Smallpox and Vaccines in the Nineteenth Century in Sweden

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Abstract

Smallpox was a severe epidemic disease that took many lives in older times. The disease could be prevented medically, though, as a vaccine was developed in England at the end of the eighteenth century. This was the only vaccine available against epidemic diseases in the nineteenth century. In 1816, vaccination of children became mandatory by law in Sweden and in Norway this had been the case since 1810. The last major epidemics took place in Stockholm in 1874 and in Gothenburg in 1892–1894.

For me as an ethnologist the question is how affected individuals and their environment have handled such times of disease. To gain an idea of how smallpox affected the lives of individuals in different parts of Sweden, I have studied folk life records in archives in Gothenburg, Lund and Uppsala. They are from the twentieth century, recorded from informants born in the nineteenth century. In many cases they have told about their own memories where smallpox was involved.

There was horror and anxiety both in the affected homes and in the neighbourhood. The country people understood that it was necessary to stay away from houses where someone was sick. There was a belief in fate that served as an explanation as to why some people suffered from smallpox, and why some of them died while others survived.

The person giving the vaccine shots was often the parish clerk after he had received some medical instruction from a physician. The person giving the injection carved out a mark in the skin of the children's arm and filled it with vaccine extracted from cowpox or from other human beings who had been sick.

In a regional study focused on the islands of Orust and Tjörn, north of Gothenburg, the issue is how the vaccination was carried out on these islands, and how this was related to different outbreaks of smallpox.

Keywords: smallpox, cowpox, vaccine, clerk, infection, belief in fate, medical reports

Epidemic diseases have occurred at intervals in both older and more recent times. For me as an ethnologist the question is how affected individuals and their environment have handled such times of disease.

Previously I have studied the recurrent cholera epidemics in the nineteenth century (Gustavsson 2020) and the Covid-19 pandemic in Norway and Sweden in the 2020s (Gustavsson 2022). There were no medical

protection against cholera, and it was almost a year before a functioning vaccine against Covid-19 was developed at the end of 2020.

Another severe epidemic disease was smallpox, which took many lives. However, this disease could be prevented medically as a vaccine was produced in England at the end of the eighteenth century. This became the only vaccine available against epidemic diseases during the nineteenth century.

The Nature of the Disease

Smallpox (*variola*) was an extremely contagious disease with a high mortality rate. It was caused and spread by a virus from the family of poxviridae or smallpox virus. It was not until the seventeenth century that smallpox became a widespread disease in Europe. During the eighteenth century smallpox was a significant infectious disease in Europe. The mortality rate was 20–30 per cent. The Swedish Queen Ulrika Eleonora died of smallpox in 1741.

A less aggressive variant of smallpox was called varioloids and occurred in vaccinated individuals or in those that previously had suffered and survived the disease (https://www.merriam-webster.com/medical/varioloid).

The incubation period of smallpox is typically 12–14 days. The patient suddenly falls ill with a high fever, body aches, headache and a general feeling of sickness. Around three days later facial rashes emerge, spreading to the trunk, legs and arms over a couple of days. Rashes also emerge on palms and soles. In those who survive, the rashes turn into blisters over a two-week period, and end up drying out and forming scabs. The disease was followed by disfiguring scar formation, most prominently in facial areas. Blisters could occur in the eyes, leading to blindness. At the turn of the nineteenth century, the physician and medical professor Eberhard Munck af Rosenschöld presented a detailed and horrifying description of the course

Figure 1. Child with smallpox (https://sv.wikipedia.org/wiki/Smittkoppor).

of the disease. Among other things he wrote: "the whole body, head to feet, is covered with numerous overlapping blisters, burning like fire. The face is severely swollen and disfigured, the eyes deprived of light and the nose of air" (Tillhagen 1962:143).

Transmission happened by direct contact with sick individuals or indirectly from contaminated objects. Infection could also be airborne to the immediate surroundings. Infectivity peaks one to two weeks following the emergence of rashes.

Smallpox outbreaks happened in unpredictable surges and could hit the same parish several times. From Stenkyrka on the island of Tjörn epidemics are mentioned in 1750, 1757, 1758, 1767 and 1773 (Bergstrand 1937). The situation was at its worst from the autumn to the spring. That was the case regarding smallpox outbreaks in both the eighteenth and the nineteenth centuries. This seasonal profile fits well with the Covid-19 pandemic, when the summer season was less hit than the colder part of the year.

Before the use of vaccination started, there was variolization or inoculation, where material from an infected individual was placed on the skin of an uninfected person and the skin was then subject to a small cut. The infectious agent caused a relatively mild infection and the person became immune. The future king Gustav III and his sisters and brothers were variolized in 1769.

Vaccine

The first vaccine was developed in England following the discovery that individuals who had been infected by cowpox did not contract smallpox. Among farmers in England it was known that the females who milked cows often had smooth and fresh skin since they had not been infected by smallpox. Cowpox was a common infectious disease in the eighteenth century among beef cattle and caused blister-like rashes on the udders and teats of the cow. The first vaccine (from Latin *vacca* meaning "cow") was made from fluid obtained from cows infected by cowpox. The cowpox virus is closely related to the variola virus that gives rise to smallpox in humans.

The physician Edward Jenner (1749–1823) noted that individuals who had been infected with cowpox did not contract smallpox. He therefore concluded that someone who had been infected with cowpox, an illness with a relatively benign course, then developed immunity that protected against the significantly more serious smallpox. On 14 May 1796 he had inoculated an eight-year-old boy with fluid from cowpox followed by two cosmetic scratches in his skin. The boy caught cowpox but he was now protected against smallpox (www.ne.se/smittkoppor, https://sv.wikipedia.org/wiki/Smittkoppor; Schiøtz 2017:250). Jenner's results were published in 1798. The year 1800 was a tough smallpox year in Sweden with over 12,000 dead (Tillhagen 1962:143).

The first vaccination in Sweden was in 1801 and in Bergen, Norway in 1803 (Alver, Fjell & Ryymin 2013:51). Vaccination was already under way in Gothenburg in 1802. By 1814 the same doctor had inoculated 1,200 children (https://gamlagoteborg.se/2018/01/18/smittkoppor-en-gang-vanligt-i-goteborg/).

In 1816 vaccination became mandatory by law in Sweden, as it had been in Norway since 1810, and at the same time variolization was prohibited there (Schiøtz 2017:250). In Sweden those who refused vaccination of children could be fined. In Norway the law was even more strict. Those not vaccinated were not allowed to be confirmed in the church or get married (Schiøtz 2017:250). The smallpox epidemics did not end in the nineteenth century but they happened less often than in the eighteenth century and not at all that many fell ill or died. The difference between the eighteenth century and the nineteenth century in this respect is clearly shown in Figure 2. The last major epidemics happened in Stockholm in 1874 (https://www.scb.se/hitta-statistik/redaktionellt/nar-vaccinationerna-utrotade-smittkopporna/) and in Gothenburg in 1892–1894 (https://gamlagoteborg.se/2018/01/18/smittkoppor-en-gang-vanligt-i-goteborg/. In 1874 the infestation of the infection was believed to be related to a lack of vaccination particularly among the worker population in Stockholm. From the annual report of the National Board of Health in 1874, it is clear that 81 per cent of children born this year had been vaccinated but only 60–70 per cent in Stockholm.

Adult individuals seem to have been immune from previous epidemics. Children were more vulnerable and therefore had to be vaccinated. Parents

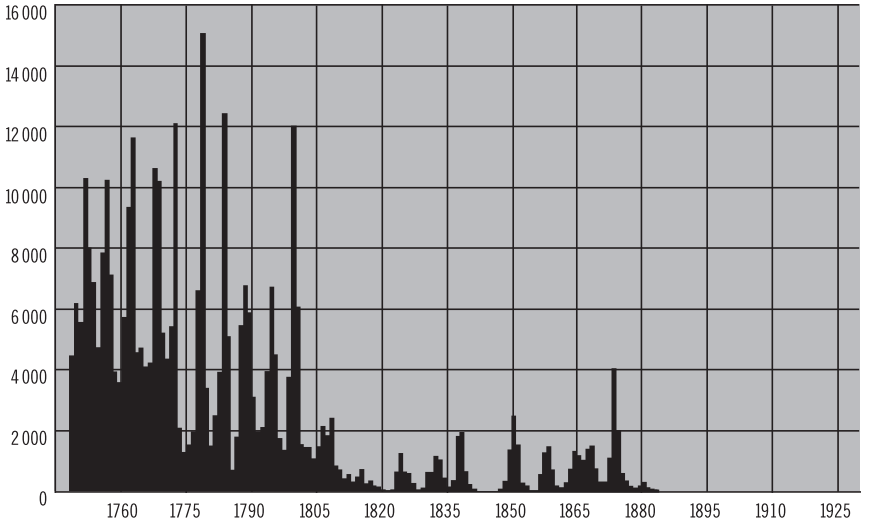


Figure 2. Number of deaths from smallpox in Sweden 1749–1930.
(https://www.scb.se/hitta-statistik/redaktionellt/nar-vaccinationerna-utrotade-smittkopporna/).

were obliged to bring them to campaigns that were announced for pox inoculation. According to notes from the vaccinators, it was mostly mothers who showed up with their children.

Folklore Stories about Smallpox

To gain a general idea of how smallpox affected the life of people in various places in Sweden, I have reviewed folk life records in archives in Gothenburg, Lund and Uppsala. They were recorded in the twentieth century from informants born in the nineteenth century. In several cases they have told about smallpox in their home area and also in their own family. Some informants were themselves afflicted by the disease and survived while other loved ones died. Those afflicted were children and young people. One informant in Råggärd, Dalsland, remembered a smallpox epidemic in 1866 when both small children and young individuals, aged 25 and 30, fell ill and died (ULMA 18874:5).

Those who took sick experienced severe itching. They scratched themselves so badly that large wounds arose with blood pouring from them. To prevent the scratching they could have their hands tied. One woman born in 1856 in Finnekumla, Västergötland, reported that this had happened to her father (IFGH 4147:24). There was no help to be found against the itching and the wounds that followed.

Those who were sick typically lived in their homes together with other members of the household. There it was not possible to keep any distance. One woman born in 1867 in Fjärås, Halland, had visited a neighbouring family where the children were ill. She did not get sick herself, but she infected her sister who was sleeping in the same bed and later died (IFGH 5514:3). It may have seemed as if chance governed who got sick and who escaped the infection. One woman in Uddevalla born in 1862 had two siblings who were ill but she did not get sick despite the fact that she played with them as a little girl.

It is easy to understand that fear and anxiety emerged both in the afflicted homes and in the neighbourhood. Country people understood that they needed to stay away from houses where someone was ill. One woman born in 1862 in Uddevalla remembered when her aunt died of smallpox in 1869. No one was allowed to visit the house where she was sick in bed. The maid in the informant's family used to get milk at her aunt's house every day, but in this time of illness the milk pot was retrieved outside on the doorstep where it had been placed by the aunt's maid (IFGH 4530:4). This is reminiscent of how milk pots were handled when cholera broke out in the nineteenth century (Gustavsson 2021). One woman born in 1863 in the town of Falsterbo recalled that no one dared to visit her family when her father was hit by smallpox and died. The only one who came to visit was an old

master mariner that had himself been sick with smallpox (LUF M 8902:6). Placards or notices on paper were posted outside houses where there were persons who were ill (LUF M 3241:10).

Physicians likewise kept a distance from those who were sick. One woman born in 1880 in the town of Ängelholm told about a doctor who was standing at the door outside the house calling to the patient: "How are you doing?" The patient answered by calling back, but later ended up dying (LUF M 9690:9).

Although most individuals who were sick typically remained in bed in their homes, some towns also had infirmaries for epidemic diseases where some sick people could be admitted. However, during epidemics those hospitals did not have a sufficient number of beds. Patients just had to stay in bed until they died or recovered. There was no treatment according to a statement from one informant born in 1862 in Uddevalla who had recovered from smallpox. In Malmö there was a "house for smallpox" where some sick persons could be admitted (LUF M 11164:4).

The general view of infections was that it happened through contact not just with people but also with items that had been touched by infected persons. Medically this could have been possible since the smallpox virus was quite persistent. A female informant in Malmö, born in 1869, stated that the infection arose when a customs officer opened a package containing a piece of silk fabric that was supposedly contaminated with smallpox (LUF M 11164:4). One woman born in Falsterbo in 1863 told about her father who died of smallpox at the age of 38. "He got the infection from a carpenter, Landgren, who had caught smallpox and recovered, but who still had the contagion in his clothes" (LUF M 8902:6).

Methods of protection in folk medicine were similar to what was used in the cholera epidemics. People were supposed to use smoked juniper, to bring in sulphur, or to drink water containing tar and aquavit.

The physician Rosén von Rosenstein spoke in 1764 about tar water and mercury being used by country people as protection against smallpox. Sulphur could also be used. He pointed out that even if these supposedly protective means had no effect, at least they were not harmful and served a function to "put many individuals' mind at rest, who are living in fear on a daily basis, and in this way they are helpful" (Tillhagen 1962:321). In a smallpox epidemic in Malmö in 1837, the city's Society of Apothecaries recommended the use of tar water (LUF M 8167:177).

One informant born in 1862 in Ånimskog, Dalsland reported: "Against the smallpox you used smoked juniper or tar. The elderly drank aquavit and chewed tobacco. So you were drinking tar water and brought in sulphur and even smoked with sulphur" (IFGH 4240:19). During a smallpox epidemic in Göteryd, Småland, in 1859 it was recommended to eat wood tar. "Some ate more than they could take but could still become infected," a woman

born in 1832 reported (LUF M 10092:78). A woman in Malmö born in 1869 recalled an outbreak of smallpox when she was around 14 years old. At that time her mother visited her sick sister and her children. She herself and her children did not catch the disease. "We always had tar at home. My mother took pieces of it, placed in the gutter and set fire to it both when the smallpox and the dysentery broke out" (LUF M 11164:4). In Råggärd, Dalsland, the use of aquavit was mentioned in particular as protection. "First aquavit was consumed for the blisters to 'emerge' because otherwise you would die, it was said, and then particularly the face was washed with aquavit so that the scars would not be so ugly" (ULMA 18874:5).

Supernatural experiences could occur in those situations of fear that arose when someone fell ill. People have experienced omens about illness and death ahead. The grandfather of one informant in Tävelsås, Småland, supposedly had a vision where he saw a funeral procession for three individuals that he later had to care for until all three died of smallpox but he himself survived (ULMA 16115). A woman born 1918 in Stehag, Skåne, reported that her grandmother had died from smallpox in 1872 at the age of 35. She wanted to speak to her son who was working at a farm close by. Because of the risk of infection the son was not allowed to visit her. As he was watering the horses the next day, he suddenly observed a bright shape that disappeared fast. The horses also shied away at that moment. Later he was told that his mother had died at exactly that moment (LUF M 3244:30).

In an effort to explain why some individuals were afflicted with smallpox and some died while others survived, there was a belief in fate. It was simply believed that some would be affected and others would escape. It was fate or God that decided over this, and there was nothing you could do about it. This way of thinking could have helped people to feel less anxiety when the epidemic struck. There was nothing you could do about what happened, even though some of the protective agents mentioned above, such as like tar water, aquavit, and so on, were considered to give some protection. One woman born in 1861 in Nättraby, Blekinge, was not hit by the disease herself, but her sister fell severely ill and lived with terrible pox scars for the rest of her life. The informant commented that "she was supposed to have it, that is how it was decided" (LUF M 10052:13). From Tävelsås, Småland, it was said: "He who was supposed to get it, got it and if his time was up he died, otherwise he survived, that is how people reasoned." The informant's grandfather took care of those that were sick, but he himself never got infected. There was the idea that he had a "white tongue" and those with such a tongue were immune against infection (ULMA 16115). This was a popular version of immunity that country people could believe in. Belief in fate went parallel with belief in God. One woman born in Södra Ljunga, Småland, in 1871 reported about some sick people with smallpox who died,

while others survived and got pox scars. Her comment was: "What God wants always happens, his will is the best."

As with deaths from cholera, there were special problems when dead persons were to be transported to a graveyard. It was supposed to be done under cover of darkness so that the transport met as few people as possible (LUF M 3701:1, Billinge, Skåne). Individuals with low social status could be talked into taking care of the corpses. A woman born in Ängelholm in 1880 reported about a person who died in his home and no one wanted to take care of the corpse. "But finally Sven, the driver, who lived here on the farm, got help from a couple of drifters. But as they were on their way with the body, the cover sheet came aside and they saw that the dead person had been infected with smallpox – they got so scared that they let go of the transport and ran off" (LUF M 9690:9). In contrast to the cholera outbreaks, there were no special graveyards for those that died from smallpox. The mortality from this disease was so much lower than was the case with cholera.

Those who survived the disease were left with permanent pox scars all over the body and could occasionally also lose their vision. Various informants reported that they often saw people with pox scars, especially at markets, up until the end of the nineteenth century, but not after that (LUF M 10092:78). The scars were prominent. In folklore tales it was said that when "the evil one" got a hold of a pox-scarred person he said that it was like curly-grained wood that is harder and firmer than ordinary wood. He then supposedly said: "This is knife handles all this" (ULMA 11901:13–14).

Vaccinators

The vaccinator was often the parish clerk who had received some medical instruction from a physician. For the supervision of the vaccinator's work every place had a head of vaccination. In 1828, the clerk Johan Heljesson in Valla, Tjörn, showed a certificate from the city doctor Falck in Marstrand and the assistant judge Holmer in Uddevalla that he was able to vaccinate. Therefore, the church committee decided that the clerk should perform the vaccinations (Pettersson 1979:145).

As qualified midwives were gradually hired in the parishes during the nineteenth century, they typically took over the task of vaccinating. On Orust and Tjörn this did not happen until the 1890s, when the first graduated midwives were hired there.

The vaccinator carved a mark in the skin on the arm of the children and filled it with vaccine from cowpox or from other individuals that had been sick. The cowpox vaccine was kept in a glass container, and was considered to lose its effect over time until the vaccination was performed. From Tjörn it was reported that children had come down with pain and suffering

Figure 3. Inoculation instruments owned by the clerk Anders Lundgren and used for all children in the parish of Lid in Södermanland approximately during the years 1884–1900. The instrument was a very sharp and pointed lacemaking tool that could be folded in between brown slabs made of horn that also served as the handle for the tool. Sörmlands museum. (https://kringla.nu/kringla/objekt;jsessionid=76CA65EF83021142A21D-CBBD3D061F03?text=smittkoppor&referens=S-DM/object/DM07353).

a couple of days after being vaccinated with a vaccine that had been kept in a glass jar (Pettersson 1979:147). That kind of suffering was not mentioned when inoculation material had been retrieved from other children that had been infected.

The district doctor Fredric Marin (1872–1834) in Uddevalla stated in his annual report for 1831 that the vaccine likely did not protect against smallpox unless at least five inoculations were made on both arms of the children at certain intervals. The vaccinator was to inspect the inoculation for pox marks nine days after inoculation had been performed. This was an indication that the vaccination had been successful. Otherwise a new inoculation had to be performed. The heads of vaccination had to be tough when inspecting to make sure that this was performed as recommended.

A female informant born in 1881 in Hallaryd, Småland, reported that the midwife ordered vaccines and vaccinated a couple of children. Then she took blisters from these children and vaccinated other children (LUF M 11026:8). One informant born 1854 in Kulltorp, Småland, reported about a clerk working in 1860–1898 who placed three blisters in each arm of the children. They may have been just one month old when they were vaccinated (LUF M 7244:2).

The vaccinator received financial remuneration for every vaccinated child. The parishes themselves decided the size of the amount. Poor people typically got a reduced fee or did not have to pay at all. In Röra, Orust, it was said that the clerk Carl Fredriksson got 50 öre for every vaccinated child and 25 öre for crofter children plus a yearly collection gathered at catechetical meetings.

Successful vaccinators often received rewards such as money and/or a medal. In Stala, Orust, the clerk Isak Rutgersson (1831–1915) had been so

Figure 4. Oil painting from 1898. The clerk vaccinating. Painting by the artist Nils Alfred Larson (1872–1914) of Sannäs, Bohuslän. Painting privately owned. (https://digitaltmuseum.se/021015921288/dokumentation-av-verk-pa-utstallning-om-konstnaren-nils-larson-pa-bohuslans).

ambitious that there were no elderly people in the congregation who were not vaccinated in the 1890s. He had received rewards such as silverware and money in 1890, and the district physician also recommended him for a medal in 1893. On Tjörn, the clerk A. J. Kristensson had been a vaccinator since 1868, and in both 1895 and 1897 he was nominated by the district doctor for a medal. In 1896 the clerk Isak Rutgersson in Stala and the organist H. Andersson in Myckleby were said to be "honourable veterans in their profession with vaccination records never tarnished by any complaints".

It could be very expensive for parents who, as was generally the case, had several children to vaccinate. From Stora Herrestad, Skåne, a woman born in 1837 reported that a mother came to have her children vaccinated, but when she heard about the price being a whole riksdaler per child, she turned back home and wanted to vaccinate the children herself. She got what was needed from a boy who had blisters on his head and went about vaccinating her children. Not just the expense may have been a deterrent for the mothers, but also experiences of children getting sick and having died following vaccination. One woman in the town of Halmstad, according to her grandchild, had been vaccinating a child that died soon after. When the

next child was born, she refused to show up for vaccination. Her husband, though, secretly brought the child with him to have it vaccinated.

The vaccinators were required to file yearly reports that served as a basis for the physicians' yearly reports and for parsons' and bishops' official reports. The reports were then forwarded to the Royal Commanding Officer. In reports from physicians it was stated when the report had been filed in due time, which was most commonly the case. However, there were some exceptions where vaccinators were reported for neglect. On 29 June 1840 the head of vaccination on Tjörn complained that clerk Johannes Heljesson in Valla had refused to turn over the register of vaccinated children. The church committee informed him that it was the vaccinator's responsibility each year to compile a register (Pettersson 1979:147). In a physician's report from 1898, it was stated from Långelanda, Orust, that "the clerk A .S. P. Edström over several years had been neglecting to send in the vaccination registers".

Figure 5. Leather case with pox inoculation tools. Golden print of a royal crown and three crowns underneath. This is a reward to clerk Carl Dahlgren in Södra Sandby, Skåne, for vaccinations. Helsingborg Museum. (https://kringla.nu/kringla/objekt?text=smittkoppor&referens=HeM/objekt/84320https://kringla.nu/kringla/objekt?text=smittkoppor&referens=HeM/objekt/84320).

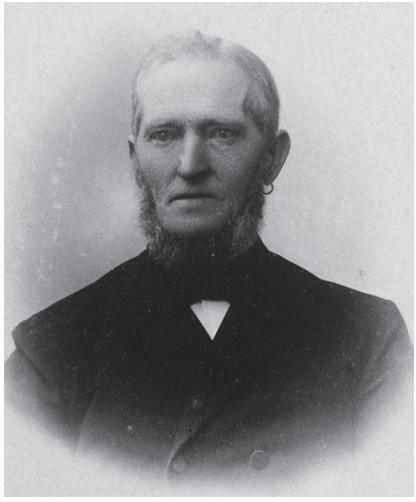
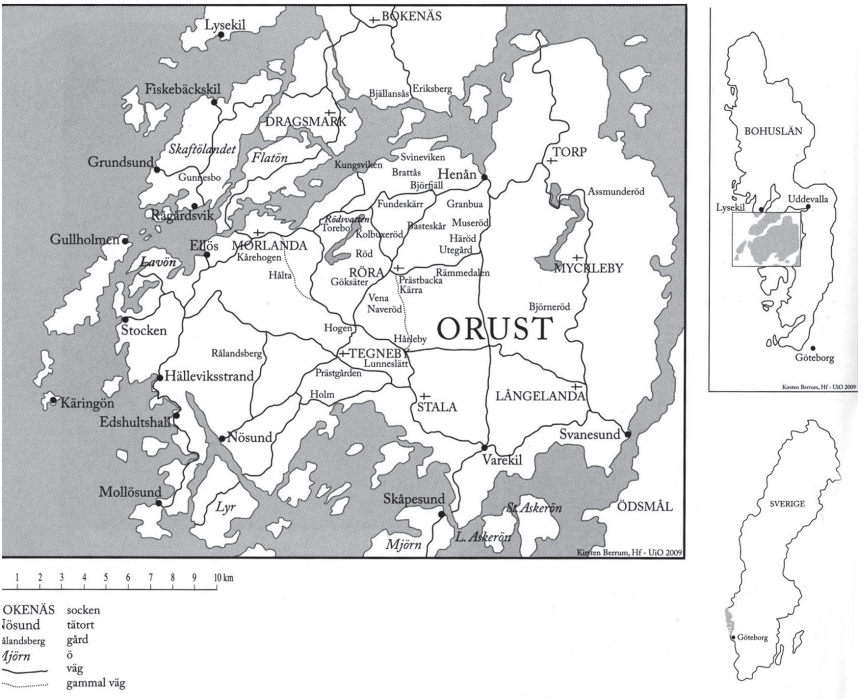


Figure 6. The clerk Isak Rutgersson (1831–1915) from Stala, Bohuslän. Photo privately owned. He received 50 öre for every vaccinated child plus a yearly collection.

A Regional In-Depth Study from a Perspective of Change

In minutes of parish meeting there is information about how smallpox broke out on several different occasions in the same parish, not just during the eighteenth century but also during the nineteenth century although to a minor extent. The disease appeared in non-predictable waves of outbreaks. People should



Karta över Orust. Den har ritats 2009 av Kirsten Berrum, Oslo universitet.

Figure 7. Map of Orust, Bohuslän and Sweden. Map drawn by Kirsten Berrum, Oslo University 2009.

therefore have been well aware of the fact outbreaks of smallpox could happen. This must surely have had an impact on the willingness to get vaccinated. But how did it work in reality?

As with the study regarding cholera in the nineteenth century, I have particularly studied annual reports from physicians on the islands of Orust and Tjörn in Bohuslän. They formed a district of physicians from 1835 and a deanery. Before 1835, the islands belonged to the Uddevalla district of physicians, which covered all of southern Bohuslän. Annual physician records exist starting in 1836, and these are digitally available in a medical database at the University of Linköping (https://ep.liu.se/databases/medhist/). Official reports from bishops and ministers can be found for all of the nineteenth century.

Orust and Tjörn were connected by a small ferry crossing the fairway at Skåpesund. The hinterland of the islands was dominated by farming. The western parts were coastal villages where fishing and shipping dominated.

The question formulated in the present regional study was how vaccination was carried out on Orust and Tjörn during the nineteenth century and how it relates to different outbreaks of smallpox. To follow the development

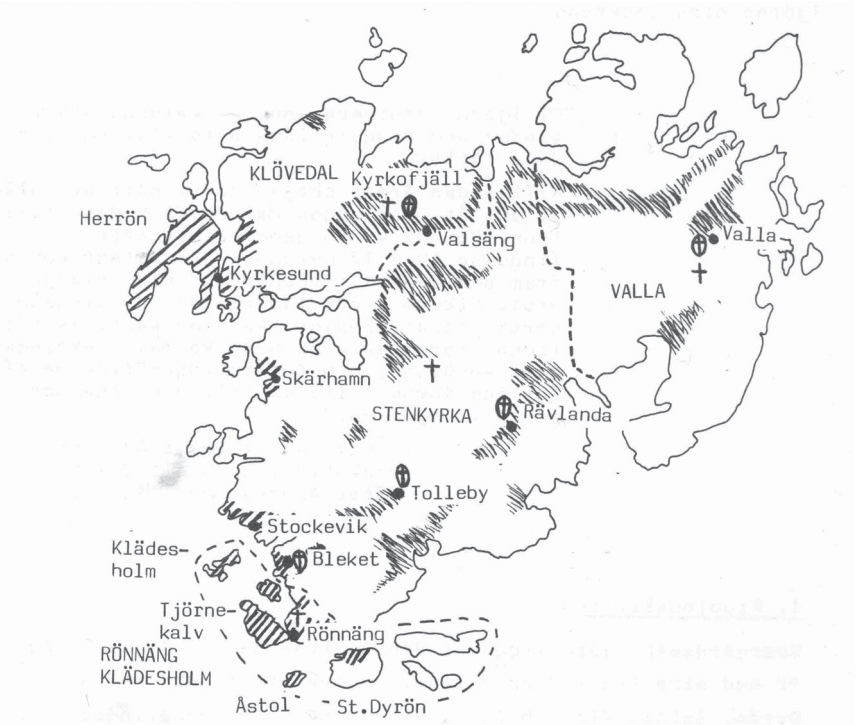


Figure 8. Map of Tjörn. By Holm 1984.

over time, I address one decade at a time up until 1900. While Tjörn constituted one parish, there were three parishes on Orust – Myckleby in the eastern part of the island, Morlanda in the west and Tegneby in the centre of the island. Thus, in contrast to the situation on Tjörn, there are official reports from three different areas on Orust. The yearly physicians' reports pertained to both Orust and Tjörn up until 1892, when Tjörn became a medical district of its own.

Early evidence for extensive vaccination comes from the minutes from Stenkyrka, Tjörn, for 1809 and 1810, reporting on all children brought by their mothers to be vaccinated. All social classes were represented. There were married mothers, widows and unmarried maids. It was carefully noted how many children were brought by each woman. This was before vaccination against smallpox became mandatory by Swedish law in 1816 (GLA Stenkyrka KIa:1). At a parish meeting in Valla, Tjörn, in 1817, the importance of the parish inhabitants showing up with their children for the vaccination opportunities offered by the vaccinator was emphasized. If the vaccinator had to visit the homes it would take more time and the inoculation vaccine could degrade as it was kept in a glass.

During an episcopal visitation on Tjörn on 16 June 1827, there were complaints that many children did not show up for the check-ups that had to be done following vaccination. This meant that the vaccinator was unable to see whether the vaccination had been successful. This in turn could have led to smallpox being around a couple of years later. The disease was however mild for those who were vaccinated. The bishop pointed out the importance of vaccination and follow-up inspections to maintain health, which was said to be "the most valuable thing owned by human beings on earth" (GLA GDA FIIa).

From Orust the first reports are from the 1830s. Earlier summary information was provided by district physician Fredric Marin (1772–1834), who worked in the Uddevalla medical district from the beginning of the nineteenth century. In his annual report in 1831 he did not discriminate between information from Orust and Tjörn, but stated that "smallpox had increased during the year to become basically ubiquitous, with a similar impact now as in previous times". This led him to point out that "the infallibility of the vaccine never should or can be doubted".

In 1837 there was only one case of smallpox on Orust. A two-year-old girl was mildly sick and the contagion did not spread. On Tjörn, however, the disease was widespread starting at the end of 1837. It culminated in February 1838 and then petered out with only scattered cases up until June when instead Orust was hit. There the disease was at its worst in February 1839. For inoculated individuals the disease was milder and was called varioloid. The doctor stated that the protective properties seemed to decrease the longer it was since the inoculation had been performed. Therefore a re-vaccination was needed. Uninoculated children and individuals aged 20 to 35 years, for whom some 20 years had passed since their inoculation as children in the 1810s, were the hardest hit. The dedication of the vaccinators seems to have had a special impact on the re-vaccination. It was most likely important that the clerks who were working as vaccinators met parish inhabitants in church on Sundays.

That also inoculated persons could get sick with smallpox, "has increased the uninterest and unwillingness, in particular on Orust, to get vaccinated". Only on Orust, where vaccination supervisors and vaccinators were very strict, did adults who had been vaccinated as children get re-vaccinated, according to the medical report in 1839.

At an episcopal visitation in Myckleby in 1839, it was stated that vaccination was no longer trusted among the country people as it had been previously. The parents did not bother coming to check-ups following vaccination. At that time, over twenty years had passed since the start of vaccination. The bishop pointed out the necessity to show up for check-ups for the vaccinator to be able to ascertain that the vaccine had left a clear pox scar. According to the bishop, it should be looked at as a Christian duty

to diligently accept the protection that had saved so many humans from a premature death. As the bishop stated, it was proven that if inoculated persons were later hit by smallpox, the disease had a milder course. This same opinion was also firmly pointed out by the bishop at a visitation in Tegneby a few days earlier in May 1839.

During the 1840s there were no visitations, but doctors filed reports every year. In 1840 the district doctor stated that vaccination, which had been neglected in Tegneby in 1839, was "performed more successfully" in 1840. The requests by the bishop in 1839 to vaccinate the children had thus been effective. The parish minister had taken it upon himself to be a vaccination supervisor to get the vaccinations in more proper order. Re-vaccination had only happened with a few individuals on Tjörn. To increase the extent of re-vaccination, the doctor had distributed to all district vaccination supervisors the leaflet of 16 May 1839 from the Royal National Board of Health about protective inoculation by means of ivory needles.

Throughout the rest of the 1840s, physicians' reports did not contain any more mentions of smallpox and vaccine. This would indicate that there were no problems with outbreaks of disease or failure to vaccinate. At an episcopal visitation on Tjörn in 1845 it was noted that vaccinations were done in an orderly manner and skilfully and that check-ups were not neglected.

According to the medical report, no cases of smallpox had occurred in 1850 despite the fact that the disease had been general, and in a malignant form in the nearest parishes on the Bohuslän mainland over the latest months of the year. Perhaps the people on Orust and Tjörn had not known about this smallpox outbreak. There had been no major re-vaccination. Here it may be mentioned that in 1851 a major smallpox epidemic took place in Sweden. A large number of children who were not vaccinated died on Orust and Tjörn in 1852, and also younger and middle-aged individuals. At an episcopal visitation in Myckleby in May 1852, it was noted that vaccination was carried out in an orderly way and that the vaccinated children "also in an orderly way" returned to the announced check-up appointments. It is interesting to note the difference in vaccination frequency and check-up visits in various areas of Orust. Everything was in order in Myckleby as opposed to the situation in Tegneby. Perhaps that was due to the vaccinator? At an episcopal visitation in Tegneby the same month in 1852, it became clear that parents neglected the vaccination of their children and failed to show up at check-ups. The bishop firmly pointed out that Swedish law could not accept the arbitrary behaviour of the parents. Since smallpox "was severely raging in many places" it was an "almost inexplicable foolishness" not to observe the law. At a visitation in Morlanda in 1851, the bishop likewise made a similar vehement request to obey the law in view of the fact that "vaccination was not so generally used".

During the late 1850s the contagion disappeared. In 1857 only one case, a bather, was reported in Henån, Orust. This person was from "the then

pox-infested province of Närke". At an episcopal visitation in Myckleby in 1857, increased trust in vaccination was reported and "few try to avoid having their children vaccinated and inspected".

During the first part of 1858, a mild variant, called varioloid, was epidemic on Tjörn. Many people fell ill but few died. The physician had made several trips to Tjörn because of that.

The 1860s began with the doctor stating that vaccinations and reports on re-vaccination had been filed in due order with the Royal Officer in Command. The vaccinators performed their duties "with assiduity and expertise". According to an ecclesiastical report from Tjörn in 1860, parents seemed to be caring for the vaccination of their children and having them examined when called on. Everything seemed to be in good order. The same impression can be had from the episcopal visitation in Tegneby in 1861. "The parishioners are willing to let the children be vaccinated and inspected", in complete contrast to the situation twenty years earlier in that parish.

In 1864 there was mild smallpox in several places. This was caused by a sailor who died following his return home from Gothenburg. The doctor stated that "contagious contact could clearly be traced in the beginning". The infection remained local. The existence of these pox infections led to re-vaccination in Myckleby. There was a clear connection here between local infection and re-vaccination.

In July 1868, smallpox flared up in the parishes of Myckleby and Torp. Epidemics arose in Torp and on the island of Käringön far out west, places that did not border on each other. In Myckleby, Röra and Morlanda there were only scattered cases. There were a few incidents of deaths. Due to these smallpox events the vaccination had started "on full scale" during the month of December. Here we have another clear connection between local infection and vaccination. The doctor had made several trips in the autumn due to the smallpox.

In 1869 some 101 cases of smallpox and varioloids were mentioned, of which nine individuals ended up dead. Twenty-five of the 101 cases occurred in January as a prolonged phase of the disease events at the end of 1868. In other words, there was a clear peak in infectivity during the coldest time of the year.

In 1868 the provincial doctor A. E. Goldkühl in the Håby medical district, in mid-Bohuslän, published a textbook on health and medical care with special focus on conditions in Bohuslän. To avoid getting infected with smallpox, healthy children should be vaccinated preferably before they got their first teeth, and weak children at the end of teething. Elderly people should be re-vaccinated if more than ten years had passed since the previous vaccination. Goldkühl had found that several individuals were sceptical about the protective property of the vaccination, since both vaccinated and non-vaccinated individuals could be hit by the disease. Instead he stressed

the importance of not being doubtful but instead thanking God for the protection offered by the vaccination (Goldkühl 1868).

In the first years of the 1870s, the doctors only reported the names of the vaccinators and vaccination supervisors, and stated that records of performed vaccinations had been filed in due time. In 1870 it was reported that no re-vaccinations had taken place. The word smallpox was not mentioned.

In 1875 smallpox had been present in the parishes of Valla and Stenkyrka on Tjörn since the end of 1874. This was, by the way, the same year as the severe smallpox epidemic took place in Stockholm. The doctor, however, had not been informed about the cases on Tjörn until 27 April. By then, one man had died on a farm the week before. His wife, three children and two farmhands were sick. In a neighbouring place, three persons were sick, one of whom died. On 24 May the doctor was called again to Tjörn. This time seven persons in the same parish as the previous one were severely ill while a large number of persons were already convalescent.

At the same time, in Långelanda in the east of Orust, the mild variant of smallpox, varioloid, had appeared. The patients were well enough to be up and about. Five individuals had been treated by the doctor. The parish neighbouring on Långelanda, Stala, had two cases of smallpox. Thus there were scattered and mild cases on Orust at the same time as the infection was raging severely in a limited part of Tjörn. It did not spread from there to the neighbouring island of Orust. Contacts between the islands at that time were not very frequent via the small ferry that connected the two islands. The doctor lived on Orust and had to be called from Tjörn when he was needed there. In 1875 it was reported that 736 individuals had been successfully vaccinated but that no re-vaccination occurred. At an episcopal visitation in Tegneby in 1875, it was reported that vaccination was properly performed. There was no resistance among the country people.

In 1876 there were only two cases of smallpox in Morlanda, western Orust. In one of the cases the illness was severe, but both persons that were sick survived. In 1878, re-vaccination had been performed on adults who had been vaccinated as children.

In 1880 both vaccination and re-vaccination were diligently performed. At an episcopal visitation in Myckleby in 1882, it was reported that vaccination was properly performed by the clerks. This was also the case at an episcopal visitation on Tjörn in 1884. There were no complaints about the parents' willingness to vaccinate their children.

The physician Emil Olsson, working on Orust and Tjörn in 1879–1892, was brief in his reports compared with previous doctors. He was known in the neighbourhood for having alcohol problems (Gustavsson 2017). This may have been reflected in the brief yearly reports. He stated that vaccination reports had been filed in due time and that re-vaccination had not been performed.

From 1885 onwards there were special medical reports from western parts of Orust that supplemented to the reports from Emil Olsson. From the western parts of Orust in 1885, 1886 and 1887 only the names of the vaccinators and their allowance was mentioned. Nothing was stated about cases of illness or frequency of vaccination.

In 1891 Emil Olsson reported that vaccination was said to be performed according to regulations. One case of smallpox occurred in December with a person coming from Gothenburg and that was isolated. It is worth noting that Gothenburg was hit by a severe smallpox epidemic in 1892–1894. At an episcopal visitation in Tegneby in 1892 it was reported that vaccination was performed in good order. "There was no non-compliance."

In 1893 re-vaccination had only been performed in Långelanda on Orust, which was surprising to the doctor considering the smallpox epidemic in Gothenburg "as steamboats and sailing ships from Gothenburg visit the harbours of the district several times a week". Thus, the willingness to get vaccinated, according to the doctor, should have been greater also in other parts of Orust.

In 1894 vaccination procedures were properly carried out and no one tried to keep their children away on Orust. During the year many had themselves re-vaccinated "fearing the ongoing smallpox epidemic in Gothenburg". And so the willingness to get re-vaccinated had finally happened. One could ask why it took so long for this willingness to be established. How did information from Gothenburg get out?

Figure 9. The midwife Sofia Nordgren (1840–1910) started performing vaccinations in 1891 in Tegneby parish when she became a midwife. She received a salary of 10 kronor and 50 öre for each vaccinated child. Photo privately owned.

In 1896, vaccination was performed in western parts of Orust, and no one had refused to vaccinate their children. However, in some cases parent had refused to allow their children to be vaccinated with vaccine from inoculated children. There was no re-vaccination.

In 1898 there was likewise no refusal to let children be vaccinated on Orust, and at the same time there was no re-vaccination. On western Orust, however, one mother, "out of non-compliance had kept her children away from the follow-up inspection at the set time". She had therefore been reported to the municipal board by the vaccination supervisor. In 1900 it was reported that vaccination was performed "with the utmost diligence".

From 1892 on there were special medical reports from Tjörn by the new medical doctor, John Emil Wachenfelt. In 1895 there were no non-vaccinated elderly people in the coastal villages of Rönnäng and Klädesholmen, which was ascribed to the diligence shown by the vaccinator clerk, A. J. Kristensson. In the farming parish of Klövedal, on the other hand, there was a group that for religious reasons had refused to have their children vaccinated. A mission church in Klövedal was established in 1877, and by 1889 it had 99 members, which was roughly 6 per cent of the inhabitants in the parish. This mission church was more critical of the state church than other mission congregations established on Tjörn in the 1870s. It arranged baptism by a layman, it had its own holy communion, Sunday school and confirmation teaching (Holm 1984). The resistance against vaccination performed by the church clerk could have been older in Klövedal than in the 1890s without it being reported in Doctor Emil Olsson's brief reports (1879–1892).

In 1898, parents conscientiously showed up with their children for vaccination. In Rönnäng, Klädesholmen and Valla there were no records of elderly people who were not vaccinated. In Klövedal, however, there was still the group that for religious reasons had so far not wanted to vaccinate their children. In Stenkyrka only animal vaccine from cows had been used and not from already inoculated children. This was likely due to the fact that parents had previously refused to vaccinate their children with vaccine from inoculated children.

In 1900 the religious party in Klövedal had abandoned their principle not to vaccinate their children. Therefore, there were no elderly unvaccinated individuals in Klövedal, Stenkyrka, Rönnäng or Klädesholmen, in other words, all of Tjörn. In Stenkyrka only animal vaccine was still used.

Conclusions

Smallpox was one of the most severe epidemic diseases in the nineteenth century. This disease was the only one for which there was a vaccine during that century, and its use was established early as mandatory by law. One

would think that under those circumstances all children would be vaccinated and that adults would be re-vaccinated a couple of decades after their childhood vaccination. This was not always the case, however.

The present investigation has highlighted the practice of vaccination and its frequency, relating this to the presence of the infection. Collaboration between church and medical expertise was clearly present. Bishops, ministers and not least clerks were highly active in the protective work against smallpox.

In addition to the vaccine, the country people observed common protective measures that were used against epidemic diseases such as cholera. This meant, for example, drinking water mixed with tar but also aquavit. The public also understood the significance of staying away from houses that were afflicted by the contagious disease. This was not possible, though, when the infection hit one's own home where everybody in the household lived together, whether they were sick or healthy.

Thanks to the vaccine, smallpox did not cause the same high death rate as cholera during the nineteenth century. Therefore there was no need for special epidemic graveyards, as was the case with cholera.

The doctors differentiated between severe and mild forms of smallpox. The milder form, called varioloids, could be associated with those individuals who had been vaccinated or re-vaccinated. In the regional study of Orust and Tjörn, the vaccination frequency was shown to have been high in the early nineteenth century. Thereafter, it declined in some places for a couple of decades. Then bishops, ministers, doctors and not least clerks had to start an extensive information campaign to reverse the development towards greater acceptance for vaccination. These measures seemed to have been effective in that the willingness to vaccinate increased from the mid-1800s onwards.

People appear to have been more reluctant to bring their children for check-ups than for the actual vaccination. The country people do not seem to have realized why these check-ups were necessary. Another reason for the reluctance to vaccinate during the first part of the nineteenth century was that country people had noticed that even vaccinated persons could become infected. There was also some resistance due to the fact that the vaccine was taken from already vaccinated children instead of from cowpox. At the end of the nineteenth century, there was a different kind of resistance against vaccination for religious reasons in free church communities on Tjörn but not on Orust. The resistance does not seem to have been very widespread, but it ran against the commitment of the state church to carry out the vaccinations.

It also seems to have been hard under some circumstances to get the country people to understand the need for re-vaccination. It appears that it was only when the infection came close to a locality that the willingness to re-vaccinate increased. Some examples of this can be found in the regional study.

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