

The impact of training on perceived performance in reproductive, maternal, and newborn health service delivery among healthcare workers in Tanzania: A baseline- and endline-survey

Tumbwene Mwansisya (✉ mwansisya@yahoo.co.uk)

: Aga Khan University - Tanzania

Columba Mbekenga

Aga Khan University - Tanzania

Kahabi Isangula

Aga Khan University

Loveluck Mwashu

Aga Khan University

Stewart Mbelwa

Aga Khan University

Mary Lyimo

Aga Khan University

Lucy Kisaka

Aga Khan University

Victor Mathias

Aga Khan University

Eunice Pallangyo

Aga Khan University

Grace Edwards

Aga Khan University

Michaela Mantel

Aga Khan University

Sisawo Konteh

Aga Khan Hospital Dar es Salaam

Thomas Rutachunzibwa

Ministry of Health

Secilia Mrema

: Ministry of Health

Hussein Kidanto

Aga Khan University

Marleen Temmerman

Aga Khan University

Research

Keywords: reproductive health, baseline, endline, perceived performance, training need analysis, healthcare workers

Posted Date: July 13th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-693460/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background

Delivery of quality reproductive health services has been documented to depend on the availability of healthcare workers who are adequately supported with appropriate training. However, unmet training needs among healthcare workers in reproductive, maternal, and newborn health (RMNH) in low-income countries remain disproportionately high. This study investigated the effectiveness of trainings with onsite clinical mentorship towards perceived importance and performance in RMNH among healthcare workers in Mwanza Region of Tanzania.

Methods

The study used a quasi-experimental design using single group pre-and post-intervention evaluation strategy. The training needs of healthcare workers from the selected health facilities were assessed, skills gaps identified and ranked according to priority. Training courses that addressed skills gaps were developed and delivered with adaptations of the national guidelines followed by onsite clinical mentorship for one year. The baseline and endline survey were conducted at 3 years interval to assess change in HCWs on their perceived importance and performance on different aspects of RMNH care. Independent samples *t*-tests were used to compare differences in perceived performance in selected training areas between baseline and endline. Significance was set at $p < 0.05$.

Results

TNA was administered to 152 and 216 healthcare workers at baseline and endline respectively. In total, 141 (65%) of the 216 end line survey participants had received at least one IMPACT project training course and at least three mentorship visits. Participants were matched on their age and duration in RMNH services, but differed in age and duration of employment. Comparison between baseline and endline by using the training needs analysis questionnaire scores showed statistically significant positive changes ($p \leq .05$) in most training needs analysis items, except for some items including those related to research capacity and provision of health education for cancer.

Conclusions

The findings revealed that the training and onsite clinical mentorship program that address the actual needs of healthcare workers to have significant positive changes in perceived performance in a wide range of RMNH services. However, further studies with rigorous designs are warranted to evaluate the long-term effect of such training programs on RMNH outcomes.

Plain Language Summary

Reproductive maternal and newborn health (RMNH) in low- and middle-income countries continue to face critical challenges. Trained healthcare workers especially using a combined approach (training followed by immediate clinical mentorship) in RMNH have been documented as an essential strategy to reduce maternal and neonatal mortality in low-and middle-income countries closer to those in high-income countries. This study investigate the effectiveness of a tailored CPD trainings that were complemented by clinical mentorship among healthcare workers in Mwanza Region. Participants in the end line survey were the same as those in the baseline survey or other participants from the same health facility. The before and after survey included 152 and 216 participants (post-intervention: training courses and mentorship), respectively. Participants in the end line survey were the same as those in the baseline survey or other participants from the same health facility. Comparing between before and after the intervention the perceived performance was found with significant positive changes in multiple tasks. Participants were matched on their age and duration in RMNH, but differed in age and duration of employment

Introduction

Reproductive maternal and newborn health (RMNH) in low- and middle-income countries continue to face critical challenges. A large body of literature suggest that maternal mortality in low- and some middle-income countries is 50- to 100-fold higher than in high-income countries (Alkema et al., 2016; Goldenberg, McClure, & Saleem, 2018). In support, some literature indicate that maternal mortality ratio (MMR) is low in high-income countries at 1 per 5600 live births, whereas that in low-income and middle countries remains substantially high at 1 per 30 live births (Clark, 2015; Fernandes, Nunes, Prudencio, & Mamede, 2015; Semali, Tengia-Kessy, Mmbaga, & Leyna, 2015; Vogel et al., 2015). Relatedly, neonatal mortality in low- and middle-income countries is also around 10-fold higher than in high-income countries (Mariani et al., 2017). Amidst these worrying statistics, skilled birth attendants have been documented as essential to reduce maternal and neonatal mortality in low-and middle-income countries to rates closer to those in high-income countries (Mariani, 2017). Clinical mentorship which is a system of practical training and consultation to foster continuous profession development has been recommended by WHO to be integrated with and immediately following initial training for yielding high-quality clinical care outcomes (WHO, 2005). However, the effect of such a combined approach on RMNH healthcare workers' performance remains unknown. This calls for evaluation of the impact of clinical mentorship as an integral component of the training among healthcare workers in RMNH services in low- and middle-income countries. Thus, this study, evaluated the effectiveness of CPD training supplemented by onsite mentorship program on the perceived importance and performance in specific areas of RMNH service provision as identified using a Training needs analysis (TNA) tool.

Low- and middle-income countries continue to face critical shortages of human resource for health especially skilled birth attendants. Tanzania for example, is experiencing a notable shortage of skilled birth attendants (Shimamoto & Gipson, 2015). The available data in Tanzania indicate an average shortage of 56% of skilled workforce with private sector being disproportionally affected (United Republic of Tanzania (URT), 2013). Moreover, a systematic review has indicated that the absence of skilled obstetric providers to be associated with maternal mortality of 1% of all deliveries (Vieira et al., 2012). As a remedial strategy, the WHO has recommended the use of skilled birth attendants that are supplied with the necessary requirements including capacity building for provision of their services (WHO, 2004). However, the unmet training needs for RMNH among healthcare workers in low- and middle-income countries remains disproportionately high. The persistently high skills gaps among healthcare workers continues to be cited as major factors associated with pregnancy outcomes and high maternal and antenatal mortality (Goldenberg et al., 2018). Nevertheless, Continuous professional development (CPD) programs have been reported to enhance healthcare workers' knowledge and skills and improve the quality of healthcare, thereby contributing to reducing maternal and newborn mortality (Frenk et al., 2010; Ona et al., 2019). Moreover, effective mentorship have been reported to contribute to the improvement of certain quality of health care outcomes (Schwerdtle, Morphet, & Hall, 2017). Therefore, effective training programs with clinical mentorship might have potentials to improve the knowledge and skills of healthcare workers to meet needs in health service delivery.

Although CPD courses delivered has been found to improve the competencies of healthcare workers (Alnazly, 2018; Cavicchiolo et al., 2018; Lutenbacher, Elkins, Dietrich, & Riggs, 2018). Tanzania currently has no documented formal program that respond to training needs identified by healthcare workers themselves. Likewise, few of the training programs conducted to address healthcare workers skills gaps were delivered without inclusion of mentorship component to synergize the knowledge and skills gained by healthcare workers. Unfortunately, adopting and implementing international standards and guidelines in some in low- and middle-income settings such as Tanzania may be difficult because of limited human resources, limited funding, cultural factors, irrelevance, limited attainability, and geographic challenges (Maaloe et al., 2019). The training that is complemented by mentorship program has been found to be effective in improving healthcare workers skills (Jayanna, 2016; Schwerdtle, 2017).

It is within this background, the present study aimed to investigate the effectiveness of a tailored CPD training for healthcare workers on the perceived performance in RMNH care in Mwanza Region. The findings derived from a large-scale project on RMNH which included a training component followed by clinical mentorship of healthcare workers. The details of the project

Improving Access to Reproductive, Maternal and Newborn Health in Mwanza, Tanzania (IMPACT)-have been described elsewhere (Orwa, 2019). Briefly, as part of IMPACT project, participants' training needs were evaluated before commencement of interventions by using the Training needs analysis questionnaire (TNA). Then, local and international RMNH guidelines were examined and contents adapted to develop training packages and subsequent clinical mentorship sessions. The training program focused on the gaps identified during training needs assessment, including basic and comprehensive obstetric and neonatal care, family planning, respectful maternity care, gender sensitivity, and use of local research evidence. We hypothesized that the training program would lead to increased perceived performance in relation to the targeted training areas among healthcare workers. The findings of this study offers insights on the design of effective trainings that is supplemented by the onsite clinical mentorship for improving RMNH service delivery in low resource settings.

Materials And Methods

Setting

Details of the study setting have been reported elsewhere (Orwa et al., 2019). Briefly, the study was conducted in Mwanza Region, which is located in the northern part of Tanzania. The region is part of the Lake Zone, where the MMR was 453 deaths per 100,000 live births and the under-five mortality ratio was 88 deaths per 1,000 live births in the 10-year period preceding the 2015/16 Tanzania Demographic and Health Survey (TDHS, 2016)., Mwanza Region is one of five regions in Tanzania prioritized by the Tanzanian Government because of its poor RMNH indicators (TDHS, 2016). Understanding the training needs of healthcare workers in Mwanza Region formed an important entry point for IMPACT project) in seeking to increase their contribution toward improving RMNH indicators.

Study Population

All healthcare workers responsible for RMNH service provision that were present in the selected facilities at the time of the survey were eligible to participate. The specific inclusion and exclusion criteria were as follows.

Inclusion criteria

1. All healthcare workers aged 18 years and above.
2. Healthcare workers who could understand and communicate in the Kiswahili or English languages.
3. Healthcare workers who were working in RMNH.
4. Healthcare workers who were willing to provide informed consent and participate in this study.

Exclusion criteria

1. Healthcare workers who were found in RMNH but who did not usually work in such a unit.
2. Healthcare workers that were unable to answer questions because of physical or mental impediments.
3. Healthcare workers that were not willing to participate.

Study design

This was a quasi-experimental design using single group pre-and post-test evaluation strategy. Whereby healthcare workers from RMNH at the sampled health facilities were assessed on their training needs at baseline. The choice of this design is because it has been widely used in healthcare settings previously (Agrawal et al., 2021; Alnazly, 2018; Neil-Sztramko, Coletta, Dobbins, & Marr, 2020). Tailored training based on the identified and prioritized needs was implemented through a series of short courses. These courses were followed by a mentorship program that aimed at synergizing and complementing the knowledge and skills gained through the training courses. A similar approach was used in the mentorship program where mentees identified gaps in clinical skills that would guide the agenda for each mentorship visit. These courses were

delivered at 36 health facilities in Mwanza Region. Three years after the training and a year mentorship program, the same health facilities were sampled and the healthcare workers in RMNH in these health facilities were recruited for a post-test survey. Figure 1 presents the flow of the study.

Intervention (Training Program)

The training needs analysis was conducted at baseline to identify areas where capacity building was needed. After the baseline survey, the identified training needs were prioritized based on participants' responses and validated with regional database and current evidence in literature. Short courses to address these areas were developed, some of which were adapted from national or international guidelines, as noted above. The topics covered by the short courses are outlined in Table 1 below. The course delivery included a combination of face-to-face sessions, simulation, and practical sessions in clinical environment under supervision of accredited trainers. The trainees were drawn from the participating health facilities in Mwanza Region and received more than one short course. Moreover, the short courses were followed by clinical mentorship in real-life clinical settings. The mentorships design involved experienced medical specialists and nurses/midwives with over 15 years of RMNH experience serving as master mentors to local mentors (nurses & midwives and clinicians) who conducted mentorship visits at least once monthly to support trained healthcare providers in their healthcare facilities. A public health specialist (KI) with over 10 years of clinical experience in the same setting provided technical oversight and coordination of the mentorship intervention. Local mentors were identified from a list of trained healthcare workers based on their competencies, commitment, and availability for the mentorship program. The combine approach (training and onsite mentorship) has been implemented by several other studies and found to improve performance in clinical settings (Lutenbacher et al., 2018; Oikarainen et al., 2018; Tuomikoski, Ruotsalainen, Mikkonen, Miettunen, & Kaariainen, 2018; VanderKaay, Letts, Jung, & Moll, 2019).

Table 1
List of short courses conducted by the IMPACT project in Mwanza Region

Short courses	Number of trainees
1. Infection prevention and control	80
2. Standards-Based Management and Recognition	80
3. Health Management Information System	90
4. Referral	80
5. Health system management	114
6. Basic emergency obstetric and newborn care	104
7. Trainer of Trainers or comprehensive emergency obstetric and newborn care	30
8. Adolescent Sexual Reproduction Health	80
9. Respectful maternity care and gender responsive RMNCAH	80
10. Post abortion care	80
11. Focused antenatal care	80
12. Comprehensive emergency obstetric and newborn care	80
13. Family planning	80
14. Research methods for clinicians	40
15. Postnatal care	80
16. Clinical mentorship program	

Data Collection Tool

A training needs assessment (TNA) questionnaire was developed for RMNH providers at the primary (dispensary and health center) and secondary (health center and district and designated district hospital) levels. The tool was adapted from the Hennessy-Hicks TNA instrument (Hicks & Hennessy, 1997; Hicks, Hennessy, & Barwell, 1996), which has been psychometrically tested for reliability and validity and adopted by the WHO (Hicks & Hennessy, 1997). Several other TNA questionnaires were considered, including the Professional Nurse Self-Assessment Scale of Clinical Core Competencies (Wangensteen et al., 2018), Addiction Medicine Training Need Assessment Scale (Pinxten et al., 2019), and Community Competence-based Questionnaire (Shewade, Jeyashree, Kalaiselvi, Palanivel, & Panigrahi, 2016). However, the Hennessy-Hicks TNA questionnaire was selected because it was specifically developed to evaluate training requirements of healthcare professionals and facilitate the subsequent use of the findings for prioritizing and meeting local training needs (Hicks & Hennessy, 1997). The questionnaire measures a range of skills including clinical, managerial, administrative, and research audit activities.

Data Collection Procedure

Baseline data collection took place in August 2017 and endline data were collected from September to October, 2020. The team of two researchers and four research assistants collected the data. During data collection, the person in-charge of the selected facility identified RMNH personnel. The participants were those healthcare workers providing RMNH services and present at the time of the survey. The questionnaires were only given to these selected participants for completion. Participants were requested to assess their own performance on specific RMNH services/activities through a self-administered, confidential, paper-based questionnaire. Each questionnaire item was rated on a seven-point Likert scale.

Participants were also asked to identify areas in which they most wanted to receive additional training and note the trainings that they had most recently completed. Research assistants were available to answer questions and clarify elements of the questionnaire as needed. Returned questionnaires were checked for completeness and accuracy before the research team left each health facility.

Data Analysis

SPSS version 25.0 was used for data entry and statistical analyses. Data from the questionnaires were reviewed to identify consistencies and differences, and then coded and quantified. The data were then manually entered into a password-protected database via an entry screen that performed validation checks for accuracy. Missing data were excluded from analysis. We evaluated the normality of the TNA questionnaire score distribution using the Shapiro-Wilk test for perceived importance and performance at baseline and end line. The Shapiro-Wilk test confirmed the variable scores followed a normal distribution ($p > 0.05$). The difference in participants' characteristics between the two groups were tested with independent sample *t*-tests and Pearson's chi-square tests. Although the end line participants were drawn from the same health facilities as those at baseline, some participants in the end line survey were likely to be new to the study. Therefore, the most appropriate way to calculate the differences in perceived importance and performance between the baseline and endline surveys was an independent samples *t*-test. The independent samples *t*-test was also used to compare difference between perceived importance and performance and across the groups (baseline and end line). Significance was set at a 95% confidence interval with $p < 0.05$.

Ethical Considerations

Ethical Approval to conduct this study was obtained from the National Institute for Medical Research in Tanzania (Registration Certificate: NIMR/HQR/R.8a/Vol.IX/2517) after review by the Aga Khan University Institutional Review Board in Tanzania. Permission to conduct this study obtained from the Mwanza Regional Administrative Secretary. All participants provided oral and written informed consent after receiving an explanation of the benefits, potential harm, duration of the questionnaire, and their right to refuse or withdraw from the study at any point.

Results

Participants

The baseline and endline survey included 152 and 216 participants (post-intervention: training courses and mentorship), respectively. Participants in the end line survey were the same as those in the baseline survey or other participants from the same health facility. In total, 141 (65%) of the 216 end line survey participants had received at least one IMPACT project training course. Participants were matched on their age and duration in RMNH, but differed in age and duration of employment (Table 2).

Table 2
Comparison of participants' sociodemographic characteristics between the baseline and end line surveys

Variables	Baseline (n = 152)		End line (n = 216)		Equality of means (t-test)					
	Mean	Std. deviation	Mean	Std. deviation	t/ χ^2	Df	p-value	Mean Difference	95% CI	
Age	38.77	10.90	36.88	9.23	1.773	358	.077	1.888	-0.206	3.983
Duration in employment	13.59	11.72	11.23		2.158	359	.032	2.357	0.209	4.504
Duration in reproductive child health service	7.90	9.03	8.61	8.93	-0.607	249	.545	-0.705	-2.992	1.583
Sex (M/F)	25/127		59/157		5.98	1	0.014			
Received IMPACT training	-		141/216 (65.0%)							
CI, Confidence Interval.										

Comparison of health facility characteristics showed that the facilities were comparable in terms of type and the kind of support they received (government or private/faith based) (Table 3).

Table 3
Comparison of health facility information

Variable	Baseline (n = 152)	End line (n = 216)	Statistical tests		
			χ^2	df	p-value
Level of health facility					
Dispensary	29	54	2.208	2	.331
Health center	53	76			
Hospital	70	86			
Type of support					
Government	136	186	0.922	1	.337
Faith-based	16	30			

Comparisons of perceived importance in the baseline and end line surveys showed that most TNA items had statistically significant differences, except for "Providing education and counselling around voluntary counselling and testing (VCT) for HIV/AIDS," "Competently managing severe intra- and postpartum hemorrhage," "Providing care and education for cervical cancer screening and treatment," "Statistically analyzing your own data and using health facility data to understand local health challenges and inform service delivery," "Identifying research needs and designing locally relevant research," "Accessing research resources (e.g., time, money, information, equipment), and "Actively influencing evidence-based service provision" (Table 4).

Table 4
Comparison between baseline and endline scores for perceived importance of training needs

Training needs assessment items	Baseline		End line		Statistical test		
	Mean	Std. deviation	Mean	Std. deviation	T	df	p-value
1. Understanding gender equality issues relating to reproductive, maternal, child, and adolescent health	5.93	0.720	6.18	0.928	-2.764	366	.006
2. Delivering gender sensitive reproductive, maternal, child, and adolescent health services (e.g., providing privacy for consultations, gender sensitive counselling approaches, involvement of men)	5.88	0.712	6.27	0.802	-4.887	363	.000
3. Providing client/patient friendly reproductive, maternal, child, and adolescent health services	5.91	0.848	6.40	0.767	-5.727	363	.000
4. Understanding and using maternal, newborn and child health (MNCH) score cards (WHO)	5.82	1.189	6.27	0.957	-3.949	364	.000
5. Providing focused antenatal care (FANC) according to WHO guidelines	6.11	0.676	6.42	0.791	-3.860	366	.000
6. Offering malaria diagnosis with rapid diagnostic testing (RDT)	6.03	0.809	6.50	0.876	-5.187	364	.000
7. Providing malaria treatment in pregnancy	6.21	0.887	6.67	0.710	-5.453	361	.000
8. Providing education and counselling around voluntary counselling and testing (VCT) for HIV/AIDS	6.23	0.676	6.34	0.996	-1.175	365	.241
9. Providing education, counselling and support around HIV/AIDS prevention, care, and management for adolescents	5.86	1.161	6.43	0.857	-5.430	363	.000
10. Competently managing uncomplicated deliveries	6.01	1.129	6.45	0.835	-4.213	363	.000
11. Competently utilizing the partograph for every woman in labor	6.23	0.896	6.51	0.839	-3.122	362	.002
12. Competently providing basic emergency obstetric and newborn care (BEmONC)	6.13	1.118	6.42	0.909	-2.709	363	.007
13. Competently providing comprehensive emergency obstetric and newborn care (CEmONC)	5.79	1.593	6.43	0.956	-4.456	322	.000
14. Competently managing severe intra- and postpartum hemorrhage	6.21	0.989	6.39	0.876	-1.875	362	.062
15. Responding effectively to women suffering from severe pre-eclampsia and eclampsia	6.23	0.946	6.50	0.848	-2.934	364	.004
16. Effectively resuscitating newborns using the newborn bag and mask (HBB-Helping Babies Breathe)	6.21	0.997	6.52	0.869	-3.062	362	.002
17. Identifying dangerous signs and complications in childbirth and effectively managing maternal and newborn referral for further investigations or treatment	6.19	1.021	6.52	0.766	-3.537	365	.000

Training needs assessment items	Baseline		End line		Statistical test		
			Mean				
18. Providing education and counselling on prevention of mother to child transmission of HIV (PMTCT)	6.38	0.649	6.60	0.695	-3.168	366	.002
19. Effectively managing PMTCT treatment of HIV positive pregnant women, mothers, and infants	6.29	.925	6.54	0.767	-2.795	364	.005
20. Providing education, counselling and support to mothers in early initiation of breastfeeding (within one hour of delivery) and exclusive breastfeeding for 6 months	6.34	0.672	6.60	0.709	-3.507	365	.001
21. Implementing the maternal infant and young child nutrition (MIYCN) program	6.00	0.891	6.20	0.928	-2.021	357	.044
22. Offering the Tanzania expanded program for immunization (EPI)	6.11	1.074	6.33	0.951	-2.035	361	.043
23. Understanding vaccine management and logistics (cold chain maintenance)	6.00	1.013	6.29	1.021	-2.688	359	.008
24. Being proficient on injection safety and infectious waste management	6.34	0.630	6.55	0.753	-2.857	365	.005
25. Providing family planning services to women and men in a union	5.99	.924	6.35	0.907	-3.647	363	.000
26. Providing family planning services to unmarried/single women and men	5.82	1.062	6.23	0.992	-3.752	364	.000
27. Providing information, education, counselling, or family planning services to adolescents	5.84	1.101	6.31	0.887	-4.543	364	.000
28. Providing care and education for cervical cancer screening and treatment	5.92	1.205	6.55	7.062	-1.082	326	.280
29. Feeling confident in providing surgical care (including caesarean section)	4.83	2.156	7.26	10.094	-2.636	212	.009
30. Feeling confident in providing anesthetic care	4.75	2.227	7.37	11.660	-2.503	196	.013
31. Identifying cases of sexual- and gender-based violence and knowing how to make appropriate referrals	5.81	1.234	6.08	1.148	-2.082	350	.038
32. Providing counselling, care and support for women who are subject to gender-based violence	5.83	1.214	6.22	0.982	-3.410	361	.001
33. Planning and organizing an individual patient's care	5.79	1.233	6.38	0.817	-5.548	362	.000
34. Evaluating patients' psychological and social needs	5.72	1.315	6.26	0.963	-4.556	360	.000
35. Implementing effective infection control strategies	6.03	1.070	6.49	0.783	-4.691	366	.000
36. Implementing effective disease surveillance and reporting	5.84	1.252	6.16	1.051	-2.617	354	.009
37. Organizing your own time effectively	6.09	1.035	6.51	0.842	-4.338	365	.000
38. Personally coping with change in the health service delivery	6.21	0.637	6.43	0.875	-2.657	363	.008

Training needs assessment items	Baseline		End line		Statistical test		
			Mean				
39. Working as a member of a team	6.28	0.723	6.67	0.735	-4.968	366	.000
40. Assuming a leadership role	5.60	1.276	6.39	0.890	-6.927	363	.000
41. Developing leadership skills	5.63	1.228	6.40	0.879	-7.005	365	.000
42. Mentoring and guiding other staff	6.09	0.813	6.41	0.847	-3.649	366	.000
43. Supervision and management of community health workers	6.00	0.931	6.30	0.850	-3.151	357	.002
44. Training of community health workers	5.96	1.019	6.19	1.013	-2.050	347	.041
45. Undertaking effective data reporting and monitoring of service delivery	6.17	0.870	6.37	0.858	-2.130	361	.034
46. Statistically analyzing your own data and using health facility data to understand local health challenges and inform service delivery	6.21	0.843	6.27	0.850	-0.679	359	.498
47. Identifying research needs and designing locally relevant research	5.82	1.092	5.97	1.077	-1.252	334	.212
48. Accessing research resources (e.g., time, money, information, equipment)	5.78	1.269	6.03	1.093	-1.896	336	.059
49. Actively influencing evidence-based services provision	6.00	0.879	6.08	1.100	-0.734	349	.463

Findings from the TNA questionnaire on performance revealed that there was a statistically significant difference in most items following the intervention (short training courses and mentorship) from baseline to endline. However, there was still a gap in some items including: “Being proficient in injection safety and infectious waste management,” “Providing care and education for cervical cancer screening and treatment,” “Identifying research needs and designing locally relevant research”, “Accessing research resources (e.g., time, money, information, equipment),” and “Actively influencing evidence-based service provision” (Fig. 2).

Evaluation of the perceived importance and performance findings showed that in most items, perceived importance and performance at endline were statistically significantly higher than at baseline. This indicated that the IMPACT project training CPD program and onsite mentorship had a major impact on RMNH services in the study region. The details are provided in Fig. 3.

Discussion

This study aimed to evaluate the effectiveness of training CPD training supplemented by onsite mentorship program on the perceived importance and performance in specific areas of RMNH service provision as identified using a TNA tool. The purpose was to offer insights that could inform the design of effective trainings for improving RMNH service delivery in low resource settings.

This study demonstrated a statistically significant positive changes among RMNH healthcare workers following the intervention (training and mentoring). There was a significant improvement in perceived importance and performance in provision of RMNH services, leadership skills, and some research skills. In addition, some items were not statistically significant in terms of perceived importance (e.g., “Providing education and counselling around voluntary counselling and testing for HIV/AIDS,” “Competently managing severe intra- and postpartum hemorrhage,” and “Accessing research resources and influencing evidence-based service provision”) but showed a significant change in performance. Despite this

few items, overall, the findings indicate that the training and mentorship skills are of critical important in improving healthcare workers' performance in RMNH. These findings mirror the current scholarly discussion on RMNH. Research evidence continue to show that healthcare providers improved their performance in obstetric care, including conducting surgical procedures, when they received the correct training and support (Ellard et al., 2014; Wilhelm, Mothes, Chiwewe, Mwatibu, & Kahler, 2012; Wilson et al., 2011). Low- and middle-income countries, particularly Sub-Saharan African countries, are facing a crisis in available human resources for health, including insufficient providers of RMNH services. The literature suggests that evidence-based deployment and training policies have potential to improve service provision in low-resource settings, including healthcare settings in rural Africa (Murphy et al., 2014). Moreover, a previous study indicated that combined exposure to certain procedures in reproductive health has a cumulative positive impact on intention to provide such services in the future (Romero, Maldonado, Fuentes, & Prine, 2015). Therefore, the combined training approach (reproductive and newborn care, leadership, and research skills) implemented in this study has been confirmed to be effective for improving perceived importance and performance in RMNH training.

Good leadership skills are essential for optimal RMNH team performance (Block, Dehlendorf, Biggs, McNeil, & Goodman, 2017; Sibande, 2013). In this study, health system management and leadership skills were integrated in each of the RMNH training courses. The study revealed a significant positive change in perceived importance of and performance in leadership skills, including organizing time effectively, coping with change in health service delivery, working as a team member, assuming a leadership role, developing leadership skills, mentoring and guiding other staff, and supervision and management of community health workers. These findings are similar to those reported in previous studies. For instance, Block et al. (2017) reported that additional procedural training accompanied by mentorship of leadership skills was the most critical component of a program on successful provision of reproductive health services. Studies further indicate that Leadership competencies such as demonstrating appreciation for team members and creating connections between colleagues have been found to improve morale and increase retention, innovation, and productivity, and also have potential to prevent burnout (Hackworth, Steel, Cooksey, DePalma, & Kahn, 2018; Shanafelt & Noseworthy, 2017). Another study in (country) suggested that transformative learning including interdisciplinary leadership competencies such as self-awareness, vision, self-regulation, motivation, decisiveness, integrity, interpersonal communication skills, strategic planning, team building, innovation, and being an effective change agent are effective for an interdisciplinary team of healthcare providers (Negandhi et al., 2015). The present study provided training on general health system management, and further studies may be needed to explore the specific leadership skills required for RMNH in low-income settings.

The research capacity of health personnel, financial resources, positive reward systems, and collaborative relationships have been reported to be fundamental for improving RMNH services (Matus, 2018). However, in low- and middle income countries such as Tanzania, most available funds, expertise, and other resources come from the North-South collaboration, and little attention is directed to research activities (Van der Veken, 2017). In the present study, although there were some statistically significant positive changes in research capacity post-test (e.g., "Assessing research resources and actively influencing evidence-based service provision"), there were no significant changes in perceived importance and a deficit remained in capacity to analyze facility data to inform local service delivery and identifying locally-relevant needs. Therefore, strengthening research capacity in low- and middle-income countries has been reported to be a powerful, cost effective, and sustainable way of advancing health, healthcare, and development (Kabra et al., 2017). Strengthening research capacity may enable healthcare providers to undertake research based on their local needs and priorities that can advance RMNH services and related leadership skills in low- and middle-income countries. Innovative interventions for changing attitudes and building research capacity in research management, proposal writing for grants, and report writing may provide positive changes in perceived importance and performance in research.

The present study provides evidence of positive changes among healthcare workers in terms of the perceived importance of and performance in identified and prioritized areas in RMNH, leadership, and research capacity. This intervention (training program) was unique because it covered the range of knowledge and skills in RMNH and was supplemented by mentorship program in the real-life clinical setting. Mentorship interventions have been reported to have a statistically significant

positive impact on competencies among healthcare providers (Creanga et al., 2020). The CPD courses and mentorship program were effective and may be less expensive than other training options because they used local trainers and mentors, which suggested this approach may be sustainable. However, cost analysis may be needed to substantiate the cost of the employed approach.

The Current study have some strength worth mentioning. This study used a combined approach of job and onsite clinical mentorship. Studies have indicated that many trainees lose their skills soon after training therefore the combine approach used in this study ensures retention of knowledge and skills. Therefore, there is a need for continuous use of low dose high frequency training model (Cavicchiolo, 2018). This study is without limitations. At the time the endline survey was conducted, there were varying durations since the CPD courses (6 months to 3 years). Therefore, the observed differences between baseline and endline scores may partly result from changes in the learning climate (e.g., training from other partners) and accumulation of experience through clinical practice over this period. However, the approach used in this study was deemed suitable as it was not considered meaningful to use an artificial environment isolating healthcare workers to study the effectiveness of a training intervention. Second, the baseline was conducted through the TNA questionnaire that may have highlighted existing training needs in an individual participant than the work related perceived performance. Therefore, the healthcare workers may have focused on improving their performance on the identified gaps. Third, though the health facilities were selected randomly, participants were recruited using convenience sampling. This means the findings may not be generalizable to all healthcare providers in Tanzania. Fourth, there was no comparison group, meaning it was difficult to determine whether the observed changes were due to time or the effect of the training program. However, selection of a comparison group was not feasible because implementation of the training program was regional across all health facilities. Moreover, a group follow up was based on the same health facility that might be not the same with the paired groups. Therefore, we treated the baseline and endline survey groups as independent groups and we opted independent samples t-test to test the effectiveness instead of paired t-test.

Conclusions

In conclusion, the present study was conducted in a low-income setting using a TNA tool to identify, prioritize, implement, and evaluate the effectiveness of trainings with mentorship program on perceived importance of and performance in aspects of RMNH services among healthcare workers. The findings revealed that training based on healthcare workers' identified and prioritized needs according to their healthcare facilities and supported with clinical mentorship resulted in significant positive changes in perceived importance and performance across a wide range of RMNH services. Therefore, conducting TNA that is followed by training and mentorship according to the identified needs among healthcare workers plays a significant role in improving their performance. However, further studies with rigorous designs are warranted to evaluate the long-term effect of such a training program on pregnancy and newborn outcomes.

Declarations

Ethics approval and consent to participate

Approval to conduct this baseline survey was obtained from the National Institute for Medical Research in Tanzania (Registration Certificate: NIMR/HQR/R.8a/Vol.IX/2517) after a review by the Aga Khan University Institutional Review Board in Tanzania. Permission to conduct the study was obtained from the Mwanza Regional Administrative Secretary. All participants provided oral and written informed consent after an explanation of the benefit, potential harm, duration of the interview, and the right to refuse or withdrawal from the study at any point if they wished to do so.

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from the Aga Khan University Monitoring and Evaluation Research Unit (MERL). There are some restrictions to the availability of these data due to license, so the data are not publicly available. However, the data may be made available from the authors upon reasonable request and with permission of the Aga Khan University MERL.

Competing interests

Authors declare that they have no competing interests.

Funding

This study received a grant from Global Affairs Canada through the Aga Khan Foundation Canada.

Authors' contributions

TM drafted the manuscript and conducted data analysis. GE and KI reviewed the original TNAQ. TM, MM, SK, SM and CM conducted the data collection. TM, ES, MM, CM, LM, TM, KI, and MT contributed to the conception and design of the study. TM, CM, KI, LM, EP, GE, SM, SM2, MM, LK, ML, VM, HK, SK, SM3, and MT provided critically important revisions of the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We would like to extend our thanks to Mwanza Regional Management including Regional Administrative Secretary, village executive officers, health management team, and participants for their support during the baseline survey. We also extend our acknowledgement to James Orwa, Edna Selestine, David Siso, and Michael Mugerwa for their management skills and participation in data collection.

References

1. Agrawal N, Bhargava S, Usmanova G, Srivastava A, Kumar S, Mahajan S, . . . Sood B. Evaluating the effect of strengthening nurse midwifery pre-service education in two Indian states: A single group pre - and post - intervention study. *Nurse Educ Today*. 2021;96:104640. doi:10.1016/j.nedt.2020.104640.
2. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, . . . technical advisory, g. (2016). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *Lancet*, 387(10017), 462–474. doi:10.1016/S0140-6736(15)00838-7.
3. Alnazly EK. The impact of an educational intervention in caregiving outcomes in Jordanian caregivers of patients receiving hemodialysis: A single group pre-and-post test. *Int J Nurs Sci*. 2018;5(2):144–50. doi:10.1016/j.ijnss.2018.03.007.
4. Block A, Dehlendorf C, Biggs MA, McNeil S, Goodman S. Postgraduate Experiences With an Advanced Reproductive Health and Abortion Training and Leadership Program. *Fam Med*. 2017;49(9):706–13.
5. Cavicchiolo ME, Cavallin F, Bertuola F, Pizzolo D, Segafredo G, Wingo OM, . . . Trevisanuto D. Effect of a Low-Dose/High-Frequency Training on Real-Life Neonatal Resuscitation in a Low-Resource Setting. *Neonatology*. 2018;114(4):294–302. doi:10.1159/000490370.
6. Clark J. Child deaths plummet but many countries miss millennium development goal. *BMJ*. 2015;351:h4850. doi:10.1136/bmj.h4850.

7. Creanga AA, Jiwani S, Das A, Mahapatra T, Sonthalia S, Gore A. . Shah H. Using a mobile nurse mentoring and training program to address a health workforce capacity crisis in Bihar, India: Impact on essential intrapartum and newborn care practices. *J Glob Health*. 2020;10(2):021009. doi:10.7189/jogh.10.021009.
8. Ellard DR, Chimwaza W, Davies D, O'Hare JP, Kamwendo F, Quenby S,.. . Group ES. Can training in advanced clinical skills in obstetrics, neonatal care and leadership, of non-physician clinicians in Malawi impact on clinical services improvements (the ETATMBA project): a process evaluation. *BMJ Open*. 2014;4(8):e005751. doi:10.1136/bmjopen-2014-005751.
9. Fernandes BB, Nunes FB, Prudencio PS, Mamede FV. (2015). [Epidemiological research of the maternal deaths and compliance with the fifth millennium development goal]. *Rev Gaucha Enferm*, 36 Spec No, 192–199. doi:10.1590/1983-1447.2015.esp.56792.
10. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T,.. . Zurayk H. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet*. 2010;376(9756):1923–58. doi:10.1016/S0140-6736(10)61854-5.
11. Goldenberg RL, McClure EM, Saleem S. Improving pregnancy outcomes in low- and middle-income countries. *Reprod Health*. 2018;15(Suppl 1):88. doi:10.1186/s12978-018-0524-5.
12. Hackworth J, Steel S, Cooksey E, DePalma M, Kahn JA. Faculty Members' Self-Awareness, Leadership Confidence, and Leadership Skills Improve after an Evidence-Based Leadership Training Program. *J Pediatr*. 2018;199:4–6 e2. doi:10.1016/j.jpeds.2018.05.007.
13. Hicks C, Hennessy D. The use of a customized training needs analysis tool for nurse practitioner development. *J Adv Nurs*. 1997;26(2):389–98.
14. Hicks C, Hennessy D, Barwell F. Development of a psychometrically valid training needs analysis instrument for use with primary health care teams. *Health Serv Manage Res*. 1996;9(4):262–72. doi:10.1177/095148489600900406.
15. Kabra R, Castillo M, Melian M, Ali M, Say L, Gulmezoglu AM. Research capacity strengthening for sexual and reproductive health: a case study from Latin America. *Reprod Health*. 2017;14(1):35. doi:10.1186/s12978-016-0222-0.
16. Lutenbacher M, Elkins T, Dietrich MS, Riggs A. The Efficacy of Using Peer Mentors to Improve Maternal and Infant Health Outcomes in Hispanic Families: Findings from a Randomized Clinical Trial. *Matern Child Health J*. 2018;22(Suppl 1):92–104. doi:10.1007/s10995-018-2532-z.
17. Maaloe N, Meguid T, Housseine N, Tersbol BP, Nielsen KK, Bygbjerg IC, van Roosmalen J. Local adaption of intrapartum clinical guidelines, United Republic of Tanzania. *Bull World Health Organ*. 2019;97(5):365–70. doi:10.2471/BLT.18.220830.
18. Mariani G, Kasznia-Brown J, Paez D, Mikhail MN, Bhatla DHS, Kashyap N, R. Improving women's health in low-income and middle-income countries. Part I: challenges and priorities. *Nucl Med Commun*. 2017;38(12):1019–23. doi:10.1097/MNM.0000000000000751.
19. Murphy GT, Goma F, MacKenzie A, Bradish S, Price S, Nzala S,.. . Hamavhwa D. A scoping review of training and deployment policies for human resources for health for maternal, newborn, and child health in rural Africa. *Hum Resour Health*. 2014;12:72. doi:10.1186/1478-4491-12-72.
20. Negandhi P, Negandhi H, Tiwari R, Sharma K, Zodpey SP, Quazi Z,.. . Yeravdekar R. Building Interdisciplinary Leadership Skills among Health Practitioners in the Twenty-First Century: An Innovative Training Model. *Front Public Health*. 2015;3:221. doi:10.3389/fpubh.2015.00221.
21. Neil-Sztramko SE, Coletta G, Dobbins M, Marr S. Impact of the AGE-ON Tablet Training Program on Social Isolation, Loneliness, and Attitudes Toward Technology in Older Adults: Single-Group Pre-Post Study. *JMIR Aging*. 2020;3(1):e18398. doi:10.2196/18398.
22. Oikarainen A, Mikkonen K, Tuomikoski AM, Elo S, Pitkanen S, Ruotsalainen H, Kaariainen M. Mentors' competence in mentoring culturally and linguistically diverse nursing students during clinical placement. *J Adv Nurs*. 2018;74(1):148–59. doi:10.1111/jan.13388.

23. Ona S, Easter SR, Prabhu M, Wilkie G, Tuomala RE, Riley LE, Diouf K. Diagnostic Validity of the Proposed Eunice Kennedy Shriver National Institute of Child Health and Human Development Criteria for Intrauterine Inflammation or Infection. *Obstet Gynecol.* 2019;133(1):33–9. doi:10.1097/AOG.0000000000003008.
24. Orwa J, Mantel M, Mugerwa M, Brownie S, Pallangyo ES, Mwashu L, . . . Temmerman M. Maternal healthcare services use in Mwanza Region, Tanzania: a cross-sectional baseline survey. *BMC Pregnancy Childbirth.* 2019;19(1):474. doi:10.1186/s12884-019-2653-4.
25. Pinxten WJL, Fitriana E, De Jong C, Klimas J, Tobin H, Barry T, . . . Schellekens A. Excellent reliability and validity of the Addiction Medicine Training Need Assessment Scale across four countries. *J Subst Abuse Treat.* 2019;99:61–6. doi:10.1016/j.jsat.2019.01.009.
26. Romero D, Maldonado L, Fuentes L, Prine L. Association of reproductive health training on intention to provide services after residency: the family physician resident survey. *Fam Med.* 2015;47(1):22–30.
27. Schwerdtle P, Morphet J, Hall H. A scoping review of mentorship of health personnel to improve the quality of health care in low and middle-income countries. *Global Health.* 2017;13(1):77. doi:10.1186/s12992-017-0301-1.
28. Semali IA, Tengia-Kessy A, Mmbaga EJ, Leyna G. Prevalence and determinants of stunting in under-five children in central Tanzania: remaining threats to achieving Millennium Development Goal 4. *BMC Public Health.* 2015;15:1153. doi:10.1186/s12889-015-2507-6.
29. Shanafelt TD, Noseworthy JH. Executive Leadership and Physician Well-being: Nine Organizational Strategies to Promote Engagement and Reduce Burnout. *Mayo Clin Proc.* 2017;92(1):129–46. doi:10.1016/j.mayocp.2016.10.004.
30. Shewade HD, Jeyashree K, Kalaiselvi S, Palanivel C, Panigrahi KC. Assessment of community-based training of medical undergraduates: Development and validation of a competency-based questionnaire. *Educ Health (Abingdon).* 2016;29(3):244–9. doi:10.4103/1357-6283.204218.
31. Shimamoto K, Gipson JD. The relationship of women's status and empowerment with skilled birth attendant use in Senegal and Tanzania. *BMC Pregnancy Childbirth.* 2015;15:154. doi:10.1186/s12884-015-0591-3.
32. Sibande C. "There is a lot of goodwill from the country's leadership and many people to address reproductive health issues including safe motherhood ... Interview by Thengo Kavinya. *Malawi Med J.* 2013;25(1):27–8.
33. TDHS. (2016). Tanzania Demographic Health Survey (TDHS) 2010 and 2015/16.
34. Tuomikoski AM, Ruotsalainen H, Mikkonen K, Miettunen J, Kaariainen M. The competence of nurse mentors in mentoring students in clinical practice - A cross-sectional study. *Nurse Educ Today.* 2018;71:78–83. doi:10.1016/j.nedt.2018.09.008.
35. VanderKaay S, Letts L, Jung B, Moll SE. On-line ethics education for occupational therapy clinician-educators: a single-group pre-/post-test study. *Disabil Rehabil.* 2019;41(23):2841–53. doi:10.1080/09638288.2018.1473510.
36. Vieira C, Portela A, Miller T, Coast E, Leone T, Marston C. Increasing the use of skilled health personnel where traditional birth attendants were providers of childbirth care: a systematic review. *PLoS One.* 2012;7(10):e47946. doi:10.1371/journal.pone.0047946.
37. Vogel JP, Pileggi-Castro C, Chandra-Mouli V, Pileggi VN, Souza JP, Chou D, Say L. Millennium Development Goal 5 and adolescents: looking back, moving forward. *Arch Dis Child.* 2015;100(Suppl 1):43–7. doi:10.1136/archdischild-2013-305514.
38. Wangensteen S, Finnbakk E, Adolfsson A, Kristjansdottir G, Roodbol P, Ward H, Fagerstrom L. Postgraduate nurses' self-assessment of clinical competence and need for further training. A European cross-sectional survey. *Nurse Educ Today.* 2018;62:101–6. doi:10.1016/j.nedt.2017.12.020.
39. WHO. WHO recommendations for clinical mentoring to support scale-up of HIV care, antiretroviral therapy and prevention in resource-constrained settings. Geneva: World Health Organization; 2005.
40. Wilhelm TJ, Mothes H, Chiwewe D, Mwatibu B, Kahler G. Gastrointestinal endoscopy in a low budget context: delegating EGD to non-physician clinicians in Malawi can be feasible and safe. *Endoscopy.* 2012;44(2):174–6. doi:10.1055/s-

41. Wilson A, Lissauer D, Thangaratnam S, Khan KS, MacArthur C, Coomarasamy A. A comparison of clinical officers with medical doctors on outcomes of caesarean section in the developing world: meta-analysis of controlled studies. *BMJ*. 2011;342:d2600. doi:10.1136/bmj.d2600.

Figures

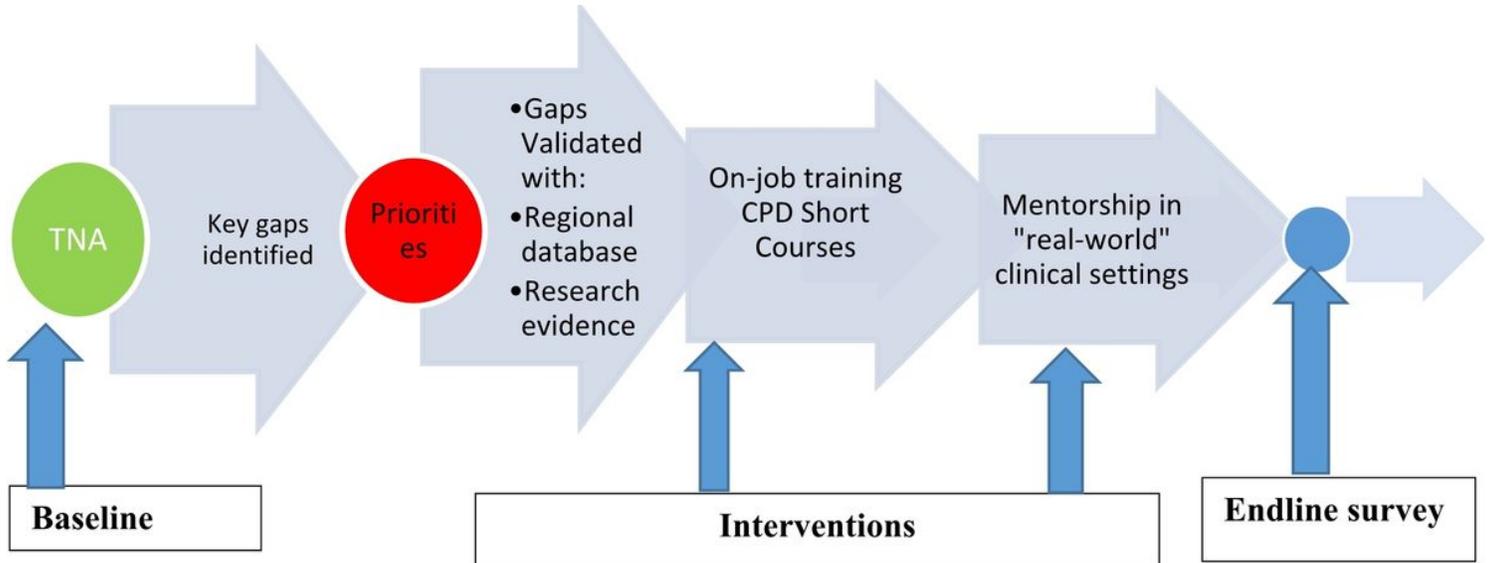


Figure 1

Study design flow chart

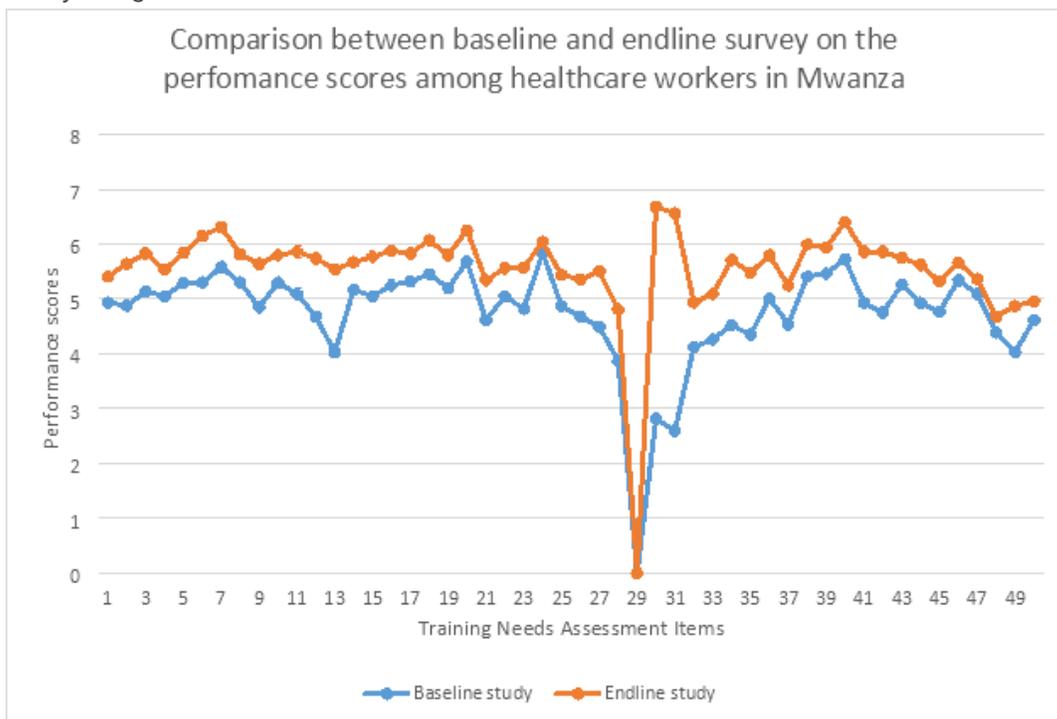


Figure 2

Comparison between baseline and endline survey on the performance scores among healthcare workers in Mwanza

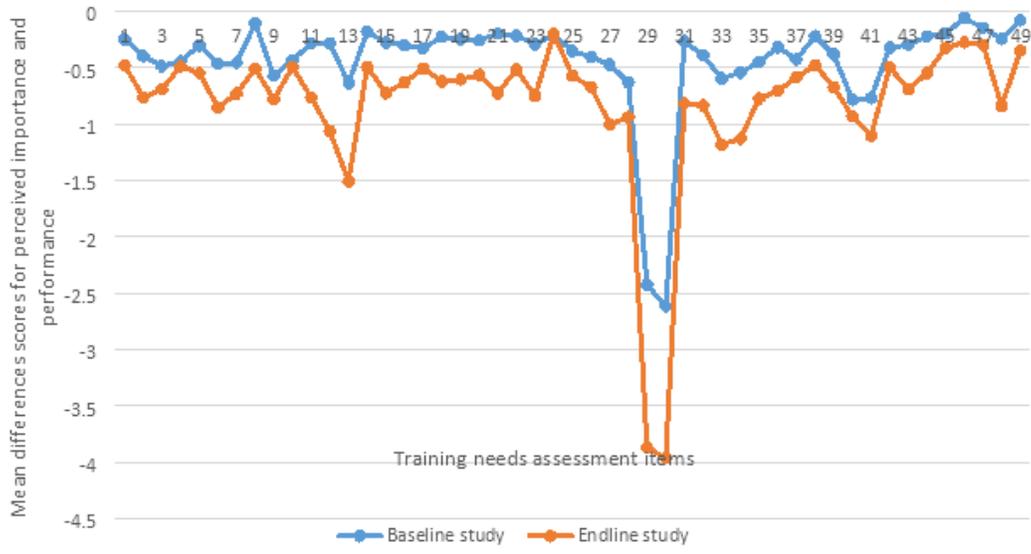


Figure 3

Training need assessment gaps as measured by the mean differences in perceived importance and performance