

A mixed methods evaluation of an integrated training package for skin neglected tropical diseases in Kaduna and Ogun, Nigeria

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Background: The overall burden of neglected tropical diseases (NTDs) affecting the skin is undetermined. Skin conditions are among the top 10 causes of disability worldwide. Affected persons seek treatment at advanced stages of the disease, resulting in morbidity and disability. We developed and evaluated an integrated training intervention for early case detection, referral and management of skin NTDs in two states in Nigeria.

Methods: This was a mixed-methods study using participatory approaches to develop specific skin algorithms and training packages for community and primary level health workers. This supported the identification, referral and clinical diagnosis of suspected cases. We used Kirkpatrick's model to evaluate the training package.

Results: Participants' knowledge improved after the 2-months intervention. Across both states, knowledge retention appeared more robust for cadres at all levels: state, local government area and primary healthcare. All (100%) participants mentioned that the training assisted them in detecting, referring and managing skin NTDs. Training was understood by participants and training materials were easy to understand. Materials were also effective in educating community members about the symptoms of NTDs and supported referral to facilities for appropriate management.

Conclusions: Community implementers can be trained and supervised to detect people affected by skin NTDs and support appropriate management within the existing patient care pathway.

Keywords: case detection, integrated, NTDs, skin, training.

Introduction

Neglected tropical diseases (NTDs) affecting the skin are projected as the 18th leading cause of burden of diseases worldwide and are one of the top 10 causes of disability.¹ Early case detection and diagnosis is essential for the prevention of associated morbidity and disability for many skin NTDs, including lymphatic filariasis, trachoma and yaws.¹ However, persons affected often seek treatment at health facilities at the latter stages of disease, only once symptoms become severe, potentially leading to life-changing morbidity and disability. In many settings, healthcare workers are also inadequately skilled in detecting and diagnosing these diseases.² The World Health Organization (WHO), Department for the Control of NTDs, has proposed integrating pro-

gramme implementation for more effective and efficient management of skin NTDs.³ Integrated management of skin NTDs entails merging activities targeting two or more skin NTDs in the same communities through the health system⁴ and can include mapping, training, clinical diagnosis and management.⁵ In 2020, The WHO suggested that innovative approaches for implementing integrated services for skin NTDs required the development of innovative training approaches for frontline health workers to enhance case detection and management.

There has been significant progress in controlling the transmission of some NTDs in Nigeria, predominantly those that require treatment through the mass administration of medicines (MAM). However, many skin NTDs, specifically those that require

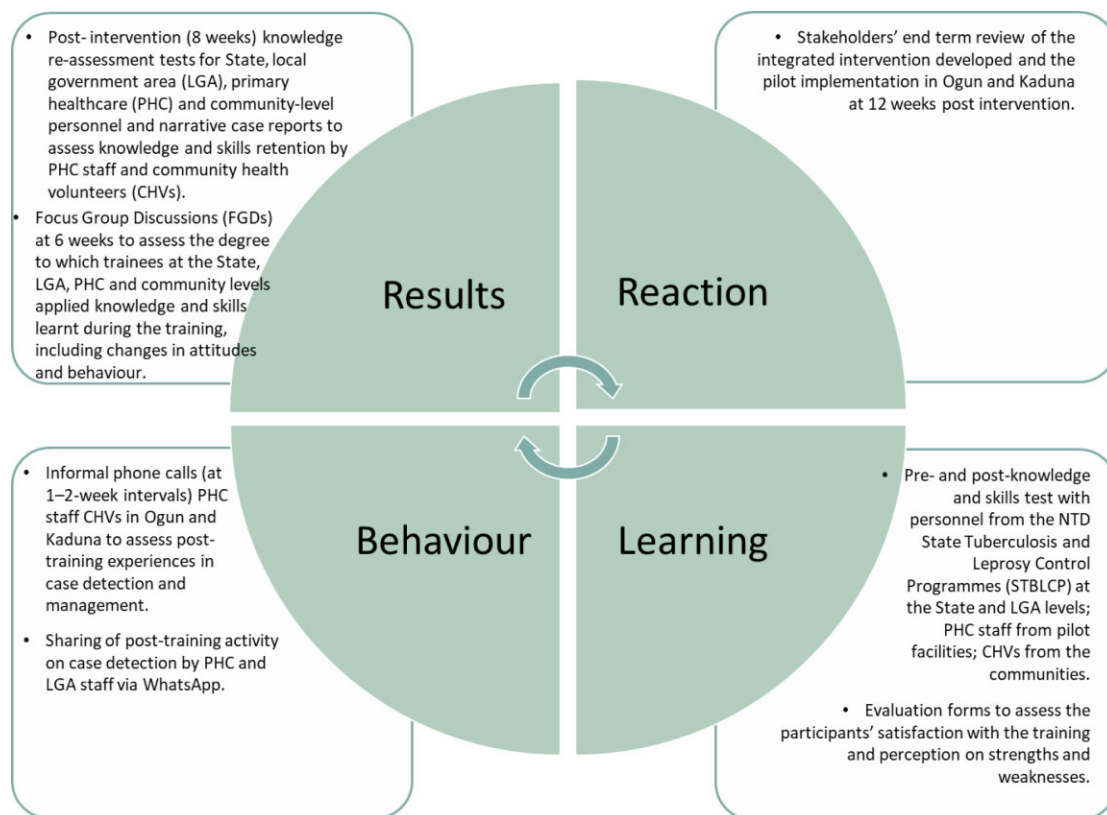


Figure 1. Adapted Kirkpatrick's evaluation model.

long-term disease management, have been underprioritised due to chronic NTDs programme verticalisation and uncoordinated resource mobilisation.⁶ In Nigeria, Buruli ulcer (BU), leprosy and clinical manifestations of lymphatic filariasis, specifically lymphoedema and hydrocele, are skin NTDs being prioritised for integrated (across disease and within the health system) case management.⁶ In line with the current global drive for the integrated management of skin NTDs, Nigeria has simultaneously mapped multiple skin NTDs (BU, leprosy and clinical manifestations of lymphatic filariasis, specifically lymphoedema and hydrocele) to identify areas of co-endemicity as a first step in understanding where integrated management approaches may be feasible. Following mapping activities, an Operational Plan for the Integrated Case Management of Neglected Tropical Diseases (2019–2021) has been drafted and is undergoing ratification by the Federal Ministry of Health (FMoH).⁷ The plan is now ready to be operationalised and one of the key targets within the plan is to identify a routine system for the case detection and referral of suspected skin NTDs cases at the community level. However, health-care workers and community volunteers were identified as having limited knowledge and skills in managing skin NTDs. Thus, the development of integrated skin algorithms and associated training has been prioritised and proven as necessary to improve health worker capacities to correctly identify cases, manage cases appropriately or refer to appropriate health facilities.⁸

This study sought to respond to the needs of the Nigerian health system in operationalising their plan for the integrated

management of skin NTDs by: (i) collaboratively developing training materials to improve identification, referral and management of skin NTDs (BU, leprosy, lymphoedema and hydrocele); and (ii) evaluating the effectiveness of the training materials with frontline health workers, including state implementers, frontline health facility staff (FLHFs) and CHVs to assess their feasibility for use in a wider setting. To evaluate the training, we draw on Kirkpatrick's (revised 2016) evaluation model to explore effectiveness in four core domains.^{9,10}

Theoretical framing: Kirkpatrick's evaluation model

This evaluation model is a universally renowned approach for assessing the findings of training and learning programmes.^{9,10} The model consists of four domains: Reaction assesses participant reactions to and perceptions on how useful the training was for them; Learning looks at understanding of the training in relation to knowledge, experience and skills acquisition at the end of the training; Behaviour measures application of learning from training in a real-life setting (e.g. the health centre); and Results ascertain the positive impact the training process and materials have on the system and the long-term outcomes.^{9,10} Each method used within our evaluation is aligned to the domains of the Kirkpatrick framework, as presented in Figure 1.

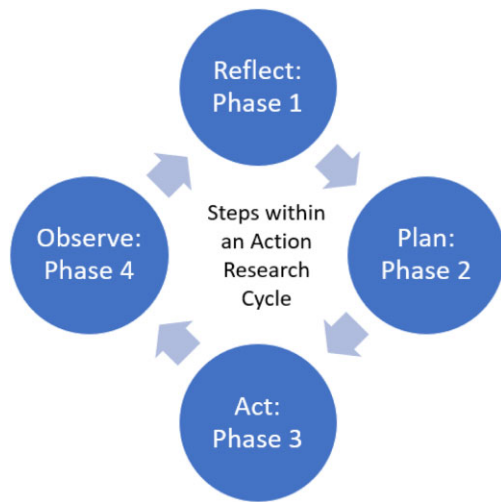


Figure 2. Phases in action research cycle.

Materials and Methods

Our overall study design was an action research approach. Figure 2 outlines the four steps of the action research cycle.

This paper focuses specifically on the evaluation of a training package that was co-created and implemented during study phases 1–3. Thus, within this paper, we present methods and results specifically related to study phase 4.

The study was conducted in Kaduna and Ogun States, Nigeria, from November 2019 to September 2021. Study states were purposively selected because they are endemic for two or more of the skin NTDs prioritised for integration; have geographic variance

in location; and have varied population density, ethnicity and literacy rates. Table 1 provides further detail on the study locations.

Within each state, study sites were selected in collaboration with the State Ministry of Health, NTDs Unit and State Tuberculosis (TB) and Leprosy Control Programme (STBLCP). This was based on endemicity for two or more of the priority skin NTDs, geographic differences and the number of cases. In Kaduna, two local government areas (LGAs), and in Ogun, two senatorial districts, were prioritised for training roll out. Across both states, the main NTDs case management referral facility was also included for appropriate referral and management of detected cases.

Development of the training manuals

We conducted grey literature and document reviews to explore existing mechanisms for case detection, referral and treatment of skin NTDs in sub-Saharan Africa in order to inform the design of a training package for the integrated community-based case detection and referral system for NTDs. Results were synthesised and presented in a booklet to support health system implementers to use existing evidence in the development of new training manuals that were shaped by context-specific challenges.

We then hosted a 1-d participatory workshop with affected persons, NTDs and STBLCP units in both states to understand existing health-seeking pathways and to support the design of new training materials. At the close of each state meeting, an intervention working group was formed to utilise the learnings from the participatory workshop and literature review to develop the training intervention.

The working group included: the research team (seven Nigerians and three British; NB: due to the pandemic and travel

Table 1. Sociodemographic information for Kaduna and Ogun

State	Total population	Number of LGAs	Number of ethnic groups	Major languages	Youth % literacy rate	Adult % literacy rate	LGA/Senatorial District	Context	Partner support in NTDs programme implementation
Kaduna	8 252 400	23	60	Gbaya, Hausa, Fulani, Gwong, Atuku, Bajju, Atyab, Gure	96.5	72.4	Igabi Kaduna North	Rural Urban	Established disease management and disability inclusion (DMDI) services including active case finding and surgical and wound care management for hydroceles and BU
Ogun	5 217 700	20	6	Yoruba, Egba, Ijebu, Remo, Egbado, Awori Egu	93.8	77.7	Ogun-West Ogun-Central	Rural Urban	Absent DMDI services. Ad hoc case management for leprosy and BU by non-governmental development organisations (NGDO) partners

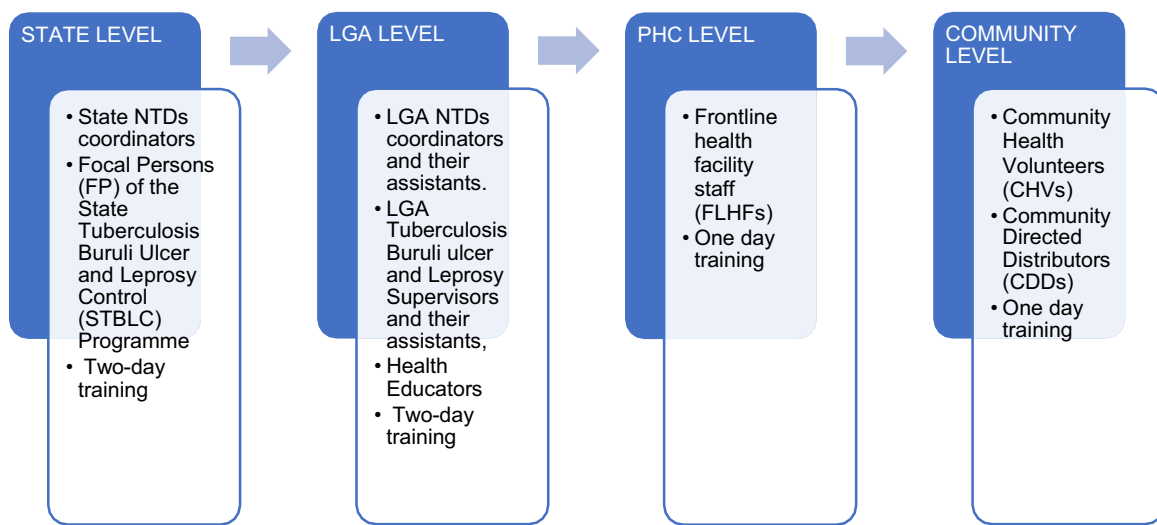


Figure 3. The cascaded training approach.

restrictions, British researchers participated virtually); stakeholders drawn from the National Ministry of Health (MoH) (two programme coordinators); State MoH (eight across the two states); LGA MoH (six across the two states); PHC and community levels (four across the two states); and representatives of persons affected by skin NTDs (eight across the two states) from each study site. Four doctors across the two states and one dermatologist were also part of the working group.

Together, the intervention working group developed a three-module intervention manual for the case detection and referral of skin NTDs cases at the community level. This manual was then presented to a larger group of stakeholders including federal, state, LGA implementers and persons affected who validated the document.

Module one of the integrated intervention manual contains the resource materials to be used by frontline implementers for case detection, referral, diagnosis and management; module two contains the associated training manual; and module three contains guides and resources for supervising and monitoring the implementation of the intervention. A copy of the intervention manual can be found at <https://countdown.lstmed.ac.uk/>.

Intervention roll out

Once the intervention manual was approved for piloting, an implementation plan was developed in collaboration with State MoH stakeholders. Implementation centred around the training cascade, as outlined in Figure 3. The aim of the training was to train participants about early case detection, signs and symptoms and treatment of skin NTDs, wound care and providing respectful care. Training was delivered in Kaduna State (44 participants) and in Ogun State (48 participants), with participation from health workers from state/LGA level (State NTDs coordinators), frontline health facilities (Community Health Officers) and community level (community health volunteers).

The training materials were translated and back-translated to the local languages in Kaduna (Hausa) and Ogun (Yoruba), to facilitate easy communication at the community-level training.

Evaluation of the training materials

We conducted a mixed-methods evaluation of the training that was aligned to Kirkpatrick's evaluation model, as used in a study by Abdel-All et al.¹⁰ A mixed-method approach facilitated triangulation of the data between methods.

Quantitative

1. A post-training assessment of 20 questions was issued to the participants to gather their opinions and insights on the quality and content of the training and its delivery. Pre- and post-tests (the same content) were developed to assess the knowledge and skills of participants and were administered to all participants at all levels. For the State, LGA and PHC workers, these consisted of multiple choice and true or false questions on what the diseases are (using dermatological images), the modes of transmission, signs and symptoms, effects, treatment, referral and case studies to determine treatment steps. For the CHVs, the questions included matching dermatological images to the disease names and true and false questions on what the diseases are and how to identify them.

The same pre- and post-tests, which consisted of multiple choice and true/false questions about the skin NTDs as well as vignettes to assess how the trainees would respond to patients, were conducted with PHC workers and CHVs at 8-wk. This was to assess knowledge retention in trainees within an 8-wk period. A different set of translated questions was used for the CHVs. Participants were assessed based on their knowledge and skills at baseline and after training across all levels: at State/LGA level,

Table 2. Sample matrix for focus group discussions

Study site	Group/role	Number of participants per group	Number of FGDs per group	Total number of FGDs per state
Kaduna	Community health volunteers	6–8	1 (per selected health facility)	2
	Frontline health facility staff		1 (merged from selected facilities)	1
	State level (Programme Manager STBLCP or a representative, State NTD coordinator (SNTDC), assistant SNTDC, FP STBLCP, Local government NTD staff (LNTDs) and Tuberculosis, BU, and Leprosy Supervisor; TBLS)		1	1
Ogun	Community health volunteers		1 (per selected health facility)	2
	Frontline health facility staff		1 (merged from selected facilities)	1
	Staff of Hansen's Disease Centre - the referral centre State level (Programme Manager STBLCP or a representative, SNTDC, assistant SNTDC, FP STBLCP, LNTDC and TBLS)		1	1
Total FGDs in study				9

Abbreviation: FGDs, focus group discussions.

29 participants (15 Ogun; 14 Kaduna); at health facility level, 15 frontline health workers (8 Ogun; 7 Kaduna); and at community level, 16 CHVs (8 Ogun; 8 Kaduna). The tests were marked by the core research team and the scores for each trainee were recorded in a spreadsheet.

Post-training evaluation forms were administered to the trainees to assess participants' perceptions on the quality of the training. Both Likert-scale and open-ended questions were used. In total, 17 State/LGA level participants took part (eight in Ogun, nine in Kaduna); 30 frontline health providers (16 in Ogun, 14 in Kaduna); and 32 community health volunteers (16 in Ogun; 16 in Kaduna).

Qualitative

1. Participant observation was conducted during the participatory design workshops, by two researchers at both study sites, using a structured observation grid. The purpose of

this was to reflect on the processes of implementation and the level of engagement of participants; this included observations on the atmosphere, power dynamics, interactions and behaviour of participants. This helped add depth to the evaluation as structured observation can help support understanding behavioural or attitudinal change and highlight areas that may need addressing. In total, seven meetings were observed per state: one 3-d action planning meeting per state, one 2-d state and LGA level training per state, one 2-d PHC level training, two 1-d community-level trainings per state and two 1-d review meetings per state.

2. Focus group discussions (FGD)s were held at the sixth week post-training in each state. FGDs were conducted among state and LGA participants, CHVs and FLHFs. The purpose was to ask participants to reflect and evaluate the successful and challenging experiences that they had during the training. They were also asked to suggest any solutions or improvements. A total of nine FGDs were completed in Kaduna (four) and Ogun (five), as shown in Table 2.

Table 3. Sociodemographics of participants

	Kaduna, n (%)	Ogun, n (%)	Total, n (%)
Age			
Younger (<50 y)	38 (82.6)	42 (84.0)	80 (83.3)
Older (≥50 y)	8 (17.4)	8 (16.0)	16 (16.7)
Gender			
Female	34 (74.0)	42 (84.0)	76 (79.2)
Male	12 (26.0)	8 (16.0)	20 (20.8)
Education			
Attended primary education (<6 y)	0 (0.0)	3 (6.0)	3 (3.1)
Completed primary education (6 y)	2 (4.4)	0 (0.0)	2 (2.1)
Attended secondary education (<10 y)	0 (0.0)	13 (26.0)	13 (13.6)
Completed secondary education (10 y)	14 (30.4)	6 (12.0)	20 (20.8)
Further education (>10 y)	30 (65.2)	28 (56.0)	58 (60.4)
Role in health system			
State and LGA-planning, training, supervision of LGA implementers and vetting final reports	15 (32.5)	18 (36.0)	33 (34.4)
PHC-implementers at the facility level, diagnose and treat cases, train and supervise the community implementers	15 (32.5)	16 (32.0)	31 (32.3)
CHWs - close to community workers who identify cases in the community and refer to the facility	16 (35.0)	16 (32.0)	32 (33.3)

3. Narrative case reports were conducted at the eight week postintervention to assess the knowledge application by eight FLHFs and eight CHVs per state. Eleven questions on how participants used the diagnostic skills that they had learnt during the training to detect, refer and make clinical diagnoses and manage appropriately were elucidated, as well as their interactions with the persons affected. A total of 16 narrative case reports were conducted across both states and disaggregated by gender and age.

Data analysis

Quantitative

The pre- and post-training knowledge assessment test sheets of each participant were marked by one member of the research team per state. Specific marking templates were designed and used for the different types of tests taken by the participants at different levels of the health system. Data were collected using paper forms, assessment results aggregated in Excel (Microsoft Cooperation, Redmond, Washington, USA) and then analysed using the STATA statistical package version 13.0 (TX: Stata Corp LP). Improvement of participants' knowledge of skin NTDs was analysed by comparing mean scores over the three knowledge assessment periods (pre-training, onsite post-training and 8-wk post-training), using t-tests for statistical comparisons of pre vs post and pre vs 8-wk and then stratifying results by state and participant types (PHC, state and LGA health workers).

Qualitative

Qualitative data were transcribed and translated. Data from the FGDs, narrative case reports and observation grids were brought

together and jointly analysed through an inductive and deductive approach.¹¹ Coding frameworks were developed using Kirkpatrick's model and the subthemes emerged from the data. Transcripts were coded using NVivo software version 12. Charts were developed to summarise the data that were explained further into broader themes.

Results

Description of training participants

Most of the trained participants were female (79.2%) and had completed >10 y of education (60.4%). Table 3 summarises the demographics of the participants.

Our Results section is presented around the four domains of the adapted Kirkpatrick framework outlined above (Figure 1).

Learning and results

Learning and results looked at knowledge and skills achieved by trainees from the training and long-term outcomes of training. This was evaluated quantitatively through pre- and post-test and the training evaluation results. Table 4 shows that across both states and all participant groups, knowledge of skin NTDs improved over time. The only exception to this was in Ogun State, where CHWs' mean score after 8 wk decreased slightly; however, the overall increase remained significant to baseline (mean=15.3/30; t-test=3.79, $p<0.001$). Across both states, knowledge retention appeared more robust for the state, LGA and PHC cadres.

Training resulted in at least 98% of participants in both states reporting that they felt more confident in future patient

Table 4. Knowledge of skin neglected tropical diseases among participants

	State/LGA/PHC Pre-test	State/LGA/PHC Post-test	State/LGA/PHC 8-wk post-training	Community Pre-test	Community Post-test	Community 8-wk post-training
Kaduna	43% (mean=1 7.5 out of 41)	57% (mean=23.5/41; t-test=3.35, p=0.001)	64% (mean=26.3/41; t-test=5.66, p<0.001)	mean score of 32% (mean=9.5 out of 30)	55% (mean=16.4/30; t-test=4.29, p<0.001)	56% (mean=16.8/30; t-test=4.60, p<0.001)
Ogun	54% (mean=2 2.3 out of 41)	65% (mean=26.5/41; t-test=2.96, p=0.004)	69% (mean=28.4/41; t-test=4.72, p<0.001)	32% (mean=10.6 out of 30)	55% (mean=16.0/30; t-test=3.75, p<0.001)	56% (mean=15.3/30; t-test=3.79, p<0.001)

interactions on the topics of managing NTDs (98%) and stigma (98%) and in helping them with their everyday activities (100%).

Reaction

Reaction looked at how useful the training was and participants' perceptions of the training. This was evaluated qualitatively and quantitatively using training evaluations and end of term reviews and FGDs. Overall, the two trainings facilitated in Kaduna and Ogun States proved highly effective and all participants reported the training to be useful and 97% rated it as good or very good, from the training evaluation data. Positive reactions to the training were also emphasised in the FGDs and narrative case reports.

Training delivery and content

Participants appreciated the inclusion of practical exercises and role play within activities, which they described as making the training engaging and interactive, particularly on learning signs and symptoms and referral. However, inclusion of field trips was a suggestion for improvement to enhance skill development.

Before I received this training, I had less knowledge about the diseases but now that I have received the training, I have much knowledge and understanding regarding skin NTDs. For instance..., about lymphoedema, it makes one leg to swell, some would have drawn incisions on the leg, but with the help of this training, we CHVs will be able to explain to the affected person that drawing incisions would not heal the leg and then we refer the patients to go to the health centre where they manage such diseases. BU starts as a wound and when it starts people treat it at home as a wound and wonder why it is not healing but through this training, we have acquired the knowledge to refer such affected person to the health centre for treatment (female, narrative case report, CHV, Ogun).

Training materials

Overall, both qualitative (from FGDs and narrative case reports) and quantitative data (Table 5) emphasised that training materials were easy to understand; in particular, pictorial materials were described as making learning more effective. Implementers also mentioned that the job aids they used to identify cases were accepted by community members, as the pictorial guides enabled them to recognise skin NTDs from the pictures.

The pictures have really helped me to know the differences between all these [skin NTDs,] especially the Buruli ulcer and lymphoedema (male, Hansen's Disease Centre, FGD Ogun).

The job aids were good, all that were said in the modules can be seen physically by just looking at the job aids, and the use of local black people in the pictures is good, we did not use American people in the pictures, so it is good, it will make our people to know the diseases happens to our people (female, State FGD, Kaduna).

In Kaduna, 98% of the participants found the training manual easy to use, had confidence in interacting with patients and managing stigma and 95% found the PowerPoint presentations easy to understand, while the corresponding results for Ogun were 97% and 98%, respectively. For example, most participants across all levels of the health system in both states described learning how to differentiate the skin NTDs from each other and from other diseases like hernia by recognising the characteristic signs and symptoms. They also described knowing how to refer appropriately. However, shortages of referral forms and the use of personal funds by implementers to make additional copies was a challenge. Regarding training content, participants mentioned that differential diagnoses should also be included in future training, particularly in relation to hydrocele occurring in children.

Many trainees described an increase in confidence due to training activities, which rendered them to share their learning with other healthcare workers. This also reflected the sustainability of the training as many participants mentioned that

Table 5. Training and training materials feedback

Training materials feedback	Usefulness of training	Good/very good	Training materials easy to understand	Training inclusive of all trainees	Training language: Hausa in Kaduna and Yoruba in Ogun	Sufficiency of training duration	Usefulness of topics	Job aids easy	Good knowledge by facilitators
Kaduna	100%	97%	95%	95%	83%	65%	49%	100%	98%
Ogun	100%	97%	100%	94%	88%	73%	59%	100%	100%

their learning from the training could be cascaded. To ensure ongoing sustainability and equity in early case detection, some participants at the LGA level suggested that training should be scaled up to other health cadres and LGAs; this would also accommodate staff transfers.

Before the training, I was thinking if I can stand in front of many people to talk but after the training, I now developed the confidence to carry out training for the CDDs...We used PowerPoint and it served as a guide as I used the PowerPoint with the experience I gathered from the previous training coupled with the manual helped me step down the training for the community level (female FGD, FLHFs, Ogun).

Assuming I wasn't trained well, I would not be able to step down new things (male, FGD, State and LGA personnel, Ogun).

FLHFs described gaining new skills that are relevant to clinical diagnosis, including how to use the integrated diagnostic flowchart, job aids or conduct new diagnostic tests like the transillumination test for hydrocele or skin sensitivity test for leprosy.

Behaviour

Behaviour looked at evidence of application of learning in a real-life setting. This was evaluated using data from FGDs and narrative case reports.

Addressing stigma and attitudinal change

The training on stigma was reported to have had an impact on changes in attitude within many CHVs and FLHFs. Prior to the training, some participants mentioned their own preconceived ideas towards people affected and that stigma had not been formally addressed in training before. The stigma training was adapted from the International Federation of Anti-Leprosy Associations/Neglected Tropical Disease NGO Network Guides on Stigma and Mental Wellbeing and focused on understanding stigma, and practical sessions to reduce stigma, particularly when supporting persons affected by NTDs.¹² Following the training, participants in FGDs mentioned now interacting with persons affected with empathy and counselling patients appropriately, through reassuring them and explaining the causes and treatment options available for NTDs. Many participants mentioned

that the affected persons were happy with the interactions that they had with them, they felt less discriminated against and that they also enlightened other community members about their positive experience. Most participants also educated persons affected on nutrition, wound care and exercise and they demonstrated wound care and assisted with cleaning wounds. Participants followed up with affected persons through telephone calls and home visits to ensure that patients were doing well. This improved patient interactions and the quality of care provided.

The training has changed our attitude on how to treat patients especially those with smelling wounds, the training made me to attend to the patient with the right attitude by simply wearing face-covering and surgical gloves (male, FGD, FLHF, Kaduna).

The CHVs also described that training supported them to correct initial beliefs that skin NTDs are caused by evil curses or charms. The component on addressing stigma within the training was described as impactful by participants in supporting them in gaining the confidence of affected persons to openly discuss their diseases, supporting them to be referred appropriately for management in the health facilities and following up with them to discuss their progress. This has resulted in many CHWs and PHC staff changing their behaviour through the way they now interact with patients by discussing stigma more openly and professionally and not discriminating against persons affected.

Surely it does; for example, in dealing with persons affected with hydrocele, there are those whose swelling has busted, and they are smelly, but the training on stigma has taught us not to stigmatise them, as such we speak with them freely and encourage them to seek help, so they are treated and stop the smell. If we had not received the training, I think we would not have felt free to approach them (male, FGD, PHC, Ogun).

You tell them, "We are like you people. It is just the condition." You talk to them. Let them feel a sense of belonging, "You were like this before. Since this [the condition] has come in, there is no problem. Don't worry. It will be okay. They will be happy to hear that. We encourage them. We don't stigmatise them. You encourage them, health educate them. By doing this, they will be happy too (female, narrative case reports, FLHFs, Ogun).

Gendered care

The training covered the gendered aspects of NTDs, such as considering cultural sensitivities, which participants described as supporting them to provide gender-sensitive care. Hydrocele management was often described as the most difficult to manage because it is associated with stigma and privacy and many men prefer to see male health workers or traditional healers. Women with BU, leprosy or lymphoedema may prefer seeing female health workers. In Nigeria, cultural and social norms relating to gender can also affect health-seeking behaviour; for example, permission is often required for females from their husbands to seek healthcare, which can lead to delayed health-seeking behaviour. Female CDDs mentioned overcoming challenges in providing hydrocele management by engaging with the wives of affected men by informing them about gaining the confidence of their husbands and approaching them to seek appropriate care in the health facilities. Therefore, FLHFs mentioned that traditional birth attendants should be trained so they can know when to refer cases appropriately. Participants were guided on how to talk through this using job aids and to refer appropriately.

Traditional birth attendants should know that they cannot treat them, if they detect any cases, they should refer them to health centre (male, FGD, Hansen's Disease Centre, Ogun).

Before that time, I was not comfortable attending to males when it comes to showing private part but with that training, I was able to summon some courage to attend to him without feeling somehow (female, narrative case report, FLHF, Kaduna).

FLHFs and CHWs mentioned gaining the confidence of patients and or their families to detect and refer cases to the health facilities. They achieved this by leveraging on existing structures; MAM, skin camps, partner support (German Leprosy Relief Agency) in Ogun, house to house visits, advocacy to LGA Chairmen and through community sensitisation. The implementers counselled patients and especially people with disabilities and skin NTDs on stigma and overcoming it by being open with the health workers and by knowing that once the disease is detected early, it can be treated in health facilities and often cured. However, the hearing impaired could not communicate with implementers, and vice versa, to detect and refer them. Therefore, participants recommended inclusion of trained interpreters in subsequent training, so that they can work with the implementers in detecting and referring hearing-impaired patients appropriately.

[W]hen the training is taking place next, people who can interpret to dumb and deaf people should be invited to be trained to interpret to the dumb and blind people so that they will know what is going on (female, FGD, FLHF, Kaduna).

The training was conducted in June 2021 during COVID-19 but postlockdown. We observed social distancing, constant and consistent use of face coverings and hand hygiene to prevent transmission.

Implementation challenges

Implementation challenges were identified that are worth learning from for future use of the training resource materials. Health system challenges can limit the effectiveness of training. Examples include healthcare worker strikes, work overload, lack of medicines and commodities such as bandages, hand gloves, soap and ointments for adequate patient management. Additionally, hard to reach areas and insecurity make it difficult to access such communities for appropriate skin NTDs management, therefore supervision was conducted remotely through phone calls and WhatsApp.

Insecurity. I could not go to people living in Zangon Afaka due to insecurity, so there were some of the cases I couldn't go there to see with my eyes (male, FGD, FLHF, Kaduna).

Broader contextual factors can shape the ability of health workers to change their behaviour and implement learning from training. The CHWs found it challenging to transport and feed themselves as they commute for case detection and referral of patients. There were also challenges related to community perceptions and trust as the intervention was conducted around the time of political campaigns. FLHFs described being perceived by the community as government workers campaigning for politicians through the intervention.

We were wrongly judged to be government agents trying to use the intervention to win the local government election coming up in August in the State (male, FGD, FLHFs, Kaduna).

There are places you go to, and they will resist us saying to us that we are just playing politics with them, because they have been affected with the disease for long, but we never came to them, but now that we are getting close to the period of elections, that is why we are coming to them. We then pacify them and tell them we are not politicians, that we are health workers and that there has been an increase in these diseases, which is why we have come to enlighten them. Nevertheless, they keep complaining that they have had the conditions for long, but we never gave them drugs (female, FGD, FLHFs, Kaduna).

Participants, especially the CHVs, also expressed difficulties in having visible identification documents, which limited access to communities for case detection, referral, trust and patient interactions. Therefore, provision of identification cards for community implementers, stipends for CHWs, provision of free treatments to communities and awareness creation about the integrated intervention should be provided in places of worship and through jingles and the use of posters and small printed sheets.

Discussion

Summary of results

We present our results based on the adapted Kirkpatrick's model. This was useful for evaluating the results, learning reactions and behavioural change of participants to the training. The model showed the clear and concise perceptions, understanding, real life application and impact that the training had on identification, referral and management of persons affected by skin NTDs.

Our results showed that cascaded training improved the knowledge and skills of participants from the pre- and post-intervention test scores and the training evaluations. Pretest scores improved from 43% to 69% across both contexts and participants were happy with the content of the training, which included disease conditions, how to identify and manage them, the interactive and participatory delivery of the training and the job aids, which they could refer to at all times. Recent studies have shown that behavioural change is necessary for evidence-based implementation, which is the basis for most training interventions.^{13–15} Challenges existed and an example was on the lack of trust and credibility of CHWs with the community to seek appropriate care because free treatments are not always available for patients. Therefore, treatment should be free or subsidised, especially medications and commodities for wound dressing and treatment and hydrocele surgeries. This was a similar challenge in the study conducted by Abdel-All et al. in India, where there was a low response from community members (especially housewives and farmers) regarding not having sufficient time to attend group meetings, lack of transportation support and supply of medicines.¹⁰ This shows that treatment costs, among other challenges, contribute to not seeking appropriate care.

Like a study conducted in south-eastern Nigeria among community members and health workers, participants perceived that the skin NTDs were caused by witchcraft, and herbal medicines were the remedy¹⁶; the study recommended training health workers to overcome this challenge. Other studies conducted in Ghana and Ethiopia documented stigma and discrimination, which was also linked to seeking alternative care because of easier access and affordable costs,^{16,17} like the findings from this study.

Importance of integrated training for skin NTDs

Integration of skin NTDs has been a global priority for the past 10 y,^{18–20} and it offers several benefits, such as a way of aggregating more people where health resources are scarce.²¹ For about two decades, successes have been recorded in significant decreases in disease prevalence of lymphatic filariasis, guinea worm and leprosy.²² These achievements in vertical programmes are recognised, but resource shortages are promoting integrated programme implementation. Verticalisation also hinders wider health system strengthening that universal health coverage promotes and the cross-cutting approach of the WHO roadmap.²³ In Anambra, Nigeria, a study was conducted to provide evidence about the effectiveness of integrated care for BU, leprosy and lymphoedema. Findings resulted in reduced costs of care, better quality of life scores and improved disability status.²⁴ Findings from our study have been disseminated at state and national

levels to support the FMOH in Nigeria to deliver their operational plan, in line with their focus on integration of NTDs.⁷

The WHO have produced a training guide on recognising NTDs through changes on the skin, which supports health workers in case detection and diagnosis.²⁵ This is like the training materials that we produced in this study, which used diagnostic flowcharts. Studies conducted in Mali and Lalo, Benin, also showed how training community health workers on leprosy and common skin diseases improved integrated diagnosis, referral and their ability to properly examine patients, which demonstrates the value of integrated training in different contexts.²⁶ A study conducted in northern Nigeria showed that household contact examination was more cost effective than routine rapid village surveys, which supports the need for training community health workers for case detection.²⁷

Regarding morbidity management, all skin NTDs can become chronic, leading to long-term disability following successful underlying treatment. Foot care using soap and water can prevent painful inflammatory reactions from lymphoedema. Trained community members reinforced foot care, bandaging, exercising and the wearing of appropriate shoes, resulting in fewer episodes of inflammatory reactions compared with the control group.^{28,29} This was also similar to a study conducted in Ethiopia, where health workers were trained on managing lymphoedema.³⁰ This is reflected in our study, in which practical demonstrations of wound care made participants more confident to clean and dress such wounds, as their behaviour regarding this changed from baseline following the training. Most skin NTDs are coendemic in sub-Saharan Africa, where there are few dermatologists.³¹ Like our study, this gap in human resources justified the use of village nurses to detect skin NTDs such as BU, leprosy and scabies in school children in Cote d'Ivoire. Community acceptance was high in this study as diagnosis and treatment were offered.¹⁸ However, free medications were provided for all skin NTDs, except tinea capitis, due to its long duration of treatment with griseofulvin for 6–8 wk. Treatment for those with severe forms, including extensions and inflammations, was provided. However, in our study, we acknowledged the importance of discussing the scope of the study and funding available with stakeholders prior to commencement of the study to manage expectations on treatment capacity. The findings of this study were like experiences of providing care in varying global contexts, which showed that person-focused care, where persons affected participate in the design and training, which is practical and engaging, will lead to better case management outcomes.³²

Recommendations of these resources for future use

The integrated training manual developed in this study focused on capacity development for early skin NTDs case detection, referral and management within the existing health system at the community level. This was a pilot study and learning from this can be scaled up to wider geographical areas and implementation levels. This may not be restricted to skin NTDs programme implementation but could serve as an operational framework for other common skin conditions. This study also emphasised the value in working with community and state level stakeholders to develop culturally adapted training materials and strategies. With emphasis on the burden of these diseases, and how the

chronic complications are inadequately understood, evidence-based data are limited. Therefore, more data regarding the role of training and integration to improve early case detection are required to support political advocacy and fundraising.

Study limitations

The use of Kirkpatrick's model^{9,10} to evaluate the training intervention on knowledge scores, behaviour change, motivation and reactions is a strength, as mixed methods facilitated triangulation of findings. However, we did not assess knowledge in a control group, and we were unable to consider the impact of the training from the perspective of affected persons. A longer evaluation using health management information systems data and indicators, such as stages of disease, could have been included to evaluate impact over time to quantitatively assess early case detection. Furthermore, inclusion of the perspectives of affected persons in relation to their treatment and care is essential in future work. Due to time and funding constraints, it was not possible to pilot and evaluate the intervention at higher levels of healthcare delivery at the national and subnational levels of implementation.

Conclusions

Our study has shown that a cascaded training intervention for integrated skin NTDs can change knowledge, skills and enthusiasm and improve the capacity of implementers, especially at the community level. Findings show the need for culturally adaptable training materials for skin NTDs that can be delivered in participatory and innovative ways. This increased trainees' abilities to detect cases early, refer and manage them appropriately. Use of the Kirkpatrick training evaluation model¹⁰ supported the effectiveness of the training using multiple outcomes, which made comparisons more comprehensive. This model also demonstrated the transfer of learning and change in the behaviour of trainees to achieve early case detection, referral and appropriate management at the health facilities of persons affected by skin NTDs. Implications for future studies include retraining and training more implementers using virtual platforms, particularly as Nigeria finalises its draft operational plan for integrating case management NTDs. The evaluation of this training package has therefore demonstrated that this learning can be scaled up to other skin and non-NTD conditions, programmes and settings.

Authors' contributions: LL designed the study implemented it, analysed and interpreted the data, made a major contribution to writing, reading and approval of the final version. SC designed the study, co-implemented it, analysed and interpreted the data, made a major contribution to writing, reading and approval of the final version. CU, DY, DA, OOO, SH and JA collected, interpreted and analysed data and read and approved the final version. SI, JS and RT made contributions to the writing and read the final version. LD designed the study, supported the implementation, analysis and interpretation of the data, made a major contribution to the writing and approved the final version.

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Data availability: Data can be accessed using this link, <https://lstmed.sharepoint.com/sites/COUNTDOWNNigeria/Shared%20Documents/Forms/AllItems.aspx?id=%2Fsites%2FCOUNTDOWNNigeria%2FShared%20Documents%2FExtension%2FIntegrated%20management%5F%20Case%20detection%20study%2FData%20Management&viewid=9bc7cdf2%2De440%2D4b1f%2D84eb%2Dde530d07faf3>

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