included difficulty of associating outcomes, limited post-index time period, and potential misclassification when establishing a standardized algorithm for PWID identification.

	All Drug Injectors Pre-Index n=328 (#, %)	All Drug Injectors Post-Index n=398 (#, %)	P-value	Opioid Injectors Pre-Index n=146 (#, %)	Opioid Injectors Post-Index n=156 (#, %)	P-value
Biological Sex			0. 52			0.46
Male	230 (70.12)	270 (67.84)		103 (70.55)	103 (66.03)	
Female	98 (29.88)	128 (32.16)		43 (29.45)	53 (33.97)	
Race			0.09			0.64
White	223 (67.99)	245 (61.56)		118 (80.82)	124 (79.49)	
Black	104 (31.71)	148 (37.19)		27 (18.49)	29 (18.59)	
Others	1 (0.30)	5 (1.26)		1 (0.30)	3 (1.92)	
Hispanic †	123 (37.50)	134 (33.75)	0.31	65 (44.52)	57 (36.54)	0.16
Age in Years			0.11			0.17
18-29	39 (11.89)	60 (15.08)		22 (15.07)	30 (19.23)	
30-39	88 (26.83)	90 (22.61)		47 (32.19)	47 (30.13)	
40-49	67 (20.43)	108 (27.14)		36 (24.66)	48 (30.77)	
50-59	83 (25.30)	97 (24.37)		30 (20.55)	20 (12.82)	
60-65	37 (11.28)	28 (7.04)		9 (6.16)	5 (3.21)	
65+	14 (4.27)	15 (3.77)		2 (1.37)	6 (3.85)	
Insurance Status	(N, %)	(N, %)	0.88			0.90
Uninsured	166 (50.61)	196 (49.25)		85 (58.22)	95 (60.90)	
Medicaid	95 (28.96)	122 (30.65)		31 (21.23)	34 (21.79)	
Medicare + Federal	51 (15.55)	66 (16.58)		24 (16.44)	21 (13.46)	
Private	13 (3.96)	11 (2.76)		5 (3.42)	4 (2.56)	
Other	3 (0.91)	3 (0.75)		1 (0.68)	2 (1.28)	
Median Length of Stay	4	3	0.39	4	2	0.14
Expired During Study Period	15 (4.57)	17 (4.27)	0.85	5 (3.42)	4 (2.56)	0.74

† "Hispanic" is recorded as a yes/no function similar to US Census Data. Hispanics of any race and are included in the applicable race categories.

Infectious Sequela Admissions in Persons who Inject Drugs††	All Drug Injectors Pre-Index n=328 (N, %)	All Drug Injectors Post-Index n=398 (N, %)	P-value	Opioid Injectors Pre-Index n=146 (N, %)	Opioid Injectors Post-Index n=156 (N, %)	P-value
Endocarditis	13 (3.96)	29 (7.29)	0.08	6 (4.11)	12 (7.69)	0.23
Bacteremia, Sepsis	147 (44.82)	165 (41.46)	0.37	70 (47.95)	55 (35.26)	**.026**
Osteomyelitis of bone/spine	49 (14.94)	78 (19.60)	0.12	20 (13.70)	25 (16.03)	0.63
Skin and Soft Tissue	172 (52.44)	212 (53.27)	0.88	82 (56.16)	98 (62.82)	0.24
HIV	52	56	0.53	18	21	0.86
HCV	107	140	0.48	64	94	0.0056
Overdose Sequela	32 (9.76)	14 (3.52)	**0.0006**	20 (13.7)	6 (3.85)	**0.0034**

†† Some admissions had multiple infectious sequelae coded

Disclosures. **All authors:** No reported disclosures.

1644. Performance of Symptom-Based Case Definitions to Identify Influenza Virus Infection among Pregnant Women in Middle-Income Countries: Findings from the Pregnancy and Influenza Multinational Epidemiologic (PRIME) Study

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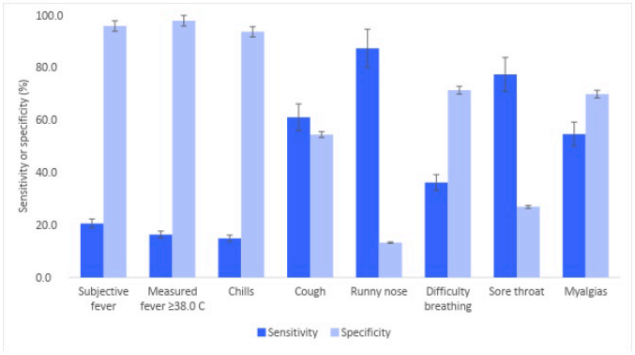
Background. The World Health Organization (WHO) recommends case definitions for influenza surveillance that are also used in public health research, though their performance has not been assessed in many risk groups, including pregnant women in whom influenza may manifest differently. Â We evaluated the performance of symptom-based case definitions to detect influenza in a cohort of pregnant women in India, Peru, and Thailand.

Methods. In 2017, we contacted 4774 pregnant women twice a week during the influenza season to identify illnesses with new or worsened cough, runny nose, sore throat, difficulty breathing or myalgia, and collected data on other symptoms and nasal swabs for influenza rRT–PCR testing. To identify symptom predictors of influenza, we used multivariable logistic regression with forward selection of symptoms significant in univariate analysis after controlling for country, chronic conditions, influenza vaccination, and time from symptom onset to swab collection. We calculated sensitivity and specificity of each symptom, WHO respiratory illness case definitions and a case definition based on significant predictors from the multivariable model.

Results. Of 2431 eligible illness episodes among 1,716 participants, 142 (5.8%) were positive for influenza. Among individual symptoms, runny nose was most sensitive and measured fever ≥ 38° Celsius was most specific (Figure 1). In a multivariable model, measured fever ≥ 38° Celsius [adjusted odds ratio = 3.8, 95% confidence interval [CI] = 2.0–7.2], cough [2.7, CI 1.6–4.7], chills [2.2, CI 1.2–3.8], and myalgia [1.2, CI 2.2, 5.3] were independently associated with influenza illness. A case definition based on these four (measured fever, cough, chills or myalgia), was 91%-sensitive and 37% specific. Sensitivity and specificity of case definitions varied (Figure 2).

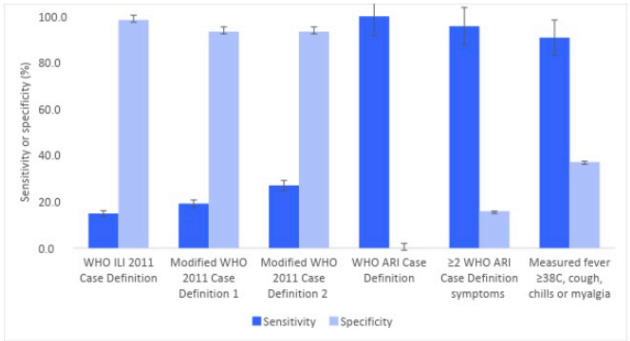
Conclusion. While a case definition based on one or more of fever, chills, cough or myalgia is highly-sensitive and moderately specific among pregnant women, case definitions requiring measured or subjective fever may miss many influenza cases making them sub-optimal for studies of burden or vaccine efficacy. The intended use of case definitions should be considered when evaluating the tradeoff between sensitivity and specificity.

Figure 1. Sensitivity and specificity of individual symptom-based case definitions to identify influenza virus infection among a cohort of pregnant women in middle-income countries, India, Peru and Thailand, PRIME 2017.



Error Bars Indicate 95% confidence intervals.
RT-PCR for influenza is used as the gold standard for these calculations.

Figure 2. Sensitivity and specificity of combination symptom-based case definitions to identify influenza virus infection among a cohort of pregnant women in middle-income countries, India, Peru and Thailand, PRIME 2017.



WHO Influenza-like illness (ILI) 2011 Case Definition includes measured fever ≥38.0 Celsius and cough.
Modified WHO 2011 Case Definition 1 includes measured fever ≥38.0 Celsius or subjective fever and cough.
Modified WHO 2011 Case Definition 2 includes measured fever ≥38.0 Celsius or subjective fever or chills and cough.
WHO ARI Case Definition includes at least one of the following: cough, sore throat, runny nose or difficulty breathing.
Final model includes measured fever ≥38.0 Celsius, cough, chills or myalgia.
Error bars indicate 95% confidence intervals.
RT-PCR for influenza is used as the gold standard for these calculations.

Disclosures. **All authors:** No reported disclosures.

1645. High Seroprevalence and Seroconversion Rate of *Borrelia burgdorferi* Infection Among Hispanic/Latino Immigrant Workers in Eastern Suffolk County, New York: A Longitudinal-Based Study

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Background. Lyme disease, caused by *Borrelia burgdorferi*, continues to be the most commonly reported vector-borne disease in the United States (US) affecting the

public health and the economy. Suffolk County, New York (NY) has one of the highest incidences in NY State affecting primarily the Hispanic/Latino population working in gardening, landscaping, and agriculture (field workers). However, there is a paucity of research among this population. Thus, the aim of this longitudinal study was to assess the current seroprevalence and seroconversion of the *Borrelia burgdorferi* infection and its risk factors such as sociodemographic, symptoms, tick encounter, and use of the Fatigue Severity Scale, associated with seropositivity in the Hispanic/Latino immigrant worker population of Eastern Suffolk County.

Methods. Recruitment of participants was based on several towns of this County. Following signed informed consent, participants completed a questionnaire and had their blood drawn. Samples were tested using the conventional 2-tiered serological testing for Borreliosis.

Results. Between June 2016 and October 2018, 660 (83.5%) completed Visit 1; 58.8% of them completed elementary school or less, and 56.7% reported earning = or <$20,000 annually, 344 were field workers, from which, 82.3% and 55.2% were male and from Guatemala, respectively. The overall seroprevalence was 7.2% (48/660) but was significantly higher among gardener/Landscapers (11.5%) having an adjusted odds ratio (OR) = 2.02 with a CI = 1.02–4.03. Another significant risk factor was experiencing fevers after a tick-bite (Adjusted OR: 2.08, CI:1.42–5.63). 2.7% (8/292) seroconverted and were gardener/landscaper.

Conclusion. Several barriers to healthcare access, health literacy, and prevention were identified. Gardening/landscaping has an occupational risk in this population. Efforts to educate about tick-borne infections and preventive methods such as vaccinations are warranted for this population.

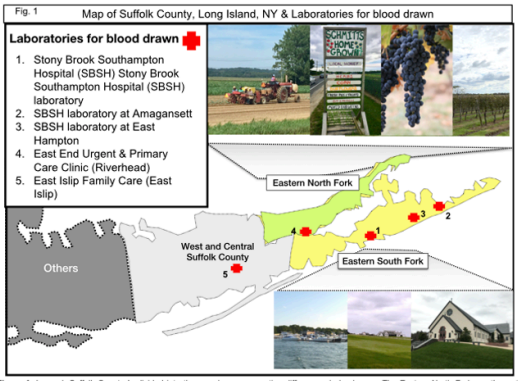

Figure 1- Legend: Suffolk County Is divided into three regions representing differences in landscape. The Eastern North Fork mostly contains vineyards and farms, while the Eastern South Fork contains accommodations for beach attractions. The West and Central Suffolk County is the most commercial corridor including retail trade, manufacturing, construction, health care, professional service, research and technical service, etc.

Fig 2 Participants and Seropositive cases throughout years and visits 1 & 2

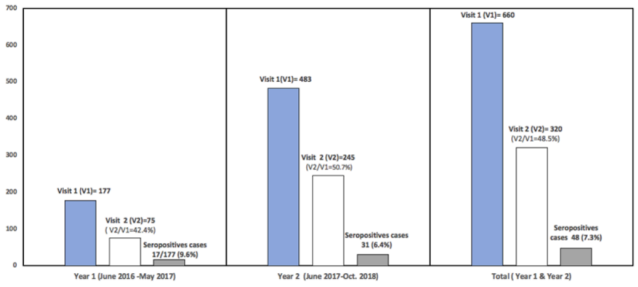

Figure 3 - Legend: The number of participants in Visit 1(V2), Visit 2 (V1), proportion of V2 / V1, and the seropositive cases in Year 1 and Year 2.

Table 1. Seroprevalence of *Borrelia burgdorferi* among Hispanic/Latino immigrant workers in the Eastern End of Suffolk County, New York (N=660)

	%	(n/N)	Unadjusted associations	Adjusted Association	
			p value	β (p value)	Odds Ratio (CI)**
Overall prevalence	7.2	(48/660)			
Prevalence among occupational groups:					
Non-outdoors workers	2.8	(5/181)			
Outdoor workers	9	(43/479)	* 0.006	0.623 (0.24)	1.846 (0.658-5.27)
* Non-Field workers	3.48	(11/316)			
*** Field workers**	10.75	(37/344)	* 0.046	0.699 (0.76)	2.012 (0.93-4.34)
- Gardener/Landscapers	11.5	(32/278)	*** 0.000**	**0.706 (0.44)**	**2.026 (1.02-4.03)**
- Non-Gardeners/Landscapers	4.2	(16/382)			
- Agriculture/Vineyard/Farm workers	7.7	(5/65)			
- Non-Agriculture/Vineyard/Farm workers	7.22	(43/595)			

* Chi-square (Fisher Exact Test) in a univariate analyze ** CI: Confidence interval

Table 2: Risk Factors with seropositivity to *Borrelia burgdorferi* in Hispanic/Latino immigrant workers in Suffolk county, NY

Risk Factors	Seropositive cases	Seronegative cases	Pearson Chi-Square
Socio-demographic & Tick exposure			
- Age	42.35 +/-10.03	38.39 +/-10.93	p=0.011 (*)
- Occupation:			
- Outdoors worker	43/48 (89.6%)	436/612 (71.2%)	p=0.006
- Field worker	37/48 (77.1%)	307/612 (50.2%)	p=0.000
- Gardener/landscaper	32/48 (66.7%)	246/612 (40.2%)	p=0.000
- Agriculture worker/Vineyard worker	5/48 (10.4%)	60/612 (9.8%)	p=0.891
- Living in Eastern Long Island?	46/48 (95.8%)	539/612 (97.3%)	p=0.103
- South Fork	20/48 (58.3%)	256/612 (58.2%)	p=0.982
- North Fork	26/48 (45.8%0	283/612 (53.8%)	p=0.289
- Education: Have only elementary School or less	34/48 (70.8%)	354/612 (57.8%)	p=0.078
- Estimate annual income equal or less than $ 20,000	21/48 (56.3%)	353/607 (58.2%)	p=0.052 (**)
- Years living/working in Long Island	12.87 +/-8.09	11.321 +/-9.44	p=0.218 (***)
- Have seen a tick on themselves or had a tick-bite this or last summer	45/48 (93.8%)	454/584 (77.7%)	p=0.538
- Estimated range of 1-5 ticks seen on themselves this or last summer	35/45 (77.8%)	396/454 (87.2%)	p=0.062 (***)
- Remove tick from their body their hands	40/45 (83.3%)	412/612 (67.3%)	p=0.021
- Have pets at home	4/48 (8.3%)	144/612 (23.5%)	p=0.015
- Knew what Lyme disease before today	15/48 (31.3%)	206/612 (33.7%)	p=0.733
- Use repellent working or going outdoors	16/48 (33.3%)	207/612 (33.8%)	p=0.945
- Use clothes treated with permethrin (outdoors)	0/48 (0%)	37/612 (6%)	p=0.08
Medical History			
- Previous non-communicable disease (a, b, c)	Yes: 13/48 (27.1%)	Yes: 192/612 (31.4%)	p=0.536
a. High cholesterol	Yes: 12/48 (25%)	Yes: 140/612 (22.9%)	p=0.736
b. Hypertension	Yes: 7/48 (14.6%)	Yes: 70/612 (11.4%)	p=0.513
c. Diabetes	Yes: 2/48 (4.2%)	Yes: 34/612 (5.6%)	p=0.683
- Previous communicable disease			
a. Lyme disease	Yes: 9/48 (19.1%)	Yes: 71/612 (11.6%)	p=0.144
b. Other tick-borne disease	Yes: 8/48 (16.7%)	Yes: 27/612 (4.4%)	p=0.000
Fatigue Severity Scale (FSS)			
- FSS Score ≥ 4	16/48 (33.3%)	174/612 (28.4%)	p=0.47
Clinical questions:			
- Symptoms Score (mean +/- SD)	2.45 +/- 2.3	1.99 +/- 2.02	p=0.072 (*)
a. Do you usually have muscle pain?	Yes: 24/48 (50%)	Yes: 223/612 (36.4%)	p=0.062
b. Do you usually have joint pain?	Yes: 24/48 (50%)	Yes: 234/612 (38.2%)	p=0.108
c. Do you usually have stiff neck?	Yes: 14/48 (29.2%)	Yes: 160/612 (26.1%)	p=0.647
d. Do you feel fatigue most of the time?	Yes: 20/48 (41.7%)	Yes: 200/612 (33%)	p=0.221
e. Have you ever had swollen knee	Yes: 8/48 (16.7%)	Yes: 110/612 (18%)	p=0.820
f. Have you ever had facial paralysis	Yes: 2/48 (4.2%)	Yes: 28/612 (4.6%)	p=0.896
g. Have you ever had a rash after a tick-bite?	Yes: 16/48 (33.3%)	Yes: 153/612 (25%)	p=0.203
h. Have you ever had fever after a tick-bite?	Yes: 17/48 (35.41%)	Yes: 77/565 (13.6%)	p=0.000

(*) Student's t-tests (**) Some participants didn't want to give this data (***) Mann Whitney U Test

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1646. Education Level is Associated with Tetanus Vaccine Coverage: Results from the 2016 BRFSS

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Background. Vaccination coverage among US adults for tetanus, a potentially fatal disease, continues to be lower than the national goals. Education has been considered to have positive impact on vaccination coverage. However, recently there have been outbreaks of vaccine preventable conditions in areas with high college completion rates. This study aims to assess the relationship between education and vaccination coverage. Specifically, we looked at the association between education level and tetanus vaccination status of the US adults.

Methods. Data from the 2016 Behavioral Risk Factor Surveillance System, a self-reported annual survey for non-institutionalized adults in the United States from the Centers for Disease Control, were analyzed. The outcome was up-to-date tetanus coverage (within the last 10 years) defined by the response to: *have you received tetanus vaccine since 2005?* Education was stratified into four categories: (1) grade 11 or less, (2) grade 12/GED, 3) college 1–3 years, and (4) college 4 or more years. Bivariate analyses and multivariable logistic regression were conducted on the analytic sample (n = 417,473) using Stata 15, accounting for weighting and the complex survey design of the BRFSS.

Results. This study identified that 59.9% of US adults are up-to-date on the tetanus vaccine status (Table 1). Higher education level was found to be associated with increased odds of up to date tetanus vaccination. The highest odds were for those with 4 or more years of college education [aOR = 1.31; 95% CI: 1.26–1.35)] while the lowest odds were for those less than grade 11 education, when compared with those with a high school degree [aOR = 0.93; 95% CI: 0.88–0.98] (Figure 1). Other covariates identified as negatively associated with up-to-date tetanus status were race/ethnicity, female sex, unemployment, not being married, not having insurance or a personal healthcare provider, and being above 45 years of age (Figure 1).

Conclusion. This study identified a positive association between up-to-date tetanus status and higher education level. Introducing community-specific vaccination education