Why do Mexico need a more systemic multi-sectorial-approach to face food insecurity?

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Background

- Food insecurity (FI) is recognized as a pressing global problem: as close to 800 million people suffer hunger around the world[1].
- FI has been associated with negative impacts on human development such as increased poverty, inequality, and poor economic growth[2-4]. Moreover, empirical studies suggest an association between FI and adverse health outcomes like increased risk of obesity[5,6], type 2 diabetes[7,8], and other chronic conditions[9,10].
- Its understanding has moved away from a food-production focus to one embracing nutrition and social conditions[11]. FI needs to be recognized as a complex construct ranging from food production to access to healthful foods.
- Such complexity requires coherent and comprehensive polices at the local, national and international levels[12]. Thus, food assistance programs in isolation will likely have small effects.
- FI is a persistent problem in Mexico despite substantial increases in per capita expenditures on food assistance programs. While expenditure has almost doubled – from $20 USD in 2008 to $35 USD in 2010– the overall prevalence has remained constant at about 45% of the households; figure 1.
- Food-assistance programs in Mexico are allocated at the state level and are heterogeneous in its design, implementation, and target population. This diversity coexists with important variations in the prevalence of food insecurity among states and municipalities in Mexico; figure 2.

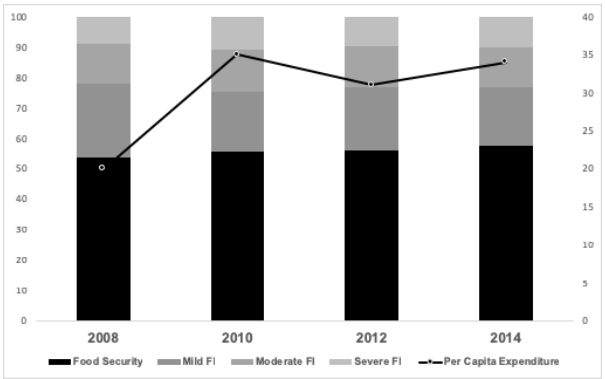

Figure 1. Prevalence of Food Insecurity and per capita expenditure on food programs by year in Mexico

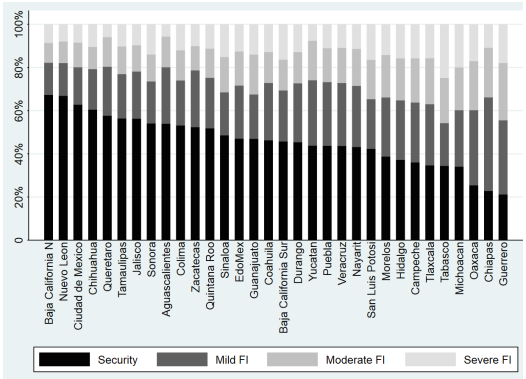

Figure 2. Prevalence of Food Insecurity by Sate in Mexico

Objective: To assess how Food Insecurity at the household level in Mexico is explained by socioeconomic, political, and bio-geophysical differences at the municipal and state levels.

Methods

A three-level multinomial hierarchical linear model (HLM) was estimated using data from several sources that allowed to identify political, economic and socio-demographic characteristics at the state, municipal and household levels. Secondary data was obtained from open official statistics. The analytical sample comprised **19,124 nationally representative households**, nested in **506 municipalities**, which are in turn nested in **32 states**.

Dependent variable. **Food insecurity** was operationalized through the Latin-American and Caribbean Food Security Scale (ELCSA)[13] obtained from the ENIGH 2014. The households were classified as being food secure, and mild, moderate, or severe food insecure.

Household level variables. The socio-demographic controls were **household size**, **gender** and **education** level of the head of household, obtained from ENIGH 2014

Municipal level variables. At the municipal level, a variable for **climate vulnerability** was calculated through an index composed of exposure, sensitivity and adaptive capacities[14], developed by the National Institute of Ecology and Climate Change (INECC). The index was operationalized with a dummy variable, which identifies municipalities with high or very high vulnerability to hydro-meteorological climate-related disasters[15]. A **poverty index** considering education, households' conditions, monetary income, and population density from CONAPO was also used in quintiles.

State level variables. **State Gross Domestic Product (GDP)** per capita was transformed into quintiles and a dummy variable captured the **change of political party** in the state government. **Food-assistance programs** were included as the number of state level programs obtained from CONEVAL's inventory.

All models keep household level variables as controls. The models were estimated with sampling weights at the household level and the maximum number of macro-iterations was set at 1,000. We used STATA version 15[16] and HLM software version 7[17] to run the analyses.

Results (Table 1)

- Model 1 shows that municipalities tagged as having high or very high vulnerability to climate disasters had nearly 30% more severe food insecurity than those with low or moderate vulnerability to natural disasters. An additional quintile in the municipal-level poverty index yields a 51% increase in severe food insecurity when compared to food security.

- In Model 2, when poverty is accounted for at the municipality level, change of party in power at the state level and the number of food assistance programs were not significantly associated with food insecurity.

- Model 3 reveals that, when poverty is estimated at the state level, the number of food assistance programs at the state level becomes significant, decreasing severe and moderate food insecurity by 9% and 7%, respectively. An additional quintile in state GDP yields a 28% decrease in severe and moderate food security and a 26% decrease in mild food insecurity. Change in political party remained non-significant.

Discussion

- Spending in food assistance programs is insufficient to modify the prevalence of food insecurity at the household level. Variability in the prevalence is explained by contextual variables like the vulnerability to climate disasters and a poverty index at the municipality level. Structural inequalities influence access to healthful food choices.
- Food- assistance programs are not designed to address these multilevel determinants. We need complex interventions involving a wide range of actors including governments, civil society, human rights ombudsperson, academia, and international organizations, amongst others[11], that may help strengthen a modern and systemic approach to food security governance[18].
- Changes in the levels of food insecurity do not show monotonic steps. Different determinants explain moving from mild food insecurity to moderate than moving from moderate to severe food insecurity.

Conclusion

The study evidences the limits of food assistance programs when social inequalities and climate change are not considered. Thus, narrowly defined food programs will not produce long lasting effects in reducing food insecurity. Conversely, food security governance is a well-suited multi-sectorial approach to address the challenge of hunger and access to a nutritious diet.

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Table 1. Household food insecurity explained by 3-level HLM models

Model 1		**Severe**			**Moderate**			**Mild**	
	Coeff	OR	CI	Coeff	OR	CI	Coeff	OR	CI
Intercept	-3.93**	0.02	0.02, 0.02	-3.04**	0.05	0.94, 1.32	-1.93**	0.15	0.13, 0.17
				Municipal level					
Vulnerability to natural disasters	0.25*	1.29	1.07,1.56	0.11	1.12	0.94, 1.32	0.15	1.02	0.88, 1.17
Poverty index quintiles	0.41**	1.51	1.42, 1.60	0.34**	1.47	1.40, 1.56	0.35**	1.42	1.36, 1.49
Model 2		**Severe**			**Moderate**			**Mild**	
	Coeff	OR	CI	Coeff	OR	CI	Coeff	OR	CI
Intercept	-3.94**	0.09	0.02, 0.02	-3.08**	0.05	0.04, 0.06	-2.01**	0.13	0.11, 0.16
				Municipal level					
Vulnerability to climate disasters	0.26*	1.29	1.07, 1.56	0.11	1.12	0.94, 1.33	-0.12	0.89	0.73, 1.07
Poverty index quintiles	0.41**	1.50	1.41, 1.59	0.39**	1.47	1.39, 1.55	0.40**	1.50	1.40, 1.59
				State level					
Change of party in power	0.08	1.08	0.83, 1.42	-0.09	1.10	0.84, 1.43	0.16	1.17	0.90, 1.52
Number of food assistance prog.	-0.01	0.99	0.93, 1.05	0.00	1.00	0.95, 1.06	0.02	1.02	0.96, 1.08
Model 3		**Severe**			**Moderate**			**Mild**	
	Coeff	OR	CI	Coeff	OR	CI	Coeff	OR	CI
Intercept	-4.11**	0.02	0.01,0.02	-3.23**	0.04	0.03, 0.05	-2.13**	0.12	0.10, 0.14
				Municipal level					
Vulnerability to climate disasters	0.50**	1.65	1.33,2.04	0.35**	1.42	1.17, 1.73	0.23*	1.26	1.07, 1.49
				State level					
Number of food assistance prog.	-0.09**	0.91	0.87,0.96	-0.08*	0.93	0.87, 0.98	-0.06	0.94	0.88, 1.00
Per capita GDP quintiles	-0.32**	0.72	0.66,0.79	-0.32**	0.72	0.65, 0.80	-0.31**	0.74	0.66, 0.82

Note: Coeff, coefficient; OR, Odds Ratio; CI, confidence Interval; GDP, gross domestic product. Reference category is "Food Security". Significance level: * p<0.10. ** p<0.05, *** p<0.01.