BMJ Paediatrics Open

Pandemics, epidemics and inequities in routine childhood vaccination coverage: a rapid review

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To cite: Spencer N, Nathawad R, Arpin E, *et al*. Pandemics, epidemics and inequities in routine childhood vaccination coverage: a rapid review. *BMJ Paediatrics Open* 2020;**4**:e000842. doi:10.1136/bmjpo-2020-000842

Received 17 August 2020
Accepted 8 October 2020

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ABSTRACT

Inequity in routine childhood vaccination coverage is well researched. Pandemics disrupt infrastructure and divert health resources from preventive care, including vaccination programmes, leading to increased vaccine preventable morbidity and mortality. COVID-19 control measures have resulted in coverage reductions. We conducted a rapid review of the impact of pandemics on existing inequities in routine vaccination coverage. PICO search framework: Population: children 0–18 years; Intervention/exposure: pandemic/epidemic; Comparison: inequality; Outcome: routine vaccination coverage. The review demonstrates a gap in the literature as none of the 29 papers selected for full-paper review from 1973 abstracts identified from searches met the inclusion criteria.

INTRODUCTION

Inequity in routine vaccination coverage in low and middle-income countries, although reducing, persists with children in the poorest households and remote rural areas less likely to receive optimal immunisation coverage due to inadequate health infrastructure and supply chain problems.[1] Inequity in coverage in high-income countries has also been reported.[2] Infectious outbreaks, such as COVID-19, H1N1 and Ebola epidemics, disrupt infrastructure and divert health resources from preventive healthcare, such as routine immunisation programmes, to management of acute illness. As a result, routine immunisation programmes are allotted fewer resources and lower priority, thereby threatening the health of children. UNICEF reports twice as many children died of measles during the Ebola epidemic than of the virus itself.[3] Measures to control the spread of COVID-19 have disrupted vaccination programmes in high and low-income countries.[2 3] Following the introduction of physical distancing measures due to COVID-19 in England, hexavalent vaccination was 4.4% lower (95% CI −4.8% to −4.0%) and measles, mumps and rubella vaccination 7.2% lower (95% CI −7.7% to −6.7%) than in 2019.[4] The potential for inequity in vaccination coverage reduction in the UK has been raised though no reference cited.[2] We conducted a rapid review to synthesise published evidence for the impact of pandemics and epidemics, including COVID-19, on inequities in routine childhood vaccination coverage.

METHODS

PICO search framework: Population: children aged 0–18 years; Intervention/exposure: pandemic, epidemic, COVID-19, SARS, Middle East respiratory syndrome, H1N1; Comparison: inequality/inequity; Outcome: immunisation, vaccination coverage. Using a search strategy devised by SJ (see Ovid MEDLINE search strategy in box 1), we searched the following clinical/medical, sociological and preprint electronic databases up to June 2020, week 2: Ovid MEDLINE(R); MEDLINE Daily; MEDLINE Epub Ahead of Print and In Process & Other Non-Indexed Citations; Embase; Web of Science; Cochrane Central; Cochrane CDSR; Sociological Abstracts; ASSIA; and MedRxiv. Start date for Web of Science is 1900 and MEDLINE 1946. The remaining databases start later. No language restrictions were imposed. Inclusion criteria: papers reporting data on social, regional or gender inequality in reductions in routine childhood vaccination coverage during any pandemic or epidemic. Abstracts were independently screened by three authors (EA, RN and NS) who selected papers for full review which were then independently evaluated against the inclusion criteria by the same authors. Differences were resolved by consensus. Results presented as a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram in figure 1. There was no patient or public involvement in this study.

RESULTS

The search strategies in the 10 databases identified 1973 abstracts after deduplication

Box 1 Search strategy: Ovid MEDLINE(R) (1946 to June 2020, week 2)

1. pandemic*.mp. or exp Disease Outbreaks/ or exp Influenza Pandemic, 1918–1919/or exp Pandemics/ (112619).
2. epidemic.mp. or exp Epidemics/ (90574).
3. exp Influenza A Virus, H1N1 Subtype/ or h1n1.mp. (19098).
4. exp SARS Virus/ or exp Severe Acute Respiratory Syndrome/ or sars*.mp. (11449).
5. mers.mp. or exp Middle East Respiratory Syndrome Coronavirus/ (3657).
6. exp Coronavirus Infections/ or covid*.mp. or coronavir*.mp. (22685).
7. exp Coronaviridae/ (17450).
8. 1 or 2 or 3 or 4 or 5 or 6 or 7 (192951).
9. exp Vaccines/ or vaccin*.mp. or exp Vaccination/ (347853).
10. exp mass vaccination/ (3012).
11. exp viral vaccines/ or viral vaccin*.mp. (109948).
12. exp vaccination coverage/ (1042).
13. exp Immunization Programs/ or exp Immunization/ or immunisation.mp. (184041).
14. immuni*.mp. (413778).
15. 9 or 10 or 11 or 12 or 13 or 14 (649139).
16. inequality.mp. or exp Socioeconomic Factors/ (455074).
17. inequalities.mp. (15908).
18. exp Poverty/ (43029).
19. healthcare disparities.mp. or exp Healthcare Disparities/ (16909).
20. exp Health Services Accessibility/ (110071).
21. exp Income/ (62914).
22. exp Social Class/ or social status.mp. (44940).
23. exp Educational Status/ (51454).
24. exp "social determinants of health"/ (3005).
25. exp Health Status Disparities/ or exp Health Status/ (335619).
26. 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 (845727).
27. exp Child/ or child*.mp. (2271544).
28. infant*.mp. or exp Infant/ (1222215).
29. 27 or 28 (2776507).
30. 8 and 15 and 26 and 29 (342).

(figure 1). Twenty-eight papers were selected for full-paper review and one additional paper was identified in secondary search of references. The reviewed papers were excluded for the following reasons: measures of inequity not reported (14 papers); outbreak-specific vaccine reported not routine vaccination (13 papers); and not pandemic related (2 papers). No publication meeting the inclusion criteria was identified by the search.

DISCUSSION

Equity in routine childhood vaccination coverage, especially for poor, marginalised and rural communities, has been identified by WHO[1] and UNICEF[5] as essential to the attainment of Sustainable Development Goal 3.b. Inequity in immunisation access is a violation of the child's right to survival and optimal healthcare (United Nations Convention on the Rights of the Child Articles 6 and 24).[6] Although our search strategy included all major clinical/medical, sociological and preprint databases, reports and publications in the grey literature

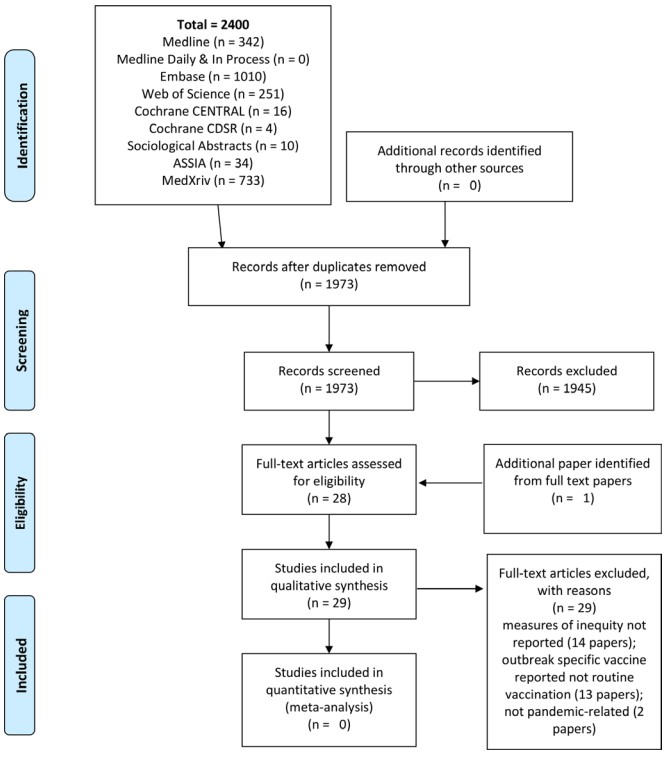

Figure 1 PRISMA 2009 Flow diagram. From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(6): e1000097. doi:10.1371/journal.pmed1000097. For more information, visit www.prisma-statement.org.

from non-governmental organisations and governments may have been missed. Our rapid review did not find any publications in the international literature encompassing pandemics and epidemics since 1900 with data on reduction in routine childhood vaccination by equity stratifiers. Research, using international data and including equity stratifiers, is needed to inform policy so that advances in vaccination coverage equity are not reversed.

Contributors NS, RN and EA devised the plan for the review. SJ designed the search strategy and ran the searches. NS, RN and EA independently reviewed the citation abstracts, selected the papers for full-paper review and assessed the papers against inclusion criteria. NS prepared the initial draft and all coauthors contributed to the final and revised versions.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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