Short and long-term impacts of famines. The case of the siege of Paris, 1870-1871

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Introduction

Although it is both obvious and quite well known that the level of nutrition has a strong impact on health, their precise relationship is still difficult to observe. Robert Fogel (1994 & 2004) attributes almost all the decrease in mortality from the 18th century to the end of the 19th century to improvements in nutrition. The role of alternative factors like public health, hygiene, and medical technology are still very much debated, for the European context as well as for other historical cases (Cutler, Deaton, Lleras-Muney 2006).

As better fed children end up taller and taller adults seem to die later, height stature is often used as an intermediate variable that allows studying the relationship between parental income—or more generally food availability in early ages—and long-term health (Deaton, Bozzi and Quintana-Domeque 2009). Still, the causal impact of nutrition improvements on height—and then on life expectancy—is still debated both in terms of magnitude and of timing over the stature growth period (in utero, early ages, adolescence). Recent works exploit the natural experiments generated by exogenous agricultural income failures, either due to droughts (Maccini and Yang 2009), pests (Banerjee, Duflo, Postel-Vinay and Watts 2010), or commodity price falls (Cogneau and Jedwab 2012). Other works look specifically at the impact of famines (van den Berg, Pinger, & Schoch 2011; Scholte, van den Berg, and Lindeboom 2012), in particular the Chinese Famine during the Big Leap Forward (Gørgens, Meng and Vaithianathan 2012; Meng and Qian, 2009). As famine not only results in lower caloric intakes but also in higher mortality, lower fertility and possibly migration out of famine stricken areas, these contributions devote great effort in trying to isolate the nutritional channel from selection effects that potentially confound it. Our contribution adds to this latter strand.

We aim at measuring the causal impact of famine on the height stature of children who were inside Paris during the 1870-71 siege by the Prussian army then by 'legalist' governmental French troops.

We take advantage of the high quality of the French administrative data to assess precisely the extent of that shock. Of course data from the siege itself are scarce, not to say nonexistent. But there are many individual data covering both the periods immediately before and after the event as well the rest of the country. Therefore we can make a double comparison in both time and space so as to assess the consequences of the shock.

This paper has three goals related with the nutrition shock occurring during the 1870-1871 siege of Paris. The first one is to establish the size of the infant mortality increase linked to the shock. The second is to measure the height penalty linked with the shock, if any, and to determine which cohorts were affected. The third is to link both phenomenon to understand more precisely how famines affect adult height.

Context and method

As the war erupts between France and Prussia, the Prussian armies gain territory really fast – much faster than the French army had imagined – and soon Paris, the French capital city, gets surrounded. It is the beginning, at the end of summer 1870, of a long and painful siege. The Prussian surround the city and soon block all exits. At the same time they bomb the city and fight any attempts to break the siege, which only ends with the surrender of the French and the ceasefire of January 26th 1871. The discussions that follow acknowledge the defeat of France in early March 1871.
But the end of the Siege is not the end of the story for the city, as a revolution—the Commune de Paris—soon breaks out as a direct result of the defeat. The Paris Commune results in another siege, this time by the French governmental forces (the so-called “Versaillais” because the temporary government was located in Versailles). That siege is even fiercer as it has a strong class related background, the Commune being viewed as a threat not only to the French dominant group by also to the whole European Bourgeoisie; on the opposite side, the Commune will remain for decades a symbol of the resistance of the working class, with its myths, its songs, and its heroes. That siege is much shorter but ends up in a bloodbath at the end of spring 1871. All in all the city was entirely shut down for almost seven months, in two phases, between the end of September 1870 and the end of May 1871.

For our study, several issues matter here. Firstly, the progression of the Prussian armies was so swift that very few people had the time to leave the city before the city became completely surrounded. This limits the selection effect from migration on the population who bore the burden of the siege. Secondly, the siege resulted without doubt on a generalized famine that was the main cause of death (either directly or indirectly through diseases erupting because of hunger) while war related casualties (for instance related to Prussian bombings) remained very limited. The contemporary descriptions of the famine are both numerous and converging. People started to eat the limited food supply they had, then ate all the horses, then whatever animal they could find, from the elephant of the zoo to rats. Thirdly, the limited extension of the siege, both in space (contrary to large-scale famines in China or India for instance), and in time (contrary to Leningrad WWII siege for instance) means that the population to study is quite limited but easy to identify.

As a result, the double difference empirical strategy we follow amounts to making a comparison in both time and space so as to get an indirect measure of the consequences of the famine on mortality and on height stature. We compute the same indicators (mortality rates or stunted people) for different cohorts born in some poor districts of Paris. This provides a first estimation of the effect of the famine by comparing the conditions for those who were children at the time with individuals who were older or who were born after, i.e. to other birth cohorts. Then we compute the same simple difference for other places in France that are as comparable as possible to our Parisian districts, but did not experience the siege: we select in particular the poorest district of the French second largest city, Lyon. Provided that the trends in height gains were similar in Paris and Lyon before the shock, the double difference will provide us an unbiased estimate of the impact of the shock on the distribution of height stature.

However, this reduced form impact could mix many potential channels: one is nutrition, but another one is selective mortality.

Hence we need to explore at the same time mortality and heights. First, famines have short term effects through mortality: many people are dying either from the lack of food itself or from the diseases that take advantage of the weakened bodies. Yet, famines also have long-term effects, by impeding the physical growth of survivors. The brutal and severe lack of nutriment endured by the body during famine periods means that even those who survive the famine will face its consequences for some time. Second, both effects are certainly linked. On the one hand, people who survived are selected and may therefore bias heights up: if those who died as a result of the famine are the shortest, then we may observe unusually tall individuals after the famine. On the other hand, everyone, including those who survived, experienced a lack of food and thus we may think that on average people would be shorter as a result from the famine.

Data and implementation

To compute height measures in the long run, we rely entirely on individual data from the military registers. Immediately after the 1871 defeat to Prussia, France switched its military organization from a small professional army to universal conscription. Starting in 1872, all men
had to report to the army at the age of twenty years old. The military authorities tested their fitness for the service and, in particular, registered their heights. This means that we can have access to height information at the individual level for all cohorts born after 1851. We aim at collecting all cohorts born between 1852 (aged 18 at the time of the siege) and 1875 (born after the siege) to get a full sense of the trend in height and its change caused by the siege. Of course, we cannot collect all the data for all those cohorts: there are approximately 10,000 conscripts in Paris in each year. So we choose to focus on one particular district (arrondissement). We focus on a working class stronghold, the 19th district for obvious reasons. First, it seems clear that the poor would suffer more from the context of famine. Second, they were the less prone to flee the city either in between the two sieges or after the second one.

For mortality, we use a mix of aggregated and individual data. Our goal is the same than for height: to get a complete picture of the trends in cohort size and to compare them with the other areas of France at the same time. However, the issue is a bit different for mortality. Firstly, we assume that the effect of the famine is less long-lasting on mortality than on height. So we may limit ourselves to a few points immediately after the famine episode. Secondly, collecting individual data on mortality is more costly than collecting those on heights. But the aggregated data on mortality are much more available and reliable. Finally we then use aggregated data from both the census and the vital statistics. The censuses from 1866, 1872, and 1876 give us the number of people alive within a certain cohorts. Then the statistics of births and death by age allow us to observe how each cohort evolves over time and to indirectly assess infant mortality during the siege.

For the geographic comparison, we collect the data for Lyon, France’s second largest city, because it seems to be the closest comparison point. Lyon is not only a large city but, just like Paris, it is also a quite industrial one. We focus on a working-class district (the 4th district) which provides a good comparison point with Paris’ 19th district. Lyon was not directly affected by the war; there was neither a siege nor any direct presence of the Prussians.

Preliminary results

We are still in the process of organizing the data, although we have collected and computerized most of the archives. So at this stage we can only provide simple results like the average height of some cohorts born in the 19th district of Paris (figure 1). All those individuals are born in that district and they are still living there at twenty years old. So we may expect that they grew up there. This is the most precise assessment about their childhood we can make (a further control by the fact that their parents are also living in the district when they turn 20 does not change the results).

Figure 1. Average height of conscripts born in Paris’ 19th district according to their year of birth.

As can be seen on the figure, the strongest effect seems to be for those born between 1862 and 1863, that is those aged 7 to 9 during the siege. What is even more surprising is that
there seems to be no effect for those who were born during or immediately before the siege. Those results are similar to those found by van den Berg, Lundborg, Nystedt, & Rooth (2009) in a completely distinct context (immigrants in Sweden from poor countries).

Still, we may suspect there may be some selection effects linked to mortality. We will investigate that more precisely in the full paper.

For the final paper, we will complete in the coming months these data so as to have not only the full set of cohorts born between 1852 and 1875 but also the same series for Lyon which we will use as a comparison group. That way, we expect to be able to get a precise picture of the consequences of the famine on heights.

At the same time, we will proceed in the same way for mortality. We will try to estimate precisely the extent of infant mortality during the siege in order to take it into account for explaining the pattern of height penalties.

References


