

Rotavirus in the time of SARS-CoV-2: The South African story (2018-2022)

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A division of the National Health Laboratory Services

14th International Rotavirus Symposium

March 2033









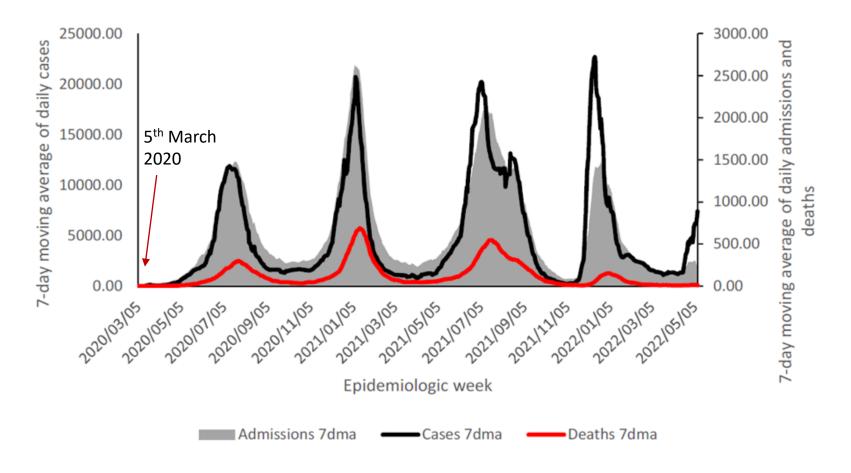
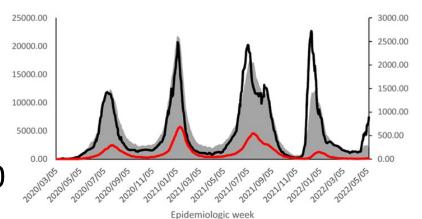


Figure 1: 7-day moving average of SARS-CoV-2 cases, COVID-19 admissions and in-hospital deaths, South Africa, 5 March 2020-7 May 2022.

(Figure 1; https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/weekly-hospital-surveillance-datcov-update/).

Government mandated alert levels and dates of implementation

- Level 5: 27th Mar 30 Apr 2020
- Level 4: 1st May 31st May 2020
- Level 3: 1st Jun 31st Aug 2020
- Level 2: 18th Aug 20th Sep 2020
- Level 1: 21st Sep 28th Dec 2020



- Adjusted level 3: 29th Dec 2020 28th Feb 2021
- Adjusted level 1: 1st Mar 30th May 2021
- Adjusted level 2: 31st May 15th Jun 2021
- Adjusted level 3: 16th Jun 27th Jun 2021
- Adjusted level 4: 28th Jun 25th July 2021
- Adjusted level 3: 26th Jul 12th Sep 2021
- Adjusted level 2: 13th Sep 30th Sep 2021
- Adjusted level 1: 1st Oct 2021 4th Apr 2022

SUMMARY OF ALERT LEVELS

ALERT LEVEL 5	ALERT LEVEL 4
measures to contain the spread of the virus and save lives.	Extreme precautions to limit community transmission and outbreaks, while allowing some



Drastic

SECTORS PERMITTED

Only essential services as per existing regulations.

All essential services, plus a limited number of sectors with a low rate of transmission and high economic or social value.



RETAIL PERMITTED

(including stores, eCommerce and informal traders)

Only essential goods, including food, medical products, cleaning and hygiene products, fuel, and winter goods such as blankets and heaters.

All essential goods, as well as educational books, stationery, office supplies, IT equipment (including computers and mobile phones), children's clothing winter goods such as clothing, bedding and heaters, and textiles required to produce masks. Restaurants and fast food outlets may open for delivery only.



⊘ MOVEMENT

You must stay at home unless you are an essential worker. You may leave home only to purchase essential goods or seek medical care.

No inter-provincial movement of people, except for transportation of goods and exceptional circumstances (e.g. funerals).

You must stay at home except to go to work, do shopping where necessary, or seek medical care.

No inter-provincial movement of people, except to return to usual place of residence, for transportation of goods and exceptional circumstances (e.g. funerals).

Curfew in place between 8pm and 5am, except for essential workers.

Walking, jogging and cycling permitted between 6am and 9am, but not in groups.



GATHERINGS

All public gatherings are prohibited.

All public gatherings are prohibited.



TRANSPORT

Bus services, taxi services, e-hailing and private motor vehicles may operate at restricted times, with limitations on vehicle capacity and stringent hygiene requirements.

Passenger rail, bus services, taxi services, e-hailing and private motor vehicles may operate subject to directions.



Directions issued by the Minister of Basic Education and Minister of Higher Education, Science and Innovation.

SUMMARY OF ALERT LEVELS

ALERT LEVEL 4	ALERT LEVEL 3
Extreme precautions to limit community transmission and outbreaks, while allowing some activity to resume.	Strict precautions to keep transmission low, and additional measures to contain outbreaks in hotspots.



SECTORS PERMITTED

All essential services, plus a limited number of sectors with a low rate of transmission and high economic or social value.

All economic activity is permitted, with a few exceptions where the risk of transmission is high.



RETAIL PERMITTED (including stores, eCommerce and informal traders)

All essential goods, as well as educational books, stationery, office supplies, IT equipment (including computers and mobile phones), children's clothing, winter goods such as clothing, bedding and heaters, and textiles required to produce masks. Restaurants and fast food outlets may open for delivery only.

All retail permitted, with strict health protocols in place. Alcohol will be sold under strict conditions and on specified days.



MOVEMENT

You must remain at home except to go to work, do shopping where necessary, or seek medical care.

No inter-provincial movement of people, except to return to usual place of residence, for transportation of goods and exceptional circumstances (e.g. funerals).

Curfew in place between 8pm and 5am, except for essential workers.

Walking, jogging and cycling permitted between 6am and 9am, but not in groups.

You must remain at home, except to travel to work, purchase goods, seek medical care or attend schools and universities when these reopen.

Additional restrictions on movement apply in hotspot areas.

There is no curfew on the movement of people.

Exercise permitted at any time during the day, but not in groups.



GATHERINGS

All public gatherings are prohibited. All public gatherings are prohibited.



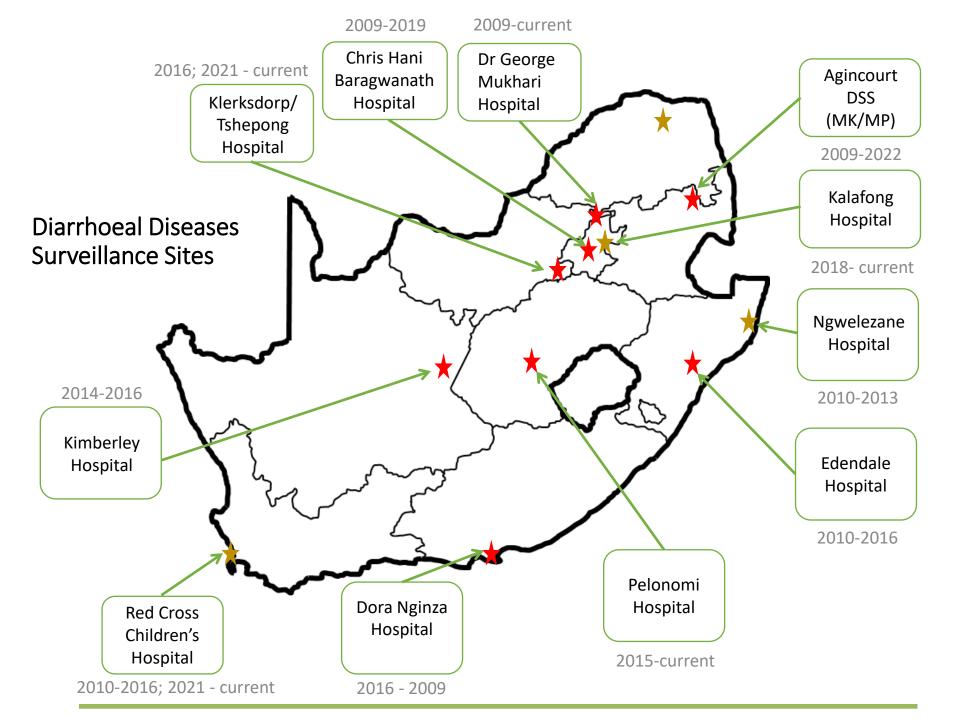
TRANSPORT

Passenger rail, bus services, taxi services. e-hailing and private motor vehicles may operate subject to directions.

All public transport may operate subject to directions, as well as limited domestic air travel for work purposes.



Directions issued by the Minister of Basic Education and Minister of Higher Education, Science and Innovation.



Diarrhoeal Diseases Surveillance

- GERMS-SA surveillance redirected to respiratory surveillance and SARS-CoV-2 activities
- Externally funded program with surveillance in 3 sentinel sites (Kalafong, Mapulaneng, Matikwana) allowed to continue
- Mapulaneng (Apr/May 20) Hospital closed for a few days when staff became infected with SARS-CoV-2
- Restricted access to certain wards (persons under investigation)
- Hospital admissions for life-threatening cases only
- No unnecessary surgery





Two sentinel sites – Kalafong Hospital, Gauteng Province (urban); Matikwana and Mapulaneng Hospitals, Mpumalanga Province (rural)





Mpumalanga (2 sites) Sub-tropical, rural



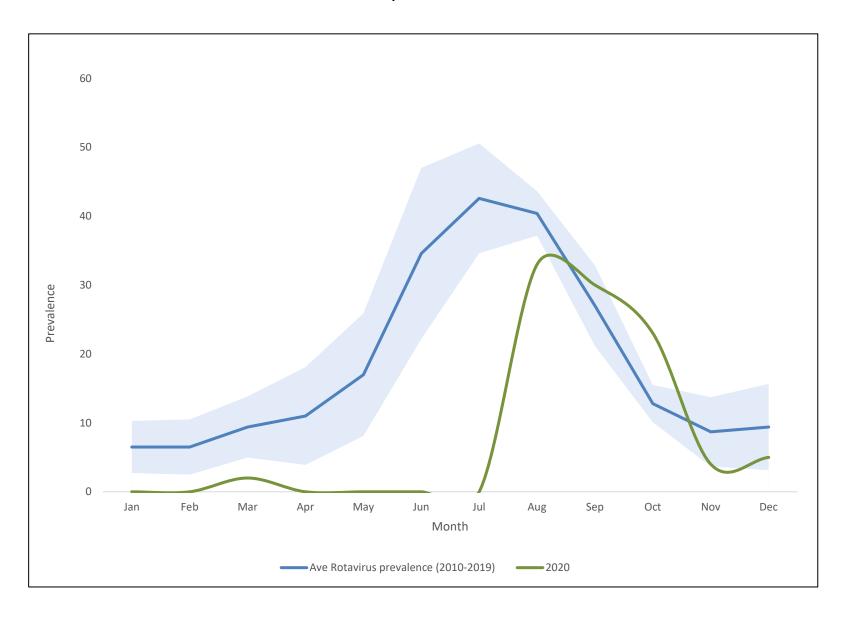
Gauteng (1 site) Temperate, urban

- While preparing for the 2020 rotavirus season, we noticed that we didn't have any rotavirus cases by mid-July; even in the private sector
- That's funny why is that?
- Could non-pharmaceutical interventions including hand washing, social distancing, regular cleaning of frequently touched surfaces and closing of schools and businesses be responsible?
- The aim of the study was to assess the impact of nonpharmaceutical interventions on rotavirus and other enteric virus circulation in South Africa

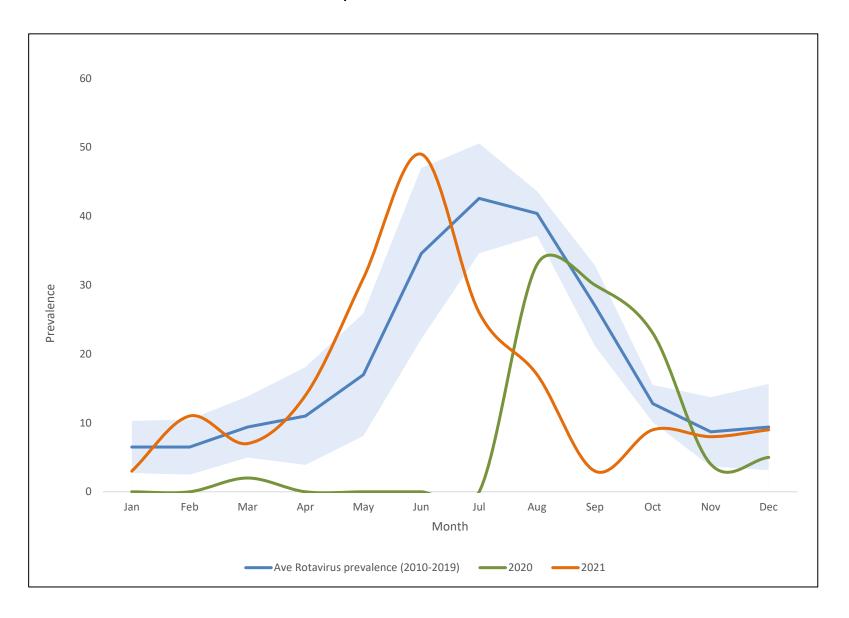
Methods

- Mined historical databases (2010 2019) for rotavirus, norovirus and sapovirus cases; average prevalence by month with 95% CI
- Nucleic acid extraction Qiagen Viral RNA or DNA Stool kits
- Rotavirus detection EIA (Ridascreen) with genotyping (WHO manual); some real-time PCR detection in 2021/2022 (FTD)
- Norovirus and sapovirus detection real-time inhouse monoplex or Fast Track Diagnostics Viral Gastroenteritis kit

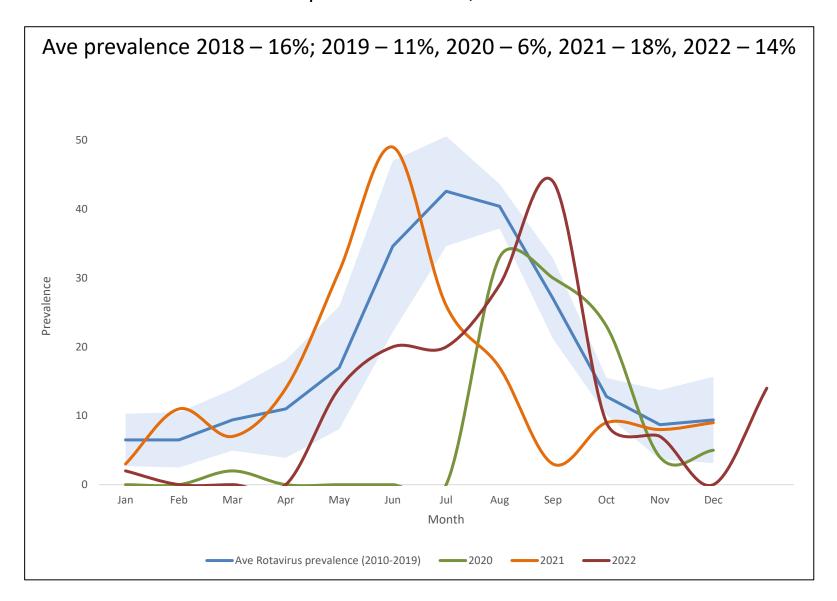
Rotavirus prevalence 2020



Rotavirus prevalence 2020 and 2021

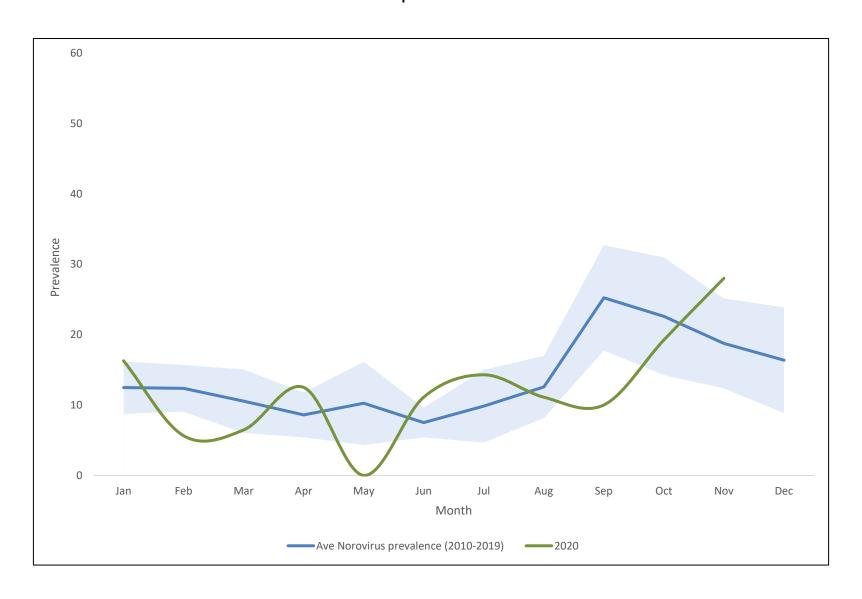


Rotavirus prevalence 2020, 2021 and 2022

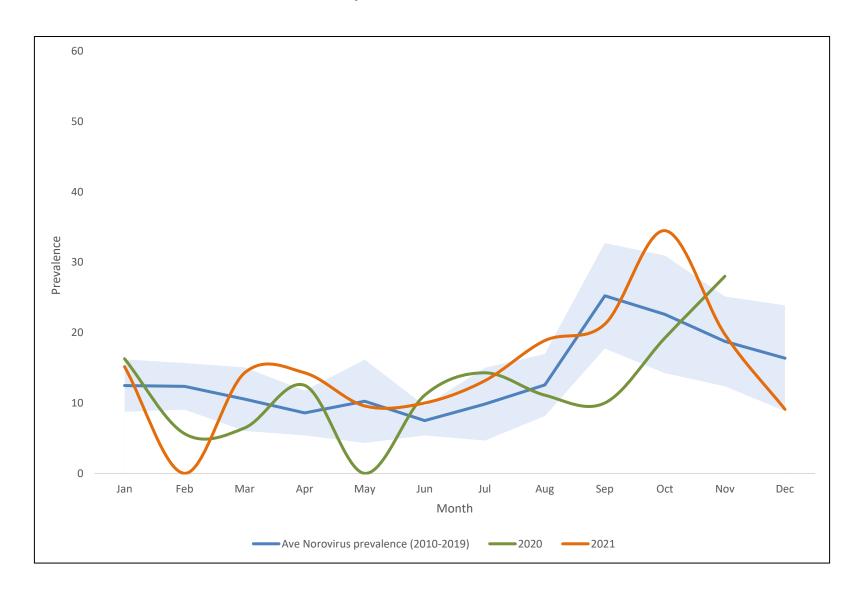


2022 - 35%(26) cases presented to a clinic

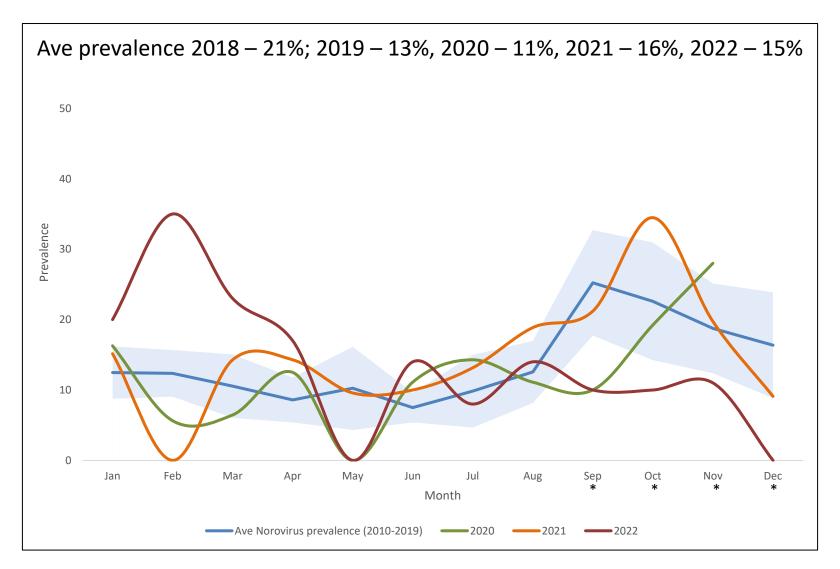
Norovirus prevalence 2020



Norovirus prevalence 2020 and 2021

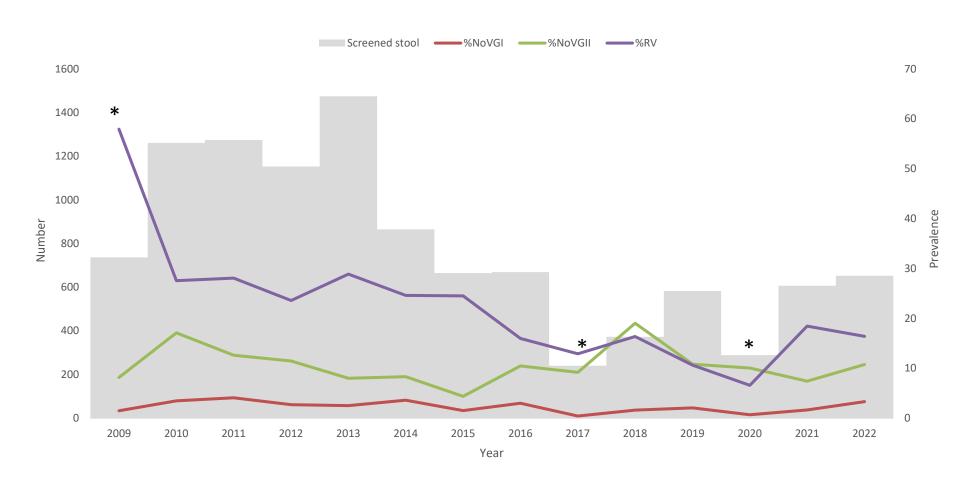


Norovirus prevalence 2020, 2021 and 2022

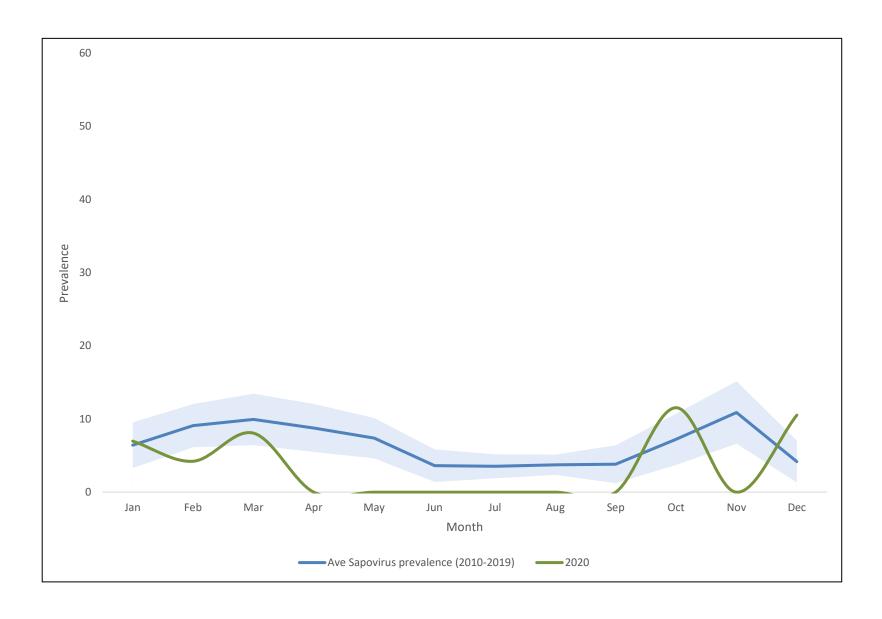


2022 - 18%(9) cases presented to a clinic

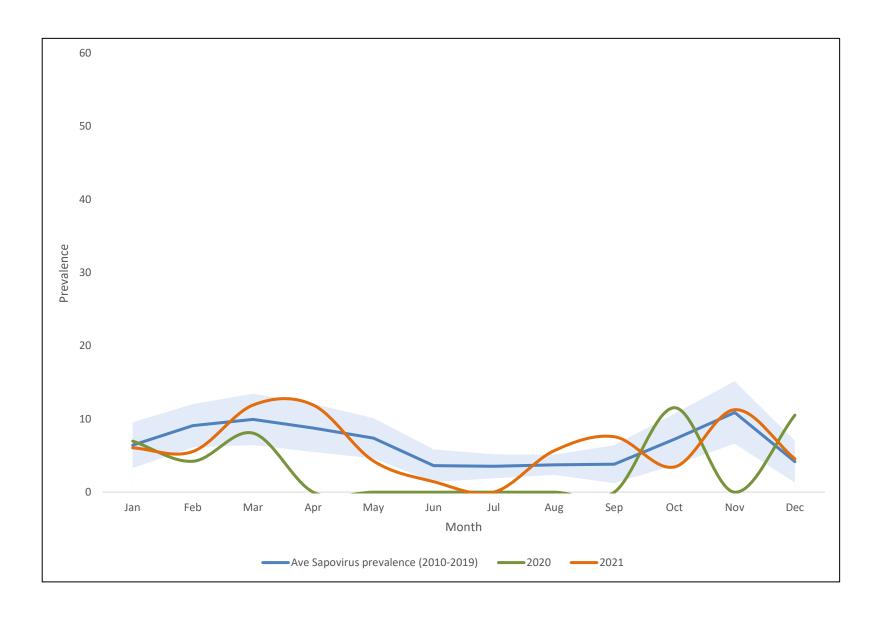
Thirteen years of rotavirus and norovirus surveillance: 2009 - 2022



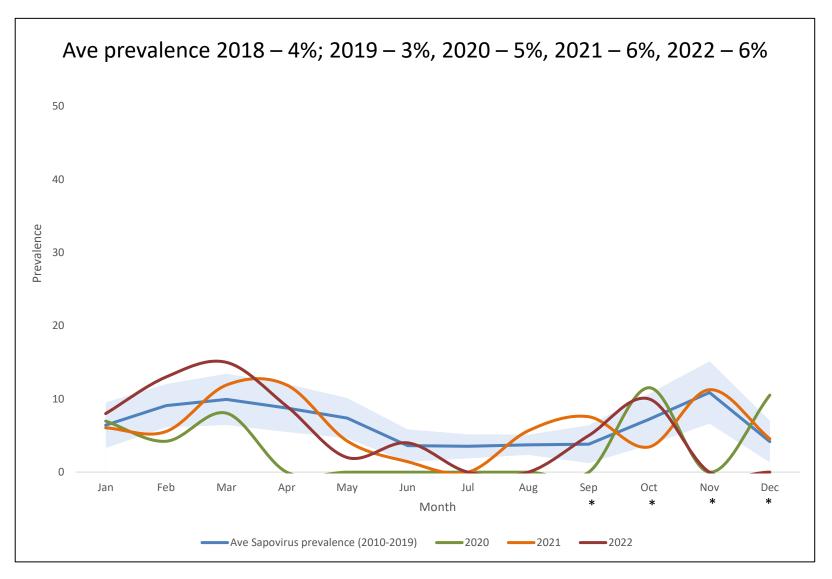
Sapovirus prevalence 2020



Sapovirus prevalence 2020 and 2021



Sapovirus prevalence 2020, 2021 and 2022



2022 - 22%(6) cases presented to a clinic

Age – Rotavirus positive specimens (2018-2022)

Age group	2018	2019	2020	2021	2022*	Total
< 1 year	61%	51%	67%	65%	52%	137
	(25)	(25)	(12)	(36)	(39)	
1-4 year	34%	45%	28%	29%	39%	86
	(14)	(22)	(5)	(16)	(29)	
5-17 year	5% (2)	2% (1)	0	2% (1)	5% (4)	8
18-44 year	0	0	0	0	1% (1)	1
> 45 year	0	2% (1)	6% (1)	4% (2)	1% (1)	5
Total	41	49	18	55	75	238

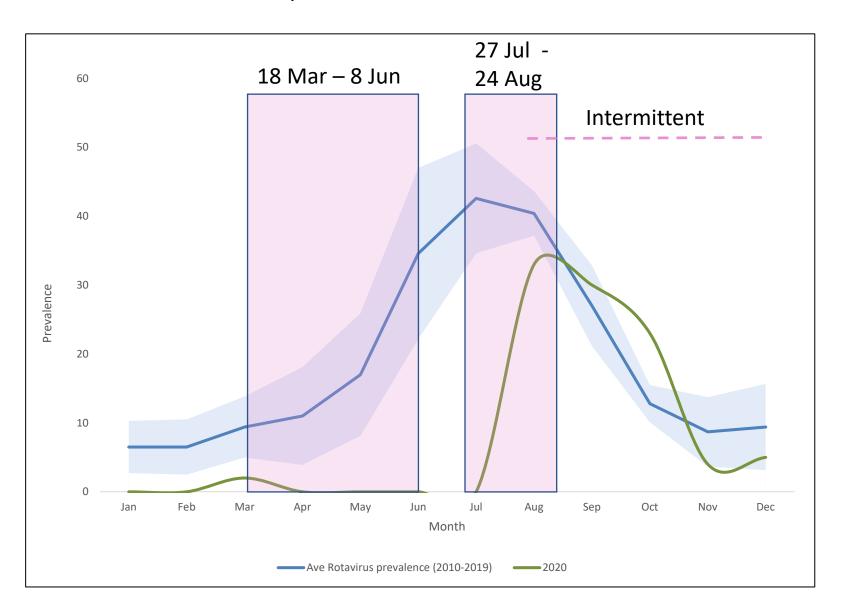
Age – Rotavirus case and controls (2018-2022)

Age group	Hospitalised cases*	Controls	Total
< 1 year	96	3	99
1-4 year	56	1	57
5-17 year	4	0	4
18-44 year	0	0	0
> 45 year	4	0	4
Total	160	4	164

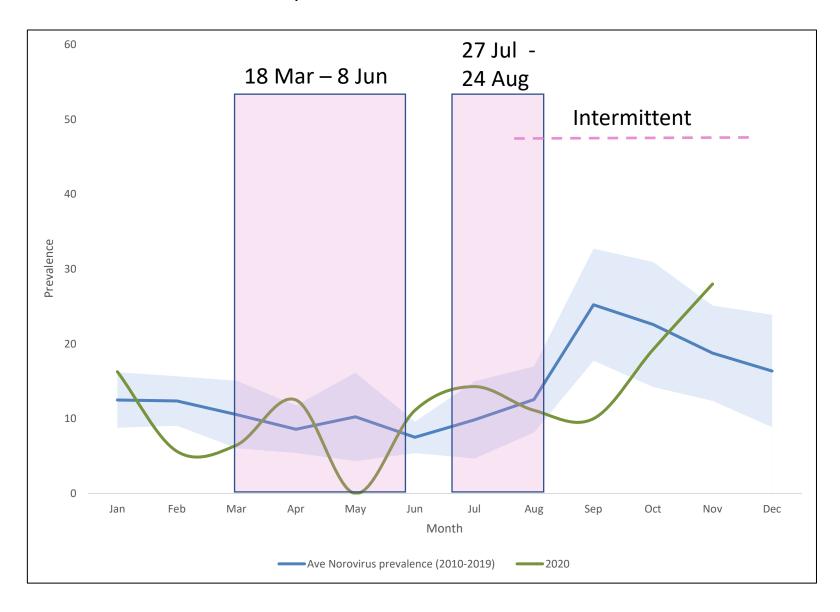
Median Ct (cases) = 24.3 (IQR 21.0-28.4); 13.4% in cases Median Ct (controls) = 28.8 (IQR 28.0-30.1); 1.2% in controls

^{*}Only to Feb 2022

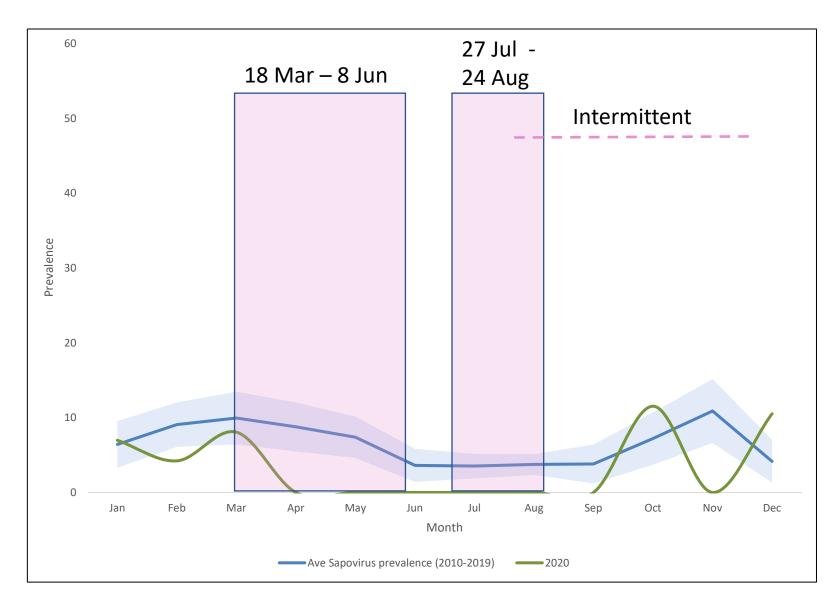
Rotavirus prevalence 2020 and school closures



Norovirus prevalence 2020 and school closures



Sapovirus prevalence 2020 and school closures



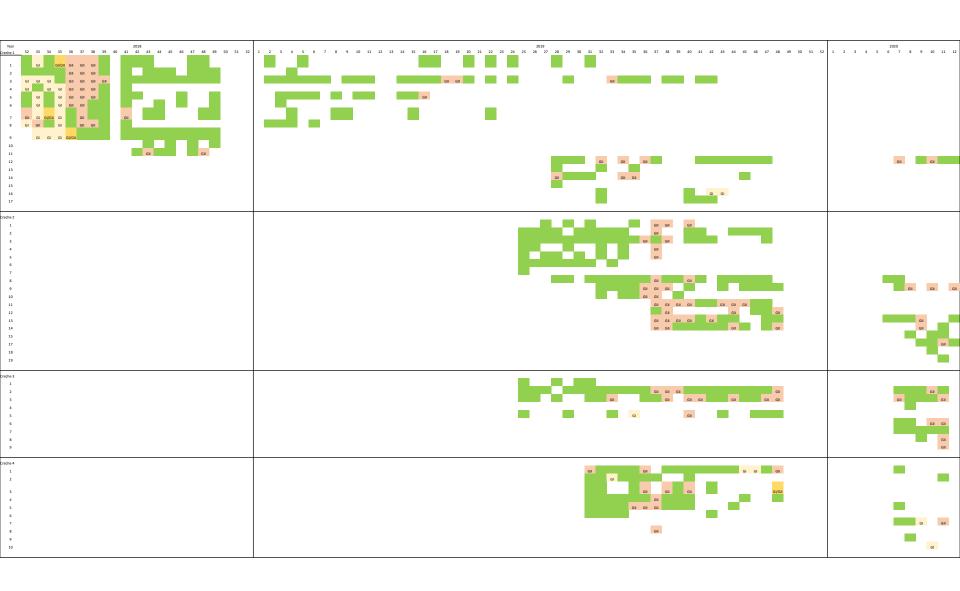
Observations

- NPIs were temporally associated with a lower rotavirus season in 2020; perhaps related to improved hand hygiene, school and business closures
- Norovirus transmission showed less obvious interruptions (only slightly lower annual prevalence 13% vs 11%); reduced potency of hand sanitizer, less restricted movement in informal settlements
- Sapovirus transmission was interrupted between April and September 2020; ?surveillance artifact or low season, average prevalence remained consistent (3-6%)

Creche study – rotavirus positive specimens; mild/asymptomatic



Creche study – norovirus positive specimens; mild/asymptomatic

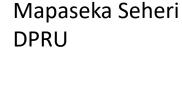


Transmission

- In addition to children <1 year, children 1-4 years appear to be transmitters of rotavirus; limited detection in adults noted
- Rotavirus vaccine seems to have interrupted transmission in the 1-4 year age groups
- Unanswered question role of adults, mothers and child caretakers with mild/asymptomatic infections in transmission pathway

Acknowledgements







Michelle Groome





BILL & MELINDA
GATES foundation



SPONSORED BY THE



Contributing surveillance officers, doctors, epidemiologists and study participants



Federal Ministry of Education and Research

Questions?



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