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ORIGINAL ARTICLE - PUBLIC HEALTH

EPIDEMIOLOGY OF ACUTE DIARRHEAL DISEASES REPORTED IN TAMIL NADU IN 2022 & 2023

Avudai Selvi Rathinasamy [(1)], Amudha A [(1)], Sankarmani Ramasamy Mathivanan [(1)], Subhashini K J [(1)], Mohammed al ossama [(1)], Vimalkumar Elangovan [(1)], K Bhuvana [(1)], R Ramya [(1)], M.K Ganapathy [(1)], M.Senthilkumar [(1)], Sampath P [(1)], Selvavinayagam T S [(1)],

(1) Directorate of Public Health and Preventive Medicine, Government of Tamil Nadu, India.

ABSTRACT

INTRODUCTION : Acute Diarrheal Disease is one of a major long-standing public health problem in developing countries; factors contributing to this persistent issue include inadequate access to clean drinking water, poor sanitation and a lack of awareness regarding hygiene practices. This study aims to assess the burden of diarrheal diseases in Tamil Nadu and analyze the month-wise trends of Acute Diarrheal Disease (ADD) and related outbreaks across various districts of Tamil Nadu from January 2022 to December 2023.

METHODS : This study is carried out with secondary data analysis of Acute Diarrheal Disease cases reported in the Integrated Disease Surveillance Programme under Integrated Health Information Portal (IHIP- IDSP) in Tamil Nadu. The study data includes the patients attending the health care facilities with diarrhea which is captured in Presumptive form (P- form) of IHIP -IDSP. The study duration is from January 2022 to December 2023.

RESULTS : A total of 162,765 ADD cases were reported in P form of IHIP-IDSP during the two years 2022 & 2023. The highest number of ADD cases is reported in the age group between 31- 40 years of (19.3%) and it is predominant in females. A rising trend is observed from the month of April and peak is observed in the month of June. Of the total cases reported, four districts viz., Ramanathapuram, Tiruvanamalai, Pudukottai & Villupuram, each district constituted >5% of ADD cases. Three districts, Nilgiris, Kaniyakumari & Dindigul constituted less than 1% of ADD cases.

CONCLUSION : In this article IHIP - IDSP data that are available in the web portal have provided a better platform for analyzing the seasonal dependency of the outbreaks. IHIP- IDSP acts as a ready reckoner for analyzing the pattern of the outbreaks for any communicable diseases in Tamil Nadu by enabling with necessary information which will be useful to the policy makers and administrators to circumvent the effect of morbidity and mortality due to outbreaks or any Health Events.

KEYWORDS : Acute Diarrheal Diseases, IHIP-IDSP, Surveillance

INTRODUCTION

Acute Diarrhoea refers to episodes of loose stool with rapid onset and lasts for 3 to 7 days but it can also last up to 10 to 14 days. The causative agent of Acute Diarrheal Diseases (ADD) are virus, bacteria and parasitic (protozoan and helminths).[1] The WHO/UNICEF Joint Monitoring Program for Water Supply, Sanitation and Hygiene (JMP) 2017 report revealed that 844 million people worldwide lack access to basic drinking-water services and 2.3 billion lack basic sanitation services, while 892 million still practiced open defecation.[2] Ballester., et al. suggested that seasonal variations should be considered as prime factor while analyzing any public health issues.[3]

Diarrhoea is one of the top 10 diseases to contribute to global DALY, even in recent years. In the developing world, infectious causes of Acute Diarrhoea are largely related to contaminated food and water supplies[4] In the developed countries, technological progress and an increase in mass production of food have paradoxically contributed to the persistence of foodborne illness, despite higher standards of food production.[5] Mortality due to diarrheal disease has been declining due to various preventive measures taken by the individual and at the State level in spite of this intervention the incidence of ADD cases remain constant. Apart from this, the recovered individuals develop various public health burdens such as impaired cognitive development, reduced immune response, Developmental delay etc.[6,7]

Diarrheal diseases have indeed been a significant public health challenge in India since independence. Factors contributing to this persistent issue include inadequate access to clean drinking water, poor sanitation, and a lack of awareness regarding hygiene practices.[8]

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Corresponding Author: M.Senthilkumar
e-mail : dphepi@nic.in

Despite various interventions, such as improved water supply and sanitation programs, diarrheal diseases still account for a substantial burden of morbidity and mortality, particularly among children under five. Research indicates that these diseases often result from a combination of environmental, socio-economic, and health system-related factors.[9]

Efforts to combat this issue have included promotion of oral rehydration therapy, initiatives aimed at improving sanitation and hygiene practices. Continued investment in these areas, along with community education and robust health infrastructure, remains crucial for reducing the incidence and impact of diarrheal diseases in India.[10]

Outbreak is the occurrence of unusual increase of cases of disease or syndrome in excess, what would normally be expected in a defined community, geographical area or season. Variations in weather and climate significantly influence the intensity of outbreaks. The seasonal changes affect the incidence of infectious diseases which is crucial for effective public health monitoring and response.

This study aims to assess the burden of diarrheal diseases in Tamil Nadu and analyze the month-wise trends of Acute Diarrheal Disease (ADD) and related outbreaks across various districts of Tamil Nadu from January 2022 to December 2023.

METHODS

This study is carried out with secondary data analysis of Acute Diarrheal Disease cases reported in the Integrated Disease Surveillance Programme under Integrated Health Information Portal (IHIP- IDSP) in Tamil Nadu. The study data includes the patients attending the health care facilities with diarrhea which is captured in Presumptive form (P-form) of IHIP -IDSP. The study duration is from January 2022 to December 2023. Official permission to conduct this study was obtained from the Director of Public Health and Preventive Medicine (DPH&PM), Tamil Nadu.

The line listing format includes information on name, age, sex, address, date of diagnosis, and the patient care (in-patient or out- patient). The IDSP - IHIP data were collected from all Government Primary health centers (PHCs), Community Health Centers (CHCs), Sub-District Hospitals, District hospitals (DHs), Government Medical College Hospitals and other health facilities. The personal identifiers of the patients were not disclosed in this study. Deidentified data used and confidentiality maintained.

Based on the line list data of ADD cases during the study period, a preliminary analysis was carried out by SPSS software (version 16.0). District wise and month wise incidence of ADD cases & the outbreaks reported was analyzed and interpreted using mapping by QGIS software (version 3.34).

RESULTS

In Tamil Nadu, IHIP – IDSP has 10,019 P-form reporting units which includes all health facilities like Government Primary health centers (PHCs), Community Health centers (CHCs), Sub-District Hospitals(SDH), District Hospitals (DHs), Government Medical College Hospitals(MCH) and Other Health Facilities (OHF) which includes Private Hospitals

A total of 1,62,765 ADD cases were reported in P form of IHIP-IDSP from January 2022 to December 2023. Table 1 & 2 shows socio-demographic distribution and gender distribution of ADD cases.

Table 1: Age Wise distribution of ADD cases reported in IHIP-IDSP in Tamil Nadu from January 2022 to December 2023, N =1,62,765

Age Group in Years	2022	2023	n	%
0-10	9623	9995	19,618	12.1
11-20	6399	6781	13,180	8.1
21-30	11573	12270	23,843	14.6
31-40	14605	16870	31,475	19.3
41-50	13932	16191	30,123	18.5
51-60	11692	13820	25,512	15.7
61-70	6157	7291	13,448	8.3
71-80	1916	2273	4,189	2.6
81-90	513	531	1,044	0.6
91-100	155	178	333	0.2
Total	**76565**	**86200**	**1,62,765**	**100**

Table 2 : Gender wise distribution of ADD cases reported in IHIP-IDSP in Tamil Nadu from January 2022 to December 2023, N=1,62,765

Gender	n	%	95% CI
Female	90,149	55.4	5.51 to 5.56
Male	72,513	44.6	4.43 to 4.47
Transgender	103	0.1	0
Total	**1,62,765**	**100**	

19.3% cases are reported in the age group between 31-40 years followed by 18.5% in 40-50 years of age and the lowest number of ADD cases reported in the elderly age group of above 71 years of age. In terms of gender distribution, 55.4% reported among females and 44.6% among males.

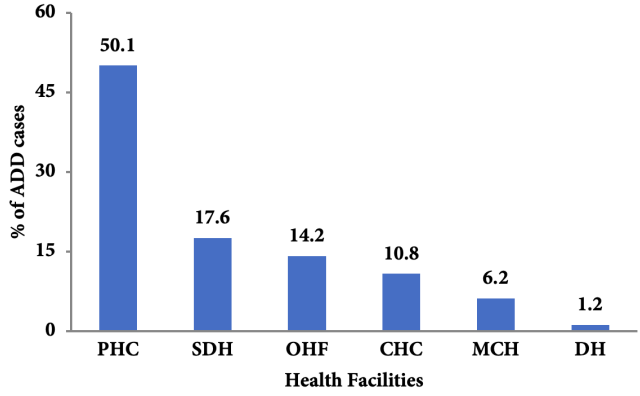

Figure 1: Facility wise % of ADD cases reported in IHIP-IDSP in Tamil Nadu from January 2022 to December 2023, N=162765

About 50.1% of ADD cases reported in Primary Health Centers, followed by 17.6% in Sub-District Hospitals, 14.2% in other Health facilities which includes all private reporting units, 10.8% in Community Health Centers and 6.2% in Government Medical College Hospitals and 1.2% in District Hospitals.

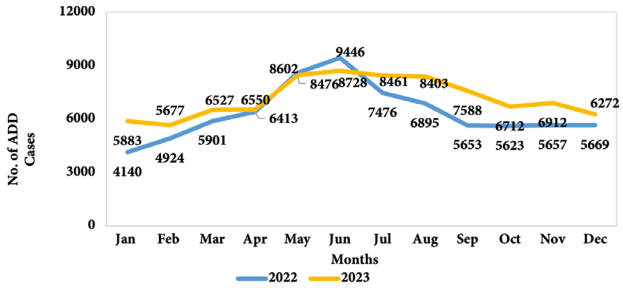

Figure 2: Month Wise Trend of ADD cases reported in IHIP-IDSP in Tamil Nadu from January 2022 to December 2023, N=162765

As per the figure 2, the overall ADD cases reported in the year 2023 is high throughout the year when compared with 2022 except for a dip in the month of May & June. A rising trend is observed from the month of April and peak is observed in the month of June in both years.

Of the total cases reported, four districts viz., Ramanathapuram, Tiruvanamalai, Pudukottai & Villupuram, each district constituted >5% of ADD cases and ADD outbreaks were observed in Villupuram and Pudukottai. Similarly, each of the following district constituted 3-5% of total ADD cases Viz., Tiruchirapalli, Mayiladuthurai, Thanjavur, Madurai, Chennai, Salem, Ranipet, Kallakurichi, & Krishnagiri but ADD outbreaks reported in Tiruchirapalli, Salem, Kallakurichi, Thanjavur & Krishnagiri. 21 districts constituted 1-2% cases of ADD Viz., Erode, Nagapattinum, Dharmapuri, Coimbatore, Theni, Namakkal, Kanchipuram, Tiruppur , Perambalur , Tirunelveli, Tenkasi, Tiruvallur, Tiruvarur, Tuticorin, Tirupathur, Chengalpattu, Sivaganga, Vellore, Virudhunagar, Ariyalur, Karur & Cuddalore and ADD Outbreaks reported in Ariyalur , Chengalpattu, Coimbatore, Kanchipuram , Dharmapuri , Thiruvarur and Vellore

Three districts - Nilgiris, Kanyakumari & Dindigul constituted less than 1% of the total ADD cases reported.

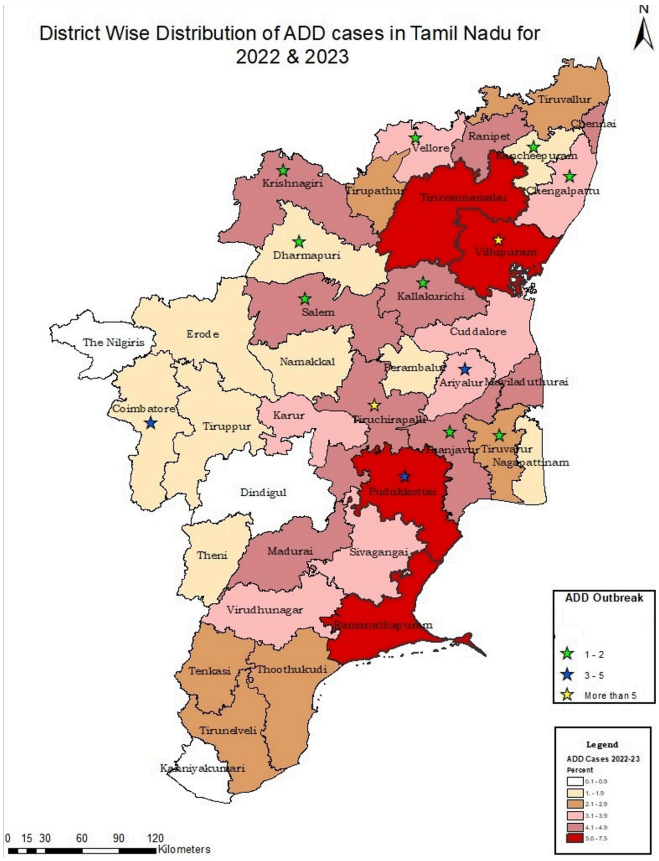

Figure 2: Month Wise Trend of ADD cases reported in IHIP-IDSP in Tamil Nadu from January 2022 to December 2023, N=162765

DISCUSSION

Occurrence of ADD cases and outbreaks are persistent public health challenge imposing a significant burden on both healthcare systems and communities. The country has experienced numerous ADD outbreaks, often with severe consequences, particularly among vulnerable populations. In this study, we have analyzed the data which is collected over the past two years to better understand the pattern of ADD cases reported all over the state and correlated with ADD Outbreaks. Although diarrheal diseases are common in younger age group as per Anandan M et al, which shows maximum number of ADD cases in less than 5 years of age, a study carried out at Tiruvallur District.[11] but in our study it is observed that ADD cases were higher between 31 to 60 age group, it clearly indicates consumption of unsafe water, especially in workplaces where water sanitation may be

compromised. Key factors that contribute to contamination at workplaces include inadequate water filtration, poor hygiene and improper sanitation practices.[12]

Our study findings show high ADD cases reported among female population, this finding is similar to Mohan Anandan, et al who reported a higher rate of acute diarrheal disease among female population[13] it shows women likely to seek medical care than males which leads to higher reported cases in healthcare facilities.

Interestingly, it is observed that in our study the highest number of patients were reported in Primary Health Centre, it indicates that the PHCs are often easily accessible for medical care. Only 1.2% and 6.1% cases were reported in Secondary and Tertiary care institutions respectively and this indicates complications due to ADD is very minimal and it is similar with another study by Jarir At Thobari,et al, carried out at Indonesia.[14]

In this study period, the first upsurge of ADD cases is observed in the month of April and reaches the peak in the month of June which is the similar finding in 2022 & in 2023. It could be due to high temperature during this month which causes water scarcity in many regions and people may resort to use unsafe water resources. Similar findings are also observed in studies Giribabu Dandabathula., et al and DL et al.[15, 16] whereas Pathak., et al. used the field level data from two hospitals and concluded that during the summer and rainy season the probability of diarrheal diseases is higher for part of Ujjain region.[17]

Very few ADD cases in Nilgiris, Dindigul and Kaniyakumari, which could be attributed by several factors like improved sanitation or better Health education in among the population. In Nilgiris, the Environmental and Geographical factor like high altitude region with cooler temperature, it experiences lower incidence of ADD cases which may be due to boiling habit which is a regular practice and it is one of an effective method to eliminate a pathogen especially waterborne pathogens[18] and also the pathogens are less likely to thrive in lower temperature.[19] It appears that the prevalence of ADD cases in the Western belt of Tamil Nadu, specifically in Coimbatore, Salem, Namakkal, Dharmapuri, Krishnagiri, Erode, and Tiruppur, is relatively low (Under 2%). This statistic could indicate various factors such as effective public health measures, socio-economic conditions, or community awareness in this region.

Even though ADD cases were higher in Ramanathapuram, Tiruvanamalai, Pudukottai & Villupuram, only Villupuram had 4 ADD Outbreaks. Ramanathapuram, Tiruvanamalai has not documented ADD outbreaks during the study period, this may be due to better surveillance activity at the district.

LIMITATIONS

The limitations of this study include the reliance on only two years of data, which restricts the ability to identify seasonal trends or expected patterns.

This short time frame may not capture fluctuations due to seasonal variations, long-term trends or other external factors that could influence ADD cases. Future research with a longer time span with information on social, educational and other demographic details could enhance the understanding of these patterns, trends and risk factors attributing to ADD outbreaks and cases.

Patterns of diarrheal cases occur as per the climatic condition of particular location. The seasonality of diarrhea in India, peaked both years during the summer. Diarrheal cases were found to be substantially higher in summer for most part of Tamil Nadu. In this article, IHIP - IDSP data that are available in the web portal have provided a better platform for analyzing the seasonal dependency of the outbreaks.

IHIP- IDSP acts as a ready reckoner for analyzing the pattern of the outbreaks for any communicable diseases in Tamil Nadu by enabling with necessary information which will be useful to the policy makers and administrators to circumvent the effect of morbidity and mortality due to outbreaks or any Health Events.

RECOMMENDATIONS

Education and Awareness Campaigns to the public about the causes, prevention, and management of ADD should be provided with focus on hygiene practices, such as handwashing with soap, safe food preparation, and safe drinking water.

Distribute ORS packets in communities and educate caregivers on their use to prevent dehydration. Establish robust surveillance systems to monitor the incidence of ADD and identify outbreaks quickly.

DECLARATION OF INTEREST

The authors declare no conflict of interest

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