



## 1. Introduction

Globalization is a key challenge to public health around the world, but establishing quantifiable linkages between globalization and health is extremely complex. Although a growing amount of literature has emerged in recent years, no studies to date have focused on a particular process of globalization, health, or their interactions in a specific country. There is still much to be understood about the direct and indirect relationships between a process of globalization known as "population mobility" and the health outcomes of a population. This paper reviews the scholarly literature on the specific connections between globalization and health, and then analyzes, both qualitatively and quantitatively, the links between population mobility and the increasing levels of pertussis (whooping cough) in the United States.

## 2. Objective

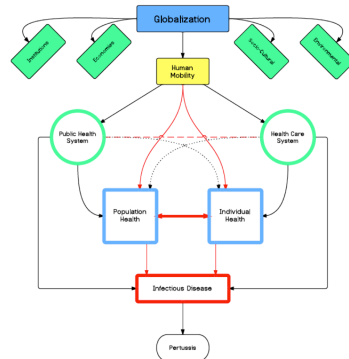
To describe and better understand the relationships between population mobility, a key process of globalization, and pertussis infections in the United States.

## 3. Methods

- **Interdisciplinary approach** (health policy, global health, globalization)
- **Multiple methods approach** (qualitative literature review, quantitative statistical analysis using secondary data)
- **Qualitative analysis** (literature review of 127 articles, briefs, reports and news media pieces)
  1. Bordetella pertussis
  2. Theories for increased incidence of pertussis in US
  3. Globalization
  4. Population mobility and infectious disease
- **Quantitative analysis** (using secondary data from the following sources)
  1. US Census Bureau
  2. US Department of Commerce
  3. Centers for Disease Control and Prevention
  4. United Nations
  5. World Health Organization
- **Analytic approach and Key measures**
  - Multiple regression analysis using STATA Version 13
  - **Primary variable:** pertussis cases, by state, per year (1997 – 2012)
  - **Independent variables:** non-immigration (international travel), immigration (documented), refugees, asylees

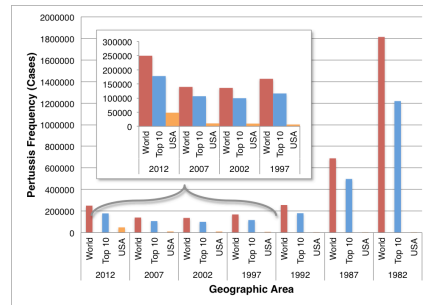
## 3. Methods (cont'd)

- **Conceptual Framework** - Relationship between globalization and health



## 4. Analysis

- **A reemerging rise in the global burden of pertussis (whooping cough)**



- **History of pertussis in the US**
  1. 1,010 cases: record low in 1976
  2. 260,000 cases: record high in 1934
  3. 48,276 cases: 158% increase from 2011-2012
- **History of globalization**
  1. Conquest (desire to ensure security and extend political power)
  2. Prosperity (search for a better life)
  3. Religious evangelism
  4. Curiosity & wanderlust

## 4. Analysis (cont'd)

- Today's globalized world
  - across many email social
  - around world flows huge
  - instant movements countries economies
  - national computers information capital
  - raw oceangoing telephone service
  - borders technology airplanes
  - ideas materials cultures cheap laws
- **Globalization's effect on health**
  1. West Nile Virus
  2. Severe Acute Respiratory Syndrome (SARS)
  3. Middle East Respiratory Syndrome (MERS)
  4. Ebola Virus Disease (EVD)

## 5. Results

1. An independent t test was conducted to compare mean incidence of pertussis in the US between years 1982-2001 & 1982-2012.
2. There was a significant difference in the means between the ranges of years:  $t(49) = -2.39, p = 0.01$
3. All significant coefficient estimates had the expected sign (i.e., positive or negative) in terms of the relationship between independent and dependent variables
4. The explained variation, or coefficient of determination  $R^2$ , ranged from 13.1% (adjusted) to 13.6% (unadjusted)
5. When "international travel" and "combined migration" (immigrants, refugees and asylees) were entered separately in the regression (not pictured), neither international travel nor combined migration were significantly associated with pertussis cases, but were together as an aggregate variable (aggregate population mobility).

**Summary Statistics** Including Mean and Standard Deviation of All Variables (covering each state\* between 1993 – 2014)

Variable	Mean <sup>^</sup>	SD
Pertussis Cases	295	560
International Visitors	581,411	1,313
Immigrants (documented)	18,677	39,000
Refugees	1,792	1,985
Asylees	1,518	3,805
State Median Household Income	\$53,147	\$8,133
State Uninsured Rate	13.1%	4.9%
State Unemployment Rate	5.7%	1.9%
State Health Ranking	25.5	14.4

<sup>^</sup> does not include D.C.  
<sup>^</sup> mean was computed by state, by year, when data was available

## 5. Results (cont'd)

**Multiple Regression Analysis** of Select Factors That Influence the Number of Pertussis Cases in the United States (log-log, unless noted)

Variable	Regression		
	Coef.	SE	p
Constant	12.836	4.077	0.002
<b>Aggregate Population Mobility Rate</b>	0.159	0.030	0.000
<b>State Median Household Income</b>	-1.505	0.378	0.000
State Uninsured Rate	-0.077	0.171	0.651
<b>State Unemployment Rate</b>	0.566	0.131	0.000
<b>State Health Ranking*</b>	-0.037	0.004	0.000
$R^2$ /Adj. $R^2$	.14/.13		
F Statistic (Overall)	31.10	0.000	

Note: \*Natural units. **Bold** indicates stat. sig. result.

## 6. Conclusions

**The association between population mobility and infectious disease rates can be seen as extremely complex.**

1. Pertussis continues to be a cause for morbidity and mortality around the world and the rates are especially rising in the US. (419% increase when comparing means of incidence [1982-2001(4,854) / 2002-2012 (20,330)]).
2. The epidemiology of pertussis in changing.
3. Population mobility has increased significantly over the past century.
  - international travelers have exceeded 1 billion per year
4. The findings of this analysis support the hypothesis that population mobility is significantly associated with pertussis cases in the United States.
5. A preponderance of qualitative evidence also supports the hypothesis that population mobility is associated with pertussis cases.
6. This poster is meant to enhance the conversation by utilizing a new framework that can connect public health professionals, researchers and policy-makers.

## Contact Information

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