

Prevalence and Genotype Distribution of Rotavirus among Children in an Urban Informal Settlement in Kenya, Following Transition to Rotavac Vaccine

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15th Rotavirus symposium



Background

- Rotavirus infection was attributed to over 3000 deaths annually, in children under 5 years of age in Kenya (Tate JE *et al.*, 2016)
- Rotavirus Genotype **G1P[8]**, **G9[P4]** were highly detected in Mukuru informal settlement **pre-vaccine** → 24% overall prevalence (Gikonyo *et al.*, 2017)
- Kenya introduced rotavirus vaccine - **Rotarix**® (G1P[8] – two-dose) into her NIP in July 2014
- The country switched to **ROTAVAC**® (G9P[11]- three- dose vaccine) in January 2023
- There's paucity of data on circulating genotypes after ROTAVAC® introduction in this setting
- Mukuru Informal settlement
 - Densely populated
 - Poor **WASH** infrastructure



Mukuru informal settlement

Study Objectives

1

To determine rotavirus **vaccine coverage and effectiveness**

2

To determine the **prevalence** of rotavirus after rotavirus vaccine introduction

3

To determine the rotavirus **strain distribution** after the rotavirus vaccine introduction

Methods



Study design

Observational surveillance study

Time points: October 2023 – November 2024



Study population

Children <5 years presenting with acute diarrhea (≥ 3 loose stools/ 24hr)



Study site

Mukuru informal settlement – 4 health facilities



Data collection

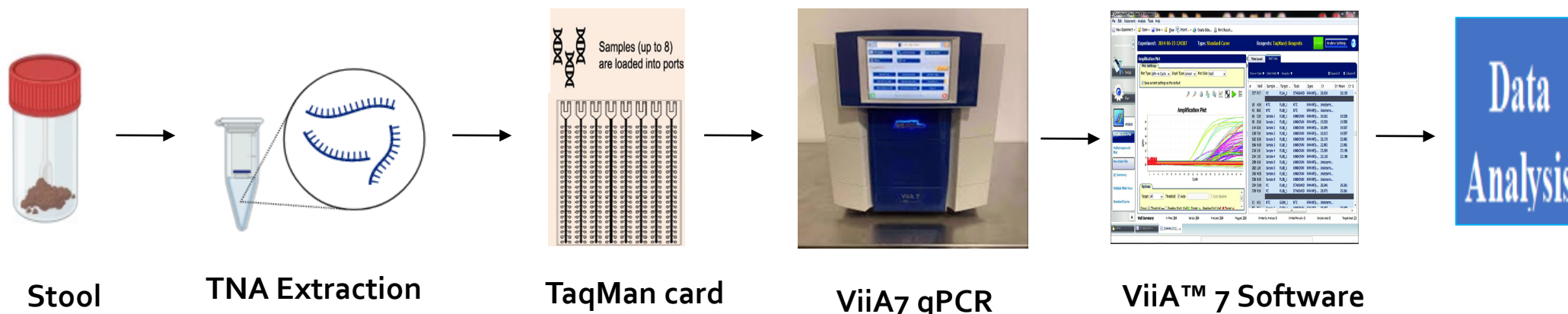
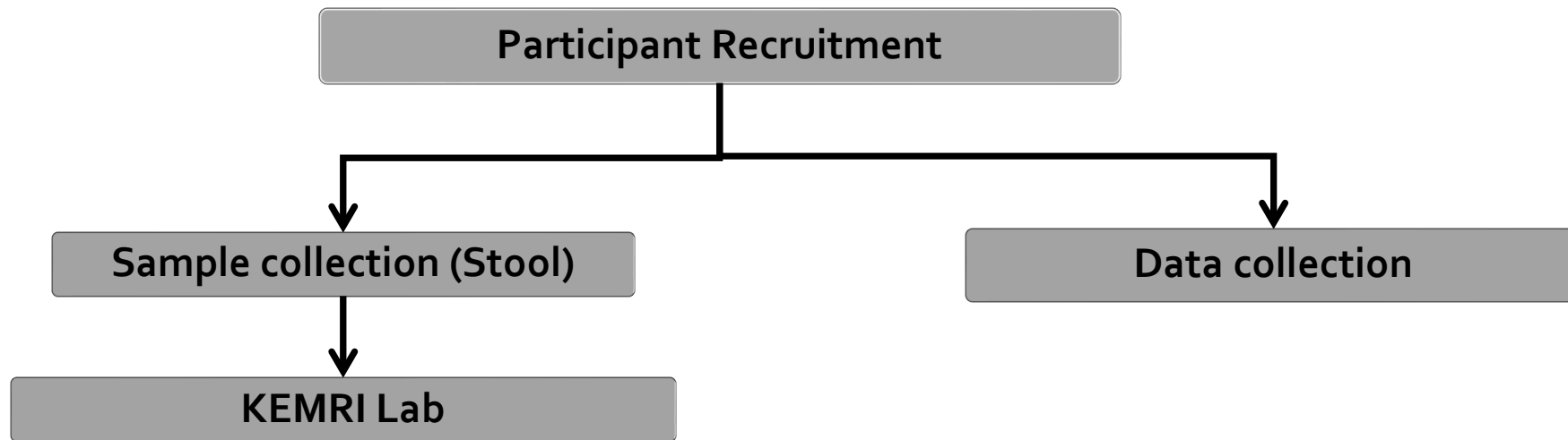
- Administered Rotavirus pathological form
- Epicollect5 app



Data analysis

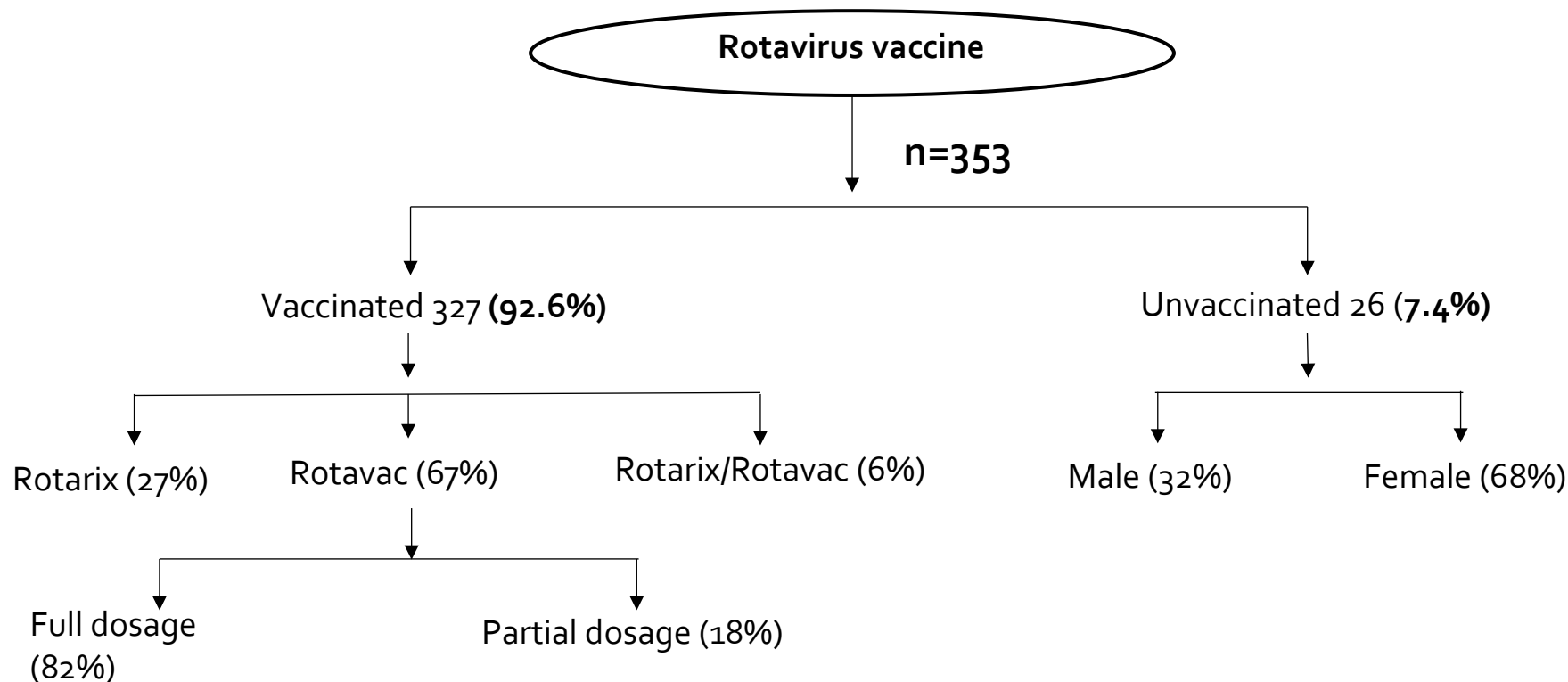
- STATA v15.1
- Post-hoc test-negative case-control analysis - calculated crude odds ratio – VE estimate

Methods



Results and Discussion

Vaccine uptake and VE



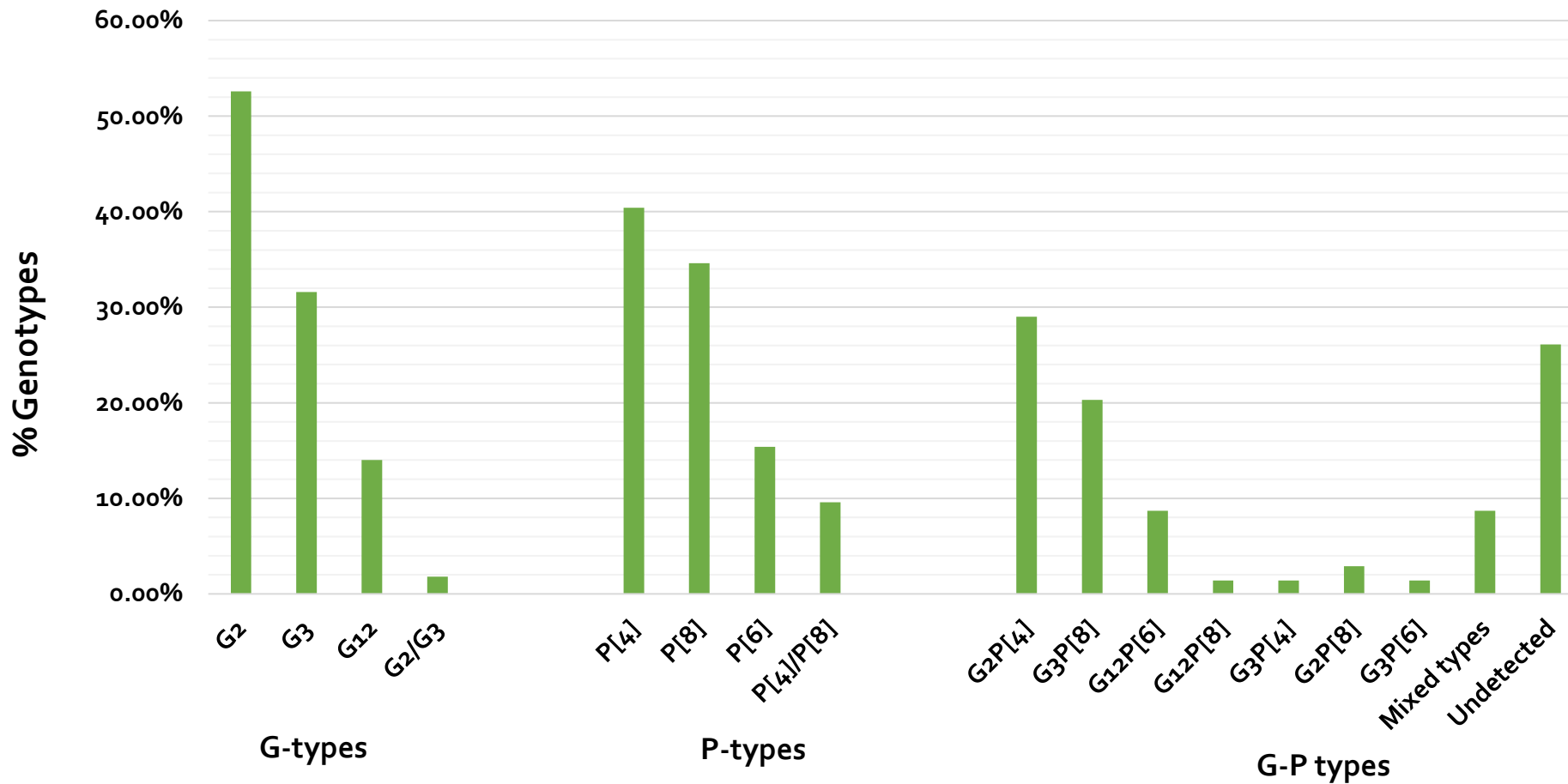
- Vaccine coverage – 92.6% - observed overall in Kenya
- Full dosage - 82%
- Drop out rate – 18%

- The VE was 57.6% (95% CI; 18.1-99.8%)
- Comparable to previous VE studies in Kenya of the RV1 against hospitalized RVGE (54-64%) (*Khaghayi et al., 2020*)

Comparison between age and immunization data with rotavirus (n = 353)

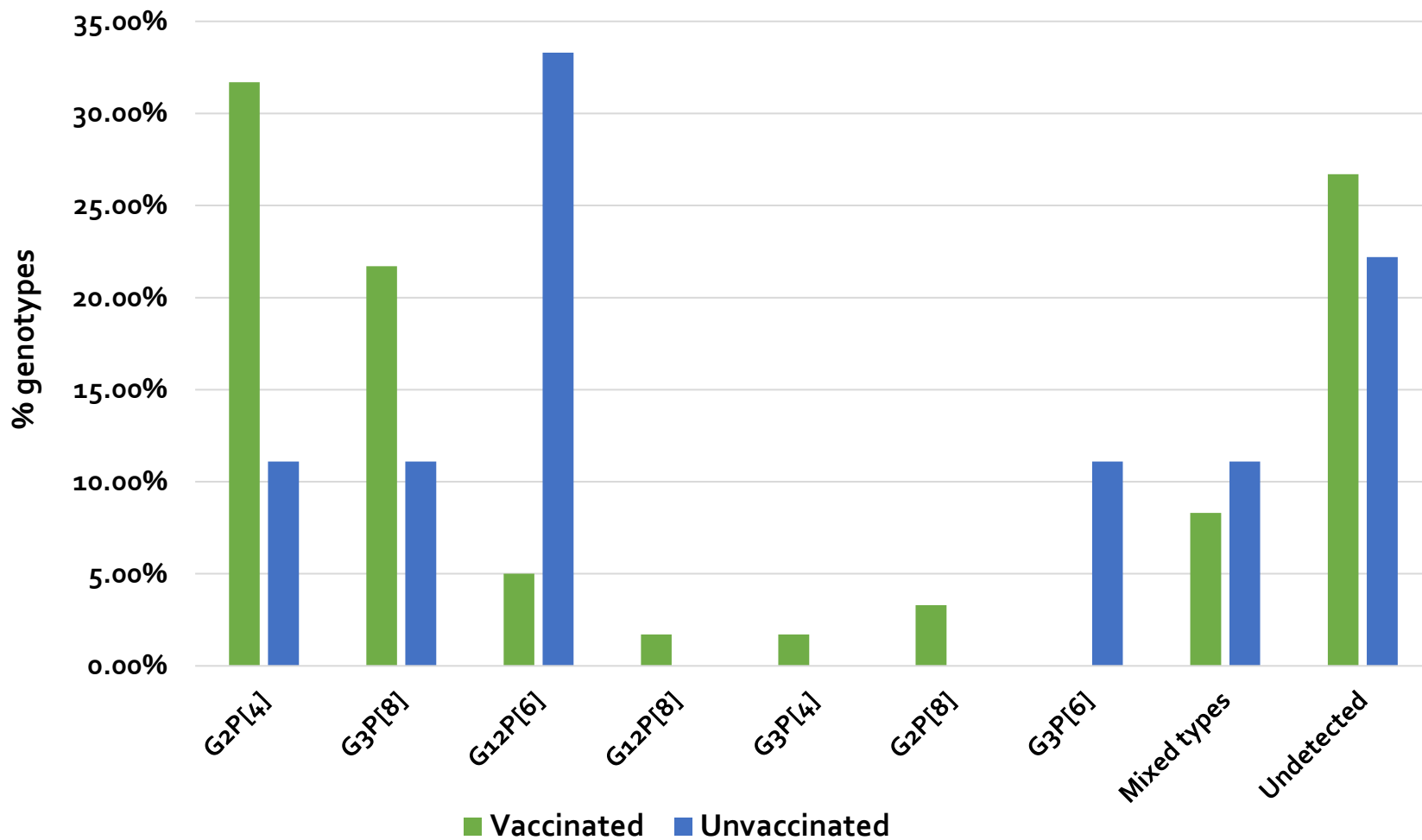
Variable	Categories	Positive cases n=69	Percentage (95% C1)	p-value
Overall prevalence		69/353	19.5%	
Age (Months)	≤11	26/125	20.8	0.023
	≤2	2/7		
	3-5	2/34		
	6-8	12/39		
	9-11	10/45		
	12-23	30/123	24.4	
	24-59	13/105	12.4	
Immunization status	Yes	60/327	18.4	0.044
	No	9/26	34.6	

- **Prevalence** post-vaccine – **19.5%**, (95% C.I : 15.5 – 24.1%)
- Mean age of participants (months)- 19.0, (95% C.I : 17 – 20)
- 12-23 months had the highest infection- 24.4% 95% C.I 17.1– 33.5%)
- Statistical significance association between rotavirus positivity and immunization



- G2 – most predominant of the G-types while P[4] dominated in the P-types
- G2P[4] was the highly detected strain (29.0%)
- Of the mixed types - 2 were equine-like (G3P[8]eG3 & G2G3P[4]P[8]eG3)
- Newly detected strains e.g. G2P[8], G12P[6]

Genotype distribution in Mukuru slums post-vaccine



- G2P[4] – dominated in the vaccinated population – 31.7%
- G12P[6] – unvaccinated 33.3%
- The equine-like strains isolated in ROTAVAC® vaccinated children

Genotypes distribution among vaccinated and unvaccinated populations

Discussion

- Prevalence is slightly lower than pre-vaccine rates in Mukuru informal settlements - 4.5% reduction – detection methods
- Similar observation – recorded in other studies in Kenya
- High detection of RVGE in older children - declining effectiveness after the first year of life, particularly in the LMICs
 - Possibly emerging strains
- G2P[4] - most predominant strain in Mukuru & G3P[8], signifies a marked shift in rotavirus genotype circulation patterns following introduction of vaccine
- Increased detection of G12P[6], G3P[8] and G2P[8], previously uncommon, reflects expanding viral diversity & the emergence of previously underrepresented genotypes in this setting– Brazil, Malawi, India

(Gutierrez et al., 2020, Mhango et al., 2022, Kumar, 2021, Habar et al., 2021, Wandera et al., 2024)

Conclusion

- Rotavirus burden remains high in Mukuru despite high vaccine coverage
- A shift in rotavirus cases from vaccine-eligible to older children post-vaccine underscores the need for continued surveillance to ensure that the new vaccine provides optimal protection
- Genotypes circulating in Mukuru show considerable diversity with global and emerging strains detected
 - G2P[4] replacing G1P[8] as the most predominant strain

Recommendations

- Future studies should assess effectiveness of a booster dose or the neonatal vaccine in sustaining protection and reducing rotavirus disease burden
- Sequencing of the G₃P equine strains & emerging strains e.g. G₂P[8] – detect reassortment
 - detect potential vaccine-driven selection
 - detect vaccine escape variants
- The findings call for scaling up a comprehensive strategy for managing diarrheal infections
 - Improved WASH infrastructure and practices

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Thank you

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