



Government of the people's Republic of Bangladesh

Ministry of Housing and Public Works

Urban Development Directorate

82 Segunbagicha, Dhaka-1000

PREPARATION OF DEVELOPMENT PLAN FOR MEHERPUR ZILLA

REPORT ON ASSIGNMENT-4

Analysis on Demography (Population Projection) of Gangni Upazila

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Introduction

Population projection is the process of estimating the future population of a region or country based on current demographic trends, such as birth rates, death rates, migration patterns, and other factors. It helps policymakers, planners, and researchers anticipate future needs for resources, infrastructure, healthcare, and economic planning. I am applying the Cohort-Component Method for population projection of Gangni Upazila because this method allows for the calculation of birth rate, death rate, and net migration, which helps in making a more accurate projection. Below is a description of this method.

Cohort component method

The cohort-component method is a commonly used and straightforward approach for population projection. It leverages available data and theoretical insights into population dynamics, considering both causal factors and compositional elements as its core components. This method enables the creation of consistent and comparable projections at both national and sub-national levels, which can be easily updated. It involves a thorough analysis and the development of assumptions for each component of change. Given these advantages, this study adopts the cohort-component method. The summary equation for the population at time (t+n) is defined as follows:

$$P_{t+n} = S[t, t+n] + B[t, t+n] + NM[t, t+n],$$

where $S[t, t+n]$ is the survived population at time t+n, $B[t, t+n]$ is the number of births observed in the period [t, t+n] and $NM[t, t+n]$ is the net migration observed in the period [t, t+n]. To project the total population size, and the number of males and females by 5-year age groups, this study found the number of people who survive or are expected to be alive in the future. Then the survived population number, the number of births that took place and the number of net migrants is added.

Inputs and Outputs of the Cohort Component Method

To apply cohort component method, we need base year population by age, assumptions on birth; assumptions on mortality: survival ratios by age; net migration rates. We expect to get a number of outputs from a population projection using cohort component method: age structure of the population; population aggregates: population size, population in selected broad age groups, mid-interval population size, number of person years lived, population growth, births, deaths, net change due to migration, indicators of the population structure: proportions by broad age groups, dependency ratios, median age of the population, proportion of women in childbearing ages, sex ratio of the population; indicators of the population distribution (national; if urban and rural populations are being projected): proportion urban, proportion rural; rates of population change: crude birth rate, crude death rate, rate of natural increase, crude net migration rates, rate of population growth etc.

To apply the cohort-component method, we need base year population data by age also by sex, along with assumptions regarding birth rates, mortality (expressed as survival ratios by age), and net migration rates. This method allows us to produce a range of outputs, including the age structure of the population and various population aggregates, such as total population size, population in broad age groups, mid-interval population size, and the number of person-years lived. We also obtain indicators of population structure, like dependency ratios, median age,

the proportion of women of childbearing age, and the sex ratio. Additionally, the method provides insights into population distribution, such as the proportion of urban versus rural, crude birth rate, crude death rate, rate of natural increase, crude net migration rate, and overall population growth rate.

Steps of the Cohort Component Method

The cohort component method consists of a number of steps, which are described below:

Step 1- Collecting Information: The cohort component method requires information from both the most recent and the prior census. Information on the number of death rate is also required. Ideally the total death is calculated from the information on death rate of the particular place or from the documented death certificates. But the local level data is unavailable, so that the divisional death rate has been used for the calculation. These rates are used to project the total number of deaths that occur during the particular year. A life table or calculated survival population are also needed to calculate the mortality rates in the projected years. For this the existing population has been calculated by subtracting death from the present population then multiply it to the survival rate.

Existing Population = $\text{Population}_{t+n} - \text{Death}$

Survived Population = Existing Population X Survival rate

For the calculation of the Survived Population of Meherpur, the assumed survival rate is 1.

Step 2- Calculation of Birth: Information on the number of birth rate is also required. Ideally the total birth is calculated from the information on birth rate of the particular place. But the local level data is unavailable, so that the divisional birth rate has been used for the calculation. These rates are used to project the number of births that occur during the projection period.

Step 3- Calculation of Net Migrants: For the calculation of net migrants the following calculation has been used

Net Migrants = $(\text{Population}_{+n} - \text{Population}) - (\text{Births} - \text{Deaths})$

Step 4- Calculation of Projected Population: By adding the above calculations the projected population is calculated for each particular year for an area.

Projected Population = Survived Population + Birth + Net Migrants

Population Projection of Gangni Upazila in Cohort Method Based on Population 2011:

Upazila/Union	Population 2011	Population 2001	Survived Population	Number of Birth	Number of Death	Net Migration
Gangni Upazila	299607	250524	272515	5318	1590	19855
Bamandi	26776	22414	26620	520	155	3997
Dhankhola	41332	38070	41091	802	240	2700
Kathuli	22379	21447	22249	434	130	628
Kazipur	39811	38692	39579	772	231	578
Matmura	44609	38301	44350	865	259	5702
Raypur	20665	19988	20546	401	120	396
Shaharbati	23139	20492	23005	449	134	2332
Shola Taka	24533	21519	24391	476	142	2680
Tentulbaria	30863	29601	30684	599	179	842

Projected Population:

Upazila/Union	Year						
	2016	2021	2026	2031	2036	2041	2046
Gangni Upazilla	329031	360195	391359	422523	453687	484851	516015
Bamandi	31137	35654	40171	44688	49205	53722	58239
Dhankhola	44593	48095	51597	55099	58601	62103	65605
Kathuli	23311	24373	25435	26497	27559	28621	29683
Kazipur	40929	42279	43629	44979	46329	47679	49029
Matmura	50917	57484	64051	70618	77185	83752	90319
Raypur	21343	22140	22937	23734	24531	25328	26125
Shaharbati	25786	28567	31348	34129	36910	39691	42472
Shola Taka	27547	30703	33859	37015	40171	43327	46483
Tentulbaria	32125	33566	35007	36448	37889	39330	40771

Population Projection of Gangni Paurashava in Cohort Method Based on Population 2011:

Paurashava/Ward	Population 2011	Population 2001	Survived Population	Number of Birth	Number of Death	Net Migration
Gangni Paurashava	25500	19657	25352	495	148	5496
Ward No = 01	2769	2029	2753	54	16	702
Ward No = 02	3102	2385	3084	60	18	675
Ward No = 03	3603	2622	3581	70	21	932
Ward No = 04	3096	2326	3078	60	18	728
Ward No = 05	2618	2326	2603	50	15	257
Ward No = 06	2301	1919	2288	45	13	350
Ward No = 07	3158	3030	3138	61	18	85
Ward No = 08	2526	2224	2512	49	15	268
Ward No = 09	2327	2121	2314	45	14	175

Projected Population:

Paurashava/Ward	Year						
	2016	2021	2026	2031	2036	2041	2046
Gangni Paurashava	31343	37334	43325	49316	55307	61298	67289
Ward No = 01	3509	4265	5021	5777	6533	7289	8045
Ward No = 02	3819	4554	5289	6024	6759	7494	8229
Ward No = 03	4583	5585	6587	7589	8591	9593	10595
Ward No = 04	3866	4654	5442	6230	7018	7806	8594
Ward No = 05	2910	3217	3524	3831	4138	4445	4752
Ward No = 06	2683	3078	3473	3868	4263	4658	5053
Ward No = 07	3284	3430	3576	3722	3868	4014	4160
Ward No = 08	2829	3146	3463	3780	4097	4414	4731
Ward No = 09	2534	2754	2974	3194	3414	3634	3854

Population Density (per Acre) Projection:

Gangni Upazila

Upazila/Union	Year							
	2011	2016	2021	2026	2031	2036	2041	2046
Gangni Upazila	4	4	4	5	5	5	6	6
Bamandi	4	5	5	6	6	7	8	8
Dhankhola	3	3	3	3	4	4	4	4
Kathuli	3	3	3	3	3	3	3	4
Kazipur	5	5	5	5	5	5	5	6
Matmura	4	4	5	5	6	7	7	8
Raypur	3	3	3	3	3	3	4	4
Shaharbat	3	4	4	4	5	5	6	6
Shola Taka	3	4	4	5	5	6	6	6
Tentulbaria	4	4	4	4	4	4	5	5

Gangni Paurashava

Paurashava/Ward	Year							
	2011	2016	2021	2026	2031	2036	2041	2046
Gangni Paurashava	6	7	9	10	12	13	15	16
Ward No = 01	6	8	9	11	13	14	16	18
Ward No = 02	7	9	10	12	14	16	17	19
Ward No = 03	6	8	10	12	14	15	17	19
Ward No = 04	30	37	45	52	60	68	75	83
Ward No = 05	3	3	3	4	4	4	5	5
Ward No = 06	5	6	7	7	8	9	10	11
Ward No = 07	5	6	6	6	6	7	7	7
Ward No = 08	14	16	18	20	22	24	25	27
Ward No = 09	5	5	6	6	7	7	8	8

Analysis:

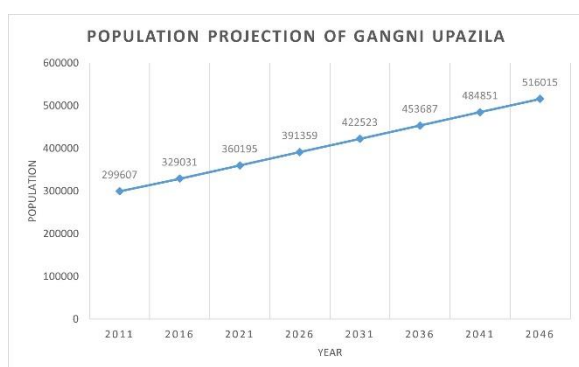


Figure: Population Projection

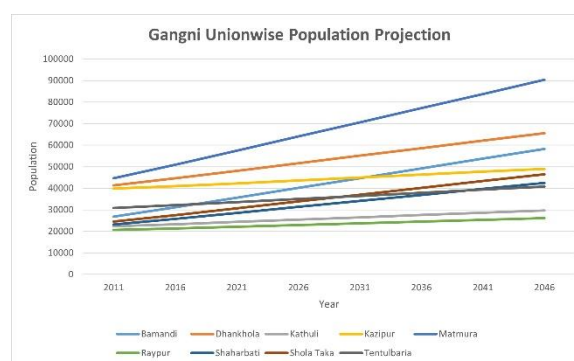


Figure: Population Projection Union-wise

We have conducted the population projection based on the 2011 BBS data and projected it up to 2046. Along with the population projection, we have also calculated population density per acre.

Through population projection, we can observe that the population growth in Gangni Upazila is significant until 2046. In particular, the population increase in Matmura, Dhankhola, and Bamundi Unions is exceptionally high between 2011 and 2046. In contrast, the growth rate in Kathuli and Raipur Unions is very low.

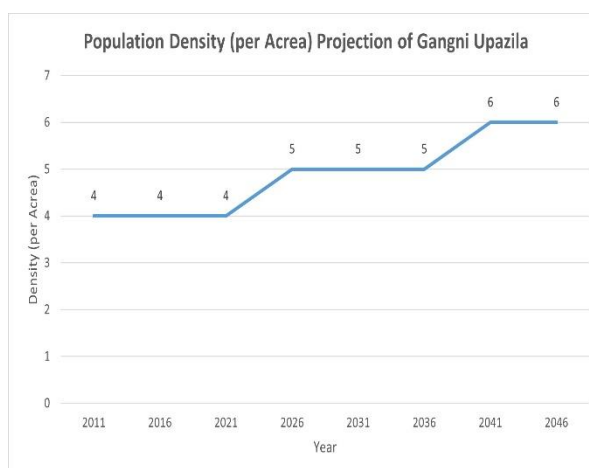


Figure: Upazila Population Density Projection

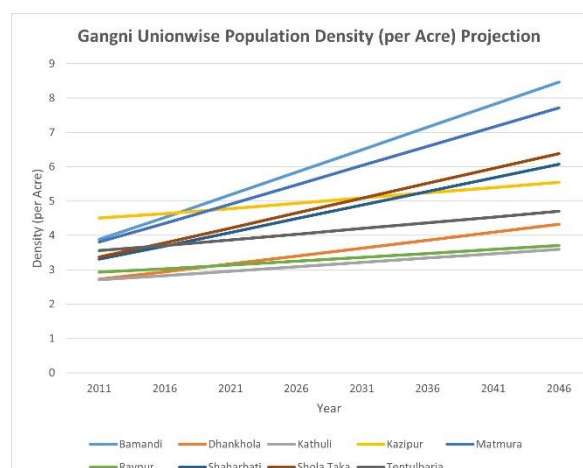


Figure: Union-wise Population Density Projection

Additionally, we calculate population density using this projection. The density is measured per acre. It is observed that the population density (per acre) in Gangni Upazila was 4 people from 2011 to 2021. This density increases to 5 people in 2026 and remains the same until 2036. Later, it rises to 6 people, extending until 2046.

On the other hand, when calculating population density projections on a union-wise basis, it is evident that the density increase is significantly high in Bamundi, Matmura, Sholataka, and Saharbari Unions.

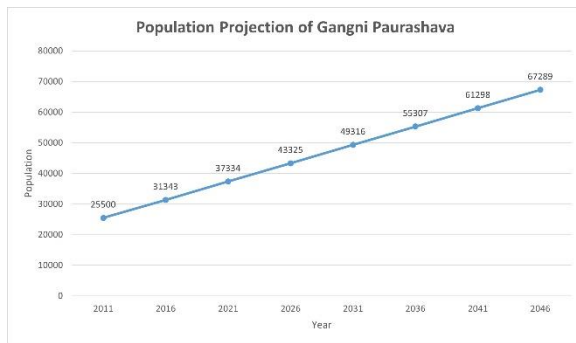


Figure: Population Projection

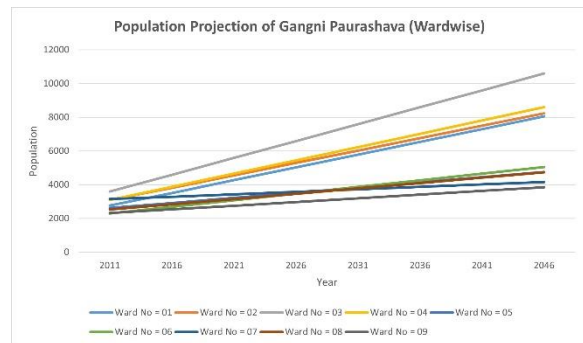


Figure: Population Projection Ward-wise

In Gangni Municipality, population projection based on BBS 2011 data shows that the population was 25,500 in 2011, whereas the projection for 2046 indicates 67,289 people. This means that in 35 years, the population has more than doubled.

On the other hand, when analyzing the population projection by ward, it is observed that Ward No. 3 has experienced significant population growth. According to the BBS 2011 data, the population of this ward was 3,603, and the projection for 2046 shows 10,595, which is almost three times the 2011 figure. Similarly, Wards No. 1, 2, and 4 have also shown a high rate of population growth.

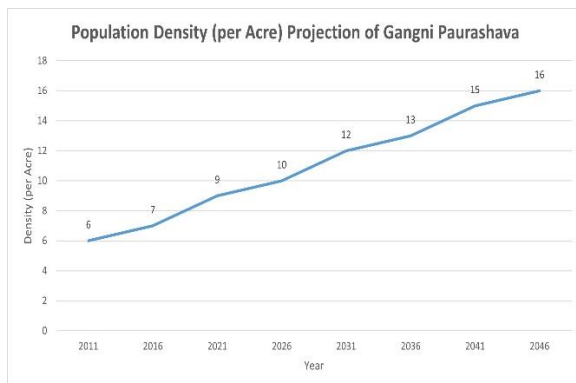


Figure: Paurashava Population Density Projection

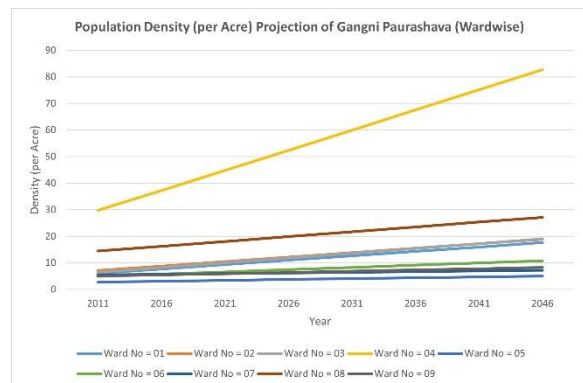


Figure: Ward-wise Population Density Projection

We conducted the population projection from 2016 to 2046. Using the respective area of the population, we calculated the density per acre.

For Gangni Municipality, based on BBS 2011 data, the population density was 6 people per acre. However, according to the 2046 population projection, the density increases to 16 people per acre, meaning it has more than doubled in 35 years.

Analyzing ward-wise density, we found that Ward No. 4 has the highest density. Specifically, according to BBS 2011 data, the density was 30 people per acre, and after population projection for 2046, it rises to 83 people per acre, which is nearly 2.5 times higher.

Additionally, Ward No. 8 also shows a significant increase in population density per acre. On the other hand, Ward No. 5 has a very low-density growth rate.

Population Projection (2011 - 2046) with Density (per Acre) of Gangni Paurashava

