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## *Chapter 2*

# **INFANT MORTALITY AND RELIGIOUS CULTURE: A COMPARATIVE APPROACH OF TWO SWISS STATES (1860-1930)**

*Anne-Françoise Praz*

University of Fribourg, Switzerland\*

## **ABSTRACT**

At the end of nineteenth century, infant mortality in the Catholic canton of Fribourg was one of the highest in Switzerland; in the neighbouring Protestant canton of Vaud, it was well below the national average. To what extent can these differences be attributed to religious culture? After an overview of some hypotheses that have been used to explain religious differentials in infant mortality, this chapter presents a new mechanism implicating the state institutions and policies.

We first examine the impact of religious norms. Protestant and Catholic doctrine did not consider the loss of infant in the same way. These teachings might influence the parental behaviour in respect to the survival of their children. However, a causal pathway that leads from dogmatic discourse to the relevant individual behaviour is difficult to substantiate and to test.

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Religious norms are likely to play a critical role in shaping behaviour only when religious authorities diffused them regularly and have at their disposal a menu of rewards and sanctions encouraging the faithful to conform. In the period under study, such an impact is difficult to attest, as church institutions were loosing influence.

At the turn of the 20<sup>th</sup> century, religion gains an impact on demographic processes above all through mechanisms implicating the state institutions and policies. In examining carefully the health and population policies and the discourse put forward by cantonal elites to legitimate them, we then show the influence of religious culture on political, legislative and administrative priorities.

Using standard demographic measures and Cox regression analysis of the determinants of infant mortality, we test our hypotheses on a comparative sample of four villages that differed systematically in the main explaining variables for the period of the so called fertility transition (1860-1930). The prevalence of gastroenteritis in the Catholic canton, even in the years 1900-1930 when overall infant mortality is declining, attests to the absence of adequate health measures.

## INTRODUCTION

The relationship between religious affiliation and demographic trends has been established in many studies. The study of the influence of religion has generated an abundant literature in historical demography, mainly focused on the relationship between religion and fertility, especially during the period known as the first fertility transition (1860-1930), namely the generalisation of marital fertility control in Europe. In this context, the late fertility decline of Catholic populations has been largely attributed to the strict prohibition of contraception in the Catholic doctrine, opposed to Protestant tolerance and even a certain moral justification of contraceptive practices (Noonan, 1969, 531-535; Perrenoud, 1974). Recent research poses new methodological requirements. Studies using individual-level data are strongly recommended, as they permit to disentangle the complex skein of causality determining demographic processes; it is individual parents that make the decisions; the bigger an aggregate, the less it is homogeneous in respect to the main determining factors. When individual data are not available, aggregate statistics can provide new insights when analysed at the regional levels, in order to detect spatial variations in demographic patterns. But whatever the type of data, correlation between demographic indicators and religious appurtenance is not sufficient evidence of the impact of religion; researchers

cannot but go a step further and specify through what mechanism this impact of religion works (Derosas and van Poppel 2006).

Compared to the extensive research on religion and fertility, the issue of infant mortality has received less attention. However, recent studies highlight the interest of the questioning, as the explanation of infant mortality in the European past might shed light on similar problems in many contemporary countries. Moreover, the complexity of the mechanisms involved represents a real challenge. The following chapter commences with an overview of some hypotheses that were used to explain religious differentials in infant mortality and some preliminary theoretical considerations before we present our main argument. We then try to demonstrate that, during the first fertility transition, religion had a strong impact on demographic processes, above all through causal mechanisms implicating state institutions and policies. In the second part, after having presented our sample and our research design, we elaborate this argument for the Swiss case, focusing on the causal impact of religion on infant mortality, with a short overview of the relation of religion and fertility, which is the broader issue. The statistical test of our hypotheses is subsequently laid out; we use standard demographic measures and Cox regression analysis of the determinants of infant mortality, applied on individual data collected in a comparative sample of four Swiss villages that differed systematically in the main explaining variables for the period 1860-1930.

## **RELIGION AND INFANT MORTALITY: A CONTROVERSIAL RELATIONSHIP**

Scholars dealing with the impact of religion on demography emphasise the importance of controlling for the “characteristics hypothesis”, which posits that – more than religion itself – it is the socio-economic and demographic variables associated with religious communities that explain differences in demographic trends. For example, Catholics are more likely than Protestants to live in rural environment, where the type of dwelling could have an impact on infant survival; the socioeconomic structure as well as the level of income could differ strongly. Demographic behaviour like early marriage, as often usual among Muslim women, might increase the risk of difficult delivery and neo-natal infant mortality. Religion can also coincide with ethnicity or isolated groups, genetic factors being thus susceptible to play a role. An additional

mechanism explaining differentials in infant mortality among religious communities with non religious factors, namely a variation of this characteristics hypothesis, has been put forward by a recent study on infant and child mortality in Holland. The authors suggest that the social isolation of small religious groups lowered their exposure to certain kinds of infectious disease, and they demonstrate the pertinence of such a hypothesis in accounting for the lower mortality of Jewish children in the city of The Hague (van Poppel and al. 2002). Once these socio-economic and demographic variables are taken into account, religious differentials should disappear. A few studies have tested this characteristics hypothesis with individual data in the field of infant mortality, but they all agree in attesting that differences between religious groups persist, after controlling for socio-economic status and demographic characteristics, and that genetic factors are unlikely to account for much of the variation in mortality (Reid 1997, Derosas 2000).

A second set of explanations refers to the so called "particularised ideology hypothesis" that emphasizes the role of religious doctrine. Religion, as a particular system of belief and values, generates a corresponding set of norms that frame and limit the individual decision making and the practices of everyday life. Regarding fertility, the prohibition of contraception in Catholic doctrine is a well know example. In the area of overall mortality, certain religious teachings are likely to influence behavioural patterns and attitudes regarding health. So, the lower mortality rate of Adventists is attributed to religious regulations that promote abstaining from tobacco and alcoholic beverages and refraining from meat consumption. Jews are thought to be more ready to attend to their health and that of their families and to make better use of medical care, as a consequence of rabbinic teachings. Specific prescriptions such as the obligation of carefully examining food and table for the presence of worms and insects that are not allowed to be consumed, contribute to more hygienic feeding (van Poppel 1992).

In identifying the religious teachings able to influence individual behaviour, Calvin Goldscheider insists that historians should consider not only the elements influencing demographic behaviour directly, but also those that do so indirectly. He points to norms about the value of children and education, and those concerning sexuality and gender roles (Goldscheider 2006). As every religion expresses concerns about parental conduct, attitudes relevant for procreation and infant mortality could well fit into such a particular normative framing.

After having specified the religious teachings likely to influence demographic trends, it remains to demonstrate through what mechanism this



influence changes individual behaviour. Certain studies use a sociological model, stating that individual adherence to religious norms explains behaviour: the reasons inciting parents to care more about children's health should relate to their endorsement of religious teachings. Thus, they evaluate to what extent people subscribe to religious norms, a procedure relying on indicators of religiosity. Such indicators are not only difficult to produce they often contradict each other – a problem we also encountered in our research. To give an example: a classical measure of religiosity is the proportion of parishioners attending important church services, and such statistics were available for my sample in a series of parochial reports. However, I noticed that the more religious village in my Catholic sub-sample, according to this indicator, had a lower fertility and a lower infant mortality, so going against the correlation expected. Another indicator, proposed by Ron Lestheaghe (Lestheaghe 1991), is the proportion of marriages during Lent and Advent, periods in which marriage should not be celebrated following the Catholic rules. This indicator is more interesting, as it can be collected at the individual level. Again, it is in the more religious village of my sample, according to the indicator of church attendance, that marriages during these prohibited periods occurred more often. So, in historical research, except when we can make use of oral history methods – a research strategy only available for recent periods – it is very difficult to produce reliable information about individual religious beliefs. Actually, this difficulty conceals a problem of methodology: the mechanism linking religiosity with a given demographic behaviour is not specified. We don't trace the pathway that leads from religious beliefs to the proximate determinants of infant mortality or fertility.

Research based on the "particularised ideology hypothesis" is more convincing when they turn to religious institutions, their shaping of the social environment, their role in diffusing teachings and in enforcing norms related directly or indirectly to demographic behaviour. Kevin McQuillan states that religious values are likely to play a critical role in shaping demographic behaviour only when religious authorities have at their disposal a menu of rewards and sanctions encouraging the faithful to conform (McQuillan 2004). In this model, conformity to religious norms does not need to presuppose that individuals believe in the doctrine. Church institutions translate norms and values into costs and benefits, and individuals conform in order to avoid the costs of transgression. These costs are not only the moral costs associated with religious beliefs – for example the fear of God's punishment –, but also social costs like stigmatisation in the religious community, access denied to

welfare services provided by the churches, or exclusion from important social positions.

This mechanism emphasizing the role of religious institutions comes across new difficulties for the period of the first demographic transition, namely the end of the nineteenth century and the beginning of twentieth, when changes in fertility and infant mortality are more pronounced and therefore more in need of explanation. Actually, this period coincides with a process of secularisation and of waning influence of religious institutions. These lost their ability to reward or sanction conformity to their norms as they were marginalized or became very cautious and avoided insistence on controversial issues. A striking example is the attitude of the Catholic Church, attested by studies in Belgium, France and Switzerland, who refrained from reminding the faithful of the prohibition of contraception; in order to prevent conflicts that might have accelerated the process of secularisation already under way (Sevegrand 1995, Servais 2001, Praz 2006). Scholars are therefore compelled to explain the higher fertility of Catholic families otherwise than by moral costs associated with transgression of the doctrine, and have to answer a new research question: If church institutions were not able or unwilling to enforce compliance with religious norms, through what mechanism did these norms have an impact?

In this research perspective, we suggest a third kind of hypothesis linking religion and demographic behaviour, by turning to the role of state institutions. During the first demographic transition, state institutions were gaining social influence at the cost of church institutions. The state took over many social functions, traditionally fulfilled by the churches, such as health and education, that strongly influence demographic processes. State institutions were indeed more efficient, as they were able to enforce policies that constrained all families, and not only those who felt a sense of attachment to a religious community. But we suggest that state institutions acted as a mediator between religious norms and the corresponding demographic behaviour. The political elites had an interest in supporting religious values. On the one hand, and this is more the case for conservative elites, religious values could help them to maintain their political influence over the population. On the other hand, progressive elites that strived to implement changes took advantage of a language and an argumentation pertaining to a religious culture familiar to most citizens.

This "state policies hypothesis" is in line with David Kertzer's argument, stating that the cultural factors shaping demographic behaviour should not be considered separately from the political ones (Kertzer 1995). Political forces

select some aspects of the cultural sphere and give them an institutional substance, transforming cultural norms into laws and rights that can be enforced on a general level, thus creating new constraints for individual behaviour. Historical research must point out what values and norms were selected in this way and how they were translated into concrete state policies. We will develop this argumentation below for the Swiss case.

### **SAMPLE, DATA AND COMPARATIVE RESEARCH DESIGN**

Switzerland figures as “a miniature laboratory” to study the impact of religion on demography and the role of state institutions. Four languages, two religions, a lack of communication between linguistic groups and a long historical antagonism opposing Catholics and Protestants that have both limited the contacts between the different areas and thus in the period under study upheld heterogeneity. The political organisation, based on strong federalism supplied by a real fiscal autonomy gives to the 25 provinces (named cantons) important competences in many domains of legislative and administrative governance, as key areas like population and health policy.

We used a comparative approach, contrasting two Swiss cantons, situated in the French-speaking part of the country, that were religiously homogeneous during the period studied. The canton of Fribourg was Catholic, led during all the period by a conservative party that collaborated closely with the Catholic Church. This collaboration was motivated first by convergence of interests – the conservative elites were suspicious of modernisation and strived to maintain the rural character of the canton – and second by strategic purposes; to secure the conservative vote within a population mostly dispersed in the countryside and still not very much affected by the rise of the written press, it was crucial to use the network of parishes and religious associations. The political opposition was not well organized and fragmented. The Protestant canton of Vaud was led by a progressive government, the result of a democratic revolution. As Protestant ministers were associated with the conservative groups, the new government put them under state control and weakened their influence in civil institutions like schools, welfare services, or local administration. Perceived as hostile to democracy, the ministers lost their prestige among the popular classes, thereby hastening a decline of religiosity. However, religious ideology did not vanish and I will show how Protestant

values pervaded the political discourse. Moreover, these political struggles resulted in the emergence of a dissident Protestant church, whose members pertained predominantly to professional classes, and consequently many physicians were among them.

To isolate the impact of these cultural and political variables, I selected two pairs of villages, each pair sharing very similar economic conditions. The first pair (Chavornay/VD and Broc/FR) had experienced the same transformation in agriculture before 1900, namely the shift from cereal crop to intensive dairy farming, a shift that occurred slightly later in the Protestant village; from 1900 on, they experienced industrialisation, with the same industry, which happened to be a chocolate factory. The second pair consists in two neighbouring communities (Chevroux/VD and Portalban-Delley/FR) that maintained an economic structure based on agriculture and fishing. We collected individual data in these four villages. Demographic data – a family reconstitution covering marriages celebrated between 1860 and 1930 – is based on the parochial and civil registers, supplemented by local population registers and censuses. As we used event history analysis, which has more flexible rules in data selection, we could keep 86 per cent of the data collected, namely 5381 legitimate births for 1848 married and fecund women under observation.

The sample permits to eliminate the “characteristics hypothesis”, as our set of data has been chosen so as to control severely the effects of socio-economic variables at the macro and the micro level, and to isolate the influence of institutional factors on fertility (Smith, 1989, 178). The “social isolation hypothesis”, stating that small religious groups living apart are less exposed to contamination, is obviously not the case for our villages that are religiously homogenous and pertain to the dominant political and religious ideology in their respective cantons.

### **EXPLAINING RELIGIOUS DIFFERENTIALS IN FERTILITY: A FIRST APPLICATION OF OUR MODEL**

In spite of these very similar economic conditions, demographic behavior differed greatly between Catholic and Protestant villages. Regarding fertility, the decline took place clearly later in the Catholic villages.



**Table 1. Cox regression of the determinants of fertility by periods (all villages)**

Variables	1860-1878		1879-1898		1899-1914		1915-1930	
	<i>N. of obs: 1804</i>		<i>N. of obs: 1848</i>		<i>N. of obs: 2354</i>		<i>N. of obs: 2415</i>	
	<i>Prob &gt; chi2 = 0</i>		<i>Prob &gt; chi2 = 0</i>		<i>Prob &gt; chi2 = 0</i>		<i>Prob &gt; chi2 = 0</i>	
	Relative risk	P> z	Relative risk	P> z	Relative risk	P> z	Relative risk	P> z
<b>Mother's age at child birth</b> (reference: 25-29 years)								
15-19 years	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
20-24 years	1.16	0.54	1.18	0.36	1.14	0.55	1.11	0.57
30-34 years	1.09	0.37	1.05	0.63	<b>1.28</b>	0.00	1.13	0.16
35-39 years	<b>0.80</b>	0.01	<b>0.72</b>	0.00	<b>0.82</b>	0.01	<b>0.72</b>	0.00
40 years and more	<b>0.76</b>	0.01	<b>0.55</b>	0.00	<b>0.59</b>	0.00	<b>0.57</b>	0.00
age unknown	<b>0.21</b>	0.00	<b>0.17</b>	0.00	<b>0.16</b>	0.00	<b>0.13</b>	0.00
	1.01	0.93	<b>0.73</b>	0.02	1.24	0.03	1.32	0.02
<b>Religion Catholic</b> (ref.: Protestant)	<b>1.25</b>	0.00	<b>1.29</b>	0.00	<b>1.25</b>	0.00	<b>1.14</b>	0.06
	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
<b>Father's occupation</b> (ref. farmer, land owner)	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
labourer,								
unskilled worker	0.92	0.38	0.89	0.21	0.90	0.20	0.95	0.60
factory								
worker	1.56	0.19	0.77	0.31	<b>0.77</b>	0.00	<b>0.71</b>	0.00
trade-craftsman,								
civil servant	<b>1.17</b>	0.08	<b>0.76</b>	0.00	<b>0.86</b>	0.06	<b>0.76</b>	0.00
highly qualified								
occupation	1.02	0.95	0.87	0.58	<b>0.73</b>	0.08	<b>0.75</b>	0.07
occupation					deleted		deleted	
unknown	0.74	0.00	0.35	0.04	*			
<b>Birth place of the mother</b> (ref: the same village)	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
the same canton	1.02	0.79	1.03	0.71	1.04	0.56	<b>1.16</b>	0.06
an other canton	1.13	0.41	<b>1.20</b>	0.09	1.11	0.33	<b>1.05</b>	0.66
Abroad	<b>1.69</b>	0.01	0.86	0.73	0.99	0.95	<b>0.74</b>	0.13

Note: bold printed rates are significant at minimum 90%.

\*Because of very few occurrences.

Table 1 presents the results of a Cox regression model of the determinants of fertility by periods. This analysis aims to measure the impact of religious affiliation on fertility, controlling at the same time the influence of other

variables: the *women's age*, known as the major biological determinant of fertility, the *husband's occupation*, an indicator for socioeconomic status, the *birth place of the mother*, as mothers born in the village are likely to be more sensitive to the weight of social norms and the influence of the parochial priest. The variable *Catholic religion* observes the impact on fertility of the mother's affiliation to Catholicism, compared to affiliation to Protestant religion (the reference category, assigned the value 1). As the results of this variable attest to, the Catholic mothers, compared to the Protestant ones, always have a higher relative risk of giving birth. The most important difference appears in the second period (1879-1898), when the likelihood of another birth for Catholic mothers is 29% higher than those of Protestant mothers. Yet, research in the Episcopal archives on pastoral literature and correspondence demonstrate that a clear reminding of the prohibition of contraception by the Catholic Church was missing at that time and taken up only in the last period (1915-1930).

The "state policies hypothesis" permits to explain this seeming contradiction. We turned to school policies, following John Caldwell's thesis, which argues that mass education is a primary determinant of fertility decline, since it increases the costs of children, both monetary and opportunity costs (Caldwell 1980). In both cantons studied mass education was implemented during this second period (1879-1898), marked by a significant difference in Catholic and Protestant fertility. Now, the school policies differed greatly, according to religious culture. Content analysis of qualitative material such as political discourse, educational periodicals and school manuals demonstrates that Catholic and Protestant culture did not consider in the same way the importance of education, and especially in the case of girls. These respective discourses and ideologies shaped school policies. The Protestant canton implemented compulsory schooling more efficiently as school attendance was regularly controlled and absenteeism severely repressed. In the Catholic canton, the control and repression of school absenteeism was relatively haphazard, and the school system permitted many exceptions in school attendance for teenagers, especially for girls, whose parents often took them out of school before the legal age.

To evaluate the impact of these discourses and policies on the chances of children to get education, and therefore on the costs of children for their parents, we constituted a data base of the school career of the children of our villages, based on our demographic data and on information from administrative sources on the cantonal and local level (pupil listings, school attendance statistics and correspondence of the school authorities). For the

5042 legitimate children who survived until age 15, we managed to reconstitute the school career of 2353 of them (1333 boys and 1020 girls). We could demonstrate that in the Protestant villages, parents incurred important costs for the education of their children, both girls and boys. In the Catholic canton, due to gender discrimination justified in religious culture and permitted by school policies, Catholic parents avoided an important part of the growing costs of children. Consequently, fertility control was less imperative (Praz, 2005, 2006 and 2007).

### EXPLAINING RELIGIOUS DIFFERENTIALS IN INFANT MORTALITY: A NEW CHALLENGE

We now turn to the issue of infant mortality, i.e. the deaths in the first year of life per 1000 recorded live births, which is more decisive for life expectancies than child mortality (defined as mortality between 1 and 5 years); in fact, work on child mortality is still to be done, and the relationship between infant and child mortality remains understudied. Regarding infant mortality, recent research has amply showed that for most European countries a significant decline began at the end of the nineteenth century and continued till the outbreak of the Great War. For countries for which long term data is available at the national level, researchers are able to demonstrate that this decline was preceded by a first one that occurred more or less a century before. For Switzerland however, this cannot be confirmed as regular and standardized data is only available from the end of the nineteenth century.

**Table 2. Infant mortality rates (0-1 year) by cantons  
(per thousand - stillbirths not included)**

	1871-1880	1881-1890	1891-1900	1901-1910	1911-1920	1921-1930
<b>Fribourg</b>	252,0	223,4	198,2	172,4	134,0	83,5
<b>Vaud</b>	178,1	161,3	155,6	128,7	85,8	52,3
<b>Suisse</b>	205,7	173,3	154,1	126,2	90,7	59,2

Source: Francine van de Walle, *One Hundred Years of Decline - The History of Swiss Fertility from 1860 to 1960*, vol 2, table 4.2 (manuscript, University of Neuchâtel, 1977).

Around 1870, according to this official data, Switzerland was one of the countries with a relatively high infant mortality. However, the levels varied markedly from one canton to another, and the example of our two cantons is paradigmatic. In the Catholic canton of Fribourg, 1 in 4 babies died during their first year between 1871 and 1880, many more than the national average, while the Protestant canton of Vaud was well below this average (cf. table 2).

In spite of these striking differences in levels, infant mortality is attributed in both cantons to the same dominant causes. Contemporary testimonies, namely official reports of sanitary officers, medical and philanthropic publications, as well as the causes of death noted in the civil registers we consulted, confirm what has been attested to by many studies on other countries. If the babies survived the first month of life although marked by the threat of the so called endogenous mortality (genetic defect, weak constitution, bad conditions of delivery), they then mostly died of gastroenteritis and other digestive diseases, due to inadequate food or contaminated milk and water. Respiratory diseases seem to play a less important role; other indications given in registers or in some testimonies are difficult to interpret; for example, the term "convulsions" constitutes an ill-defined category and may have included different causes of death.

According to this prevalence of digestive diseases, the most important prevention was prolonged breastfeeding because of its many virtues: it is sterile, it meets all the infant's nutritional requirements and permit avoiding inadequate infant feeding, and moreover has immunological properties that provide protection against many kinds of infections. When breastfeeding is not possible, special attention to infant feeding and care is requested. In this context, information on adequate infant feeding and improvement of food control and hygienic facilities (water supply, plumbing, sewage systems and rubbish disposal) becomes of paramount importance to reduce the risk of contamination. And all the more so, as many testimonies indicate that breastfeeding was declining during this period, in both cantons and especially in the villages of my study, as a consequence of women working in factories, or their more intensive work in agriculture, and sometimes because of mother's bad health conditions.

### **Catholic and Protestant Attitudes towards Infant Mortality**

Can we attribute the striking cantonal differences in infant mortality to religious culture? This question is in line with some conclusions of recent



research, asserting that "in the long run, cultural factors were essential to the breakthrough in the fight against high mortality" (Schofield, Reher and Bideau 1991, 16-17). An initial step towards an explanation of religious differentials in infant mortality consists in identifying the religious teachings likely to influence behavioural patterns and attitudes regarding health and the religious norms concerning parental care.

Protestant and Catholic doctrine did not consider the loss of infants in the same way. As highlighted by Alfred Perrenoud for French-speaking Switzerland, the Protestant teachings stressed the parental responsibility for children (Perrenoud 1974). Parents were considered as collaborators in God's creation through their activity in caring and educating children. This increased investment in human capital encouraged them to have less children in order to fulfil this responsibility. Consequently, lower fertility of Protestant families can contribute to reduced infant mortality, because when children are less numerous each receives more parental attention<sup>1</sup>.

Contrasting with this responsibility for the quality of children, Catholic teachings promoted a moral of procreation essentially quantitative and fatalistic. In the canton of Fribourg, Catholic parents were invited "to accept with pleasure and gratitude all the children that God might well give them"; they also were invited to trust in Providence for providing the necessary means to bring them up<sup>2</sup>. The faithful were taught to accept humbly the physical pain and sickness that God allows and the death of a child had to be accepted as God's will. The gravity of the loss of infants was mitigated: in Catholic teachings and rituals, this death is even transformed into a positive event, as a dead child can intercede in heaven for its family. While an infant death was considered as a parental failure in the Protestant doctrine, the same event did not call into question the purpose of marriage as defined in Catholic pastoral literature: "to give saints to the Church and elected to Heaven".<sup>3</sup>

Another factor that is of relevance is the attitude towards innovation. Catholic populations were more susceptible to popular believes in "religious" treatments of illness, instead of taking recourse to modern medicine. In the second half of the nineteenth century, the Catholic Church launches in many European countries a wide campaign of revival of popular piety, in order to

<sup>1</sup> Actually, relationship between fertility and infant mortality is not unidirectional: a significant decrease in child mortality also accelerates the adoption of birth control, a high number of surviving children weighing heavily on the family budget (van de Walle, 1992, Reher 1999).

<sup>2</sup> Mgr Bovet André, *Instruction pastorale sur la vie familiale*, Fribourg, 1914.

<sup>3</sup> Abbé E. Descloux, *Préparation au Mariage. Conseils à la jeunesse*, Fribourg, 1907.

regain control of the faithful and to fight against modernism. The cult of the Virgin Mary, apparitions, pilgrimages and miraculous healings experienced a renewed popularity, and this was especially the case in the canton of Fribourg. Priests instilled suspicion against modernity, warned about newspapers and books, an attitude that did not favour openness to information on medical, hygienic or scientific issues.

Protestant culture considers more positively scientific advancement and knowledge. Both men and women are encouraged to develop the intellectual capacities God has given them for their own spiritual enlightenment and for individual autonomy, thus permitting them to work in God's honour. Protestant ethics emphasize the importance of vocations, and this contributed to the high esteem in which professionals like physicians were held. As co-creators, human beings have to use their intelligence to understand nature and to improve it. Therefore, it may be assumed that Protestant populations – more familiar with written media and more attentive to scientific medical discourse – developed an earlier awareness of the benefit and significance of hygienic measures. This information began to be popularized during the period under study, namely at the end of the nineteenth century, along with the Pastorian revolution.

We might suppose that these religious teachings and traditions influence the parental concern for the survival of children. However, a pathway that leads from religious discourse to relevant behaviour is difficult to substantiate and to test. Anyway, whatever the parental concern, it must be translated into concrete behaviour, namely more or less adequate care, in order to have an impact on infant survival. The question is whether the means available do permit this care: the access to valuable information, the availability and cost of hygiene, health services, etc. and the role of institutions is crucial in this regard. For my period and sample, state institutions became the most adequate structure to provide this information and these services<sup>4</sup>. A careful comparative analysis of the implementation of health policies and of the discourse put forward by cantonal elites to legitimate them will help us to trace the impact of religious culture on political, legislative and administrative priorities. We will show that influence for two crucial measures that lead to lower infant mortality: the statistical apparatus and data, necessary to get a

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<sup>4</sup> In the Protestant canton of Vaud, health and welfare services were totally taken over by the cantonal government. In the Catholic canton of Fribourg, although public health also became legally a state attribution, the concrete realisations were delayed; traditional religious and charity networks played a role in welfare services, but they were concerned with orphans and illegitimate children only.

clear view of the problem and to conceive adequate measures, and the fight against gastroenteritis, the most important cause of infant mortality.

### The Statistical Data and Apparatus

In Switzerland the federalist system slowed the standardization of statistics and the production of data. The first national census was performed only in 1850. A Federal statistics office was set up in 1860 and conducted from this date on a national census every ten years. In 1876, a Federal Act obliged all cantons to secularise the registry office and impose the same procedures for the vital registration by civil officers; with this data, the Federal office was able to produce unified statistics of the number of births, marriages and deaths. In the reports that cantonal governments published every year to inform Parliament and the public about their activities, the cantons had the obligation to publish annual tables of the number of births, marriages and deaths. This obligation did not include other data and syntheses produced by the Federal office, as infant mortality rates by cantons and districts, which were available since the middle of the 1870's in federal publications. The statistical data published by the cantons varied greatly, before and after the federal unification, as cantons made a selection of the federal data at their disposal and as some of them even produced their own supplementary data and calculations.

#### NAISSANCES.

DISTRICTS.	LÉGITIMES.		ILLÉGITIMES.		TOTAL.
	Garçons.	Filles.	Garçons.	Filles.	
Sarine . . . . .	351	312	43	25	731
Singine . . . . .	174	173	33	34	414
Gruyère . . . . .	298	250	19	17	584
Lac . . . . .	194	229	11	17	451
Glâne . . . . .	196	187	10	11	404
Broye . . . . .	174	178	24	27	403
Veveyse . . . . .	126	110	7	7	250
Sommaire	1513	1439	147	138	3237

Le nombre total des naissances étant de 3257, dont 285 illégitimes, il en résulte que, sur 11 naissances, il en est une d'illégitime.

Figure 1. The births in the canton of Fribourg (as given in the 1861 cantonal report).

As the data published by the canton of Fribourg demonstrates, population trends and infant mortality in particular were of no concern to the government. In the cantonal reports, demographic data was very scarce, limited to the federal tables of the number of births, marriages, and deaths. Demographic trends were considered more as indicators of good morality than of public health. For example, the stable number of inhabitants was considered as a reassuring sign that the population was not yet attracted by the “mirages” of the big cities, outside the canton. The increasing number of births was praised, as showing that married people were as yet untouched by “immoral practices”; the fact that this high fertility was correlated with high infant mortality remained hidden.

Figure 1 presents a table of births given in the 1861 report, before the federal unification. The categories used in this table are relevant of the dominant concern of the cantonal government. The first classification does not use a demographic criterion, but a legal and moral one: legitimate versus illegitimate children. This category will later disappear in the tables produced by the Federal office, replaced by a biological and medical criterion: stillbirths versus live births. The text under the table gives the only calculation regarding population trends that was made in these reports between 1860 and 1883: the rate of illegitimate births (*une naissance illégitime pour 11 naissances – one in eleven*). Yet, a birth rate could have been calculated, as the necessary data were already on hand. But obviously, the cantonal government was not interested in publishing, and perhaps even in knowing this rate. Until the end of the century, these reports persisted in making use of demographic indicators to highlight moral issues. Since 1883, they give the suicide rate, since 1884 the divorce rate by districts, indeed extremely low and of marginal interest with respect to demography. But suicide is a grave sin in Catholic doctrine; divorce also was not tolerated and Fribourg opposed strongly the Federal marriage legislation that introduced legal divorce in 1875.

By contrast, the issue of infant mortality remained invisible in cantonal reports, where the first infant mortality rate was published in 1899 only. When in 1870 the Federal statistics office asked the cantons to provide data about infant deaths during the first year, month by month, the government of Fribourg protested officially against this obligation, qualified as “a luxury of information”. Another revealing indicator is the place of demographic data in the cantonal reports. They were put under the chapter “registry office”, in the section “police department”, and not in the section “economy department” and even not in the chapter “population health”. Until the end of the century, there was no link between demography and health in these reports. When



complaints about infant mortality were regularly voiced in the chapter about public health, it was without any reference to statistical data. A change only occurred around 1900, with the creation of the cantonal statistics office, directed by a statistician, and with the nomination of another scientist, professor of medicine and bacteriology, as secretary of the cantonal health council. From this date on, the cantonal reports made systematic links between health and demographic statistics, and published detailed data on general and infant mortality. A more scientific approach of the problem became perceptible, albeit enquiries on the causes of infant mortality were only planned, but not conducted.

The contrast with the canton of Vaud is striking. The vital registration was secularised in 1835 already and became a state concern well before the federal law (1876). Significantly, this section of vital registration was supervised by the cantonal health council. A cantonal statistics office was instituted in 1860 already, the second of the 25 cantons of Switzerland. In the cantonal reports, population data pertained from the beginning to the chapter "public health". The first calculation given in 1860 was the excess of births over deaths, in order to predict the overall number of inhabitants for the next year. After the federal unification, the canton carried on publishing its own data that stressed the scale of population growth and the concern for mortality. The number of stillbirths was reported, qualified as a scandalous waste, and attributed to the incomplete training of midwives. The importance of having more accurate statistics on mortality led in 1886 to the creation of a cantonal health office, endowed with its own statistics department. From then on, many pages in the reports were dedicated to infant mortality, with elaborate data: for example, the prevalence of mortality due to gastroenteritis was analysed by districts with the results presented in tables and maps. During the years 1880, the cantonal health office set up two enquiries on the prevalence and causes of puerperal fever and gastroenteritis. Relations between gastroenteritis and infant feeding were examined, and the questionnaire asked detailed questions on breastfeeding or artificial feeding, on the use of spoon, of baby-bottle, with tube or without tube. Obviously, the investigators were well aware of the latest development of medical science, as many physicians had warned against tube feeding bottles, which were very convenient for busy mothers, but impossible to clean correctly.

This importance given to population statistics and to scientific inquiries, as well as the focus put on certain topics reveal the influence of religious culture. For the Protestant elite, population was a wealth, a human capital, not to be wasted. As co-creators, human beings were held responsible for the

conservation of life; they have to use their intelligence to understand nature and to improve it. This ideology can be traced in the political discourse, in phrases speaking of the “conservation des enfants” (safe-keeping of children) not only an individual responsibility, but also a state concern. This religious culture combined with politics, as the party in power presented itself as the champion of progress, a commitment to the obligation to be pro-active in many domains.

The Catholic elite by contrast were influenced by a culture of fatality, in which demographic trends pertained to God’s plans; they had not be understood or changed. For the conservative party, which had other public priorities than health policies, this ideology also legitimated its inactivity in this domain. To be sure, this view did not remain unchallenged, and the sources attest to civil servants or physicians who asked for more accurate data and measures against infant mortality. However, they met with little success in modifying political priorities.

### **The Fight against Gastroenteritis**

To improve notably child survival, health policy measures have to be conceived and implemented in order to reach the neediest (Lee, Vögele, 2001, 65-96). According to this requirement, cantonal differences are again striking. In Fribourg, the first measures were taken in the 1890’s. They are typical of the way the cantonal government proceeded, namely half-heartedly under external pressure. A publication of the Federal office, taken up by the newspapers, focused on the high infant mortality in Fribourg and gave the canton a bad press<sup>5</sup>. A host of measures were then proposed, as public conferences, teaching of childcare in schools, health centres, distribution of sterilized milk, etc., but only two were finally implemented, whose effectiveness moreover was rather limited.

Imitating other cantons, Fribourg printed a brochure about infant care that was to be diffused among parents by the civil officers. However, its diffusion proved problematic for many reasons. The civil officers had first to give the brochure to “each father who asked for it”, later to each father who declared a first birth and finally at every birth. A new edition was not immediately ordered when the stock ran out, and the civil officers remained without

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<sup>5</sup> Crevoisier, Louis (1889), « Enquête statistique sur la mortalité infantile en Suisse pendant les dix années 1876 à 1885 », *Journal de statistique suisse*, (1889), 108-143.

material for years. The minutes of the health council indicate that the distribution of these brochures stopped altogether after 1910. Moreover, the same source indicates that most of the parents did not read the brochures (Bosson 2002). This is explained by the very sparse diffusion of popular literature and written media in general during this period in Fribourg; the population was literate, but the habit of reading was not widespread. This attitude was enhanced as the Catholic culture traditionally considered reading with suspicion and as the Catholic Church in Fribourg realized only at the end of the nineteenth century that popular press could be a useful means in order to maintain its influence.

The brochure rightly warned of the danger of feeding babies too early with cereals and promoted breastfeeding. At the beginning of 20<sup>th</sup> century, insistence on breastfeeding is also perceptible in religious discourse. According to new directives given by the Catholic bishop for the pastoral care of marriage, the duty to breastfeed was reminded to each bride by the parish priest. Breastfeeding was presented as a Godly institution and mothers who neglected this natural duty were stigmatized as egoistic. In line with this religious discourse, cantonal authorities also strived to promote breastfeeding. In 1916 they implemented a prize rewarding the midwives who could attest to a minimum of ten mothers, among their patients, who had breastfed for at least eight months. In the following years, although the prize was financially attractive, the number of midwives registered for it remained under 20 per cent of the total of authorized midwives. This should be a reliable indicator that for many women it was impossible to breastfeed for so long and it attests that breastfeeding was not a question of religiosity. The recourse to midwives instead of the diffusion of written information would have been effective, as they were ideal mediators between authorities and population and could have popularized medical knowledge among mothers, especially concerning adequate infant feeding, the need for boiling the water, of thorough cleaning of the bottles, etc. Unfortunately, the mere insistence on breastfeeding without the recognition of the social realities that made its practice very difficult, risked making matters worse. In addition, a recurrent problem in Fribourg at the time was the shortage of midwives and their lack of medical education.

The careful medical training and the severe control of midwives was the most important measure taken by the canton of Vaud in order to fight infant and maternal mortality. From 1882 on, all midwives had to attend a complete course at a modern maternity hospital for one year. In 1886, a Sanitary Act reinforced their obligations: each midwife received a delivery register, in which she had to write down indications on the situation of the mothers and

their babies. Every year, midwives were asked district by district to attend a conference, to show their registers to physicians who asked them medical questions. In the case of insufficient knowledge or of high mortality among her mothers and babies, a midwife had to attend a complementary course; she was reprimanded or even lost her licence. Brochures on infant feeding were also diffused, but first to the midwives, to encourage teaching hygienic principles to mothers and families. The canton also introduced the teaching of hygiene in primary schools, with childcare lessons for older girls. In 1886, a new Sanitary Act introduced measures that indirectly reduced the prevalence of gastroenteritis, given the decline of breastfeeding. In case of an epidemic, the cantonal government could compel the communes to make an enquiry about sanitary conditions and to improve the water supply and the sewage system if necessary. A regular bacteriological control of the public fountains was instituted in 1890. At the turn of the century another Act imposed sanitary rules in buildings. The communes were compelled, but at the same time incited by cantonal subventions, to improve sanitary conditions. This act also reduced the risk of respiratory diseases, as each commune was compelled to organise an isolation place for the sick, who could not be isolated properly at home, and to provide free disinfection of houses and clothes for poor families. This kind of measures was taken up in Fribourg only in the late twenties.

### **STATE POLICIES AND INFANT MORTALITY: A STATISTICAL ANALYSIS**

The comparative sample of the four villages we used in our study is particularly appropriate for testing the impact of these very different health policies on the levels of infant mortality. As indicated, these villages have been chosen so as to control severely the effects of socio-economic and to isolate the influence of institutional factors. Moreover, this choice of villages is interesting regarding environmental conditions that could influence infant mortality. In the first pair of villages (Chavornay/VD and Broc /FR), these conditions were relatively favourable, with a rather dry and sunny climate. The contrast with the second pair of villages (Chevroux/VD and Portalban-Delley/FR) was striking as they were situated on the shores of the same lake; the winter was particularly humid. We have collected aggregate data for each village, as well as individual data which will permit a more sophisticated statistical analysis.



### Descriptive Statistics at the Village Level

To give a first picture of infant mortality trends, we turn to descriptive statistics at the village level. These aggregate data must be considered with caution. Moreover, they are difficult to interpret: between 0 and 1 year many mortality risks are conflated. It gives an approximation that permits formulating problems and hypotheses that we be tested later on individual data.

The periodisation refers to relevant events related to infant mortality trends at the cantonal level. For example, the first period ends with the implementation of the 1886 Sanitary Act in the canton of Vaud. A similar benchmark is not available for the canton of Fribourg, as a new Sanitary act was only implemented in the late twenties; so I use the date of 1908, which marks the beginning of the fertility decline in the canton.

During the first period (1860-1885), in the absence of sustained sanitary measures, it is very likely that differences in infant mortality were mostly due to climatic conditions and breastfeeding practices. This hypothesis can account for the higher rates in the lake villages. On the one hand, the humid climate favoured respiratory diseases. On the other hand, mortality due to gastroenteritis should also have been high, as the mothers in the fishermen's families had to wean children early, because they had to work along with their husband on the fishing boat. However, only individual data permits to test the correlation between mortality and the father's occupation. The higher rates in the Protestant village or Chevroux are intriguing.

**Table 3: Infant mortality (0-1) rates (per thousand) by villages and periods (total of live births)**

	1860-1885	1886-1907	1908-1930
<b>Broc/FR</b> <i>industrialized around 1900</i>	137.4 (371)	131.0 (519)	64.8 (1187)
<b>Chavornay/VD</b> <i>industrialized around 1900</i>	131.0 (664)	90.7 (573)	79.4 (680)
<b>Delley-Portalban/FR</b> <i>non industrialized</i>	154.7 (407)	188.5 (366)	92.8 (266)
<b>Chevroux/VD</b> <i>non industrialized</i>	171.4 (441)	167.0 (425)	59.5 (235)

Source: Parochial and civil registers of Broc, Portalban-Delley, Chavornay and Chevroux (Stillbirths are not included).

We can point to the fact that this village was more exposed to both risks: all the houses were situated near the lake, and the proportion of fishermen's families was higher than in the neighbouring Catholic village. For this first period preceding the establishment of official vital registration, an under-estimation of deaths in Catholic villages is also plausible. Lorenzetti and Perrenoud have estimated that the real number of infant deaths might be higher by 23% (Lorenzetti and Perrenoud, 1999).

Infant mortality is clearly declining in the Protestant village of Chavornay during the second period (1886-1907), and this could attest to the impact of the Sanitary Act. To disentangle the different mortality risks (gastroenteritis, respiratory diseases or endogenous mortality due to conditions of delivery) it is pertinent to rely on a statistical analysis on individual data. This decline remains slight for Chevroux. Contemporary testimonies confirm that this area was affected during this period by recurrent epidemics of diphtheria, scarlet fever and measles. The higher rate in Delley-Portalban, the Catholic lake village, also indicates this problem. We might suppose that the rate would have been still higher in Chevroux in the absence of the Sanitary Act.

The level of infant mortality decreases significantly during the last period (1908-1930) which corresponds to the beginning of the fertility decline in Fribourg and with industrialisation in two of the villages. The rate of the village of Broc is clearly lower than the total rate of the canton of Fribourg for the corresponding period, and this result suggests a new hypothesis we will later test on individual data. It could be assumed that industrialisation increased the income of many families, thus permitting higher expenditure for such items as better food, accommodation and clothing, all helping to strengthen resistance against infectious diseases. The increased resort to powdered milk is also attested to in the region, as nearby two factories were set up and running intense advertising.

### **Event History Analysis of the Determinants of Infant Mortality**

For this analysis, we rely on our data file of 1848 legitimate children, born in the four villages between 1860 and 1930; each record of a child consists of a set of values for independent variable that are supposed likely to influence infant mortality (cf. table 4). The dependant variable is the risk of death in a given period.

A first set includes biological variables that play an important role during the first months. *Child's sex* refers to the higher likelihood of endogenous mortality for male babies, a well-known phenomenon. It is also important to control for *mother's age*, as babies have a higher mortality risk when the mother is older and therefore less resistant (the risk of very young women becoming mothers is of no relevance in our sample as the age of marriage was homogeneously high). This mortality risk is also important, when the interval with the previous birth is short and the previous child still alive, implicating a heavy burden on mother's care and a risk of infant neglect. A second set includes socio-economic and demographic variables. The variable *father's occupation* is an indicator of socio-economic status and income, whereas the *mother's employment in factory* tells us whether the mother was able or not to breastfeed for a longer period; the number of *siblings* according to sex shows the level of pressure on family budget. Finally, the environmental variables permit to test the impact of the climate of the *lake villages* and to evaluate the risk associated with various diseases; the variable *seasonality* is particularly aimed at disentangling the risk of respiratory diseases that peaks in winter and, when the babies are weaned, the risk of digestive diseases highest in summer. This variable has been constructed as a categorical variable, dividing the year in four seasons. Summer months is the reference category; if the mortality is significantly lower during the winter months compared to the reference, this indicates an important prevalence of gastroenteritis.

We relied on the model developed by Brecchi, Derosas and Oris (Brecchi and al. 2003). Since mortality risks change very rapidly at the beginning of life, these authors propose a segmentation of infant life in four stages: the first month (to capture the risks associated with endogeneous mortality), from one to six months, from six months to the first birthday (a critical period because of weaning), and from 1 to 4 years. We consequently constituted four files, each for the corresponding stage of survival; from the first file to the fourth, the number of children reduced progressively.

Using a Cox regression, we assess the impact of each variable on the relative risk of dying, during the relevant period. The same statistical test, using the aforementioned variables, has been applied for each segmented sub-file, comparatively on the Catholic and Protestant villages, and this for two periods: before and after 1898, which is the date of the setting up of the factories<sup>6</sup>.

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<sup>6</sup> A finer periodisation, taking into account the implementation of the Sanitary act for example, is not possible, as the number of deaths would have been too low in relation to the number of independent variables.

**Table 4. Cox regression of the risk of infant mortality  
between 1 and 6 months**

	<b>Fribourg 1860-1898</b>		<b>Vaud 1860-1898</b>		<b>Fribourg 1899-1930</b>		<b>Vaud 1899-1930</b>	
	<i>Number of obs. = 1039</i>		<i>Number of obs. = 1520</i>		<i>Number of obs. = 1962</i>		<i>Number of obs. = 1308</i>	
	<i>Prob &gt; chi2 = 0.3595</i>		<i>Prob &gt; chi2 = 0</i>		<i>Prob &gt; chi2 = 0.0026</i>		<i>Prob &gt; chi2 = 0.1181</i>	
<b>Biological variables</b>	<i>Relative risk</i>	<i>P&gt; z </i>	<i>Relative risk</i>	<i>P&gt; z </i>	<i>Relative risk</i>	<i>P&gt; z </i>	<i>Relative risk</i>	<i>P&gt; z </i>
<b>Child's sex male</b> (reference: female)	1.03	0.89	1.07	0.76	0.72	0.16	1.14	0.69
	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
<b>Mother's age at child birth</b> (reference: 25-29 years)	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
15-19 years	1.42	0.74	0.87	0.89	0.92	0.94	0.00	1.00
20-24 years	1.26	0.62	1.69	0.16	1.38	0.41	1.87	0.27
30-34 years	2.31	0.02	0.88	0.73	1.33	0.40	1.41	0.55
35-39 years	1.41	0.47	1.57	0.24	0.65	0.38	2.45	0.16
40 years and more	2.68	0.07	1.34	0.56	0.49	0.35	1.03	0.98
age unknown	1.85	0.22	2.11	0.06	1.67	0.26	4.44	0.01
<b>Previous birth inter- val and child survival</b> (ref.: more than two years and alive)	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
1 <sup>st</sup> born	1.61	0.25	1.16	0.68	1.20	0.65	0.62	0.39
less than two years and alive	1.31	0.37	1.93	0.02	1.37	0.29	1.47	0.33
less than two years and dead	2.43	0.41	0.00	1.00	0.00	1.00	0.00	1.00
more than two years and dead		deleted	0.00	1.00		deleted		deleted
<b>Socio-economic and family variables</b>								
<b>Father's occupation</b> (reference: farmer - land owner)	1.00	ref.	1.00	ref.	1.00	ref.	1.00	ref.
day-labourer, fishermen, unskilled worker	0.57	0.12	2.18	0.01	0.89	0.73	0.55	0.35
factory worker		no factory		no factory	0.45	0.04	1.29	0.56
trade-craftsman, civil servant	0.67	0.35	1.22	0.48	0.63	0.24	0.56	0.26
highly qualified occupation	1.39	0.66	1.78	0.44	0.27	0.20	1.67	0.51
occupation unknown	1.33	0.52	1.56	0.30		deleted		deleted



	<b>Fribourg 1860-1898</b> <i>Number of obs. = 1039 Prob &gt; chi2 = 0.3595</i>		<b>Vaud 1860-1898</b> <i>Number of obs. = 1520 Prob &gt; chi2 = 0</i>		<b>Fribourg 1899-1930</b> <i>Number of obs. = 1962 Prob &gt; chi2 = 0.0026</i>		<b>Vaud 1899-1930</b> <i>Number of obs. = 1308 Prob &gt; chi2 = 0.1181</i>	
<b>Mother factory worker</b>	<i>no factory</i>		<i>no factory</i>		<b>1.81</b>	0.08	<b>2.80</b>	0.07
Siblings								
number of elder brothers	0.99	0.96	0.99	0.87	1.35	0.00	0.97	0.80
number of elder sisters	<b>1.18</b>	0.04	<b>1.33</b>	0.00	1.01	0.93	<b>1.20</b>	0.09
<b>Environmental variables</b>								
<b>Village / lake village non-industrialized</b>	<b>0.85</b>	<b>0.49</b>	<b>1.86</b>	<b>0.01</b>	1.31	0.36	0.97	0.95
(reference: industrialized village)	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>
<b>Seasonality</b>								
(reference: July- August-September)	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>	<i>1.00</i>	<i>ref.</i>
January-February- March	1.19	0.59	<b>0.59</b>	0.07	<b>0.54</b>	0.07	0.95	0.92
April-May								
June	1.17	<b>0.62</b>	<b>0.76</b>	0.31	<b>0.79</b>	<b>0.45</b>	<b>1.46</b>	0.41
October-November- December	0.70	0.31	<b>0.55</b>	0.05	<b>0.53</b>	0.06	1.55	<b>0.34</b>

Note: bold printed rates are significant at minimum 90%.

Table 4 presents the more interesting results obtained, namely the analysis of the determinants of infant mortality between 1 and 6 months, and especially the values of the variable seasonality. For the first period (1860-1898) in Fribourg, the mortality risk was not significantly associated with a season, as no period obtained significant results. We know, through aggregate measures, that infant mortality was high in the nineteenth century. These results mean that in Catholic villages, babies died as frequently in winter as in summer. Gastroenteritis was surely an important risk, but it was not higher than the risk of the winter diseases. In the canton of Vaud, the values and significance obtained for the winter months indicate that mortality was clearly lower during winter. We can conclude that gastroenteritis was a real problem, while respiratory diseases presented a relatively lower risk.

To test the hypothesis that the risk of gastroenteritis concerned especially the children in fishermen's families, we can look, for the same period, at the result of the variable *father's occupation*. In the Protestant villages, the risk of

To test the hypothesis that the risk of gastroenteritis concerned especially the children in fishermen's families, we can look, for the same period, at the result of the variable *father's occupation*. In the Protestant villages, the risk of dying between 1 and 6 months is double for the babies of day-labourers, fishermen and unskilled workers, compared to the children of farmers, the reference category. For the lake village, this category was homogenous; it was mostly made up of fishermen; moreover, fishermen had periodically to work as day-labourers or unskilled workers, when the fish became scarce. The environmental variable *lake village* is also associated with a higher mortality risk in this sample.

The results of the second period (1899-1930) are also instructive. In the canton of Vaud, seasonality is no longer significant. As contemporary sources attest to the decline of breastfeeding, this result should be attributed to better information on infant feeding, to higher quality of water and to the sanitary control of milk. In the canton of Fribourg, infant mortality remains very sensitive to seasonality as it is significantly higher in summer, attesting to the persistence of gastroenteritis. Thus the hypothesis of a positive effect of the diffusion of powdered milk is falsified. Even if mothers used it, they probably did not prepare it properly, thus indicating that information was still lacking. We know from mortality rates that infant mortality was declining in the Catholic villages during this period. This analysis permits to conclude that this decline was not due to a decrease of gastroenteritis and should be attributed to other causes. The better standard of living associated with industrialisation can explain it. Better clothing and housing reduced the mortality due to respiratory diseases. This fact is supported by the result of the variable *father's occupation*, which indicates a significant lesser risk for babies of factory workers in the Catholic sample, compared to babies of farmers. We know that the director of the chocolate factory in Broc built houses for the workers, with separate rooms, a lot of light, running water and a small garden. Here, as with the fishermen, the variable *factory workers* is not only a proxy for income but also for certain environmental conditions. This finding is in line with a contribution made by Alice Reid, who was able to take advantage of a set of individual data of the 1911 British census. She demonstrates that location appears to be more important than class. "To a fairly large degree, infant mortality differentials by social class are observed because environment is not controlled for." (Reid 1997, 138)

Anyway, children of workers lost this advantage when the mother too was working in the factory. The result of the variable *mother factory worker* is clear. Children born to these mothers had a higher mortality risk than children

born to female non factory workers. We know that in both factories, maternal leave did not exceed one month, thus obliging mothers to terminate breastfeeding very early. The higher value obtained by the same variable on the Protestant side is intriguing. We must keep in mind that the result of the variable mother factory worker on the Protestant side should not be compared directly with the result on the Catholic side, but with the result of the reference category, that is the children of non working mothers, on the same side. Consequently, this result does not mean that the children of the Protestant working mothers were worse off than those of the Catholic mothers, but that the difference between children of working and non working mothers was more important for the Protestant sample.

What about the variable *siblings*? We introduced this numeric variable to test the impact of parity, more exactly of the number of children already born and surviving. Some studies show that first-born children have a higher mortality risk and this is attributed to a conscious or unconscious neglect. Other researches show that we find more often the situation where siblings of all birth orders were exposed to rather similar risks of infant mortality. However, we can ask to what extent the mortality risk was influenced by family composition, distinguishing between brothers and sisters. If we look at the first period, we can see that the number of elder brothers has no influence on the mortality risk; the number of elder sister increases this risk. What does it mean? My answer is that the higher the number of elder female siblings, the higher the probability that the oldest will be of an age to take care of the infant instead of the mother, which could also mean early weaning. However, we have no convincing explanation for explaining why the number of elder brothers becomes significant for the second period in Fribourg...

This table presenting the results for the mortality risk between one and six months does not show the existence of neglect practices differentiated by sex. However, the sex variable becomes significant when we observe the mortality risk for the first month (table not given). In the Catholic villages of Fribourg, for the period prior to 1900, the mortality risk is significantly higher for male babies during the first month. Male babies have 62% more risk of dying during the first month than female babies. We know that male babies have generally a weaker constitution. The high level of this biological risk is amplified by bad sanitary conditions or bad medical training of midwives and this result confirms the deficiency of health policies.

## CONCLUSION

With this comparative analysis of infant mortality in Switzerland we have come closer to answering the question of the ways in which religion influence health and mortality. The most important finding is that, for the period 1860-1930, in which both fertility and infant mortality trends changed markedly, state institutions were the most efficient force able to modify the set of constraints and opportunities shaping the relevant individual behaviour for the survival of children. During this period, a new means of reducing significantly infant mortality was at hand thanks to the discoveries of Pasteur, which permit taking effective measures to combat the prevalence of digestive diseases during the first year. As religious institutions lost their prerogatives in health care and assistance, the role of state institutions was crucial for the diffusion of pastorian techniques and for taking up the challenge of conceiving and implementing adequate measures able to reach the neediest. This process also explains the findings highlighted in other research, that Catholicism exerted a negative influence on health especially after the 1880s (van Poppel 1992).

The influence of religious culture on the attitudes of political elites proved decisive to accelerate or delay the implementation of adequate health policies. Protestant and Catholic culture differ strongly in their consideration of the loss of children, in the importance of investment in human capital for terrestrial life, not just for the hereafter, and moreover in their suspicious or positive attitude towards science. Consequently, regions of Protestant culture are better able to grasp the importance of the second economic revolution taking place in Switzerland as well as throughout the Western world at the turn of the century. The revolution is conceptualized by Douglas North as 'a fundamental change in the productive potential of society as a consequence of a basic change in the stock of knowledge and a consequent, equally basic, change in organisation to realise this productive potential' (North, 1981, 171). Human capital became more important, and thus the quality of childcare and mass education, resulting in a trade-off between quality and quantity of children. The different approaches of the two cantonal governments in the use of scientific knowledge (statistics, medicine) to inform policy, and in the concern for human capital as a political priority are paradigmatic, and affected the actual policies they implemented. The results obtained in our analysis of the determinants of infant mortality demonstrate that effective health policies were able to reduce the most important risk of infant mortality (digestive diseases) in the Protestant sample, while this risk remained clearly higher in the Catholic canton.



The pathways through which religion influence the behaviour of individuals and shape institutional structures are manifold. It is of paramount importance to demonstrate a causal mechanism that can be tested on individual data, instead of correlations between aggregate. But a word of caution is appropriate. In the long run perspective, religion might well appear less and less a cause of evolution but turns into an effect of deeper structures. In historical research this turning point might easily escape attention.

## REFERENCES

- Bosson, Alain (2002), "La lutte contre la mortalité des nourrissons en Suisse: enjeux et mesures de prévention (1876-1930)", *Cahiers d'histoire – Lyon*, 47 (1/2), 93-125.
- Breschi Marco, Derosas Renzo and Oris Michel (2003), "About the Determinants of Infant and Child Mortality. The Fatal Years in Comparative Perspective", in Bengtsson Tommy, Campbell Cameron, Lee James, et. Al., *Life Under Pressure: Mortality and Living Standards in Europe and Asia, 1700-1900.*, Harvard Ms., Massachussets Institute of Technology Press.
- Busset, Thomas (1995), "La mise en place du Bureau fédéral de la statistique", *Revue suisse d'histoire*, (1995)1, 7-28.
- Caldwell, John (1980), "Mass Education as a Determinant of the Timing of Fertility Decline", *Population and Development Review*, 6 (1): 225-255.
- Derozas, Renzo and van Poppel, Frans (eds.) (2006), *Religion and the Decline of Fertility*, New York/Dordrecht, Springer, pp. 104-132.
- Derozas, Renzo (2000) "When culture matters: Differentials infant mortality of Jews and Catholics in nineteenth century Venice", *International Congress of Historical Sciences*, Oslo 6-13 August 2000.
- Goldscheider, Calvin (2006), "Religion, family and fertility: What do we know historically and comparatively?" in Renzo Derozas and van Frans Poppel (Eds.), *Religion and the Decline of Fertility*, (pp. 41-58), Dordrecht, The Netherlands: Springer.
- Kertzer, David I. (1995), "Political-economic and cultural explanations of demographic behavior", in Greenhalgh, S. (Ed.), *Situating fertility. Anthropology and demographic inquiry*, (pp. 29-52), Cambridge: Cambridge University Press.
- Lee Robert and Vögele Jörg (2001), "The Benefits of Federalism? The Development of Public Health Policy and Health Care Systems in

- nineteenth-century Germany and their Impact on Mortality Reduction", *Annales de démographie historique*, (2001)1, 65-96.
- Lesthaeghe, Ron (1991), "Moral control, Secularisation and Reproduction in Belgium (1600-1900)", in *Historiens et populations*, Liber amicorum Etienne Hélin, Louvain-la-Neuve: Academia, 257-279.
- Lorenzetti, Luigi and Perrenoud (1999), Alfred, "Infant and Child Mortality in Switzerland in the 19<sup>th</sup> and 20<sup>th</sup> centuries", working paper, University of Geneva.
- McQuillan, Kevin (2004), "When does religion influence fertility?" *Population and Development Review*, 30, 25-56.
- Noonan, John T. (1969), "Contraception et mariage. Evolution ou contradiction dans la pensée chrétienne", Paris : Cerf.
- North, D.C. (1981), *Structure and Change in Economic History*, New York and London, W.W Norton and Company.
- Perrenoud, Alfred (1974), "Malthusianisme et Protestantisme", *Annales ESC*, 29/4, 975-988.
- Praz, Anne-Françoise (2005), *De l'enfant utile à l'enfant précieux – Filles et garçons dans les cantons de Vaud et Fribourg, 1860-1930*, Lausanne: Editions Antipodes.
- Praz, Anne-Françoise (2006), "State institutions as mediators between religion and fertility. A comparison of two Swiss regions (1860-1930)." in R. Derozas and van Frans Poppel (Eds), *Religion and the Decline of Fertility* (pp. 104-132), Dordrecht, The Netherlands: Springer.
- Praz, Anne-Françoise (2007), "Four Swiss Villages, 1860-1930: Putting Gender back into Historical Demography", *Gender and History*, 19, 242-259.
- Reher, David (1999), "Back to the basics: mortality and fertility interactions during the demographic transition", *Continuity and Change*, 14 (1), 9-31.
- Reid, Alice (1997), "Locality or class? Spatial and social differences in infant and child mortality in England and Wales, 1895-1911", in Corsini, Carlo A. and Viazzo, Pier Paolo (Eds.), *The Decline of Infant and Child Mortality. The European Experience: 1750-1990*, (pp. 129-154), The Hague, The Netherlands: Martinus Nijhoff Publishers.
- Servais, Paul (2001), "The Church and the Family in Belgium", *Revue belge d'histoire contemporaine*, 31(3-4): 621-647.
- Sevegrand, Martine (1995), *Les enfants du bon Dieu - Les catholiques français et la procréation au XX<sup>e</sup> siècle*, Paris: Albin Michel.
- Schofield, R., Reher, D, and Bideau, A. (1991), *The decline of mortality in Europe*, Oxford: Clarendon Press.

- Smith, Herbert L. (1989), "Integrating Theory and Research on the Institutional Determinants of Fertility", *Demography*, 26 (2), 621-647.
- van de Walle, Etienne (1992), "Fertility Transition, Conscious Choice, and Numeracy", *Demography* 4, pp. 487-502.
- van de Walle, Francine (1977), *One Hundred Years of Decline - The History of Swiss Fertility from 1860 to 1960*, Philadelphia, (dactyl., Bibliothèque universitaire de Neuchâtel/Suisse).
- van Poppel, Frans, Schellekens, Jona, and Liefbroer, Aart C. (2002), "Religious differentials in infant and child mortality in Holland", *Population Studies*, 56, 277-289.
- van Poppel, Frans (1992), "Religion and Health: Catholicism and Regional Mortality Differences in Nineteenth-Century Netherlands", *Social History of Medicine*, 5/2, 229-253.