

REGULAR ARTICLE

National Swedish survey showed that child health services and routine immunisation programmes were resilient during the early COVID-19 pandemic

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Abstract

Aim: Routine immunisation programmes are at risk of disruption due to the COVID-19 pandemic. This study aimed to investigate the resilience of the Swedish national immunisation programme for children up to the age of five years during the early stages of the pandemic.

Methods: This was a cross-sectional, web-based survey of regional child health offices in Sweden between 10 September and 9 October 2020. It explored the organisation of child health services during the early stages of the pandemic, focusing on routine child immunisation.

Results: All 21 Swedish regional child health offices responded. They stated that child immunisation had been prioritised, communication with families had been intensified and there was greater flexibility at all organisational levels of child health services. In addition, the vaccine supply was sustained and child health centres remained open. However, there were periodic staff shortages, increased numbers of health visits cancelled by parents and most parent education groups were paused.

Conclusion: The Swedish immunisation programme was resilient during the early COVID-19 pandemic, thanks to sustainable organisation co-ordinated by Sweden's network of regional child health offices.

KEYWORDS

child health services, COVID-19, immunisation programme, resilience, vaccination

1 | INTRODUCTION

Routine immunisation programmes are at risk of disruption worldwide due to the COVID-19 pandemic and this could lead to a global re-emergence of vaccine-preventable diseases. Populations in

low-income countries face a particular risk and this represents another burden in addition to the COVID-19 pandemic.¹⁻⁵ However, a drop in immunisation coverage during the early pandemic has also been reported in high-income countries, including Finland, the United States of America and England.⁶⁻⁸

Abbreviations: WHO, World Health Organization.

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Sweden's Public Health Agency and public health professionals made routine child immunisation services a high priority in the early days of the pandemic. This was in line with the World Health Organization's (WHO) guidance document.⁹⁻¹¹ Childhood vaccine coverage remained unchanged from 2019 to summer 2020, after the start of the pandemic in Sweden. The coverage of the first dose of measles, mumps and rubella vaccine was 90.1% in June 2019, for children born in 2017, compared to 90.8% in June 2020, for children born in 2018.¹² Figure 1 shows similar numbers of vaccinated children from January to May 2019 and from January to May 2020, according to the Swedish national vaccine register. The reason of the shape of the curve during the autumn and winter months is that the eligible children were already vaccinated during August-December due to the 18 months age of the presented dose.

For many decades, there has been universal access to Swedish child health services and the childhood vaccination programme has achieved very high coverage.^{13,14} The vaccinations included in the Swedish national immunisation programme are free of charge, but not compulsory. They are administered by specialised child health nurses in child health centres during the preschool years^{15,16} and then by school health nurses.^{13,15} Swedish child health nurses are involved in many promotional and preventive interventions. They play a key role in providing information about childhood vaccines and administering them with child health physicians at almost 1,000 child health centres. The average family has 13 child health consultations during the child's first year of life and the aim is for the same nurse to be present at each visit. The first visit takes place in the family's home and the other 12 are at child health centres.¹⁴ The nurses are joined by physicians at four of the visits.

Each of the 21 regions in Sweden has a child health office that supports the staff at the child health centres. Their aim is to ensure that all families in the region receive equitable, high-quality child health services. The Public Health Agency supports the regional child health offices by providing regular networking meetings, recommendations and guidelines. The Swedish national vaccine

Keynotes

- This study surveyed Swedish regional offices in autumn 2020 to assess the impact of the COVID-19 pandemic on routine child immunisation programmes and other child health services.
- Child immunisation had been prioritised, communication with families had been intensified, vaccine supplies were sustained and child health centres remained open.
- However, there were periodic staff shortages, increased numbers of health visits cancelled by parents and most parent education groups were paused.

register, held by the Public Health Agency, covers all vaccines included in the national immunisation programme. It has been shown to be a reliable, validated and highly complete data source for vaccine coverage monitoring.¹⁷

This study investigated the resilience of the Swedish national immunisation programme and other selected child health services in Mars to August 2020, during the ongoing pandemic. It did this by surveying all 21 and regional child health offices.

2 | METHODS

2.1 | Study design and survey

This was a cross-sectional, web-based survey and the 18 questions included the four main areas of the WHO's Global Routine Immunization Strategies and Practices framework.¹⁸ The survey was piloted on four individuals with previous experience of child health work, but they did not form part of the study population.

Each regional child health office was asked to submit just one reply and was encouraged to have internal discussions among

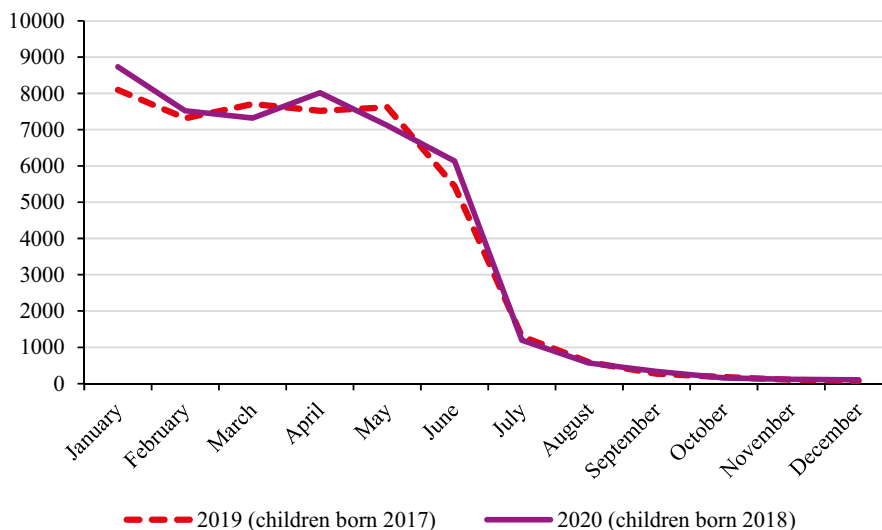


FIGURE 1 Number of children who received their first dose of the measles mumps rubella vaccine during 2019 (children born in 2017) and 2020 (children born in 2018). This dose is administered at 18 months of age, thereby the eligible children are already vaccinated during August-December¹²

colleagues before submitting their responses. They were sent a link to a web-based questionnaire (Appendix 1), but their responses were not anonymised. The questionnaire comprised 18 questions and these included multiple choice and open-ended questions, as well as those that asked for specific and yes or no responses. These covered a wide range of issues relating to the pandemic such as local service priorities, staffing, guidance and how the vaccination programme was maintained.

2.2 | Study population and study process

All 21 regional child health offices in Sweden were asked to respond to the survey between 10 September and 9 October 2020 and received weekly reminders. Multidisciplinary teams work together at the regional child health offices and these usually include one or more child health physicians, specialist nurses and psychologists (Figure 2). The aim was to reflect their combined views.

FIGURE 2 The organisation of the Swedish regional child health offices.

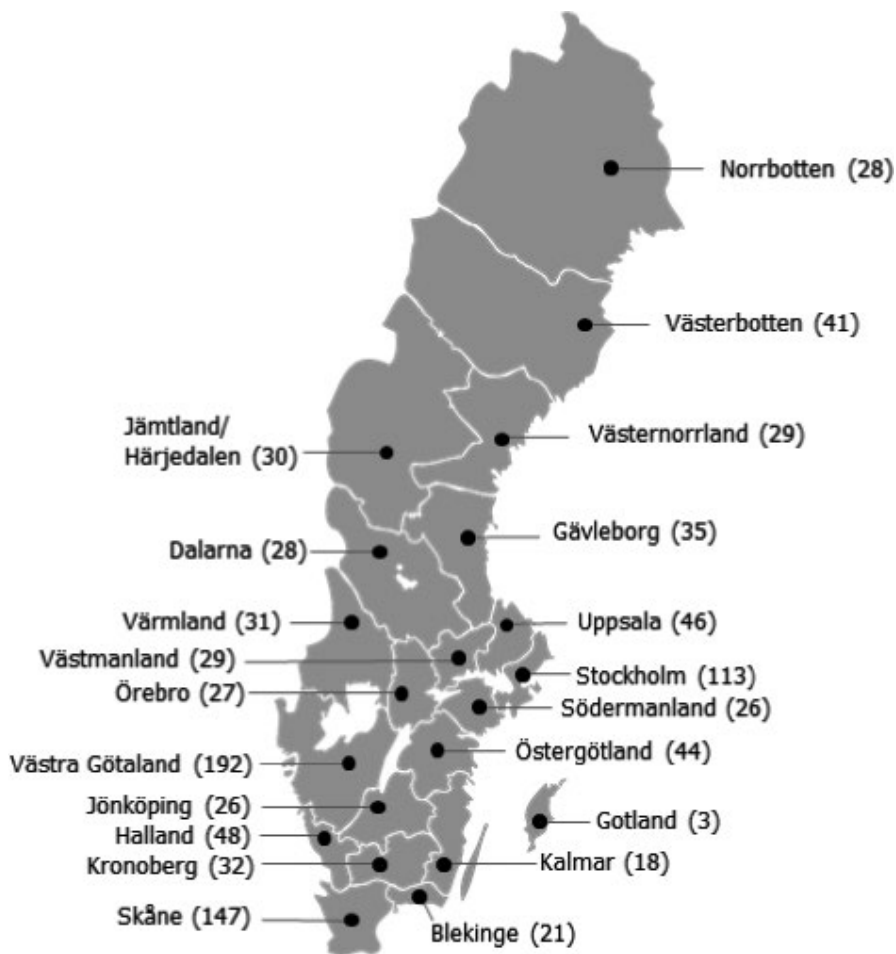


FIGURE 3 Names of the 21 child health offices, with the number of child health centres in brackets.

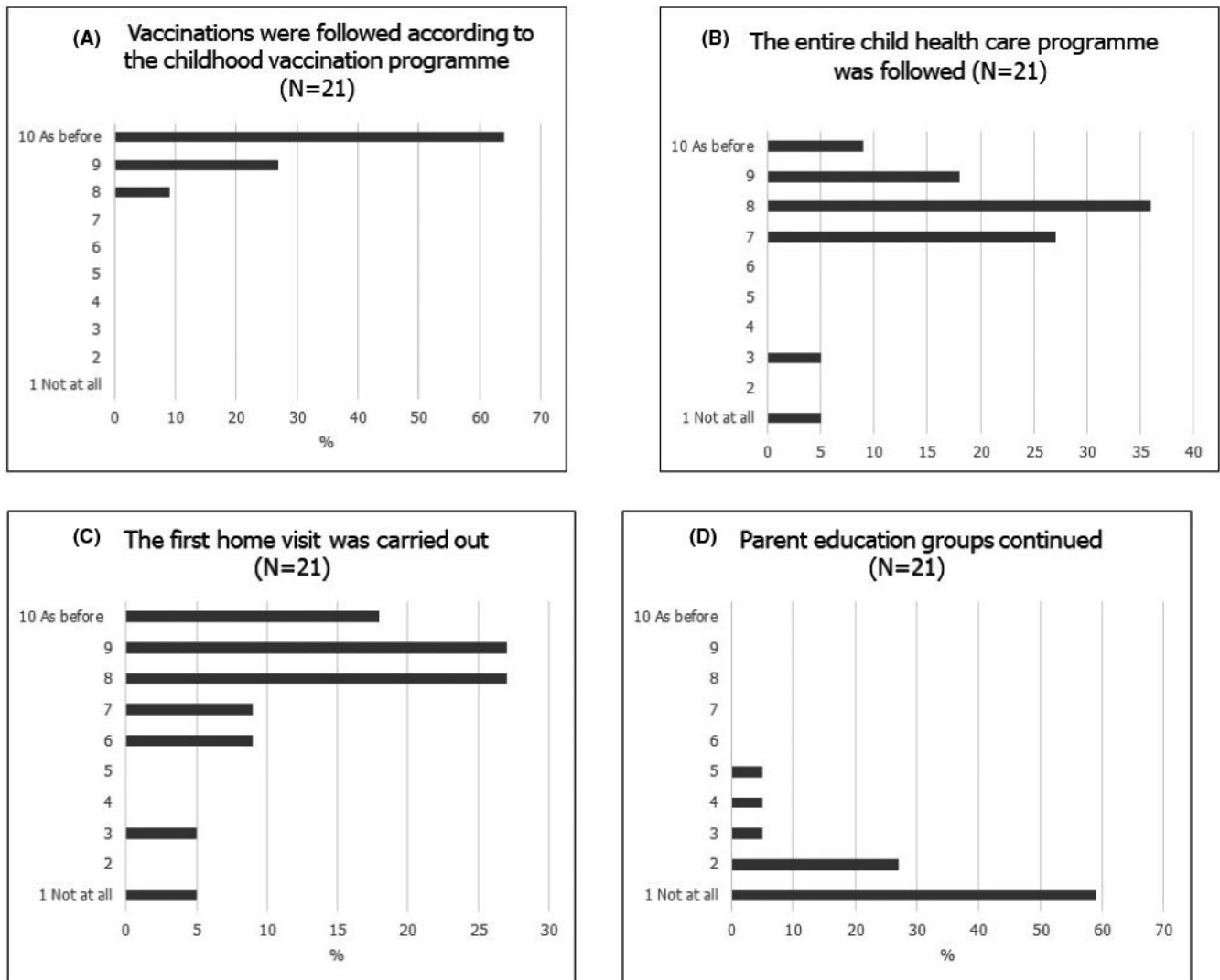


FIGURE 4 Impact of the COVID-19 pandemic on (A) vaccinations, (B) the national child health programme, (C) home visits within the first two weeks of life and (D) parent education groups. 1 represents not at all and 10 represents the same as before the pandemic.

2.3 | Ethics

The Swedish Ethical Review Authority had no objections to the project (2020-03705) and completing the questionnaire provided informed regional office consent.

2.4 | Analysis

The quantitative analysis was descriptive. The open-ended questions generated a list of statements, but not paragraphs or narratives. This was not a formal qualitative analysis, but a careful examination and analysis of the content of the responses to identify frequent or repetitive codes. Similar codes were grouped into categories that shared common content and meanings. The three categories were as follows: a well-functioning health system, well-established trust and relationships with parents and well-trained healthcare providers. Quotes are not presented in this paper, in order to maintain anonymity, because they were only 21 respondents.

3 | RESULTS

All 21 child health offices responded to the web-based survey and are presented in Figure 3.

3.1 | Overall impact on vaccinations and child health services

The Swedish child health programme was followed as before the pandemic, but the number of physical meetings was reduced. Vaccinations were prioritised, despite cancelled visits and periodically reduced staff resources. Figures 4 and 5 illustrate the overall impact that the COVID-19 pandemic had on health visits and vaccinations.

Overall, the youngest children received their vaccinations in a timely manner, but other vaccinations were occasionally postponed. These included the diphtheria-tetanus-pertussis-polio booster given at five years of age.

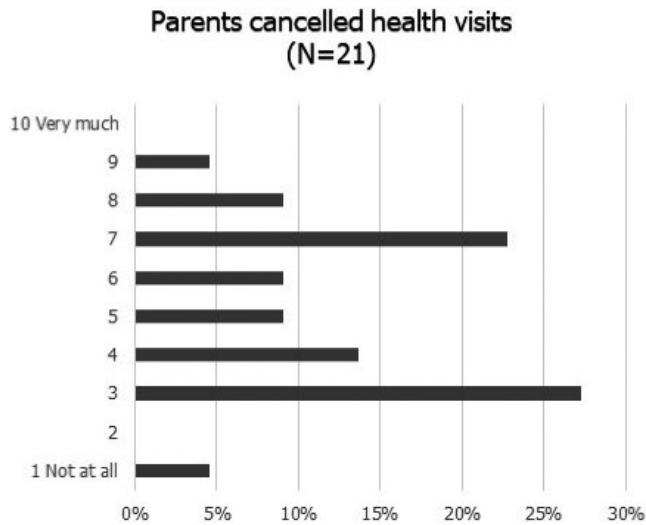


FIGURE 5 Routine visits to child health centres cancelled by patients during the early COVID-19 pandemic (March-August 2020) compared to the pre-pandemic era. 1 represents minimum difference and 10 represents maximum difference.

Physical meetings were affected by the pandemic to some extent. Most parent education groups were paused according to regional guidelines. However, a few centres in various regions were able to continue by keeping the numbers low or holding group meetings outdoors. Families were more likely to cancel health visits, compared to the pre-pandemic era, especially at the start of the pandemic. However, the first home visits were largely unaffected by the pandemic.

3.2 | Availability of vaccines, resources and materials

The childhood vaccine supply chain was not disrupted, but periodic staff shortages and equipment were reported. Figure 6A shows that vaccines were available during the study period in all regions, but Figure 6B shows that staff shortages were reported in the child health centres. This was mainly due to lower thresholds for sick leave and healthcare staff keeping sick children at home. The issues were fairly evenly distributed across the regions. About 40% of the regional child health offices reported staffing changes during the COVID-19 pandemic. For example, child health physicians and nurses were temporarily moved to clinical work, backed up colleagues on sick leave or were members of at-risk groups.

Transient shortages of protective equipment were also reported in some regions during the very early phase of the pandemic (Figure 6C and 6D).

3.3 | Guidelines and decision-making about priorities

Participants reported that, overall, national, regional and local guidelines of prioritisation of routine child immunisation during the pandemic were supportive when priorities had to be established.⁹⁻¹¹

National guidelines from the national working group on child health were followed by 91% of the respondents, and the figure was 86% for guidelines from Sweden's Public Health Agency. Regional recommendations from the county communicable disease prevention and control officer were followed by 82% of the respondents. Other sources of regional support that were reported were the medical lead for primary health care and the regional crisis management group. Hospital administrators also worked closely with regional child health consultants.

At the local level, 78% of respondents said that decisions on priorities were primarily made by the managers of the child health centres.

3.4 | Communication from regional offices to local centres

The regional child health offices supported the child health centres by exchanging information using a number of different communication channels. These included emails, telephone calls, digital meetings and video conferences, as well as face-to-face and online education and consultations with psychologists. When information on COVID-19 needed to be communicated to the child health centres, this was limited to digital methods and phone calls, due to the national recommendations on social distancing.

The nurses used the same pre-pandemic communication methods to keep families informed during routine visits to the child health centre.

3.5 | Parents' questions and concerns

Overall, parents raised few questions or concerns about routine vaccines during the study period (Figure 7A-B). Geographical and cultural differences were detected in some regions. The answers to the open-ended questions revealed various perception about why bookings were cancelled by parents in different socioeconomic contexts. Some health visits had to be postponed. Initially, this was due to uncertainty and concerns about the pandemic, but later this was mainly due to cold symptoms in the family. Occasionally, parents of unvaccinated children showed an interest in them having routine immunisations.

3.6 | Perceived facilitators

The 21 child health offices were asked about the most important factors in the child health system that ensured that children did not miss out on their vaccinations. They stated that these were information and collaboration. Collaboration enabled local child health centres to prioritise immunising all children under five years of age, as outlined in the guidelines. Extra efforts by nurses and the trust they had built with parents strengthened existing functioning health systems. Immunisation was sustained, even if nurses had to give vaccines outside the child health centre, for example in parking lots.

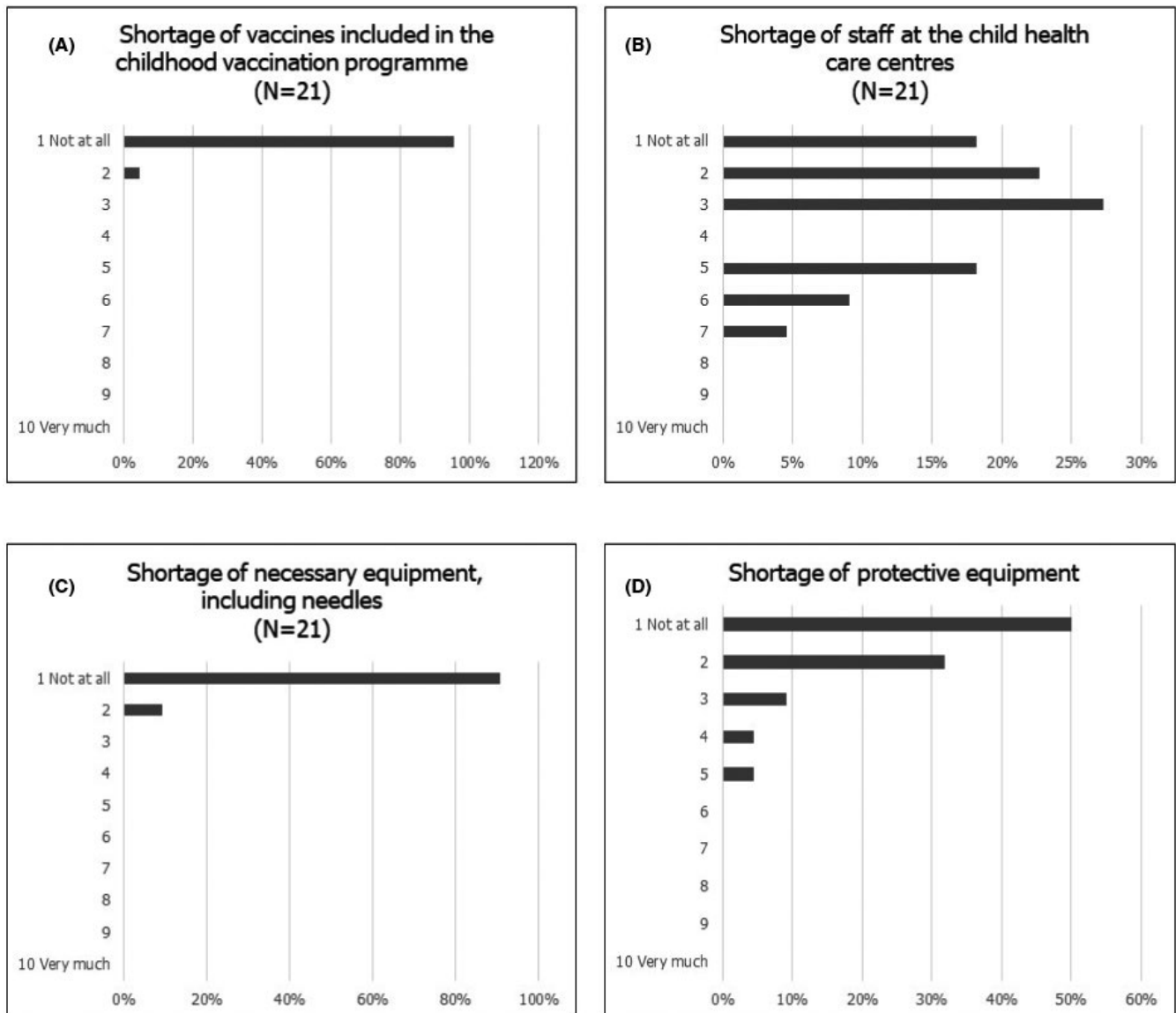


FIGURE 6 (A-D) Shortages of vaccines, child health centre staff, necessary equipment and protective equipment during the pandemic.

3.7 | Categories identified from the open-ended questions

The qualitative analysis of the open-ended questions resulted in three categories: the well-functioning health system, well-established trust and relationships with parents and well-trained healthcare providers. These categories were in line with the above mentioned results.

4 | DISCUSSION

The Swedish national childhood immunisation programme was sustained during the early COVID-19 pandemic, according to our survey of the 21 regional child health offices across Sweden. This was achieved by robust organisation, adherence to national guidelines that prioritised vaccinations, intensified communication with

families and flexibility at several organisational levels of child health services. In addition, the vaccine supply was sustained and the child health centres remained open. However, participants reported periodic staff shortages, increased numbers of cancelled health visits and paused parent education groups.

The literature has described how routine health services, such as immunisation services, have been vulnerable during the pandemic. There have been a number of barriers to maintaining routine immunisation programmes in many countries. These include disruptions in the supply chain due to border closures and travel restrictions and severe shortages of healthcare providers.¹⁹ However, the effect on Sweden has not had a negative impact on immunisation coverage during the current pandemic.

Thanks to the validated Swedish national vaccination register, vaccine coverage of young children has undergone thorough surveillance, even during the pandemic.¹⁷

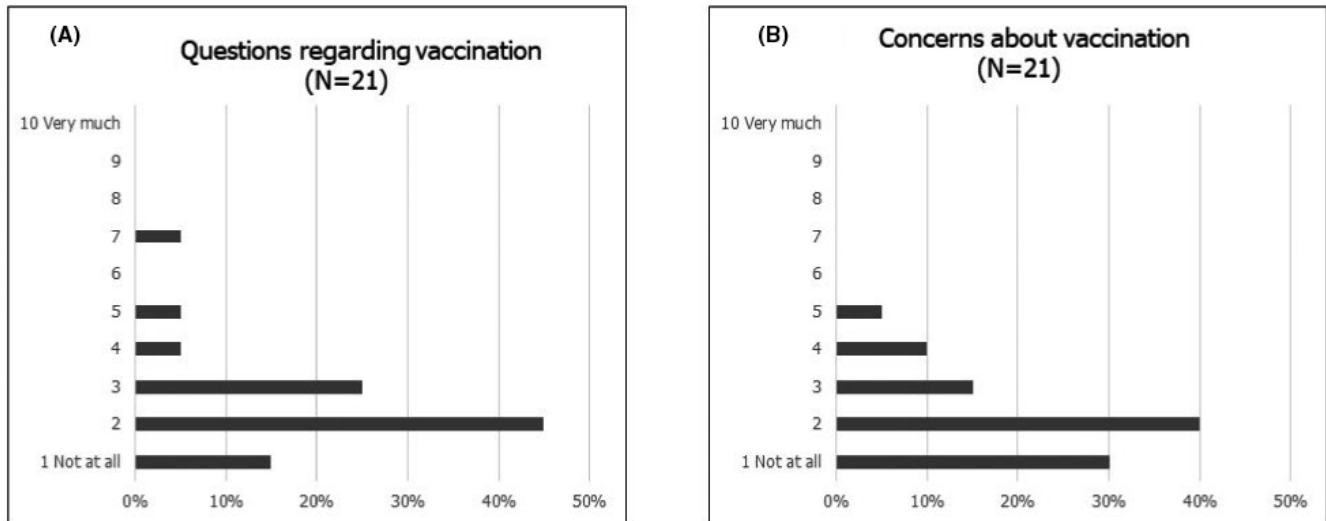


FIGURE 7 (A-B) Reported frequency of general questions or concerns about vaccinations raised by parents or guardians. 1 represents not at all and 10 indicated a lot.

4.1 | Strengths and limitations

One limitation of this study was that we studied only one part of a complex organisation involved in the national childhood immunisation programme. However, vaccine coverage was sustained, thanks to well-organised child health care, supported by organisations such as the Public Health Agency. The guidelines on prioritising immunisation from the WHO and the Swedish Public Health Agency were followed. However, a broader approach may be needed, in the future, including other stakeholders who may have different views. It would also be interesting to study facilitators and barriers to vaccination during the COVID-19 pandemic. These could include focus group interviews with child health nurses who provide vaccinations in different regions. We also need a deeper understanding of whether there were geographical and cultural differences in the reasons why parents cancelled bookings.

The cross-sectional design was a limitation with regard to drawing conclusions, compared to longitudinal studies. The strength of the study was that all 21 regional child healthcare offices took part in the survey, which enabled us to build up a national picture.

5 | CONCLUSION

There are several facilitators within the existing Swedish child healthcare organisation that have maintained routine childhood immunisation coverage in Sweden during the early pandemic. These included the country's long tradition of universal child health services, trusted relationships with local child health and well-established communication channels between all stakeholders. In addition, child health services remained mostly available during the pandemic.^{20,21}

We do not know how long this pandemic will last. It is essential to continue surveillance of vaccine coverage, identify any organisational changes, ensure supplies of routine vaccines and identify facilitators and barriers for childhood immunisation programmes, both in Sweden and globally.

The authors hope that these results can support Swedish child healthcare organisations during the pandemic and any future crises. Hopefully, the sustained vaccine coverage seen in Sweden can also provide a role model for countries experiencing reduced childhood immunisation during the COVID-19 pandemic.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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REFERENCES

1. WHO. 2020 <https://www.WHO.int/news/item/31-08-2020-in-WHO-global-pulse-survey-90-of-countries-report-disruptions-to-essential-health-services-since-covid-19-pandemic> Accessed 16 feb 2021
2. WHO. 2020. WHO | More than 117 million children at risk of missing out on measles vaccines, as COVID-19 surges Accessed 16 feb 2021
3. WHO. 2020. At least 80 million children under one at risk of diseases such as diphtheria, measles and polio as COVID-19 disrupts routine vaccination efforts, warn Gavi, WHO and UNICEF Accessed 16 feb 2021
4. Chandir S, Siddiqi DA, Mehmood M, et al. Impact of COVID-19 pandemic response on uptake of routine immunizations in Sindh, Pakistan: An analysis of provincial electronic immunization registry data. *Vaccine*. 2020;38(45):7146-7155.

5. Abbas K, Procter SR, van Zandvoort K, et al. Routine childhood immunisation during the COVID-19 pandemic in Africa: a benefit-risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. *Lancet Global health*. 2020;8(10):e1264-e1272.
6. Yle. 2020. Editorial comment from the Finnish broadcasting corporation, YLE. Färre har vaccinerats i år än tidigare - THL:s Salminen: Det här är mycket, mycket oroväckande | Hälsa | svenska.yle.fi Accessed 16 feb 2021
7. Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration – United States, 2020. *MMWR. Morbidity and Mortality Weekly Report*. 2020;69(19):591–593.
8. McDonald HI, Tessier E, White JM, Woodruff M, Knowles C, Bates C, et al. Early impact of the coronavirus disease (COVID-19) pandemic and physical distancing measures on routine childhood vaccinations in England, January to April 2020. *Eurosurveillance*. 2020;25(19). <https://doi.org/10.2807/1560-7917.ES.2020.25.19.2000848>
9. Europe WHO. Guidance on routine immunization services during COVID-19 pandemic in the WHO European Region, 20 March 2020 (produced by WHO/Europe). A4 Prelims English restricted distribution (who.int) Accessed 16 feb 2021
10. Public Health Agency of Sweden, 2020. BHV och elevhälsan – vaccinationsprogram – Folkhälsomyndigheten (folkhalsomyndigheten.se) Accessed 16 feb 2021
11. Rikshandboken i barnhälsovård, 2020 Rekommendationer för barnhälsovård under covid-19-pandemin - Rikshandboken i barnhälsovård (rikshandboken-bhv.se) Accessed 16 feb 2021
12. PublicHealthAgencyofSweden,2020.Barnvaccinationsprogrammet stabilt under pandemin – Folkhälsomyndigheten (folkhalsomyndigheten.se) Accessed 16 feb 2021
13. Arat A, Burström B, Östberg V, Hjern A. Social inequities in vaccination coverage among infants and pre-school children in Europe and Australia - a systematic review. *BMC Public Health*. 2019;19(1):290.
14. Wallby T, Hjern A. Child health care uptake among low-income and immigrant families in a Swedish county. *Acta Paediatrica*. 2011;100(11):1495–1503.
15. Wettergren B, Blennow M, Hjern A, Söder O, Ludvigsson JF. Child health systems in Sweden. *J Pediatric*. 2016;177:S187–S202.
16. Schollin Ask L, Hjern A, Lindstrand A, Olen O, Sjögren E, Blennow M, et al. Receiving early information and trusting Swedish child health centre nurses increased parents' willingness to vaccinate against rotavirus infections. *Acta Paediatrica*. 2017;106(8):1309–1316.
17. Chrapkowska C, Galanis I, Kark M, et al. Validation of the new Swedish vaccination register - Accuracy and completeness of register data. *Vaccine*. 2020;38(25):4104–4110.
18. WHO. 2020. Global Routine Immunization Strategies and Practices (GRISP). WHO | Global Routine Immunization Strategies and Practices (GRISP) Accessed 16 feb 2021
19. Olorunsaiye CZ, Yusuf KK, Reinhart K, Salihu HM. COVID-19 and child vaccination: A systematic approach to closing the immunization gap. *International journal of MCH and AIDS*. 2020;9(3):381-385.
20. Public Health Agency of Sweden, 2020. The Public Health Agency of Sweden's work with COVID-19 - The Public Health Agency of Sweden (folkhalsomyndigheten.se) Accessed 16 feb 2021
21. Ludvigsson JF. The first eight months of Sweden's COVID-19 strategy and the key actions and actors that were involved. *Acta Paediatrica*. 2020;109(12):2459–2471.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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