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Assessment of community health workers activities in six districts of Zambézia Province, Mozambique

Cristolde Salomão[1,2] · Talata Sawadogo-Lewis[3] · Réka Maulide Cane[1,2,6] · António Júnior[1,6] · Briana Stone[3] · Júlia Sambo[1,6] · Michael R. Diaz[3] · Fernando Padama[4] · Humberto Rodrigues[5] · Timothy Roberton[3] · Acácio Sabonete[1]

Received: 17 October 2023 / Accepted: 3 July 2024
Published online: 23 July 2024

Abstract
Mozambique's Community Health Worker (CHW) or Agentes Polivalentes Elementares in Portuguese (APE) in Mozambique was reinitiated in 2010 after an unsuccessful first attempt decades prior. Two decades after this reinitialization, the Ministry of Health of Mozambique (MoH) and other interested parties sought to understand how the implementation of APEs interventions is progressing. Given its low coverage of many health interventions. A cross-sectional study was carried out in six districts of the Province of Zambézia, namely: Ile, Inhassunge, Milange, Mocubela, Mulevala, and Pebane. A questionnaire was developed based on government plans, APE training material, and best practices for implementing ACS programs found in the literature for individual face-to-face interviews with APEs. A descriptive analysis was carried out to summarize the different components of the APEs program according to the interviewees' responses**.** A total of 148 APEs were interviewed. Only 48% of APEs replenished their kits every month, and stock-outs of medications ranged from 19 to 92%, with expired medication being found for 5–13% of the medications. Although the quality of supervision appears high with APEs reporting service delivery observation (88%), discussion of work performance (81%) and work-related problems (91%), checking of supplies (90%), review of records (93%), and praise (92%) during their last supervision, only 59% of the sample study reported having had their last meeting with their supervisor less than 1 month ago. APEs are very important in providing care to patients in remote communities. Nonetheless, challenges persist in ensuring the proper performance of the APEs program. More urgently, there is a need to focus more on securing a constant supply of APE kits to provide patient care and on regular and timely delivery of subsidies as an incentive.

Keywords Assessment · Community · Health workers · Districts · Mozambique

✉ Cristolde Salomão, todysalo@gmail.com | [1]Instituto Nacional de Saúde, Ministério da Saúde, Maputo, Mozambique. [2]Plataforma de Saúde da Mulher, Criança e Nutrição, Observatório Nacional de Saúde, Maputo, Mozambique. [3]Institute for International Programs, Johns Hopkins School of Public Health, Baltimore, USA. [4]Provincial Health Directorate of Zambézia, Ministério da Saúde, Zambézia, Mozambique. [5]National Community Health Worker Program, Ministério da Saúde, Maputo, Mozambique. [6]Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Lisbon, Portugal.

1 Introduction

Mozambique is a country on the eastern coast of Southern Africa, between the 10/27′ and 26/52′ parallels of South latitude and between the 30/12 and 40/51 longitudinal meridians. It has 801537 square km of land area and a population of 34785211 inhabitants. Administratively, it is divided into three regions, north, center and south, where the country's 11 provinces are located, which are subdivided into districts [1].

Mozambique's community health worker (CHWs) program—known in Portuguese as Agentes Polivalentes Elementares (APEs)—was initially launched in 1978. Despite some initial success, the program was halted in 1989 due to various obstacles—mostly centered around poor coordination of different APEs initiatives, poor monitoring and supervision, and limited support for APEs [2, 3]. Despite multiple attempts to revive the program and although various non-governmental organizations (NGOs) continued to fund program-specific APEs, the official government APE program remained halted for nearly two decades [3], before being relaunched in 2010. Building on lessons learned from the unsuccessful first implementation, this relaunch included clearly defined training goals, specified activities, and a medium- to long-term plan for the program's implementation [4].

In 2015, a technical revision to the APEs training curriculum was issued and implemented, which added the administration of family planning interventions [5]. In theory, each APE is meant to be responsible for 500 to 2000 inhabitants depending on the population density and access to health facilities [4]. As part of the basic healthcare services they provide, each APE is given a medical kit which contains basic medication and commodities to diagnose and treat common minor illnesses [4]. The kits are assembled by Ministry of Health (MoH) and are distributed to local health centers on a monthly basis for APEs to collect and use in their communities. Each APEs' entire kit is intended to be replaced every month, regardless of the quantity of commodities used [4]. The type and quantity of components in the APE kits were based on rough estimates of APEs' commodity monthly use originally calculated by the MoH. These quantities have not been significantly altered since the initiation of integrated community cases management (iCCM) in Mozambique and are not based on current APE consumption data or on regional and seasonal variations in disease burden [10]. The coverage of health interventions in Zambézia is generally lower than the national average. For example, the contraceptive prevalence rate in Zambézia is 18%, compared to 27.1% nationally. 20% of women in Zambézia have not attended any pre-natal consultations, compared to the nation-al average of 6.7%, and 75% of Zambézia's babies do not receive any post-natal consultation, compared to 55.6% nationally [5]. Additionally, most of Zambézia's population is rural and 39.1% of its population belongs to the poorest wealth quintile [5]. Zambézia is therefore particularly well positioned to benefit from an APE program. This study assessed how the APE program is currently being implemented. The findings from this study will help identify where roadblocks exist and help guide decision-makers in addressing them.

2 Methods

2.1 Study design, location, and population

A cross-sectional survey was carried out on the APEs in the province of Zambézia, using cluster sampling in a single phase. This sampling strategy was chosen because, for indicators that take individual APEs as the unit of analysis, single-stage cluster sampling would result in an accuracy of ± 10 percentage points, assuming an observed estimate of 50%, a design effect of 1.5 and an alpha of 5%. Since there are a total of 22 districts in the province of Zambézia, this meant selecting 6 districts as sampling units. To select the districts, a list of all 22 districts of the Zambézia province was obtained. This list was first stratified by urban (n = 5) and rural (n = 17). Next, systematic random sampling was carried out in each stratum to select the 6 districts, 5 of which were rural (Inhassunge, Ile, Mocubela, Mulevala, Pebane) and 1 urban (Milange). An updated list of all APEs working in the selected districts was then obtained, through the District Service for Health, Women and Social Action. All APEs included in this list for selected districts were included in the sample.

2.2 Data sources

A questionnaire was developed to capture how well the APEs program (as described in the government plans) is being implemented. To this end, national strategies, government documents and the APE training curriculum were examined

to identify what knowledge, tools, medicines, and activities an APE should theoretically have or do [6–9]. Based on this information, a questionnaire was developed that asks about each expected activity (e.g., frequency of occurrence, knowledge about the activity) as well as each individual medication (e.g., whether the APE carries it, expiration date (for see if expired), out of stock). In addition, the Community Health Workforce Assessment, and Improvement Matrix [11], which summarizes the key factors required for a successful APE program, was used to assist with analysis. Based on both elements, a questionnaire was developed and is available as supplementary material. Open Data Kit (ODK) was used as a data collection platform. As data collection took place in January (i.e. during the rainy season), road conditions for traveling in the districts were poor. Teams were provided with an updated list of APEs for their assigned district. Additional APEs found during data collection were not included in the sample. The face-to-face interviews took place in the APE's homes, when road conditions allowed, and in the health unit, when it was not possible to reach the APE's homes. Data collectors carried out an inspection of the kits only when they managed to reach the APEs' homes, as the kits and complete inventories are too large for the APEs to carry with them to the health facilities. Data collection took 14 days in the selected districts.

2.3 Data management and analysis

The knowledge, activities and presence of appropriate medicines and equipment for use by APEs were examined. APE's job satisfaction was also assessed. Data was analyzed using descriptive statistics, such as frequencies and means, to summarize APE responses using Microsoft Excel. The estimates were calculated taking into account the study design and sampling weights. Weights were constructed for each APE based on the joint probability of being in the final sample of APEs that responded, that is, the probability of: (1) the district having been sampled (2) the APE having been sampled within the district (which, given the study design, it was 100% for all APES) and (3) the APE was contactable (different for each district). To take into account the grouping (in this case, districts), Taylor series linearization was used to estimate the variance and calculate confidence intervals. A Finite Population Correction (FPC) factor was also applied to the estimated standard errors to take into account how close the sample size is to the entire provincial-level APE population. To apply these adjustments to the sampling design and response rates to estimate the results for the province of Zambézia as a whole, the set "svy" command in Stata was used. All data presented in this document are weighted estimates along with their 95% confidence interval for all APEs in the province of Zambézia. Statistical analysis was performed using Stata version 18 (Stata Corp LLC) [12].

3 Results

3.1 Sociodemographic characteristics

Of the 171 APEs planned for this survey, 148 (87%) were interviewed and 23 (13%) were not interviewed, for various reasons. Of the 23 not interviewed, 11 individuals no longer worked as APE, 10 were unable to be contacted during data collection and two died. The majority of APEs were between 20 and 39 years old (62%), male (67%), and married (79%). More than half of the respondents (57%) had a secondary level and knew how to read (93%) and solve a simple arithmetic Eq. (81%) (Table 1).

3.2 APEs workload

APEs are on average responsible for 3926 individuals spread across an average of 3.4 communities (Table 2). They live on average 38 km away from the health facility and 52 km from the center of the district (Table 2).

3.3 Training and activities

The performance of APEs in terms of training is described in Table 3. While 99% of the interviewed APEs reported having received training to be an APE, only 20% reported having received some training in the last 3 months before the survey.

Table 1 APEs socio-demographic characteristics

Characteristic	Estimate
Average age (years)	36.6
Age distribution (%)	
<20	0.6
20-29	29.9
30-39	31.6
40-49	24.2
50-59	12.2
>60	1.5
Gender (%)	
Female	33.2
Male	66.8
Marital status (%)	
Married	79.3
Single	14.7
Separated	4.2
Widowed	1.9
Highest level of education completed (%)	
Primary	43.1
Junior Secondary	48.5
Senior Secondary	8.4
Able to read a short sentece correctly (%)	93.4
Able to solve a simple arithmetic equation (%)	81
Average number of years working as APE (years)	4.7
Women	4.1
Men	5.1

Table 2 Summary of APEs workload, distance, and recruitment

Characteristic	Est.	95% CI
Average number of communities per APE (n))	3.4	1–12.0
Average number of population per APE (n)	3.926	147–75,800
Average distance from the APE´s home to their affilliated health facility (km)	38	0–190
Average distance between health facilities and district headquarters (km)	52	3–390
APEs recruited during or after 2015 (%)		
All	53.2	40.4–65.6
Women	59.5	39.6–76.8
Men	50.0	37.7–62.4
APE recruitment source (%)		
Recruited by community	86.2	66.5–95.1
Recruited by health facility	12.3	4.5–29.4
Other	1.5	0.3–7.9

3.4 Challenges reported by APEs

The kits of 64% of the reachable APEs were observed. Findings show that 81% of the kits were in unacceptable condition (Annex 1). As for the condition of the medications in the kit, the percentage of expired medications varied from 5 to 13% (Fig. 1).

Table 3 APEs training

	Est.	95%CI
APEs reports having being trained as part of becoming an APE (%)	99.2	92.4–99.9
Average number of years since initial training (n)	4.9	3.9–5.9
Average duration of initial training (days)	142	133.7–150.3
APEs reports receiving any training after their initial training (%)	91.7	86.7–95.0
Reason for not receiving training since becoming an APE (excluding initial training)		
No training was offered to APE (%)	81.4	31.9–97.6
Training was offered but APE could not attend because of scheduling conflicts (%)	18.6	2.4–68.1
Average amount of times received training since initial training (n)	5.59	1.80–9.40
APE reports receiving any training in the past 3 months	19.7	9.8–35.5

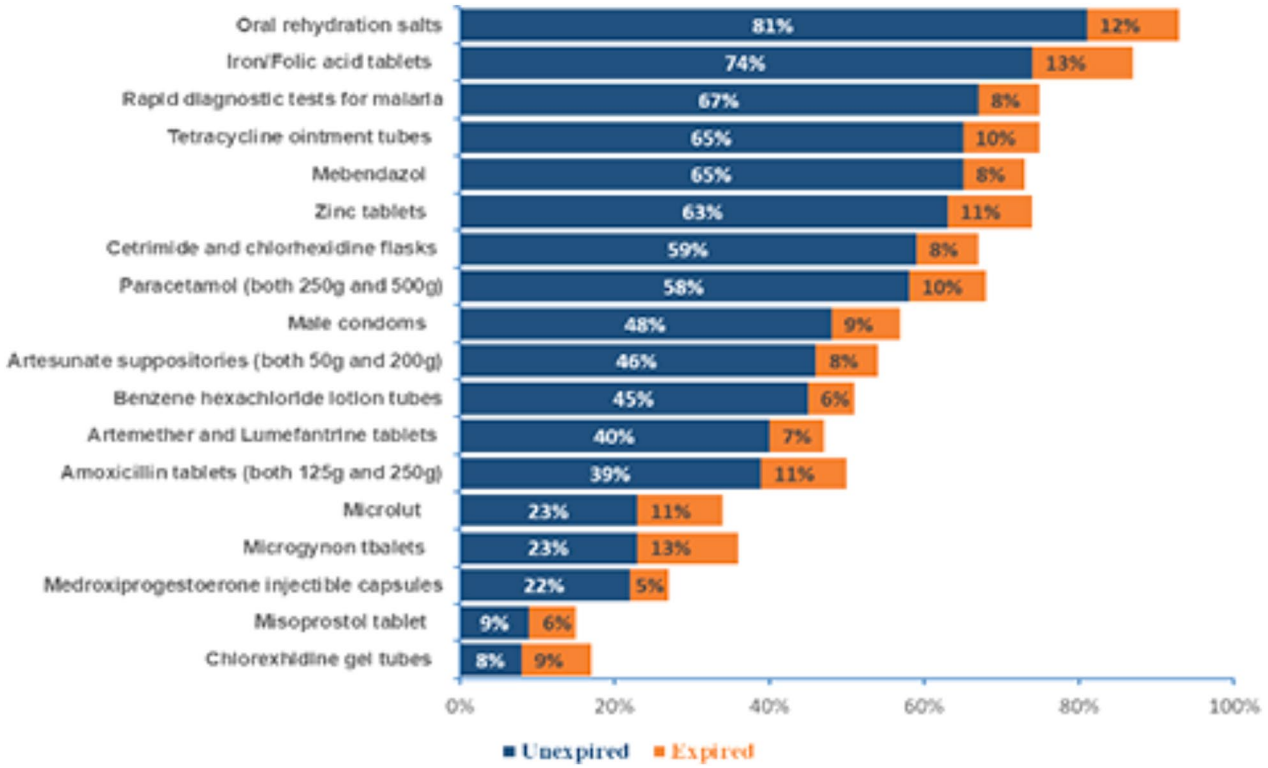

Fig. 1 Percentage of APEs that had given commodities and the expiration status of each commodity

Regarding supervision, 99% of APEs reported that they had ever received supervision but only 18% had received supervision in the last two months. Most APEs (94%) reported that they were given suggestions and advice during the last supervision they received. During supervision only 80% of APEs mentioned that the supervisor used the checklist during supervision and 88% mentioned that the supervisor observed them while working during their last supervision. When asked about frequency of activity reports sent to supervisors, 92% had sent the activity report in the last month, 99% submitted the reports directly to the health unit and 79% received feedback from the reports (Annex 2).

With regard to the barriers mentioned for not going to the health facility when patients are referred, 45% of the APEs reported that patients do not have transport to the health facility, 20% stated that patients do not have money to go to the health facility and 15% of patients did not want to go to the facility (Annex 3). Regarding barriers to replenishing their equipment and medications, 58% of the APEs reported not facing any challenge and 31% said that the health facility had a stockout (Fig. 2).

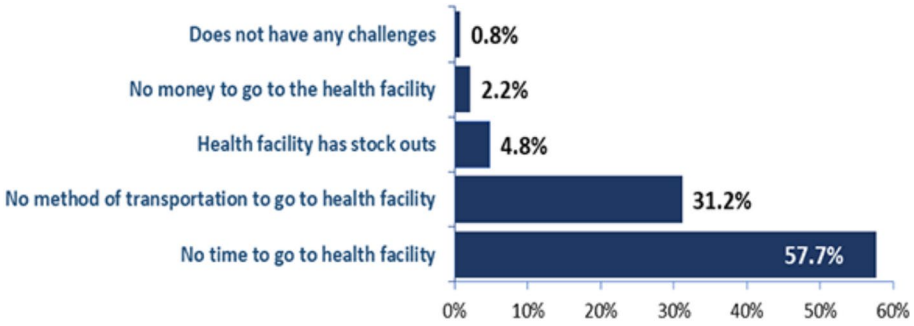

Fig. 2 Challenges reported by APEs for the replenishment of equipment and medications

4 Discussion

4.1 APEs and the health system

Although the program prioritizes the recruitment of women to be APEs, this study´s findings show that men continue to outnumber women—which has been a concern from the very beginning of the program [2]. Encouragingly, the findings suggest a shift towards hiring more women as of 2015 (year of the introduction of family planning to the APEs program).

In terms of recruitment, only APEs who are literate and able to solve simple arithmetic equations are supposed to be allowed into the program. Nearly a fifth of the APEs are unable to solve a simple equation, as a concern to APE's need to be able to dispense a specific amount of medication and this may impact the delivery of their services. Although some evidence suggests that interpersonal skills outweigh educational background in terms of what makes a good CHW [13], literacy and basic numeracy is also very important for anyone managing medication.

Community integration approach is a key determinant factor for the success of CHW programs. The CHWs are typically most familiar with their community, because it protects CHWs from fluctuations in political interests [13, 14]. The findings, shows that most of the APEs were recruited by their own community, more than 10 or 10% were recruited by health facility staff. APEs also reported that their patients did not heed to their referral to the health facility because of unwillingness to visit the health facility (15%) and because of the APE's own poor relationship with the health facility (5%). Hence there, there is room to engage the health system at community level and the APEs.

The discrepancies between the lists of APEs provided at central and local level by the APEs Program may indicate the existence of a disconnect at the level of updating records. This disconnection leads to a lack of precision and integrity of information, for example, by not including the systematic updating of APEs that have already died, others that are no longer working as APEs, and new APEs found in the field and that were not included in the aforementioned lists. Proper record-keeping and quality assurance have been linked to improved performance of CHW programs [15], suggesting that there is also room for improving the monitoring system.

Infrequent supervision, supervision that does not include field visits, and supervision that focuses excessively on reports m demotivating CHWs [15, 16]. From the research findings 90% of APEs in this study´s sample reported that their supervisor provided advice and asked about work-related problems during their last supervision. This suggests that the supervisor-APE relationship typically goes beyond simple box-checking exercises. However, from the research findings not all the supervisors did not complete their supervisory role and fifth of the APEs did not complete the check listing supervisory task while another fifth did not receive feedback on their reports as a requirement for the APEs.

4.2 Medication and commodities

It was found that a high percentage of APEs had expired medicines in their kits at the time of inspection. This finding was surprising, because 90% of APEs reported that their supervisor had reviewed their medications during the most recent supervision (which occurred in the last month before supervision). And APEs reported receiving an average of 8 supervision visits per year, 4 fewer than planned.

Stock outages were found for all medicines at the time of the study, with APEs also reporting having had stock outages in the last three months for all medicines. As APEs serve, on average, approximately two to four times the

population their kits were designed for (3,926 individuals, compared to the planned 500–2000), stockouts are not surprising. APEs that run out of medication at the beginning of the month have no recourse and must refer patients to the health unit, which also suffers from frequent stockouts [17, 18]. Although some diseases exhibit seasonal patterns in Mozambique [19], the medication provided in the kits does not take these patterns into account—as supported by the low availability of malaria medication in the study´s findings. Frequent occurrences of the community seeking assistance from CHWs who are unable to provide care due to stock-outs can lead to the undermining of community trust [16–20]. Similar factors are likely at play with the APE program in Zambézia as well.

The availability of all family planning items—from injectable capsules to male condoms—is particularly low, which contrasts with the APE program's focus on family planning as a priority area. This is of particular concern since interruptions in contraceptive use puts patients at increased risk for unintended pregnancies. Relatedly, misoprostol was also very infrequently available, and many APEs reported never having had it at all. Although women's health is prioritized at the policy level in Mozambique [21], breakdowns in the supply chain such as those found threatens potential gains in women's health.

4.3 Training

Although APEs have been trained to carry out health activities in their communities, refresher training over time is still infrequent. This suggests that APEs have not had sufficient or recent training in practice, which can affect performance and the impact of their activities on communities [22], in-service training aims to update CHW with new policies and programs, reinforce initial training, and ensure they are practicing skills learned [22]. In-service training is provided at regular intervals, varying from monthly to twice a year, and offered in the form of workshops, monthly meetings, and refresher courses [23]. According to James et al., continuous training programs are more likely to contribute to improving the level of systems in environments with limited resources [24]. Continuing, or refresher, training provide an opportunity to update APEs on new skills, to reinforce their initial training, and to ensure they are practicing skills learned. Beyond pre-service training, many countries also provide in-service trainings to extend or refresh the skills of the CHWs [25].

4.4 Challenges

Transport was the most frequently reported difficulty for APEs to collect their kits and refer patients. This is a common issue for CHW programs generally [26] since these programs was intended to be implemented in remote regions where access to a health facility is difficult. However, the APE program does provide bicycles, and no was provisions made for repairs and maintenance.

Only a quarter of APEs reported having received their medication kit in the last month before the assessment and approximately a third of respondents reported not having received it in the last three months before the assessment. The amount of the monthly subsidy (1200 Meticais, roughly equivalent to 16 United States dollars at time of writing) has also not increased since the inception of the program a decade ago, even though APEs were informed that it would [16] and that the guidelines do plan for adjusting for inflation over time [4]. Small payments that were delivered infrequently have been identified as demotivating factors for CHWs in other similar settings [20–26].

Although not captured quantitatively, some APEs accidentally revealed wearing more than one hat by showing the research team cellular phones, contraceptives of a different type, and medications of different brands when asked to show their APE kits. All of these are items that were not included in the APE kit but are part of kits of other NGO-based health outreach programs in the region. A complex funding landscape and vertical programming is a well-documented issue in Mozambique [27], and that APEs would diversify both their income and medical source is unsurprising. APEs in Mozambique already reported feeling overburdened [16–28] and having to resort adding on additional positions may worsen the situation.

5 Limitations

Data collection took place during the rainy season, meaning that road conditions made it impossible to reach all the APEs' communities to observe their kits. The kits that were observed belongs to APEs who resided close enough to a functional road to be reached by car, short walk, or motorbike—who have easier access to their health facility. Additionally, given the

seasonality of certain diseases, data collected during the dry season may have presented a different picture in terms of consumption of medication.

6 Conclusion

A decade after it was restarted, Mozambique's APE program has had some successes, but challenges remain. APEs are very important in providing care to patients in remote communities. More urgently, there is a need to focus more on ensuring a constant supply of APE kits to ensure patient care and on regular and timely delivery of subsidies as an incentive. As the workload has increased for APEs, a review of the program is needed to match current realities, either by hiring more APEs, or the supplies and support, both financial and through supervision, planned for each APE must be increased.

6.1 What is already known on this topic

- The coverage of health interventions in Zambézia is generally lower than the national average.
- The official government APEs program remained halted for nearly two decades before being relaunched in 2010.
- In 2015 a technical revision to the APEs training curriculum was issued and implemented.

6.2 What this study adds

- Although APEs have been trained to carry out health activities in their communities, refresher training over time is still infrequent.
- Transport was the most frequently reported difficulty for APEs to collect their kits and to refer patients.
- More focus on ensuring a steady supply of APE kits and subsidies being delivered regularly and on time remains necessary.

Acknowledgements The authors would like to thank IIP-JHU, the Mozambique Ministry of Health (MISAU), the Instituto Nacional de Saúde (INS) and the Mozambique APEs Program. The authors are also grateful to all APEs and APEs supervisors who participated in the evaluation, to the Provincial Health Department (DPS), to the District Health, Women and Social Services (SDSMAS) and health facilities in Mozambique.

Authors' contributions CS, BS, AJ, HR, RMC, TSL, TR and AS planned and designed the study. CS, BS, TSL, and FP supervised the study teams collecting the data. TR, BS, AJ, FP, JS, TSL, CS, MD and RMC performed data analysis. CS, AS, RMC, TR and TSL prepared the manuscript. All authors read and approved the final manuscript.

Data availability The data is available at the Instituto Nacional de Saúde (INS, Mozambique) and will be available upon request.

Declarations

Ethics approval and consent to participate The study was approved by the Institutional Bioethics Committee of the National Institute of Health of Mozambique (Nossa Ref.:112/CIBS-INS/2019) in accordance with the relevant guidelines and regulations and declaration of Helsinki. Written informed consent was obtained from each participant before participating in the study.

Competing interests This study was carried out as part of the National Evaluation Platform (NEP) project funded by Global Affairs Canada (Project Number CA-3-M013604001). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The authors declare that they have no competing interests.

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