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Born to be Obese and Self-Employed: Evidence of Long-Term Effects from Pre-Natal Exposure to an Acute Diarrheal Disease

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Born to be Obese and Self-Employed. Evidence of Long-Term Effects from Pre-Natal Exposure to an Acute Diarrheal Disease

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Abstract

This paper finds that women exposed to Cholera while in-utero are more likely to be obese, more likely to be self-employed and less likely to be employed in the service sector, providing evidence that these women may be suffering from discrimination in the labor market. This study suggests that, given the widespread incidencen of diarrheal diseases in the developing world, individuals in poor countries are born more vulnerable to becoming obese and self-employed, and, therefore, interventions that reduce these diseases will have important additional benefits as the obesity epidemic continue to expand in these countries.

Keywords: Obesity; acute diarrheal diseases; Cholera ; clean water; in-utero.

JEL Codes: I15, I18, O10

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1 Introduction

Obesity increases the risk of serious health diseases, including diabetes, heart disease and some cancers. Additionally, obese women, in particular, suffer from lower wages and discrimination in the labor market (Cawley, 2004; Rooth, 2009; Garcia and Quintana-Domeque, 2006). Obesity rates are growing at an alarming pace not just in rich countries but also in developing countries (WHO, 2014; Keats and Wiggins, 2014). In fact, in most middle-income and poor countries the rate of growth in obesity prevalence is greater than in rich countries, and this is not just a convergence story, as we can see in Figure 1. One potential explanation is that individuals in these countries are changing their calorie intake (or energy expenditure) at a faster pace than in other countries, due to, for example, poor access to clean water. In this regard, Ritter (2019) finds evidence from Morocco and the Philippines that children without access to piped water at home are more likely to consume sodas and food prepared outside the home, have a higher BMI and are more likely to be obese; and Ritter (2018) finds in Peru that households with access to potentially contaminated water are especially sensitive to a decrease in the price of soda, which in turn increases their obesity rates, but also reduces their diarrhea levels, suggesting that individuals in these countries are substituting contaminated water with soda. Another potential explanation is that individuals in these countries are biologically pre-disposed to being obese. In this study, we are going to explore the second possibility by analyzing the long-term effects of prenatal exposure to an acute diarrheal disease.

Barker (1990) argues that intrauterine nutrition, in particular starvation, can program the fetus' metabolism, such that in later life these individuals are better prepared to deal with similar environments. However, when this environment changes and there is no nutritional scarcity later in life, these individuals are more likely to be obese, and suffer cardiovascular diseases and type-II diabetes. This theory was further tested with the Dutch Famine of 1944; Ravelli, Stein and Susser (1976) find that exposure during the first half of pregnancy significantly increased obesity rates among 19 year-old men; Stein et al. (2007) find an increase in fat deposition for women and in blood pressure for both women and men; and Painter, Roseboom and Bleker (2005) find exposure to famine in early gestation increased the probability of coronary heart disease and obesity prevalence among 50 year old adults. Similar results have been found in other settings: Fung (2009) finds that women, but not men, exposed to the China famine while in utero are more likely to be obese and Hoynes, Schanzenbach and Almond (2016) finds that prenatal and early childhood access to food stamps leads to a reduction in a metabolic syndrome indicator (obesity, diabetes, high blood pressure and heart disease) among adults in the US. All these studies exploit changes in food consumption, however, exposure to diarrheal diseases can have a similar effect, since these diseases reduce dietary intake and intestinal absorption of nutrients (Brown, 2003).

The empirical estimation of the long-term effects of in-utero exposure to acute diarrheal diseases represents an important challenge since these diseases have significant impacts on childhood mortality (Cutler and Miller, 2005; Galiani, Gertler and Schargrodsky, 2005; Watson, 2006; Gamper-Rabindran, Khan and Timmins, 2010; Anderson, Charles and Rees, 2018), and because mortality tends to be concentrated among those who are the weakest ("select mortality"), i.e. the survivors tend to be a healthier subpopulation (Bozzoli, S. Deaton and Quintana-Domeque, 2007; Currie and Vogl, 2013). Thus, in order to detect long term effects, the "scarring" effect on those who survive needs to be larger than the selection effect. (Venkataramani, Bhalotra et al., 2013) analyze the effect of early-life exposure to Mexico's National Clean Water Program on long term outcomes and find effects on adult height for men and completed schooling for women, but no effect on BMI or obesity rates. They exploit variation in pre-program diarrheal disease mortality rates, with the assumption that those with high pre-program diarrheal mortality would experience the largest effects of the program. However, if the selection bias was larger among those with high pre-program diarrheal mortality, then their results underestimate the real effect.

In this study we exploit the Cholera Epidemic occurring in Peru in early 1990s to test whether exposure to acute diarrhea while in utero has long term effects on obesity prevalence and on other outcomes. Cholera is an acute, diarrheal disease generated by a bacterial infection. The main symptom is profuse diarrhea that causes dehydration. The means of contagion is through food handling and consumption, with drinking water being the most common vehicle of transmission (Gotuzzo, 1991; Maguiña Vargas et al., 2010). The rate of mortality due to post-natal exposure to the epidemic was relatively low during this crisis, approximately 9 per 100 000 inhabitants in the first year (1991), but Ritter and Sanchez (2019) find that prenatal exposure to the Cholera Epidemic in Peru in the same year increased average childhood mortality by 14% and indigenous childhood mortality by 32%. Additionally, evidence from other countries shows a very high incidence of miscarriages, between 2% to 36% (Moro and Sukumaran, 2017; Tran et al., 2015; Grout et al., 2015; Ciglenecki et al., 2013).

We apply a Difference-in-Difference approach exploiting the variation in Cholera incidence across cohorts and regions. Ritter and Sanchez (2019) find that the mortality effect is concentrated among indigenous individuals. Thus, in order to reduce the selection bias, we concentrate our analysis on non-indigenous individuals, who represent more than 90% of the total population. We find that women exposed to Cholera while in their first trimester in-utero have higher BMI are more likely to be obese as adults. We do not find statistical effects among women exposed to Cholera while in their second or third trimester probably because of the higher mortality incidence among those women (Ritter and Sanchez, 2019).We do not find any effect on the probability of women to work, but we do find that women exposed to Cholera while in their first trimester in-utero are more likely to be self-employed. This result is not driven by more female entrepreneurs, professionals or technicians, who typically work as independent contractors, nor is it driven by lower education or a larger number of children, which generally increases women's demand for more flexible jobs. It seems therefore possible that obese women have a harder time finding a job and as a consequence decide to work independently or for a family member. We further find evidence that among those women who are employed, exposure to Cholera during the first trimester decreases their probability to work in sales or in the service industry, in general. This occupational choice meshes well with the story of discrimination agains obese women, as these jobs require more contact with customers (Rooth, 2009). Our event studies show no pre-existing trends in the results.

This study makes three important contributions. First, it contributes to our understanding of the long-term effects of Cholera, and more generally, diarrheal diseases. Cholera is not a rare disease; in the last 200 years there have been 7 pandemics and as of 2012, approximately 1.4 billion people are at risk for cholera. Approximately 2.8 million cholera cases occur annually in countries where it is endemic, while approximately 87,000 cholera cases occur in non-endemic countries, and it is estimated that only 5-10% of the actual number of cases are officially reported Ali et al. (2012). More recently, new and more severe variants have been discovered in Asia and Africa (WHO, 2019), and several studies suggest that global warming is increasing the likelihood of more cholera outbreaks (Chowdhury et al., 2017; Jutla et al., 2011; Vezzulli, Colwell and Pruzzo, 2013). It is important to note that acute diarrhea is the main effect of a Cholera infection, and that other consequences are believed to derive from this main effect (Seas and Gotuzzo, 2005). Moreover, the Vibrio Cholera bacteria produces diarrhea by "exactly the same mechanism" as several other bacterial infections with difference only in severity levels (Abdulkadir, 1991), and patients with mild and moderate dehydration due to cholera are difficult to differentiate from those infected by other pathogens, such as *enterotoxigenic Escherichia coli* or *Rotavirus* (Seas and Gotuzzo, 2005). Hence, we believe our results are informative with respect to acute diarrheal diseases, in general.

Second, our study contributes to the in-utero literature (Almond and Currie, 2011) providing evidence that Barker's theory does not apply solely to shocks that reduce intrauterine food consumption, but also to prenatal exposure to diarrheal diseases.

Finally, our study contributes to the understanding of the obesity epidemic in developing and builds on the evidence regarding discrimination against obese women. Given the prevalence of diarrheal diseases in the developing world, this study suggests that individuals in poor countries are born more vulnerable to becoming obese and self-employed, and, therefore programs that reduce these diseases will have important additional benefits as the obesity epidemic continue to expand in developing countries.

To conclude, it is important to mention that although we argue that our results are most likely driven by the acute diarrhea that Cholera produces, and therefore are generalizable to other acute diarrheal diseases, we cannot rule out the possibility that these results are generated by particularities of the Vibrio Cholera bacteria. We, therefore, urge further research to corroborate our hypothesis.

2 Background: Cholera in Peru in 1991

The Cholera epidemic in Peru of the early 1990s is part of the 7th pandemic, which still persists in many countries (Seas and Gotuzzo, 2005). It was caused by the bacterium Vibrium Colérico zero group 01 (Lanata, 1989) and spread though food handling and consumption, with drinking water being the most common means of transmission (Gotuzzo, 1991). The disease was first reported in the areas around the coastal cities of Chancay, Chimbote and Piura (Maguiña Vargas et al., 2010). It is important to clarify that this was believed to be the first case in Peru, not just the first to be reported, because groups of adults and children were tested before 1991 and the bacterium *Vibrium Cholerae* was not identified (Gotuzzo, 1991). From these zones, the epidemic advanced to other urban and rural areas of Peru, spreading from Costa to Sierra through Cajamarca and Junín, finally penetrating the Peruvian jungle to Loreto and San Martín (Maguiña Vargas et al., 2010). By the end of 1991, the disease had spread to fourteen countries in Latin America and the Caribbean, totaling 366,017 cases, with Peru responsible for 83% of all cases presented in the Americas (Mujica, Gomez Mujica and Gomez, 2013).

Figure 2 shows the largest number of cases was reported in 1991, the number decreasing over time, with a peak of approximately 20 thousand cases a week during the first quarter of the year. The frequency of cases showed seasonal variability, with the higher incidence corresponding to the summer season. The jungle was the region most affected by cholera, reaching an incidence rate of 0.16 per 100 inhabitants in mid-1991, while the coast reached its peak in the first quarter, as was the case for Sierra; reaching an incidence rate of 0.14 and 0.035 per 100 inhabitants, respectively. As shown in Figure 3, most deaths occurred during the year 1991. This is probably the consequence of greater awareness about the disease in the following years. The government made great efforts to strengthening of the clinical management of patients suffering from dehydration (Lanata, 1989) and to disseminating information about adequate personal hygiene and food handling. In addition, environmental measures were adopted, such as the chlorination and monitoring of existing water supply systems in urban areas and the distribution of chemical products for water purification in homes and comparators for the monitoring of residual chlorine (Maguiña Vargas et al., 2010).

3 Data and Summary Statistics

The data used in this paper uses two sources of secondary information. The first source contains the number of cases of cholera registered in Peru disaggregated by week-year and region (with the exception of Apurimac and Madre de Dios). It was obtained from a report elaborated by the General Directorate of Epidemiology, of the Ministry of Health of Peru (Suárez-Ognio, 2011). The second source of data used in this study are the most recent 10 rounds of the Demographic and Family Health Survey - ENDES (from 2009 to 2018) conducted by the National Institute of Statistics and Informatics - INEI from Peru. The data includes records of women born between January 1984 and December 1993, with a total of 77,095 observations. We eliminated teenage and pregnant women from the sample. Ritter and Sanchez (2019) find that the effect on childhood mortality is concentrated among indigenous individuals. Thus, in order to reduce the selection bias, we concentrate our analysis on non-indigenous individuals, who represent 92% of my sample. Nevertheless, we show the estimates on our main outcomes for indigenous inviduals in Table 9 of the Appendix.

Table 1 shows the summary statistics of the main variables used in this study. Women in our sample are 26 year old on average (18 to 34), have an average height of 1.5 mts, body mass index of 26, with 16% obese. 64% of the women in the sample are married or cohabitate and they have 1.5 children on average. 58% of the women work and of those who work, 46% are self-employed. This high levels of self-employment are very common in developing countries. Most of it is believed to represent a way to cope with the lack of formal jobs (Leal Calderon and Chacón, 2017). 18% of employment is in the service sector. The table also shows the average cholera incidence corresponding to the first trimester in-utero was 0.02% inhabitants (ranging from 0 to 3.3%) of those born in 1991.

4 Empirical Strategy

We estimate the following specification:

$$Y_{r,m,t} = \beta_o + \beta_1 Ch^1_{r,m,1991} + \beta_2 Ch^1_{r,m,1992} + \beta_3 Ch^1_{r,m,1993} + \beta_4 Age_{r,m,y} + \alpha_r + \rho_{m,y} + \varepsilon_{r,t}$$

where $Y_{r,m,t}$ stands for the outcome of women born in month m, and year t, who currently lives in region r. $Ch^1_{r,m,t}$ stands for the cholera incidence that correspond to the first trimester in-utero of the child. For example, $Ch^1_{Ica,4,1992}$ represents the incidence of the first trimester (between 38 and 29 weeks before birth) of those born in April 15th[1], 1992 in the region of Ica. We analyze the effect of exposure to cholera during the first trimester following the results in the epidemic literature (Ravelli, Stein and Susser, 1976; Painter,

[1]The ENDES does not provide day of birth, so we assume all children were born on the 15th day of the month. The ENDES does also not provide information on preterm births, hence following the medical literature, we assume 38 weeks of gestation, with the first 10 weeks corresponding to the first trimester, the following 14 weeks corresponding to the second trimester, and the last 14 weeks corresponding to the third trimester.

Roseboom and Bleker, 2005). In the Table 10 and Table 11 of the Appendix we see that the estimations using trimester 2 and 3, respectively, have no statistically significant results. The incidence for all cohorts born before 1991 is 0, since the first case appeared in 1991. Our coefficient of interest is β_1, which is the effect of the exposure to Cholera in 1991, the first year of the epidemic, since it was unexpected when it first appeared but not necessarily in the following years. α_r stands for region fixed effects, $\rho_{m,t}$ stands for month-year of birth fixed effects, and $Age_{r,m,t}$ stands for the age of the woman. We do not control for other variables, since there is evidence that in-utero shocks can affect a wide variety of outcomes, including human capital and income variables (Almond and Currie, 2011). Unfortunately, we do not have information to control for parents characteristics; nevertheless, Ritter and Sanchez (2019) find that parents variables were not significantly different for cohorts exposed while in-utero to the cholera epidemic. Standard errors are clustered at the regional level. Since we only have data from 22 regions, we present the p-values of Wild Bootstrap inferences, to correct for the small number of regions, following Cameron, Gelbach and Miller (2008).

Additionally, we estimate the following event-study specification:

$$Y_{r,m,t} = \alpha_o + \sum_{t=1984}^{1993} \beta_t Ch_{r,m}^{1,1991} t + \alpha_1 Age_{r,m,y} + \alpha_2 Ch_{r,m}^{1,1992} t_{1992} + \alpha_3 Ch_{r,m}^{1,1993} t_{1993} + \alpha_r + \rho_{m,y} + \varepsilon_{r,t}$$

$Ch_{r,m}^{1991}$ stands for cholera incidence corresponding to the first trimester in-utero of the child of region r born in month m of year 1991. Thus, β_{1991} would give us the effect of the exposure to a 1 percentage point increase in cholera incidence during the first trimester in-utero of the child in region r that was born in month m of 1991. β_t of other cohorts of children give us the placebo effect on the mortality rate among children that were born in the same region an in the same month but in years previous to, or after, 1991. For example, β_{1990} would give us the effect of the exposure to a 1 percentage point increase in cholera incidence of 1991 one year after the child was in his first trimester in-utero and β_{1992} would give us the effect of the exposure to a 1 percentage point increase in cholera incidence of 1991 one year before the child was in his first trimester in-utero. Since in 1992 and 1993 the cholera epidemic was not completely over and the cholera incidence of 1992 and 1993 is very likely correlated with the cholera incidence of 1991, we also control for the actual incidence of cholera in 1992, $Ch_{r,m}^{1,1992}t_{1992}$, and 1993, $Ch_{r,m}^{1,1993}t_{1993}$.. We control additionally for the age of the mother. The purpose of this estimation is to test whether mortality rate on those regions and months that had a higher incidence of cholera was already increasing before the epidemic.

5 Results

Tables 2 to 4 show the long-term effect of cholera exposure on several outcomes. We begin by estimating the effect on BMI. Table 2, column 1 shows that exposure to a 0.1 percentage-point incidence of cholera during the 1st trimester in-utero increases BMI by 0.05 kg/m2. Likewise, column 2 shows that exposure to a 0.1 percentage-point incidence of cholera during the 1st trimester in-utero increases obesity rates by 0.5 percentage points or 3%. Figures 4 and 5 show the event studies from BMI and obesity rates, respectively. The figures show no pre-existing trends. Column 3 shows no effect on whether or not the women exposed to Cholera while in-utero work or not, however, column 4 shows that exposure to a 0.1 percentage-point incidence of cholera during the 1st trimester in-utero increases self-employment rates by 0.5 percentage points or 1%. This result does not seem to be driven by an inhability to work Butcher and Park (2008), since they are working; it is not driven by a greater number of female entrepreneurs or by professionals or technicians, who typically work as independent contractors, nor is it driven by lower education or by a larger number of children (which typically increases demand for flexible jobs); as we can see in Table 3 there is no effect on those variables. It therefore seems likely that obese women have a harder time finding a job and, as a consequence, decide to work independently or for a family member. We further see in column 4 of Table 2 that among those who are employees, exposure to a 0.1 percentage point incidence of cholera during the 1st trimester in-utero decreases their probability to work in sales or in the service sector, in general, by 0.6 percentage points or 3%. This occupational choice fits well in the story of discrimination agains obese women, since this type of employment requires contact with customers (Rooth, 2009). Figures 6 and 7 show the event studies from the effect on self-employment and on employment in the service sector, respectively, and again we see no pre-existing trends. Finally, table 4 shows the estimation results on other variables: height, access to piped water, toilet and electricity at home and number of assets. We can see no significant effect on those variables.

6 Robustness

A cholera epidemic is typically not a random shock. It spreads under high temperatures and unsanitary conditions. The region fixed effect controls for differences in these conditions and any other variable that are constant in time, and the time fixed effect controls for variables during the time of the cholera that are similar across regions. The event studies show no pre-existing trends. However, we cannot completely rule out the possibility of omitted variable bias. In order to increase the robustness of our estimates, in Tables 5 to 8 we show the results of estimating different specifications on our main outcomes. Column 1 shows the results of estimating the regression without any control variables, Column 2 shows the results of estimating the regression controlling for age (our main specification), Column 3 shows our specification controlling additionally for region-specific trends and Colum 4 shows our specification controlling for age, for region-specific trends on only those women who have lived in the same city or town their entire life. As we can see in the tables, our results show very little sensitivity to control for age and more importantly to control for region-specific trends. The estimations lose quit a bit of significance when we include only those women who have not moved in their entire life, but this is mainly due to the fact that we lose about half of the sample. This happens because there are more than 1,800 cities in Peru, and it is very common to move to another city within the same region. Ideally, we would isolate the women who have never moved from another region only, but unfortunatelly, this information is not available, but at least we can see that the point estimate remain the same sign.

7 Conclusions

This paper exploits the Cholera Epidemic in Peru to analyze the long-term effects of acute diarrheal diseases. We find that a 0.1 percentage-point increase in of cholera incidence in the first trimester in-utero increases BMI by 0.05 kg/m2 and increases obesity by 0.5 percentage points or 3% among young adult women. We also find that a 0.1 percentage-point increase in cholera incidence in the first trimester in-utero increases the likelihood of being self-employed by 0.5 percentage points or 1%. This result is not driven by an increase in the number of female entrepreneurs or by professionals or technicians, who typically work as independent contractors, nor by lower education or a larger number of children (typical reason for seeking job flexibilty). It therefore seems that obese women have a harder time finding a job and, as a consequence, decide to work independently or for a family member. Moreover, we find that a 0.1 percentage-point increase in cholera incidence in the first trimester in-utero decreases the likelihood of being employed in the service sector by 6 percentage points or 3%, yielding additional support for the same conclusion.

Given the widespread of diarrheal diseases in the developing world, this study suggests that individuals in poor countries are born more vulnerable to becoming obese and self-employed. and, therefore, interventions that reduce these diseases will have important additional benefits as the obesity epidemic continue to expand in these countries.

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Figure 1: Growth in Women's Obesity Prevalence by Type of Country

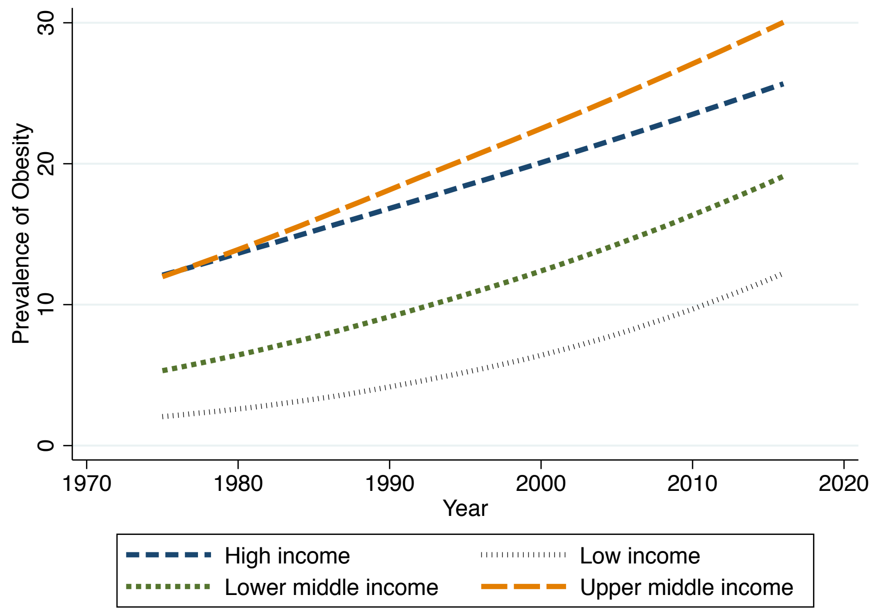


Figure 2: Weekly Incidence of Cholera Epidemic

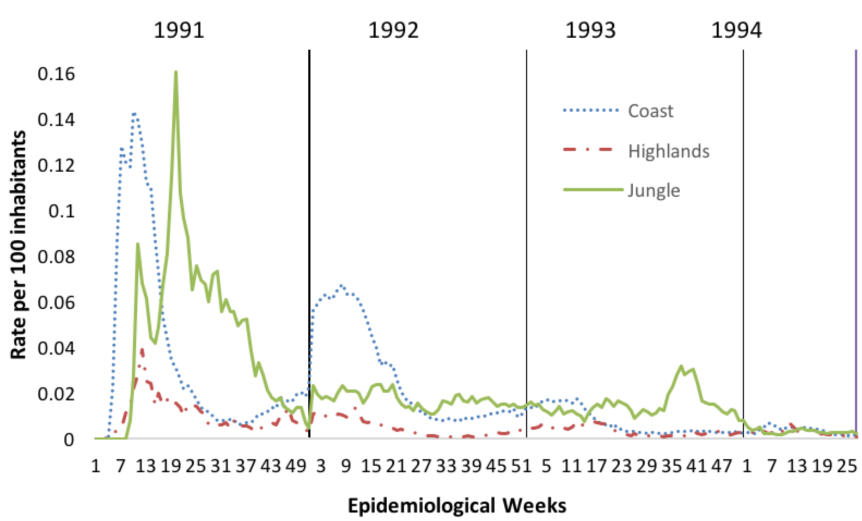


Figure 3: Incidence and Mortality of Cholera Epidemic

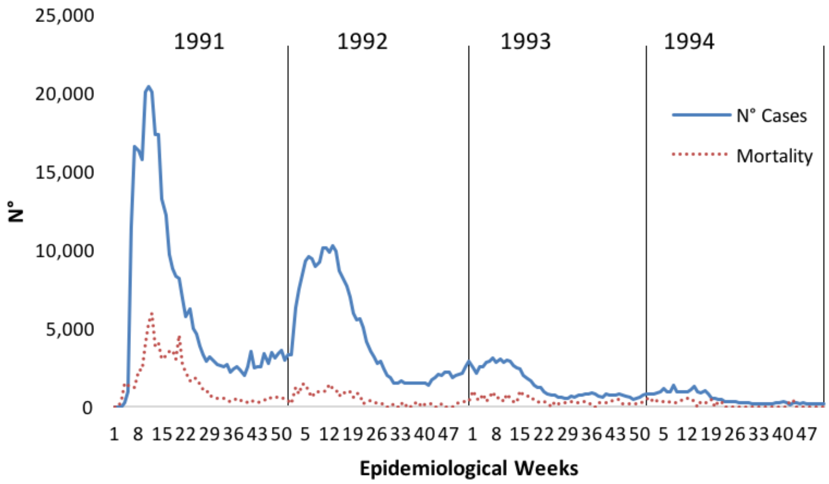
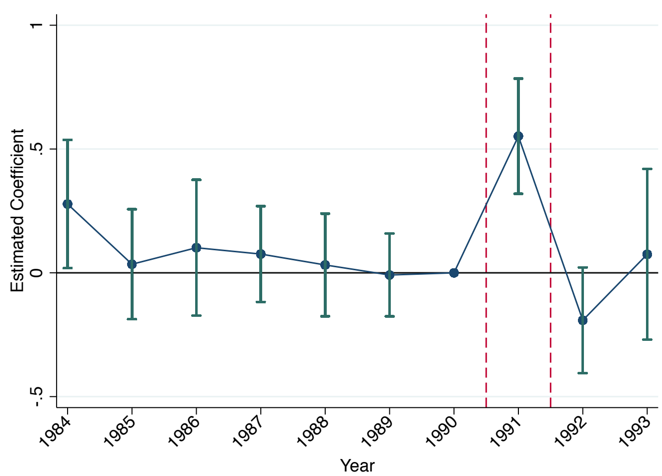
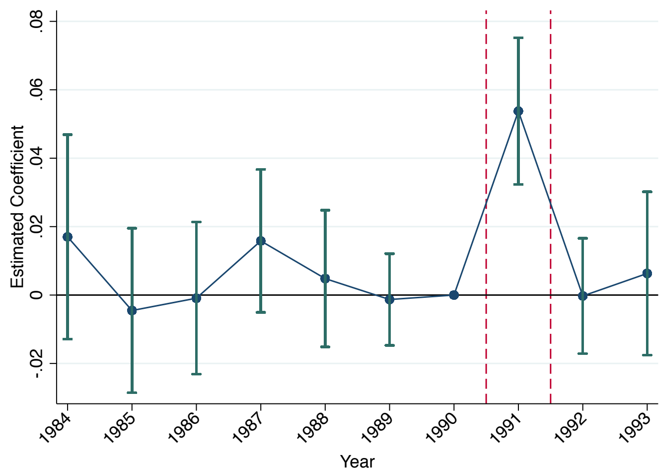


Figure 4: Event Study on Body Mass Index



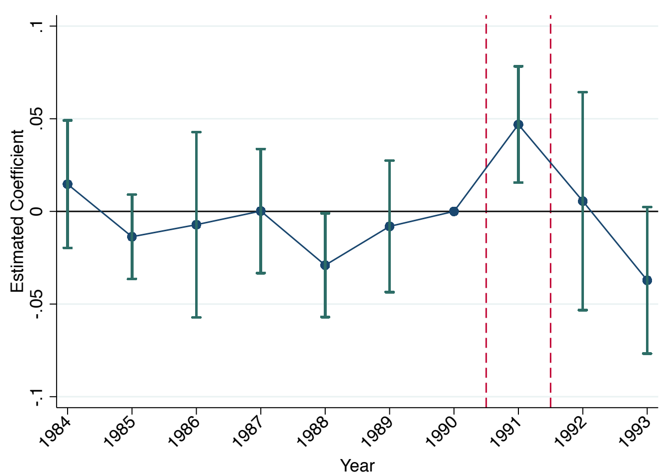
Note: Graph includes point estimates from the event study (normalized to 0 in the first trimester of 1990) and 95 percent confidence intervals of Wild Bootstrap inferences to correct for the small number of regions.

Figure 5: Event Study on Obesity Prevalence



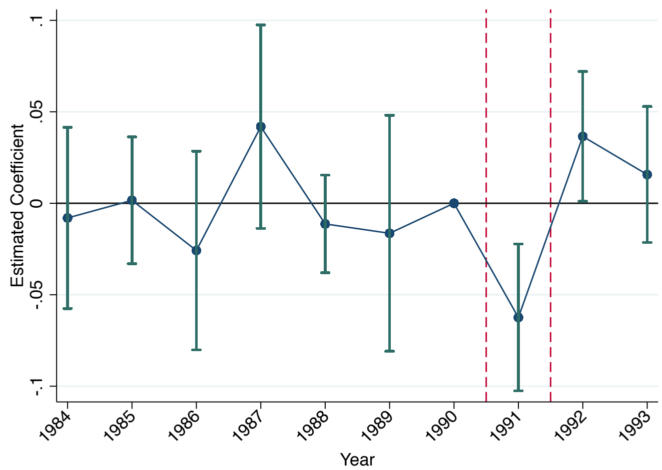
Note: Graph includes point estimates from the event study (normalized to 0 in the first trimester of 1990) and 95 percent confidence intervals of Wild Bootstrap inferences to correct for the small number of regions.

Figure 6: Event Study on Self-Employment



Note: Graph includes point estimates from the event study (normalized to 0 in the first trimester of 1990) and 95 percent confidence intervals of Wild Bootstrap inferences to correct for the small number of regions.

Figure 7: Event Study on Emplyment in the Service Industry



Note: Graph includes point estimates from the event study (normalized to 0 in the first trimester of 1990) and 95 percent confidence intervals of Wild Bootstrap inferences to correct for the small number of regions.

Table 1: Summary Statistics

	Obs.	Mean	Stand. Desv.	Max.	Min.
Age	79059	25.58	3.80	34.00	18.00
Height - cm	77011	1.53	0.05	1.66	1.39
Body mass index	77095	25.91	4.15	40.04	18.00
Obesity Rate	77095	0.16	0.37	1.00	0.00
Married or living together	79059	0.64	0.48	1.00	0.00
Number of children alive	79059	1.47	1.22	8.00	0.00
Work	79058	0.58	0.49	1.00	0.00
Self-employed	55333	0.46	0.50	1.00	0.00
Service Employee	29719	0.23	0.42	1.00	0.00
Manager Prof. or Tecn.	55198	0.18	0.38	1.00	0.00
Literate	79059	0.96	0.20	1.00	0.00
Years of education	79059	10.79	3.51	18.00	0.00
Piped water at home	79059	0.76	0.42	1.00	0.00
Toilet at home	79059	0.59	0.49	1.00	0.00
Electricity at home	79059	0.92	0.27	1.00	0.00
Number of assets	79059	3.68	1.47	9.00	0.00
Cholera x 1991	79059	0.02	0.14	3.27	0.00
Cholera x 1992	79059	0.03	0.14	2.21	0.00
Cholera x 1993	79059	0.01	0.05	0.61	0.00

Table 2: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic

	(1) BMI	(2) Obesity	(3) Work	(4) Self-employed	(5) Service Employee
Cholera x 1991	0.541	0.053	0.024	0.049	-0.063
	(0.04)	(0.01)	(0.34)	(0.04)	(0.08)
	[0.04, 0.72]	[0.01, 0.07]	[-0.01, 0.12]	[0.00, 0.11]	[-0.11, 0.01]
Cholera x 1992	-0.203	-0.005	0.025	0.034	-0.046
	(0.23)	(0.61)	(0.32)	(0.36)	(0.19)
	[-0.57, 0.13]	[-0.02, 0.02]	[-0.06, 0.05]	[-0.04, 0.10]	[-0.16, 0.01]
Cholera x 1993	0.291	0.045	0.039	-0.010	-0.078
	(0.29)	(0.11)	(0.51)	(0.88)	(0.21)
	[-0.50, 0.80]	[-0.02, 0.12]	[-0.12, 0.18]	[-0.21, 0.11]	[-0.23, 0.08]
R^2	0.103	0.048	0.030	0.058	0.022
Observations	77095	77095	79058	55333	29585

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 3: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic

	(1) Manager Prof. or Tecn.	(2) Education	(3) Literate	(4) Married	(5) N. Children
Cholera x 1991	0.003	-0.032	0.010	0.020	0.029
	(0.91)	(0.78)	(0.22)	(0.26)	(0.41)
	[-0.03, 0.08]	[-0.43, 0.51]	[-0.01, 0.02]	[-0.03, 0.06]	[-0.09, 0.20]
Cholera x 1992	-0.008	-0.046	-0.000	-0.004	-0.008
	(0.22)	(0.81)	(0.99)	(0.86)	(0.92)
	[-0.04, 0.01]	[-0.49, 0.40]	[-0.02, 0.02]	[-0.10, 0.05]	[-0.13, 0.12]
Cholera x 1993	0.016	-0.257	-0.010	-0.035	0.217
	(0.89)	(0.43)	(0.67)	(0.39)	(0.14)
	[-0.16, 0.24]	[-1.51, 0.46]	[-0.07, 0.05]	[-0.14, 0.09]	[-0.22, 0.48]
R^2	0.028	0.104	0.029	0.134	0.259
Observations	55198	79059	79059	79059	79059

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 4: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic

	(1) Height	(2) Piped Water	(3) Toilet	(4) Electricity	(5) N. Assets
Cholera x 1991	0.001	0.007	-0.010	-0.003	0.075
	(0.64)	(0.44)	(0.48)	(0.73)	(0.17)
	[-0.01, 0.01]	[-0.02, 0.05]	[-0.06, 0.04]	[-0.04, 0.01]	[-0.07, 0.21]
Cholera x 1992	0.001	-0.006	-0.035	0.000	0.021
	(0.71)	(0.38)	(0.16)	(0.98)	(0.69)
	[-0.01, 0.01]	[-0.02, 0.01]	[-0.07, 0.02]	[-0.02, 0.03]	[-0.10, 0.16]
Cholera x 1993	0.012	0.035	0.067	0.006	0.073
	(0.03)	(0.70)	(0.62)	(0.71)	(0.62)
	[0.00, 0.03]	[-0.16, 0.16]	[-0.12, 0.21]	[-0.04, 0.04]	[-0.28, 0.51]
R^2	0.029	0.124	0.144	0.086	0.114
Observations	77011	79059	79059	79059	79059

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 5: Effects on Body Mass Index - Different Specifications

	(1)	(2)	(3)	(4)
Cholera x 1991	0.605	0.541	0.565	0.693
	(0.02)	(0.03)	(0.02)	(0.09)
	[0.08, 0.81]	[0.06, 0.74]	[0.12, 0.74]	[-0.11, 1.24]
Cholera x 1992	-0.235	-0.203	-0.225	-0.250
	(0.12)	(0.26)	(0.13)	(0.23)
	[-0.53, 0.07]	[-0.54, 0.13]	[-0.52, 0.13]	[-0.67, 0.32]
Cholera x 1993	0.221	0.291	0.184	0.832
	(0.47)	(0.25)	(0.60)	(0.06)
	[-0.57, 0.71]	[-0.36, 0.81]	[-0.89, 0.69]	[-0.02, 1.48]
R^2	0.038	0.103	0.103	0.110
Observations	77095	77095	77095	38338

Note: Columns 1 included no control variable, Columns 2 controls for age (our main specification), Columns 3 controls additionally for region-specific trends and Colums 4 controls for age, for region-specific trends on only those women who have ever moved. All Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 6: Effects on Obesity Rates - Different Specifications

	(1)	(2)	(3)	(4)
Cholera x 1991	0.055	0.053	0.052	0.070
	(0.01)	(0.01)	(0.02)	(0.03)
	[0.01, 0.07]	[0.01, 0.07]	[0.01, 0.07]	[0.01, 0.11]
Cholera x 1992	-0.008	-0.005	-0.010	-0.004
	(0.44)	(0.66)	(0.20)	(0.80)
	[-0.02, 0.01]	[-0.02, 0.02]	[-0.02, 0.01]	[-0.05, 0.04]
Cholera x 1993	0.037	0.045	0.034	0.078
	(0.23)	(0.09)	(0.34)	(0.24)
	[-0.04, 0.12]	[-0.01, 0.12]	[-0.05, 0.10]	[-0.06, 0.18]
R^2	0.022	0.048	0.048	0.054
Observations	77095	77095	77095	38338

Note: Columns 1 included no control variable, Columns 2 controls for age (our main specification), Columns 3 controls additionally for region-specific trends and Colums 4 controls for age, for region-specific trends on only those women who have ever moved. All Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 7: Effects on Self-Employment - Different Specifications

	(1)	(2)	(3)	(4)
Cholera x 1991	0.048	0.049	0.052	0.055
	(0.04)	(0.03)	(0.03)	(0.08)
	[0.01, 0.10]	[0.01, 0.11]	[0.01, 0.11]	[-0.01, 0.13]
Cholera x 1992	0.032	0.034	0.029	0.038
	(0.39)	(0.37)	(0.31)	(0.17)
	[-0.03, 0.09]	[-0.02, 0.10]	[-0.02, 0.08]	[-0.03, 0.15]
Cholera x 1993	-0.022	-0.010	0.006	0.011
	(0.75)	(0.88)	(0.94)	(0.91)
	[-0.23, 0.10]	[-0.20, 0.11]	[-0.19, 0.11]	[-0.28, 0.17]
R^2	0.056	0.058	0.059	0.063
Observations	55333	55333	55333	28557

Note: Columns 1 included no control variable, Columns 2 controls for age (our main specification), Columns 3 controls additionally for region-specific trends and Colums 4 controls for age, for region-specific trends on only those women who have ever moved. All Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 8: Effects on Employment in the Service Industry - Different Specifications

	(1)	(2)	(3)	(4)
Cholera x 1991	-0.066	-0.063	-0.061	-0.022
	(0.07)	(0.09)	(0.08)	(0.51)
	[-0.12, 0.01]	[-0.11, 0.01]	[-0.11, 0.01]	[-0.11, 0.08]
Cholera x 1992	-0.047	-0.046	-0.038	0.002
	(0.20)	(0.17)	(0.11)	(0.91)
	[-0.18, 0.02]	[-0.17, 0.01]	[-0.14, 0.00]	[-0.08, 0.09]
Cholera x 1993	-0.083	-0.078	-0.021	-0.051
	(0.19)	(0.22)	(0.79)	(0.56)
	[-0.24, 0.09]	[-0.24, 0.10]	[-0.24, 0.12]	[-0.25, 0.19]
R^2	0.016	0.022	0.023	0.033
Observations	29585	29585	29585	16374

Note: Columns 1 included no control variable, Columns 2 controls for age (our main specification), Columns 3 controls additionally for region-specific trends and Colums 4 controls for age, for region-specific trends on only those women who have ever moved. All Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 9: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic - Indigenous Population

	(1)	(2)	(3)	(4)
	BMI	Obesity	Work	Self-employed
Cholera x 1991	0.240	0.022	0.009	-0.031
	(0.24)	(0.26)	(0.70)	(0.89)
	[-0.51, 2.25]	[-0.04, 0.22]	[-0.12, 0.17]	[-0.48, 1.14]
Cholera x 1992	-0.258	-0.018	-0.067	-0.100
	(0.50)	(0.36)	(0.29)	(0.18)
	[-1.95, 1.39]	[-0.11, 0.05]	[-0.40, 0.25]	[-0.44, 0.09]
Cholera x 1993	2.613	0.218	0.100	-0.201
	(0.54)	(0.41)	(0.76)	(0.79)
	[-3.80, 10.56]	[-0.27, 0.79]	[-0.70, 1.09]	[-1.92, 2.02]
R^2	0.151	0.079	0.090	0.170
Observations	6688	6688	5455	973

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 10: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic - Indigenous Population

	(1) BMI	(2) Obesity	(3) Work	(4) Self-employed	(5) Service Employee
incidtrim21991	-0.058	-0.004	0.010	-0.017	-0.026
	(0.49)	(0.49)	(0.45)	(0.28)	(0.34)
	[-0.23, 0.09]	[-0.02, 0.01]	[-0.01, 0.06]	[-0.04, 0.02]	[-0.08, 0.02]
incidtrim21992	-0.095	-0.010	0.014	0.031	-0.043
	(0.67)	(0.16)	(0.57)	(0.27)	(0.14)
	[-0.58, 0.29]	[-0.03, 0.00]	[-0.08, 0.07]	[-0.06, 0.09]	[-0.10, 0.02]
incidtrim21993	-0.094	0.026	0.037	-0.010	-0.036
	(0.78)	(0.42)	(0.34)	(0.80)	(0.51)
	[-1.36, 0.59]	[-0.05, 0.07]	[-0.08, 0.14]	[-0.13, 0.07]	[-0.20, 0.09]
R^2	0.102	0.047	0.030	0.058	0.022
Observations	77095	77095	79058	55333	29585

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.

Table 11: Effects of Cholera Incidence during the 1st. Trimester In-Utero by the Year of the Epidemic - Indigenous Population

	(1) BMI	(2) Obesity	(3) Work	(4) Self-employed	(5) Service Employee
incidtrim31991	-0.151	-0.011	-0.002	-0.009	0.002
	(0.29)	(0.19)	(0.91)	(0.48)	(0.85)
	[-0.36, 0.17]	[-0.02, 0.01]	[-0.03, 0.03]	[-0.05, 0.02]	[-0.03, 0.04]
incidtrim31992	0.027	0.016	-0.031	0.019	-0.055
	(0.86)	(0.12)	(0.15)	(0.45)	(0.20)
	[-0.49, 0.37]	[-0.01, 0.05]	[-0.11, 0.03]	[-0.08, 0.05]	[-0.13, 0.04]
incidtrim31993	0.731	0.019	-0.047	-0.014	0.027
	(0.23)	(0.68)	(0.43)	(0.82)	(0.79)
	[-0.34, 2.06]	[-0.06, 0.13]	[-0.17, 0.06]	[-0.19, 0.10]	[-0.24, 0.22]
R^2	0.102	0.047	0.030	0.058	0.022
Observations	77095	77095	79058	55333	29585

Note: Regressions include region of residence and month-year of birth fixed effects and control for age. P-values of Wild Bootstrap inferences shown in round parentheses and 95-percent confidence intervals shown in square parentheses.