[Preliminary Version, Please Do Not Cite] Long Term-Consequences of Early Life Exposure to War: A Look at Later-Life Outcomes of Children Conceived During the Vietnam War

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0.1 Specific Aims

The aim of this paper is to explore the long-term effects of maternal stress on the children who were conceived during the heaviest period of fighting in the Vietnam War.

Using the 1999 Vietnamese Census data, the research will seek to answer the following question: What are the education, literacy, labor market, and marriage market outcomes of children conceived during the heaviest period of fighting during the war?

0.2 Background and Significance

A growing number of studies has shown that early life circumstances are critical determinants of morbidity and lifespan prospects. Case et al. show that income and health in childhood could have profound impact on adult health.[5] Exposure to infectious diseases such as respiratory tuberculosis, hepatitis B and cirrhosis/liver cancer, rheumatic heart disease, and respiratory infection/bronchitis in childhood may increase risk of chronic diseases later in life. Other mechanisms which may raise the risk of disease later in life include persistent viruses, dietary practices, and the burden of infectious disease in childhood. [8]

Even prenatal and neonatal environments could determine later health outcomes.[9][1] One theory that attempts to explain link between childhood conditions and adult health outcomes is the fetal origins hypothesis. Under this hypothesis, people are designed to adapt to their environment especially early in life when the body is still developing. Conditions in the womb act as a signal for the environment that a person may face later in life and the body responds by adapting in such a way as to best cope under such circumstances. This hypothesis has been used to explain the links between in utero conditions and chronic diseases, such as coronary heart disease.[4]

In times of war, food may be less available and maternal malnutrition may be prevalent. Mothers may also experience other sources of stress, including spousal separation, deaths in

the family, and insecure living conditions. Almond et al.'s study on the effect of in utero exposure to famine has shown that children conceived during the 1959-1961 Chinese famine had poorer literacy, labor market, wealth, and marriage market outcomes. Reduced sex ratio also was observed among the cohort and their offsprings.[1]

In this study, I will examine the impact of in-utero exposure to armed conflict on later life outcomes using the case of the Vietnam War. This study will test whether a difference in socioeconomic status can be observed between those exposed to war in the womb but not after birth and those who have never been exposed to war.

The Vietnam War officially lasted from 1954 to 1975 and was fought between North and South Vietnam. While American support of South Vietnam began early in the war, the war became escalated in 1965 when American troops were sent into Vietnam and aerial bombing raids were conducted. The war ended with the fall of Saigon in April of 1975. Vietnamese mortality from the war is estimated to be approximately one million.[10]

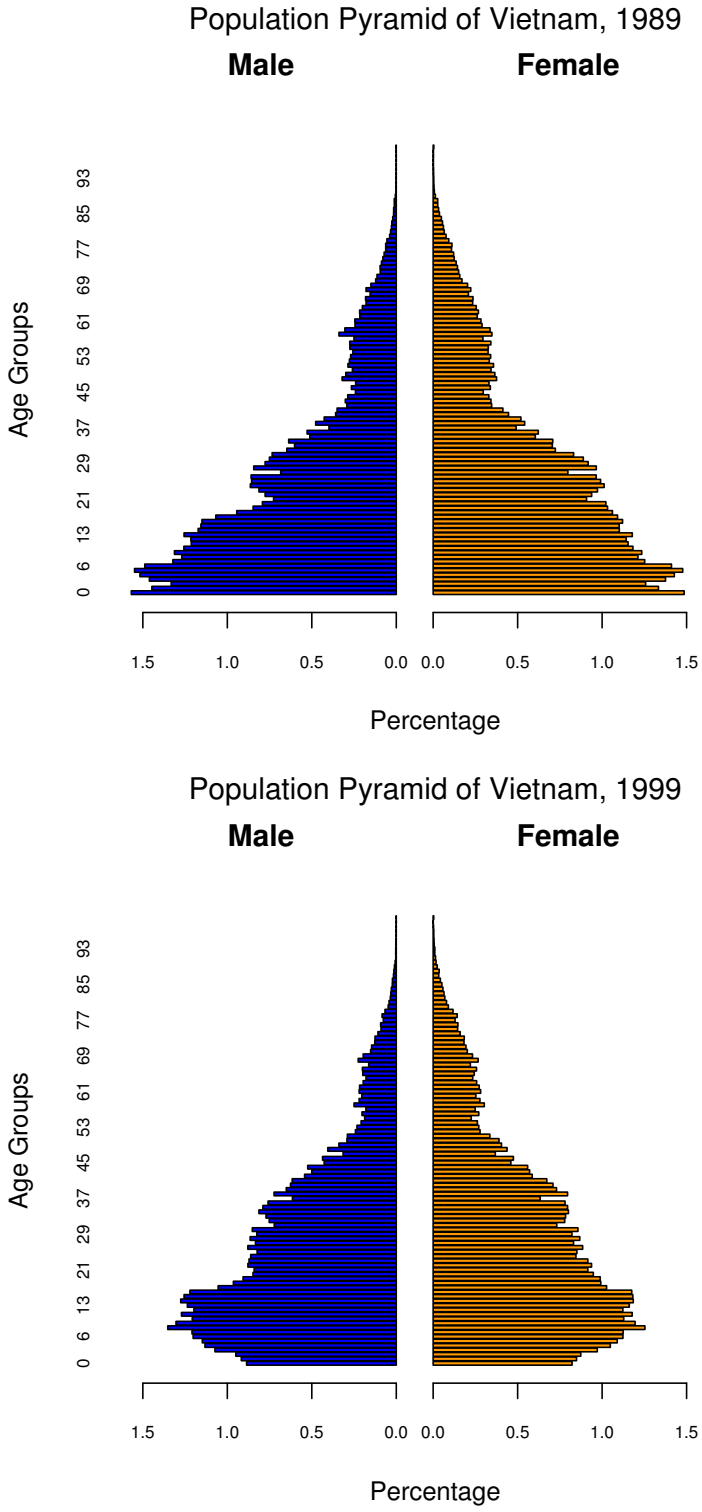
Until the mid-1990's, the population of Vietnam has been characterized by a young population with low sex ratios. [3][10] It has gone through the demographic transition in the 1990's, partially spurred by strong family planning policies and the base of the population pyramid is no longer wide in 1999 (See Figure 1). The 1999 sex ratios are still low, especially in the 20-24 year age group and in 55-59 and 60-64 age groups. However, they show a departure from the pattern of sex ratios seen in 1989. While in 1989, the sex ratios dropped sharply starting in the 20-24 age group and stayed constant until ages 50-54, the 1999 sex ratios showed a drop in the 20-24 year age group but not to the level nearly as low as those observed in 1989, and recovered to a level close to 1 in the 25-29 and 30-34 year age group, then declined starting in the 35-39 age group. It is possible that the low sex ratios in the 55-59 and 60-64 age groups may be attributable to the impact of the war, since this cohort would have been in their 20's and 30's during the period with the heaviest fighting, between 1965 and 1975. However, other demographic processes and reporting errors may

be confounding this phenomenon, such as selective emigration among the refugees who left Vietnam after 1975 or sex-selective age misstatement or under-enumeration. The drop in the sex ratio in the 20-24 age group is likely to be due to under-enumeration of men studying or working in other countries or on military duty, or other forms of sex-selective migration. The drop in sex ratio in this age group is similar to that observed by Hirschman et al. [10] in the 1979 and 1989 censuses. Between 1989 and 1999, the male cohort survival rates also show similar patterns of fluctuations that are not consistent with gradual increases in mortality at each older age. Some of the survival rates are greater than one, possibly indicating return migration (Fig. 3. This irregular pattern of cohort survival was also observed between 1979 and 1989 by Hirschman et al. [10].

Data on mortality trends in Vietnam dating back to before the end of the war are sparse. Mortality trends were examined to see whether existing data show any evidence of a mortality peak during the period in which heaviest fighting occurred. Estimates of crude death rates in Vietnam are varied and are shown in Figure 2. For Vietnam as a whole, there seems to be a steady decline in crude death rates since the 1930's. In North Vietnam, a slight increase in crude death rates are apparent in 1972.

Age specific death rates from 1979 to 1999 are available through the censuses of 1979, 1989, and 1999. Figures 5 and 6 show the age specific death rates for men and women from the three censuses. The age-specific death rates from the 1979 death rate were calculated by Banister (Table D-2, p.88) [2] from the age-specific life expectancies reported in the 1979 Census report. Banister, however, concluded that mortality from these estimates were too low. Merli[11] estimated mortality in Vietnam between 1979 and 1989 applying the Preston-Bennett's census-based method and Preston's version of the Bennett-Horiuchi death-distribution method using two rounds of census data. She also concluded that mortality rates reported in the 1979 and 1989 censuses were too low. Although the levels may be underestimated, the age patterns of mortality shows a typical J-shaped curve on the log

Figure 1: Population Pyramid, Vietnam, 1989 and 1999 (Source: General Statistics Office of Vietnam)



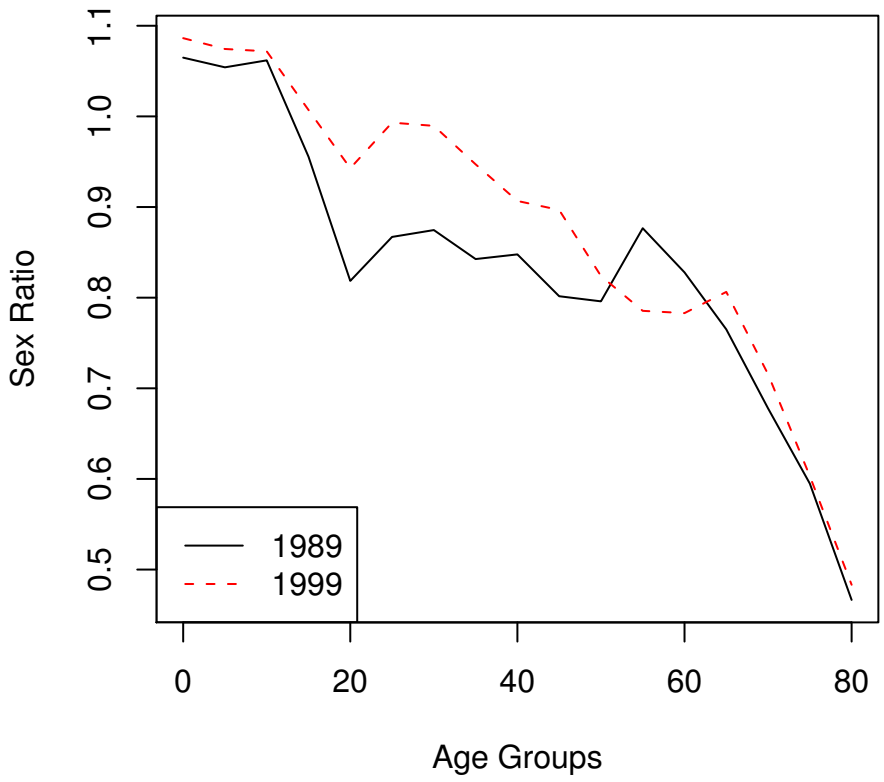


Figure 2: Sex Ratios by five-year age groups, Vietnam, 1989, 1999

Figure 3: Ten-year Cohort Survival Rates, Vietnam, 1989 (Source: General Statistics Office of Vietnam)

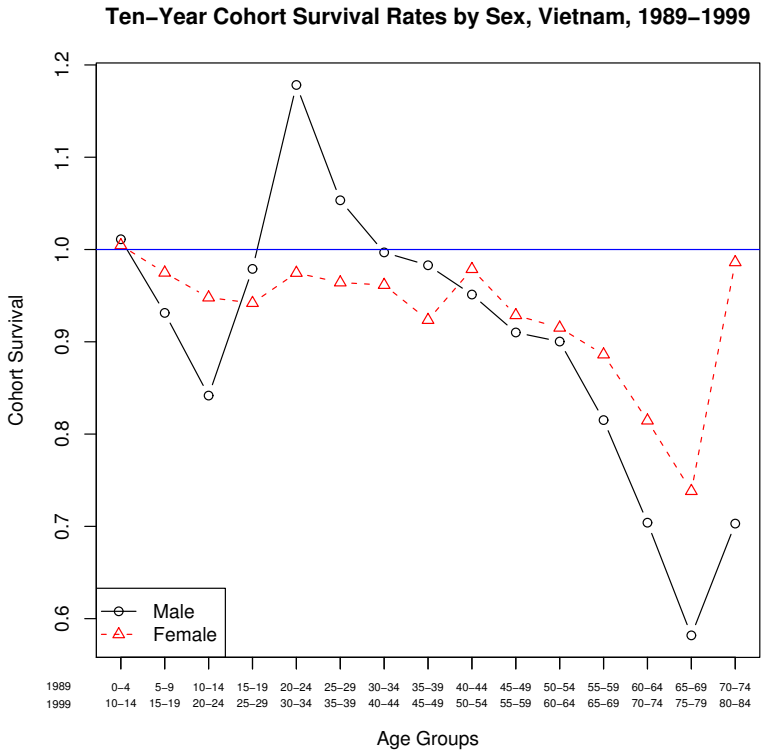
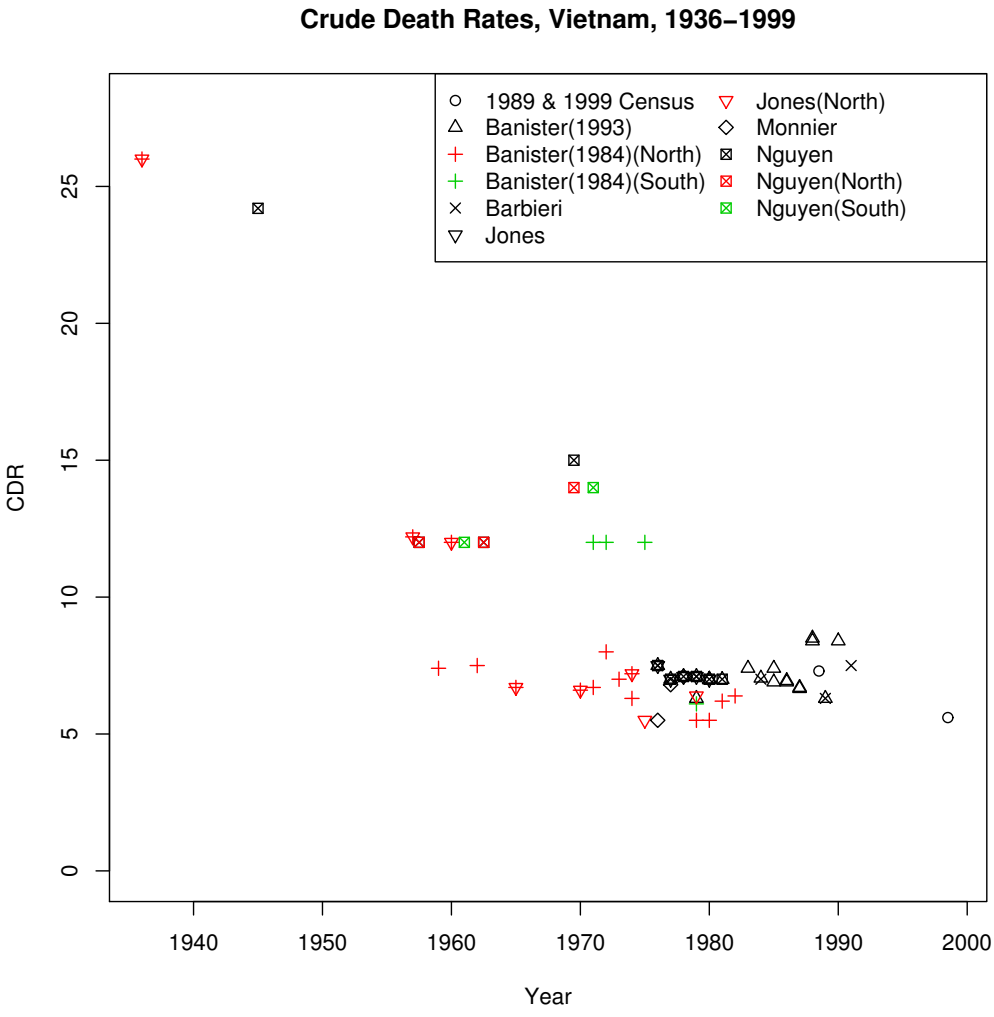


Figure 4: Estimates of crude death rates, Vietnam, 1936-1999.



scale for the years 1979, 1989, and 1999 for both males and females. For the 1965-1975 estimates calculated by Hirschman et al., the female rates are consistent with the general pattern but the male rates show elevated mortality in the 15-29 age group and the 30-44 age group.

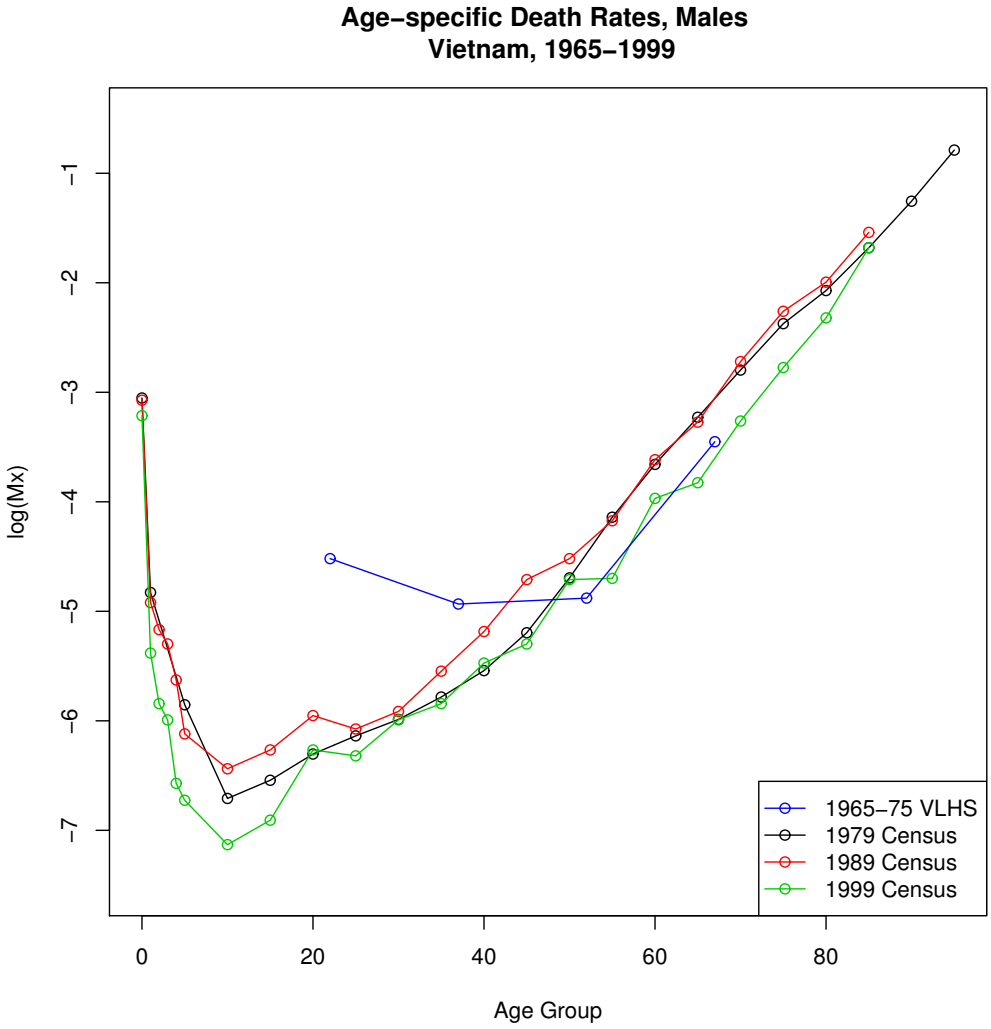


Figure 5: Male age specific death rates, 1979-1999, Vietnam

Infant and child mortality rates were also examined to see whether mortality peaks during the war can be observed. Reported infant mortality rates from various sources between 1936 and 1999 are shown in Figure 7. Rather than a peak in mortality during the war years, there

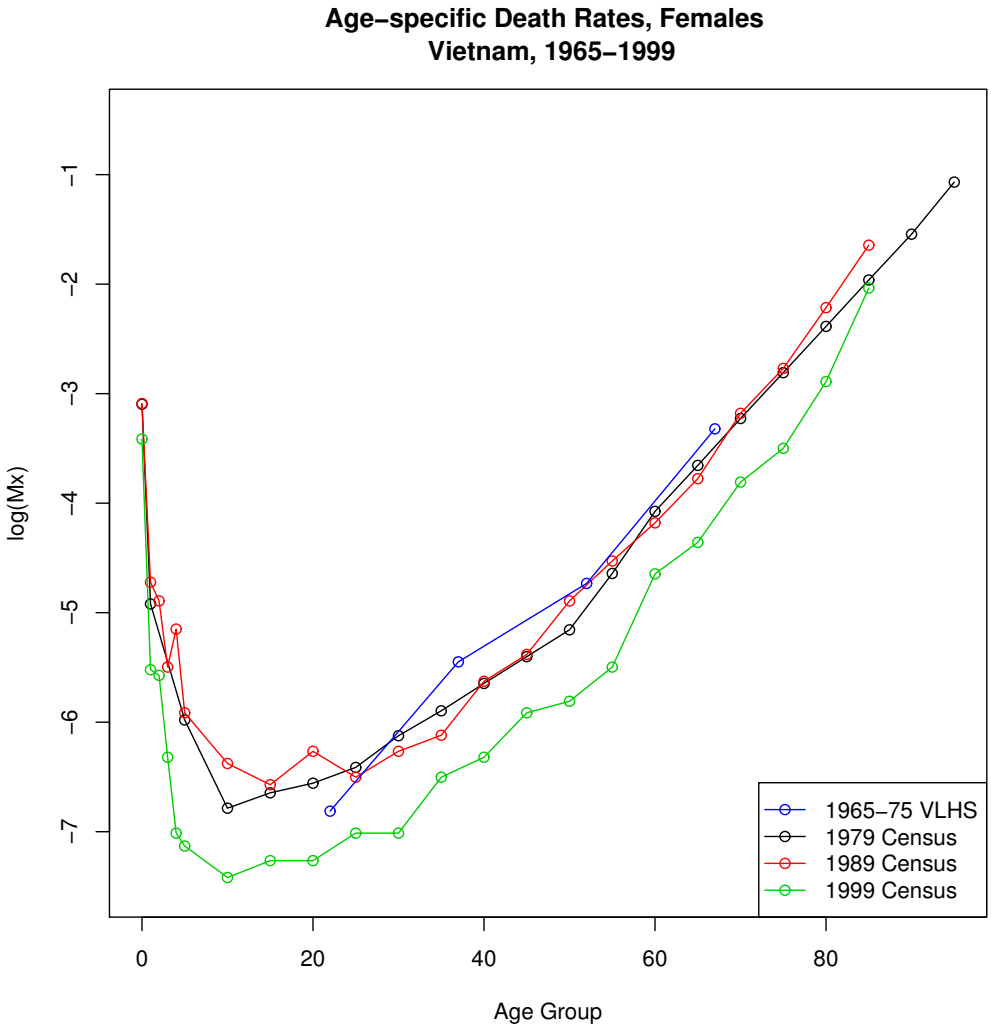


Figure 6: Female age specific death rates, 1979-1999, Vietnam

appears to be a drop in infant mortality rates during the period of intense warfare between 1965 and 1975. This may be due to under-reporting or recall bias rather than an actual drop in infant mortality. Similarly, an examination of under-five mortality rates do not show any mortality peaks among children during the conflict period (Figure 8). A steep decline in under-five mortality rates is evident from the 1979 to the present time. This is consistent with Savitz et al.'s analysis [13] using the 1988 Demographic and Health Survey data to examine the Vietnamese infant and childhood mortality in relation to the Vietnam War. They did not find evidence for increased infant or child mortality during the war period.

As stated earlier, available data show inconclusive evidence for increased mortality during the war. Mortality seems to have been steadily declining as Barbieri[3] has observed. Yet, reports of crude death rates from North Vietnam and age-specific death rates from 1965-1975 seem to indicate some increase in mortality from this period. In addition, examining deaths by cause reveals that the number of violent war deaths per year peaked during the 1965-1974 period [12]. Using the World Health Survey, Obermeyer et al. (2008) showed that the total violent war deaths rose from 131,000 (75,000 to 211,000) during 1955-1964, to 170,000 (102,000 to 255,000) during 1965-1974 and then down to 81,000 (44,000 to 127,000) in the post-war period of 1975-1984.

While the immediate effects of the Vietnam War on mortality has been studied[10], the long-term impacts of the war on the generation of children who were conceived during its most violent period has not been examined. Data from almost a quarter of a century after the end of the war may provide a unique examination of the long-term effects of the war on this generation. Furthermore, this study will examine how the war affected the youngest of the children, those who were exposed to the conflicts in utero.

Figure 7: Estimates of infant mortality rates, Vietnam, 1936-1999.

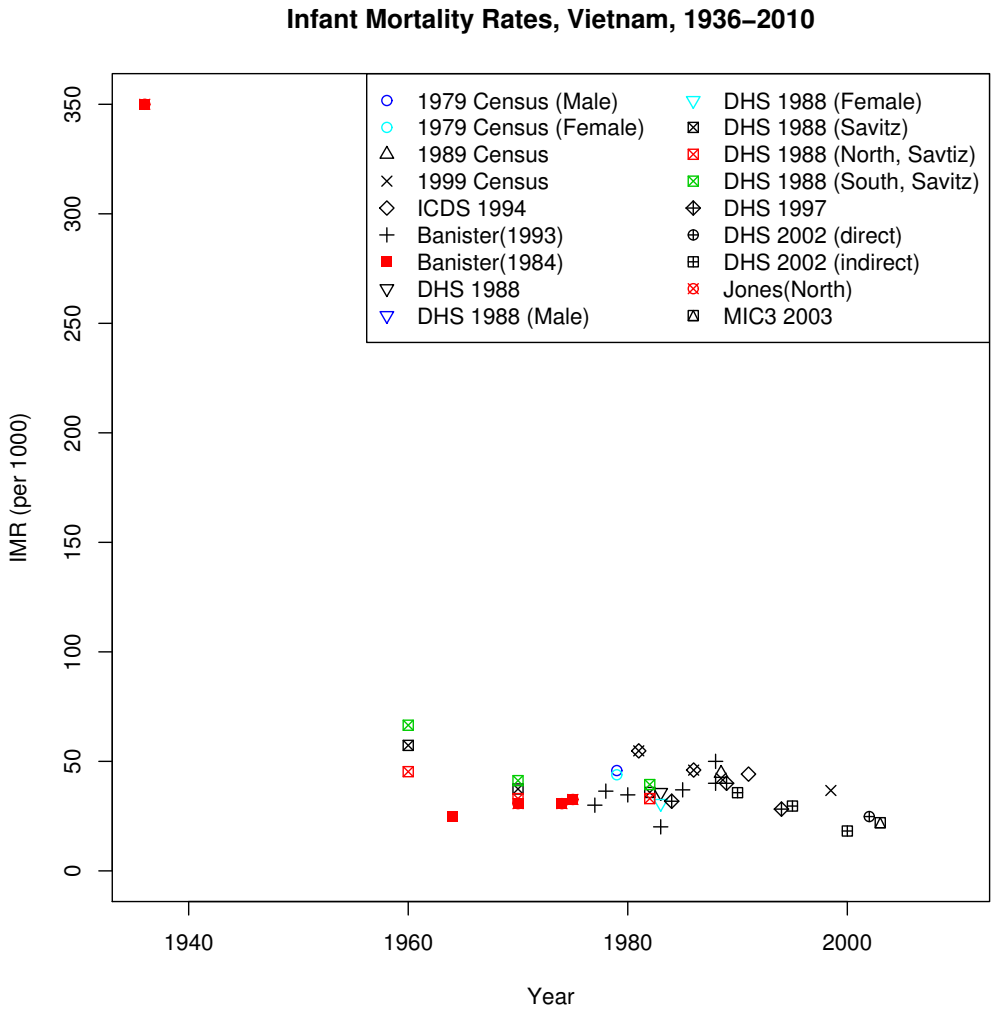
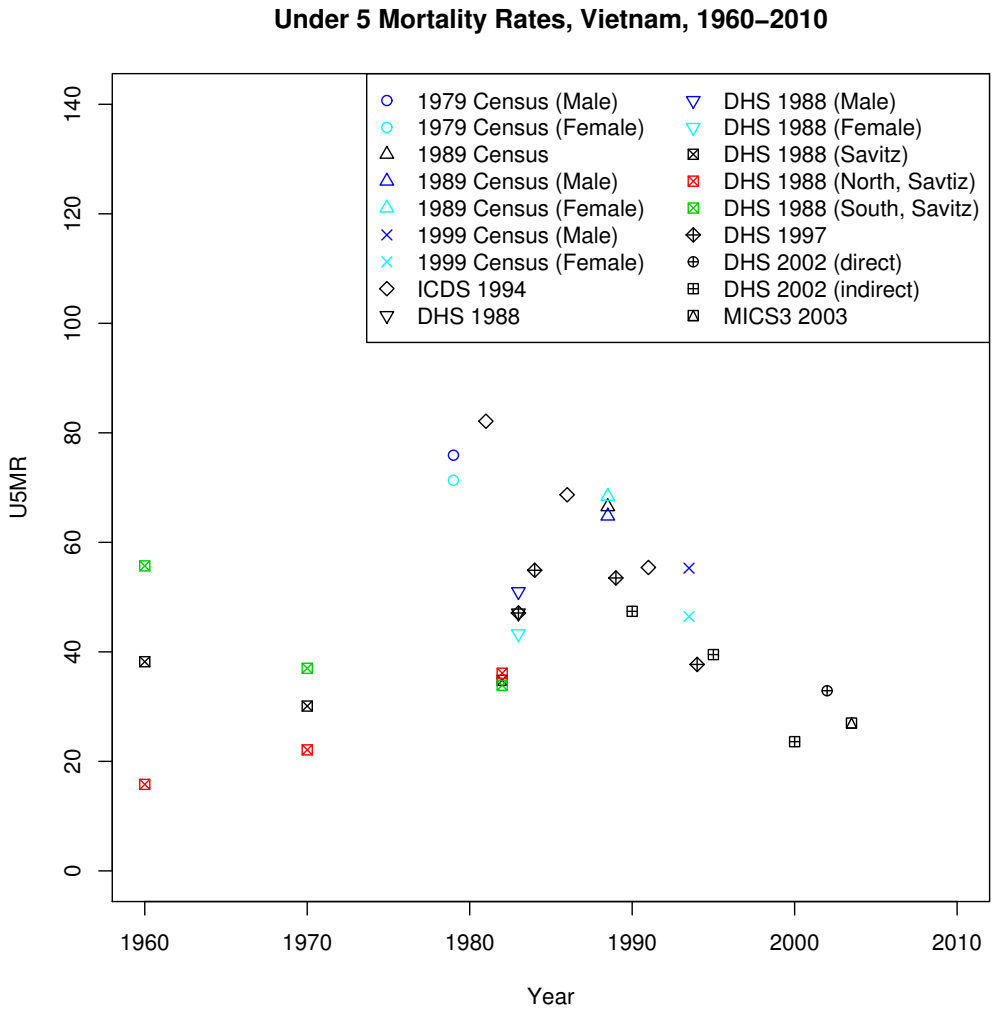


Figure 8: Estimates of under-five mortality rates, Vietnam, 1936-1999.



0.3 Data and methods

0.3.1 Data

This paper will use the 1989 and 1999 Vietnamese census microdata, available through the Integrated Public Microdata Series–International: Version 5.0 [6]. The 1989 census was conducted on April 1, 1989 and the 1999 census was conducted on March 31, 1999. 1989 data consists of a 5 percent sample with 2,627,000 persons while the 1999 data is a 3 percent sample and includes 2,368,000 persons.

An examination of the data quality indicates that age heaping does not seem to be a big problem in the Vietnam censuses. Patterns of age reporting seems to be consistent between the sexes, although the levels are different. Looking at heaping by birth year, there is some evidence of heaping around years ending in 0, however, this seems to be more problematic in cohorts born in 1960 or earlier and therefore is not a concern for the purpose of this paper.

The age and sex structure indicate that there may be some under-enumeration of males in the 20-24 age group in 1999 and in older age groups as discussed earlier. The male deficiency in the 20-24 age group from the 1999 census may be of concern, since the cohort of interest in this study falls in this age group. When the cohort survival is examined.

Another point of concern is that the cohort survival differs substantially by sex, especially for the age groups of interest in this analysis. As shown earlier, for men, cohort survival decreases drastically in the cohort aged 10-14 in 1989 who would be 20-24 in 1999, perhaps reflecting emigration, the underenumeration of military personnel, students studying abroad, or laborers working overseas. It then rebounds and the survival is greater than one in the cohort aged 20-24 and 25-29 in 1989, possibly reflecting the return migration of those who were on overseas military duty, studying or working abroad. For females, the pattern is less dramatic, showing a stable cohort survival until the age 40-44 after which it shows a steeper decline in survival.

Finally, as the number of household heads and the number of households were compared for consistency. They matched fairly well with only minor differences.

0.3.2 Method

This paper will apply the difference-in-difference technique to the 1989 and 1999 Vietnamese census microdata to evaluate the long-term effects of the Vietnam War. The cohort conceived between August 1974 and April 1975 will be the focus of this study. The 1989 Census captures the cohort at around age 13 in 1989 and age 23 in 1999. This cohort was chosen because it was exposed to war in utero before the fall of Saigon on April 30, 1975. However, they were not exposed to war after birth. The date of conception was determined based on the month and year of birth, assuming 9 months of gestation.

This cohort will be compared to those conceived and born during the war and those who were conceived and born after the war. In order to control for the effect of month of birth on later life outcomes, these two cohorts were selected exactly one year before and one year after the war-conceived cohort. The cohorts are defined for the year and months of birth of individuals, as well as from the last born children of mothers in the sample.

Table 1: Age of cohorts

Cohort	Birth Period	Age at 1989 Census	Age at 1999 Census
War-born	May 1974-Jan 1975	14	24
War-conceived	May 1975 - Jan 1976	13	23
Post-war	May 1976 - Jan 1977	12	22

Another way a control could be established is through geography, based on where the heaviest fighting occurred. Those born in areas with the heaviest fighting could be compared to those born in areas that saw less fighting. However, place of birth data is not available through the Census. The location of the household in 1989 and 1999 may be used as a proxy

for the location of conception. However, after the end of the war, the newly established Vietnamese government implemented a massive population redistribution program aimed at easing population congestion in urban areas. [7] These policies were aimed at easing the population density in the urban areas in the South and to move the population from the North to the South, especially from the population dense Red River Delta in the North. This creates a challenge for using place of residence as proxies for birth place. In order to minimize the people who would be migrants into the area, only the those who had lived in the same province for the last five years was used for the analysis.

Provinces were assigned to high, intermediate, and low war activity according to the designation by Savitz et al.[13] The high war activity provinces were Nghe Tinh and Binh Tri Thien (which now consist of Quang Tri, Quang Binh, and Thua Thien Hue). Hanoi, Ha Bac, Ha Nam Ninh, and Phu Khanh (Phu Yen and Khanh Hoa) were designated as intermediate war activity regions. The low war activity provinces were Tien Giang, Dong Nai, Hai Hung (Hai Duong and Hung Yen), Cao Bang, Hau Giang (Can Tho and Soc Trang), and Ho Chi Minh City. These designations were used to examine whether there were any differences among the areas with varying experiences of war intensity.

The difference in difference (DD) analysis was be used to compare the war-born and war-conceived to the post-war conceived and born cohorts and in high and medium war intensity areas to low intensity areas. The outcomes that were examined included education, literacy, marital status, labor market status, and disability. The educational outcome variables included school attendance, completion of primary education, and literacy. School attendance was measured as whether the person is currently attending school or not and was measured in 1989 at the time when the cohorts were school-age. Completion of primary education and literacy are from the 1999 Census, when the cohorts were in their mid-twenties. Literacy was defined as ability to read or write in any language. Labor market status was indicated by whether the person was in the labor force or not at the time of the 1999 Census. Disability

was defined as whether the person was economically inactive because of disabilities. Marital status was measured by whether the person was ever-married and fertility was indicated by the number of children ever born and number of children died.

The regression form of the DD model is as follows:

$$\begin{aligned} Y_{ijc} &= \alpha + \beta_{1i}X_i + \beta_{2j}A_j + \beta_{3c}C_c + \beta_4 F_i + \beta_{5jc}(A_j * C_c) + \beta_{6j}(A_j * F_i) \\ &\quad + \beta_{7c}(C_c * F_i) + \beta_{8ijc}(A_j * F_i * C_c) + \epsilon_{ijc} \end{aligned}$$

where i indexes the individual, j indexes the war intensity area categories, and c indexes the cohorts. Y represents the outcome variable, X_i is the set of covariates, A is the set of dummy variables for medium and high war intensity areas, C is the set of dummy variables for war conceived and war born cohorts, F is the dummy for being female, and ϵ is the error term. The covariates used in the analysis a dummy variable indicating urban area and the interaction between urban and female. For the analysis examining mortality status of the last birth as the outcome variable, the covariates also included mother's age, mother's education, and mother's marital status. The variable for children-ever-born was only available for women, and therefore, analysis was conducted without the dummy variable for sex.

The DD estimates of interest are the level two interaction terms between war intensity and cohort, β_{5jc}. In order to also control for sex, I also examined the differences in the difference-in-difference estimators between males and females, which are represented by the level three interaction terms β_{8ijc}.

0.4 Results

0.4.1 Descriptive Analysis

Table 2 shows the proportions of the outcome indicators by cohort and war intensity for all of Vietnam. The values in brackets are the standard errors. The first row shows proportion of children attending school by cohort and war intensity areas in 1989. School attendance is highest among the post-war cohort, followed by war-conceived cohort in all areas. This could be a reflection of drop out rates between the ages of 12 and 14. The descriptive analysis shows that the war-born cohort has the highest proportion completing primary education, followed by the war-conceived cohort in all areas. Whether the individual completed primary education was measured in 1999 at ages between 22 and 24. At these ages, most people who would complete primary school would have completed it even in the youngest age group. The results for literacy show inconsistent patterns. In low and medium intensity areas, proportion literate for war-born and post-war cohorts are about the same, while the war-conceived cohorts show a slightly lower percentage. In high-war intensity areas, all three cohorts have about the same levels. Proportion ever married is lowest among the post-war cohort, followed by the ever-married group. This may be because the 1999 census captures the cohorts at ages 22 to 24 when people begin to marry. Hence this may be a function of age, rather than war exposure status. Examining patterns of employment status of the cohorts reveal that in low and medium intensity areas, the proportion employed in 1999 is highest among the war-born cohorts, followed by war-conceived cohorts. However, the proportion employed are lower in the medium war intensity areas than the low war intensity areas. In the high intensity areas, the war-born cohort has the highest proportion employed followed by the post-war cohort. No consistent patterns were observed for proportion of people who had claimed employment disability in 1999.

Outcomes	Low War Intensity			Medium War Intensity			High War Intensity		
	War-born	War-conc.	Post-war	War-born	War-conc.	Post-war	War-born	War-conc.	Post-war
School attendance	0.610	0.725	0.807	0.533	0.742	0.845	0.625	0.750	0.860
	[0.009]	[0.008]	[0.007]	[0.009]	[0.007]	[0.006]	[0.012]	[0.011]	[0.008]
Primary school compl.	0.738	0.713	0.673	0.883	0.854	0.849	0.753	0.709	0.695
	[0.009]	[0.010]	[0.010]	[0.009]	[0.009]	[0.010]	[0.014]	[0.015]	[0.015]
Literacy	0.950	0.942	0.950	0.977	0.968	0.978	0.953	0.951	0.950
	[0.004]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.007]	[0.007]	[0.007]
Ever-married	0.554	0.477	0.416	0.509	0.430	0.312	0.526	0.483	0.376
	[0.011]	[0.011]	[0.010]	[0.015]	[0.014]	[0.013]	[0.016]	[0.016]	[0.015]
Employed	0.928	0.921	0.906	0.903	0.899	0.839	0.949	0.924	0.933
	[0.008]	[0.008]	[0.009]	[0.011]	[0.010]	[0.012]	[0.008]	[0.009]	[0.008]
Disabled	0.005	0.008	0.004	0.005	0.004	0.007	0.008	0.010	0.015
	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.004]

Table 2: Descriptive statistics of outcome variables by cohort and war intensity, Vietnam, 1989 and 1999*

*All of the data are from the 1999 census except for school attendance which was from the 1989 census.

0.4.2 Regression results

Table 3 and 4 show the coefficients of the interaction terms showing the difference in difference estimators comparing the cohorts and the war intensity areas and the difference in difference in difference estimators between females and males from the regression analysis.

When comparing high war intensity areas to low intensity areas (see Table 3) for males, the only statistically significant estimates were for disability. However, contrary to expected, the coefficients were negative, indicating that the joint effect of being in the war-born or war-conceived cohorts and living in high intensity areas is to lower the proportion claiming disability. However, since this indicator is related only to disability in employment, it may be confounded by other factors. For example, some people who can claim disability may choose to work for various reasons and it does not capture those who are not in the labor market.

Comparing females to males in high intensity areas, school attendance for girls born during the war was lower than that of boys in the same cohort. The difference in difference estimate of girls born during the war was 0.07 lower than that for boys. Further, literacy was lower among women born during the war relative to men in the same cohort, but the coefficient was only marginally significant ($p < .10$). Moreover, the added effects of being female and being born or conceived during the war on disability are positive. These counterbalance the negative difference in difference observed for males for disability.

For medium war intensity areas relative to low intensity areas (Table 4), the effect of being born during the war on school attendance for boys was negative, indicating lower school attendance among boys born during the war. When females were compared to males, the added affect for being female in addition to being born during the war in a medium intensity area further lowers the proportion attending school. However, this coefficient was only significant at the .10 level. The differences in the difference in difference estimates between males and females for ever-married were statistically significant and positive for

both war-born and war-conceived cohorts. This may be because women tend to marry at younger ages than men. Therefore, in these age groups, while some women may have already married, many men may marry at a later age and therefore are not in the analysis. For employment, the difference between men and women were also significant, with women having higher employment rates than their male counterparts in both the war-born and war-conceived cohorts.

Table 3: Difference-in-difference estimates for males and added difference for females in high war-intensity areas relative to low-intensity areas.

	DD for males			Added effect for females		
	Estimate	Std. Error	p-value	Estimate	Std. Error	p-value
A. School attendance ('89)						
War-born	-0.0078	0.0204	0.7030	-0.0685	0.0297	0.0210
War conceived	-0.0070	0.0203	0.7302	-0.0344	0.0292	0.2395
B. Primary education completed						
War-born	-0.0057	0.0351	0.8717	-0.0044	0.0489	0.9276
War conceived	-0.0401	0.0347	0.2474	0.0269	0.0484	0.5785
C. Literacy						
War-born	0.0229	0.0172	0.1822	-0.0413	0.0240	0.0850
War conceived	0.0066	0.0170	0.6964	0.0030	0.0238	0.9010
D. Ever-married						
War-born	0.0116	0.0381	0.7610	0.0020	0.0533	0.9704
War conceived	0.0256	0.0377	0.4973	0.0405	0.0527	0.4418
E. Employed						
War-born	-0.0111	0.0234	0.6338	0.0131	0.0332	0.6940
War conceived	-0.0200	0.0232	0.3891	-0.0076	0.0330	0.8168
F. Disability						
War-born	-0.0244	0.0065	0.0002	0.0324	0.0090	0.0003
War conceived	-0.0219	0.0064	0.0006	0.0252	0.0090	0.0050

0.4.3 Conclusion

There are many weaknesses to this study. First, because of the absence of birth place data, the geographic controls used in the analysis is not optimal despite attempts to mitigate the

Table 4: Difference-in-difference estimates for males and added difference for females, medium war-intensity areas compared to low-intensity areas.

	DD for males			Added effect for females		
	Estimate	Std. Error	p-value	Estimate	Std. Error	p-value
A. School attendance						
War-born	-0.0875	0.0182	0.0000	-0.0475	0.0262	0.0696
War conceived	-0.0111	0.0179	0.5353	-0.0160	0.0258	0.5363
B. Primary education completed						
War-born	-0.0403	0.0268	0.1323	0.0036	0.0379	0.9240
War conceived	-0.0371	0.0266	0.1630	0.0133	0.0374	0.7225
C. Literacy						
War-born	0.0021	0.0126	0.8705	-0.0101	0.0181	0.5778
War conceived	-0.0128	0.0125	0.3067	0.0231	0.0178	0.1930
D. Ever-married						
War-born	0.0198	0.0280	0.4796	0.0963	0.0401	0.0163
War conceived	-0.0140	0.0277	0.6138	0.1097	0.0394	0.0054
E. Employed						
War-born	0.0149	0.0178	0.4025	0.0726	0.0260	0.0052
War conceived	0.0114	0.0178	0.5208	0.0618	0.0256	0.0160
F. Disability						
War-born	-0.0064	0.0048	0.1760	0.0067	0.0068	0.3271
War conceived	-0.0062	0.0047	0.1899	-0.0021	0.0067	0.7488

effects of migration. Second, the cohorts may still have been too young to have been the subject of a study of socioeconomic outcomes. A study from the next round of census may produce more informative results. Finally, conditions in Vietnam immediately after the war may not have been much better than conditions during the war. End of war meant lack of subsidies from foreign powers that supported each side of the war.[7] Following the end of war was a serious food shortage due to a gap in production. This may mean that maternal and child malnutrition may have stayed the same or increased compared to the time of war. In addition, health and mortality conditions in Vietnam may have stagnated or worsened in the period after the war. One report cited in Banister [2] notes:

> During the past several years as a result of economic difficulties of the entire

> country and shortcomings on the part of the health sector, the quality of public health activities has declined somewhat. (Dang Hoi Xuan, 1983, p.48 as cited in Banister[2])

Hence, observing the effect of specific battles during the Vietnam War may have been able to observe the effect of war on the long term outcome of the children exposed to war.

However, despite these weaknesses, what seem apparent from the results is that differences in the differences-in-differences between males and females exist. This may be pointing to differential effect of war exposure by sex or it may be an artifact of the age groups under study where men and women are experiencing different life stages. Further investigation is needed to further explore this topic.

Bibliography

[1] Douglas Almond, Lena Edlund, Hongbin Li, and Junsen Zhang. Long-term effects of early-life development: Evidence from the 1959-1961 china famine. Technical Report Working Paper No. 87, Center on Institution and Governance, June 2008.

[2] Judith Banister. *Vietnam population dynamics and prospects*. Institute of East Asian Studies, University of California, Berkeley, 1993.

[3] M. Barbieri, J. Allman, B. S. Pham, and M. T. Nguyen. Demographic trends in vietnam. *Popul*, 8:209–234, 1996.

[4] D. J. P. Barker. Fetal and infant origins of adult disease. *Monatsschrift Kinderheilkunde*, 149(13):S2–S6, June 2001.

[5] Anne Case, Darren Lubotsky, and Christina Paxson. Economic status and health in childhood: The origins of the gradient. *The American Economic Review*, 92(5):1308–1334, 2002.

[6] Minnesota Population Center. *Integrated Public Use Microdata Series International: Version 5.0*. University of Minnesota, Minneapolis, 2009.

[7] Jacqueline Desbarats. Population redistribution in the Socialist Republic of Vietnam. *Population and Development Review*, 13(1):43–76, Mar., 1987.

[8] I. T. Elo and S. H. Preston. Effects of early-life conditions on adult mortality: a review. *Popul Index*, 58(2):186–212, 1992.

[9] Robert William Fogel. Chapter 9 new findings on secular trends in nutrition and mortality: Some implications for population theory. volume Volume 1, Part 1, pages 433–481. Elsevier, 1997.

[10] Charles Hirschman, Samuel Preston, and Vu Manh Loi. Vietnamese casualties during the american war: A new estimate. *Population and Development Review*, 21(4):783–812, December 1995.

[11] M. Giovanna Merli. Mortality in vietnam, 1979-1989. *Demography*, 35(3):345–360, Aug., 1998.

[12] Ziad Obermeyer, Christopher J L Murray, and Emmanuela Gakidou. Fifty years of violent war deaths from vietnam to bosnia: analysis of data from the world health survey programme. *BMJ*, 336(7659):1482–1486, Jun 2008.

[13] D A Savitz, N M Thang, I E Swenson, and E M Stone. Vietnamese infant and childhood mortality in relation to the vietnam war. *Am J Public Health*, 83(8):1134–1138, August 1993.