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Contextualised strategies to increase childhood and adolescent vaccination coverage in South Africa: a mixed-methods study

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ABSTRACT

Introduction Despite the unparalleled success of immunisation in the control of vaccine preventable diseases, immunisation coverage in South Africa remains suboptimal. While many evidence-based interventions have successfully improved vaccination coverage in other countries, they are not necessarily appropriate to the immunisation needs, barriers and facilitators of South Africa. The aim of this research is to investigate barriers and facilitators to optimal vaccination uptake, and develop contextualised strategies and implementation plans to increase childhood and adolescent vaccination coverage in South Africa.

Methods The study will employ a mixed-methods research design. It will be conducted over three iterative phases and use the Adopt, Contextualise or Adapt (ACA) model as an overarching conceptual framework. Phase 1 will identify, and develop a sampling frame of, immunisation stakeholders involved in the design, planning and implementation of childhood and human papillomavirus immunisation programmes in South Africa. Phase 2 will identify the main barriers and facilitators to, and solutions for, increasing vaccination coverage. This phase will comprise exploratory qualitative research with stakeholders and a review of existing systematic reviews on interventions for improving vaccination coverage. Using the findings from Phase 2 and the ACA model, Phase 3 will develop a set of proposed interventions and implementation action plans for improving immunisation coverage in South Africa. These plans will be discussed, revised and finalised through a series of participatory stakeholder workshops and an online questionnaire, conducted as part of Phase 3.

Ethics Ethical approval was obtained from the South African Medical Research Council (EC018-11/2018). No risks to participants are expected. Various steps will be taken to ensure the anonymity and confidentiality of participants.

Dissemination The study findings will be shared at stakeholder workshops, the website of Cochrane South Africa and academic publications and conferences.

Strengths and limitations of this study

- Our mixed-methods and theory-informed approach will facilitate the development of a more holistic and comprehensive understanding of the barriers and facilitators to vaccination uptake than could be gained from single methodologies and atheoretical approaches.
- Our rigorous maximum variation sampling approach will enable engagement with a heterogeneous group of relevant stakeholders and could potentially provide maximum diversity of responses and experiences to address our research questions.
- Complementary research competencies and experiences among the research team will help strengthen the rigour of the study interpretations.
- Our sample is limited to stakeholders involved in the design, planning and implementation of immunisation programmes, with the exclusion of potentially relevant decision-makers outside the field of immunisation and the end-users of vaccinations.
- The scope of our study does not include an evaluation of the implementation of interventions, nor the measurement of the effectiveness of the interventions, another potential limitation of the study.

BACKGROUND

Despite the unparalleled success of immunisation in the control of vaccine preventable diseases, immunisation coverage in South Africa remains suboptimal.[1] Not only has the country failed to reach internationally-set vaccination coverage targets, locally-set targets also remain unachieved. At the World Health Assembly in May 2012, all 194 WHO Member States, including South Africa, endorsed the Global Vaccine Action Plan and committed to achieving at least 90% national coverage with three doses of diphtheria-tetanus-pertussis (DTP3) containing vaccines in children under 1 year of age in all countries by 2015.[2] South Africa had set a goal of achieving at least 92% DTP3 coverage by 2017.[3] However, the South African Demographic and Health Survey conducted in 2016 found DTP3

coverage to be only 66%.[4] The low childhood immunisation coverage in South Africa points to a serious situation which may see the country battle with the re-emergence of previously controlled infectious conditions including diphtheria, pertussis and measles. There are already indications of re-emergence of these conditions in some parts of the country, including recent diphtheria and measles outbreaks.[5 6]

To ensure a sustainable improvement in vaccination coverage in South Africa, we need to identify what the main barriers are, and develop and implement effective and context-specific interventions to address these barriers. There are many successful evidence-based interventions to increase immunisation coverage in other countries. These include strategies directed at recipients of immunisation services, healthcare providers or the health system, as well as multi-component strategies.[7 8] However, while strategies to increase vaccination uptake may be effective in one setting, they are not necessarily applicable or effective elsewhere.[7] Irrespective of their effectiveness, immediate adoption of interventions from elsewhere is only likely to occur if health systems, health expenditure, disease epidemiology, workforce and training and patient literacy and sharing are common between countries.[7 8] When this is not the situation, contextualisation or adaptation of interventions may be required to ensure that they are locally relevant, and engage local people appropriately to enhance uptake.[9] Contextualisation and adaptation involve building 'bridges' between the best evidence and effective local implementation, when best-available evidence recommendations cannot be immediately adopted.[9 10] Ultimately, in implementing interventions there is a need 'to move from what works to what works where and why'.[9]

South Africa's immunisation programme

Currently the National Department of Health's Expanded Programme on Immunisation of South Africa targets 11 diseases: polio, measles, tuberculosis, diphtheria, pertussis, tetanus, *Haemophilus influenzae* type b, hepatitis B, rotavirus diarrhoea, pneumococcal infection and cervical cancer (see table 1). Vaccines against the first 10 diseases are provided free of charge to infants and children at all public healthcare facilities. Since 2014, cervical cancer has been targeted through a school-based human papillomavirus (HPV) vaccination programme, with two doses (6 months apart, administered during 1-month campaigns) of the bivalent HPV vaccine offered free of charge to grade 4 girls aged 9 years or more in public sector schools. In addition to the vaccines listed in table 1, vaccines targeting influenza, rubella, mumps, varicella (chickenpox), meningococcal meningitis, hepatitis A and genital warts (the quadrivalent HPV vaccine prevents cervical cancer and genital warts) are available in the private sector in South Africa.

Table 1 Expanded Programme on Immunisation schedule in South Africa

Age of child	Vaccines scheduled
At birth	Bacille Calmette-Guérin (BCG) Oral polio vaccine (OPV) (0)
6 weeks	OPV (1) Rotavirus vaccine (RV) (1) Diphtheria, tetanus and acellular pertussis vaccine + inactivated polio vaccine + *Haemophilus influenzae* type b vaccine + hepatitis B vaccine combined (DTaP-IPV-Hib-HepB) (1) Pneumococcal conjugate vaccine (PCV) (1)
10 weeks	DTaP-IPV-Hib-HepB (2)
14 weeks	RV (2) DTaP-IPV-Hib-HepB (3) PCV (2)
6 months	Measles vaccine (1)
9 months	PCV (3)
12 months	Measles vaccine (2)
18 months	DTaP-IPV-Hib-HepB (4)
6 years	Tetanus and reduced-strength diphtheria vaccine (Td) vaccine
≥9 years	Human papillomavirus (HPV) vaccine (1 and 2; 6 months apart)
12 years	Td vaccine

Aims and objectives

The overarching aim of this research is to investigate barriers and facilitators to optimal uptake of vaccination services and develop contextualised strategies and implementation plans to increase childhood and adolescent vaccination coverage in South Africa. The specific objectives are to:

1. Identify and compile a list of stakeholders who are involved in the planning, design and/or implementation of childhood and adolescent vaccination programmes in South Africa;
2. Consult with representative samples of these stakeholders to identify barriers and facilitators to, and solutions for, increasing vaccination coverage;
3. Identify and review relevant in-country immunisation-related documentation, including (but not limited to) legislation and policies relevant to immunisation;
4. Conduct a review of systematic reviews on effects of interventions for improving vaccination coverage;
5. Develop practical interventions and implementation plans for increasing vaccination coverage in South Africa and tailoring global evidence to local needs, barriers and facilitators.

METHODS

This study will employ a mixed-methods research design, including exploratory qualitative research with immunisation stakeholders, stakeholder participatory workshops, reviewing of the global literature and a structured

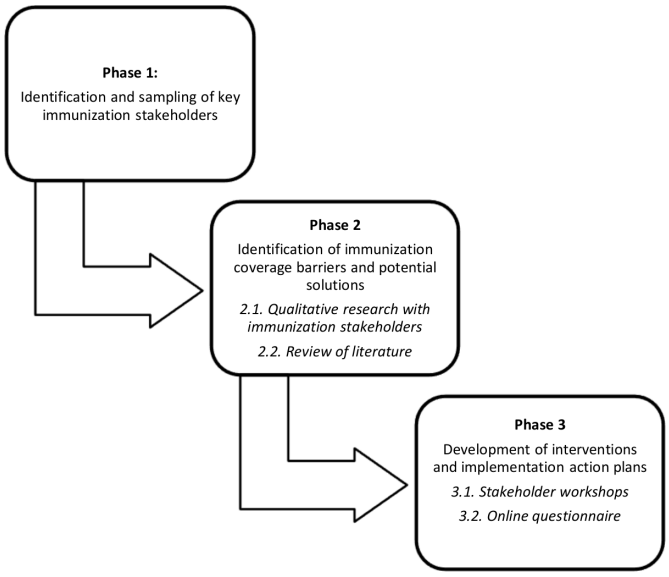

Figure 1 Study phases.

questionnaire. It will consist of three iterative phases. The study will commence in July 2019 and will end in July 2021. An overview of the study phases is depicted in figure 1.

Overarching conceptual framework

We will draw on the Adopt, Contextualise or Adapt (ACA) model developed by Dizon and colleagues[11] as the overarching conceptual framework for the study. This framework was developed and tested for use in low-income and middle-income countries to better understand the gap between evidence-based recommendations and their local uptake. The ACA comprises 18 well-defined stages to identify barriers to intervention or guideline implementation and to guide discussions on implementing solutions to barriers. It considers the time frames for likely impact of solutions; with the assumption that longer-term time frames are generally required when solutions necessitate change to policies, regulations, health systems or research. The use of the ACA model in the planned study is double-sided, in that it will help to identify barriers for reaching all children and adolescents with life-saving vaccines and address local implementation of strategies that have been used elsewhere to increase coverage, thus ensuring that strategies are relevant to local situations.

Phase 1: identification and sampling of immunisation stakeholders

A draft list of stakeholder groups has already been developed by the project team and will be updated iteratively and as necessary. This list was developed by the project team, drawing on their collective knowledge of the relevant stakeholders, scoping of the literature, team discussions and the list generated from an earlier study among Expanded Programme on Immunisation (EPI) managers.[1] The methodology for developing the stakeholder list was guided by the methods used by the South African Guidelines Excellence Allied Health study in identifying a complex multiple stakeholder allied health reference sample.[12]

Stakeholders comprise people involved in any aspect of the design, planning and implementation of childhood and HPV immunisation programmes in South Africa. These include policymakers in national and provincial departments of health and education, programme and facility managers and bureaucrats, healthcare personnel and educators, academics or researchers, funders, members of professional associations, independent advisory bodies, Non-Governmental Organisations and school governing bodies.

Both maximum variation and snowball sampling techniques will be used.[13] We have divided the stakeholder groups into clusters and estimated the number of people, and their potential roles, likely to be available in each cluster. The number of people we aim to speak to in each cluster will depend on the size of the cluster, and the likely heterogeneity of the people within the cluster. For example, in some stakeholder groups, such as the South African National Department of Health, it appears that each person involved in immunisation has a different role and will potentially bring a different perspective. Therefore, the estimated sample size is the same as the estimated number of people in the group. In other stakeholder groups, where there are many people doing similar work, we will sample approximately 10% (as appropriate across geographical areas). We anticipate a sample of approximately 140 people (either individually or in focus groups), however, sampling will be continued until data saturation is reached.

In table 1 (see online supplementary file 1) we outline the potentially-relevant stakeholder groups, the estimated number of people in each and how we will approach the sampling for each group.

Patient and public involvement

In the current study we have not involved patients in the design and do not plan to involve them in the recruitment and conduct of the study. The beneficiaries or end-users of vaccination and the wider public also will not be included as participants in the study. Previous research in South Africa has identified that the vast majority of missed opportunities for vaccinations are caused by health facility obstacles,[14–16] and thus we felt it is pertinent to start with understanding the 'provider-perspective'. We intend to build on the findings of this study to develop and implement a larger-scale subsequent study to obtain the views, experiences and input of the end-users of vaccination, including patients and the wider public.

The results of the study will be disseminated to participants through a variety of mechanisms, including at the consultation workshops, through the online questionnaire and Cochrane South Africa website and through a project report of the main study findings which will be shared with all stakeholders who took part in interviews, focus groups and/or consultation workshops (see more details under 'Dissemination of Findings)

Phase 2: identification of immunisation coverage barriers and potential solutions

Qualitative research with immunisation stakeholders

Recruitment

We will identify one key person in each stakeholder cluster who can assist us with recruitment of others. This may be someone at a national, provincial, regional or community level, who can assist in providing a short initial list of names of people who may be interested in participating, and who may know of others who might be interested in taking part in the study. Some members of our team are well known within the immunisation community in South Africa and have a clear understanding of the stakeholders and the key players. Thus, they will commence the recruitment by identifying names of people in key positions, who are known to them, and who they believe could assist with recruitment of others. We will also obtain, from the South African National Department of Health (NDoH), permission to conduct interviews with NDoH stakeholders and support with identifying and contacting such stakeholders.

Potential participants will be sent an email inviting them to take part in either interviews or focus group discussions. If no response is received within 2 weeks, we will follow-up the invitation with another email and/or phone call. If we do not have a response at this stage, we will select another person in the same group (if possible) and initiate the invitation process.

Data collection

Semi-structured interviews or focus group discussions (FGDs) will be conducted with the sample of immunisation stakeholders. The choice of an individual interview or FDG will be determined by the role, sensitivities, time constraints and knowledge of participants. It is envisaged that individual interviews will be conducted with participants in unique roles (where only that person can provide insights from that perspective). Focus groups will be conducted for efficiency when the views of a number of representatives of the same stakeholder group should be heard, where it is feasible to combine participants from one stakeholder group, and/or where hearing these views as a group will potentially increase the richness of understanding.[17]

Interviews will be conducted face-to-face or telephonically at a date and time chosen by participants. Face-to-face interviews will take place at a location convenient to participants, which is conducive to a confidential exchange. The interviews will last between 45 and 60 min. FGDs will last between 60 to 120 min and will each contain 6 to 10 participants, in line with methodological recommendations of appropriate focus group size.[18] The composition of focus groups will be stakeholder-specific, for example only nurses or only EPI managers. This will prevent the power-dynamics that exist between different stakeholder groups from potentially impacting on the discussions, and help ensure that more marginalised individuals can openly express their views and their experiences.

Both the interviews and the FGDs will be guided by a semi-structured topic guide (see online supplementary file 2) and conducted by two researchers who are trained in qualitative research methodologies and interviewing techniques. The interview guide has been developed by drawing on and integrating the insights obtained from a preliminary mapping of potential barriers and solutions to immunisation coverage in South Africa conducted by the project team, a scoping review of the literature, team discussions and the findings of two previous studies conducted by the Principal Investigator of this study.[1 19] The topic guide will explore the following topics: involvement in immunisation programmes, general views on the EPI in South Africa, perspectives of the challenges of and solutions for the EPI programme (including in relation to the healthcare system, healthcare providers and service users/public) and views and experiences of the HPV vaccine and school-based HPV vaccination programme in South Africa. The guide will be flexible to ensure that participants can express what is important to them, and so learnings from previous interviews can be clarified and probed further.

With the permission of participants, all interviews and FGDs will be digitally recorded and field notes will be taken to ensure credibility and reliability of the information being collected. Data collection will be continued until data saturation is reached.

Data management and analysis

Interview and FGD recordings will be transcribed verbatim, and all personal identifying information will be removed from transcripts. The anonymised transcripts, together with field notes, will be downloaded into NVivo, a software programme that aids with the management and analysis of qualitative data.

The data will be analysed through a thematic analysis, using the phases described by Braun and Clarke.[20] Thematic analysis is a useful method for identifying and describing recurring patterns that are present in the data.[20] Two researchers will independently code 10 transcripts through line-by-line reading and with the aid of NVivo to create a list of conceptual components (‘opening coding’). These components will then be re-categorised into potential themes related to key immunisation barriers and solutions (‘selective coding’), and adapted into a coding framework to guide the analysis. The two researchers will compare their draft coding frameworks, and propose a standard and coherent coding framework. This will be presented to the project team for debate, clarification and endorsement for all subsequent analyses. One researcher will then code the rest of the transcripts using this framework. Additional or revised codes will be developed iteratively as determined by the data and added to the coding framework. Throughout the research, the project team will meet regularly to discuss emerging findings and themes, and to use these to fine tune interview questions for subsequent interviews and FGDs. The final product of the analysis will be a ‘conceptual map’ which

depicts the main barriers and potential solutions for increasing immunisation coverage in South Africa.

Review of literature

We will identify and review relevant in-country EPI-related documentation, including legislation and policies relevant to immunisation, including EPI policy documents; broader health plans (eg, the National Health Insurance, National Development Plan, Vision 2030); National Immunisation Technical Advisory Group reports and meeting minutes (where available); reports of stock-outs and any other relevant documents. We will also identify and review legislation and policy documents indirectly relevant to immunisation, for example, those related to school health and school standard operating procedures, data security and sharing and digital health, among others. We will use both these directly and indirectly relevant documents to obtain information on the context of immunisation in South Africa and reported barriers and facilitators, to supplement the findings from our qualitative research with stakeholders.

We will also conduct a review of systematic reviews of interventions for improving vaccination coverage worldwide. The objective of the review is to provide a broad synthesis of what is known from up-to-date systematic reviews about the effectiveness and costs of interventions for improving vaccination coverage.

We will develop a comprehensive search strategy for peer-reviewed literature, and search the following databases from inception to the date of the search: Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, PubMed and PDQ-Evidence.[21] We will use standard Cochrane methods for the screening of search outputs, selection of reviews, data extraction and assessment of methodological quality of included reviews.[22 23] For each included systematic review, we will prepare key messages, important background information, a summary of the findings of the review and structured assessments of the relevance of the review for South Africa. The reviews will be organised using the logic framework we have previously developed for interventions aimed at improving vaccination coverage.[8]

We will describe the characteristics of the included reviews in a table that will include the date of the last search, any important limitations, what the review authors searched for and what they found. We will take into account all other relevant considerations besides the findings of the included reviews when drawing conclusions about implications for the immunisation programme in South Africa. This includes considerations related to the applicability of the findings, likely impacts on equity and the values and preferences of South African immunisation stakeholders.

Phase 3: development of intervention recommendations and implementation action plans

Using the findings from Phase 2, together with the ACA decision-making process,[11] the project team will develop a set of proposed interventions and implementation action plans for improving immunisation coverage in South Africa. We will also undertake a preliminary costing of each proposed intervention and accompanying implementation plan.

Stakeholder workshops

The list of interventions, draft implementation plans and preliminary costs will be sent to all stakeholders who took part in interviews and FGDs, as well as to the head of each stakeholder group for comment. Thereafter, stakeholder workshops will be convened. Questions and comments on the draft implementation plans will be invited prior to the workshops. Modifications will be made to the draft implementation plan prior to the workshop, and the revised plan will be circulated several days before the workshop to allow participants to familiarise themselves with changes. An accompanying document will outline the modifications that were made and why they were made.

One main workshop will be held at the South African Medical Research Council (SAMRC) Head Office in Cape Town, and at least one workshop will be held in each province after this. All those who participated in interviews and FGDs, as well as the head of each stakeholder group, will be invited to attend a workshop. Using a range of participatory methodologies,[24] the modified implementation plan will be discussed, further revised and endorsed at the main workshop, and this document will be presented and endorsed at each subsequent workshop. Not only will the workshops acknowledge stakeholders' valuable participation in the research, they will also help facilitate 'buy-in' for proposed implementation strategies. That is, stakeholders will potentially become change agents on the ground, who can assist in implementing and improving uptake of recommended interventions.[25]

Online questionnaire

Individuals from stakeholder groups (outlined in Phase 1) who did not take part in interviews or FGDs will be given an opportunity to provide input on the recommended interventions and implementation action plans through an online questionnaire. Specific targeted approaches (including emails, telephone calls, postal mail, editorials or advertisements in professional newsletters and journals, website alerts and other social media outlets such as Twitter and Facebook) will be used to alert people in the stakeholder groups about the questionnaire and to invite them to provide input.

Individuals will be invited to download the summary document and implementation plans from a link hosted on the Cochrane South Africa website. Feedback on the implementation plans will be invited for a 6-week period, using a structured questionnaire delivered by an electronic SurveyMonkey form. SurveyMonkey is an efficient electronic tool that captures large data sets safely and quickly. It also collates findings into a Microsoft Excel spreadsheet. The questionnaire will be linked directly to the implementation plans for ease of questionnaire

completion. It will ask for input on the feasibility and acceptability of the implementation plans and whether the time frame of the plans is achievable. Respondents will also be asked to identify potential barriers to successful implementation of the plans, and if possible, to identify ways to resolve them. We anticipate no more than 10 questions on the implementation plans, and another one to two questions on barriers and facilitators. Where possible, questions will have drop-down menus to aid completion. Feedback will be anonymous.

The feedback will be summarised descriptively for each question, using the appropriate statistics (percentages or mean values). The findings will be posted on the Cochrane South Africa website within 2 months of the closure of the consultation period, and will be held there while the implementation plans are being rolled out. In this way, stakeholders can have immediate access to the plans and the feedback as required.

ETHICAL CONSIDERATIONS

Ethical approval has been obtained from the SAMRC (EC018-11/2018). The study process will comply with the requirements of the latest version of the Declaration of Helsinki (seventh revision, 2013). Verbal and written information about the study will be provided to all participants taking part in interviews and FGDs. The consent form will make the following aspects explicit: the voluntary nature of participation, that there will be no negative consequences if they decide not to participate and that they will be asked explicitly for permission for the interview to be digitally recorded and that this is also voluntary. Written consent will be obtained from all research participants before proceeding with interviews or focus groups. All participants who complete the structured questionnaire will be provided with an online study information sheet as part of the electronic SurveyMonkey form, and will be required to provide online consent before proceeding with the questionnaire. All feedback on the questionnaire will be anonymous.

Details from interviews and FGDs will be entered into a study-specific database on the day of collection (stakeholder group, participant ID, and so on). Study data, including audio-recordings, will be stored on password-protected computers and shared with the study team only. All digital recorders on recorders will be destroyed following safe storage and transcription, and identifying information will be removed from all transcripts. Reports of the findings will not identify individual participants. Participant anonymity and confidentiality will thus be ensured.

No risks to participants or researchers are expected. All potential participants for interviews or focus groups are not considered as vulnerable individuals or groups. However, participants may be uncomfortable expressing criticisms of vaccination programmes. Where there is this potential, and where potential participants identify concerns, we will reassure participants of the steps that will be taken to ensure confidentiality. For participants in focus groups, we will remind participants at the outset that while the researchers undertake to maintain confidentiality, we cannot guarantee that other focus group participants will. At the start of the focus group, we will discuss the importance of maintaining confidentiality by everyone involved after the focus group, but will explain that there is an inherent risk of breaches of confidentiality in this method. We will ensure participants are aware of this risk.

DISSEMINATION OF FINDINGS

The findings of the study will be shared with people in the stakeholder groups, at the consultation workshops and through the online questionnaire and Cochrane South Africa website. In addition, at the end of the study, a project report of the main study findings will be shared with all stakeholders who took part in interviews, focus groups and/or consultation workshops. The findings will also be communicated through academic publications and conferences. Reporting of the qualitative data will adhere to the Consolidated criteria for reporting qualitative research (COREQ)[26] guidelines and the reporting of the review of systematic reviews will adhere to the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P)[27] and PRISMA[28] for the protocol and full review, respectively.

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Contributors The study was conceived by CW. SC led the design of the qualitative components of the study. KD and JD developed the overarching conceptual framework and the sampling approach. NN and DN developed the list of stakeholder groups, with input from PM and RB; NN, DN, PM and RB worked together to develop the methodology for phase 3 of the study. The manuscript was drafted by CW and SC. All authors reviewed and provided critical input to manuscript drafts and provided final approval.

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REFERENCES

1 Wiysonge CS, Ngcobo NJ, Jeena PM, *et al*. Advances in childhood immunisation in South Africa: where to now? programme managers' views and evidence from systematic reviews. *BMC Public Health* 2012;12:578.
2 World Health Organisation. Global vaccine action plan 2011-2020, 2013. Available: http://www.who.int/immunization/global_vaccine_action_plan/en/ [Accessed 14 Oct 2018].
3 National Department of Health. *Annual report 2016/17: strategic outcome orientated goals*. Pretoria, South Africa: National Department of Health, 2017: 30.
4 National Department of Health and Statistics South Africa and South African Medical Research Council and ICF. *South Africa demographic and health survey 2016*. Pretoria, South Africa, and Rockville, Maryland USA: National Department of Health, Statistics South Africa, South African Medical Research Council and ICF, 2019.
5 National Institute for Communicable Diseases. Diphtheria: update on outbreak in KwaZulu-Natal Province. *Communicable Diseases Communique* 2015;14.
6 National Institute for Communicable Diseases. Measles outbreaks and surveillance update in South Africa, January-September 2017. *Communicable Diseases Communique* 2017;16.
7 Oyo-Ita A, Wiysonge CS, Oringanje C, *et al*. Interventions for improving coverage of childhood immunisation in low- and middle-income countries. *Cochrane Database Syst Rev* 2016;7:CD008145.
8 Wiysonge CS, Young T, Kredo T, *et al*. Interventions for improving childhood vaccination coverage in low- and middle-income countries. *S Afr Med J* 2015;105:892–3.
9 Machingaidze S, Grimmer K, Louw Q, *et al*. Next generation clinical guidance for primary care in South Africa - credible, consistent and pragmatic. *PLoS One* 2018;13:e0195025.
10 Dizon JM, Machingaidze S, Grimmer K. To adopt, to adapt, or to contextualise? The big question in clinical practice Guideline development. *BMC Res Notes* 2016;9:442.
11 Dizon JM, Grimmer K, Louw Q, *et al*. South African guidelines excellence (SAGE): adopt, adapt, or contextualise? *S Afr Med J* 2016;106:1177–8.
12 Dizon JM, Grimmer K, Machingaidze S, *et al*. Mapping South African allied health primary care clinical guideline activity: establishing a stakeholder reference sample. *Health Res Policy Syst* 2016;14:77.
13 Patton MQ. *Qualitative research and evaluation methods*. 3rd edn. Thousand Oaks, CA: Sage, 2002.
14 Burnett RJ, Mmoledi G, Ngcobo NJ, *et al*. Impact of vaccine stock-outs on infant vaccination coverage: a hospital-based survey from South Africa. *Int Health* 2018;10:376–81.
15 Corrigall J, Coetzee D, Cameron N. Is the Western Cape at risk of an outbreak of preventable childhood diseases? Lessons from an evaluation of routine immunisation coverage. *S Afr Med J* 2008;98:41–5.
16 Le Roux K, Akin-Olugbade O, Katzen LS, *et al*. Immunisation coverage in the rural Eastern Cape - are we getting the basics of primary care right? Results from a longitudinal prospective cohort study. *S Afr Med J* 2016;107:52–5.
17 Lambert SD, Loiselle CG. Combining individual interviews and focus groups to enhance data richness. *J Adv Nurs* 2008;62:228–37.
18 Lindlof T, Taylor B. *Qualitative communication research methods*. 2nd edn. Thousand Oaks, CA: Sage, 2002.
19 Wiysonge CS, Uthman OA, Ndumbe PM, *et al*. Individual and contextual factors associated with low childhood immunisation coverage in sub-Saharan Africa: a multilevel analysis. *PLoS One* 2012;7:e37905.
20 Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.
21 Johansen M, Rada G, Rosenbaum S, *et al*. A comparative evaluation of PDQ-Evidence. *Health Res Policy Syst* 2018;16:27.
22 Pantoja T, Opiyo N, Lewin S, *et al*. Implementation strategies for health systems in low-income countries: an overview of systematic reviews. *Cochrane Database Syst Rev* 2017;9:CD011086.
23 Wiysonge CS, Paulsen E, Lewin S, *et al*. Financial arrangements for health systems in low-income countries: an overview of systematic reviews. *Cochrane Database Syst Rev* 2017;9:CD011084.
24 AVAC and UNAIDS. Good participatory practice: guidelines for biomedical HIV prevention trials 2011 Geneva: joint United nations programme on HIV/AIDS (UNAIDS), 2011. Available: http://www.unaids.org/sites/default/files/media_asset/JC1853_GPP_Guidelines_2011_en_0.pdf [Accessed 1 Jun 2017].
25 Kitson A, Harvey G, McCormack B. Enabling the implementation of evidence based practice: a conceptual framework. *Qual Health Care* 1998;7:149–58.
26 Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19:349–57.
27 Shamseer L, Moher D, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647.
28 Moher D, Liberati A, Tetzlaff J, *et al*. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009;6:e1000097.