Exploring the role of district clinical specialist teams in maternal health outcomes in a South African district: A mixed method study from 2012 to 2020

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Background. High maternal and child mortality in South Africa (SA) necessitated the establishment of district clinical specialist teams (DCSTs) in all health districts in 2012, mandated to work in collaboration with district managers and health professionals to achieve joint goals of improved maternal and child health services and outcomes.
Objectives. Within the context of SA district health services, to explore the various obstetric intervention measures undertaken by a DCST over an 8-year period (July 2012 - February 2020), as aligned to the national DCST policy framework, and to document the knowledge and perceptions among managers and health professionals on the work done by the DCST in the district health service.
Methods. A review of DCST reports and documents was conducted along with in-person structured interviews among health professionals and district health managers in the Ekurhuleni Health District in SA. Health professionals who had a working relationship with the DCST and relevant managers of health, including CEOs, clinical managers, community health centre managers, maternal and child health co-ordinators and municipal managers were selected for the interview. Interviews were conducted by the interviewer using a data collection tool focused on the scope of work and acceptance of the DCST in improving maternal health services in a geographically defined district health system. Data collection tools were completed by the interviewer upon questioning the participants. Data were analysed by documenting the activities of the DCST, and thematic analysis was performed for the interviews.
Results. Analysis of DCST reports and documents revealed the broad range of activities, including clinical training and mentoring, clinical work, supervision, audit, research, monitoring and evaluation and clinical risk management. Thematic analysis extracted seven themes, namely clinical effectiveness, clinical risk management, professional development, accountability for maternal and child health, clinical work, monitoring and evaluation, and leadership and governance. All (n=20) participants acknowledged the positive impact of the DCST on the improvement in maternal health services.
Conclusion. The DCST was perceived by local peers as a successful strategy to improve maternal health services in a district health service. This success is likely rooted in its focused intervention measures, within a supportive environment of district managers and health professionals. Such district-based clinical teams are a potential strategy to improve maternal health services within primary healthcare services.
Keywords: district clinical specialist team, maternal health, district health services, outcomes

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Worldwide, over 295 000 women and girls died of complications related to pregnancy and childbirth in 2017, yielding an overall maternal mortality ratio (MMR) of 211 per 100 000 live births.[1] Sub-Saharan Africa (SSA) accounted for approximately two-thirds (196 000) of these maternal deaths.[2] Many initiatives (Millennium Development Goals, Campaign on Accelerated Reduction on Maternal Mortality in Africa, Saving Mothers, Giving Life and Sustainable Development Goals) have been developed to improve maternal health.[3-7] MMR in South Africa (SA) was 176/100 000 in the years 2008 - 2010.[8] While in many countries maternal mortality has been declining, in SA it has increased during the last decade. A 2007 community survey suggested that maternal mortality in SA may have quadrupled from 1998 to 2007.[9] Although SA has developed excellent maternal health policies, such as the right to reproductive healthcare in the Constitution,[10] 'Decreasing maternal and child mortality: Negotiated service delivery agreement: A long and healthy life for all South Africans'[11] and the policy document on primary healthcare re-engineering,[12] over the last two decades,

their implementation remains a major challenge at health facility level, leading to unacceptably high maternal mortality.[13] Analysis of maternal deaths by the National Committee for Confidential Enquiries into Maternal Deaths suggests that maternal mortality is mainly attributable to: (*i*) administrative factors, (*ii*) patient-related factors and (*iii*) health worker-related factors.[14]

Against this background, the SA National Department of Health decided to address these factors through a ministerial task team, which in 2012 recommended the establishment of district clinical specialist teams (DCSTs) in each SA district. Proposed roles and responsibilities were to 'ensure quality clinical services; providing clinical training, monitoring and evaluation, supporting district-level organisational activities and health systems and logistics, collaboration, communication, and reporting, teaching and research'.[15] Each DCST should include an obstetrician/gynaecologist, a paediatrician, a family physician, an advanced midwife, an advanced paediatric nurse and an advanced primary healthcare (PHC) nurse, and ideally also an anaesthesiologist.[15] During the establishment process of DCSTs in 2012, there were 72 DCSTs appointed, which was equal to 47% of the estimated 364 posts to be appointed nationally.[16] The DCST policy framework was developed, which included four pillars, namely, (*i*) clinical effectiveness, (*ii*) clinical risk management, (iii) professional development and (*iv*) accountability for maternal, neonatal, child and women's health (MNCWH) services at district level.[16]

Many studies have been conducted on maternal health outcomes in SA,[17-20] but very little is known about the state of maternal health and its determinants at a district and subdistrict level. DCSTs work at a district and subdistrict level to improve maternal and child health services, and are expected to work together with other district stakeholders, such as the district health management team, district heath information system team, local municipality, district managers and relevant health programme co-ordinators, for planning and problem-solving purposes.[21] The present study was planned against this backdrop. The broad aim was to assess the role of the DCST at Ekurhuleni Health District. The specific aim was to describe all DCST obstetric interventions, followed by structured interviews with relevant district managers and health professionals to determine their knowledge and perception thereof.

Methods

The study was conducted at the Ekurhuleni Health District, one of the 52 districts in SA, which is located in Gauteng Province. It has an estimated population of 4.1 million,[22] has 6 public sector hospitals (1 district hospital, 4 regional hospitals and 1 tertiary hospital), 8 community health centres (CHCs) and 95 PHC clinics. Hospitals and CHCs provide a 24-hour service to pregnant and non-pregnant women, children and men. Other services (antenatal, postnatal and women's health) are available on weekdays in all hospitals, CHCs and PHC clinics. Uncomplicated and complicated pregnant women are managed at PHC/CHCs and hospitals, respectively. Family physicians working at the PHC clinics and CHCs have an oversight function, including services to pregnant women. All health facilities report monthly performance to the relevant programme managers for the purpose of programme oversight. The DCST was implemented in the study district in 2012 when the district was one of the 25 worst-performing health districts in the country in terms of MMR, at 218/100 000 live births. The MMR was gradually reduced to 115/100 000 live births in 2020.[23]

This was a mixed methods study, and was conducted in two parts: firstly, an analysis of obstetric interventions and activities undertaken by the DCST over an 8-year period (July 2012 - February 2020), and secondly, semi-structured interviews with relevant district managers and health professionals working in the study district. The interview questionnaire was piloted in another district with two district managers and one health professional prior to conducting this study.

The DCST reports its activities monthly and quarterly to the province and the district management team, as required.[24] These reports were collated and evaluated, and similar activities were grouped under the related pillars of the DCST policy framework.

A research assistant (not living or employed in the study district and thereby functioning as an independent interviewer) conducted face-to-face interviews at the offices of the interviewees. Participants signed written informed consent prior to the interview. All transcripts were kept anonymous and given a unique study number. A snowballing method was used to identify participants who interacted with the DCST members, a sampling strategy suitable for the generation of knowledge about a phenomenon (implementation of DCST) that evolved over time and with inter-related developmental events.[25] This approach was used to minimise bias in the selection of interviewees.

Twenty interviews were conducted between May 2019 and February 2020, which included semi-structured conversations and open questions with open-ended probes. The interviews were continued until theme saturation was achieved. The interviews focused on maternal and women's health services, the functions of DCST members and the influence of the DCST on implementing changes in maternal health services in the district. Interviews were audio-recorded and transcribed, with ambiguities removed, and were then verified and signed by the participants. The first author and the interviewer independently extracted the statements and formulated the codes, which were then compared and checked by a second author. Codes were grouped into categories and developed into themes. Additional themes were added from new concepts derived from the interviews. The Human Research Ethics Committee (Medical) of the University of the Witwatersrand (ref. no. M 160231), Gauteng Provincial Research Committee and Ekurhuleni Health District Research Committee approved the study.

Results

Results are discussed in two parts, namely the recorded DCST activities, and qualitative interview results.

DCST activities and interventions

The four pillars of the DCST policy framework, as provided in Table 1, are subsequently used to discuss the DCST activities and interventions that were documented within the Ekurhuleni Health District.[15]

Pillar 1: Clinical effectiveness

The document review indicated that various activities were undertaken by the DCST with regard to maintaining clinical standards within the health district. The activities included regular support visits (weekly at hospitals, and monthly at CHCs and PHC clinics) for clinical mentoring and auditing, as well as regular use of platforms such as DCST-initiated WhatsApp groups for clinical assistance and mentoring services. Activities were also focused on specific needs and challenges at the facility and district level, as per need. Various clinical audits, such as on maternal deaths, stillbirths, partograms, cardiotocographies, antenatal care and family planning records, were conducted monthly, which subsequently informed targeted training and other interventions as part of clinical quality improvement cycles. Operational research projects, focused on the challenges in the health services, were also undertaken.

Table 1. Pillars of DCST policy framework[15]

Pillar	Component	Activity
1: Clinical effectiveness	Clinical standards	Clinical support to healthcare facilities Clinical support through mobile medicine (telephonic clinical consultation) Availability of skilled health workers at the service delivery point Accessibility of health services Clinical work Assisting referral of patients to appropriate levels of care Mobilising effective patient transport systems
	Clinical audits	Review of clinical records Operational research
2: Clinical risk management	Risks related to patients	Patient Safety Incident Committee meetings Mortality and morbidity meetings Quality assurance meetings Provision of expert analysis of all adverse events and legal cases
	Risks related to healthcare providers	Improving the skills, knowledge and competency of health professionals who manage patients Discussing the adverse events with the healthcare provider to identify the gaps, if any, and improve the skills
	Risks related to the organisation	Reviewing the service delivery platform (clinics, community health centres, district, regional and tertiary hospitals) by providing regular support visits to check the functionality of the equipment, infrastructure, logistics and pharmacy Assisting with mobilisation of resources Assessing the emergency care provided to patients Providing quality improvement plan
3: Professional development	Continuing professional development	Identifying and addressing the skills gaps in patient management through onsite clinical mentoring at the clinics, community health centres and hospitals and by regular clinical consultation with healthcare workers, as per need
	Competency standards	Determining the type of interventions required, i.e. mentoring, in-service training or formal training, ideal clinic national core standard, and developing an action plan and time frames to achieve the required outcomes
4: Accountability for maternal, neonatal, child and women's health	Consumer liaison	Promoting health campaigns, for instance relating to pregnancy conditions
	Consumer participation	Participating in community dialogues and radio campaigns to address challenges related to maternal-child health services in the district Field visits to support household and community interventions Cervical cancer screening campaigns, mentor-mother training; household visit with community health workers
	Interaction within the health system	Collaborating and working closely with other district stakeholders, including the district management, municipal management, hospital management, monitoring and evaluation, quality assurance, pharmacy, emergency transport services, primary healthcare and family medicine team in order to achieve targets related to maternal-child health indicators. Participating in provincial and national activities

Pillar 2: Clinical risk management

Risks related to healthcare providers were addressed by regular emergency obstetrics simulation training (or EOST drills) at the health facilities, which is a well-described strategy to improve emergency obstetrics care in low- and middle-income countries focusing on specific clinical emergency skills.[26] Risks related to the organisation were managed by DCST activities such as regular monitoring of daily bed occupancy, staffing norms, number of deliveries and caesarean sections at all health facilities, with subsequent reporting to the district management team. Additionally, the DCST regularly created action plans to be implemented at the facilities level to improve any poorly performing maternal-child health indicators.

Pillar 3: Professional development

The purpose of professional development is to identify the competency levels of employees and determine the level of intervention required to address the gaps in competency levels.[13] Professional development programmes conducted by the Ekurhuleni DCST included various targeted trainings such as 'essential steps in managing obstetric emergencies' (ESMOE), 'basic antenatal care plus', postnatal care training and continuing medical education in obstetric conditions for all healthcare workers. Competency standards were maintained by development of clinical guidelines, referral criteria and referral guidelines, onsite clinical evaluation and assessment of caesarean section skills.

Pillar 4: Accountability for maternal, neonatal, child and women's health services at district level

The work activities linked to this pillar entailed identification of community-based factors that contribute to the under- or overutilisation of health services. In this regard, the DCST liaised with the provincial management, the district management team as well as other healthcare workers (including community health workers and school health nurses) on health promotion and prevention activities in the community.

Qualitative interview results

Twenty interviews were conducted using an interview guide (appendix 1 https://www.samedical.org/file/2303) developed for this study. Participants were professional nurses (*n*=13, 65%) and doctors (*n*=7, 35%) by profession, and had a mean (standard deviation (SD)) duration of working experience and experience

in their current positions of 17.3 (9.3) years and 4.2 (2.8) years, respectively. Current positions of the interviewees included CHC managers (*n*=6, 30%), family physicians (*n*=3, 15%), antenatal clinic nursing sisters at PHC clinics (*n*=3, 15%), obstetricians at regional hospitals (*n*=2, 10%), deputy director of health programmes (*n*=1, 5%), assistant director of the MNCWH programme (*n*=1, 5%), subdistrict manager (*n*=1, 5%), district municipal maternal and child health manager (*n*=1, 5%), chief executive officer (CEO) of regional hospital (*n*=1, 5%) and clinical manager of maternity section of regional hospital (*n*=1, 5%).

A deductive approach was used for the analysis and presentation of the results based on the four pillars of DCST policy framework,[15] to ensure structure and theoretical relevance, which were applied to determine participants' perceptions about the work of DCST members fulfilling their roles against the set parameters. The identified themes are reflected in Table 2 and are described in detail in the following sections.

Theme: Clinical effectiveness

Clinical effectiveness entails the implementation of national guidelines as well as agreed standards/clinical performance reflecting 'best practice'. All participants mentioned that maintaining clinical effectiveness was an important activity of the DCST, with the categories, subcategories and responses under this theme listed in appendix 2, Table 3 https://www.samedical.org/file/2304).

Theme: Clinical work

Although clinical work is not included as a part of the proposed four pillars of the DCST policy framework, its importance was mentioned by five participants (appendix 2, Table 4 https://www.samedical.org/file/2304).The DCST work at the PHC facilities, assisting the facilities with their clinical skills and educating the nursing staff rendering ANC, while at hospital level they do ward rounds and assist in the antenatal care and women's health clinics. The CEO of one hospital proposed fully dedicated clinical work of the DCST at the hospital. This showed that hospital CEOs may not be aware of DCST activities due to alternate reporting structures.

Theme: Clinical risk management

Clinical risk management was mentioned by 14 participants as an important DCST activity, as presented in (appendix 2, Table 5 https://www.samedical.org/file/2304). The DCST's regular visits to health facilities, the ease of contacting them by the facility-level health professionals, participation in mortality and morbidity meetings and conducting of emergency obstetrics simulation training were identified as important strategies for management of clinical risks in obstetrics. The role of DCST members was acknowledged by participants in reducing organisational risk, through ensuring the procurement of logistics, equipment and medication as well as resource mobilisation. Quality improvement plans are used as tools by the DCST to improve the organisational practice in order to improve poorly performing indicators, where necessary.

Table 2. Themes identified through qualitative interviews

Theme	Participants mentioning the theme, *n* (%)
Clinical effectiveness	20 (100)
Clinical work	5 (25)
Clinical risk management	14 (70)
Professional development	15 (75)
Accountability for maternal, neonatal, child and women's health services	19 (95)
Monitoring and evaluation	15 (75)
Leadership and governance	4 (20)

Theme: Professional development

Fifteen participants acknowledged the contributions of DCST members to continuous professional development for health professionals through in-service training, including training on use of machines and procedures, namely ultrasound, insertion of long-acting contraceptive devices, dissemination of protocols and guidelines, ESMOE training and onsite staff mentoring, as described in more detail in appendix 2, Table 6 https://www.samedical.org/file/2304).

Theme: Accountability for MNCWH

Categories, subcategories and the responses under this theme are listed in appendix 2, Table 7 https://www.samedical.org/file/2304. Communication with the community, and obtaining their active support, is crucial to reduce deaths due to patient-associated factors. The study district organised several community dialogues, in which the DCST took an active role in conversations with the community regarding antenatal care, contraception, teenage pregnancy and HIV. These dialogues were mentioned by one participant, who recalled a real-life situation in which a positive impact occurred due to this activity. Other participants mentioned challenges related to community. The ward-based outreach teams (WBOTs) are one of the four arms of PHC re-engineering strategy introduced by the National Department of Health.[27] The WBOTs were trained by the DCST for early pregnancy identification in homes, with subsequent referrals to health facilities, which was acknowledged by participants. The DCST had regular engagements with the district management team and programme managers regarding all activities, which were mentioned by the study participants.

Theme: Monitoring and evaluation

Monitoring and evaluation emerged as another important theme that was not included in the four pillars of the initial DCST policy framework, mentioned by 15 interviewees (appendix 2, Table 8 https://www.samedical.org/file/2304). Improvement of the MNCWH indicators has occurred since 2012 through DCST activities, which included identification of poor-performing facilities, regular facility visits and implementation of improvement plans through close monitoring and regular evaluation.

Multiple MNCWH indicators mentioned by participants were reproductive health indicators, couple year protection rate, antenatal care booking before 20 weeks rate, delivery in-facility rate, postnatal visit 3 - 6 days rate, and maternal mortality and stillbirth rate. The couple year protection rate measures performance of the family planning programme, an indicator that never reached the target in the study district, while participants acknowledged the contribution of the DCST for improving this indicator. The antenatal visit before 20 weeks was another poorly performing indicator in which improvement was noted. Regarding in-facility deliveries, concerns were noted regarding babies born outside health facilities, and similarly, the postnatal visit (3 - 6 days) rate was a poorly performing indicator, with improvements noted after the introduction of the DCST in the study district. Additionally, interviewees highlighted the contribution of DCSTs toward the reduction of maternal deaths in the district, as well as the interventions the DCST had introduced to reduce stillbirths. Regarding quality management, the contributions of the DCST in quality improvement planning designed to improve MNCWH indicators was acknowledged.

Theme: Leadership and governance

Leadership and governance were not part of the proposed DCST policy framework, but it is a theme that bears importance. Interviewees acknowledged the DCST members as senior clinicians with an important leadership role, who created a positive impact. Participants perceived that DCST members may experience resistance to fully applying their leadership roles at hospitals, and expressed their wish for DCST members to have stronger leadership control over the hospitals, similar to their leadership roles at CHCs and PHC clinics (appendix 2, Table 9 https://www.samedical.org/file/2304).

Discussion

The DCST was formulated at a time when global changes were driving health systems in developing countries to improve MNCWH services.[4] The present study is the first in which activities undertaken by the DCST obstetrics unit over a period of 8 years were comprehensively analysed, and one of very few studies in which interviews were conducted with district managers and health professionals to determine their perceptions of the role and work of the DCST members in their district. Additionally, this is the only study in which documented DCST activities were corroborated with the responses of interviewees, with overall agreement shown.

The analysis showed that the DCST members conducted their activities covering broad aspects of clinical governance, such as clinical effectiveness, clinical risk management, professional development, monitoring and evaluation, and accountability for MNCWH services. The DCST members worked hand in hand with district managers and health professionals in the district, and they played a leadership role in motivating and assisting all staff to improve their professional activities. Participants acknowledged their roles as clinicians, communicators, mentors, negotiators, trainers and researchers. Overall, the DCST was seen as an important change agent that has had a positive impact on MNCWH services in the district. As senior and experienced clinicians in their specialties, the DCST members were able to assist in integration of care between PHC facilities and hospitals, thus having an overall positive effect on the health system. Their management skills and ease of availability were the highlights of their performance, potentially providing impetus for managers and health professionals to perform better in their areas of services. The teamwork between the DCST members and the healthcare professionals was found to have made an overall positive change in district health services in relation to MNCWH.

Some previous studies have shown a positive impact of DCSTs on maternal and child health services in SA, and are similar to the current study.[28-30] Oboirien *et al.*[31] found that the location of DCSTs within the district health services assisted with the reorganisation of MNCWH services within a district, and helped shape healthcare practices by redefining the challenges and influencing organisational change, which MNCWH teams previously struggled with.[31] This finding was similar to that of the current study, which additionally identified the intervention measures undertaken by the DCST to effect a positive impact on the MNCWH services.

An earlier study in 2015 that included interviews with DCST members and district managers in three districts in SA showed both positive and negative views from managers, with the conclusion that changes in the health system can take a long time to become fully effective.[32] The findings of the current study, which was done 8 years after DCST implementation, showed differences to the 2015 study in that all interviewed local peers and managers had positive views about the work of the DCST. Any change in health services requires incremental improvement in existing organisational capabilities, which includes providing empowerment and continuous support to the change leaders.[33,34] The success of the DCST on reducing the number of maternal mortalities, increasing the number of antenatal visits before 20 weeks of pregnancy, reducing stillbirth and the conducted training and education programme was acknowledged by participants. The limitations of the study include that the research was done in only one district, although studies previously done in other districts showed the similar results.[28-30] There were no negative comments made on DCST activities, which may have been due to social desirability bias.

Conclusion

Maternal and women's health services are complex and multifaceted, and require concurrent implementation of a range of evidence-based interventions to ensure appropriate maternal health outcomes. The implementation of DCSTs has made a team of experienced specialist doctors and nurses available at PHC level, which can be considered a major change management process to improve MNCWH services at district level. The activities, interventions and skills of the DCST are enabling factors toward improvement of MNCWH services and outcomes within district health services in SA. Because the DCSTs are available in many districts in SA, they can be a powerful tool to have an overall effect on the country's health system, and making specialist teams available at PHC level could also be applied to other clinical disciplines within the health system. Additionally, this health system improvement initiative can also be implemented in other low- and middle-income countries with similar health system challenges. Further research is needed in other districts to determine if the role of DCSTs is similar to this study, and what their impact is on healthcare workers and managers in the district.

Data availability. Data will be made available on request from the first author (JB), at the discretion of the first author.

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1. World Health Organization. Trends in maternal mortality 2000 to 2017: Estimates by WHO, UNICEF, UNFPA, Geneva: World Bank Group and the United Nations Population Division, 2019. https://apps.who.int/iris/handle/10665/327596 (accessed 5 October 2023).
2. World Health Organization. Maternal mortality. Geneva: WHO, 2020. https://www.who.int/news-room/fact- sheets/detail/maternal-mortality (accessed 5 October 2023).
3. Campaign on Accelerated Reduction of Maternal Mortality in Africa. Status report on maternal newborn and child health. CARMMA, 2013. http://www.carmma.org/resource/2013-status-report-maternal-newborn-and-child-health-africa (accessed 5 October 2023).
4. United Nations. The Millennium Development Goals Report. New York: UN, 2009. https://www.un.org/millenniumgoals/pdf/MDG_Report_2009_ENG.pdf (accessed 5 October 2023).
5. Republic of South Africa, 2010. Millennium Development Goals: Country Report 2010. Pretoria: Government Press, 2010. http://www.statssa.gov.za/news_archive/Docs/MDGR_2010.pdf (accessed 5 October 2023).
6. United Nations. Open Working Group proposal for Sustainable Development Goals. New York: UN, 2015. https://sustainabledevelopment.un.org/sdgsproposal (accessed 5 October 2023).
7. World Health Organization. Sustainable Development Goal 3: Health. Geneva: WHO, 2020. https://www.who.int/topics/sustainable-development-goals/targets/en (accessed 6 October 2023).
8. National Committee for the Confidential Enquiries into Maternal Deaths. Saving Mothers 2011 - 2013: Sixth report on confidential enquiries into maternal deaths in South Africa. Pretoria: National Department of Health, 2014.

9. Garenne M, McCaa R, Nacro K. Maternal mortality in South Africa: An update from the 2007 Community Survey. J Popul Res 2011;8(1):89-101. https://doi.org/10.1007/s12546-010-9037-y
10. South Africa. Constitution of the Republic of South Africa. Act No. 108 of 1996.
11. National Department of Health, South Africa. Decreasing maternal and child mortality: Negotiated service delivery agreement: A long and healthy life for all South Africans. Pretoria: NDoH, 2010. https://www.gov.za/news/media-statements/progress-towards-negotiated-service-delivery-agreement-health-sector-15-feb (accessed 6 October 2023).
12. National Department of Health, South Africa. Policy document on primary health care re-engineering. Pretoria: NDoH, 2011.
13. Human Rights Watch. South Africa: Stop making excuses: Accountability for maternal health care in South Africa. New York: Human Rights Watch, 2011. https://www.hrw.org/sites/default/files/reports/sawrd0811webwcover.pdf (accessed 6 October 2023).
14. National Committee for the Confidential Enquiries into Maternal Deaths. Third Report on Confidential Enquiries into Maternal Deaths in South Africa: Pretoria: National Department of Health, 2006. https://www.gov.za/sites/default/files/gcis_document/201409/maternaldeaths0.pdf (accessed 6 October 2023).
15. National Department of Health, South Africa. Ministerial task team report. District clinical specialist teams in South Africa. In: Ministerial Task Team Report to the Honourable Minister of Health, Dr Aaron Motsoaledi. Pretoria: NDoH, 2001. https://www.hst.org.za/publications/South%20African%20Health%20Reviews/5%20District%20Clinical%20Specialist%20Teams%20-%20SAHR2014.pdf (accessed 6 October 2023).
16. National Department of Health, South Africa. Handbook for District Clinical Specialist Teams (DCST). Pretoria: NDoH, 2014. http://www.health-e.org.za/wp-content/uploads/2015/06/Handbook-for-DCSTs.pdf (accessed 6 October 2023).
17. Chopra M, Daviaud E, Pattinson R, Fonn S, Lawn JE. Saving the lives of South Africa's mothers, babies, and children: Can the health system deliver? Lancet 2009;374(9692)835-846. https://doi.org/10.1016/S0140-6736(09)61123-5
18. Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. Health and health system of South Africa; historical roots of current public health challenges. Lancet 2009;374(9692):817-834. https://doi.org/10.1016/S0140-6736(09)60951-X
19. Moodley J, Fawcus F, Pattinson R. Improvements in maternal mortality in South Africa. S Afr Med J 2018;108(S1):S4-S8. https://doi.org/10.7196/SAMJ.2018.v108i3.12770
20. Damian DJ, Njau B, Lisasi E, Msuya Sia, Boulle A. Trends in maternal and neonatal mortality in South Africa: A systematic review. Syst Rev 2019;8(1):76. https://doi.org/10.1186/s13643-019-0991-y
21. National Department of Health, South Africa. National launch and induction of the district clinical specialists teams: Speech for the minister. Launch of the induction programme of the clinical specialist teams. Pretoria: NDoH, 27 September 2012. http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=312 83&tid=86339 (accessed 9 October 2023).
22. Gauteng Department of Health. District Health Information System. Ekurhuleni Health District, 2023. Routine Health Data: Gauteng Province, 2023.
23. Massyn N, Day C, Damboo M, Baron P, English R, Padarth A (eds). District Health Barometer 2012/13. Durban: Health Systems Trust, 2013.
24. National Department of Health, South Africa. Expanded terms of reference from the maternal, child and women's health committee. Pretoria: NDoH, 2014. https://www.gov.za/sites/default/files/gcis_document/201409/childwomenhealth0.pdf (accessed 9 October 2023).
25. Ritchie J, Lewis J. Designing and selecting samples sampling strategies. In: Ritchie J, Lewis J, eds. Qualitative Research Practice: A Guide for Social Science Students and Researchers. London: SAGE Publications, 2003.
26. Frank K, Lombaard H, Pattinson RC. Does completion of the Essential Steps in Managing Obstetric Emergencies training package improve knowledge and skills in managing obstetric emergencies? S Afr J Obstet Gynaecol 2009;15(3):94-99.
27. Feucht U, Marshall C, Kauchali S, et al. Innovations in the clinical care of mothers and children in South Africa: The contribution of district clinical specialist teams. S Afr Med J 2018;108(3a):S38-S43. https://doi.org/10.7196/SAMJ.2017.v108i3b.12808
28. Rhoda NR, Velaphi S, Gebhardt GS, Kauchali S, Barron P. Reducing neonatal deaths in South Africa: Progress and challenges. S Afr Med J 2018;108(3a):S9-S16. https://doi.org/10.7196/SAMJ.2017.v108i3b.12804
29. Oosthuizen SJ, Bergh AM, Grimbeek J, Pattinson RC. CLEVER maternity care: A before-and-after study of women's experience of childbirth in Tshwane, South Africa. Afr J Prim Health Care Fam Med 2020;12(1):a2560. https://doi.org/10.4102/phcfm.v12i1.2560
30. Oyebanji OG, Mathole T, Jackson D. Promoting awareness of the role of the district clinical specialist team in the Amathole district, South Africa: A valuable specialty in improving healthcare access and quality. Trop Med Infect Dis 2022;7(12):436. https://doi.org/10.3390/tropicalmed7120436
31. Oboirien K, Goudge J, Harris B, Eyles J. Can institutional entrepreneurship strengthen clinical governance and quality improvement: A case study of a district-based clinical specialist team in South Africa. Health Policy Plan 2019;34(Supp 2):ii121-ii134. https://doi.org/10.1093/heapol/czz110
32. Oboirien K, Harris B, Eyles J, et al. Understanding roles, enablers and challenges of District Clinical Specialist Teams in strengthening primary health care in South Africa. S Afr Health Rev 2014;1(1):45-56. https://api.semanticscholar.org/CorpusID:51731944 (accessed 9 October 2023).
33. Al-Abri R. Managing change in healthcare. Oman Med J 2007;22(3):9-10.
34. Choi M, Ruona WEA. Individual readiness for organisational change and its implications for human resource and organisation development. Hum Resour Dev Rev 2011;10(1):46-73. https://doi.org/10.1177/1534484310384957

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