Citizenship Policy and the Spread of Communicable Diseases: Evidence from the Dominican Republic

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How can social policy affect the **transmission** of communicable diseases?

- **Migrants** face increased vulnerability to vector-borne diseases due to crowded conditions and limited healthcare access
- Recent causal evidence of how immigration policy affects health access: **"chilling effects"** and crowding (Watson (2014); Ager et al. (2023))
- We focus on a **citizenship policy** in a context where:
  - Citizenship is highly relevant for accessing public health services
  - Communicable diseases do not discriminate based on citizenship status

How can social policy affect the **transmission** of communicable diseases?

Research Question(s)

- How does restricting citizenship for a **subpopulation** affect the overall burden of communicable diseases?
  - Empirically exploring the **indirect** effects on the non-targeted or native population
  - Documenting **"chilling effects"**
- Can social integration and assimilation of immigrants mitigate these effects?

In this paper

- A controversial policy in the **Dominican Republic (DR)** effectively limited access to health services for as much as 10% of its population
  - A citizenship policy targeting Haitian-Dominicans (HD)
- We focus on **dengue**, a mosquito-borne communicable disease that had an outbreak during 2013 in the Dominican Republic
  - **Highly contagious** (*daytime*) with a RO of 4.25 (COVID-19 Delta RO is 5.08)
- Two main sources of data:
  - Official counts of communicable and non-communicable diseases
  - Pre-policies Census data on the presence of the Haitian-Dominican (HD) pop
- We implement a *diff-in-diff* design, exploiting differential exposure to the policy among municipalities in the DR

A preview of our results

- **Immediate chilling effects:** CC-168 led to 13.5% decrease in recorded dengue cases (1.2 fewer cases per month per sd increase in exposure)
- **Spillover transmission emerges:** After 6 months, effects reverse as disease spreads to non-targeted population, with high-exposure areas seeing increases up to 16.7%
- Effects are robust to outliers and alternative measures. DHS short term analysis reports increases in Dengue symptoms.
- **Social integration matters:** Low Dominican-Haitian integration areas experience:
  - Stronger healthcare avoidance (more negative chilling effects)
  - Greater spillover transmission (2.778 additional cases per 100,000)
- Effects concentrated in public facilities where targeted population primarily seeks care; minimal effects in private facilities

Contributions

1. 'At home' effects of both immigration (Watson, 2014; Ibáñez et al., 2021; Rozo and Vargas, 2021; Rozo and Sviatschi, 2021; Ager et al., 2023) and citizenship-related policies (Amuedo-Dorantes et al., 2017; Amuedo-Dorantes and Antman, 2017; Kuka et al., 2020; García-Pérez, 2019; Jácome, 2022)
   - Closest work is Ibáñez et al. (2021) and Ager et al. (2023)
   - We provide novel evidence on Dengue and an unusual citizenship policy
2. Spread of communicable diseases.(Oster, 2012; Adda, 2016; Eichenbaum et al., 2020)
   - We document how policies not directly tied to health can **worsen** the burden of disease
3. Effectiveness of health policies. (Miguel and Kremer, 2004; Bleakley, 2010; Cohen et al., 2010; Dammert et al., 2014)
   - We show how citizenship policies may limit the effectiveness of health policies

Constitutional Court's Rule 168-13 (CC-168)

Historical Tension between the DR and Haiti: Long-standing conflict between both nations, including the 1937 massacre ordered by Dominican dictator Rafael Trujillo

- Sparked by a trade war in early 2013, the DR issued the CC-168 in **September 2013** targeting Haitian-Dominicans (HD)
- The CC-168 was retroactive: Dominicans born to foreign parents between 1929 and 2010 were to be stripped of their Dominican nationality

Constitutional Court's Rule 168-13 (CC-168)

The CC-168 had a profound impact on the HD population

- **Impact:** Affected 500K-1.1MM people, leading to struggles in accessing education, work, social security, and health services (IACHR report, 2015).

Dengue: A spreading tropical disease

- Mosquito-borne **viral** disease, with 5 serotypes, transmitted by *Aedes Aegyptis* and *albopictus*
- Highest historical record of dengue cases in 2023 (6.5 million new infections) mostly driven by surges in South America and Southeast Asia
- Key features:
  - **Highly contagious** (*daytime*) with a RO of 4.25 (COVID-19 Delta RO is 5.08)
  - **Frequently asymptomatic** but affects children (stomach pain, vomiting and diarrhea) and adults (fever and respiratory issues) differently
  - Serotype-specific immunity (only 1 out of 5 types), **a second infection is more likely to be severe**

In comparison with Malaria: Less contagious (*night time*) and no evident immunity

Dengue in the Central American and the Caribbean

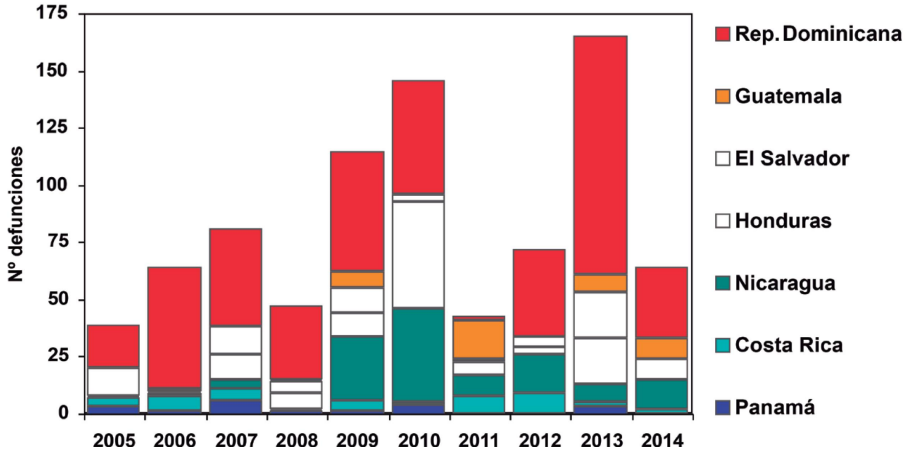


Figure: Source: Ávila-Agüero et al. (2019)

Healthcare Access Barriers and Dengue Control in the DR

Pre-existing healthcare barriers for Haitian-Dominicans:

- **Citizenship requirement:** ID needed to access public health services
- **Chronic exclusion:** HD immigrants and descendants face persistent barriers to care (Simmons, 2010; Rojas et al., 2011; Brito et al., 2017; Miller et al., 2016)

Dengue control requires healthcare engagement (PAHO Protocol, 2012):

1. Environmental cleaning and sanitation
2. Community participation
3. **Early detection and treatment**

- Effective control depends on population willingness to seek care
- Documentation barriers limit disease surveillance and response

CC-168 intensified pre-existing barriers, creating conditions for healthcare avoidance among HD population and subsequent disease spillover

Data

- Official disease counts from the DR's Epidemiology Direction (PAHO protocol)
  - Communicable (Dengue) and non-communicable diseases (Diabetes, Heart Attacks, Strokes)
  - Data collected from patients showing up at health centers
  - Data is available at the health-center $\times$ week level, but we aggregate up to the municipality (155) level in our preferred estimations
- 2010 Census data from IPUMS for exposure to the policies: proxy this with self-declared immigration status, a likely underestimate
  - This is likely an underestimate, but this is the closest measure available
  - We have 2 measures: recent immigrants (in the last 5 years) and long-term immigrants

Data

- Other sources of data:
  - Data from the DHS 2013 (July-Oct'13) to go beyond aggregate counts and explore symptomatology
  - Epidemiological data on the bioclimatic suitability of disease vectors (Kraemer et al., 2015)
  - Official Wedding Records

Empirical Strategy

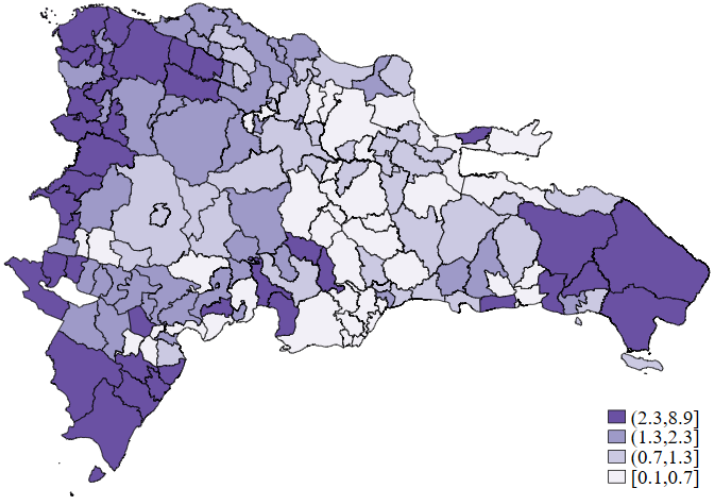
- We use a *diff-in-diff* design to identify the effects of the CC 168 on the case incidence of Dengue:

$$y_{mt} = \delta \cdot Exposure_m \cdot \mathbf{1}[\text{CC-168}_t] + X'_{mt}\beta + \gamma_t + \gamma_m + \epsilon_{mt} \quad (1)$$

- **Parallel trends assumption**: after partialing out municipality-level and time-period FE, the incidence of dengue would have evolved similarly regardless of their HD population around the policy shock

Exposure to the CC-168

Share of population that are recent Haitian immigrants (up to 5 years)



Notes: National share is 1.6%.

Results: Significant healthcare avoidance following CC-168

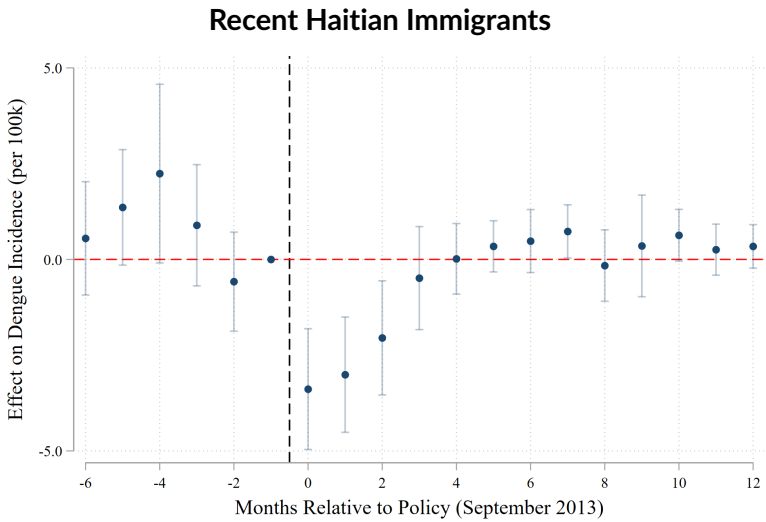
Long-Term

- 1 s.d. increase in exposure → 1.2 less dengue cases per month, 13.5% decrease
- Top quartile areas show even larger effects: 3.307 fewer cases (34.7% decline)

	(1) HD pop. (%, s.d.)	(2) HD pop. (Top Quartile)
Pol. x HD Exposure	-1.285**	-3.307*
	(0.639)	(1.787)
Month FE	Yes	Yes
Municipality FE	Yes	Yes
Dep. Var. Mean (2012)	9.532	9.532
N	3696	3696

Results on Dengue using an Event Study

Long-Term



Event Study Summary: Short-Term Haitian Migrants (Last 5 Years)

- **Immediate chilling effect (0-5 months):** Recorded dengue cases decline by 12.7–31.0%
- **Spillover emerges (6-12 months):** Effects reverse sign, moving toward positive (up to 6.5%)

	Exposure Measure	
	Continuous	Top Quartile
Panel A: First 6 Months (t=0 to 5)		
Average Effect	-1.429***	-3.494***
	(0.451)	(1.239)
Percent Change (%)	-12.67	-30.97
Panel B: Months 6-12 (t=6 to 12)		
Average Effect	0.375	0.733
	(0.287)	(0.870)
Percent Change (%)	3.33	6.50
Pre-Trend Test (p-value)	0.237	0.117
Observations	3,696	3,696
R-squared	0.699	0.699
Pre-Policy Mean	11.28	11.28

Event Study Summary: Long-Term Haitian Migrants (All Haitian-Born)

	Exposure Measure	
	Continuous	Top Quartile
Panel A: First 6 Months (t=0 to 5)		
Average Effect	-1.366***	-3.643***
	(0.459)	(1.186)
Percent Change (%)	-12.11	-32.29
Panel B: Months 6-12 (t=6 to 12)		
Average Effect	0.581**	1.361*
	(0.287)	(0.790)
Percent Change (%)	5.15	12.07
Pre-Trend Test (p-value)	0.115	0.164
Observations	3,696	3,696
R-squared	0.700	0.701
Pre-Policy Mean	11.28	11.28

Robustness

- **Outliers**: robust to dropping Santo Domingo and border regions, and other measures (long-term immigrants) ▸ Outliers ▸ Long-Term
- **Randomization Inference**: Results survive a randomization inference test ▸ Rand
- **Non-communicable diseases**: We expect to see no effects on other types of diseases (non-communicable, like diabetes or strokes) ▸ Non-Comm
- **Symptomatology**: Alternative dataset (DHS) implemented immediately before and after the policy, we explore symptoms
  - Dengue is **frequently asymptomatic** but affects children (stomach pain, vomiting, diarrhea) and adults (fever, respiratory issues) differently ▸ DHS
- **Disease-prone environment**: Could results stem from areas being more disease-prone environments with lower healthcare access? ▸ Mosquito

Mechanism: Differential Chilling Effects by Facility Type

Estimation

Public Facilities:

- **Free/subsidized care** → primary access point for HD population
- **Government-run** → perceived risk of documentation checks
- **Immigration enforcement concerns** → fear of deportation
- **More visible** to authorities

⇒ **Larger chilling effect expected**

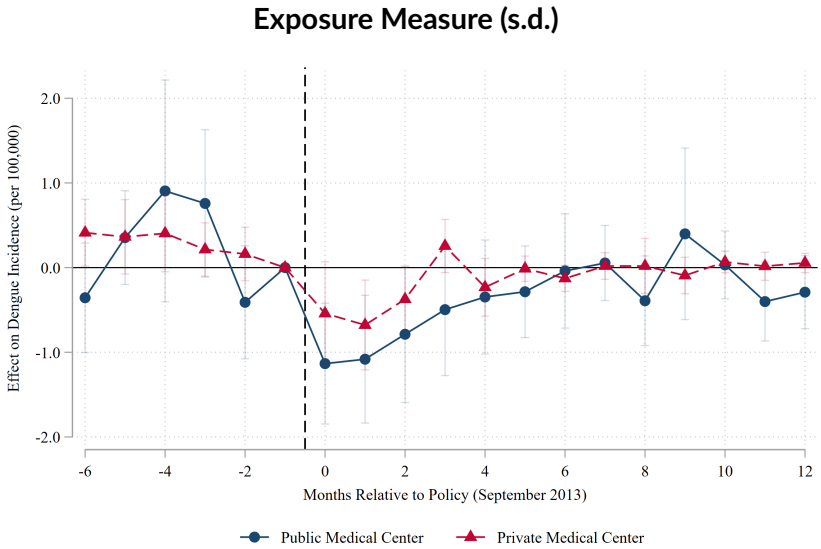
Private Facilities:

- **Fee-for-service** → less accessible to HD population
- **Commercial operations** → weaker enforcement incentives
- **Privacy expectations** → lower perceived risk
- **Smaller HD baseline** usage

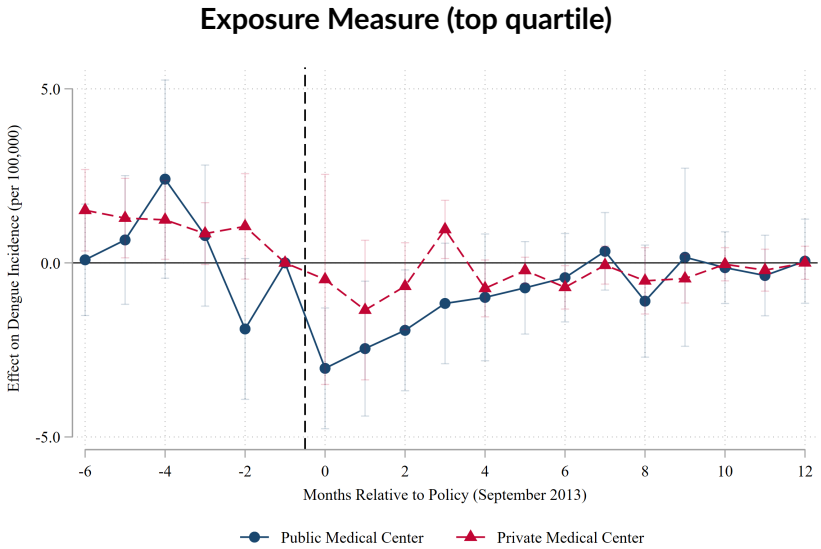
⇒ **Smaller/null effect expected**

If healthcare avoidance drives our results, effects should be **concentrated in public facilities** where the targeted population primarily seeks care

Results: Chilling Effect Concentrated in Public Facilities



Results: Chilling Effect Concentrated in Public Facilities



Results: Chilling Effect Concentrated in Public Facilities

- **Public facilities:** Large, immediate negative effects post-policy. Peak decline around t=2-4 months, indicating severe healthcare avoidance
- **Private facilities:** Much smaller effects, confidence intervals include zero. Minimal evidence of avoidance
- Healthcare avoidance concentrated where HD population primarily seeks care (public facilities), consistent with discrimination-driven chilling effect
- **Confirms discrimination mechanism:** Public facilities, where HD population faces greater documentation barriers and enforcement risk, show concentrated effects

Mechanism: CC-168's effects by high vs. low integration areas

Can't directly observe discrimination or healthcare barriers. **Solution:** Use pre-policy intermarriage rates (2009-2012) as proxy for social integration ▸ Maps

Two marriage types:

- **Dominican-Haitian**
  Integration with targeted group
- **Dominican-Foreign**
  Robustness (given negative bias)

Classification:

- High vs. low based on top 10% of distribution

Why intermarriage matters:

- **Information:** Mixed families navigate barriers together
- **Social pressure:** Healthcare workers less likely to discriminate in integrated communities
- **Self-selection:** High intermarriage signals tolerant communities

⇒ Intermarriage reveals where policy barriers are weakest

Triple-Difference Strategy: Social Integration as Moderator

Does social integration moderate the policy's health impacts?

Empirical Model:

$$\begin{aligned}\text{Cases}_{mt} =& \beta_1(\text{Exposure}_m \times \text{Post}_{0-5}) \\ &+ \beta_2(\text{Exposure}_m \times \text{Post}_{0-5} \times \text{LowIntegration}_m) \\ &+ \beta_3(\text{Exposure}_m \times \text{Post}_{6-12}) \\ &+ \beta_4(\text{Exposure}_m \times \text{Post}_{6-12} \times \text{LowIntegration}_m) \\ &+ \gamma_m + \delta_t + X'_{mt}\Gamma + \epsilon_{mt}\end{aligned}$$

Key Parameters:

- β_1, β_3: Policy effects in high integration areas (reference)
- β_2, β_4: **DDD coefficients** – differential effects in low integration areas
- High integration = reference

Two-Stage Mechanism: Chilling Effects + Spillover

Stage 1 (0-5 months):

Healthcare Avoidance

- HD stop accessing health centers
- Recorded cases **decline**
- Low integration $\rightarrow$ more discrimination $\rightarrow$ worse avoidance

Expected:

- $\beta_1 < 0$
- $\beta_2 < 0$

Stage 2 (6-12 months):

Spillover to Dominicans

- Untreated cases remain infectious
- Disease spreads to Dominicans
- Dominicans get diagnosed $\rightarrow$ recorded cases **increase**

Expected:

- $\beta_3 \approx 0$ (spillover begins)
- $\beta_4 > 0$ (more spillover in low integration)

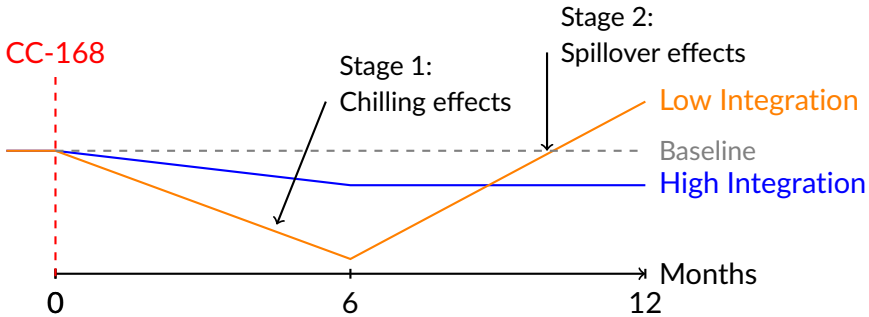
Positive β_4 means low integration areas move toward positive/zero *faster*, indicating greater spillover transmission to non-targeted population

Results: Social Integration Matters

- Stage 1: All DDD coefficients **negative** – low integration → worse chilling effect
- Stage 2: All DDD coefficients **positive** – low integration → more spillovers

	Short-term Migrants		Top Quartile Exposure	
	(1) Haitian Int.	(2) Foreign Int.	(3) Haitian Int.	(4) Foreign Int.
Exposure × Post (0-5 months)	−1.751**	−1.210**	−2.685	−1.100
	(0.710)	(0.579)	(2.148)	(2.526)
× Low Integration (DDD)	−0.272	−0.900	−2.856	−4.486
	(1.050)	(0.978)	(3.102)	(3.372)
Exposure × Post (6-12 months)	−0.590	−0.910**	−1.655	−3.033**
	(0.541)	(0.425)	(1.440)	(1.344)
× Low Integration (DDD)	0.353	0.803	0.996	2.778*
	(0.652)	(0.520)	(1.676)	(1.559)
Observations	4896	4928	4896	4928
R-squared	0.680	0.680	0.680	0.680
Municipality FE	*Yes*	*Yes*	*Yes*	*Yes*
Month FE	*Yes*	*Yes*	*Yes*	*Yes*
Controls	*Yes*	*Yes*	*Yes*	*Yes*

Low Integration Intensifies Negative Externalities



- Discriminatory citizenship policies create **negative externalities** on non-targeted populations
- Low integration areas experience up to **2.8 additional spillover cases**

Conclusion

- **Exclusionary citizenship policies have unintended public health consequences** that extend beyond the targeted population
- We document a two-stage result:
  1. Healthcare avoidance among Haitian-Dominicans (chilling effects)
  2. Disease spillover to Dominican population through untreated transmission
- **Social integration serves as a protective factor:** Communities with higher Dominican-Haitian intermarriage experienced weaker chilling effects and less spillover transmission
- For communicable diseases, restricting healthcare access based on citizenship status is counterproductive creating negative externalities that affect the entire population

Thank you!
Gracias

Any comments or suggestions, email me at albavif@wfu.edu

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Testimonies

Back

"I was born in a hospital in Mao in the Dominican Republic in 1999. My mom and dad are Haitians. ***At school, they are already asking me for a birth certificate, but they don't give it to me...*** *I feel bad because in the street they call me damn, dirty, and treat me badly. We are all equal and that's not right. I have as much right to be Dominican as the others. I just want to study. This is not fair".*

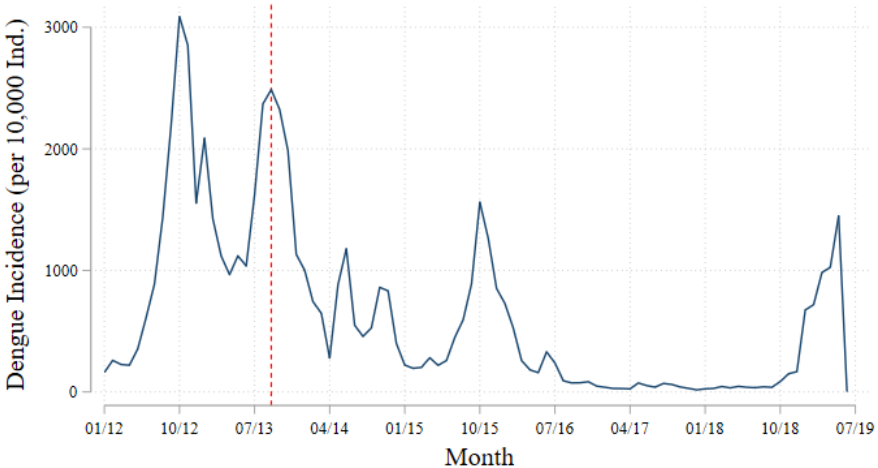
- A 15-year-old woman born in the Dominican Republic

"I have a 3-year-old little girl. She has been unable to go to school; I have been unable to register her; ***I can't get health insurance because she is not registered and I don't have the identity card.****"*

- A Haitian woman referring to her Dominican-born daughter

Time Series

Back



Political Context Timeline

Back

03/2010	**New DR Constitution**
	Jus soli citizenship is no longer included
01/2012	**Beginning of PAHO protocol for data collection**
	Weekly, health-center level, for different diseases.
09/2013	**DR-Constitutional Court's Ruling 168-13**
	$7\% - 10\%$ of DR pop. gets their citizenship contested
06/2014	**Regularization program for those with contested citizenship**
	$< 10\%$ Success rate
06/2015	**Mass Deportations begin**
	End of Regularization period.
	Deportations amount to 10% of HD pop., and 1% of DR pop.
06/2019	Maximum span of data before COVID-19

Results

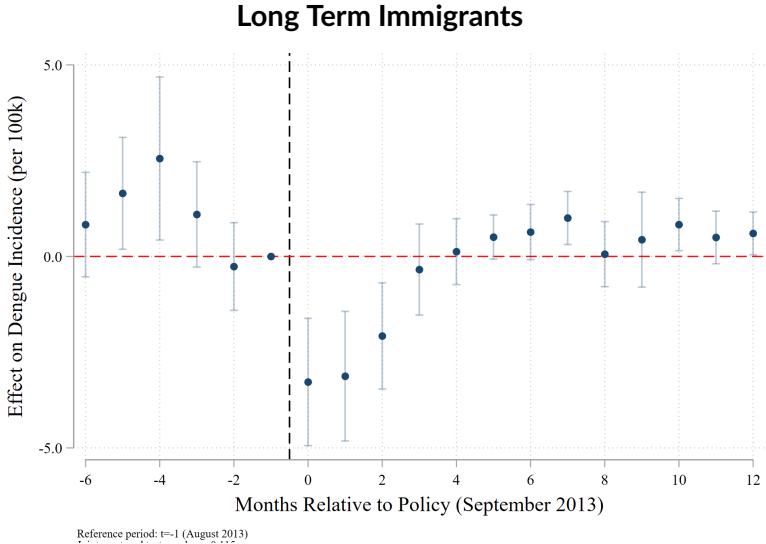
Back

Long Term Immigrants

	(1) HD pop. (%, s.d.)	(2) HD pop. (Top Quartile)
Pol. x HD Exposure	-1.242**	-4.754***
	(0.581)	(1.803)
Month FE	Yes	Yes
Municipality FE	Yes	Yes
Dep. Var. Mean (2012)	9.532	9.532
N	3696	3696

Results using a Event Study

Back



Robustness: Randomization Inference

Back

Could our results arise by chance from random variation?

1. **Randomly reassign treatment:**
   - Generate fake HD exposure (matching true distribution)
   - Randomize policy timing ($\pm$12 months from actual date)
2. **Re-estimate model:** Run same DD specification with placebo treatment

$$\text{Cases}_{mt} = \beta(\text{FakeExposure}_m \times \text{FakePolicy}_t) + \gamma_m + \delta_t + X'_{mt}\Gamma + \epsilon_{mt}$$

3. **Collect placebo t-statistics:** Store $|t|$ from each iteration
4. **Repeat 400 times:** Build distribution under null hypothesis
5. **Compare:** Locate true t-statistic (δ) within placebo distribution

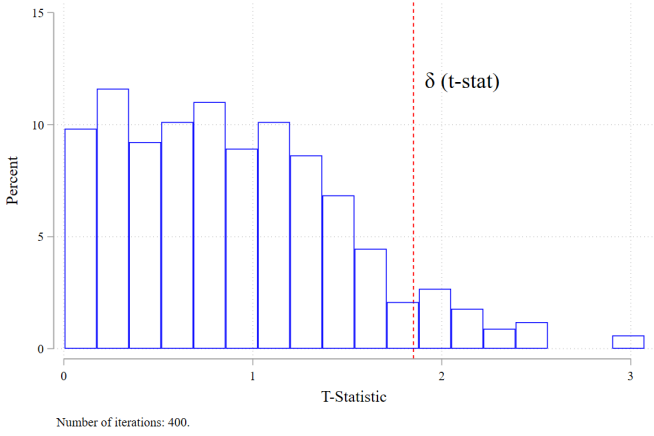
Interpretation: If true $|t|$ is in far right tail $\rightarrow$ result unlikely due to chance

Robustness: Randomization Inference

Back

Results are unlikely to arise from chance assignment of treatment timing or exposure levels

- Most fake t-statistics cluster below 1.5 (blue histogram)
- Our actual t-statistic ($\delta \approx 2.0$) falls in far right tail
- Very few placebo iterations (less than 5%) produce t-statistics as large as our true estimate



Sensitivity to outliers: big regions

Back

Excluding Santo Domingo (capital) and border provinces

	(1) Full sample	(2) W/o Capital Region	(3) W/o border
Pol. x HD Exposure	-1.285**	-1.098*	-1.185*
	(0.639)	(0.607)	(0.669)
Month FE	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes
Dep. Var. Mean (2012)	9.532	8.862	9.850
N	3696	3672	3120
Rel. effect	-0.135	-0.124	-0.120

Negative Results on non-communicable diseases

Back

- We interpret the negative coefficients as mechanical undercounting of the targeted population and as reduced congestion at health centers.

	HD pop. (%, s.d.)		HD pop. (Top Quartile)	
	(1) Diabetes	(2) Stroke	(3) Diabetes	(4) Stroke
Pol. x HD Exposure	1.841	-2.127	-3.881	-5.296*
	(3.531)	(1.649)	(7.788)	(2.677)
Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Dep. Var. Mean (2012)	21.55	11.19	21.55	11.19
N	476	444	476	444

Short-term effects using 2013 DHS Data

Back

- Results are consistent with symptoms for adults and children.

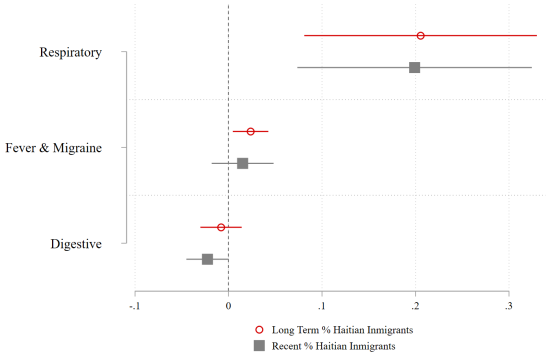


Figure: Adults

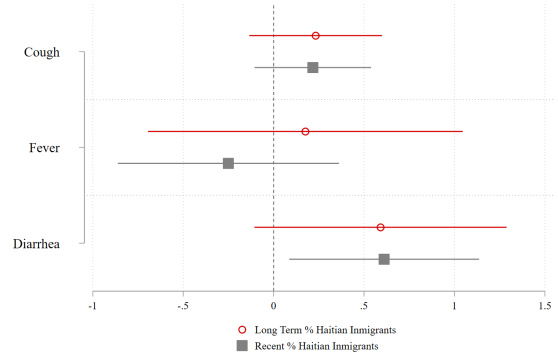


Figure: Children

Disease Suitability: Aedes Aegypti Mosquito

Back

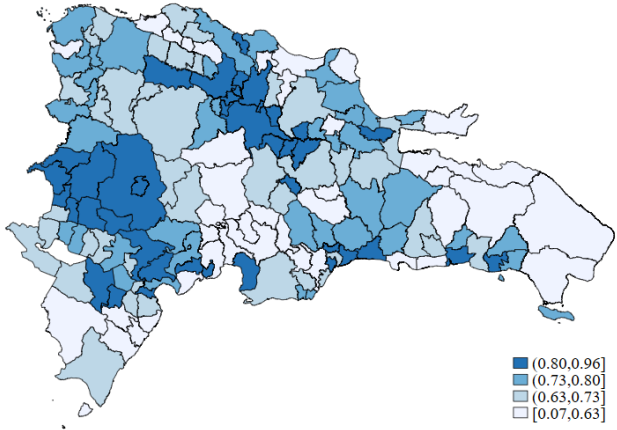


Figure: Suitability of *Aedes Aegypti* mosquitos (Kraemer et al., 2015)

Disease Suitability: Aedes Aegypti Mosquito

Back

- Horse racing the HD population and disease suitability

	(1) HD pop. (%, s.d.)	(2) HD pop. (Top Quartile)
Pol. x HD Exposure	-1.339**	-3.448*
	(0.622)	(1.750)
Pol. x Main Vector Suit.	-0.416	-0.442
	(0.651)	(0.651)
Month FE	Yes	Yes
Municipality FE	Yes	Yes
Dep. Var. Mean (2012)	9.532	9.532
N	3696	3696

Event Study: Public vs Private Medical Centers

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$$\text{Cases}_{mt}^{Public} = \sum_{k=-6, k\neq -1}^{12} \beta_k^{Pub}(\text{Exposure}_m \times \mathbb{1}[t=k]) + \gamma_m + \delta_t + X_{mt}'\Gamma + \epsilon_{mt}$$

$$\text{Cases}_{mt}^{Private} = \sum_{k=-6, k\neq -1}^{12} \beta_k^{Priv}(\text{Exposure}_m \times \mathbb{1}[t=k]) + \gamma_m + \delta_t + X_{mt}'\Gamma + \epsilon_{mt}$$

Interpretation:

- β_k^{Pub}: Effect on public facility cases at time k relative to policy
- β_k^{Priv}: Effect on private facility cases at time k relative to policy
- **Prediction:** $|\beta_k^{Pub}| > |\beta_k^{Priv}|$ in post-period (stronger avoidance of public)

Dominican-Haitian/Foreign Marriages

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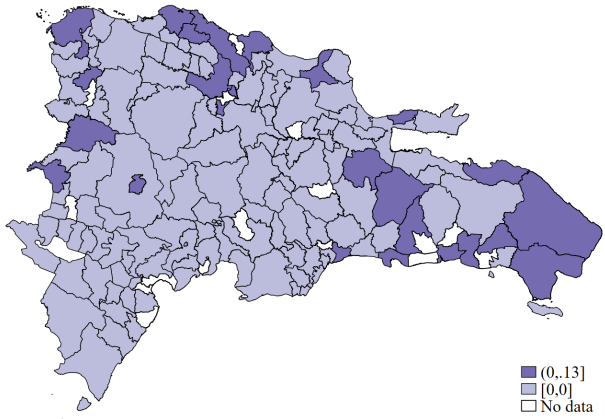
Figure: Share of Dominican-Haitian marriages (2009-2012 average)



Notes: 2012-2009 national average is .004 %.

Dominican-Haitian/Foreign Marriages

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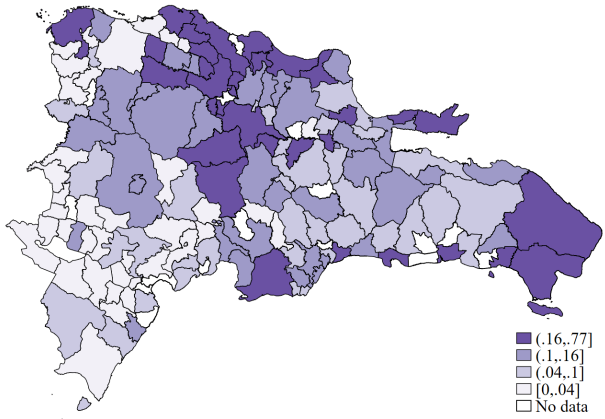
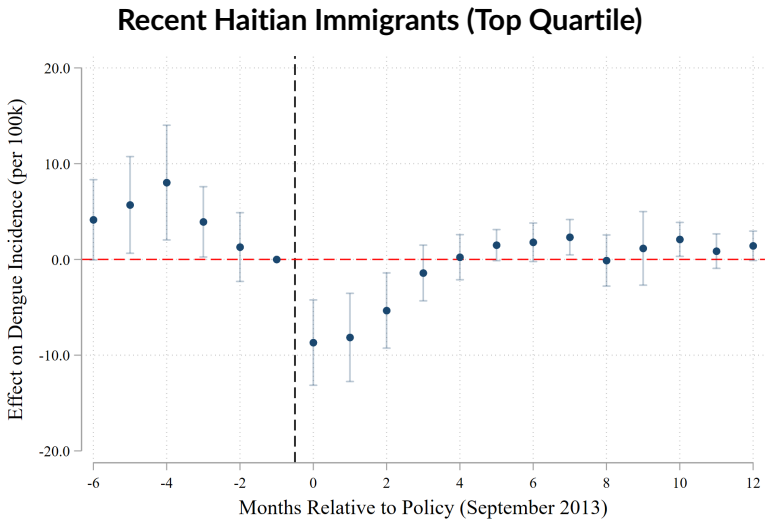
Figure: Share of Dominican-foreign marriages (2009-2012)



Notes: 2012-2009 national average is .125 %.

Results on Dengue using an Event Study



Policy Recommendations

- **Universal access to basic healthcare**, regardless of citizenship status
  - Communicable disease treatment generates positive externalities for entire population
- **Target vector-borne disease prevention in vulnerable communities**
  - Intensify sanitation and health education in areas with marginalized populations
- **Reform citizenship and documentation policies** to reduce administrative barriers
  - Create pathways to regularization for long-term residents