HHS Public Access

Author manuscript

Int J Public Health. Author manuscript; available in PMC 2018 March 01.

Published in final edited form as:

Int J Public Health. 2017 March ; 62(2): 197–207. doi:10.1007/s00038-016-0857-1.

The Impact of Unemployment Cycles on Infant and Maternal Health in Argentina

George L. Wehby[1,2], **Lucas G. Gimenez**[3], and **Jorge S. López-Camelo**[3]

[1]University of Iowa, Departments of Health Management and Policy, Economics, and Preventive & Community Dentistry, and Public Policy Center, Iowa City, United States of America

[2]National Bureau of Economic Research, Cambridge, MA, United States of America

[3]Centro de Educación Médica e Investigación Clínica (CEMIC), Buenos Aires, Argentina

Introduction

Argentina has had dramatic economic fluctuations over the past two decades including a short recession in 1995 and a major economic crisis between 1999 and 2002 that had devastating effects on the country's economy by substantially increasing unemployment and poverty rates and devaluing the currency. The economic downturn began in late 1998 and intensified in 2001 and 2002, when Argentina's GDP declined by over 4% and 10%, respectively, and unemployment rate increased to ~20% from ~10% in 1994 (Supplementary Figure 1). The substantial employment decline and savings loss increased the extreme poverty rate to 23% compared to 8% in 1998 (World Bank, 2015). By 2003, the economy turned back growing by over 8% and unemployment rate dropped below 10% in 2007. Extreme poverty dropped to 16% in 2003 and to 7% in 2006 (World Bank, 2015). Since 2014 however, Argentina has been experiencing another recession. Such dramatic economic fluctuations may impact population health especially for the most vulnerable population groups, including pregnant women and infants.

Previous work points to an increase in infant mortality and low birth weight (LBW, <2500 grams) with declining economic activity in Argentina. Bozzoli and Quntana-Domeque (2014) find reductions in birth weight (and increase in LBW risk) with declining national-level gross domestic product (GDP) with more pronounced effects among low educated mothers. Cruces et al (2011) finds an increase in infant mortality and LBW rates with declining province-level GDP. In contrast, Rucci (2004) in unpublished work reports no

Corresponding Author: George L. Wehby, Ph.D., Associate Professor, University of Iowa, Departments of Health Management and Policy, Economics, and Preventive & Community Dentistry, and Public Policy Center, PhD Program Director, Department of Health Management and Policy, Research Associate, National Bureau of Economic Research, 145 N. Riverside Dr., 100 College of Public Health Bldg., Room N248, Iowa City, Iowa 52242-2007, Phone: 319-384-3814, Fax: 319-384-4371, george-wehby@uiowa.edu.

Compliance with Ethical Standards:

The authors have no conflicts of interest with this work. This research was approved by the IRB and ethics committee of the authors' institutions. Our study uses existing (secondary) data and there were no contacts with subjects. Individuals provided data into ECLAMC after consenting to enroll in that program. All procedures were in accordance with the ethical standards of the institutional IRB and ethics committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interests: The authors have no conflicts of interest with this work.

evidence of an association between province-level unemployment rate and LBW and infant mortality rates between 1991 and 2002.

This brief literature on Argentina suggests that economic downturns may have impacted infant health. However, much remains to be understood in this area. Birth weight is driven by both gestational age and fetal growth rate, which may be impacted differently by nutritional and stress pathways (Dole et al, 2003; Rondo et al, 2003; Wu et al, 2004). Disentangling these effects is important for understanding mechanisms for changes in birth weight. Furthermore, understanding the economic effects on various aspects of maternal health such as illness incidence and use of prenatal services is important not only for examining channels to child health but also for understanding the full spectrum of economic influences on household health. The administrative data used in the previous studies do not provide such outcomes.

The broader literature on economic downturns and child health in other settings has produced mixed evidence, including negative or no effects as well as positive effects. Eiríksdóttir et al (2013) find an increase in LBW rate but no effect on preterm birth (PTB; gestational age <37 weeks) incidence during the 2008 great recession in Iceland. In contrast, Dehejia and Lleras-Muney (2004) find that state-level unemployment rates in the United States (US) between 1975 and 1999 are related to declines in LBW, very LBW (VLBW, <1500 grams), birth defects, and infant/postneonatal mortality. Their work points to two main channels for the improvement in birth outcomes: 1- higher socioeconomic status (SES) selection effect into pregnancy (higher education and married rate) among births during economic downturns among Black mothers; and 2- increase in prenatal care use. A broader literature on economic cycles and adult health has also produced mixed findings (e.g., Dave and Kelly, 2012; Colman and Dave, 2013; Ásgeirsdóttir et al, 2014; Ruhm, 2015).

The mixed empirical evidence is not surprising since the impact of economic downturns, especially less severe ones, on child health and more broadly on population health can be theoretically ambiguous. One the one hand, a reduction in income and employment loss can have a negative impact on child and maternal health via an income effect that reduces consumption of health-producing inputs such as adequate/healthy diets. Financial insecurity may also increase maternal stress which can have adverse biological impacts on both maternal and fetal health. On other hand, a reduction in income may reduce household risky behaviors such as smoking and alcohol consumption which can positively impact fetal health. Furthermore, economic downturns can result in a substitution effect towards increased reliance on maternal time inputs for health production such as greater physical activity or use of preventive care or reduced delay in initiating prenatal care. Other potential consequences of economic downturns that can positively affect maternal and child health include reduction in industry-generated pollution and decline in job-related stress.

We examine the effects of unemployment cycles in Argentina on infant health and the health and prenatal behaviors of pregnant women between 1994 and 2006, a period covering the 1995 recession and the 1999–2002 economic crisis. Using unique mother/infant-level data systematically collected on births from a large network of hospitals in South America, we investigate a wide range of infant and maternal outcomes including use and quality of

prenatal services. We find that unemployment rise reduces fetal growth rate particularly among high educated parents. In contrast, there is less reporting of maternal acute illnesses, especially among low educated parents, but increased reporting of poverty-related infectious disease. Also, there is some decline in access to prenatal care and technology among low educated parents.

Methods

Data

We employ data from the Latin American Collaborative Study of Congenital Anomalies (ECLAMC), an epidemiological surveillance program in South America (Castilla and Orioli, 2004). ECLAMC involves a large network of hospitals in South America. ECLAMC-affiliated physicians monitor and enroll into ECLAMC all newborns with birth defects in their hospitals in addition to a sample of infants born without birth defects matched one-to-one to the sample with birth defects by gender, birth date, and hospital of birth. The physicians obtain data on household demographics, maternal health, behaviors, and socioeconomic indicators through interviews with mothers before hospital discharge after delivery and from birth records as needed. Infant health outcomes such as birth weight and gestational age are also measured (Wehby et al, 2009a; Woodhouse et al, 2014; Wehby et al, 2015).

A unique aspect of this data is that it is systematically collected across all participating hospitals and routinely transmitted to ECLAMC headquarters for evaluation and storage. A unique advantage of such data in the absence of routinely administered national surveys of child and maternal health in most South American countries is providing detailed micro-level information on several household and health measures for a large sample of birth cohorts over long period, which enables studying several determinants of infant and maternal health. Despite the convenience nature of the sample of hospitals, ECLAMC is built on voluntary participation and collaboration with affiliated hospitals and physicians and there are no established criteria for hospital selection that would clearly result in systematic bias in the sample of children without birth defects. The ECLAMC data have been used in numerous studies of infant and maternal health in South America (e.g. Wehby et al, 2009a, 2009b, 2009c; 2010; Nyarko et al. 2013a, 2013b; Wehby et al. 2014; Woodhouse et al. 2014; Wehby et al, 2015).

Sample and Outcomes

Our analytical sample includes infants without birth defects who were conceived between 1994 and 2006 and enrolled into the ECLAMC and their mothers. This period covers the 1995 recession and the major 1999–2002 economic crisis. We exclude infants with birth defects from this sample because the infant health outcomes we investigate such as birth weight, gestational age, or hospitalization status are influenced by birth defects (Nyarko et al, 2013b; Wehby et al, 2009b, 2014). The total sample with data on the study variables includes around 15,000 births born in 50 hospitals in 29 cities in 13 provinces.

We examine several infant health indicators including birth weight in grams and coded into LBW (<2500 grams) and VLBW (<1500 grams), gestational age in days and coded in PTB (<37 weeks) and very PTB (VPTB, <32 weeks), fetal growth rate (FGR, birth weight divided by gestational age), and hospital discharge status after birth including whether the child was discharged alive, died in hospital, or was still hospitalized (by the time of the last follow-up by the ECLAMC-affiliated physician). While the timing of the last follow-up/reporting varies between children, most occur within one month from birth (Wehby et al, 2012).

We evaluate several maternal health outcomes and use of prenatal health services. Maternal health is captured by indicators for any chronic and acute health conditions during pregnancy and for key conditions such as diabetes or hypertension, anemia, Chagas disease, syphilis, and toxoplasmosis. The latter three conditions are acute or chronic infections generally linked to poverty. We examine multiple indicators for prenatal care including any use of prenatal care, obtaining under 5 visits (generally considered inadequate care), obtaining 9 or more visits (reflecting frequent use but possibly pregnancy complications), delay in initiating prenatal care in weeks (which can serve as an access indicator), receiving immunization in the first trimester (indicator for early access to preventive care) or any time during pregnancy. Data on prenatal care delay and visits were collected beginning in 1996. We also examine ultrasound screening (any and number) which can represent access to healthcare technology and quality of prenatal care, and cesarean delivery which can reflect access to advanced maternity care but also changes in provider financial or time incentives.

In order to examine potential selection in the livebirth population with economic cycles, we evaluate as outcomes maternal and paternal ages, education, employment status, occupational activity, and length of cohabitation (as an indicator for marital status; Rittler et al, 2007). Table 1 shows sample descriptive statistics.

Empirical Models

We examine the impact of province-level unemployment rate on the above-mentioned outcomes using an approach similar to most prior research on economic cycles and downturns that uses unemployment rates as an indicator of macroeconomic conditions (e.g. Dehejia and Lleras-Muney, 2004, Ruhm, 2015). We first estimate the following regression:

$$H_{ist}=\alpha+\beta \bullet U_{st}+\mathbf{F}_s+\mathbf{T}_t+e_{ist}. \quad (1)$$

H_{ist} is a child or a mother outcome for children conceived in year t in province s. U represents the unemployment rate in province s in year t. **F** can include province fixed effects, but since ECLAMC data is collected from hospitals nested within provinces, we include in **F** fixed effects for birth hospitals to improve precision (which still capture time-invariant differences between provinces). **T** includes fixed effects for year of conception. The variation to identify β comes from within-province variation in unemployment rates over time with the year fixed effects capturing national trends in the study outcomes shared across provinces. Unemployment rates are available from the Permanent Household Survey (EPH) conducted by the National Institute of Statistics and Census (INDEC) in Argentina.

Following the literature (e.g. Dehejia and Lleras-Muney, 2004), we do not adjust for maternal and household-level variables in the regression. These variables (e.g. maternal and father's occupation, maternal health and use of prenatal services, and maternal selection into pregnancy based on factors like education or age) represent channels through which macroeconomic conditions affect infant health. Because our goal is to capture the "total" effect of economic cycles on infant health through all channels, adjusting for these variables would result in estimating partial effects through other channels. Also, maternal (and household) characteristics of our sample cannot confound the province-level unemployment rate derived independently of our sample. Furthermore, observable maternal and household factors are likely confounded by unobserved (household) factors (such as income). Therefore when examining channels, we evaluate the maternal and household factors as dependent variables.

One concern about model (1) above is omitted variable bias from other province time-varying characteristics correlated with the unemployment rates. While we lack data on other province-level indicators that one might consider such as health insurance coverage or welfare programs, these may also be influenced by macroeconomic conditions and unemployment rates and are, therefore, on the causal pathway between economic downturns and maternal and child health. Thus, even if such data exist, one should avoid adjusting for them in the main regression as that biases estimates of total unemployment rate effects on health outcomes. To evaluate the potential of unobserved time-varying differences between provinces however, we estimate another model that adds province-specific linear time trends:

$$H_{ist}=\alpha+\beta \bullet U_{st}+\mathbf{F}_s+\mathbf{T}_t+\partial_s(\mathbf{S}_s \bullet t)+e_{ist}, \quad (2)$$

which adds 0/1 province indicators **(S)** multiplied by a linear time trend *t*. In addition to estimating the model for the pooled sample, we stratify by maternal age and education to evaluate heterogeneity in effects across these factors.

Results

Effects on Child Health

Total Sample—Table 2 reports the unemployment rate effects from models (1) and (2) for the total sample. Beginning with model (1), unemployment rate has insignificant effects on most outcomes except for a positive effect on gestational age but a marginally significant negative impact on FGR. Model 2 adding province-specific time trends shows overall similar findings but the negative effect on birth weight becomes larger and marginally significant. In contrast, the effect on gestational age declines and becomes marginally significant while the effect on FGR increases (in absolute value) and becomes significant. Clustering standard errors at the hospital versus province-level mainly shows similar results (Supplemental Table A1 online). Overall, these models indicate a relatively small positive impact of unemployment rate on mean gestational age – one-day increase with a 5 percentage-point rise in unemployment rate – but a small negative impact on birth weight by

constraining FGR (up to a 25 gram decline in birth weight with a 5 percentage-point rise in the unemployment rate).

Stratifying by Maternal and Father's Education—Next, we estimate the unemployment rate effects on infant health outcomes stratified by parental education (Table 3). We find no significant effects for low educated mothers (primary school or lower education). In contrast, for high educated mothers (more than primary school education), we find a decline in FGR and birth weight and an increase in gestational age (similar to the full sample). Furthermore, there is a marginally significant increase in VLBW.

Stratifying by father's education also shows more pronounced effects on birth weight, VLBW, FGR, and gestational age among high educated fathers in the same direction as indicated above. There is also a significant decline in PTB risk. Among low educated fathers, there is a marginally significant decline in VPTB and a smaller decline in FGR (significant when including province-specific trends). Overall, these results indicate a more pronounced effect of unemployment rise among high educated parents.

Stratifying by Maternal Age—Table 4 reports the unemployment rate effects on child health stratified by median maternal age (<25 versus ≥25 years). Focusing on the model with province-specific trends, some differences emerge between these two groups. Among older mothers, birth weight and FGR significantly decline with rising unemployment. However, there is also an increase in likelihood of the child discharged alive from the hospital (and a corresponding decline in still being hospitalized) at the last follow-up. In contrast among younger mothers, there is an increase in likelihood of death in the hospital after birth. A smaller decline in FGR (compared to older mothers) is also observed. Overall, these results suggest differential unemployment rise effects by maternal age including more prominent effects on older parents.

Effects on Maternal Health

Total Sample—Table 5 reports the unemployment rate effects on maternal health outcomes. We find a significant decline in reporting an acute illness with rising unemployment. However, there is an increased reporting of Chagas disease, syphilis, or toxoplasmosis (reported by about 2% of the mothers). There is no significant effect on reporting a chronic illness including diabetes/hypertension. However, there is a marginally significant increase in anemia (in the model without province-specific trends).

Stratifying by Parental Education and Maternal Age—We repeat the regressions for maternal health outcomes stratifying by maternal and father's education and by maternal age, focusing on the specification including province-specific time trends (Supplementary Table A2). The decline in reporting acute illness with rising unemployment rise is more pronounced among low educated parents but the increase in reporting Chagas disease/ syphilis/toxoplasmosis is observed for both low and high educated parents. Interestingly, the risk of reporting a chronic condition increases with unemployment rate among high but not low educated parents. Stratifying by maternal age also shows interesting heterogeneity, in that the decline in acute illness risk is specific to younger mothers (<25 years), while the rise

in Chagas disease/syphilis/toxoplasmosis is only observed among older mothers (≥ 25 years).

Effects on Maternal Use of Prenatal Care

The results for maternal use of prenatal health services are in Table 6. We find no significant effects of unemployment rate on most of these outcomes with the exception of an increase in receiving under 5 prenatal visits (although that becomes insignificant when adding province-specific trends), and a decline in the likelihood of receiving ultrasounds (only significant in the model with province-specific trends).

Examining these effects by parental education shows that unemployment effects on reducing access to healthcare are concentrated among low educated parents (Supplementary Table A3) for whom the likelihood of not receiving prenatal care increases with rising unemployment rates while ultrasounds and cesarean delivery decline. Among high educated mothers, only a marginally significant increase in prenatal care delay is observed. Stratifying by maternal age shows no prominent differences between younger and older mothers.

Changes in Parental Characteristics

As noted above, we examine changes in the distribution of parental demographic and socioeconomic characteristics to understand potential effects of the macroeconomic changes on selection into pregnancy. Supplementary Table A4 reports the unemployment rate effects on maternal age, prior live births, education, employment, and occupational activity. Supplementary Table A5 reports the effects on father's age, education, employment, occupational status, and length of parental cohabitation (including 0 for single parents). Focusing on the model with province-specific trends, unemployment rise is associated with fewer prior live births, lower father's education, and declines in maternal and father's employment including declines in maternal and father's unskilled blue collar jobs and maternal clerical jobs. There are no significant changes in maternal age or education, father's age, or parental length of cohabitation. Overall, there is no evidence of systematic parental selection based on these observable characteristics. However, the province-level unemployment rate changes are not equal to those in the birth sample; a one percentage-point rise in overall unemployment results in ~0.7 percentage-point rise in parental unemployment suggesting higher employment rate among parents of newborns than the overall labor force. The impact of economic downturns on health of newborns and their mothers may be partly offset by this selection.

Discussion

Using a unique dataset with rich data on infant and maternal health outcomes and socioeconomic and demographic indicators, we find that rising unemployment in Argentina reduces FGR especially among high educated parents (above high school education). However, there is some evidence of a small increase in gestational age in this group. Consequently, birth weight declines and VLBW risk increases with rising unemployment among high educated parents.

Mixed evidence is observed for maternal health. Reporting acute illness declines with rising unemployment among low educated parents. In contrast, there is an increase in infections closely linked to poverty for both low and high educated parents. Also, reporting chronic illness increases among high educated parents. Furthermore, there is some evidence that unemployment reduces access to prenatal care and technology among low educated parents. There is no clear evidence of a systematic change in demographic and socioeconomic characteristics of parents.

These findings generally indicate adverse effects from economic recessions in Argentina including the major 1999–2002 crisis on certain infant and maternal health outcomes, although several outcomes show no evidence of significant change. Unemployment changes among parents during recessions are smaller than the general labor force, which may partly explain the lack of systematic adverse effects across all examined infant and maternal health outcomes.

Our study is especially timely in light of the recent economic downturns in Argentina and some other South American countries (such as Brazil and Venezuela). Despite the mixed evidence, our results offer some implications for policymaking in Argentina and possibly other South American countries of similar economic trends. Healthcare safety-net interventions may be needed for expanding access to quality prenatal care particularly for women of low socioeconomic status to circumvent any declined use during recessions. Prenatal care has been shown to have meaningful beneficial effects on fetal growth in Argentina and other South American countries (Wehby et al, 2009a; 2009b; Woodhouse et al, 2014). Another implication is that welfare benefit expansions during economic downturns may need to consider not only low income but also middle income parents who may still be adversely affected, perhaps because of greater stress and income shocks from employment and savings losses (especially during strong economic crises such as the 1999–2002 downturn).

Our results paint a different picture for how economic downturns relate to maternal and child health in Argentina compared to the US, where there appears to be little evidence for adverse effects (Dehejia R, Lleras-Muney, 2004). This is likely because of the much stronger economic crises in Argentina and the weaker social safety nets. Our results are generally consistent with prior findings on the Argentinean 1999–2002 crisis. Bozzoli and Quntana-Domeque (2014) report a decline in mean birth weight of ~35 grams during the crisis peak in 2002. Our model using the full sample and including province-specific time trends suggests a 50 gram decline in birth weight with a 10 percentage-point rise in unemployment rate, which is nearly the change between 1994, our first study year, and 2002. Unlike their study however, we find that high educated mothers are more sensitive to FGR and birth weight declines. This result may be due to a greater income among high educated parents with rising unemployment. It may also be partly driven by the differential effects on maternal acute and chronic illnesses by parental education described above. The decline in reporting acute illness with rising unemployment rates among low educated mothers may result from reduced exposure to occupational hazards which are likely more prevalent in this group than high educated mothers. It may also result from greater declines in exposure to industrial or traffic pollution if more low educated parents reside in industrial areas (e.g.

closer to factories) or heavy traffic roads. In contrast, the increase in maternal chronic illnesses among high educated parents can result from greater stress due to greater income and saving losses.

A key strength of our study is employing rich infant and maternal data for a large sample. One potential caveat is that even though we find no evidence of systematic selection based on the livebirth sample, we cannot examine potential selection in undelivered pregnancies including miscarriages and terminations. We are however able to examine stillbirths since ECLAMC obtains counts of total births and stillbirths in each month from each participating hospital. Using the same regression model described above with hospital-month as the unit of observation, we overall find no evidence of a significant change in stillbirths and the unemployment rate coefficient is negative across all regressions (detailed results available upon request). Another caveat is that our sample is not nationally representative. It is however highly demographically and socioeconomically diverse (Table 1) and comes from 29 cities in 13 provinces (out of 23 provinces plus the Federal Capital in Argentina). Furthermore, the vast majority of births in Argentina are born in hospitals. It is also unlikely that there is a systematic selection into our sample based on pregnancy complication. Indeed, there is extensive variation in prenatal care use in the sample and between ECLAMC hospitals in their total volume of VLBW infants (Wehby et al, 2012). The demographic, socioeconomic, and geographic diversity and the voluntary participation of hospitals in ECLAMC would therefore suggest that the results are likely to be generalizable for at least a meaningful subset of the Argentinean population. Developing efforts to obtain richer data on child and maternal health in the national birth registration system in Argentina in the future will certainly expand the scope and generalizability of research examining the effects of Argentina's economic conditions on population health.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The study was supported by grant 1R03TW008110-01A2 from the National Institutes of Health / Fogarty International Center, USA.

References

Ásgeirsdóttir TL, Corman H, Noonan K, Ólafsdóttir Þ, Reichman NE. Was the economic crisis of 2008 good for Icelanders? Impact on health behaviors. Econ Hum Biol. 2014; 13:1–19. [PubMed: 23659821]

Bozzoli C, Quintana-Domeque C. The Weight of the Crisis: Evidence from Newborns in Argentina. Review of Economics and Statistics. 2014; 96(3):550–62.

Castilla EE, Orioli IM. ECLAMC: the Latin-American collaborative study of congenital malformations. Community Genet. 2004; 7:76–94. [PubMed: 15539822]

Colman G, Dave D. Exercise, Physical Activity, and Exertion Over the Business Cycle. Social Science & Medicine. 2013; 93:11–20. [PubMed: 23906116]

Cruces, G., Glüzmann, P., López Calva, LF. World Development. Vol. 40. Elsevier; 2012. Economic Crises, Maternal and Infant Mortality, Low Birth Weight and Enrollment Rates: Evidence from Argentina's Downturns; p. 303-314.

Dave D, Kelly IR. How does the business cycle affect eating habits? Social Science & Medicine. 2012; 74(2):254–262. [PubMed: 22137244]

Dehejia R, Lleras-Muney A. Booms, Busts, and Babies' Health. Quarterly Journal of Economics. 2004; 119(3):1091–1130.

Dole N, Savitz DA, Hertz-Picciotto I, Siega-Riz AM, McMahon MJ, Buekens P. Maternal stress and preterm birth. American Journal of Epidemiology. 2003; 157(1):14–24. [PubMed: 12505886]

Eiríksdóttir VH, Ásgeirsdóttir TL, Bjarnadóttir RI, Kaestner R, Cnattingius S, Valdimarsdóttir UA. Low birth weight, small for gestational age and preterm births before and after the economic collapse in Iceland: a population based cohort study. PLoS One. 2013; 8(12):e80499. [PubMed: 24324602]

Wu G, Bazer FW, Cudd TA, Meininger CJ, Spencer TE. Maternal nutrition and fetal development. J Nutr. 2004; 134(9):2169–72. [PubMed: 15333699]

Nyarko KA, Lopez-Camelo J, Castilla EE, Wehby GL. Explaining Racial Disparities in Infant Health in Brazil. American Journal of Public Health. 2013a; 103:1675–1684. [PubMed: 23409894]

Nyarko KA, Lopez-Camelo J, Castilla EE, Wehby GL. Does the Relationship between Prenatal Care and Birth Weight Vary by Oral Clefts? Evidence Using South American and United States Samples. The Journal of pediatrics. 2013b; 162:42–49. e1. [PubMed: 22835882]

Rittler M, Castilla EE, Chambers C, Lopez-Camelo JS. Risk for gastroschisis in primigravidity, length of sexual cohabitation, and change in paternity. Birth Defects Res A Clin Mol Teratol. 2007; 79(6): 483–7. [PubMed: 17358037]

Rondó PH, Ferreira RF, Nogueira F, Ribeiro MC, Lobert H, Artes R. Maternal psychological stress and distress as predictors of low birth weight, prematurity and intrauterine growth retardation. Eur J Clin Nutr. 2003; 57(2):266–72. [PubMed: 12571658]

Rucci, G. Unpublished doctoral dissertation. University of California; Los Angeles: 2004. The effects of macroeconomic shocks on the well-being of people indeveloping countries.

Ruhm CJ. Recessions, healthy no more? J Health Econ. 2015; 42:17–28. [PubMed: 25839783]

Wehby GL, Murray JC, Castilla EE, Lopez-Camelo JS, Ohsfeldt RL. Quantile effects of prenatal care utilization on birth weight in Argentina. Health Economics. 2009a; 18:1307–1321. [PubMed: 19142894]

Wehby GL, Murray JC, Castilla EE, Lopez-Camelo JS, Ohsfeldt RL. Prenatal care demand and its effects on birth outcomes by birth defect status in Argentina. Economics & Human Biology. 2009b; 7:84–95. [PubMed: 19059012]

Wehby GL, Castilla EE, Lopez-Camelo JS, Murray JC. Predictors of multivitamin use during pregnancy in Brazil. Int J Public Health. 2009c; 54(2):78–87. [PubMed: 19296054]

Wehby GL, Castilla EE, Lopez-Camelo J. The impact of altitude on infant health in South America. Econ Hum Biol. 2010; 8(2):197–211. [PubMed: 20594925]

Wehby GL, Lopez-Camelo J, Castilla EE. Hospital volume and mortality of very low-birthweight infants in South America. Health Serv Res. 2012; 47(4):1502–21. [PubMed: 22352946]

Wehby GL, Nyarko KA, Lopez-Camelo JS, Ohsfeldt RL. Fetal health shocks and early inequalities in health capital accumulation. Health Economics. 2014; 23:69–92. [PubMed: 23339079]

Wehby GL, Gili JA, Pawluk M, Castilla EE, Lopez-Camelo JS. Disparities in birth weight and gestational age by ethnic ancestry in South American countries. International Journal of Public Health. 2015; 60(3):343–351. [PubMed: 25542227]

Woodhouse C, Lopez Camelo J, Wehby GL. A comparative analysis of prenatal care and fetal growth in eight South American countries. PLoS One. 2014; 9:e91292. [PubMed: 24625630]

World Bank. World Databank. [Accessed May 1, 2015] Word Development Indicators. Available online: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

Table 1

Sample Descriptive Statistics, Argentina, 1994–2006

Variable	N	% or Mean (SD)
Child Health Outcomes		
BW (grams)	15020	3256.6 (553.7)
LBW (<2500 grams)	15021	7.1
VLBW (<1500 grams)	15021	1.0
Gestational age (days)	15052	273.1 (18.9)
PTB (<37 weeks)	15052	14.5
VPTB (<32 weeks)	15052	2.5
FGR (BW/gestational age)	15020	83.4 (13.4)
Discharged alive	14810	96.7
Died in hospital	14810	0.4
Still in hospital	14810	2.9
Maternal Health and Healthcare Use Outcomes		
Any acute illness	14962	35.7
Any chronic illness	14970	15.0
Chagas/syphilis/toxoplasmosis	15052	2.1
Diabetes/hypertension	15052	4.1
Anemia	15052	2.7
No prenatal care	14672	5.6
<5 prenatal visits	14672	29.4
≥ 9 prenatal visits	14672	23.6
Delay in initiating prenatal care (in weeks)	14194	17.0 (9.0)
Any immunization in 1st trimester	14947	12.3
Any immunization in pregnancy	14381	75.6
Any ultrasound	15040	84.9
Number of ultrasounds	15040	2.0 (1.5)
Cesarean delivery	14985	25.3
Maternal age		
Maternal age in years	15027	25.4 (6.5)
Maternal age ≤19 years	15027	20.2
Maternal age ≥35 years	15027	10.7
# of previous live births	14636	2.0 (2.5)
Maternal Education		
Completed primary education	14963	33.6
Completed secondary education	14963	15.8
Completed university education	14963	3.1
Maternal Employment		
Employed	14898	20.1

Variable	N	% or Mean (SD)
Unskilled blue collar worker	14898	7.4
Skilled blue collar worker	14898	2.5
Clerk	14898	5.5
High skilled (boss/owner/executive)	14898	2.7
Father's Age	14539	29.0 (7.8)
Length of parent's cohabitation (years)	13702	5.1 (5.0)
Father's Education		
Completed primary education	14361	39.5
Completed secondary education	14361	16.7
Completed university education	14361	3.2
Father's Employment		
Employed	14419	89.3
Unskilled blue collar worker	14419	29.7
Skilled blue collar worker	14419	23.9
Clerk	14419	16.5
High skilled (boss/owner/executive)	14419	6.0

Notes: Data on prenatal care delay and visits are available beginning in 1996. SD=Standard deviation. N indicates number of observations with complete data. BW=Birth weight in grams; LBW=low birth weight; VLBW=very low birth weight; Gestation in days= gestational age in days; PTB=preterm birth; VPTB=very preterm birth; FGR=fetal growth rate; Discharged alive=discharged alive from the hospital after birth; Died in hospital=died in hospital after birth; Still in hospital= still hospitalized at the time of last follow-up.

Table 2

Effects of Unemployment Rate on Child Health Outcomes in Argentina in 1994–2006

Model	BW	LBW	VLBW	Gestation in days	PTB	VPTB	FGR	Alive	Dead	Still in hospital
Hospital and year fixed effects without province specific time trends	−1.3169 (2.6990)	0.0002 (0.0013)	−0.0002 (0.0003)	0.2330 ** (0.0945)	−0.0016 (0.0021)	−0.0011 (0.0007)	−0.1133 * (0.0580)	0.0004 (0.0012)	0.0001 (0.0003)	−0.0006 (0.0012)
N	15020	15021	15021	15052	15052	15052	15020	14810	14810	14810
Hospital and year fixed effects with province specific time trends	−5.4183 * (2.8572)	0.0013 (0.0011)	0.0003 (0.0003)	0.1375 * (0.0724)	0.0005 (0.0022)	−0.0007 (0.0005)	−0.2019 ** (0.0664)	0.0012 (0.0010)	0.0003 (0.0003)	−0.0015 (0.0010)
N	15020	15021	15021	15052	15052	15052	15020	14810	14810	14810

Standard errors in parentheses clustered at province level. *N* indicates number of observations included in the model. BW=Birth weight in grams; LBW=low birth weight; VLBW=very low birth weight; Gestation in days= gestational age in days; PTB=preterm birth; VPTB=very preterm birth; FGR=fetal growth rate; Alive=Discharged alive from the hospital after birth; Dead=died in hospital after birth; Still in hospital= still hospitalized at the time of last follow-up.

* $p < 0.1$,

** $p < 0.05$,

*** $p < 0.01$.

Table 3

Effects of Unemployment Rate on Child Health Outcomes by Parental Education in Argentina in 1994–2006

Model	BW	LBW	VLBW	Gestation in days	PTB	VPTB	FGR	Alive	Dead	Still in Hospital
Model 1: Low educated mothers	−0.6999 (3.5944)	−0.0012 (0.0015)	−0.0001 (0.0005)	0.1520 (0.1409)	−0.0002 (0.0032)	−0.0010 (0.0009)	−0.0602 (0.0708)	0.0007 (0.0014)	0.0002 (0.0004)	−0.0009 (0.0012)
N	7076	7076	7076	7090	7090	7090	7076	6972	6972	6972
Model 2: Low Educated Mothers	−4.4283 (4.4498)	0.0006 (0.0021)	−0.0002 (0.0004)	0.1013 (0.1617)	0.0039 (0.0041)	−0.0016 (0.0010)	−0.1428 (0.0896)	0.0014 (0.0014)	0.0002 (0.0004)	−0.0016 (0.0013)
N	7076	7076	7076	7090	7090	7090	7076	6972	6972	6972
Model 1: High educated mothers	−3.8876 (3.8835)	0.0023 (0.0023)	−0.0000 (0.0005)	0.3026*** (0.0957)	−0.0028 (0.0018)	−0.0009 (0.0013)	−0.2162** (0.0951)	−0.0005 (0.0013)	0.0002 (0.0004)	0.0003 (0.0015)
N	7856	7857	7857	7873	7873	7873	7856	7755	7755	7755
Model 2: High Educated Mothers	−8.0868* (3.8572)	0.0022 (0.0020)	0.0008* (0.0004)	0.1788* (0.0994)	−0.0031 (0.0018)	0.0004 (0.0011)	−0.3072** (0.1093)	0.0006 (0.0012)	0.0005 (0.0003)	−0.0012 (0.0012)
N	7856	7857	7857	7873	7873	7873	7856	7755	7755	7755
Model 1: Low educated fathers	−0.0139 (2.8953)	0.0000 (0.0020)	−0.0006 (0.0004)	0.1845 (0.1630)	0.0005 (0.0033)	−0.0019* (0.0009)	−0.0643 (0.0492)	0.0008 (0.0010)	0.0003 (0.0004)	−0.0011 (0.0010)
N	7556	7556	7556	7565	7565	7565	7556	7442	7442	7442
Model 2: Low Educated fathers	−5.5033 (3.8715)	0.0020 (0.0023)	−0.0001 (0.0005)	0.0229 (0.1709)	0.0043 (0.0040)	−0.0015* (0.0008)	−0.1681** (0.0758)	0.0008 (0.0008)	0.0005 (0.0005)	−0.0014 (0.0008)
N	7556	7556	7556	7565	7565	7565	7556	7442	7442	7442
Model 1: High educated fathers	−3.4922 (4.3049)	0.0010 (0.0018)	0.0003 (0.0004)	0.2690** (0.0917)	−0.0043** (0.0014)	0.0001 (0.0008)	−0.1827 (0.1101)	−0.0001 (0.0012)	0.0001 (0.0004)	0.0000 (0.0013)
N	6779	6780	6780	6796	6796	6796	6779	6694	6694	6694
Model 2: High Educated fathers	−8.1404* (4.2464)	0.0013 (0.0011)	0.0010** (0.0003)	0.2145 (0.1346)	−0.0042** (0.0017)	0.0011 (0.0008)	−0.2991** (0.1225)	0.0011 (0.0014)	0.0002 (0.0002)	−0.0013 (0.0015)
N	6779	6780	6780	6796	6796	6796	6779	6694	6694	6694

Model 1 includes hospital and year fixed effects but no province-specific time trends. Model 2 adds province-specific time trends. Standard errors in parentheses clustered at province level. Low educated parents are those who have completed primary school education or less. High educated parents are those above high school education. *N* indicates number of observations included in the model. BW=Birth weight in grams; LBW=low birth weight; VLBW=very low birth weight; Gestation in days= gestational age in days; PTB=preterm birth; VPTB=very preterm birth; FGR=fetal growth rate; Alive=Discharged alive from the hospital after birth; Dead=died in hospital after birth; Still in hospital= still hospitalized at the time of last follow-up.

* $p < 0.1$,

** $p < 0.05$,

*** $p < 0.01$

Table 4

Effect of Unemployment Rate on Child Health Outcomes in Argentina in the Individual-Level Dataset Stratified by Maternal Age in Argentina in 1994–2006

Model	BW	LBW	VLBW	Gestation in days	PTB	VPTB	FGR	Alive	Dead	Still in Hospital
Model 1: Mothers <25 years	2.5526 (2.6010)	−0.0004 (0.0016)	0.0001 (0.0004)	0.2438 * (0.1326)	−0.0009 (0.0028)	−0.0020 (0.0013)	−0.0098 (0.0417)	−0.0003 (0.0015)	0.0005 (0.0004)	−0.0002 (0.0015)
N	7630	7630	7630	7637	7637	7637	7630	7535	7535	7535
Model 2: Mothers <25 years	−1.6566 (2.6736)	0.0007 (0.0012)	0.0007 (0.0005)	0.1197 (0.1428)	0.0006 (0.0026)	−0.0014 (0.0013)	−0.0938 ** (0.0412)	−0.0003 (0.0014)	0.0009 ** (0.0003)	−0.0007 (0.0015)
N	7630	7630	7630	7637	7637	7637	7630	7535	7535	7535
Model 1: Mothers ≥25 years	−5.8953 (4.0756)	0.0008 (0.0013)	−0.0006 (0.0004)	0.2036 (0.1278)	−0.0021 (0.0021)	−0.0001 (0.0005)	−0.2189 * (0.1171)	0.0013 (0.0011)	−0.0003 (0.0003)	−0.0010 (0.0011)
N	7385	7386	7386	7390	7390	7390	7385	7268	7268	7268
Model 2: Mothers ≥25 years	−9.4964 ** (3.6664)	0.0016 (0.0019)	−0.0003 (0.0004)	0.1483 (0.1354)	0.0003 (0.0025)	0.0001 (0.0006)	−0.3048 ** (0.1186)	0.0029 ** (0.0011)	−0.0004 (0.0003)	−0.0025 ** (0.0009)
N	7385	7386	7386	7390	7390	7390	7385	7268	7268	7268

Model 1 includes hospital and year fixed effects but no province-specific time trends. Model 2 adds province-specific time trends. Standard errors in parentheses clustered at province level. Low educated parents are those who have completed primary school education or less. High educated parents are those above high school education. *N* indicates number of observations included in the model. BW=Birth weight in grams; LBW=low birth weight; VLBW=very low birth weight; Gestation in days= gestational age in days; PTB=preterm birth; VPTB=very preterm birth; FGR=fetal growth rate; Alive=Discharged alive from the hospital after birth; Dead=died in hospital after birth; Still in hospital= still hospitalized at the time of last follow-up.

* $p < 0.1$,

** $p < 0.05$,

*** $p < 0.01$

Table 5

Unemployment Rate Effects on Maternal Health Outcomes in Argentina in 1994–2006

Model	Any acute illness	Any chronic illness	Chagas/syphilis/toxoplasmosis	Diabetes/ hypertension	Anemia
Hospital and year fixed effects without province specific time trends	−0.0084** (0.0033)	−0.0005 (0.0026)	0.0015** (0.0006)	−0.0011 (0.0008)	0.0036* (0.0017)
N	14962	14970	15052	15052	15052
Hospital and year fixed effects with province specific time trends	−0.0078** (0.0033)	0.0031 (0.0029)	0.0027*** (0.0008)	0.0001 (0.0011)	0.0030 (0.0020)
N	14962	14970	15052	15052	15052

Standard errors in parentheses clustered at province level. *N* indicates number of observations included in the model.

* $p < 0.1$,

** $p < 0.05$,

*** $p < 0.01$

Table 6

Unemployment Rate Effects on Maternal Use of Healthcare in Argentina in 1994–2006

Model	No prenatal care	< 5 Prenatal visits	≥ 9 Prenatal visits	Prenatal care delay	Immunization in 1st trimester	Immunization anytime in pregnancy	Any ultrasounds	Number of ultrasounds	Cesarean delivery
Hospital and year fixed effects without province specific time trends	−0.0002 (0.0017)	0.0045** (0.0018)	−0.0025 (0.0018)	−0.0434 (0.0864)	0.0049 (0.0041)	−0.0088 (0.0055)	−0.0053 (0.0096)	−0.0233 (0.0215)	−0.0043 (0.0025)
N	14672	14672	14672	14194	14947	14381	15040	15040	14985
Hospital and year fixed effects with province specific time trends	0.0009 (0.0013)	0.0036 (0.0023)	−0.0021 (0.0025)	0.0271 (0.0794)	0.0018 (0.0051)	−0.0024 (0.0046)	−0.0045** (0.0020)	−0.0150 (0.0089)	−0.0053 (0.0036)
N	14672	14672	14672	14194	14947	14381	15040	15040	14985

Standard errors in parentheses clustered at province level. *N* indicates number of observations included in the model. Data on prenatal care delay and visits are available beginning in 1996.

* $p < 0.1$,

** $p < 0.05$,

*** $p < 0.01$