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Effectiveness of photovoice in improving knowledge, attitude, practice, self-efficacy, and treatment outcome regarding TB among newly diagnosed TB patients in Specialist Hospital Sokoto: A study protocol

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ABSTRACT

Background: Tuberculosis (TB), common among the poor in developing countries, can be difficult to cure due to poor treatment adherence. This study aims to develop and evaluate the effectiveness of photovoice in improving TB knowledge, attitude, practice, self-efficacy, and treatment outcome among TB patients in Specialist Hospital Sokoto, Nigeria.

Materials and Methods: A double-blinded randomized trial to determine the effectiveness of photovoice among newly diagnosed TB patients in Specialist Hospital Sokoto, Nigeria. Participants of the photovoice are to be compared with a control group who will receive an HIV health education. Both the participants and assessors will be blinded to the participation status of the patients (photovoice or control group). The study is to last for 6 months. Two hundred newly diagnosed TB patients will be recruited for the study. Structured and closed-ended questionnaires will be used to obtain data for the study. The primary end-points are TB knowledge, attitude, practice, and treatment outcome, while self-efficacy is the secondary endpoint.

Results: The participants of photovoice are expected to have more mean scores in knowledge, attitude, practice, self-efficacy and successful treatment compared with the control group.

Conclusion: The photovoice intervention will be more effective in improving TB knowledge, attitude, practice, self-efficacy, and treatment outcome among the patients to be studied.

Keywords: Photovoice; effectiveness; randomized trial; TB; treatment outcome

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1.0 Introduction

Tuberculosis (TB) is a disease of public health importance especially among the economically deprived in developing countries. Worldwide, TB is second only to HIV/AIDS as the greatest killer due to a single infectious agent. In 2013 alone, 9 million people were infected with TB, and 1.5 million died from the disease. Over 95% of TB deaths occur in low- and middle-income countries, and it is among the top 5 causes of death for women aged 15 to 44[1].

Knowledge of TB is shown to correlate with a positive attitude and better preventive practices towards the disease[2]. However, knowledge of the disease is shown to be low among different populations, particularly in African populations. Among West African nations, Nigeria reported the lowest knowledge levels of TB[3]. This lack of awareness may lead to increased exposure to risk factors of TB, which could result in an increased TB incidence and a continuing chain of transmission to susceptible populations. This results in more poverty and ignorance thereby completing the vicious cycle of ignorance, disease, and poverty[2, 4-7].

Photovoice is a process by which people can identify, represent and enhance their community through a specific photographic technique. It was introduced in the mid-90s and has since then been applied in different fields for effecting behavior change in populations[8,9]. In this study, photovoice will be used in the form of a video showing successfully treated TB patients from the state of Sokoto, Nigeria, who will share their experiences, changes in adherence and how they overcame it as well as educating the newly diagnosed TB patients. A manual for designing and delivering this program will be developed to guide the facilitator [10].

The objective of this study is to develop and evaluate the effectiveness of a photovoice program in improving TB knowledge, attitude, practice, self-efficacy, and treatment outcome among TB patients in Specialist Hospital Sokoto, Nigeria. Specifically, the aims are (i) identify the socio-demographic distribution of TB patients at baseline, (ii) determine the clinical and environmental factors at the time of enrollment, (iii) determine baseline knowledge, attitude, practice, and self-efficacy regarding TB, (iv) develop and implement the photovoice program, (v) determine the predictors of knowledge, attitude, practice, and self-efficacy as well as TB treatment outcome, and (vi) determine the effectiveness of photovoice in improving the TB knowledge, attitude practice, self-efficacy, and treatment outcome.

2.0 Materials and Methods

This research is a randomized controlled trial to be conducted among newly diagnosed TB patients in Specialist Hospital Sokoto, Nigeria. It comprised of Phase 1 (development of photovoice) and phase 2 (randomized control trial).

Phase 1 (Development of Photovoice Intervention): This will be done using constructs of the social cognitive theory (Table 1). Modeling will be applied using previously treated TB patients serving as role models to educate about TB and encourage the newly diagnosed TB patients with assurance that like the role models they can be cured by adhering to the treatment regimen. The intervention is tailored to effect behavior change and improvement in self-efficacy towards achieving positive outcomes of gain in TB knowledge and cure.

The photovoice will be contained a 16-minute video, featured in Hausa language taking into consideration cultural concerns based on social cognitive theory. Two Hausa language experts will translate the module to Hausa, and back-translated to English. Thereafter, the module and the entire program will be reviewed and endorsed by a clinical psychologist.

Table 1 Comparison of components of photovoice and constructs of Social Cognitive Theory (SCT)

S/N	Photovoice	Constructs of SCT
1	Previously treated TB patients serve as a model for the new TB patients to imitate with regards to treatment adherence.	Modelling
2	With previously treated TB patients in the video, the new patients are likely going to closely identify with them, listen and trust their advice.	Identification
3	Seeing the previously treated TB patients as evidence that the disease is curable will likely improve the self-efficacy of the new TB patients.	Self-efficacy
4	The interactive assessment at the end of each of photovoice session aims to give feedback to the participants, respond to their concerns, influence the outcome expectation and improve their self-efficacy.	Outcome expectations
5	The program will be delivered twice to each participant and assessment will be done at the end of each session. This process is designed to reinforce what the participant has learned, thereby improving their self-efficacy and treatment outcome.	Reinforcement

The module for the photovoice has three parts and fourteen sections. Part one (Sections 1 to 7) describes the development of the photovoice video while part two (Sections 8 to 13) explains the delivery and part three (Section fourteen) focuses on assessment after delivery of the intervention. The parts of the modules used for the intervention are summarized below.

Part two (Sections 8 to 13)
Section 8 (Group introduction): also termed “Ice-breaking”, lasting about five minutes allows the facilitators to introduce themselves to the participants of the respective groups and each participant to introduce himself or herself.

Section 9 (Overview of photovoice): this section lasting for about 5 minutes enables the facilitators to present an overview of TB and HIV for the intervention and control groups.

Section 10 (Fears and expectations): this section lasts about 10 minutes and allows the participants to voice out their fears and expectations which will be documented.

Section 11 (Rules and regulations): this section lasts for about 7 minutes during which the participants list the rules and regulations to guide the session and are documented.

Section 12 (Team building): Blindfold game, which lasts about 5 minutes will be played to show the importance of teamwork.

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Section 13 (The Show): over a period of 20 minutes, videos lasting about 16 minutes (photovoice and HIV health education for the intervention and control groups respectively) will be presented to the photovoice participants and the control group.

Part Three (Section fourteen)
Part 3 has only one section (Section fourteen), which is a post-intervention assessment in the form of short test multiple choice questions that require true or false responses. The test is designed to reinforce what the participants had learned during the intervention.

The second session of the program which will be delivered eight weeks after the first session involves only the welcoming address, data collection, and sections 13 and 14 of the module without giving any material incentive to the participants. In conducting the two sessions, participants will be given their medications and asked to go home immediately after the study session is over in order to reduce contamination between the participants in the two groups.

The participants and all other TB patients come to TB clinic early (from 7:00 am) for their case notes to be sorted out before consultations begin by 8:00 am. Table 2 shows the timetables for the two interventions to be given.

Table 2 Timetable for the interventions one and two

First intervention		
S/N	**Activity**	**Time**
1	Invitation	8:00–8:15 am
2	Screening	8:15-8:25 am
3	Consent documentation	8:25-8:40 am
4	Baseline data collection	8:40-9:00 am
5	Randomization	9:00-9:10 am
6	Running the program (first intervention)	9:10-10:30 am
7	Immediate post data collection	10:30-10:50 am
8	Consultation and Departure	10:50-11:00 am
Second intervention		
S/N	**Activity**	**Time**
1	Welcoming and two months post-intervention data collection	8:15-8:35 am
2	Running the program (second intervention)	8:45-9:30 am
3	Consultation and Departure	9:30-9:40 am

Phase 2 (Randomized Controlled Trial): This part, is the experimental phase of the study. It comprised of a randomized control trial that will last for six months. All the newly diagnosed TB patients who visit the TB clinic at specialist hospital Sokoto will be approached by the facilitator and invited to participate in the study and those that agreed to participate will be screened for eligibility. Thereafter, eligible patients will be asked to document consent to participate in the study. After the written consent is obtained, baseline data will be collected and randomization will be done by an independent person who will allocate the participants to intervention and control groups (Figure 1).

The intervention group will receive two exposures to photovoice via recorded video of successfully treated TB patient. These peer member of the TB patients' community will also

serve as role models for the newly diagnosed patients. The controls will be given general health education regarding HIV, but no messages regarding TB will be highlighted.

In order to reduce contamination, the venue for the intervention and control groups will be placed far apart. Two well-ventilated rooms (150 meters apart) will be used interchangeably for both groups. Each group contained 8 to 14 patients per session depending on the number of new patients obtained. There was only one facilitator for each of the intervention and the control groups. The facilitator for intervention group will be guided throughout the sessions by a module developed for the study[10]. The facilitator for the control group is an HIV educator who had received serial training on HIV. In addition, the facilitator will be trained on how to conduct the delivery of the HIV health education without giving TB-related information.

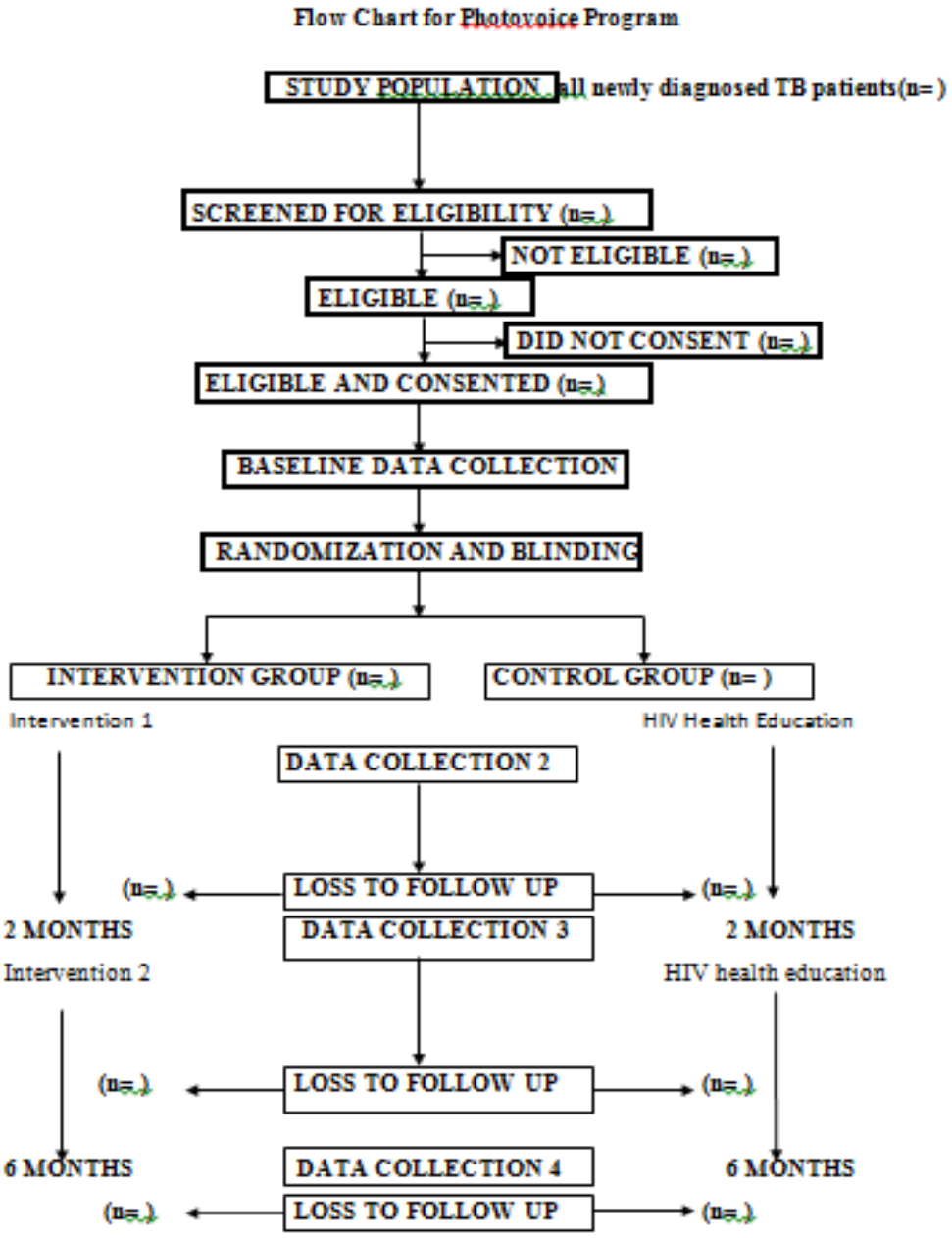

Figure 1 Schematic representation of intervention flow chart

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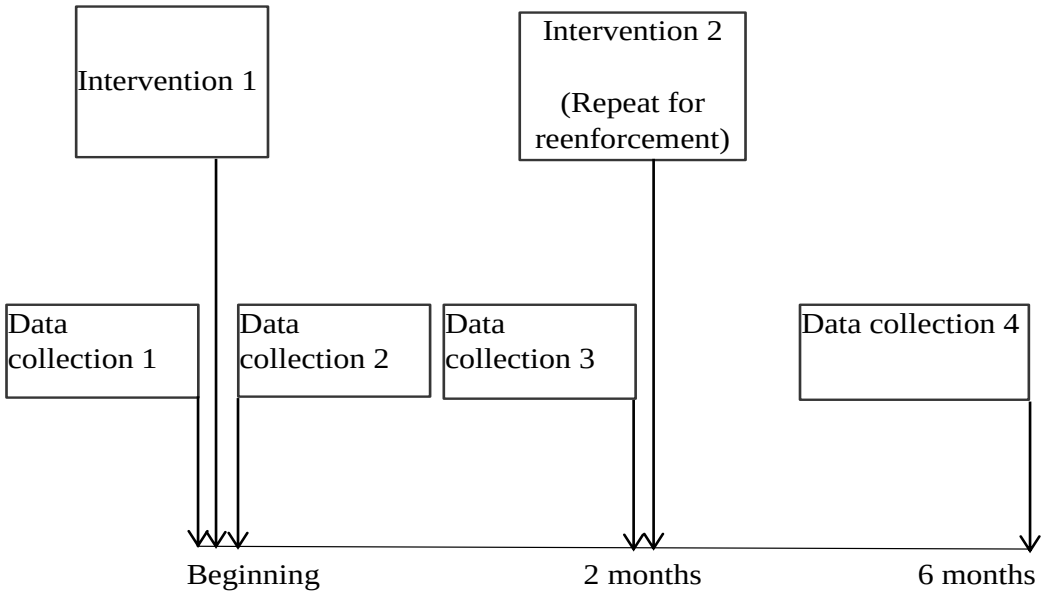

Figure 2 Time schedule of interventions and data collection

The intervention protocol will be delivered to the participants twice, first before the commencement of anti-TB treatment followed by the second exposure eight weeks after commencement of anti-TB medications. The first session which lasts about one hour thirty minutes while the second session lasts about fifty minutes will be delivered simultaneously at different locations while maintaining the same pattern of presentation. Data will be collected at four different time frames. First data collection will be before initial intervention; second immediately after initial intervention; third eight weeks after initial intervention; and fourth data collection will be six months after the initial intervention (Figure 2).

Patient selection

Inclusion Criteria: A resident of Sokoto state, seventeen years of age and above (a requirement for one of the instruments used for data collection), and newly diagnosed with TB (must be confirmed bacteriologically by AFB or culture) or have X-ray findings suggestive of TB who presented to the outpatients' clinic.

Exclusion criteria: TB patients who are currently participating in any other TB health education program.

Sample Size: The sample size is determined using the formula for 2 proportions[11] for the primary endpoint namely, successful TB treatment outcome.

$$n = \frac{[Z1 - \alpha\sqrt{2p(1-p)} + Z1 - \beta\sqrt{P1(1-P1) + P2(1-P2)}]^2}{(P1-P2)^2}$$

N = estimated sample size for each group; Z_1-α = 1.96; Z_{1}-β = 0.84 (at power of 80%); P1= 88% and P2 = 76%. The P1 and P2 were based on the proportion of patients that were found to have successful TB treatment outcome for intervention and control groups respectively from a previous study[12]. After substituting the above values in the formula, the estimated sample size was found to be 91 patients in each arm making 182 patients for the intervention and the control groups.

$$n = \frac{[1.96\sqrt{2x0.82(1-0.82)} + 0.84\sqrt{0.88(1-0.88) + 0.76(1-0.76)}]^2}{(0.88-0.76)^2}$$ = 91 participants

The dropout rate is taken to be 10% =18.2 ≈ 18. The final sample size estimate was 182 + 18= 200 respondents for both groups.

Randomization: An independent person (a medical record officer), who is not part of the study will randomize the participants into intervention and control groups using Research Randomizer (a randomization software freely available online[13]) based on the list of the patients that will be given to him while avoiding any contact with the participants. Complete randomization will be used for this study and participants will be randomized weekly during TB clinic until the required sample size is reached. Block randomization method was used to obtain equal numbers in each group.

Blinding: The participants will be blinded as to which group they belong: that is, intervention or control groups. This blinding will be done by the facilitator (a Medical Officer). Similarly, laboratory and radiology personnel will be blinded to the patients' participation status. This blinding will also be done by the facilitator who ensures that there is no information in the laboratory request form indicating patients' participation status for this study. The concealment will be preserved by way of exposing intervention and control groups to different activities (photovoice or HIV health education respectively). Similarly, the study will have only one facilitator who will not be part of data collectors. The data collectors will have no idea about the participation status of the participants. Both the photovoice and HIV health education will be delivered to the respective participants (intervention and control groups) in form of video at the same time but at different venues. In the HIV health education, the presenters will not introduce themselves as previously treated TB patients and no TB-related information will be given. Immediately after the session ended, patients will be asked to collect their drugs and depart the clinic individually. All these steps are meant to preserve concealment and reduce contamination. Some form of education will be given to all the participants irrespective of the group; it is part of usual TB care, where patients were briefly told about the disease and urged to endure treatment. Usually, the patients are told, "the disease is transmitted through coughing, is curable and the drugs are given free, and do not neglect your drugs." This education is routinely offered by a clinic staff to all the available patients before the commencement of the patients' consultation.

Measuring instruments for the research: A self-administered questionnaire will be used to generate data regarding socio-demography, knowledge, attitude, practice, depression and anxiety levels as well as self-efficacy during clinic visits. This questionnaire will be checked for face and content validity and reliability before being used for this study. The questionnaire has three sections. Section I contains five subsections A to E; A is for socio-demographic data, B is for clinical parameters, C is for knowledge, D is for attitude and E is for practice. Section II is for self-efficacy and section III is for anxiety and depression. Similarly, case report form (Proforma) was be created to record the AFB, CXR findings, weight, height, and follow-up status of the participants.

Four separate instruments will be used to collect data for this study. Three of the instruments (for knowledge, attitude, and practice; hospital anxiety and depression scale; and self-

efficacy) will be adopted with or without modification. The instrument for data collection on knowledge, attitude, and practice will be adopted and modified from WHO guide for conducting TB KAP study[14]. This tool has three sub-sections; knowledge, attitude and practice sub-sections. The instrument for measuring self-efficacy[15], and data collection on anxiety and depression[16] will be adopted without any amendment. All the instruments' sections and sub-sections will be translated into Hausa language and tested for reliability before use in this study. The reliability of the questionnaire and instruments will be tested using SPSS software. All the sections of the questionnaires have Cronbach's alpha greater than 0.7 (Table 3).

Table 3 Cronbach's alpha values of the respective instruments for the study

Section	Sub-section	Name	No. of items	Cronbach's alpha
I	C	Knowledge	19	0.789
	D	Attitude	6	0.757
	E	Practice	5	0.702
II		Self-efficacy	10	0.915
III		Anxiety and depression	14	0.876
		Anxiety	7	0.809
		Depression	7	0.749

Statistical method: SPSS version 22 will be used for data analysis and a *p*-value of less than 0.05 will be taken as significant. The following analyses will be conducted:
1. Descriptive analysis will be performed first to explore the baseline characteristics of the respondents as well as to explore their socio-demographic, clinical, and environmental factors. Measures of central tendencies and dispersion will be used for continuous data and percentages for categorical data.

2. The descriptive analysis will be followed by normality test to decide whether to conduct parametric or non-parametric test. The data for outcome variables involving knowledge, attitude, practice, and self-efficacy are continuous. Therefore, they will be explored for normality using skewness and kurtosis as well as using graphical methods (histogram, Q-Q plots, and Whisker box plot)[17].

3. Chi-square test will be performed to explore the homogeneity of participants' socio-demographic, laboratory and clinical parameters at baseline between the photovoice intervention and the control groups.

4. Pearson's correlation analysis will also be conducted to explore the extent of correlation between the combinations of two variables in this study. The combinations will be knowledge and attitude, knowledge and practice, knowledge and self-efficacy, attitude and practice, attitude and self-efficacy and practice with self-efficacy.

5. McNemar's test will be conducted to assess the effect of photovoice intervention on categorical scores of knowledge, attitude, practice and self-efficacy towards TB. The test will be conducted to explore the changes that will occur within the respective groups between baseline and immediately post-intervention, and baseline and two months post intervention. Similarly, the analysis will explore changes that will occur between baseline and six months post intervention, immediately post intervention and two months post intervention as well as

immediately post intervention and six months post-intervention, two months and six months post intervention in the intervention and the control groups.

6. Independent t-test will also be conducted to determine the mean difference between the intervention and the control groups at different times of the study. It is aimed to assess the differences between groups across different points in time. Comparisons will be made at baseline, immediately post, two months and six months post intervention.

7. Mixed design repeated measures ANOVA will be conducted to explore the difference between and within group pre and post intervention as well as their interactions. This test will help to make conclusions regarding the effectiveness of the intervention overall.

8. Finally, multiple logistic regression will be run to establish predictors of TB knowledge, attitude, practice, and self-efficacy as well as treatment outcomes among the patients.

Primary endpoints

a). First primary endpoints

- Successful/unsuccessful treatment outcome.

Successful treatment: The sum of cured and treatment completed.
Unsuccessful treatment: The sum of not evaluated, lost to follow-up, treatment failure or patient that died during follow-up.

The categorization of the above categories - successful/unsuccessful treatment - is based on 6 categories using the WHO guideline for assessing TB treatment outcomes[18].

1. Cured: A pulmonary TB patient who is bacteriologically confirmed at the beginning of therapy, who is smear or culture negative in the last month of treatment and on at least one previous occasion.

2. Treatment completed: A TB patient who completes treatment without evidence of failure BUT with no record to show the sputum smear or culture results in the last month of treatment and on at least one previous occasion were negative, either because tests are not done or because results are unavailable.

3. Treatment failed: Failure of TB treatment is considered when TB patient is still sputum smear or culture positive at the fifth month or later during treatment

4. Died: A TB patient who dies for any reason before starting or during treatment.

5. Lost to follow-up: This was a TB patient who does not start treatment or whose treatment is interrupted for two consecutive months or more.

6. Not evaluated: This is a TB patient for whom no treatment outcome is assigned. This also included patients “transferred out” to another treatment unit as well as cases for whom the treatment outcome is unknown to the reporting unit.

b). The second primary endpoint is the self-reported knowledge.

c). The third primary endpoint is the self-reported attitude.

d). The fourth primary endpoint is practice regarding TB.

Secondary endpoint: This secondary endpoint is self-efficacy, which is one's belief and conviction that he/she can achieve something[15]. It will be measured during treatment. Self-efficacy enhances adherence to treatment, which is defined as the extent to which the patient's history of therapeutic drug-taking coincides with the prescribed treatment[19]. Self-efficacy also enhances knowledge, attitude, and practice.

Dissemination: The results of the trial will be sent for publication in peer-review journals. Additionally, the results of the trial will also be given to the Ministry of Health Sokoto for implementation of the study in other TB clinics across the state.

3.0 Results

The participants of photovoice are expected to have more mean scores in knowledge, attitude, practice, self-efficacy and successful treatment compared with the control group.

4.0 Conclusion and recommendation

The study will explore the effectiveness of photovoice in improving TB knowledge, attitude, practice, self-efficacy, and treatment outcome among the patients. If found effective, photovoice should be made a part of usual TB care among newly diagnosed TB patients.

Acknowledgements

Ethical approvals for the study was obtained from Universiti Putra Malaysia Ethics Committee for Research Involving Humans, Ministry of Health Sokoto, and Specialist Hospital Sokoto. Permission and written consent from individual participants will be obtained prior to data collection. The trial is registered with Pan African Clinical Trial Registry **(**The South African Cochrane Centre**)** Trial Registration Number: PACTR201603001552101.

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Declaration

Author(s) declare that this research work is our original idea and material used were reference appropriately. We also declare that there is no conflict of interest to declare.

Authors contribution

1 AA study design, data analysis, & writing, 2 LMS study design, data collection & writing, 3 HA study design & analysis 4 FM study design & writing, 5 MTOI study design & writing and 6 SBK study design, data collection & writing.

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