


Turning the tide on female genital mutilation in a high prevalence country: a programmatic data analysis for Sudan's comprehensive health sector response, 2016–2018

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To cite: Ahmed W, Puttkammer N, Gloyd S, *et al.* Turning the tide on female genital mutilation in a high prevalence country: a programmatic data analysis for Sudan's comprehensive health sector response, 2016–2018. *BMJ Global Health* 2022;**7**:e010020. doi:10.1136/bmjgh-2022-010020

Handling editor Seye Abimbola

Received 30 June 2022

Accepted 30 September 2022

ABSTRACT

Sudan has about 87% of females aged 15–49 years living with female genital mutilation (FGM), mostly performed by midwives (64%). In 2016, the Federal Ministry of Health (FMOH) adopted the WHO's global strategy to stop healthcare providers from performing FGM. Our review of activity reports from 2016 to 2018 found the format of activities (N=95) was mainly meetings (58%) and trainings (31%) with median costs of US\$10 645 and US\$14 964, respectively. The FMOH (57%) and student/professional associations (25%) implemented activities at national (36%) and state (62%) level. The costs of activities were highest for FMOH compared with student/professional associations and academia, respectively. Sudan addressed WHO's global strategy pillars through FGM-related policies and plans (pillar 1), trainings (pillar 2) and monitoring, evaluation and accountability materials (pillar 3) targeting mainly community midwives (N=16 183) as well as creating supportive legislative and regulatory environment (pillar 4). Governmental funding on training was comparable to donor's resulting into 31% of community midwives trained on FGM complications management. Further, 31% of community midwives signed declarations or petitions to end FGM practice, while 19% were sensitised on punitive administrative measures for conducting FGM.

Although Sudan implemented a laudable health sector response to address FGM, there is a need to evaluate the quality and effectiveness of past and ongoing interventions. Particular attention to costs and quality assurance data is essential to identify cost efficient implementation approaches to reach the remaining sizeable number of health professionals to stop their involvement in FGM.

BACKGROUND

Female genital mutilation (FGM) is a harmful practice that includes all procedures involving partial or total removal of or other injury to the female external genitalia for non-medical reasons.¹ Globally, over 200 million girls and

SUMMARY BOX

- ⇒ There is limited research or programmatic data analysis on country-level health interventions addressing female genital mutilation (FGM) to inform programming, especially for high prevalence and low-income countries.
- ⇒ Sudan has a high prevalence (87%) of FGM mostly performed by midwives (64%) and was the first country to adopt the WHO's global strategy to stop healthcare providers from performing FGM at a large scale from 2016 to 2018.
- ⇒ Programmatic data review found 31% of the estimated 16,183 community midwives received training on FGM complications management and signed declarations or petitions to end FGM practice, while 19% were sensitised on punitive administrative measures for conducting FGM.
- ⇒ The Federal Ministry of Health implemented most activities (57%) and had the highest activity costs compared to other implementers and requires further investigation.
- ⇒ There is a need to scale up country-level interventions to reach the remaining community midwives (69%), which necessitate more focus on efficient uses of resources, quality assurance and monitoring for cost-effectiveness in order to maximise impact.

women alive today have undergone FGM and over 3 million girls are estimated to be at risk annually.² FGM violates girls' and women's rights to health and physical integrity, causing immediate, short-term and long-term genitourinary, sexual and psychological health complications³ with an estimated annual healthcare economic cost of US\$1.4 billion.⁴ Traditional practitioners have been mainly performing FGM; however, there is an increasing trend of involvement of healthcare providers,⁵ also known as 'FGM medicalisation'.¹ This trend is alarming because it



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violates the medical code of conduct of 'do no harm', endorses the practice and creates a false perception of safety, undermining FGM abandonment efforts.

In efforts to address this, the World Health Assembly resolution 61.16 called on member states to strengthen the health sector response. In 2010, national governments, healthcare professional bodies, United Nations agencies and non-governmental organisations (NGOs) contributed in the development of a global strategy to stop FGM medicalisation.⁶ This strategy provides guidance centred around four pillars of action, namely (1) 'mobilisation of political will and funding', (2) 'strengthening the understanding and knowledge of healthcare providers', (3) 'strengthening monitoring, evaluation (M&E) and accountability' and (4) 'creating supportive legislative and regulatory frameworks'. To our knowledge, Sudan is the first low-income country with high FGM prevalence and FGM medicalisation to implement this global strategy at a large scale.

There is a growing body of evidence on health sector interventions determining their effectiveness^{7–17} in changing healthcare providers' knowledge, attitudes and skills to provide FGM prevention or care of its complications. However, there is limited literature examining country-level health sector interventions¹⁸ especially in high FGM prevalence, low-income countries¹⁹ with no granular data detailing type of activities implemented, their costs or results. Moreover, there is limited use of programmatic health sector data on FGM interventions.

In this study, we review the first 3 years of Sudan's health sector approach using available programme data to generate learning points on programme data use and country-level implementation to other countries or regions with similar contexts. Specifically, we aim to describe the activities that were implemented within each of the four pillars of action for WHO's global strategy to stop FGM medicalisation. We use qualitative and quantitative data to describe the activities' objectives, the format of implementation, implementation level, implementers, costs and results. Finally, we conduct exploratory and bivariate analysis on cost data to understand the cost implications of various programming options. The findings could potentially inform cost-effectiveness analyses to guide investment in the future.

SETTING

In Sudan, 87% of females (15–49 years) and 66% of females (0–14 years) have undergone FGM.²⁰ The FGM type practised (77%)²⁰ is classified as type 3, also known as infibulation. It involves cutting of the inner and outer vulvar folds with or without removal of the clitoral glans and closing the outer vulvar folds, leaving a small opening for urine and menstrual blood flow.³ Repeat FGM type 3 known as reinfibulation is also performed with or without vaginal tightening, which is conducted usually after delivery and at times among elderly as a 'purification' rite before death. FGM practitioners are

mainly midwives (64%) and traditional practitioners (29%). Midwives' involvement as reported by mothers of girls <15 years with FGM increased from 55% in 1966 to 76%²⁰ in 2014. While, the prevalence of reinfibulation after delivery decreased from 61%²¹ in 2004 to 27%²⁰ in 2014 among women in reproductive age. The social values that promote FGM include perceived aesthetic improvements, cleanliness by reducing visible vaginal secretions, maintaining family honour by inhibiting sexual debut before marriage or as a religious rite.^{22–23} Midwives perform FGM partly to uphold the promotive social norms as well as the financial incentive²⁴ given their low employment (34%) and monthly governmental salary between US\$75 and US\$128.²⁵

In response to the high FGM prevalence, Sudan developed a 10-year national multisectoral FGM abandonment strategy (2008–2018). Initially, the social and legal sectors received most funding implementing this strategy. This changed in 2015 when the health sector received substantial funding from the UK government-funded Sudan Free from Female Genital Cutting (SFFGC) Programme²⁶ through Sudan's WHO country office. Subsequently, the Federal Ministry of Health (FMoH) developed a national costed health sector plan aligned to the WHO's global strategy's four action pillars with annual targets. The plan targeted mainly community midwives because of their involvement in FGM medicalisation and make up almost a quarter of health workforce (23%)²⁷ providing primary care to women who have undergone FGM. Midwives in Sudan are broadly categorised into community midwives (83%)²⁸ who complete a 1-year training while facility-based midwives (17%)²⁸ complete theirs in 2–4 years. Because of health workforce shortages,²⁷ community midwives are also facility based. Traditional birth attendants^{28–29} provide informal midwifery services and are not considered skilled midwives.

The FMoH with its affiliated training institutions, health professional regulatory bodies and associations for health professionals and students in obstetrics and gynaecology (Obs/Gyn), paediatrics, midwifery and nursing fields were involved in the implementation of the national health sector plan. Each implementer submitted costed proposals for funding in standardised templates to Sudan WHO country office which also provided technical support during implementation. On completion, implementers submitted standardised report format for activities' outputs with budget breakdown including any relevant products. Sudan's WHO country office compiled, verified and analysed these reports into a standard quarterly and annual SFFGC technical and financial templates.

During 2016–2018, the government of Sudan (GoS) financed two maternal mortality reduction projects which targeted midwives and also supported FGM-related interventions. One project aimed to build midwives' competencies while the other to increase their accountability to FMoH through hiring and health insurance coverage. Responsible governmental officers prepared activity and financial reports, including periodic data summaries.

PROGRAMMATIC DATA COMPILATION AND ANALYSIS

The motivation for this programmatic review was to address the evidence gap on health sector interventions that address FGM at national scale using programmatic data, an often overlooked data resource. We conducted the review for scholarly interest without specific funding support. Stakeholders involved in the health sector plan supported the review by providing data and were intent on using the study findings where relevant.

For the data compilation, we requested FGM-related proposals, activity and financial reports or monitoring databases for the period 2016–2018 in person, and/or through phone or email. We also conducted online searches in official websites. We excluded the private sector and NGOs working in humanitarian settings, conflict or remote areas because they were not part of the national FGM health sector plan and do not provide activity reports directly to the FMOH.

We used a Microsoft Excel (2018) template to enter several variables for each reported activity namely; objective (text), format used (training, meeting, research, field work, facility support), completion year, implementer (FMOH, State MoH, student/professional health associations, other), implementation level (international, national, state(number)), costs (Sudanese Ginaih (SDG) or American dollars (USD)) and the results (individuals reached (type and number) or products (policies, strategies, guidelines, training material, abstracts, M&E templates)). Activities were not necessarily completed in one calendar year, so we reported the calendar year when the activity was completed. In cases where the data conflicted between two reporting sources, we used Sudan's WHO country office's reported data because it was where final validation was done before submission to donor. Two research team members with support from Sudan's WHO country office's FGM programme officer performed data cleaning and validation to ensure that there were no transcription errors or duplicates.

Prior to analysis, we created two additional variables as follows: (1) 'Action pillar' designating the pillar each activity contributed into as defined by the Global Strategy to stop healthcare providers from performing FGM⁶ and (2) 'Coverage' calculated as the proportion of healthcare providers or health service users reached from their respective total populations from FMOH annual statistical reports.³⁰ In addition, we converted the activity costs in SDG into USD using the corresponding official annual conversion rates. Thereafter, standardised the USD currency for these 3 years to the value of USD in 2018 to control for inflation rate differences.

We imported the Microsoft Excel (2018) data sheet into STATA V.17. We conducted univariate summaries of the activity variables by year and explored whether activity format use, implementation level, implementer or people reached were associated with activity costs using t-test or analysis of variance (ANOVA) analysis where applicable. The rationale was that these variables may affect activity costs.

PROGRAMME DATA REVIEW FINDINGS FOR SUDAN'S FGM HEALTH SECTOR RESPONSE 2016–2018

We found 172 documents comprising of activity proposals, activity reports, monthly, quarterly and annual summary reports and databases from Sudan WHO's country office, FMOH, health professions regulatory bodies and none from health professional or student associations. Sudan WHO's country office had a database for SFFGC-funded activities and there were no FGM indicators collected through routine health information systems.

A total of 95 activities were reported between 2016 through 2018 with [table 1](#) providing details on the data quality (missingness), activity type, implementation level, implementer and results in each year. There was missing data in the number of individuals reached (25%), activity costs (13%) and state where the activity was conducted (8%). Activities were in the form of meetings (58%) or trainings (31%) and mostly (43%) completed by the second year. This could be explained by the late startup of activities in the first year of implementation and increased implementation rate in the second year. Furthermore, the high inflation rates and civil unrest that led to a civil revolution in 2018 affected the overall management and implementation for 2018. The FMOH (57%) and student/professional associations (25%) implemented activities at national (36%) and state (62%) level.

The following sections detail the reported activities aligned to WHO's four pillars of action for the global strategy to stop FGM medicalisation and, where possible, compare the proportions of healthcare providers reached ([figures 1–3](#)).

Pillar 1: 'mobilisation of political will and funding'

Federal-level activities included high-level advocacy meetings, integration of FGM within various health strategies and policies and developing a behavioural change communication draft plan. While state-level activities included advocacy meetings, developing plans as well as reactivation and establishment of health committees. A total of 2 policies, 3 strategies, 2 national and 102 locality health plans were developed. The governmental financial contribution in the roll out of in-service FGM training was equal to donor's contribution, both resulting into 5017 (31%) community midwives trained.

Pillar 2: 'strengthening of healthcare providers knowledge and skills'

The national-level interventions included development of national guidelines, training materials on FGM complications management and social norm change in preservice training curricula of four types of healthcare providers (medical doctors, midwives, medical assistants and community health workers). Preparatory work to develop FGM training content for eight specialists' curricula was also conducted. At health facility level, policies and standard operating procedures for FGM counselling were implemented in 21 facilities in 2 states.

Table 1 Features of reported health sector activities that addressed female genital mutilation during 2016 through 2018 in Sudan

	Total		2016		2017		2018	
	N	%	N	%	N	%	N	%
Activities* reported	95	100	31	32.6	42	44.2	22	23.2
Missing data								
Individuals reached	24	25.3	6	19.4	12	28.6	6	27.3
Activity cost (US\$)	12	12.6	6	19.4	3	7.1	3	13.6
Activity location (state)	8	8.4	3	9.7	3	7.1	2	9.1
Activity format								
Trainings	29	30.5	10	34.5	12	41.4	7	24.1
Meetings	55	57.9	14	25.5	27	49.1	14	25.5
Research	5	5.3	3	60.0	2	40.0	0	0.0
Field work	5	5.3	3	60.0	1	20.0	1	20.0
Facility support	1	1.1	1	100.0	0	0.0	0	0.0
Activity implementation level								
National	34	35.8	6	19.4	19	45.2	9	40.9
State	59	62.1	24	77.4	22	52.4	13	59.1
International	2	2.1	1	3.2	1	2.4	0	0.0
Implementer								
Federal Ministry of Health	54	56.8	15	48.4	28	66.7	11	50.0
State Ministry of Health	8	8.4	5	16.1	2	4.8	1	4.6
Student/professional associations	24	25.3	8	25.8	9	21.4	7	31.8
Other	9	9.5	3	9.7	3	7.1	3	13.6
Activity results								
Healthcare providers trained	7293	14.9	2248	8.0	3218	11.5	1827	11.3
Policies/strategies	5	3.9	1	0.9	4	40.0	0	0.0
Plans (national, state, locality)	104	81.9	102	91.9	0	0.0	2	33.3
Monitoring, evaluation, accountability and research	7	5.5	4	3.6	3	30.0	0	0.0
Guidelines/standard operating procedures	4	3.1	1	0.9	2	20.0	1	16.7
Training materials	7	5.5	3	2.7	1	10.0	3	50.0

*Activities are categorised into the calendar year they were completed in.

Midwives, as well as some Obs/Gyn, paediatricians and medical students, were trained as change agents to stop FGM medicalisation and to encourage their peers to address FGM routinely during clinical consultations. Short training or sensitisation sessions on FGM were also provided during annual professional and student association conferences for midwives, nurses, Obs/Gyn and paediatricians and during prelicence refresher training for paramedical health workers.

By the end of 2018, a total of seven training materials, mostly preservice and in-service modules on FGM, and four guidelines were completed. The training coverage for each profession type (figure 1) was highest among practising community midwives (31%) and nursing students (30%) compared to Obs/Gyn (17%), midwifery students (14%) and medical students and paediatricians (7% each). One year (2016) report had data indicating

that 16655 women in antenatal and maternity services, equivalent to 0.2% of estimated women who access these services, received FGM prevention counselling service.

Pillar 3: 'strengthening M&E and accountability'

At the national level, baseline data for M&E was generated from knowledge, attitude and practice (KAP) surveys among various health professionals (midwives, nurses, Obs/Gyn and paediatricians) and traditional birth attendants. An FGM surveillance model in antenatal settings was developed and tested twice in efforts to generate FGM related data to inform programming. Health facility FGM medicalisation reporting formats were also developed for M&E and accountability. Finally, biannual information sharing, research dissemination and review meetings were held mostly involving MoH officials to support planning and implementation.

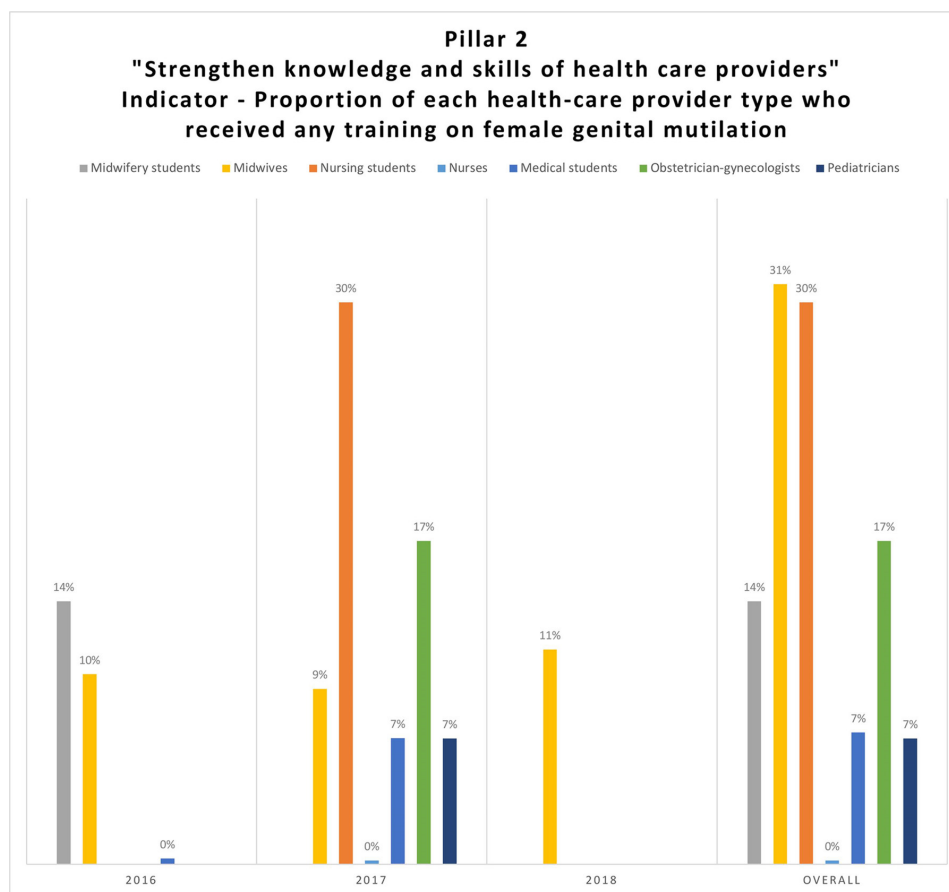


Figure 1 Proportion of each healthcare provider type who received any training on female genital mutilation in Sudan during 2016–2018.

At state level, a computerised state-level database for reporting FGM medicalisation was made available in all the 18 states. Supervisory visits and trainings on M&E for state and locality RH focal persons were also conducted. Almost a fifth of community midwives (18.2%) were sensitised on accountability for FGM medicalisation. The lower proportion of community midwives reached in this pillar was because the accountability materials took longer to develop compared with the adaptation of existing WHO training guidance for FGM complications management.

Pillar 4: 'creating supportive legislative and regulatory frameworks'

At national level, clauses on FGM medicalisation within code of conducts for midwives and doctors were developed. High-level health officials' advocacy meetings were held during conferences or health professional and student associations' annual meetings. An accountability framework for midwives was developed, piloted and finalised. Intersectoral interventions included the development of an FGM module within primary school health curriculum which was pilot-tested and rolled out in one state. This intervention aimed to create a young generation aware of FGM and its health risks to support FGM abandonment.

By the end of 3 years, a quarter of all healthcare providers signed voluntarily declarations to end FGM practice or petitions for FGM legislative measures during trainings, meetings or advocacy events. The proportions of signatures out of the total number of health professionals varied by professional category type and year (figure 2) and was highest among paediatricians (59%) in comparison to Obs/Gyn (36%), medical students (24%), nursing students (22%), midwifery students (20%) and practising community midwives (10%). However, the actual numbers of signatures were highest among medical students (3668) and community midwives (1618). There were no records of health professionals who refused to sign declarations or petitions during these activities. Even for events that had a finite number of attendees, it would be difficult to determine if missing signatures were actual refusals or signature collection failures. Further, those who signed may have felt pressure to do so based on the expectations of event organisers or peers, so the number signing may not represent the number who were 'fully committed'. Finally, the GoS initiative to enhance accountability and regulation of midwifery practice by MoH resulted in 40% of midwives on payroll and 70% with health insurance coverage.

When we examined the cumulative number of midwives who benefitted from each pillar's focus



Figure 2 Proportion of each health-care provider type who signed declarations to end female genital mutilation or petitions for legislations against it.

from 2016 through 2018, we found an incremental trend (figure 3). The proportion of midwives trained through government-funded trainings (pillar 1) grew from 5%, 10% and 14% which contributed to a cumulative total of 10%, 19% and 31%, respectively, of all midwives trained (pillar 2). The highest proportional increments occurred in 2017 for midwives who signed declarations or petitions on FGM (pillar 4) and in 2018 for midwives trained on accountability for FGM medicalisation (pillar 3) and trained on FGM during in-service training (pillar 2).

Review findings on activities' costs

The activities' costs were variable because of their diverse aims and implementation modalities. For instance, the mean (median) activity cost per person was US\$296 (US\$157) for training a health professional on FGM, US\$335 (US\$376) for a high-level official participating in an advocacy meeting, US\$261 (US\$171) and US\$393 (US\$201) for a ministry of health official involved in a planning meeting or an experience sharing meeting respectively and US\$23.5

(US\$3) for a health professional or student attending an FGM abandonment declaration meeting. However, field work and research related activities had higher median costs (US\$19 756–US\$25 749) compared with meetings and trainings (US\$10 645–US\$14 964) probably because of travel and operation complexity. There was also a significant linear incremental trend for activity costs over the 3 years ($p < 0.05$).

The median cost of activities within each action pillar ranged from US\$8953 in pillar 4 to US\$20 000 in pillar 3 (table 2). The lower range of pillar 4 activity costs could be explained by modality of implementation, as activities such as signatures for petitions or commitment to abandon FGM within health professional conferences were funded by other sources.

The median cost of activities within each pillar for health professional and student associations or other implementers (health professional regulatory and academic institutions) was four to five times less compared with FMoH and state MoH. There was no significant association between activity costs with

Cumulative proportion of midwives reached by selected activities contributing into each of the four pillars of action to stop female genital mutilation medicalization in Sudan during 2016–2018

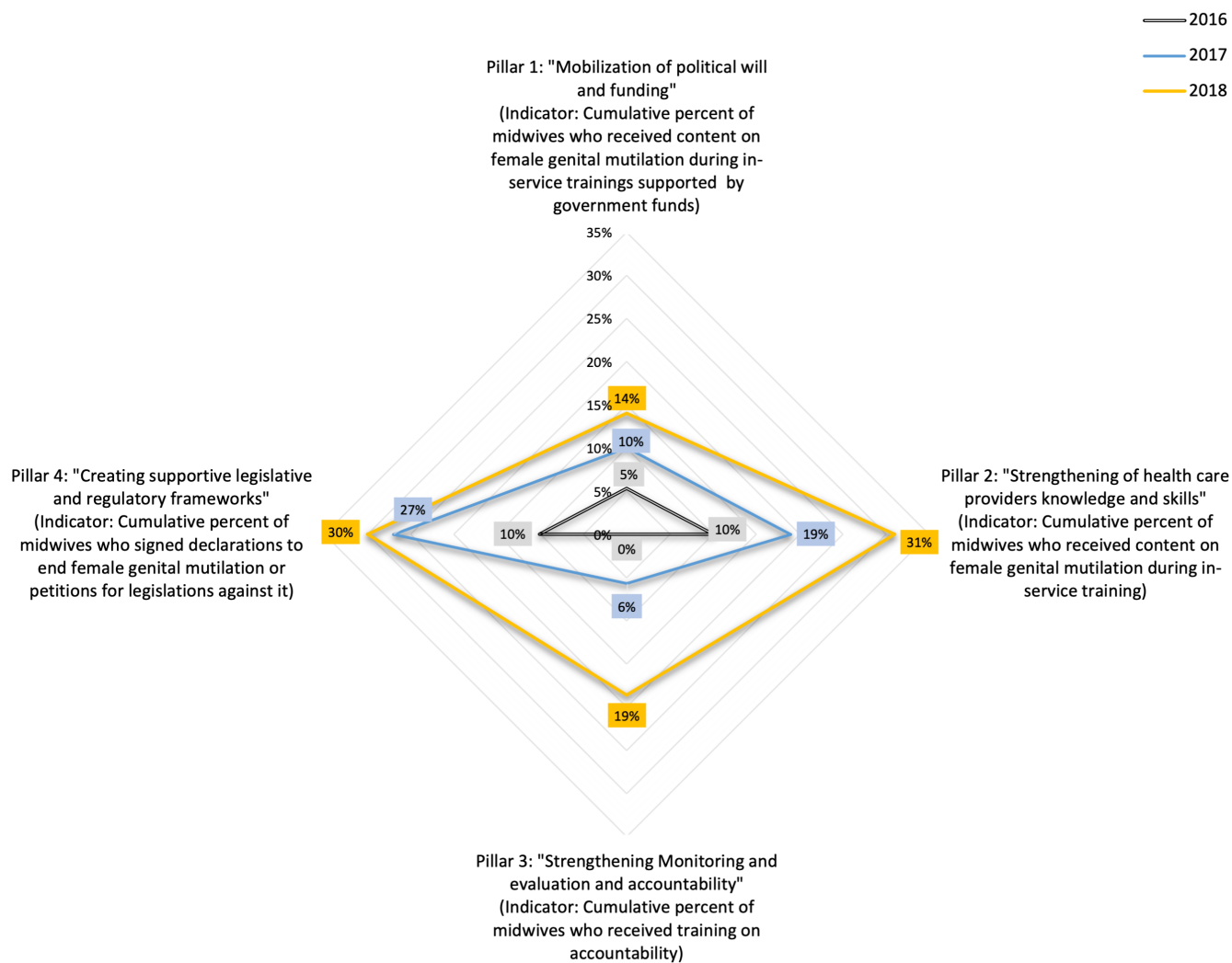


Figure 3 Radar chart comparing cumulative proportion of midwives reached by selected activities in the four pillars of action of the WHO's global strategy to stop health-care providers from performing female genital mutilation during 2016–2018 in Sudan.

activity format use, implementation level, or people reached. ANOVA test indicated differences between implementers for activity cost ($p=0.05$). The implementer differences could be a result of activity types implemented, activity complexity or modality of implementation.

Sudan's health sector response first 3 years achievements: what next?

Remarkable achievements were made in the first 3 years of implementation, there was substantial investment

from the donor including governmental buy-in. A third of midwives were trained, and many members of professional and student associations committed to end practice or called for its criminalisation. The FMoH completed the blueprint and building blocks to initiate FGM medicalisation accountability system, generate of FGM indicators for the health sector and scale up sensitisation of girls on FGM through the use of school health manual in schools.

Table 2 Median costs of activities that addressed female genital mutilation in Sudan during 2016–2018 by implementer in the four pillars of action of the WHO’s global strategy to stop healthcare providers from performing FGM

Activity cost (median (IQR)) of implementer in each pillar of action	Pillar 1 Political will and funding	Pillar 2 Knowledge of healthcare providers	Pillar 3 Monitoring and evaluation, accountability	Pillar 4 Legislative and regulatory frameworks
Federal Ministry of Health 19253.8 (9409.1–28227.2) N=54	18205.7 (33,10.4–29773.1) N=12 1 training, 9 meetings, 1 research, 1 field work	24702.8 (14305.3–42774.3) N=22 14 trainings, 8 meetings	23873.0 (19253.8–25801.5) N=9 1 training, 3 meetings, 2 research, 3 field work	12379.9 (6114.9–14079.7) N=11 4 trainings, 7 meetings
State Ministry of Health 13405 (13124.4–13405.0) N=8	13405.0 (13405.0–13405.0) N=4 4 meetings	13124.5 (12843.9–13405.1) N=2 1 training, 1 facility support	13405.0 (13405.0–13405.0) N=2 1 meeting, 1 field work	
Student/professional associations 4125.5 1527.3–8497.3 N=24	7528.0 N=1 1 meeting	3576.9 (1527.3–4233.3) N=8 6 trainings, 2 meetings	6257.5 (4017.7–8497.3) N=3 1 training, 2 research	5775.2 (0.0–25,266) N=12 12 meetings
Other 5478.7 (838.3–23914.1) N=9		3556.7 (1088.9–6024.6) N=2 2 meetings	20000.0 (4932.7–27828.2) N=5 1 training, 4 meetings	0.0 N=2 2 meetings
Total 13405 (4932.7–25801.5) N=95	14522.4 (6620.8–28227.2) N=17	14749.4 (4233.3–32130.1) N=34	20000.0 (8497.3–25801.5) N=29	8953.2 (2500.0–14079.7) N=25

It would be important to invest more in the coming years into M&E systems within the health sector, and between other sectors such as the ministry of education. The regular M&E of health sector interventions not only ensures fidelity and quality of activities, but also evaluates whether the intended cascade of results had occurred. It would be important to assess the availability and quality FGM prevention and care services in states or facilities that received most of these interventions to determine if the current scale up approach remains on track or requires some modifications.

PROGRAMME REVIEW STRENGTHS AND LIMITATIONS

We were able to use programme data to examine the type, costs and results of the health sector activities in WHO’s pillars of action. We found diverse activities within and between each of the four pillars over the years, which made it difficult to profile specific details of implementation, or make direct comparisons between activities. Further, data access and verification took time because data was not centralised. The programme data did not capture the universe of activities implemented as the private sector and other NGOs working in humanitarian settings, conflict or remote areas were excluded and may have reduced representativeness. There were several limitations in activity costs data and its analysis. We treated all activities as independent events, however, in reality some activities built unto each other for a particular product for instance. Furthermore, different combinations of activity products are used in a single activity. The missing details in implementation made it difficult to assign costs into activity bundles.

Finally, staff time use prior, during and after completion of activity was not documented and the value of staff time (based on salaries) was not included in the analysis, and cannot be assumed to be equal for all activities.

The programme data and its analysis had some strengths too. The programme data were relatively well recorded with strong institutional memory within Sudan WHO country office. We were able to use granular qualitative and quantitative data with some rigour as data were verified from multiple reporting sources. We compared our findings to the only available study which mapped country-level health sector interventions on FGM¹⁹ in 30 countries that included Sudan and eight other high FGM prevalent low-income countries. All the nine low-income countries implemented some activities for pillars 1 and 2 while 2–4 countries implemented some activities for pillars 3 and 4. Sudan was reported to have M&E systems in place with deinfibulation (surgical procedure to reopen the vaginal introitus for women with FGM type 3) services at facility level in 2018. In contrast, our review found that M&E systems were still under development and there were no FGM indicators routinely collected and compiled within the FMoH. Furthermore, the likelihood of available quality de-infibulation services was low given that 3%–11% of different healthcare providers had correct knowledge of FGM complications management per WHO guidance in 2016 and 2017 programme KAP surveys. Furthermore, a low proportion of women reported deinfibulated status (6%) while 36% reported reinfibulation practised by midwives during FGM surveillance test phase in 10 sites in 2 states in 2017.³¹

CONCLUSION

Sudan's first 3 years in implementing the four pillars of action for the global strategy to stop FGM medicalisation had remarkable achievements. Close to one-third of practising community midwives received training on FGM complications management and signed commitment to end FGM and about a fifth were sensitised on accountability for FGM medicalisation.

The use of qualitative and quantitative programmatic data provided an opportunity to study activities with more granularity and generate several learning points for other countries with similar contexts to develop and implement health sector interventions to address FGM.

We found that most of the activities were implemented by FMOH with seemingly overall higher costs, which requires further investigation. Indeed, most of the activities in the beginning did require FMOH's involvement, such as developing policy, strategies and national training curricula. However, state-level activities could have been decentralised or implemented by other entities. The limited capacity of state-level MoH and NGOs would need to be strengthened for cost efficiency in the long run. The programme data review process, data quality and findings highlight the importance of having a centralised recording system, complete activity records detailing implementation modality including costs and regular M&E. These measures will enable identification of cost-efficient and effective implementation modalities, which can be put to scale with the appropriate quality assurance mechanisms in place. It is important to maximise resource use as there is still a significant number of health professionals (about 20 000) to be reached by Sudan's health sector to meaningfully contribute into stopping FGM medicalisation and provide quality FGM related prevention, care and protection services'.

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Acknowledgements The authors would like to appreciate Dr Mohamed Babiker from the Federal Ministry of Health, Dr Amira Azhary from the National Council for Child Welfare and Dr Hiba Hussein in the WHO Sudan Office for their time and effort to share, review data and respond to queries. This review would not have been possible without their contributions.

Contributors WA conceptualised the study design, collected and cleaned data, conducted analysis and interpretation and manuscript write up. AA collected, cleaned and coded qualitative data as well as contributed in the manuscript write up. DE supported data collection, collation, cleaning, and contributed in the write up. CF and SG supervised WA and provided guidance in the whole process from conceptualisation to substantive input in manuscript write up. NP provided guidance and substantive input in manuscript write up. All authors read and approved the final manuscript.

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 consent for publication Not applicable.

Ethics approval We obtained ethical approval from the University of Washington and The FMOH's National Health Research ethics committees who both deemed this programme data review as non-research.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The datasets generated and/or analysed are not publicly available as the programme data is not published by ministry of health but are available from the corresponding author on reasonable request.

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