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Norovirus: A Global Health Concern - Part I

This is the first article of two in a series on "Norovirus: A Global Health Concern"

Noroviruses, formerly known as *Norwalk viruses*, are one of the most important causes of acute gastroenteritis (AGE) worldwide. Belonging to the *Caliciviridae* family, alongside *Sapoviruses*, these viruses are very small, only 30 to 35 nanometers in size and consist of a single-stranded, linear RNA genome surrounded by a non-enveloped icosahedral capsid. Despite their small size, noroviruses are responsible for hundreds of millions of cases of diarrheal disease globally each year, affecting people of all ages.

Norovirus infection is often called the "stomach flu," but it is unrelated to influenza. It is highly contagious, requiring only a few viral particles to cause illness, and spreads rapidly in communities, healthcare settings, and households. The disease is usually self-limiting in healthy people, but in vulnerable populations such as infants, older adults, and immunocompromised individuals, norovirus can lead to severe dehydration, hospitalisation, and even death.

Genetic Diversity and Classification:

Noroviruses are genetically diverse, which complicates prevention and vaccine development. Currently, there are at least seven known Geno groups (GI–GVII), further divided into more than 30 genotypes. Human infection is caused mainly by Geno groups GI and GII, with some limited involvement of GIV. Within these groups, genotype GII.4 is the most common worldwide and is responsible for large outbreaks.

Variants of GII.4 appear and spread globally in waves, leading to recurring epidemics. Other genotypes, such as GII.2, GII.3, and GII.6, also circulate and cause a significant proportion of infections. This genetic variability helps the virus evade immunity, meaning people can be infected multiple times during their lifetime. Immunity following infection is usually short-term and type-specific, so long-lasting protection does not occur.

Global Burden of Disease

Norovirus is one of the leading global causes of gastroenteritis. Each year, an estimated 685 million cases occur worldwide, including more than 200 million cases in children. The virus contributes significantly to hospitalisations, healthcare costs, and productivity losses.

In high-income countries, norovirus is a major cause of foodborne illness and healthcare-associated outbreaks. In low- and middle-income countries, the burden is even higher due to challenges with sanitation, clean water access, and limited healthcare resources. Norovirus outbreaks also follow seasonal patterns:

- Northern Hemisphere: outbreaks peak between November and April.
- Southern Hemisphere: outbreaks peak between April and September.

Equatorial regions: no clear seasonal pattern.
This seasonality suggests that environmental factors, such as cooler weather and increased indoor crowding, may influence transmission.
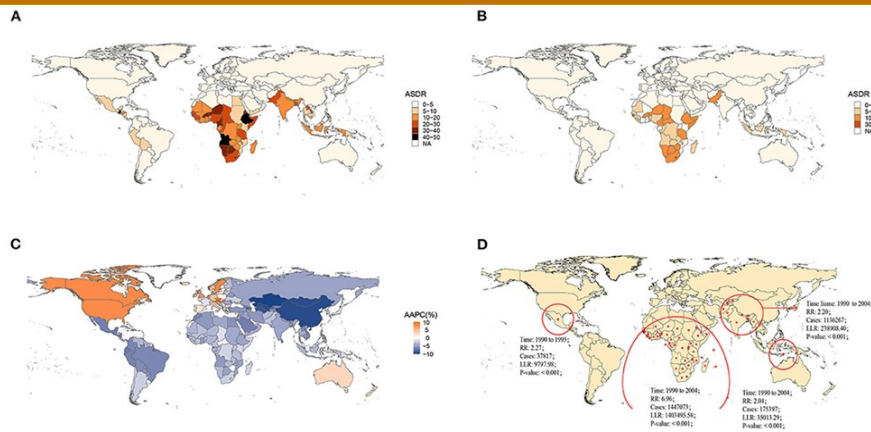
Global Burden (1990-2019) / Age-standardised Death Rate Maps & Trends

This shows how norovirus-associated death rates (ASDR) vary over time across different countries, with maps comparing 1990 vs 2019, and trend plots.

Picture credit to: Global burden and trends of norovirus-associated diseases from 1980 to 2021, an observational trend by Menglan Zhu

- **Panel A & B**: Maps of **age-standardised death rates (ASDR)** due to norovirus in 1990 (A) and 2019 (B). The darkest shades (Africa and parts of South Asia) indicate the highest death rates, highlighting that low-resource regions bear the heaviest burden.
- **Panel C:** The **average annual percentage change (AAPC)** in ASDR from 1990 to 2019. Blue regions show declining mortality rates, while orange regions (like North America) indicate increases or slower declines.
- **Panel D**: Global **spatiotemporal clusters** of norovirus mortality from 1990–2004, identifying hotspots in Sub-Saharan Africa, South Asia, and parts of Latin America.

Overall, the maps highlight that while many high-income countries have seen improvements, **Sub-Saharan Africa and South Asia remain hotspots for norovirus-related mortality.**

Transmission and Spread:

This diagram highlights the main transmission pathways from infected people to uninfected:
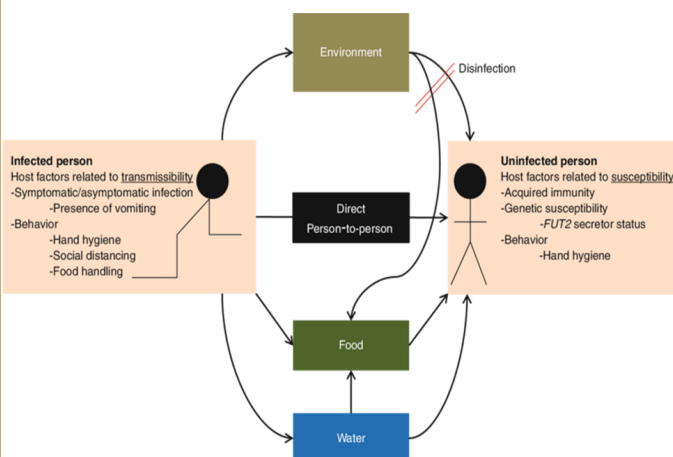

Photo credit goes to: article on Noroviruses, Sapoviruses, and Astroviruses, Ben A. Lopman, Jan Vinjé, and Roger I. Glass

Norovirus spreads primarily through the faecal-oral route. Transmission occurs in several ways:

- Eating or drinking food and water contaminated with the virus.
- Direct contact with an infected person, such as caring for them or sharing utensils.
- Touching contaminated surfaces and then touching the mouth or nose.

The virus is highly infectious, with only a small number of particles needed to cause disease. It is also very stable in the environment, surviving on surfaces and in water for extended periods. This resilience makes outbreaks especially hard to control in closed or crowded settings, such as nursing homes, hospitals, daycare centres, schools, and cruise ships.

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References:

1. https://my.clevelandclinic.org/health/diseases/17703-norovirus

2. GBD (Global Burden of Disease 2016 Diarrheal Disease Collaborators) (2018). Estimates of the global, regional, and national morbidity, mortality, and etiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Infect Dis. 18:1211–28.

3. https://www.mayoclinic.org/diseases-conditions/norovirus/symptoms-causes/syc-20355296

4. WHO ESTIMATES OF THE GLOBAL BURDEN OF FOODBORNE DISEASES

5. Background document for the WHO Guidelines for drinking-water quality and the WHO Guidelines on sanitation and health

6. https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2024.1483149/full

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Table 1: Selected notifiable diseases reported by Medical Officers of Health 19th – 25th July 2025 (30th Week)

RDHS	Dengue Fever		Dysentery		Encephalitis		En. Fever		F. Poisoning		Leptospirosis		Typhus F.		Viral Hep.		H. Rabies		Chickenpox		Meningitis		Leishmania-		Tuberculosis		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	237	7774	2	20	1	6	0	9	6	30	10	299	0	5	0	13	0	0	16	340	2	42	0	3	51	1182	100	100
Gampaha	175	5067	2	30	0	25	0	1	3	126	22	500	1	9	2	13	0	0	17	536	2	99	1	28	34	691	100	100
Kalutara	53	1622	0	28	0	6	1	13	0	42	3	422	0	2	0	4	0	0	19	567	2	32	0	1	10	355	93	99
Kandy	168	2802	1	38	0	3	1	6	1	22	4	189	1	38	0	7	0	0	13	325	1	18	1	42	6	395	100	100
Matale	27	847	0	19	0	1	0	0	0	50	4	161	0	4	0	7	0	0	7	85	0	7	8	182	11	95	100	100
Nuwara Eliya	18	218	2	60	0	5	0	4	0	50	6	86	1	43	1	1	0	0	7	176	0	21	0	0	3	165	92	100
Galle	66	1363	0	28	0	3	0	4	1	49	11	528	2	54	0	8	1	0	26	494	4	108	0	3	7	293	100	100
Hambantota	31	620	1	20	0	5	0	0	0	4	8	269	1	21	0	9	0	0	14	220	1	18	11	186	3	90	100	100
Matara	42	1099	0	11	0	2	0	1	0	10	4	322	0	12	1	11	0	0	9	259	2	28	4	66	5	101	100	100
Jaffna	19	854	2	60	0	2	0	11	0	39	0	125	9	392	0	2	2	0	6	249	3	19	0	0	8	134	93	93
Kilinochchi	1	70	0	11	0	1	0	4	0	5	0	61	0	11	0	1	0	0	0	4	0	0	0	2	0	31	100	100
Mannar	4	121	0	5	0	0	0	0	0	2	1	21	0	14	0	0	0	0	0	17	0	12	2	4	0	31	100	100
Vavuniya	0	64	0	9	0	0	0	1	0	36	0	67	0	8	0	0	0	0	1	33	0	15	0	14	0	35	100	100
Mullaitivu	0	48	0	5	0	0	0	1	0	23	1	52	0	8	0	0	0	0	1	22	0	5	1	3	0	21	100	100
Batticaloa	6	1502	3	101	0	14	0	0	0	146	0	83	0	2	0	20	0	0	3	138	0	25	0	1	7	89	100	100
Ampara	5	183	3	35	0	10	0	0	2	17	11	160	1	3	0	6	1	0	12	141	1	31	1	20	1	35	86	100
Trincomalee	7	876	0	35	0	2	0	1	33	65	2	115	0	9	0	5	0	0	1	85	1	11	0	5	8	85	100	100
Kurunegala	84	1145	0	34	0	13	0	1	0	29	15	510	0	23	0	6	1	0	20	547	2	106	11	370	6	209	97	100
Puttalam	12	447	0	22	0	3	0	0	0	5	2	197	0	31	0	1	1	0	5	105	1	63	0	22	3	116	92	99
Anuradhapura	11	415	0	26	0	6	0	3	1	27	6	300	0	19	0	12	0	0	5	217	0	46	24	487	5	178	91	100
Polonnaruwa	15	253	0	12	0	5	0	1	0	8	4	208	0	1	0	18	0	0	4	123	0	15	9	266	6	55	88	90
Badulla	20	550	0	22	0	8	0	3	4	6	5	207	1	21	7	44	0	0	9	273	1	48	4	37	10	182	94	100
Monaragala	17	598	1	17	0	3	0	0	0	4	12	419	1	26	2	21	0	0	17	113	2	37	1	127	1	81	82	100
Ratnapura	99	3448	1	82	0	6	0	3	3	50	26	1005	1	22	1	11	1	0	18	297	2	79	0	123	8	257	95	100
Kegalle	33	1025	1	47	0	12	0	9	0	32	13	508	1	10	2	15	0	0	20	572	3	76	0	22	6	174	91	100
Kalmunai	3	297	1	24	0	5	0	5	0	18	1	79	0	1	0	3	1	0	8	109	2	35	0	0	2	81	100	100
SRILANKA	**1153**	**33308**	**20**	**801**	**1**	**146**	**2**	**76**	**54**	**895**	**171**	**6893**	**20**	**789**	**16**	**238**	**8**	**0**	**258**	**6047**	**32**	**996**	**78**	**2014**	**201**	**5161**	**96**	**99**

Table 2: Vaccine-Preventable Diseases & AFP   **19th – 25th July 2025 (30th Week)**

Disease	No. of Cases by Province									Number of cases during current week in 2025	Number of cases during same week in 2024	Total number of cases to date in 2025	Total number of cases to date in 2024	Difference between the number of cases to date in 2025 & 2024
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	01	00	00	00	00	0	00	00	00	01	01	37	41	-9.7%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Mumps	00	01	01	00	00	00	00	00	00	02	04	153	166	-7.8 %
Measles	00	00	00	00	00	00	00	00	00	00	05	01	231	-99.5%
Rubella	00	00	00	00	00	00	00	00	00	00	00	04	02	-100%
CRS**	00	00	00	00	00	00	00	00	00	00	00	01	00	0 %
Tetanus	00	00	00	00	00	01	00	00	00	01	00	05	04	25 %
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0 %
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	04	06	33.3 %
Whooping Cough	01	00	00	00	00	00	00	00	00	01	02	14	36	-61.1 %

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

RDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,

Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis

CRS** =Congenital Rubella Syndrome

NA = Not Available

Take prophylaxis medications for leptospirosis during the paddy cultivation and harvesting seasons.

It is provided free by the MOH office / Public Health Inspectors.

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