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Patterns of Acute Gastroenteritis (AGE) at Palhinandan Rural Municipality, Kushma, Nawalparasi, Lumbini Province: An Epidemiological Study

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Abstract

Acute gastroenteritis (AGE) remains a major public health concern in Nepal, particularly in rural settings where inadequate sanitation and hygiene continue to increase vulnerability to enteric disease. This study aimed to assess the incidence and distribution of AGE in Palhinandan Rural Municipality using secondary data from the Health Management Information System (HMIS 9.3). Employing a retrospective design, the study reviewed AGE cases recorded over a three-year period and analyzed their monthly, place-wise, and sex-wise distribution patterns. The findings indicate that AGE incidence remained relatively stable throughout the year but exhibited seasonal peaks in Chaitra and Baisakh. Spatial analysis further showed that Ward No. 3 consistently recorded the highest incidence across the three consecutive years, a pattern likely associated with population density and poor sanitation conditions. In terms of sex distribution, females were more frequently affected than males, possibly because of greater exposure to contaminated water and food during household activities. These findings demonstrate meaningful seasonal, spatial, and gender-based variations in AGE incidence within Palhinandan Rural

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Municipality. The study contributes context-specific evidence for local public health planning and underscores the need to strengthen water, sanitation, and hygiene practices, improve data management, expand health education and immunization, and promote early diagnosis and appropriate treatment. Targeted interventions in high-risk wards and among vulnerable groups are essential to reduce the burden of AGE in the community.

Keywords: Acute Gastroenteritis; Nepal; Palhinandan Rural Municipality; Seasonal Distribution; WASH

INTRODUCTION

Gastroenteritis is an inflammation of the stomach and small intestines, usually infectious, marked by diarrhea and vomiting, sometimes with fever (Thomas, 2019; Freedman & TREKK Network, 2019). It may be acute or chronic, caused by viral, bacterial, systemic infections, or other conditions such as malabsorption, autoimmune disorders, or genetic factors (Fidanza & Sables-Baus, 2019). Viral pathogens are the leading cause of acute cases in children, and diarrhea from gastroenteritis remains a major global health issue, causing about two million deaths annually in children under five (Boyce, 2019). Acute gastroenteritis (AGE) ranks as a major cause of morbidity and mortality in children less than five years of age. The burden is higher in developing countries like Nepal owing to poor sanitation and lack of availability of safe drinking water (Farfán-García et al., 2020). Acute kidney injury (AKI) is one of the dreaded complications of AGE. Pre-renal AKI can occur due to hypovolemia as a sequela of dehydration and is the commonest mode of renal injury in AGE (Shahrin et al., 2020). Acute gastroenteritis (AGE) is a leading cause of morbidity and mortality in children under five, with a higher burden in developing countries like Nepal due to poor sanitation and unsafe drinking water (Jha et al., 2021). Acute kidney injury (AKI), particularly pre-renal AKI from hypovolemia secondary to dehydration, is a serious complication and the most common form of renal injury in AGE (Moghtaderi et al., 2014).

Gastroenteritis is the inflammation of the stomach, small intestine, or large intestine, leading to a combination of abdominal pain, cramping, nausea, vomiting, and diarrhoea. Acute gastroenteritis usually lasts fewer than 14 days. This is in contrast to persistent gastroenteritis, which lasts between 14 and 30 days, and chronic gastroenteritis,

which lasts more than 30 days. Pathogens such as bacteria and viruses, as well as chemicals, certain foods, and medications, can irritate the lining of the stomach and intestine, causing acute gastroenteritis (Graves, 2013). Acute Gastroenteritis (AGE) is primarily caused by viruses (50%–70%), with Norovirus and Rotavirus Enteric adenovirus types 40 and 41, Astrovirus, Coronavirus, and Some picornaviruses, while bacteria (15%–20%) like Shigella, Salmonella, Campylobacter, and E. coli (various pathogenic strains), Vibrio (e.g., Vibrio cholerae), Yersinia, and C. difficile (more common after antibiotic use). and parasites (10%–15%) such as Giardia (Giardia lamblia), Amebiasis (Entamoeba histolytica), Cryptosporidium, Isospora, Cyclospora, and Microsporidium (Graves, 2013). Apart from bacteria and viruses certain chemicals like lead, arsenic etc, foods like wild type poisonous mushroom and medications like use of inappropriate antibiotics can also cause acute gastroenteritis (Camilleri & Vijayvargiya, 2020).

Acute Gastroenteritis (AGE) is a major public health concern in Palhinandan Rural Municipality, evidenced by a recent rise in cases from 594 to 640 at Nawalparasi Prithvi Chandra Hospital, with the highest incidence and morbidity observed among children under five years of age. This growing burden necessitates focused research. The study's primary objective is to assess and analyze the epidemiological trend of AGE in the municipality by specifically examining the time trend (by year and month), describing the person distribution (by age and sex), analyzing the place distribution of cases, and calculating the proportion of AGE among all reported cases. These aims are intended to identify factors driving the increasing prevalence and inform effective prevention strategies for the most vulnerable population.

MATERIALS AND METHODS

The study was conducted in Palhinandan Rural Municipality among individuals who visited various health posts and the Primary Health Care Centre over the past three years. It was designed as a cross-sectional study using observation, participation, and literature review from the Health Section of Palhinandan Rural Municipality. The study was carried out over a period of seven days, from 11 to 17 April 2024.

Diagnosing gastroenteritis primarily relies on a clinical assessment supported by a thorough history, physical examination, and lab tests (blood and stool examination). The diagnostic history involves determining the onset, duration, and characteristics of

symptoms (watery, bloody, or mucous stool, frequency, fever, pain, and vomiting) and investigating epidemiological risk factors such as recent travel, hospitalization, antibiotic use, exposure to sick contacts, or consumption of high-risk foods (raw or undercooked items). The physical examination focuses on vital signs—looking for fever and signs of dehydration like tachycardia, orthostatic hypotension, dry mucous membranes, and changes in mental status. Finally, stool examination helps identify the cause by assessing the stool's consistency, color, odor, and quantity, and testing for leukocytes (indicating inflammation) and occult blood, as well as searching for ova and parasites.

RESULTS

The analysis of all collected data was conducted using Microsoft Excel, where raw information was processed, summarized, and presented. This typically involves using Excel's functions to calculate descriptive statistics (like frequencies and percentages) and to generate visual representations such as charts and graphs. The final depicted data provide a clear, structured view of the epidemiological trends of Acute Gastroenteritis (AGE) in the region, including its distribution by time, person (age and sex), and place (wards). This standard analytical approach in Excel allows for accessible interpretation of the study findings.

Time distribution of AGE:

The year-wise distribution of acute gastroenteritis (AGE) cases in Palhinandan Rural Municipality shows a consistently high incidence over the past three years, though with a declining trend. In the year 2077/78, the number of reported cases was around 900, which decreased to about 820 in 2078/79, and further dropped to approximately 700 in 2079/80. This pattern indicates that while AGE remains a significant health problem in the municipality, the incidence is gradually decreasing, possibly due to improved public health interventions, awareness, and preventive measures (Figure 1).

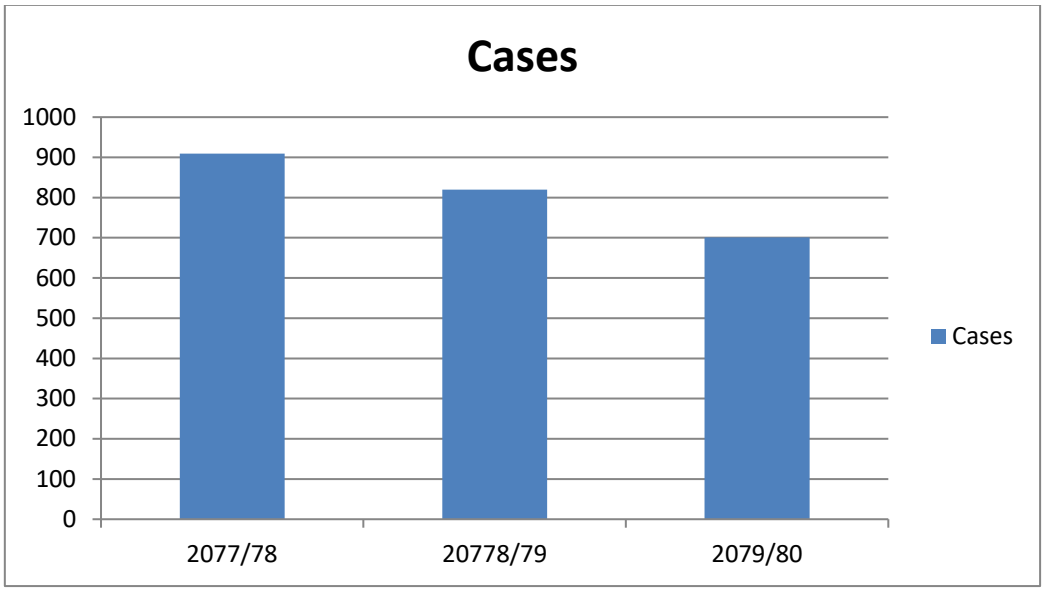


Figure1. Year wise distribution of AGE in Palhinadan Rural Municipality

The figure 2 illustrates the monthly distribution of Acute Gastroenteritis (AGE) cases in Palhinandan Rural Municipality over three fiscal years (2077/78, 2078/79, and 2079/80). The trend indicates that the incidence of AGE remains relatively steady across most months, with slight fluctuations. However, a noticeable rise is observed during the months of Chaitra and Baisakh, particularly in FY 2077/78 and FY 2079/80, where cases sharply increase compared to other months. This suggests a seasonal influence, possibly linked with environmental or behavioral factors that contribute to higher vulnerability during this period. Overall, while the incidence shows month-to-month variations, the peaks in Chaitra and Baisakh highlight the months of greater concern for AGE occurrence.

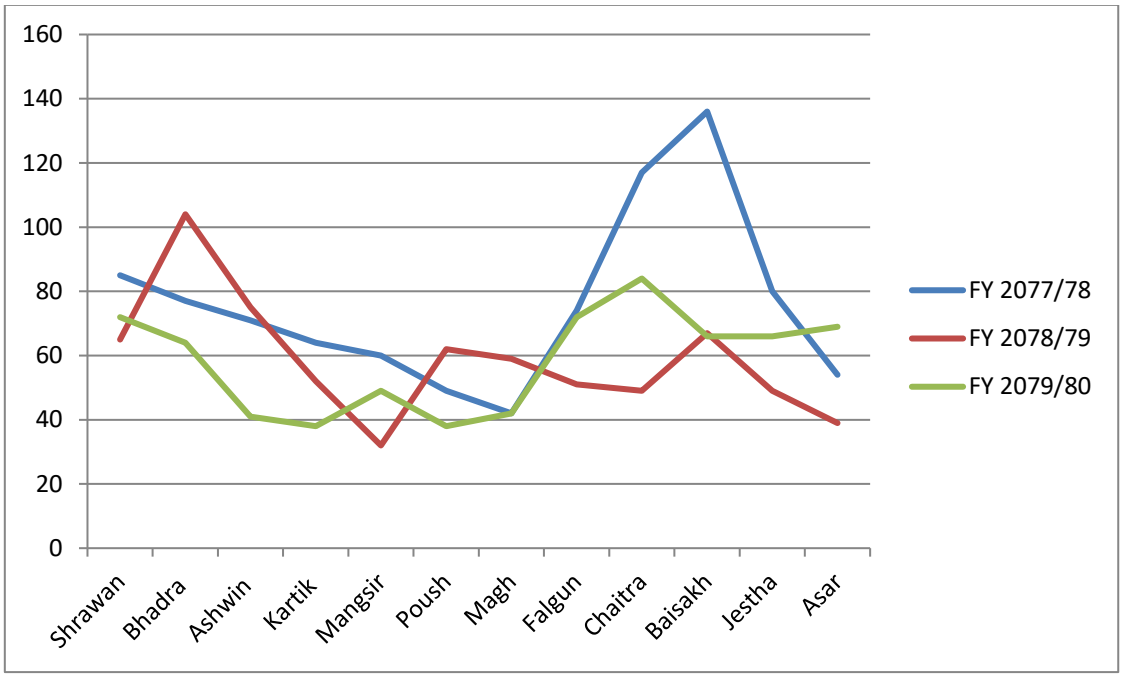


Figure2. Monthly Distribution of AGE in Palhinandan Rural Municipality

Place Distribution of AGE:

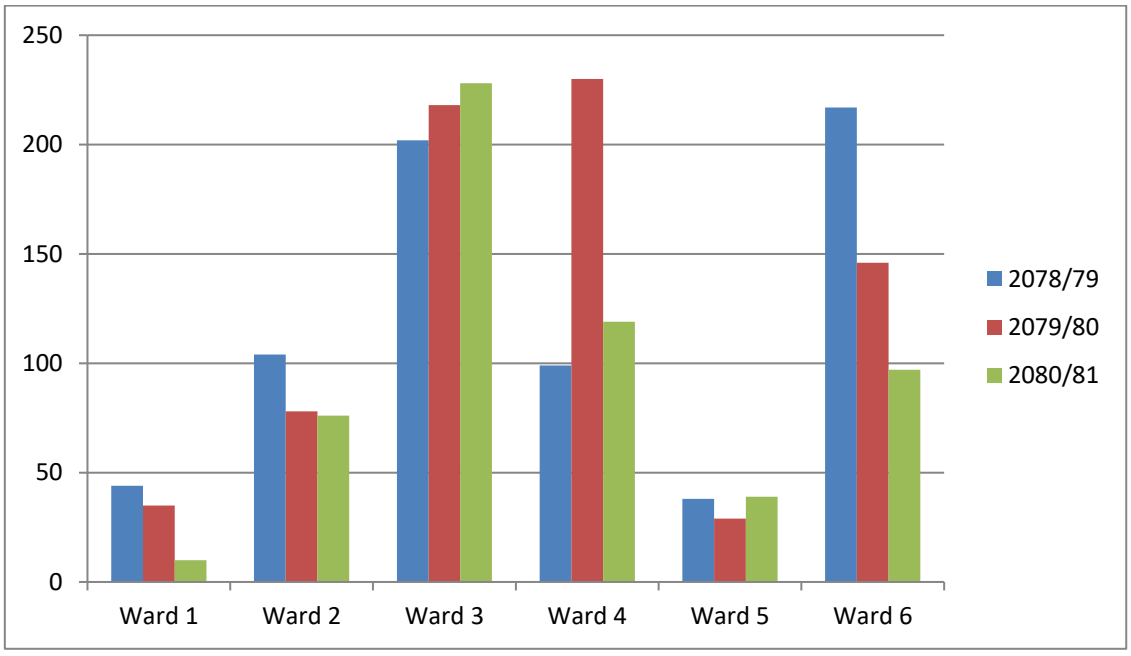


Figure3. Place Distribution of AGE in Palhinandan Rural Municipality

The figure 3 presents the place-wise distribution of Acute Gastroenteritis (AGE) cases in Palhinandan Rural Municipality across three fiscal years (2078/79, 2079/80, and 2080/81). It is evident that Ward no. 3 consistently records the highest number of AGE

cases in all three years, showing a persistent burden of the disease in this area. In contrast, other wards such as Ward no. 1 and Ward no. 5 have comparatively fewer cases, while Wards 4 and 6 also show significant but fluctuating incidence. The consistently high cases in Ward no. 3 may be associated with higher population density, sanitation challenges, or limited access to safe drinking water, making it a hotspot for AGE outbreaks. This indicates the need for targeted public health interventions and improved water, sanitation, and hygiene (WASH) practices in Ward no. 3 to reduce the disease incidence.

Person Distribution of AGE

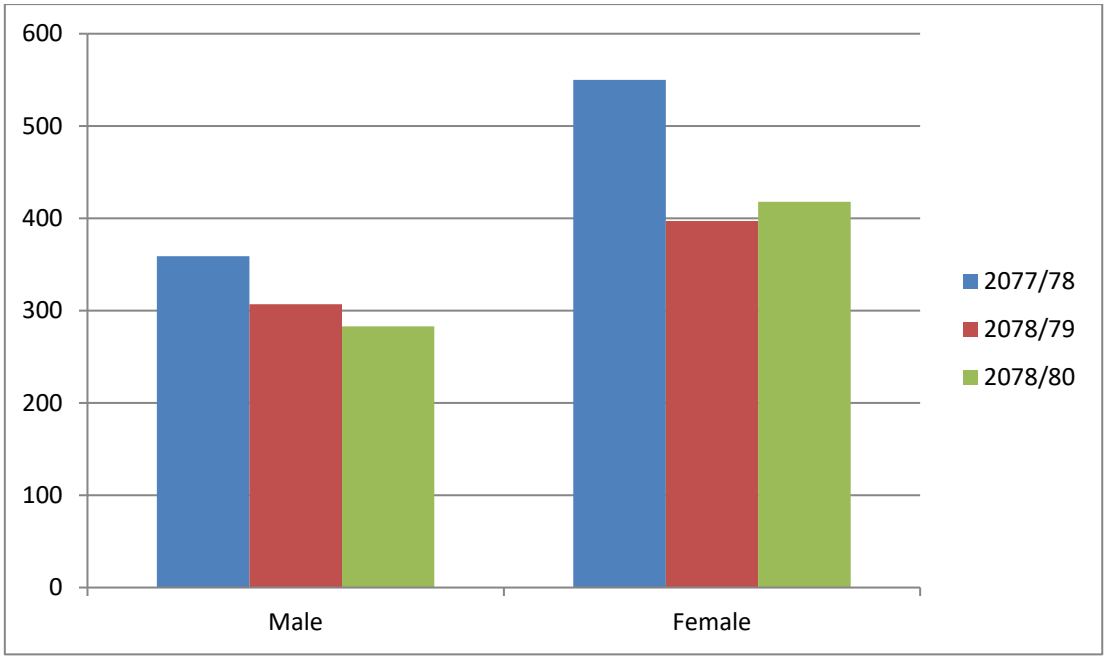


Figure4. Sex Distribution of AGE

The figure 4 illustrates the sex-wise distribution of Acute Gastroenteritis (AGE) cases in Palhinandan Rural Municipality over three fiscal years (2077/78, 2078/79, and 2079/80). It is clear that the incidence of AGE is consistently higher among females compared to males across all years. Although both sexes show a declining trend from 2077/78 to 2078/79, the number of female cases again rises slightly in 2079/80, while male cases continue to decrease. The higher prevalence among females may be linked to greater exposure to household water and food handling activities, as well as possible differences in health-seeking behavior and vulnerability. This highlights the need for gender-sensitive public health interventions, particularly focusing on improving sanitation, hygiene, and awareness among women to reduce the burden of AGE.

DISCUSSION

The present study assessed the incidence and distribution of Acute Gastroenteritis (AGE) in Palhinandan Rural Municipality using secondary data obtained from HMIS 9.3. The findings revealed seasonal, spatial, and gender variations in AGE cases. Monthly distribution showed that AGE incidence remained relatively steady throughout the year but peaked during Chaitra and Baisakh, suggesting a possible link with seasonal changes, food and water contamination, and increased exposure to pathogens during the pre-monsoon period (LaPolt et al., 2025; WHO, 2017). Place-based analysis indicated that Ward no. 3 consistently recorded the highest number of AGE cases across three consecutive years, which may be due to higher population density, poor sanitation, and unsafe water supply in that area. Similar studies in Nepal and other South Asian regions have also reported clustering of diarrheal diseases in densely populated and sanitation-deficient areas (Bhandari et al., 2024; Prüss-Ustün et al., 2019).

Sex-wise distribution showed that females were more affected than males across all years. This could be attributed to women's greater involvement in household chores, food preparation, and water collection, which increase their risk of exposure to contaminated sources. Previous research has highlighted gender differences in diarrheal disease burden, with women often being more vulnerable due to social and behavioral roles (Mahmud et al., 2019; WHO, 2020). Prevention strategies must therefore focus on both primary and secondary measures. Health education, improved sanitation, promotion of hygiene practices, and immunization programs such as rotavirus vaccination are critical to reducing the disease burden (Tang Girdwood et al., 2019; WHO, 2020). Secondary prevention, including early diagnosis, proper investigation, and appropriate antibiotic treatment where indicated, is equally important to prevent complications and control outbreaks.

Acute Gastroenteritis (AGE) is a widespread problem in Palhinandan Rural Municipality, with incidence being higher in females (potentially linked to lower literacy) and peaking in Ward No. 3. The strategy to combat this involves a dual approach: primary prevention (health education on safe water, hygiene, and immunization like the rotavirus vaccine) and secondary prevention (early diagnosis and timely antibiotic use for bacterial infections). A key limitation of the study is its reliance only on reported HMIS data, which likely underestimates the true community disease burden. Therefore, effective control requires improving data management, record-keeping, and surveillance systems, alongside

intensifying community-based health education and WASH interventions, particularly targeting high-incidence areas and vulnerable populations to reduce the impact of AGE.

CONCLUSION

This study highlights the burden and distribution of Acute Gastroenteritis (AGE) in Palhinandan Rural Municipality based on HMIS 9.3 data. The findings indicate that AGE incidence remains steady across months but peaks in Chaitra and Baisakh, with Ward no. 3 consistently reporting the highest number of cases. Furthermore, females were found to be more affected than males across three consecutive years. These patterns suggest that seasonal factors, population density, sanitation conditions, and gender roles may significantly influence disease occurrence. Although the study is limited by reliance on secondary data that may not capture all cases, the results emphasize the urgent need for improved water, sanitation, and hygiene (WASH) practices, community health education, accurate record-keeping, and timely medical interventions. Strengthening preventive measures, along with targeted interventions in high-risk areas and among vulnerable populations, is essential to reduce the incidence and impact of AGE in the community.

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