From the above study the overall inference that is gained from the study analysis of Ward 35, Chinhat of Lucknow is that the ratio of male: to female in LMC is 5:2.The ratio of males: to female in Ward 35 is 5:1.In Ward 35 female workers are less than LMC .The ratio of male: female marginal workers in ward 35 is. From 2001 to 2011 it is seen that there is a rise in 1600 and the main worker is 1045. Hence it is observed that there is a rise in female employment .Inference: In ward 35 the number of marginal workers has increased from 2001 to 2011. It is seen that there is a rise by 1600 female marginal workers and female main workers is 1045. Hence it is observed that there is a rise in female employment.

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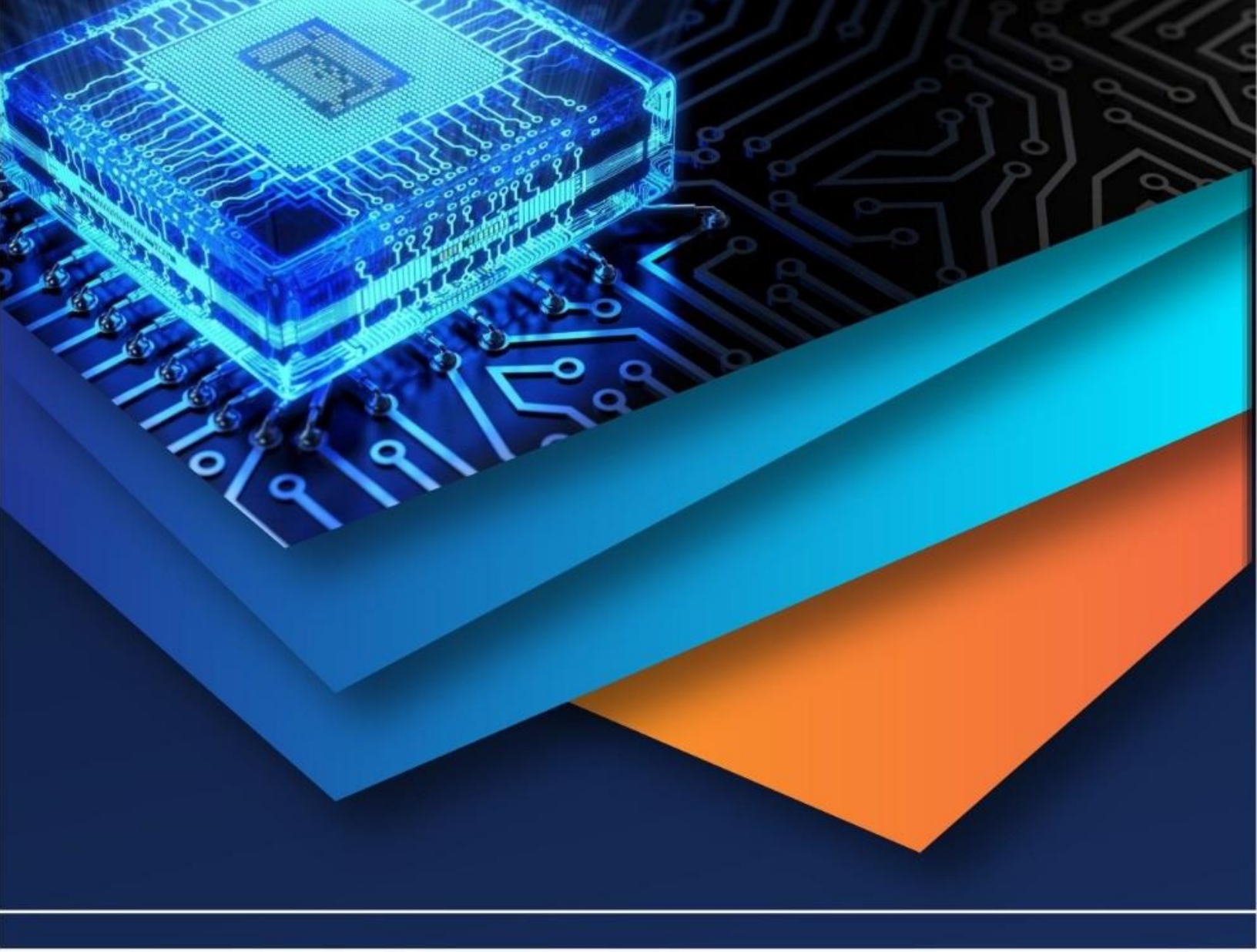

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