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Demographic Dividend and Emerging Ageing in Rural Bankura: A Long-Term Analysis of Age Structure Dynamics and Sustainability Implications

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Abstract

The age structure of a population significantly influences socio-economic development and sustainability. This study examines changes in the age-sex structure of rural Bankura District, West Bengal, from 1961 to 2011, using data from District Census Handbooks. The analysis covers age-sex pyramids, broad age groups (0-14, 15-59, and 60+ years), and dependency ratios to assess demographic transition and implications for sustainable rural development. Results show a decline in the young population (0-14 years) from 41.18% in 1961 to 27.41% in 2011, reflecting fertility reduction. The working-age group (15-59 years) rose from 53.21% to 63.37%, while the elderly (60+) nearly doubled from 5.57% to 9.18%, due to better healthcare and longevity. The dependency ratio fell sharply from 87.86% to 57.74%, indicating a favourable shift toward a productive age structure. Rural Bankura is in a demographic window of opportunity with an expanding working-age population, which can boost economic growth if supported by jobs and skills. However, the rising elderly share poses challenges for healthcare and social support in resource-limited rural settings. Effective policies to harness the demographic dividend while preparing for ageing are vital for sustainable development.

Keywords: Demographic Transition; Age-Sex Structure; Dependency Ratio; Demographic Dividend; Rural Sustainability; Ageing Population.

1. Introduction

Age structure refers to the distribution of people across different age groups in a population. It affects labour supply, savings, education needs, healthcare demands, and overall economic and social sustainability. In demographic transition theory, populations move from high birth and death rates with a youthful structure to low rates with more balanced or ageing profiles. This shift often creates a "demographic dividend" when the working-age population grows faster than dependents, leading to higher productivity and growth if policies support employment and education.

In India, demographic changes vary across regions. Nationally, the working-age population (15-59 years) has increased, offering a dividend opportunity, but challenges like unemployment

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and regional differences persist. West Bengal, with a largely rural population, has shown steady fertility decline and improved longevity. The state's age structure has shifted toward more working-age people, similar to other eastern and southern states, though slower than southern ones. Rural areas in West Bengal face unique issues like agrarian dependence, limited industry, and migration, which influence age patterns.

Bankura District in western West Bengal is predominantly rural (over 90% rural population) and agrarian, with ecological challenges like drought and lateritic soil limiting productivity. Historically, it had high fertility and moderate mortality, leading to a youthful structure. Over 1961-2011, improvements in health, education, and family planning led to fertility decline and better survival rates. This created a more favourable age structure with lower dependency.

The district's changes mirror broader Indian rural trends but highlight local sustainability needs. With limited non-farm jobs and out-migration of working-age males, harnessing the productive population is key. Rising elderly numbers add pressure on family-based support in rural settings. This study analyses these shifts to inform sustainable rural development strategies in similar regions.

2. Literature Review

Demographic transition theory explains shifts from high to low fertility and mortality, reshaping age structures from broad-based pyramids to more rectangular forms. This creates periods of demographic dividend when working-age groups expand, boosting growth through higher savings and productivity. However, the dividend requires supportive policies like education and jobs; otherwise, it risks unemployment In India, studies show regional variations. Southern states advanced faster in transition, while northern and eastern areas lag but show progress. West Bengal exhibits balanced transition with declining fertility since mid-20th century, leading to favourable dependency ratios. Rural India faces slower changes due to agrarian economies and limited services.

Ageing increases old-age dependency, demanding healthcare and pensions. In rural contexts, family support weakens with migration, heightening vulnerability. Literature on Bankura is limited, but census-based analyses confirm fertility decline and working-age growth in similar districts.

This study fills a gap by linking longitudinal rural Bankura data to sustainability, focusing on economic productivity, labour, and ageing challenges.

3. Study Area

The study focuses on Bankura District, located in the south-western part of West Bengal, India. This district is characterised by a predominantly rural population, diverse socio-economic groups, and significant reliance on agriculture and allied activities. Bankura is bordered by the districts of Purulia to the west, Paschim Bardhaman to the north, Paschim Medinipur to the south, and Hooghly to the east. Spanning latitudes 22°38′N to 23°38′N and longitudes 86°36′E to 87°46′E, the district covers an area of 6882 square kilometres and comprises 22 administrative blocks, making it a key area for studying rural labour dynamics in West Bengal.

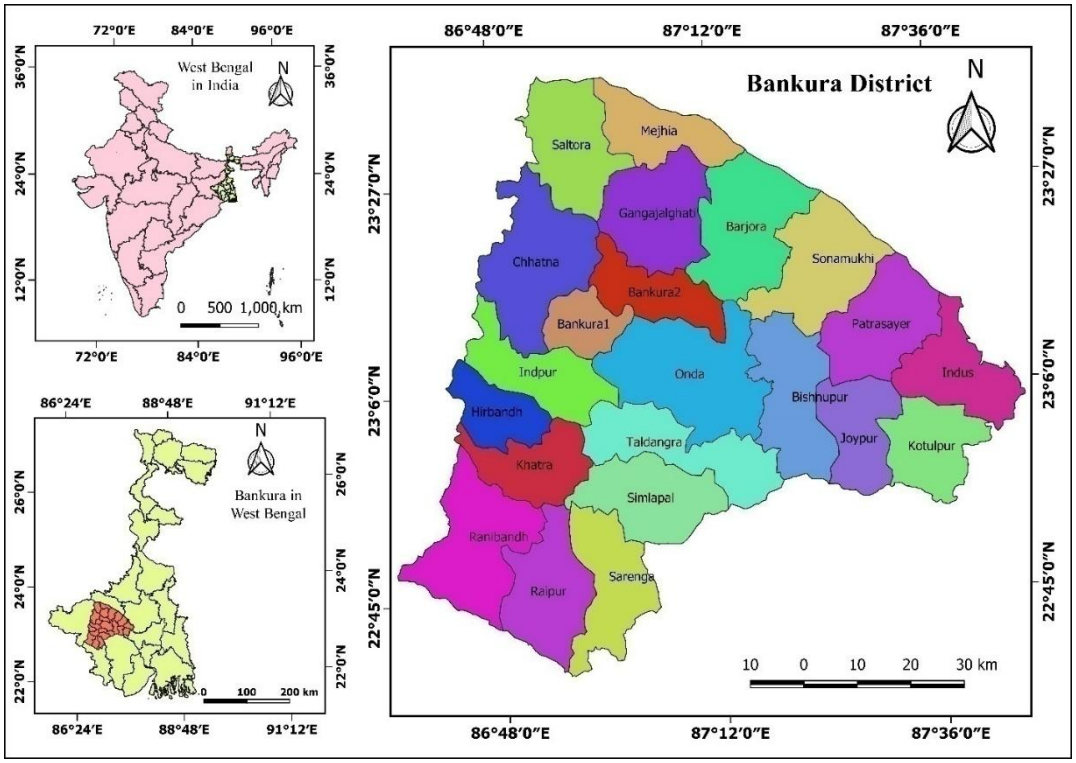

Fig. 1: Location of the Study Area

4. Objectives:

The objectives of the paper:

1. To analyse long-term changes (1961–2011) in the age-sex structure, broad age groups, and dependency ratio of rural Bankura's population.
2. To identify the presence and phase of the demographic dividend resulting from the expanding working-age population (15–59 years) during the demographic transition.
3. To assess the sustainability implications, economic opportunities from the dividend vs. emerging challenges from population ageing for rural development, healthcare, and social support in Bankura.

5. Methodology and Data Source

This study uses a descriptive demographic approach with secondary data from District Census Handbooks for Bankura (1961, 1971, 1981, 1991, 2001, 2011), focusing on rural areas for consistency.

Age-sex structure is analysed through percentage distributions across five-year groups and pyramids (conceptual, based on data trends). Broad age groups are: young (0-14 years), working-age (15-59 years), and elderly (60+ years). Proportions are calculated as percentages of total rural population.

Dependency ratio is computed as:

Dependency Ratio = (Population 0-14 + Population 60+) / Population 15-59 × 100

All computations rely on the high comparability and reliability of Indian census age data over five decades. Trends are interpreted through the lens of demographic transition theory and linked directly to sustainability dimensions: labour-supply enhancement, reduced child-welfare pressure, and emerging old-age support needs.

Limitations include reliance on census data without primary verification and assumption of potential productivity in working-age groups.

6. Result and Discussion

The rural population of Bankura District grew steadily from 1,542,356 in 1961 to 3,296,901 in 2011, more than doubling over five decades. This growth occurred alongside important changes in age and sex structure, broad age group shares, and dependency patterns. These shifts clearly show that rural Bankura moved through the middle phase of demographic transition from a youthful, high-dependency structure to a more balanced and economically favourable one.

6.1 Changes in Age-Sex Structure (1961–2011)

Age-sex pyramids changed noticeably across the decades. In 1961 and 1971, the pyramids had a very wide base (high proportion of children) and a narrow top (few elderly people), typical of high-fertility and moderate-mortality settings. From 1981 onward, the base started narrowing while the middle (working ages) widened. By 2011, the structure became closer to a bell shape, with a much smaller child proportion, a thick working-age band, and a slightly thicker elderly segment. Fig: 2

The detailed percentage distribution by five-year age groups is summarised in the original tables (Tables 1–6 in appendices). Significant observation includes:

- The 0–4 years group declined from 15.31% (1961) - 15.46% (1971) - 13.28% (1981) - 11.42% (1991) - 9.77% (2001) - 8.20% (2011).
- Young children (0–9 years combined) fell from over 31% in the early decades to about 17.3% in 2011.
- Working-age groups (especially 15–39 years) gained share consistently after 1971.
- Elderly groups (60+) increased gradually in both absolute numbers and percentage.

This pattern reflects declining fertility (fewer births), improved child survival, and rising life expectancy is a classic sign of demographic transition in rural eastern India.

Table 1: Distribution of rural population according to age and sex in Bankura District. Year 1961.

Age Group	Male	% To total males	Female	% To tatal females	Total	% To total population
0-4	117583	15.15	118529	15.47	236112	15.31

5-9	122231	15.75	121582	15.87	243813	15.81
10-14	84915	10.94	70276	9.17	155191	10.06
15-19	65066	8.38	68508	8.94	133574	8.66
20-24	62544	8.06	70556	9.21	133100	8.63
25-29	63410	8.17	63604	8.30	127014	8.23
30-34	56034	7.22	52037	6.79	108071	7.01
35-39	44014	5.67	38981	5.09	82995	5.38
40-44	39739	5.12	37804	4.93	77543	5.03
45-49	32806	4.23	29250	3.82	62056	4.00
50-54	28897	3.72	29133	3.80	58030	3.76
55-59	19497	2.51	19255	2.51	38752	2.51
60-64	18576	2.39	21451	2.80	40027	2.59
65-69	9391	1.21	9975	1.30	19366	1.26
70+	11465	1.48	15055	1.97	26520	1.72
Not stated	122	0.02	70	0.009	192	0.01
All Ages	776290		766066		1542356	

Source: District Census Hand Book 1961, Bankura W.B.

Table 2: Distribution of rural population according to age and sex in Bankura District. Year 1971

Age Group	Male	% To total males	Female	% To tatal females	Total	% To total population
0-4	143678	15	146843	15.94	290521	15.46
5-9	153258	16	150593	16.35	303851	16.17
10-14	110756	11.56	116532	12.65	227288	12.09
15-19	95688	9.99	77125	8.37	172813	9.2
20-24	65631	6.85	67057	7.28	132688	7.06
25-29	67194	7.01	68666	7.46	135860	7.23

30-34	68606	7.16	60147	6.53	128753	6.85
35-39	49690	5.19	45387	4.93	95077	5.06
40-44	48755	5.09	40715	4.42	89470	4.76
45-49	46846	4.89	32486	3.53	79332	4.22
50-54	29103	3.04	30527	3.31	59630	3.17
55-59	27854	2.91	25367	2.75	53221	2.83
60-64	21713	2.27	24542	2.66	46255	2.46
65-69	13801	1.44	16711	1.81	30512	1.62
70+	15593	1.63	18171	1.97	33764	1.8
Not stated	90	0.009	179	0.02	269	0.01
All Ages	958256		921048		1879304	

Source: District Census Hand Book 1971, Bankura W.B.

Table 3: Distribution of rural population according to age and sex in Bankura District. Year 1981

Age Group	Male	% To total males	Female	% To total females	Total	% To total population
0-4	147958	13.26	143295	13.29	291253	13.28
5-9	160089	14.35	154167	14.3	314256	14.33
10-14	135598	12.15	133435	12.38	269033	12.26
15-19	101644	9.11	89395	8.29	191039	8.71
20-24	94978	8.51	93258	8.65	188236	8.58
25-29	91759	8.23	90813	8.42	182572	8.32
30-34	77545	6.95	71354	6.62	148899	6.79
35-39	64484	5.78	58089	5.39	122573	5.59
40-44	54824	4.91	50947	4.73	105771	4.82
45-49	48789	4.37	47790	4.43	96579	4.4
50-54	40715	3.65	40158	3.73	80873	3.69

55-59	31589	2.83	31402	2.91	62991	2.87
60-64	26895	2.41	29778	2.76	56673	2.58
65-69	17123	1.53	19218	1.78	36341	1.66
70+	20896	1.87	24697	2.29	45593	2.08
Not stated	691	0.06	195	0.02	886	0.04
All Ages	1115577		1077991		2193568	

Source: District Census Hand Book 1981, Bankura W.B.

Table 4: Distribution of rural population according to age and sex in Bankura District. Year 1991

Age Group	Male	% To total males	Female	% To tatal females	Total	% To total population
0-4	149060	11.31	144630	11.52	293690	11.42
5-9	176629	13.41	169148	13.48	345777	13.44
10-14	155110	11.77	147140	11.72	302250	11.75
15-19	128190	9.73	109430	8.72	237620	9.24
20-24	119077	9.04	117993	9.4	237070	9.22
25-29	117260	8.9	112401	8.96	229661	8.93
30-34	100801	7.65	90213	7.19	191014	7.42
35-39	86283	6.55	72820	5.8	159103	6.18
40-44	63240	4.8	59660	4.75	122960	4.78
45-49	56956	4.32	56616	4.51	113572	4.41
50-54	47450	3.6	47570	3.79	95020	3.69
55-59	37100	2.82	36880	2.94	73980	2.88
60-64	30090	2.28	35700	2.84	65790	2.56
65-69	19190	1.46	21740	1.73	40930	1.59
70+	25190	1.92	28570	2.28	53760	2.09
Not stated	5890	45	4560	0.36	10450	0.41

All Ages	1317516		1255071		2572587	

Source: District Census Hand Book 1991, Bankura W.B.

Table 5: Distribution of rural population according to age and sex in Bankura District. Year 2001

Age Group	Male	% To total males	Female	% To tatal females	Total	% To total population
0-4	147665	9.74	141290	9.8	288955	9.77
5-9	183006	12.08	174543	12.1	357549	12.1
10-14	176776	11.66	162418	11.26	339194	11.47
15-19	150958	9.96	122363	8.49	273321	9.24
20-24	129722	8.56	126222	8.75	255944	8.65
25-29	131902	8.7	132584	9.19	264486	8.94
30-34	119788	7.9	114038	7.91	233826	7.91
35-39	115078	7.59	103911	7.21	218989	7.4
40-44	88329	5.83	76561	5.31	164890	5.57
45-49	76939	5.08	69562	4.82	146501	4.95
50-54	53881	3.56	52857	3.67	106738	3.61
55-59	44945	2.97	47334	3.28	92279	3.12
60-64	34673	2.29	42179	2.93	76852	2.6
65-69	25216	1.66	33210	2.3	58426	1.98
70+	35154	2.32	41795	2.9	76949	2.6
Not stated	1418	0.09	1130	0.08	2548	0.09
All Ages	1515450		1441997		2957447	

Source: District Census Hand Book 2001, Bankura W.B

Table 6: Distribution of rural population according to age and sex in Bankura District. Year 2011

	Male		Female		Total	

Age Group		% To total males		% To total females		% To total population
0-4	138724	8.23	131536	8.16	270260	8.2
5-9	153326	9.1	147552	9.16	300878	9.13
10-14	170257	10.1	162210	10.07	332467	10.08
15-19	171008	10.14	143152	8.89	314160	9.53
20-24	152712	9.06	145736	9.05	298448	9.05
25-29	142501	8.45	138426	8.59	280927	8.52
30-34	126076	7.48	125117	7.77	251193	7.62
35-39	130217	7.72	126908	7.88	257125	7.8
40-44	114887	6.82	104139	6.46	219026	6.64
45-49	102473	6.08	92199	5.72	194672	5.9
50-54	80601	4.78	70627	4.38	151228	4.59
55-59	63159	3.75	59335	3.68	122494	3.72
60-64	51007	3.03	56027	3.48	107034	3.25
65-69	37502	2.22	44538	2.76	82040	2.49
70+	50527	3	62988	3.91	113515	3.44
Not stated	800	0.05	634	0.04	1434	0.04
All Ages	1685777		1611124		3296901	

Source: District Census Hand Book 2011, Bankura W.B.

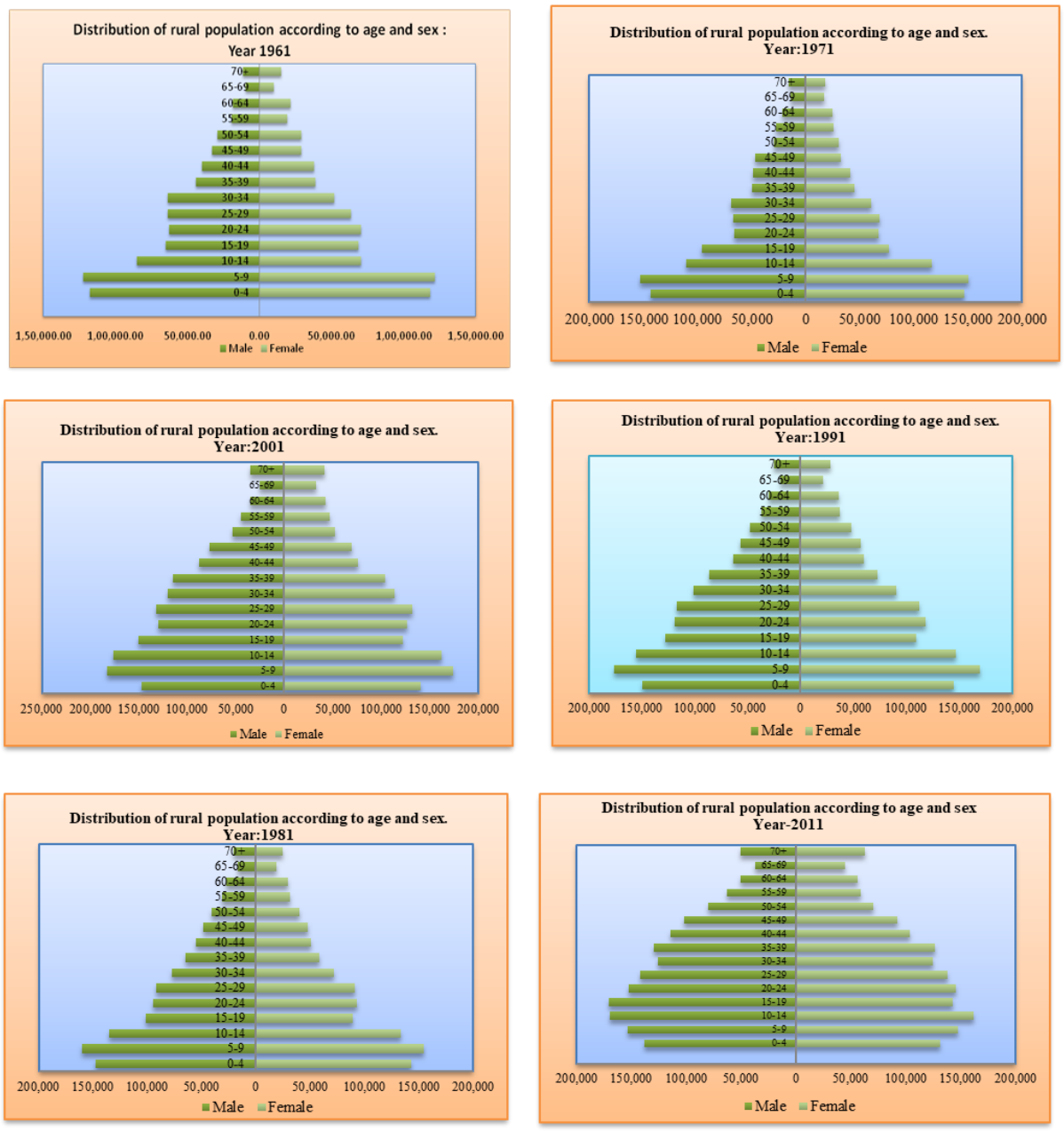

Fig. 2: Age-Sex Pyramid of Rural Population in Bankura District – 1961 to 2011

6.2 Broad Age Group Proportions and Structural Transformation

The distribution of the rural population across broad age groups in Bankura District illustrates a textbook progression through the intermediate phase of demographic transition (Table 7). From 1961 to 2011 the young population (0 to 14 years) displayed an inverted U shaped pattern: it increased modestly to 43.72 percent in 1971, reflecting a temporary intensification of child dependency, and then declined steadily and substantially to 27.41 percent by 2011. This net reduction of 16.31 percentage points from the 1971 peak provides clear evidence of an entrenched fertility transition in rural Bankura.

The sustained contraction of the child age segment after the 1970s corresponds closely with national intensification of family planning campaigns, wider female school enrolment, and

progressive gains in child survival. The average annual decline of roughly 1.1 to 1.2 percentage points after 1981 places Bankura's trajectory within the mainstream experience of eastern Indian rural districts, although the pace remained slower than that recorded in southern and western states during the same interval.

In contrast, the working age population (15 to 59 years) expanded secularly from 53.21 percent in 1961 to 63.37 percent in 2011, registering an overall gain of 10.16 percentage points. The most rapid increase occurred between 1981 and 2011. This pronounced bulge in the economically active cohort constitutes the structural foundation of the demographic dividend phase, during which the working age group grows faster than dependent groups and thereby enlarges the potential for per capita resource accumulation and economic output.

The elderly population (60 years and above), although still modest in size, almost doubled from 5.57 percent to 9.18 percent over the five decades. This consistent upward movement, driven mainly by improvements in adult and old age survival rather than any fertility rebound, marks the early onset of population ageing in rural Bankura. While the 2011 share remains well below levels observed in urban India or southern states, the trend already foreshadows rising pressure on rural health infrastructure and traditional family support systems, particularly in a context of persistent male out-migration.

Table 7: Proportion of Rural Population by Broad Age Groups in Bankura District (1961–2011)

Year	Young (0–14 years) (%)	Working-age (15–59 years) (%)	Elderly (60+ years) (%)
1961	41.18	53.21	5.57
1971	43.72	50.38	5.88
1981	39.75	54.15	6.10
1991	36.61	56.75	6.24
2001	33.34	59.39	7.18
2011	27.41	63.37	9.18

Source: District Census Handbook (Census of India) -1961, 1971, 1981, 2001 and 2011

6.3 Dependency Ratio Dynamics and the Demographic Window

The total dependency ratio, defined as the number of individuals in dependent age groups per 100 persons of working age, offers the most direct quantitative measure of changing economic demographic balance (Table 8). After reaching a peak of 98.45 in 1971, the ratio declined steadily to 57.74 by 2011, a reduction of 40.71 percentage points over four decades.

Decomposition of the trend shows that the dominant driver was the sharp fall in child dependency, which more than offset the modest concurrent increase in old age dependency. The child dependency component dropped from roughly 82 in 1971 to about 43 in 2011,

whereas old age dependency rose only from approximately 12 to 14.5 over the same period. This marked asymmetry confirms that rural Bankura remained firmly within the demographic dividend phase as of 2011, characterised by a prolonged period of falling aggregate dependency and correspondingly enhanced potential for household savings, public investment, and rural economic transformation.

The 2011 value of 57.74 percent ranks among the more favourable ratios recorded in rural eastern India during the early twenty first century, indicating a structurally advantageous position for accelerating agricultural productivity and livelihood diversification, provided labour absorption and skill development mechanisms prove adequate.

Table 8: Dependency Ratio in Rural Bankura (1961–2011)

Year	Dependency Ratio (%)
1961	87.86
1971	98.45
1981	82.72
1991	75.51
2001	68.23
2011	57.74

Source: District Census Handbook (Census of India) -1961, 1971, 1981, 2001 and 2011

The ratio peaked in 1971 (almost 99 dependents per 100 workers) due to high child numbers. It then fell steadily, dropping by about 41 percentage points between 1971 and 2011. The 2011 value (57.74%) is among the most favourable levels observed in rural eastern India during this period. This large decline came mainly from falling child dependency, which more than offset the modest rise in old-age dependency. The result is a clear demographic advantage: fewer dependents per worker, higher potential for household savings, public investment, and economic growth.

6.4 Sustainability Implications

The age structural transformation observed in rural Bankura between 1961 and 2011 holds significant consequences for the three primary dimensions of sustainable development: economic viability, social cohesion, and long-term human and environmental resilience.

From the standpoint of *economic sustainability*, the rise of the working age population to 63.37 percent by 2011 creates a structurally favourable labour supply condition that is uncommon in long standing high fertility agrarian societies. According to demographic dividend theory, such an age configuration increases the potential for capital accumulation, household savings, and public investment once dependency burdens decrease. In the specific setting of Bankura, which

features rain fed cultivation, frequent drought exposure, and minimal industrial base, realisation of this dividend hinges on effective absorption of the enlarged labour force. Without targeted measures to enhance agricultural productivity through expanded irrigation, soil conservation, and crop diversification, and without accelerated growth of rural non-farm opportunities in agro processing, handicrafts, and tourism related services, the demographic advantage may result in open or hidden unemployment instead of sustained per capita income gains. The structural shift therefore represents a conditional opportunity whose economic payoff depends heavily on complementary policies in labour markets, infrastructure, and skill development.

Regarding social sustainability**,** the marked reduction in the young age cohort from 43.72 percent in 1971 to 27.41 percent in 2011 has considerably eased quantitative demand on primary schooling, maternal and child health services, and nutrition interventions. This demographic breathing space enables a strategic reorientation of public resources from quantitative expansion toward qualitative enhancement, including improved pupil-teacher ratios, stronger learning outcomes, wider access to secondary and vocational education, and greater inclusion of girls and Scheduled Tribe children who remain underrepresented in higher levels of schooling in the district. Such investments are critical for developing a robust human capital foundation that can support future economic diversification and intergenerational equity.

The most urgent long-term concern arises from the early phase of *population ageing*. Although the elderly proportion stood at only 9.18 percent in 2011, its near doubling across five decades, together with an accelerating growth rate in recent intercensal periods, indicates the beginning of a major demographic shift toward higher old age dependency. In rural Bankura, formal pension schemes cover only a small fraction of the elderly, geriatric healthcare facilities remain scarce, and traditional multigenerational households are increasingly disrupted by male labour migration to urban and industrial centres. Unless forward looking policies are implemented, including community based elder care models, meaningful expansion of old age pension benefits, geriatric training for rural health workers, and age friendly village level infrastructure, the growing old age dependency ratio will place disproportionate pressure on the shrinking cohorts of prime working age adults in the coming decades.

In conceptual terms, rural Bankura stood at the high point of a classical demographic window of opportunity around 2011, roughly spanning the period from 1981 to 2030, during which aggregate dependency reached its lowest level and the productive age bulge attained maximum width. This phase provides a structurally advantageous interval for advancing rural economic transformation and human capital formation. Yet the window is temporary by nature. The very mortality improvements that produced the dividend are now fuelling population ageing, which will gradually close the margin for policy error. Achieving balanced and inclusive rural sustainability therefore demands the concurrent execution of two overlapping strategies: vigorous exploitation of the current productive age advantage through employment intensive and skill-oriented interventions, and anticipatory investment in ageing responsive social protection, healthcare, and community support systems to cushion the fiscal and welfare strains expected to intensify after 2030 to 2040.

In summary, rural Bankura experienced a classic demographic window of opportunity between roughly 1981 and 2011, with peak dividend potential visible around 2011. This phase supports stronger economic sustainability in the short to medium term. However, the gradual ageing trend means that long-term planning for healthcare, pensions, and age-friendly communities is already necessary to maintain overall sustainable development.

7. Conclusion and Policy Recommendations

Rural Bankura District underwent a clear and progressive demographic transition between 1961 and 2011. The proportion of the young population (0–14 years) declined sharply from a peak of 43.72% in 1971 to 27.41% in 2011, reflecting sustained fertility reduction through family planning, female education, and improved child survival. Simultaneously, the working-age population (15–59 years) expanded significantly to 63.37% by 2011, while the elderly share (60+) nearly doubled to 9.18%. These shifts drove the dependency ratio down from a high of 98.45% in 1971 to a favourable 57.74% in 2011, creating a classic demographic window of opportunity.

This structural change offers substantial potential for economic strengthening in a predominantly agrarian and ecologically fragile district. A larger productive-age cohort can support higher agricultural productivity, livelihood diversification, and rural non-farm growth, provided employment and skill opportunities keep pace. At the same time, the gradual rise in the elderly population signals the early stage of ageing, which will increase demand for geriatric healthcare, social pensions, and community-based support in a region where formal welfare systems remain limited and out-migration weakens traditional family care.

Policy Recommendations

1. Accelerate rural job creation through irrigation expansion, agro-processing, skill-linked vocational training, and promotion of women's participation in the labour force.
2. Redirect resources saved from lower child dependency into quality secondary education, digital literacy, and entrepreneurship programs.
3. Build ageing preparedness now by strengthening rural primary health centres with geriatric services, expanding old-age pension coverage, and piloting community elder-care models.
4. Integrate demographic monitoring into district planning to maintain balanced fertility and minimise unsustainable out-migration.

Appropriate, integrated action during this favourable demographic phase can convert structural advantage into long-term economic resilience and inclusive rural sustainability for Bankura.

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