Seroprevalence of Dengue, Chikungunya and Zika Viruses in an Antenatal Population in the Greater Kingston Metropolitan Region of Jamaica

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Abstract

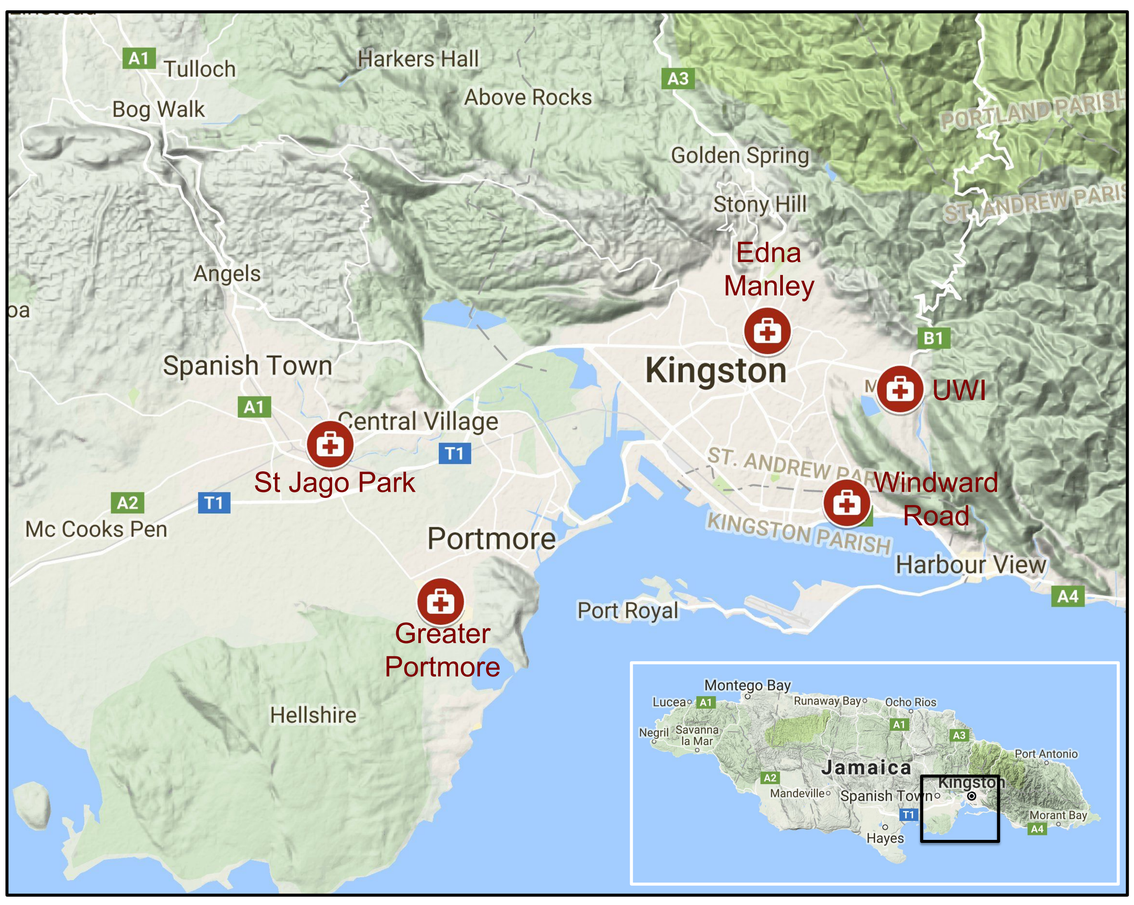
Zika, chikungunya and dengue viruses are spread by *Aedes aegypti* mosquitoes, which are endemic to Jamaica, a middle-developing, Caribbean, island-nation with population 2.8 million. Each of these viruses can cause a clinically indistinguishable fever-arthralgia-rash syndrome that may lead to severe disease and even death. Dengue epidemics have recently been increasing in frequency in Jamaica, which also experienced its maiden epidemics of chikungunya and Zika fevers in 2014 and 2016, respectively. While all three viruses are now endemic to Jamaica, it is unknown how many persons have been infected with Zika and chikungunya and dengue has not been assessed recently. We aimed to assess the background sero-prevalence of these three arboviruses.

In this preliminary sub-study of the ZIKAction vertical transmission study, we examined the extent of exposure to all three of these mosquito-borne viral infections. During mid June 2017 through February, 2018, sera were drawn from pregnant women attending five public Antenatal Clinics in the Greater Kingston Metropolitan Region which has an annual birth cohort of about 22,000. Euroimmun Zika virus, Euroimmun Chikungunya virus, and Panbio Dengue virus IgG enzyme immunoassay kits were used for serological testing. Ethical approval was obtained from the Ministry of Health and University of the West Indies. The women provided written informed consent to participate in the study.

Of the 312 antenatal serum samples tested, 177 (59.6%) were Zika IgG positive, 210 (76.3%) were chikungunya IgG positive and 256 (99.0%) were dengue IgG positive.

These 2017-2018 results indicate a high-level background sero-prevalence and previous infection with Zika, chikungunya and dengue fevers in this population of women of child-bearing age from the Greater Kingston Metropolitan Region of Jamaica. Accuracy of these sero-prevalence data can be improved with a larger sample size using archival 2012 antenatal sera and assessment of test specificity.

Study Location



Map of the Greater Kingston Metropolitan Area clinics included in the study. Inset: Map of Jamaica indicating enlarged geographical region. Map data ©2018 Google.

Demographics

Clinic	Mean Age ± SD, Years	Water Storage	Air Conditioner	Household Monthly Income ≤500USD
SJP	24.6 ± 6.1 (50)	12.0% (25)	0.0% (25)	84.0% (25)
GPM	29.6 ± 6.5 (23)	2.0% (13)	0.0% (13)	100.0% (12)
WWR	26.4 ± 6.6 (49)	70.0% (20)	0.0% (20)	100.0% (19)
EM	27.0 ± 5.9 (32)	83.3% (24)	4.2% (24)	100.0% (25)
UWI	30.6 ± 6.2 (64)	66.0% (53)	30.2% (53)	36.7% (30)
Total	27.6 ± 6.6 (218)	45.9% (135)	12.6% (135)	79.3% (111)

Data are from women assessed for IgG serology that provided information at delivery. Number of women providing information are indicated in parentheses.

IgG Serology Assays

Virus	Manufacturer	Catalog Number	Format
Dengue	Panbio	01PE30	Indirect EIA
Chikungunya	Euroimmun	EI293A9601G	Indirect EIA
Zika	Euroimmun	EI26689601	Indirect EIA

IgG Serology Results

Dengue Virus

Clinic	Number Negative	Number Equivocal	Number Positive	Number Tested	Percentage Positive
SJP	1	0	78	79	98.7
GPM	0	0	50	50	100.0
WWR	1	0	42	43	97.7
EM	0	0	41	41	100.0
UWI	1	0	98	99	99.0
Total	3	0	309	312	99.0

Chikungunya Virus

Clinic	Number Negative	Number Equivocal	Number Positive	Number Tested	Percentage Positive
SJP	13	0	66	79	83.5
GPM	10	6	34	50	68.0
WWR	5	4	34	43	79.1
EM	6	2	33	41	80.5
UWI	23	5	71	99	71.7
Total	57	17	238	312	76.3

Zika Virus

Clinic	Number Negative	Number Equivocal	Number Positive	Number Tested	Percentage Positive
SJP	18	8	53	79	67.1
GPM	17	1	32	50	64.0
WWR	18	3	22	43	51.2
EM	9	4	28	41	68.3
UWI	35	13	51	99	51.5
Total	97	29	186	312	59.6

Conclusions

- Factors associated with mosquito exposure in previous studies are common in the Kingston Metropolitan Area.
- The majority of pregnant Jamaican women in the Kingston Metropolitan Area have previously been exposed to dengue, chikungunya and Zika viruses.
- Most Jamaican adults are likely immune to chikungunya and Zika virus infection.
- This preliminary data from the ongoing vertical transmission study will be used in conjunction with additional analysis of assay specificities as well as further analysis of factors associated with seropositivity.

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