



# Association between Meningococcal Meningitis and Santa Ana Winds in Mexican Children and Adolescents from Tijuana, Baja-California, Mexico.

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## BACKGROUND

The Tijuana, Baja-California and San Diego, California, USA -border, is considered to be the most transited in the world. Based on our active surveillance studies, Tijuana has the highest incidence of meningococcal meningitis (MeM) in Mexico (Chacon-Cruz E., *et al*: Ther. Adv. Vaccines 2016; 4: 15-9. J. Infect. Dis. Treat. 2017; 3: 1-4. Emerg. Infect. Dis. 2011; 17: 543-6. *And* Ther. Adv. Vaccines 2019; 6: 1-7), and an outbreak of MeM in 2013 (Chacon-Cruz, *et al*. Ther. Adv. Vaccines 2014; 2: 71-6). The Santa Ana Winds (SAWs) are episodic pulses of easterly, downslope, offshore flows over the coastal topography of the California Border Region: Southern California and Northern Baja-California (Mexico), occurring mostly from October to April, and are associated with very dry air, often with anomalous warming at low elevations, similar to the Harmattan winds associated with MeM outbreaks in Africa. We hypothesized that the high incidence of MeM in Tijuana is, in part, associated with SAWs. This association has never yet been described.

## METHODS

Based on 13 years of active/prospective surveillance (2005-2018) in children > 7 days and < 16 years of age admitted at the General Hospital of Tijuana, we identified 51 cases of MeM (25% lethality), and 30 non-meningococcal meningitis (NMeM). Association between cases per month of MeM and NMeM, with SAWs seasons (from a 65 years review: Guzman-Morales J, *et al*. Geophys. Res. Lett. 2016; 43: 2827-34), was calculated by Risk Ratio (RR). A z test was also used to compare proportions of MeM during SAWs seasons vs. non-SAWs seasons.

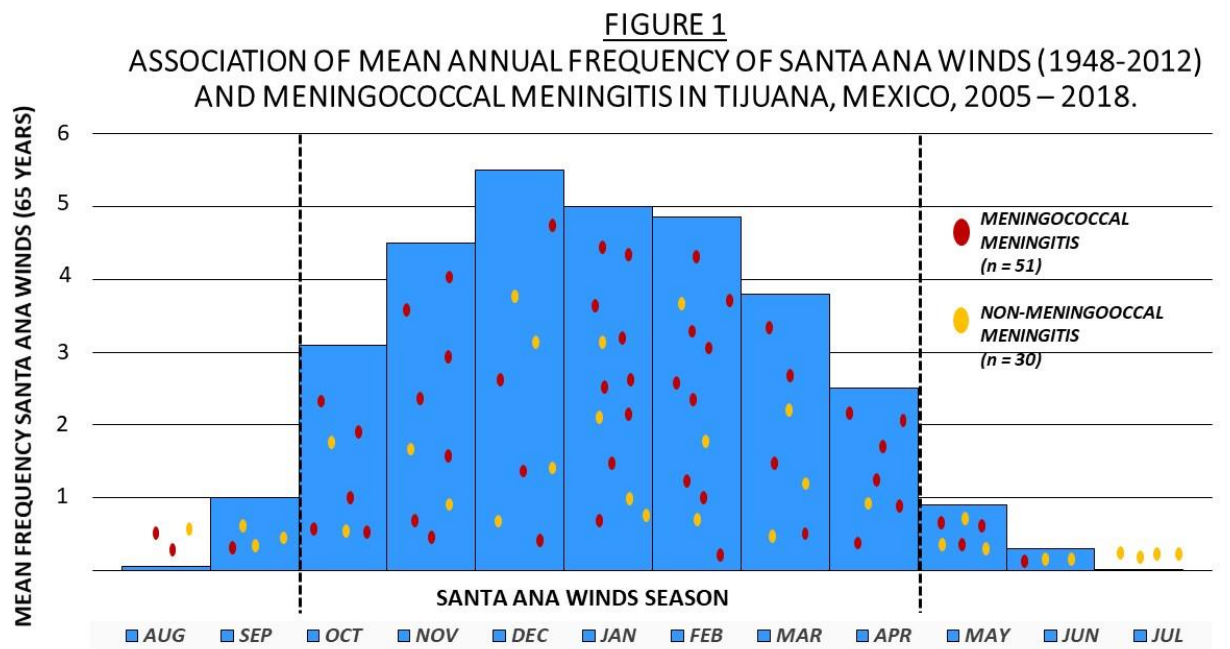
## RESULTS

From 51 MeM, 44 (86.27%) occurred during SAWs seasons (z test = 7.32, p<0.0002).

Cases per month during 13 years (91 months for SAWs seasons and 60 months for non-SAWs seasons) were as follow (See Table 1, and Figure-1):

**TABLE 1**

	<b>SAWs seasons:</b>	<b>non-SAWs seasons:</b>
<b>MeM</b>	0.483 cases/month	0.107 cases/month
<b>NMeM</b>	0.186 cases/month	0.216 cases/month
<b>RR =2.179, p &lt; 0.0001 (95% CI 1.85 to 2.56)</b>		



## CONCLUSIONS

1. In Tijuana, Baja-California, Mexico, there is a strong association of Meningococcal Meningitis with seasons when Santa Ana Winds occur.
2. Routine immunization against vs. *N. meningitidis* should be seriously considered in the region.