

# **An Insight into The Acute Respiratory Infections Among Children in Districts of West Bengal**

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## **Abstract:**

According to World Health Organization acute respiratory infections (ARIs) are responsible for nearly 20% of all deaths in children under 5 years of age worldwide. Approximately 400,000 children under the age of five years die each year from ARI-related diseases in India. The specific objective of the study was to analyze acute respiratory infection among children under five years in West Bengal at the district level on the basis of NFHS-4 and NFHS-5 factsheets. For empirical analysis the present study used some simple statistical tools and diagrams like, percentage, compound annual growth rate, box plot and bar diagram. Present study concluded that the prevalence of symptoms of acute respiratory infection of children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugly, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty-Four Parganas and South Twenty-Four Parganas districts in NFHS-5 compared to NFHS-4. The compound annual growth rate of acute respiratory infection in the children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugli, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty-Four Parganas and South Twenty-Four Parganas districts in 2019-20 respect to 2015-2016.

**Keywords:** Acute Respiratory Infections (ARIs), West Bengal, Districts, CAGR, Box-plot, NFHS

## **I. INTRODUCTION:**

According to the World Health Organization acute respiratory infections (ARIs) are responsible for nearly 20% of all deaths in children under 5 years of age worldwide. Acute respiratory infection is an infection that can affect normal breathing. It may affect the upper respiratory tract, beginning with the sinuses and ending with the vocal cords, or only the lower respiratory tract, beginning with the vocal cords and ending with the lungs (Simoes et al., 2006). In India, approximately 400,000 children under the age of five years die each year from ARI-related diseases. This figure accounts for 13-16% of all deaths in children admitted to pediatric hospitals

(Jain et al., 2001; Vashishtha, 2010). Poor child health has a long-term negative impact on the labor force of an economy. Child health is a state of physical, mental, intellectual, social, and emotional well-being, not merely the absence of disease or infirmity. Healthy children live in families, environments, and communities that provide opportunities for them to reach their full developmental potential. Children are vital to the nation's present and future. For children to grow and develop optimally, they must be properly nourished, they need to be healthy, children must feel safe and secure, and they must have the opportunity to learn from birth. West Bengal is among the eight poorest states, reflecting high

levels of deprivation in social indicators such as health, education, and living standards. Historically, the state had a strong panchayati raj system, which provides an opportunity to influence the realization of children's rights at the grassroots level. In West Bengal, health infrastructure has been developed; however, the distribution of health facilities is uneven, and hard-to-reach areas often lack functioning primary health centers. Against this backdrop, the present study examines the status of acute respiratory infection among children under five years in West Bengal. We have also attempted to examine the acute respiratory infection among children under five years in West Bengal at the district level. We will briefly review the underlying studies acute respiratory infection among children with focus on India and some other countries. Seidu et al. (2019) conducted a study to determine the prevalence of acute lower respiratory tract infections in children under five years of age from 28 sub-Saharan African countries found that the overall prevalence of ARI in all countries was 25.3%. However, the unequal distribution of the frequency of ARI episodes across states and regions of India has not been fully explored. Any efforts to improve the child mortality target of the SDGs would largely depend on progress in India, as the country accounts for one-fifth of the world's live births and more than one-quarter of neonatal mortality (Sankar et al., 2016). The prevalence of ARI is related to a variety of factors related to children's demographics, their parents' socioeconomic background, and where they live and the home environment in which they grow up. In Bangladesh and India, a relatively high incidence of ARI episodes has been observed in young, non-exclusively breastfed, anemic children and those with low birth weight (Hasan & Richardson, 2017, Budge et al., 2014; Sheikh Quyoom Hussain et al., 2014). Hasan et al. (2022) concluded that ARI remains a significant public health concern among Indian children. They showed that significant regional disparities and quantified within- and intra-region inequalities in the prevalence of ARI in India. Balasubramani et

al. (2022) showed that acute respiratory infections hotspots were predominantly seen in the north Indian states/UTs of Uttar Pradesh, Bihar, Delhi, Haryana, Punjab, and Chandigarh, and also in the border districts of Uttarakhand, Himachal Pradesh, and Jammu and Kashmir. There was a substantial overlapped among PM2.5, PM10, population density, tobacco smoking, and unclean fuel used with hotspots of ARI. The quasi-Poisson regression analysis showed that PM2.5, illiteracy levels, diarrhea in children, and maternal body mass index were associated with ARI. The rest of the article is organized as follows. The next section summarizes a brief survey of relevant literature. The third section highlighted the data source and variable descriptions. The sections afterwards describe the methodology of the study and analyze the findings. Finally, we give the conclusion.

## **2. RESEARCH OBJECTIVE:**

The specific research objectives of the present study are as follows:

- i. To find the trend of acute respiratory infection prevalence among the children under five years in West Bengal.
- ii. To analysis status of acute respiratory infection prevalence among the children under five years across the districts of West Bengal.

## **3. DATA DESCRIPTION:**

The study is prepared based on the National Family Health Survey (NFHS) Factsheets 4 and 5, which are published by the Ministry of Health and Family Welfare. The NFHS is a large scale, multi-round survey conducted in a representative sample of households throughout India. Five rounds of the survey have been conducted since the first survey in 1992-93. For the district of West Bengal, we have taken the respective data from NFHS-4 and NFHS-5 Factsheets. This is because NFHS for the districts are available only from NFHS 4. For the NFHS-1 to NFHS-3 there were no district level factsheet published.

**4. METHODOLOGY:**

We have analyzed the status of child health in West Bengal and made a district-wise comparison based on acute respiratory infection among the children less than five years. This study does not include Bardhaman district in the analysis because for 2015-16 data is available for the undivided district while for 2019-20 data are available for Purba Bardhaman and Paschim Bardhaman districts. For data analysis we have used the simple statistical tools and plots. We have also used pie chart, bar diagram for the pictorial exposition of the data. Since the NFHS reports are not done for all the continuous years, we have to compute the Compound Average Growth Rates (CAGR) for the parameters. The CAGR is defined as

$$x_n = x_0(1 + r)^t$$

$$\Rightarrow r = \left(\frac{x_n}{x_0}\right)^{\frac{1}{t}} - 1$$

Where,

$x_n$ : Value of the variable for the terminal year (NFHS year)

$x_0$ : Value of the variable for the initial year (NFHS year)

$r$ : CAGR

$t$ : Difference between two NFHS years viz. 2015-16 and 2019-20

**5. RESULTS AND ANALYSIS:**

**5.1 Status of acute respiratory infection among the children under five years in West Bengal:**

Present section highlights the scenario of acute respiratory infections among the children under five years in West Bengal on the basis of NFHS-4 (2015-16) and NFHS-5 (2019-20) factsheets. The incidence of ARI among the children under five years has been decreased to 2.8% in 2019-2020 compared to 3.3% in 2015-16. Present status of acute respiratory infection among the children under five years in West Bengal is presented in the following table.

**Table-1: Status of ARI among the children under five years in West Bengal**

Variable/ year	2015-16	2019-20
ARI (%)	3.3	2.8

Source: NFHS Factsheets (4,5) MoHFW, Government of India

Compound annual growth rate of acute respiratory infection among the children under five years in West Bengal for the period of 2005-06 to 2014-15 was quite very high around 32 percent. Most important fact was that compound annual growth rate of acute respiratory infection among the children under five years in West Bengal showed negative for the period 2014-15 to 2019-20. Compound annual growth rate of acute respiratory infection among the children under five years in West Bengal were pointed out in the following table-2.

**Table-2 CAGR (%) of ARI among the children under five years in West Bengal**

Period	CAGR
2005-06 to 2014-15	31.55
2014-15 to 2019-20	-3.23

Source: Own calculation

**5.2 Status of acute respiratory infection in the children under five years among the districts of West Bengal:**

In this section we have made a district wise comparative analysis of the percentage of children under five years affected by acute respiratory infection in West Bengal based on the NFHS-4 and NFHS-5. Status of acute respiratory infection among the children under five years in districts of West Bengal are showed in the figure-1 and figure-2.

Figure-1 presents the box-plot of ARI prevalence in children 2 weeks preceding the survey for the two years 2015-16 and 2019-20. The median ARI (%) among children was higher in 2015-16 (3.05 per cent) than that of in 2019-20 (2.55 per cent). Also, the spread of children-ARI (%) figures reported higher spread in 2015-16 compared to that in 2019-20. It is further evident from the box-plot that ARI (%) series for both the years are positively skewed.

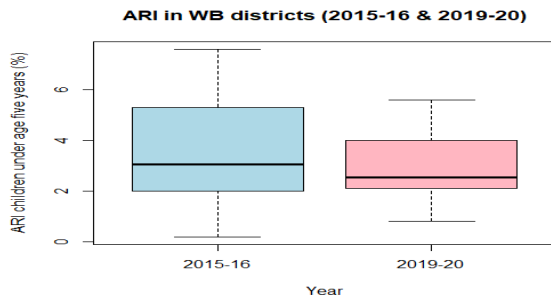


Figure-1: Box-Plot diagram of ARI in West Bengal district (2015-16 to 2019-20)

Figure 2 showed that the prevalence of symptoms of acute respiratory infection of children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugly, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty-Four Parganas and South Twenty Four Parganas districts in NFHS-5 compared to NFHS-4. Prevalence of symptoms of acute respiratory infection of children under five years has increased for rest all other districts in West Bengal in NFHS-5 compared to NFHS-4.

District-wise compound annual growth rate (%) of acute respiratory infection (ARI) in the children under five years was figure out in the figure-3. Figure-3 showed that compound annual growth rate of acute respiratory infection in the children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugli, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty-FourParganasa and South Twenty-Four Parganas districts in 2019-20 respect to 2015-2016.

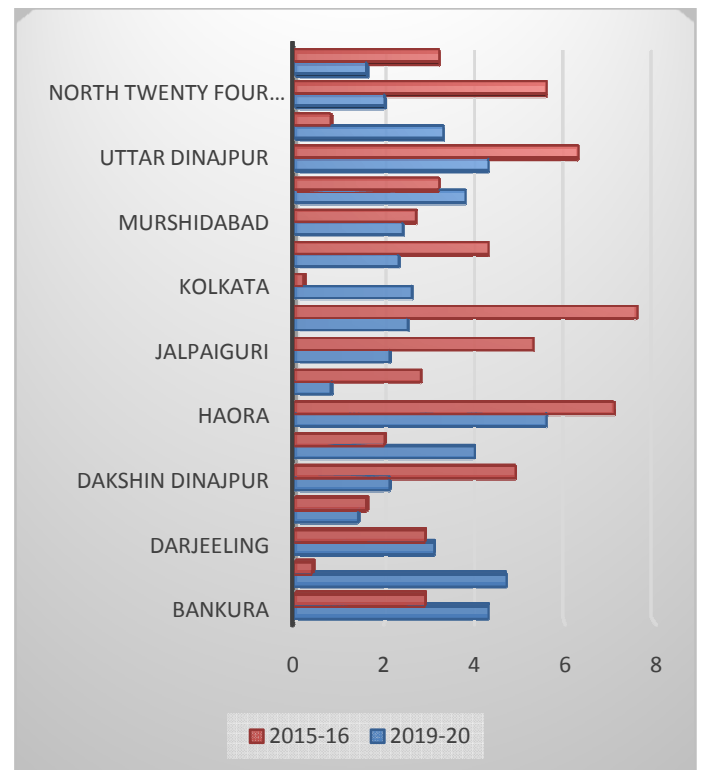


Figure-2: Prevalence of symptoms of acute respiratory infection (ARI) of children under five years in the districts of West Bengal

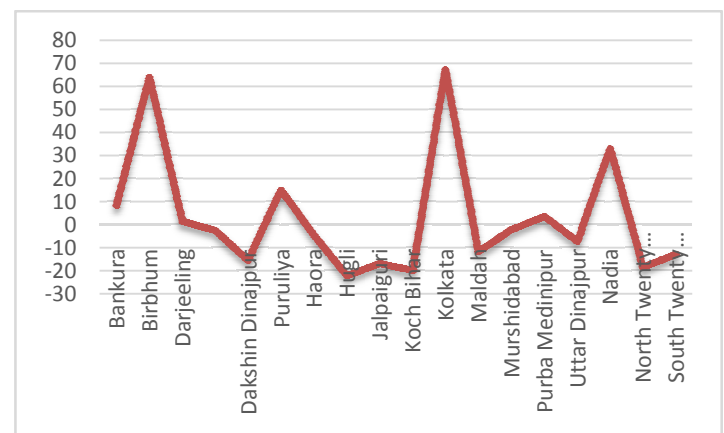


Figure-3: District-wise Compound annual growth rate (%) of acute respiratory infection (ARI) in the children under five years in West Bengal in 2019-20 respect to 2015-2016

## 6.CONCLUSION

Present study analyses the status of acute respiratory infections of the children under five years in among the districts of West Bengal. Empirical finding of the study concluded that the prevalence of symptoms of acute respiratory

infection of children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugly, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty Four Parganas and South Twenty Four Parganas districts in NFHS-5 compared to NFHS-4. The compound annual growth rate of acute respiratory infection in the children under five years has improved for the Paschim Medinipur, Dakshin Dinajpur, Haora, Hugli, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Uttar Dinajpur, North Twenty Four Parganas and South Twenty Four Parganas districts in 2019-20 respect to 2015-2016.

## REFERENCES

1. Balasubramani, K., Prasad, K. A., Kodali, N. K., Abdul Rasheed, N. K., Chellappan, S., Sarma, D. K., Kumar, M., Dixit, R., James, M. M., Behera, S. K., Shekhar, S., & Balabaskaran Nina, P. (2022). Spatial epidemiology of acute respiratory infections in children under 5 years and associated risk factors in India: District-level analysis of health, household, and environmental datasets. *Frontiers in public health*, 10, 906248. <https://doi.org/10.3389/fpubh.2022.906248>
2. Budge, P. J., Griffin, M. R., Edwards, K. M., Williams, J. V., Verastegui, H., Hartinger, S. M., & Gil, A. I. (2014). Acute viral respiratory illnesses in Andean children: a household-based cohort study. *The Pediatric infectious disease journal*, 33(5), 443
3. Hasan, M. M., & Richardson, A. (2017). How sustainable household environment and knowledge of healthy practices relate to childhood morbidity in South Asia: analysis of survey data from Bangladesh, Nepal and Pakistan. *BMJ open*, 7(6), e015019
4. Hasan, M. M., Saha, K. K., Yunus, R. M., & Alam, K. (2022). Prevalence of acute respiratory infections among children in India: Regional inequalities and risk factors. *Maternal and child health journal*, 26(7), 1594–1602. <https://doi.org/10.1007/s10995-022-03424-3>
5. <http://rchiips.org/nfhs/>
6. Jain, N., Lodha, R., & Kabra, S. (2001). Upper respiratory tract infections. *The Indian Journal of Pediatrics*, 68(12), 1135–1138
7. Sankar, M., Neogi, S., Sharma, J., Chauhan, M., Srivastava, R., Prabhakar, P., & Paul, V. (2016). State of newborn health in India. *Journal of Perinatology*, 36(3), S3–S8
8. Seidu A-A, Dickson KS, Ahinkorah BO, Amu H, Darteh EKM, Kumi-Kyereme A. Prevalence and determinants of acute lower respiratory infections among children under-five years in sub-Saharan Africa: evidence from demographic and health surveys. *SSM-Popul Health*. 2019;8:100443.
9. Sheikh Quyoom Hussain, M. A., Wani, J. G., & Ahmed, J. (2014). Low hemoglobin level a risk factor for acute lower respiratory tract infections (ALRTI) in children. *Journal of clinical and diagnostic research: JCDR*, 8(4), PC01.
10. Simoes, E. A., Cherian, T., Chow, J., Shahid-Salles, S. A., Laxminarayan, R., & John, T. J. (2006). Acute respiratory infections in children. *Disease Control Priorities in Developing Countries*. 2nd edition.
11. Vashishtha, V. M. (2010). Current status of tuberculosis and acute respiratory infections in India: much more needs to be done. *Indian pediatrics*, 47(1), 88–89