

# Levels and Trends of Human Mortality of South 24 Parganas, West Bengal, India

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**ABSTRACT:** Since the 2000s, the nature of mortality has gone through a dramatic change more or less all levels in developing world and the study area too has experienced such change to some extent. The present paper contributes about the emerging trends and patterns of mortality of South 24 Parganas district by block levels where the overall observation establishes about the fact of major decline of mortality compared to the state and the country's status. The specific analysis (2008-2017) elucidates that the district's average crude death rate is 2.03 which is three times lower than West Bengal (6.12) and three and half times lower than in India (6.99). The rural agrarian southern part of the study area displays the consistent higher death rate due to lack of sufficient health care system as well as proper awareness. The district also experiences comparatively lower level of Infant mortality compared to the state and the national average and the status of maternal mortality portrays an extraordinary gap between rural and urban sector during the reference period. The overall status of mortality and associated socio-economic components has a considerable implication towards demographic dynamics as well as development of the district.

**KEYWORDS:** Mortality, crude death rate, infant mortality, maternal mortality

## I. INTRODUCTION

Mortality is one of the three important variables in population dynamics which has an active role for the nature of growth, structure and composition of population. Population growth of any society is more dependent on drastic decline in mortality than increase in fertility. In order to investigate the past and future population trends, the mortality analysis is more important (Davis, K., 1961). According to United Nations and World Health Organization, "Death is the permanent disappearance of all evidence of life at any time after birth has taken place (post-natal cessation of vital function without capacity of resuscitation)" (United Nations, 1962). The above definition postulates that death can only occur after life birth. So there may be close relation of death to the life birth. The death prior to the live birth is not included in mortality which is regarded as still birth. Generally people have more thought about deaths than the birth since the beginning of the society. The occurrence of mortality is influenced by many factors like biological, social, cultural, economic etc. The environmental factors play a vital role that include natural physical surroundings as well as social and economic environments of the individuals (Clarke, 1972). Though, ample scholars argued that education is the single most important socio-economic determinant of mortality (Antonovsky 1967, Kitagawa 1973, Preston and Taubman 1994, Elo and Preston 1996). The decline of mortality or the increasing longevity of the inhabitants is normally responsible for the more feared 'population explosion'. The occurrence of death is a vital event usually obtained through the registration of vital events. The inadequate registration is one of the vital problems for analysis of mortality and the registration of good coverage of vital events is missing in India (Malaker, 1986; Bhat, 1987). National Census and demographic sample surveys and National Family Health Surveys provide alternative source of mortality related data in national or state level in absence of adequate data.

## II. AREA OF THE STUDY

South 24 Parganas district, the largest and 2nd most populated district in West Bengal is located in the southernmost part of the deltaic plains of Bengal. The district is situated between 21° 29' 00" North to 22° 33' 45" North latitude and 88° 03' 45" East to 89° 04' 50" East longitude. On the 1st of March, 1986, the southern part of erstwhile 24 Parganas was carved out separately to form a new district named South 24 Parganas. Kolkata and North 24-Parganas lies to its north and north east and Bay of Bengal to its south. The study area is constituted by twenty nine blocks, bounded by an International boundary with Bangladesh to the east. On the west, the river Hooghly has demarcated the boundary proceeding from north to south separates it from the district of Howrah and East Midnapore.



III. OBJECTIVES

- To analyse the trends of mortality of the district with the state and the nation.
- To construct the block wise patterns of mortality and their percentage change over time.
- To explain the trends and patterns of infant mortality by block levels.
- To investigate about the relationship between infant mortality with some social factors.
- To establish the scenario of maternal mortality in both rural and urban area of the district.

IV. MATERIALS AND METHODS

The current mortality levels have been measured by Crude Death Rate (CDR) which is calculated as  $CDR = \frac{D}{P} \times K$  where: D is the total number of deaths registered during a calendar year, P is the total population in the middle of that year; and K is 1000. Death statistics often suffers wide inaccuracy due to which a complete death history has not been possible to provide. The present study has been conducted with the help of secondary data obtained from Sample Registration System (1984-2017) for the State and the Country level and Annual Vital Statistics (2008-2017), collected from ‘Chief Medical Officer of Health, Dy-II, South 24 Parganas’ for the district. Though, such data also suffers from a lot of discrepancy.

V. RESULTS AND DISCUSSIONS

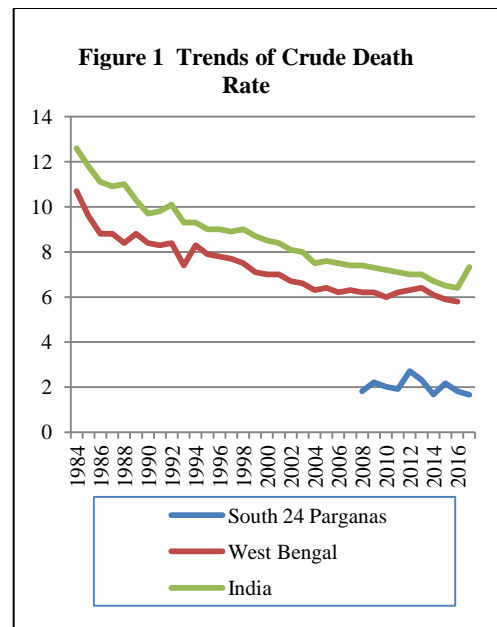
Trends of Mortality of South 24 Parganas (2008-2017), West Bengal and India (1984-2017)

The trends of mortality in terms of crude death rate shows similar trend like birth rate. The district consistently experiences a lower death rate indicating a considerable improvement in mortality conditions than the state as well as the country. The equal gap with parallel trend between the country and the state signify that they have been maintaining similar health status to some extent in terms of mortality over three decades (Table 1, Figure 1).

Table 1 Trend of crude death rate of South 24 Parganas (2008-2017), West Bengal and India (1984-2017)

Years	South 24 Pgs.	West Bengal	India	Years	South 24 Pgs.	West Bengal	India
1984	-	10.7	12.6	2001	-	7.0	8.4
1985	-	9.6	11.8	2002	-	6.7	8.1
1986	-	8.8	11.1	2003	-	6.6	8.0
1987	-	8.8	10.9	2004	-	6.3	7.5
1988	-	8.4	11.0	2005	-	6.4	7.6
1989	-	8.8	10.3	2006	-	6.2	7.5
1990	-	8.4	09.7	2007	-	6.3	7.4
1991	-	8.3	09.8	2008	1.82	6.2	7.4
1992	-	8.4	10.1	2009	2.22	6.2	7.3
1993	-	7.4	09.3	2010	2.02	6.0	7.2
1994	-	8.3	09.3	2011	1.92	6.2	7.1
1995	-	7.9	09.0	2012	2.72	6.3	7.0
1996	-	7.8	09.0	2013	2.32	6.4	7.0
1997	-	7.7	8.9	2014	1.68	6.1	6.7
1998	-	7.5	9	2015	2.18	5.9	6.5
1999	-	7.1	8.7	2016	1.82	5.8	6.4
2000	-	7.0	8.5	2017	1.66	5.8	7.33

Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017 and Sample Registration System, 1984-2017.  
Note: (-) means not available



Levels of Crude Death Rate of South 24 Parganas, 2008-2017

Levels of mortality are closely related with age, sex, social status, occupational patterns, place of residence which are considered to be a set of determinants for causing mortality in time and space. Due to the limitations of availability of detailed numerical information in sub-district level, crude death rate has become possible to analyse for ten years.



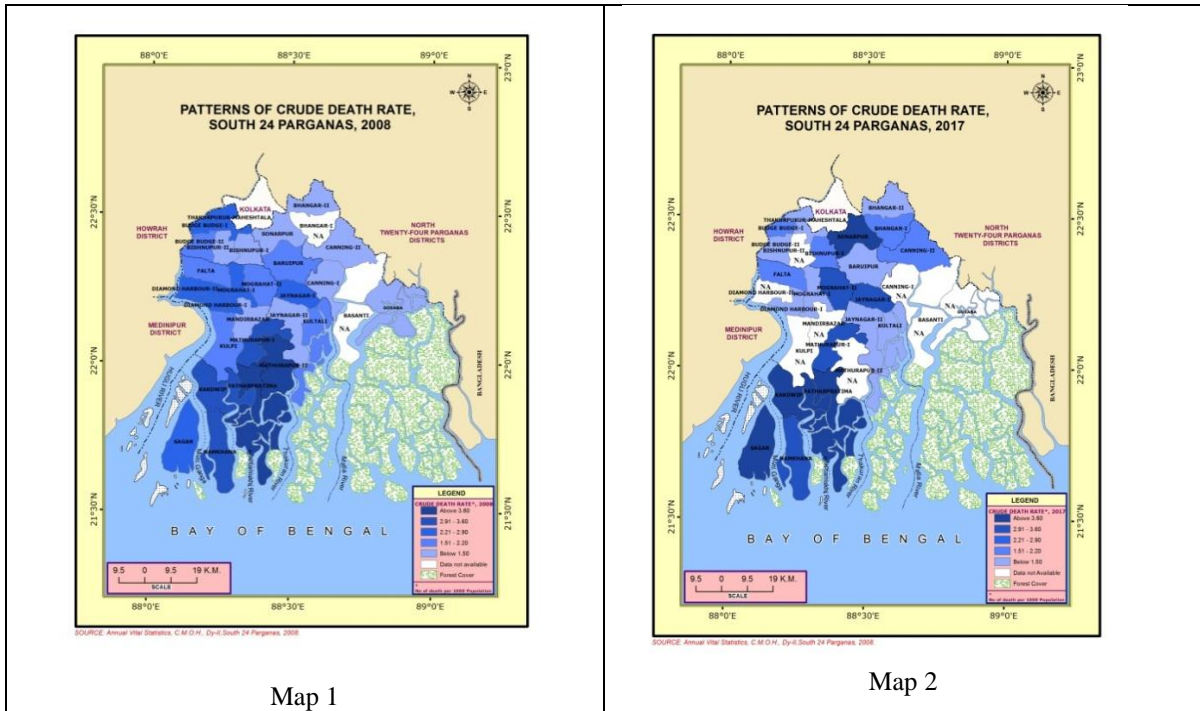
Crude death is a significant demographic component which helps to compute the natural increase of population. As a limitation, it ignores the experience of age groups which greatly influence the variability of deaths (Bhende and Kanitkar, 2004). The overall decline of crude death rate in the sub-district levels presents a well demographic status of the study area. All of the sub-districts (blocks) have experienced some diverse patterns and tends to be declined till 2017 (Table 2). At the beginning of the decades (2008-2017), levels of crude death rate shows relatively higher in rural area located southern portion of the district (map1 and 2). Remarkable variation of mortality behaviour explains about differential medical facilities and health awareness across different sectors of the study area.

**Table 2 Levels of Crude Death Rate (CDR), 2008-2017**

Sl.No.	Blocks	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1	Thakurpukur-Maheshtala	2.47	2.93	1.27	0.49	11.76	5.71	0.34	0.35	0.14	0.11
2	Bishnupur-I	1.47	1.90	1.70	2.90	2.82	3.34	2.89	0.86	3.04	1.70
3	Bishnupur-II	0.36	0.83	1.68	3.21	1.58	1.50	1.09	0.40	0.81	N.A.
4	Budge Budge-I	2.56	2.56	2.57	1.37	2.00	2.68	2.09	2.05	1.39	1.67
5	Budge Budge-II	1.64	2.26	1.35	1.21	1.64	2.43	2.65	2.46	0.11	0.16
6	Sonarpur	0.69	0.51	0.81	1.09	1.30	1.25	0.67	0.67	4.29	3.95
7	Jaynagar-I	2.85	2.65	2.32	2.00	2.45	2.72	2.45	2.83	2.10	2.96
8	Jaynagar-II	1.03	1.53	1.61	1.27	0.72	1.14	0.59	2.92	1.04	0.88
9	Kultali	1.82	2.08	1.33	1.86	1.77	1.40	1.38	1.82	1.21	1.32
10	Baruipur	1.74	2.14	1.81	1.92	1.23	1.93	1.79	2.16	1.77	1.35
11	Bhangar-I	N.A.	0.45	0.83	1.14	1.56	1.91	2.02	3.08	1.62	2.20
12	Bhangar-II	1.07	1.54	0.81	1.12	1.05	1.27	1.11	0.87	1.16	0.86
13	Canning-I	1.16	1.42	1.32	1.96	1.55	0.74	0.75	1.99	N.A.	N.A.
14	Canning-II	0.16	1.11	0.79	0.63	0.32	0.13	0.25	2.13	1.59	1.60
15	Basanti	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.27	0.17	N.A.
16	Gosaba	1.39	0.93	2.79	2.22	3.06	3.06	0.85	0.19	N.A.	N.A.
17	Mograhat-I	2.28	3.02	2.74	1.94	2.91	2.38	2.07	1.77	2.49	0.57
18	Mograhat-II	2.07	2.31	2.21	2.73	2.12	2.77	2.66	2.97	3.19	3.08
19	Mandirbazar	1.39	2.09	1.43	1.31	1.58	0.95	0.39	0.66	0.42	N.A.
20	Kulpi	1.80	3.24	4.06	1.60	1.74	0.94	1.34	2.29	0.23	N.A.
21	Falta	2.13	3.47	3.63	3.49	3.05	1.91	2.21	1.96	2.28	2.01
22	Diamond Harbour-I	2.76	2.91	2.42	3.57	5.15	6.62	6.08	7.85	3.84	0.47
23	Diamond Harbour-II	2.29	2.98	2.41	2.38	3.19	2.12	2.88	3.25	1.62	N.A.
24	Mathurapur-I	2.92	2.47	2.95	3.47	3.32	3.98	3.29	3.68	2.90	3.57
25	Mathurapur-II	3.83	4.55	3.77	1.69	N.A.	N.A.	N.A.	4.71	0.25	N.A.
26	Kakdwip	2.90	3.34	3.36	3.49	3.58	3.15	2.95	3.08	2.35	5.50
27	Namkhana	3.20	3.47	2.98	2.76	0.72	1.57	1.79	2.66	3.51	3.08
28	Sagar	2.24	2.86	2.52	2.87	3.55	3.66	3.19	3.83	4.58	4.04
29	Patharpratima	3.72	4.54	4.40	4.14	3.71	4.12	3.79	4.71	3.62	4.36
South 24 Parganas		1.82	2.22	2.02	1.92	2.72	2.32	1.68	2.18	1.82	1.66

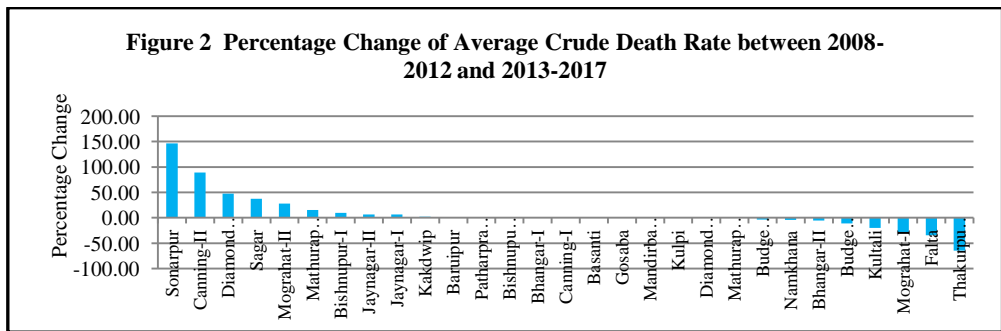
Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017

The district’s average crude death rate is 2.03 which is three times lower than West Bengal (6.12) and three and half times lower than in India (6.99) during 2008-2017 (Figure 2). The average crude death rate is 2.14 is estimated during the first five year (2008-2012). The average crude death rate of above 3.0 is recorded by Patharpratima (4.10), Thakurpukur Maheshtala (3.79), Diamond Harbour-I (3.36), Kakdwip (3.33), Falta (3.16) and Mathurapur-I (3.02). The above blocks except Thakurpukur Maheshtala has repeated their position in terms of average crude death rate of above 3.0 during the last five year analysis (2013-2017) of which the average crude death rate is 1.93. However, the rural agrarian part of in the southern part display the consistently higher death rate. A considerable number of backward villagers especially of the riverine blocks of the Sundarban area suffer from malnutrition and various diseases of which vector borne diseases (like Kala-azar, Malaria Lymphatic Filariasis etc.) and water (Diarrhoea) and food borne diseases are common that causes a large number of deaths across the district. Diarrhoea is alarmingly high peaking substantially during the rainy season and Arsenicosis also plays as a major health issue. Respiratory and Lung diseases are continuously increasing, mainly due to the significant increase in air pollution. Snakebite is a common problem in low-lying nature of a large part in the Sundarbans and it results many deaths due to their poor socio economic status, low level of education, inadequate sanitation, unsafe water supply and poor housing facilities etc. (District Human Development Report, 2009).



**Percentage Change of Average Crude Death Rate between 2008-2012 and 2013-2017**

The study area has decreased its crude death rate by -9.81 percentage points (from 2008-2012 to 2013-2017) where only 5 blocks have experienced the increasing percentage change of above 25 percent and rests have reduced their percentage change of below 25 percentage points. Among all of the blocks, the twelve blocks (figure 2) experienced growing tendency of death where as eight blocks showed decreasing status of its crude death rate.



Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2012 and 2013-2017

Maximum positive percentage change has been witnessed by Sonarpur (146.56 per cent) and followed by Canning-II (89.45 per cent), Diamond Harbour-I and Sagar (37.61 per cent) etc. only two blocks exercised very high percentage change of crude death rate of above 75 percent and three blocks namely Diamond Harbour-I, Sagar and Mograhat-II are above the range of 25 per cent. Higher decreasing tendency of crude death rate is observed in Thakurpukur Maheshala (-64.86 per cent point), Falta (-34.25 per cent point), Mograhat-I (-28.07) and Kultali (-19.65 per cent point) etc. Thus the percentage of blocks having increasing tendency is relatively higher (41 per cent) than the blocks of falling status (28 per cent).

**Trends of Infant Mortality Rate**

Infant mortality Rate (IMR) is an important type of mortality measure which is defined as the number of infant deaths per 1000 live births (Marian, 2008). In spite of having substantial progress in reducing child deaths, children from poor/disadvantaged households remain disproportionately vulnerable across all regions of the developing world

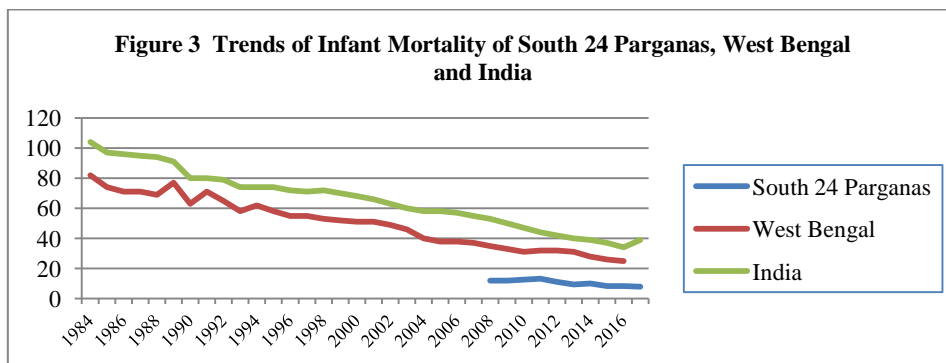


(UNICEF 2010). Like crude death rate, the status of infant mortality of the district shows lower tendency (Table 4, Figure 3) compared to the state and country. Such gradual reduction of infant and child mortality have become possible due to remarkable contribution of maternal and child health interventions (Claeson et al., 2000)

**Table 4 Trends of Infant Mortality of South 24 Parganas, West Bengal and India.**

Year	South 24 Parganas	West Bengal	India	Year	South 24 Parganas	West Bengal	India
1984	-	82	104	2001	-	51	66
1985	-	74	97	2002	-	49	63
1986	-	71	96	2003	-	46	60
1987	-	71	95	2004	-	40	58
1988	-	69	94	2005	-	38	58
1989	-	77	91	2006	-	38	57
1990	-	63	80	2007	-	37	55
1991	-	71	80	2008	12.00	35	53
1992	-	65	79	2009	11.98	33	50
1993	-	58	74	2010	12.49	31	47
1994	-	62	74	2011	13.22	32	44
1995	-	58	74	2012	11.06	32	42
1996	-	55	72	2013	9.34	31	40
1997	-	55	71	2014	9.97	28	39
1998	-	53	72	2015	8.24	26	37
1999	-	52	70	2016	8.26	25	34
2000	-	51	68	2017	7.97	24	39

Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017



Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017

**Pattern of Infant Mortality Rate**

India experiences about 70% of the under-five mortality occurs before reaching the age of one year (IIPS, 2000) where infant female mortality is relatively higher which may be the result of low female literacy, low women’s empowerment and lack of health care services (Narayana, 2008). The Patterns of average infant mortality (Table 5) present that most of the rural blocks have experienced higher infant death rate compared to the urban sector. The fully rural Mathurapur-1, Diamond Harbour-II and Sagar show the maximum infant mortality rate which signify as to the differential pattern of demographic development. The urban-based health care services and larger availability of public resources results lower investments in rural health facilities which are the main factors for such residential bias of infant mortality and such causes have also been supported by many scholars (Balarajan, Selvaraj, and Subramanian 2011). In addition, many studies have too argued that the socio economic variability is the important factor for the variation of infant mortality (Jain 1985; Arnold et al. 1998; Kravdal 2004; Mohanty 2011; Singh et al. 2011; Po and Subramanian 2011).

**The influence of Female Literacy and Urbanisation on Infant mortality rate**

A little effort has been performed to examine whether any relationship between infant mortality rate (IMR) and some other social variables. In order to fulfil the concerned objective, two variables have been considered to find out their relationship with the infant mortality rate of the district. Some previous research establishes the fact about an inverse

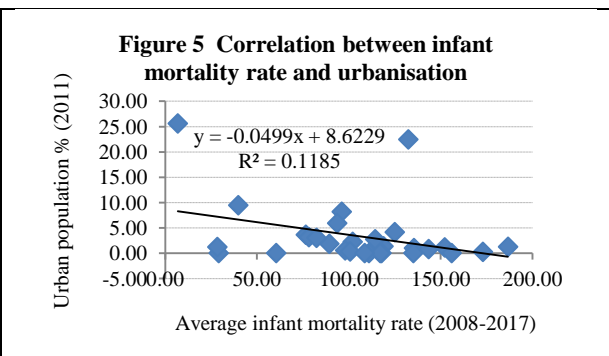
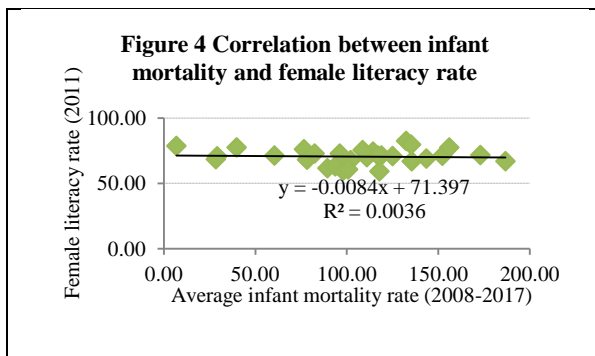


relationship between female literacy and infant mortality rate (Adhikari, 2011; Shawky, 2001; Gakidou, 2010). The present analysis has also proves that the IMR has weak negative relation with female literacy rate [Correlation coefficient (r) = -0.055], and Urbanisation (r= -0.344). Most of the blocks have consistently experienced declining trend of infant mortality rate because of their increasing rate of female literacy and urbanisation. Most of the northern blocks show lower level of infant mortality due to the major influence of urbanisation and associated standard of living. Some traceable blocks with high IMR are namely Mathurapur-I, Diamond Harbour-II, Sagar, Kulpi etc. which are inhabited by fully rural population.

**Table 5 Infant mortality rate (IMR), female literacy and urbanisation**

Blocks	Average IMR (2008-2017)	Female Literacy (%) 2011	Urban Population (%) 2011	Blocks	Average IMR (2008-2017)	Female Literacy (%) 2011	Urban Population (%) 2011
Thakurpukur Maheshtala	6.78	78.62	25.59	Gosaba	60.40	71.22	0.00
Bishnupur-I	118.86	71.29	1.34	Mograhata-I	78.21	68.04	3.14
Bishnupur-II	76.53	76.05	3.62	Mograhata-II	124.99	70.84	4.13
Budge Budge-I	39.74	77.47	9.45	Mandirbazar	28.34	68.44	1.20
Budge Budge-II	114.32	74.26	2.72	Kulpi	143.45	68.91	0.79
Sonarpur	132.38	82.43	22.44	Falta	152.21	71.06	1.12
Jaynagar-I	102.06	67.65	2.22	Diamond Harbour-I	82.37	72.78	3.01
Jaynagar-II	89.36	61.55	1.83	Diamond Harbour-II	173.00	71.59	0.24
Kultali	117.79	59.14	0.00	Mathurapur-I	186.71	66.87	1.24
Baruipur	96.11	72.72	8.16	Mathurapur-II	110.92	69.98	0.00
Bhangar-I	135.45	66.83	0.99	Kakdwip	117.04	71.22	0.00
Bhangar-II	29.08	70.64	0.00	Namkhana	135.13	79.64	0.00
Canning-I	93.63	62.95	5.90	Sagar	155.99	77.39	0.00
Canning-II	97.97	59.61	0.54	Patharpratima	108.61	75.40	0.00
Basanti	100.67	60.62	0.32	South 24 Parganas	104.52	71.40	100.00

Source: District Census Hand Book: 2011, South 24 Parganas; Primary Census Abstract and Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017



**Status of Maternal Mortality**

In respect of absolute maternal death, India shares one-fifth of the global platform contributing an estimated 4.7% annual decline in maternal mortality ratio (MMR) (RGI, 2006 and WHO, 2012) where West Bengal occupies 6<sup>th</sup> position in India as recorded in 2011-2013 (Health on the March, 2015-16). The table 6 displays that the rural South 24 Parganas contributes 51.7 (98 per cent) as average number of maternal death per year (2008-2017) out of 52.8 in total that explain about extraordinary residential gap of respective performances. The major causes of such residential bias are variation of health care services, socio economic disparity, lack of proper antenatal and post natal care of mother, malnutrition, lack of female education as well as awareness and early marriage and child bearing of women etc. Nevertheless, presently, the Government has attempted to an elaborate supervision on antenatal check up with Reproductive and Child Health Programme that make possible to increase the proportion of safe deliveries through the introduction of Janani Suraksha Yojana (JSY) and provisioning of referral transport facilities to poor and under-



privileged families under the Rogi Kalyan Samitis at subsidized rates (District Human Development Report, 2009) that have made the situation better than earlier.

**Table 6 No of Maternal Death of South 24 Parganas, 2008-2017**

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average no of death per year
Total	65	89	46	43	75	46	30	60	42	32	52.8
Rural	65	89	45	41	75	46	30	60	34	32	51.7
Urban	0	0	0	2	0	0	0	0	8	0	0.1

Source: Chief Medical Officer of Health, Dy-II, South 24 Parganas, Annul Vital Statistics, 2008-2017

### VI. FINDINGS

- The trend of the crude death rate (CDR) has become gradually slowed down and this rate remains lower than the state and the country.
- Rural parts of the district experiences relatively higher mortality compared to urban parts.
- The proportion of blocks with positive average CDR is higher to some extent (from 2008-2012 to 2013-2017).
- Most of the rural blocks have experienced higher infant death rate compared to the urban area.
- Infant mortality experiences negative relationship with female literacy and urbanisation.
- Maternal mortality is extremely higher in rural areas than the urban counterparts.

### VII. CONCLUSION

From the very beginning of the 21<sup>st</sup> century, the district demography witnesses a spectacular decline of mortality that gives a message to a substantial demographic change in future. With the progressive awareness of healthcare, the study area has started to become efficient in their fight against disease and death to some extent. The accelerating medical progress, urbanisation and increasing socio economic status have given a new transition of mortality landscape of the district which have been contributing to have lower crude death rate and infant mortality compared to the state and the country for decades. Though, all blocks have experienced varying degree of mortality based on their socio economic background that presents a unique pattern of mortality map that undergoes changes over space and time. As a consequence of substantial reduction of mortality, population aging, expected growth of the average capital investment for mother and child health care may be a better footstep for the overall welfare of the study area.

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