

PHS 211: Communicable Diseases

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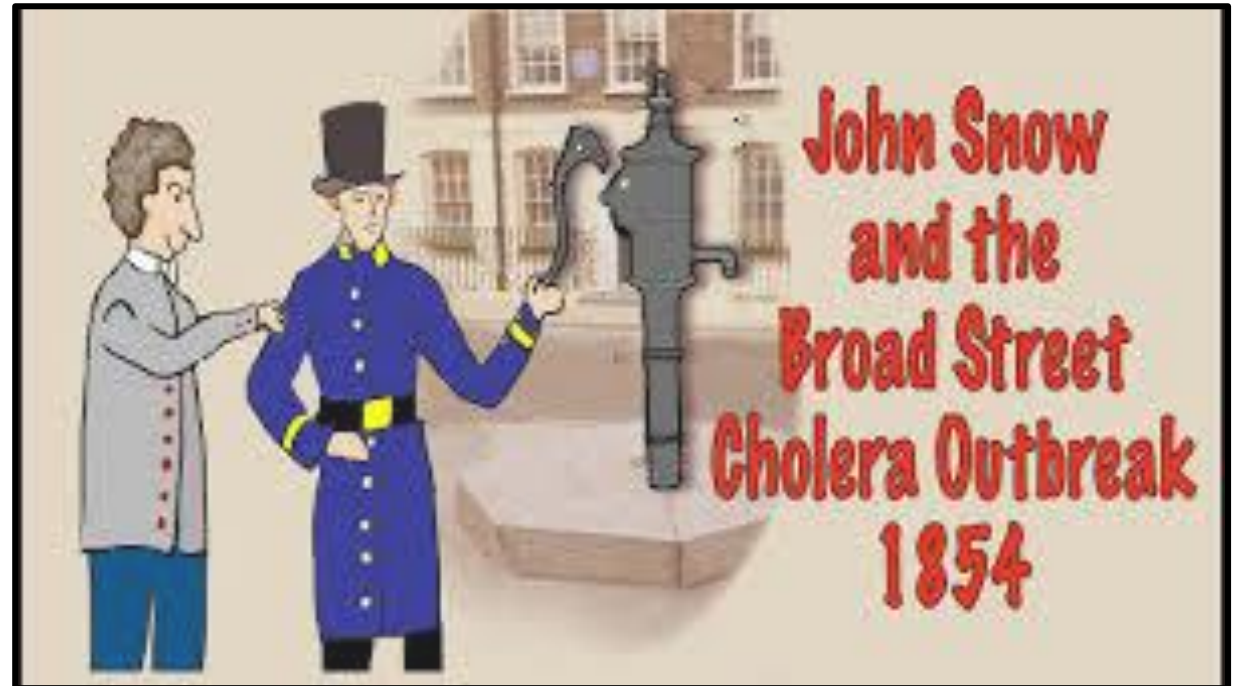
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Course Description

- Upon the successful completion of the course, students will be able to:
- Describe common communicable diseases prevalent in Nepal,
- Explain emerging communicable diseases in context of Nepal and world,
- Identify cause and factors, mode of transmission of communicable diseases, and
- Apply prevention and controlling measures of the communicable disease.

Unit I: Bacterial Diseases

Cholera



Introduction

- Cholera is an acute diarrhoeal infection caused by eating or drinking food or water that is contaminated with the bacterium *Vibrio cholerae*.
- Cholera remains a global threat to public health and is an indicator of inequity and lack of social development. Researchers have estimated that every year, there are 1.3 to 4.0 million cases of cholera, and 21 000 to 143 000 deaths worldwide due to the infection. (WHO)

Introduction

- Cholera is an extremely serious disease that can cause severe acute watery diarrhoea with severe dehydration. It takes between 12 hours and 5 days for a person to show symptoms after consuming contaminated food or water.
- Cholera affects both children and adults and can kill within hours if untreated.

Introduction

- The *Vibrio cholera* has two biotypes and two serotypes but both these are not so important from control point of view.
- The first biotype E1 Tor is the main responsible for pandemic previously but both biotypes are responsible for cholera endemic in Africa and Asia.
- V.Cholera is responsible for 5-10% of diarrhoea among hospitalized cases in all age group
- Mostly affects among 2-9 years age group and mostly severe cases
- In newly affected area, young adults is the sufferers

Situation of Cholera in Nepal

- As of 15th of August 2022 , a total of 52 cases of Cholera has been reported in Nepal from Kathmandu, Lalitpur, Bhaktapur, Nuwakot district and Dhading district. Two new cases of Cholera was detected in last 24 hours in 35 years old females from Kathmandu-21 and Dhading-2.

(<https://reliefweb.int/report/nepal/epidemiology-and-disease-control-division-cholera-outbreak-kathmandu-valley-15th-august-2022#:~:text=As%20of%2015th%20of%20August,%2D21%20and%20Dhading%2D2.>)

3. CHOLERA SITUATION (2022)

- **Jun 2022: Cases are reported in Kathmandu valley (12 cases detected as at 27 Jun 2022)**
 - Epidemiology and Disease Control Division, Ministry of Health and Population in coordination with District and Local Level is conducting an investigation.
 - Multi-sectoral approach with technical guidance from Ministry of Health and Population involving all the sectors such as Local level for community engagement and risk communication, WASH and door to door activities.
 - Similarly, Ministerial level engagement for Water Surveillance, Food Surveillance, Information dissemination etc.

15th August 2022

Ministry of Health and Population
Department of Health Services
Epidemiology and Disease Control Division
Kathmandu, Nepal



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- Two new cases of Cholera was detected in last 24 hours in 35 years old females from Kathmandu-21 and Dhading-2.
- Sukraraj Tropical and Infectious Disease Hospital (STIDH) reported 2 cases on 16 June, 1 case on 17 June, 1 cases on 19 June with an additional case on 21 June 2022. Two cases are residents of Bagbazaar, Kathmandu-28; 1 case is resident of Sanepa, Lalitpur-3; 1 case from Dilibazaar, Kathmandu and 1 case from Boratar, Balaju, Kathmandu-16.
- The first two cases reported from STIDH belonged to same family and household and worked in Dillibazar area in a furnishing shop. Initial field investigation conducted by joint team from Kathmandu DHO, Metropolitan, EDCC, DFTQC and WHO revealed using tap water for drinking purpose without boiling. Initial case investigation of other two cases revealed that source of drinking water was commercial jar water.
- 4 samples of stored tap, Jar and ground water from index case household and workplace found contamination with coliform
- Out of 62 water samples taken and tested jointly by DWSSM, EDCC, KUKL, 41 samples showed contamination with fecal E.coli.
- KVVWSMB conducted spot test of Free Residual Chlorine (FRC) in 21 tankers and out of them, 10 were not detected with FRC.

Age Group	Male	Female
1) 0-4 yrs	1	0
2) 5-14 yrs	6	0
3) 15-24 yrs	6	4
4) 25-34 yrs	4	6
5) 35-44 yrs	4	6
6) 45-54 yrs	3	2
7) 55-64 yrs	3	4
8) 65-74 yrs	2	1

Daily Case Incidence of Cholera Outbreak in Kathmandu Valley

Date of Reporting	Number of Cases
16/06/2022	2
17/06/2022	1
18/06/2022	1
19/06/2022	1
20/06/2022	1
21/06/2022	1
22/06/2022	1
23/06/2022	3
24/06/2022	1
25/06/2022	2
26/06/2022	3
27/06/2022	3
28/06/2022	1
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20/08/2022	1
21/08/2022	1
22/08/2022	1
23/08/2022	1
24/08/2022	1
25/08/2022	1

 Cases **52**
 Related deaths **0**
 Children ≤5 **3**

The map displays the distribution of COVID-19 cases across the Kathmandu Metropolitan Area. The central area is densely populated with red and orange shaded regions, indicating high case counts. Surrounding areas are mostly yellow, indicating lower case counts. Callouts provide specific case counts for several municipalities: Kageshwari Manjhi (n=1), Kirtipur (n=1), Lalitpur (n=5), and others. The map also shows the surrounding regions of Bagmati, Gandaki, and Lumbini.

- On 19th June 2022 EDCCD conducted emergency meeting on preparedness and response of Cholera involving all stakeholders from DoHS, STIDH, Kathmandu HO, and Metropolitan.
- Press brief sent to HEOC and released by MoHP
- Team division and workplan has been formulated after meeting with concerned stakeholders
- On 1st of July 2022 A team from EDCCD along with District team conducted field epidemiological investigation at Kirtipur and brought 6 samples of three cases.
- On 6th July, EDCCD director briefed on cholera outbreak on regular press brief at NTV.
- Booth campaign that was conducted in Ward 13,14,16,28 and 29 of Kathmandu Metropolitan City, 402 households voluntarily brought their drinking water for testing using Presence/Absence (H2S) vial between June 16 to June 23,2022. Out of those tested and results received (76), 10 samples were found positive with coliform, and 66 samples were found to be negative.
- On 29th July 2022, Stakeholders and National WQS committee meeting on water quality surveillance and Cholera Outbreak Response in Kathmandu Valley was held at EDCCD to discuss and review cholera response. All key stakeholder including Kathmandu and Lalitpur HO participated and updated on the ongoing response.

- Continued surveillance and detailed field investigation
- Sit regularly to review progress on response
- Plan for water surveillance and water testing capacity
- Review and update existing guidelines for safe drinking water



Mode of transmission:

- It is a water and food borne disease
- The disease transmitted from one person to another person in over crowded and unhygienic conditions
- V. cholera adhere to mucosa of small intestine, multiply and produce enterotoxin causing diarrhea.



- Water (infectious dose = 10^9)
- Food (infectious dose = 10^3)
- Person-to-person

Signs and symptoms

Large and frequently discharge
of watery diarrhoea associated
with vomiting

Most people remain asymptomatic. The symptoms of cholera include :



profuse, watery
diarrhea



stomach
pains



leg cramps



Mild fever



Vomiting



Sunken eyes
and cheeks



Dry mucous
membranes



Decreased
urinary output

Prevention

- Drinking and use safe water
- Wash hands often soap and safe water
- Use latrines or bury feces; do not defecate in any body of water
- Cook food well (especially seafood), keep it covered, eat it hot and peel fruits and vegetables
- Clean up safety- in the kitchen and in places where the family bathes and washes clothes

Prevention

- Basic health education and hygiene
- Mass chemoprophylaxis
- Provision of safe water and sanitation
- Comprehensive multidisciplinary approach: water, sanitation, education and communication.
- **Oral cholera vaccines is used in conjunction with improvements in water and sanitation to control cholera outbreaks and for prevention in areas known to be high risk for cholera.**

Treatment

- Tetracycline, I.V saline and ORS very frequently



THANK YOU

Enteric Fever

Introduction

- It is a systemic infection with typical continuous fever for 3 to 4 weeks.
- Enteric fever includes both typhoid and paratyphoid fever.
- It may be sporadic, endemic or epidemic in nature.



Problem Statement

- Enteric fever, also known as typhoid fever, is a common infectious disease in low and middle income countries.
- About 14 million people are affected annually with 136 000 deaths, mainly in low and middle income countries, according to estimates from the Global Burden of Disease Study in 2017.

GBD 2017 Typhoid and Paratyphoid Collaborators The global burden of typhoid and paratyphoid fevers: a systematic analysis for the Global Burden of Disease Study 2017. Lancet Infect Dis 2019;19:369-81. doi:10.1016/S1473-3099(18)30685-6 pmid:30792131

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- According to the recent estimates published in 2014, approximately 21 million cases and 222000 typhoid-related deaths occur annually worldwide.

(According to the World Health Organization (WHO) report published in 2014)

Problem Statement in Nepal

Burden of Typhoid in

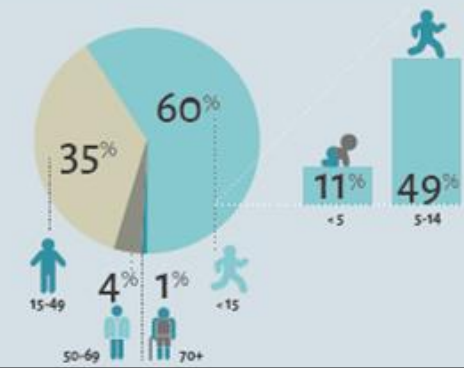
Nepal

Nepal is a typhoid-endemic country and is estimated to have one of the highest burdens of typhoid in the world. The Global Burden of Disease study estimated that, in 2019, there were at least:

82,449 typhoid cases (271 cases per 100,000)
919 typhoid deaths
68,186 disability-adjusted life-years (DALYs) lost to typhoid¹



TYPHOID CASES IN NEPAL BY AGE (2019)



Problem Statement in Nepal

- In 2001 outbreak of typhoid occurred only in Dhanusa district in Shrawan. 100 cases were diagnosed by widal test.
- In 2002 outbreak in Chitwan district occurred with total 5835 cases out of which 4 deaths occurred.

Epidemiological Determinants

Agent:

- *Salmonella typhi* and *Salmonella paratyphi A* & *Salmonella paratyphi B*
- Can be killed by drying, pasteurization & common disinfectants.

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Reservoir of Infection:

- Cases: mild, moderate or severe.
Case is infectious as long as bacilli appear in the stool or urine.
- Carrier: Can be temporary or chronic.
 - In most of the cases, organism persist in gall bladder & in biliary tract.
 - A chronic carrier case can be expected to develop in 2 to 5% of the cases.
 - Chronic carrier can excrete bacilli for many years even upto 50 yrs.

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Source of Infection:

- Feces & urine of cases or carrier
- Secondary sources-contaminated water, food fingers & flies.
- Not excreted in sputum.

Host Factor:

a) Age: Any age

- Highest in 5 to 19 years of age.

b) Sex: More males than females due to exposure.

- Carrier state higher in female.

c) Immunity: Antibody may be stimulated by infection or immunization.

- Natural typhoid fever does not always confer solid immunity; second attack may occur when challenged with large oral dose.
- Gastric acidity & local intestinal immunity provide resistance.

Environmental & Social Factor:

- Peak from July to September (rainy season)
- Outside human body, bacilli are found in water, ice, food, milk & soil for varying period of time.
- Typhoid bacilli do not multiply in water, it might die within 48 hours, but some may survive for about 7 days.
- They may survive for over a month in ice/cream.

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- Food being bad conductor of heat provide shelter to bacilli which may multiply & survive for sometimes in food.
- Grows rapidly in milk without altering its taste & appearance
- Vegetables grown in sewage farm or washed in contaminated water are a positive health hazard.

Incubation period

- Usually 10 to 14 days.
- May be short as 3 days or long as 3 weeks depending on the dose of bacilli ingested.

Mode of Transmission:

- Fecal-oral route/urine-oral route
- Contaminated finger, food, soil, water, milk, flies etc.

Clinical features

- In children with abrupt chills & high fever.
- At prodromal stage- Malaise, headache, cough & sore throat often with abdominal pain & constipation.
- After 7 to 10 days, fever reaches a plateau & patient look toxic appearing exhausted.
- May be constipation on early stage or **pea soup diarrhoea**.
- If no complication, patient condition improves over 7 to 10 days.
- Relapse may occur for up to 2 weeks after termination of therapy.

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- Rash (rose spot) commonly appear during 2nd week of disease. Especially found in trunk region which disappears in 3-4 days.
- Intestinal hemorrhage may cause with drop in temperature & sign of shock, followed by dark or fresh blood in the stool.
- Intestinal perforation may cause after 3rd week.

Diagnosis

Diagnosis of typhoid fever is made by

- Blood, bone marrow, or stool cultures test (microbiological)
- Widal test (serological)
- Slide agglutination
- Antimicrobial susceptibility testing (quick and reliable)

Control of Typhoid

- Control of Reservoir
- Immunization

Control of reservoir

a) Cases:

- ❑ Cases should be isolated till three bacteriologically negative stools & urine report are obtained on 3 separate days.
- ❑ Treatment: Fluoroquinolone (More effective than former first line drug: Chloramphenicol, Ampicillin, Amoxicillin & TMP-SMX)
- ❑ Disinfection: Stool & urine. Disinfection with 5% cresol for at least 2 hours.
 - All soiled clothes should be soaked in solution of 2% chlorine & steam sterilized.
 - Nurses & doctors should not forget too disinfect their hands.

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b) Carrier:

- ☐ Treatment: Carrier should be given an intensive course of Amphotericin or Amoxicillin together with probenecid for 6 weeks.
- ☐ Surgery: Cholecystectomy, Nephrectomy
- ☐ Health Education
- ☐ Sanitation

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Immunization- Typhoid Vaccine

- Not 100% but lowers incidence & seriousness of infection.
- Can be given in any age more than 2 years.
- Recommended to high-risk groups: those living in endemic areas, household contacts, hospital staff, school children, travellers etc.

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Vaccination

First type: Vi Polysaccharide Vaccine

- Contains killed *Salmonella typhi* bacteria.
- Administered by a shot.

Second type: The Ty21a Vaccine

- Contains a live but weakened strain of the *Salmonella* bacteria that causes typhoid fever.
- Taken orally.



Diarrhea



Introduction

- According to WHO, Diarrhea is defined as “Passage of 3 or more loose stools per day or passing more stools than normal for the age”.
- For adults stool weight >200 g/d can generally be considered diarrhea.
- Frequent passage of normal stool is no diarrhea.

CLINICAL TYPES OF DIARRHOEAL DISEASE

- **Acute watery diarrhoea** - which lasts several hours to days; the main danger is dehydration, weight loss also occurs if feeding is not continued. The pathogens that usually cause acute diarrhoea include *V. cholerae* or *E. coli* bacteria, as well as rotavirus.
- **Acute bloody diarrhoea** - which is also called dysentery the main dangers are damage of the intestinal mucosa, sepsis and malnutrition; other complications including dehydration, may also occur. It is marked by visible blood in the stools. The most common cause of bloody diarrhoea is **shigella**,

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- **Persistent diarrhoea** - which lasts 14 days or longer. The main risk is malnutrition and serious non-intestinal infection, dehydration may also occur. Persons with other illness, such as AIDS, are more likely to develop persistent diarrhoea.
- **Diarrhoea with severe malnutrition (Marasmus and Kwashiorkor)** - The main dangers are severe systemic infection, dehydration, heart failure, and vitamin and mineral deficiency.

- As per IMNCI national protocol, diarrhoea has been classified into three categories:

No Dehydration

Some Dehydration

Severe Dehydration

(Source: Annual Report DoHS, FY 2078/79)

Problem Statement-Global

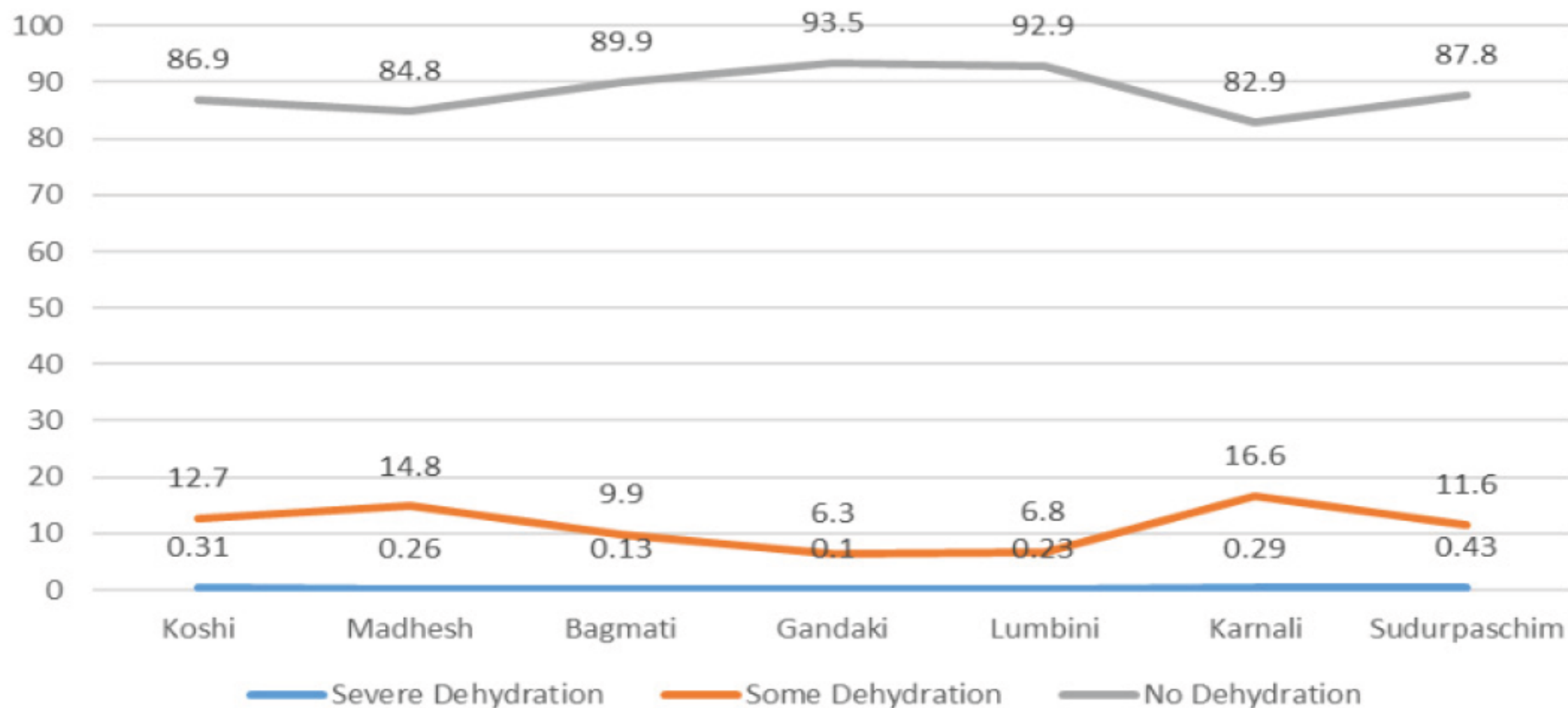
- Diarrhoeal disease is the second leading cause of death in children under five years old. It is both preventable and treatable.
- Each year diarrhoea kills around 525 000 children under five.
- A significant proportion of diarrhoeal disease can be prevented through safe drinking-water and adequate sanitation and hygiene.
- Globally, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year.
- Diarrhoea is a leading cause of malnutrition in children under five years old.
 - Total deaths due to Diarrhoeal diseases of 370,000 children in 2019.

(Source: <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>)

Problem Statement in Nepal

- A total of 923861 diarrhoeal cases were reported In FY 2078/79.
- While there was a decreasing trend in diarrhoeal cases in all provinces in FY 2078/79.
- More than three fourth (87.67%) were classified as having no dehydration, about one fifth (12%) some dehydration. Severe dehydration remained below 1% across all provinces and at national level as well.

Province wise Diarrhoral classification in FY 2078/79



Epidemiological determinants

Agent factors:

- Diarrhoea is almost universally infectious in origin. A wide assortment of organisms cause acute diarrhoea, and many of them have been discovered only in recent years such as rotaviruses and campylobacters.

Infections causing diarrhoea

1. Viruses :

Rotaviruses
Astroviruses
Adenoviruses
Caliciviruses
Coronaviruses
Norwalk group viruses
Enteroviruses
Cytomegalovirus

3. Others :

E. histolytica
Giardia intestinalis
Trichuriasis
Cryptosporidium SPP
Intestinal worms
Cyclospora

2. Bacteria :

Campylobacter jejuni
Enterotoxigenic Escherichia coli
Shigella
Salmonella
Vibrio cholerae
Vibrio parahaemolyticus
Bacillus cereus
Staphylococcus aureus
Clostridium perfringens
Enterohaemorrhagic E. coli
Clostridium difficile
Enteroinvasive E. coli
Aeromonas
Yersinia enterocolitica
Chlamydia
Neisseria gonorrhoeae

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Host factors:

- Diarrhoea is most common in children especially those between 6 months and 2 years.
- Incidence is highest in the age group 6-11 months, when weaning occurs. It reflects the combined effects of declining levels of maternally acquired antibodies, the lack of active immunity in the infant, the introduction of contaminated food, and direct contact with human or animal feces when the infant starts to crawl.
- Diarrhoea is more common in persons with malnutrition. Malnutrition leads to infection and infection to diarrhoea which is a well known vicious cycle.

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Environmental factors:

- Frequently during the warm season, whereas viral diarrhoea, particularly diarrhoea caused by rotavirus peak during the winter.
- In tropical areas, rotavirus diarrhoea occurs throughout the year, increasing in frequency during the drier, cool months, whereas bacterial diarrheas peak during the warmer, rainy season.

Mode of transmission

- Fecal – oral route
- Ingestion of contaminated food, water or by contact with hands faecal contaminated
- **Reasons of causing diarrhea:**
 - Inadequate water supply, poor personal and domestic hygiene
 - Improper food preparation and storage of food
 - Poor weaning practices – early cessation breast feeding, bottle feeding)
 - Malnutrition, immunodeficiency, immunological suppression
 - Genetic factors

Common Signs and Symptoms

- Nausea and Vomiting
- Loss of Appetite
- Bloating and gas
- Abdominal cramps and pain
- Fever

DIARRHEA

Symptoms of Diarrhea



Diagnostic Evaluation of Diarrhea

- History taking
- Physical examination
- Stool examination
- Stool culture
- Blood tests

Prevention and Control of Diarrhea

- Access to safe drinking water
- Hand washing with soap
- Use of improved sanitation
- Exclusive breastfeeding for the first six months of life
- Good personal and food hygiene

Prevention and Control of Diarrhea

- Flies control
- Health Education about how infections spread
- Rotavirus Vaccination

Treatment of Diarrhea

- Diarrhoeal cases treated with Zinc+ORS.
- Use of oral rehydration therapy.
- Vitamin A supplementation coverage rate (percent full coverage) 6 to 59 months.

