Barriers and facilitators of nutrition assessment, counseling and support for Tuberculosis patients: a qualitative study

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Abstract

**Background:** Provided the significant role of nutrition and proper diet to tuberculosis patients, nutrition assessment, counseling and support has become integral part of tuberculosis treatment. However, proper implementation is crucial to realize its effects, and the barriers and facilitators of implementation has not been studied yet.

**Objective:** To explore barriers and facilitators of implementation of Nutrition Assessment, Counseling and Support for tuberculosis patients.

**Methods:** An exploratory qualitative study conducted in public health facilities and health offices of Mekelle City, Northern Ethiopia. A total of 17 purposively selected key informants were interviewed. Interviews were tape-recorded, transcribed verbatim, and coded and analyzed using a thematic approach.

**Results:** Barriers and facilitators were identified at three levels namely organization, care provider and patient levels. Suboptimal nutritional supply, lack of supportive supervision, lack of adequate work force, staff turn-over, sudden withdrawal of partners and weak link with social service were the barriers at the organization level. Lack of commitment was reported as the only barrier at care provider level and socioeconomic status of patients, sharing and selling of supplies, perceived improved status and perceived stigma were identified as the major barriers for the implementation of nutrition assessment, counseling and support services. While training, availability of measurement and educational tools, inclusion of nutrition indicators in the tuberculosis register, and presence of collaborating partners were identified as facilitators at organizational level. Patients’ motivation to know their health status was reported to be a facilitator at patient level.

**Conclusion and Implications:** Organization, care provider and patient level barriers and facilitators found to influence the implementation. Multifaceted approaches are needed for the health system to successfully implement the program and to gain its potential impact.

Introduction

Tuberculosis (TB) is an infectious disease that remains a leading cause of morbidity and mortality, with 10 million new TB cases and 1.3 million TB deaths occur world-wide in 2017 [1]. The highest disease burden occurs in developing countries where under-nutrition and poverty are major problems [2]. Ethiopia, with 172,000 new TB case, 5500 multidrug-resistant TB (MDR-TB) and 25,000 deaths in 2017, is still one of the high TB burden countries which could be explained by unacceptably high prevalence of malnutrition [1]. Despite its substantial impact, tuberculosis (TB) treatment has averted 54 million deaths worldwide between 2000 and 2017[1].

Nutrition and tuberculosis have bidirectional relationship by which both are risk factor for each other [3]. Undernutrition is a main risk factor for the development of TB by severely affecting cell mediated immunity which is the principal host defense against TB [3]. The risk of progression from infection to
disease increases substantially in undernourished individuals. In another way, decreased appetite, nutrient malabsorption and altered metabolism which is caused by TB itself can adversely affect nutritional status leading to under nutrition [4, 5].

Under nutrition is reported to be high among TB patients [6–9] and is also known to result in poor TB treatment outcome [5, 10, 11]. In Ethiopia, evidences indicate that 39.7–53% of TB patients are undernourished [6, 9]. Severe undernutrition at diagnosis is associated with higher risk of death [10, 12, 13]. Moreover, it also increases the risk of drug toxicity, relapse and death once TB develops [14]. Hence, integrating nutrition care into routine clinical services for people with infectious diseases is an important strategy to reduce the severity of the illnesses and improve their treatment outcomes and quality of life [15]. Assessments done on Nutrition Assessment, Counselling and Support (NACS) implementation among HIV patients and other group of patients (infectious disease, maternal and child health) have shown effectiveness of the interventions [16–19]. Nutrition assessment, counseling and support (NACS) for TB is, therefore, an intervention designed to improve nutritional status of TB patients by integrating nutritional status assessment and provision of appropriate support and care [20]. Improving nutritional care and support helps to improve the health outcomes of people with TB [21, 22]. Periodic nutritional assessment and counseling on diet and nutritional management of symptoms and drug-side effects could help TB patients to maintain or increase their food intake and adhere to TB medications which improves tuberculosis treatment outcome [7, 23]. Therefore, assessments of nutritional status of every TB patient is undertaken at initial assessment and preparation for TB treatment, at the end of intensive phase of TB treatment, and up on documenting unintentional loss of weight during TB treatment. Accordingly management of malnourished patients with TB depending on the degree of malnutrition and the age of the patient, provision of nutritional counseling and support for all active TB has become part of routine adherence support to TB [20, 24].

In Ethiopia, a country with high burden of TB and Malnutrition, control and prevention of TB is among the priority health programs as indicated in Health Sector Transformation Plan (HSTP) and also working towards END TB strategy by adopting the new Global TB Strategy [20, 25]. In order to achieve this goal, provided the significant role of nutrition and proper diet to TB patients, NACS have been indicated as one of the TB treatment strategies [20, 22]. Hence, since 2016, the national nutrition program II initiative has been taken to address the nutritional requirements of individuals with infections specifically tuberculosis. Despite the recognition of NACS as routine TB care, information on the barriers and facilitators of NACS implementation in Ethiopian context is lacking. Furthermore, assessments done on NACS implementation among HIV patients and other groups show effectiveness of the interventions can be affected by various factors that operate at different levels; the patient, care providers (professionals) and organizational level [16–19]. Therefore, this study aimed to investigate the barriers and facilitators of implementation of NACS from organization, care providers’ and patients’ perspectives using an exploratory qualitative study.

Methods
Study setting

This study was conducted in public health facilities and health offices of Mekelle City, Tigray regional state, Northern Ethiopia in April 2019. The City is comprised of seven sub-cities/districts that have 10 health centers and 4 hospitals of which one is tertiary hospital and the rest are general hospitals. The TB treatment and care is one of the cares or services provided at all health facilities. Early diagnosis of tuberculosis, systematic screening of contacts, high-risk groups and treatment of all people with TB including drug-resistant TB are of highest priority services [26]. The NACS for the patients are provided according to national guideline that integrated nutrition as main component of TB treatment and care[24]. All the care providers of the TB program or care at various levels of health system including regional and woreda(district) health offices and health facilities are trained on recent TB treatment protocol[24]. According to the regional government report of 2018, the TB retreatment cases were 61(8%) with the treatment success rate of 94% for both bacteriological and clinically confirmed TB case. In addition, unfavorable treatment outcomes such as the death, lost to follow up, treatment failure and moved to MDR were 5%, 1%, 0.8%, and 0.3%, respectively [26].

Study design and participants

An exploratory qualitative study was employed to generate an indepth information on the barriers and facilitators of NACS implementation. We approached 17 purposively selected key informants. Participants consisted of four TB program coordinators at woreda(district) and regional health offices, two health facility managers, six care providers (TB focal persons) and five TB patients from various health facilities. They were identified as key informants based on their exposure to the TB care and support as a manager, care provider or patient. Facility managers, TB program coordinators and care providers were recruited based on duration of stay in the position related to the TB care and support. While adult TB patients (greater or equals to 18 years) who have received at least two months of TB treatment and differ by the type of TB (Drug susceptible-TB (DS-TB), MDR and TB/HIV), type of facility (health center and hospital) they are receiving care were recruited with the aim of including patients with different disease type and possible treatment category. The sample size was determined based on the level of saturation of information as described elsewhere in detail[27].

Data collection procedures

Interviews were conducted using semi-structured interview guide, adapted from Grol's model for barriers and incentives of change in health care[16]. Based on this framework, barriers and facilitators of the implementation of NACS could operate at various level including the individual patient, care providers and organization context[16]. The guide was further enriched based on the world health organization and a national TB treatment guideline [20, 22]. The guide comprised open-ended questions with certain main topics to be covered such as routine TB service, routine NACS services, and the barriers and facilitators for implementation of NACS at the patient, care provider(professional) and organization aspects (Additional file 1). The interviews were collected by MGD (principal investigator), ABB and one other experienced qualitative researcher. The interviews were conducted on face-to-face basis between data
collector and a participant by local language [Tigrigna]. The interviews were tape-recorded, and notes were taken for non-verbal explanation on the topic of discussion. Prior to actual data collection, the participants were asked permission, choose convenient time and place for interview to reduce possibility of interrupting the interview for office or other personal commitments. Each interview took 30 to 88 minutes and was done in private room to ensure the privacy and quality of recordings.

Data quality control

The data collection guide was piloted using similar study participants in the study setting. The information was then transcribed, translated and analyzed prior to actual study hence emerging insights were incorporated to the interview guide. Then, discussion was made by the researchers on the final version of interview guide, the techniques of interview and questioning, participant selection and ethical issues. Accordingly, the interviewers were well informed to withhold their prior experiences and avoid leading questions to minimize perception bias during data collection and transcription. Participants were probed using follow up questions for points that need clarification and depth. Collected data were coded and new dimension about the topic of interview and information saturation were identified on daily basis. Investigators conducted daily debriefing sessions to enhance trustworthiness of the data.

Data analysis

The recordings were transcribed and translated to English. The translated transcriptions were imported to the ATLAS.ti version7 software for coding and analysis. Open coding was employed to break down, conceptualize and put back together the data. Then, similar codes were systematically organized with in non-repetitive themes using a thematic analysis approach as suggested by Braun and Clark [28]. Handwritten notes which are additional information for the data were also reviewed. During the analysis, memos were recorded to capture ideas and reflections of the participants. The emerged themes were finally organized in to three levels namely organization, care provider and patient.

Results

Characteristics of study participants

The educational status of the participants ranged from primary school to MSc degree (Table 1). Table 1: Characteristics of study participants, 2019
Table 1
Characteristics of study participants

| Category                          | Age | Educational status | Occupation/position         | Duration at treatment(month)/Service year(year) |
|----------------------------------|-----|--------------------|-----------------------------|-----------------------------------------------|
| P1 MDR TB patient                | 25  | Secondary          | Driver                      | 7                                             |
| P2 TB patient                    | 20  | BSc degree         | Student                     | 3                                             |
| P3 TB patient                    | 40  | BSc degree         | Self employed               | 2                                             |
| P4 TB/HIV patient                | 30  | Primary            | House wife                  | 3                                             |
| P5 Re-treatment TB/HIV patient   | 21  | Secondary          | No job                      | 20                                            |
| P6 Care provider                 | 35  | Diploma            | TB focal person             | 3                                             |
| P7 Care provider                 | 35  | Bachelor degree    | TB focal person             | 4                                             |
| P8 Care provider                 | 46  | Diploma            | TB focal person             | 10                                            |
| P9 Care provider                 | 50  | Bachelor degree    | TB focal person             | 3                                             |
| P10 Care provider                | 30  | MSc degree         | TB focal person             | 2                                             |
| P11 Care provider                | 33  | Bachelor degree    | TB focal person             | 8                                             |
| P12 Facility manager             | 32  | Bachelor degree    | Health center director      | 2                                             |
| P13 Facility manager             | 43  | Bachelor degree    | Health center director      | 3                                             |
| P14 Program coordinator          | 39  | Diploma            | TB program coordinator      | 1                                             |
| P15 Program coordinator          | 36  | Bachelor degree    | TB program coordinator      | 2                                             |
| P16 Program coordinator          | 35  | MSc degree         | MDR TB coordinator          | 3                                             |
| P17 Program coordinator          | 41  | Bachelor degree    | TB/HIV coordinator          | 4                                             |

P: Participant; TB: Tuberculosis; MDR-TB: Multidrug Resistant-Tuberculosis; TB/HIV: Tuberculosis/Human immunodeficiency virus

**Emerged themes**
Emerged themes were organized to organizational, care providers and patient level barriers and facilitators for implementation of NACS (Table 2).

Table 2
List of themes for barriers and facilitators of NACS implementation

| Levels           | Themes                                      | Barriers                                | Facilitators                                                                 |
|------------------|---------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------|
| Organization     | • Suboptimal of nutritional supply          | • Training                              | • Availability of measurement and education tools                          |
|                  | • Lack of supportive supervision           |                                         | • Inclusion of nutrition indicators in the TB register                    |
|                  | • Lack of enough work force                |                                         |                                                                            |
|                  | • Staff turn-over                          |                                         |                                                                            |
|                  | • Sudden withdrawal of partners            |                                         |                                                                            |
|                  | • Weak link with social service            |                                         |                                                                            |
| Care providers   | • Lack of commitment                       |                                         |                                                                            |
| Patients         | • Socio economic status of patients        | • Motivation to know their status       |                                                                            |
|                  | • Sharing and selling of supply            |                                         |                                                                            |
|                  | • Perceived improved status                |                                         |                                                                            |
|                  | • Perceived stigma                         |                                         |                                                                            |

Organizational level barriers of NACS implementation

Suboptimal nutritional supply

Absence of therapeutic and supplementary foods for NACS, interruption, and delay were evident. Participants described that due to the absence of therapeutic and supplementary foods, drug susceptible TB patients with severe and moderate acute malnutrition are not being provided with nutrition support: “The supply had been reduced gradually. Then, the service was forced to be interrupted through official letter from the region that gives the direction to provide nutrition support for only HIV patients due to shortage of nutrition supplements. So, those facilities with antiretroviral therapy (ART) service are also started to address only HIV patients” (P17). Participants also described that interruption and shortage of nutrition supply hinder proper management and follow up of severe and moderate acute malnutrition patients: ‘...it interrupts very much... We share support that comes for HIV patients. Recently there was supply that came for TB patients, but it is very few. It is not enough; it may get one or two patients. So, they didn't get continuously’ (P10). Inadequate and late financial support for MDR-TB patients reported to
hinder proper management and follow up of severe and moderate acute malnutrition patients: “The Global Fund is still providing support for food items provision for MDR patients though it is not adequate. It is 650 birr per month per individual, but when we think what can be bought with this money, it is very difficult” (P17) and “Sometimes the money to purchase the supply comes late from the center. After it reaches the finance, the process there itself could be a barrier, because the materials are bought after tender” (P16). However, the program coordinator explained the reason for late and inadequate support by donors is due to lack of proper financial documentation and timely report from lower to higher level of the health system management: “…the provided financial support has to be utilized and reported timely (liquidation has to be done timely) till to higher levels. Currently, the money given is small and it is also not utilized and reported timely. The funders believe as the money is utilized if and only if the financial report reaches them timely. Otherwise, the donors think as there is financial support provided previously and in the following round, they provide only small amount of money. This is also a great challenge” (P17).

Consequently, the unavailability of nutritional supply (plumpy sup and plumpy nut) in turn discouraged the TB focal persons to conduct nutritional assessment. This was described by care providers as: “There is no available nutritional service in our health center for TB patients. Without giving our clients any access to nutrition, how can we measure their nutritional outcomes? It is non-sense” (P6). And, “If there is no therapeutic food, you may not be interested to measure height and BMI as well. If you fail to take these measurements, you will not conduct other nutrition assessments. Therefore, the absence of support leads you to be reluctant to provide the whole nutrition assessment service” (P10). This is also further strengthened by program coordinator: “Access to nutritional supplements at facility level is essential to assess and identify nutritional problems in TB patients. Otherwise, assessment and identification of nutritional problems is demotivating” (P15).

Lack of supportive supervision
Lack of supportive supervision and follow up decreased the care providers’ accountability and attention to the service as the TB focal persons are providing the service as per their understanding and conscience. A TB focal person explained this as: “There is no accountability. Therefore, whether you work or not, it is for your conscience. The higher-level leaders have no knowhow about what we are providing regarding assessment. What they know is as we give plumpy nut. This is a barrier because to work it with attention, accountability is very important in addition to your conscience. But there is no supervision from facility managers and higher-level supervisors. Therefore, we are doing what we believe is right” (P10).

The care providers also reported that sustained improper implementation of nutrition support due to lack of supportive supervision as impairing the implementation: “It makes you sad sometimes. I mean when you are doing meaningless work if there is no one who monitors this. …integration of the service has no meaning” (P10). In addition, lack of monitoring and follow up, which was assumed helpful to correct care providers’ weakness if any and to aprize good performance was noted to decrease the staff motivation. A TB focal person elaborated this as: “There are no barriers other than lack of encouragements for
professionals. Due to lack of strict follow up and monitoring to this service, we provide it haphazardly” (P10).

**Lack of adequate workforce**

Inadequate workforce and provider’s high work burden at health facilities were reported as a challenge to NACS. Participants underlined that it is difficult to implement NACS in the case of high patient flow and limited number of care providers. The care provider would not have time to give the service for all the clients according to the recommendation. A care provider illustrated this idea as: “Sometimes when there is only one who provides the service, it might be difficult to conduct the whole assessment related services. But when we (two professionals) are providing service it is easy for us to conduct assessment. When there is high patient flow, it is difficult to give attention to the whole service and provide it as needed” (P10). A program coordinator further stated this idea as: “There is only one TB focal person in each facility but if the number [of health care providers] is increased, it would have been easier to assess the nutritional status and counsel” [P15]. Participants also explained assigning only one focal person with additional workload other than the provision of service for TB clients to be a barrier to provide all the nutrition services for the TB clients: “First, it is the patient load, for example, a professional can have limited time to provide all the services. The human resource shortage is one challenge. Some of them have another additional duty” (P15). This idea was further explained by a patient as: “The care provider is too busy. She is alone to provide us the services. Ideally, she is assigned to us (TB patients), but there are also other patients who seek her services. So, it is difficult to cover the services for all TB patients and other patients by one professional” (P2).

**Trained staff turnover**

Participants had also notified trained staff turnover (with in and out of facility) and replacement of untrained professional at the clinic to cause interruption of the service as described by program coordinators: “We have problem in staff turn-over, it is a big problem. There is staff change from facility to facility. There is also within the health facility shifts/changes” (P17). Another participant also described: “When there is trained staff turnover and untrained staffs get assigned in that TB clinic, unknowingly there will be interruption of the service” (P16). Participants suggested that problem related to staff turnover could be addressed by organizing opportunities to handover skills to newly assigned providers. The following quote captured such suggestion: “If TB focal person who leaves the facility or change his work unit fails to handover very clearly for the next coming staff, the TB program will fail” (P17).

**Sudden withdrawal of partners**

Because the programs are highly dependent on partners’ support, the continuity and sustainability of the supply is often affected, and the services fail when the partners project phase out. This idea was described by a program coordinator as: “…still we don’t have guarantee to obtain nutrition support...So far this NGO was mainly providing support. But the support is interrupted after the project phase out” (P17). A care provider further explained this idea as:
“... The nutrition program is dependent on partners support, so no one gives attention when their support terminates. Because of this it has no continuity” (P10).

Weak linkage with social service

Weak linkage between sub-city social affairs and health facility to provide social support for patients with low socioeconomic status was noted to be a barrier. This idea was described by TB program coordinator as: “It is very challenging; you go to social affairs office then you might have another step which might be challenging” (P17). Strengthening communication between the organizations was suggested to solve the problem related to weak linkage between sub-city social affairs and health facility.

Organizational level facilitators of NACS implementation

Training

The participants identified that receiving integrated TB nutrition training builds the capacity of health providers and facilitates the implementation of nutrition assessment and counseling. They also reported that it has increased their commitment to give the service. A care provider stated this as: “...as we are already educated and trained, we are committed to work...” (P7). A health center director also strengthened this idea in his explanation as: “Based on the knowledge they have got from the training; they are providing education for the patients” (P12). In addition, special nutrition training given for some professionals (TB focal persons working on MDR TB clinic) facilitated the implementation of nutrition service and reporting of nutrition specific issues. A TB program coordinator explained: “There are professionals specially trained for nutrition service implementation and they also report nutrition specific things. So, this helps its implementation” (P16).

In contrast, lack of training for care providers, health facility directors and case team leaders noted to hinder the care providers engagement and identification of the nutritional problems of the patients. As described by care provider: “...we didn't receive any training about this issue but here is a new registration book which is given to us by the regional health bureau this year. So that, there is nutritional information in the registration book but since I have no idea and full information about NACS, I couldn't fill it completely” (P6). A health center director further noted: “It is also the lack of training hindering the implementation. If the focal persons are trained, they will be highly engaged and so that they can easily identify gaps. Therefore, they should have depth of knowledge on the nutrition for the TB patients” (P13).

Lack of orientation and training for the facility directors and case team leaders was reported to hinder their ability to monitor and supervise the nutritional service given for TB patients that inturn hinders the service implementation. This was described by a care provider: “The leaders do not understand this service hence no one monitors and follow-up the service and support us” (P10).

Availability of measurement and education tools

Presence of measurement tools and teaching aids in the TB clinic reported to facilitate implementation of nutritional assessment and counseling service. A care provider described this as: “We have a document that guides us to provide nutritional counseling which was given three years back. It has list of food items
like chicken, meat, millets, and others. When we use this document for provision of counseling, every patient appreciates the counseling” (P8). This was further described by program coordinators as follows: “...If there is no measurement scale in the TB clinic then the professionals take the patients to other service outlets to take the anthropometric measurements. This will make them bored, so that they may not do it. But the presence of this measurement tools in their room helps them to do the nutritional assessment. Each of the TB clinics has their own weight scale. This facilitates assessment” (P14).

However, using un-calibrated weight scale hindered proper implementation of nutritional assessment as described by patient: “Take this weight balance as an example, look on it, it is just biased, when they weigh us, they say that add 5 or 2 Kg to the reading to get your actual weight. So, there is a barrier related with the instruments and this should be adjusted” (P1).

Inclusion of nutrition indicators in the TB register
The presence of nutrition parameters in the TB register was reported to help supervisors to monitor the implementation of nutrition service as this increases the accountability of care providers to do the nutritional assessment. This idea was described by health center director as: “The presence of parameters of nutrition assessment in the TB register helps us to check whether the parameters are fully recorded or not. We also ask why if it is not complete. There is no reason not to be recorded completely. So, the presence of register that comprised the nutrition assessment parameters is helpful” (P13). A program coordinator supported this idea as follows: “The HMIS TB register has all important parameters including nutritional status. So, according to the register we check all the records. If there are incomplete records, we ask why they missed it” (P14). A care provider also described this as: “…as it is required in the record. Then, if I miss it, it will harm me because there will be question related to the service provided…” (P8).

Collaborative partners
The follow up and support of partners were also reported to encourage care providers to work with accountability and facilitate implementation of the service. A care provider described this as: “Even we are not working previously; we work due to their presence to supervise us. So, we work to avoid mistakes in the service provision. So far, they check whether the weight and height and the support given is appropriate” (P10). He further explained: “They support us even when there is shortage of plumpy net, and they call to Federal Ministry of Health to inform the presence of SAM cases and necessary supports to be given. So, if there are missed services, we will correct accordingly. Therefore, the follow-up and support of challenge TB has facilitated the implementation of nutrition assessment” (P10).

Care providers’ level barrier of NACS implementation
Lack of commitment
The participants reported NACS implementation was also influenced by commitment of the care providers. This was described by a care provider as: “...due to carelessness of the health professionals, the service is not well done sometimes... Even if you have knowledge, you might forget due to lack of attention. I can say, it is due to our weakness, we didn't give value for it” (P10). In addition, subjective
judgment of the professionals was also reported to hinder the professional’s commitment to conduct nutritional assessment for TB patients. A health center director pointed out this idea as: “…the nurses might not assess if they feel the patient is well-nourished” (P13).

**Patients’ level barriers of NACS implementation**

**Socioeconomic status of patients**

Patients’ socioeconomic status was reported to make the care providers uncomfortable to counsel patients about nutritional issue because the patients tell the care providers that they cannot afford even to eat twice a day or have no one to support them. This was described by a care provider as: “Because most of the time when we advise TB patients to eat properly with high protein foods they say “from where can I get those all supplies? It is beyond my economic level. I can’t afford for those foods”. So, you know in this case, as human when you hear this you feel discomfort. Henceforth, it is difficult to say a word about nutrition issue because I couldn’t help them regarding diet” (P6).

The patients’ socioeconomic status was also reported to affect their compliance to the nutritional counseling. A care provider pointed out this as: “When we counsel to feed properly, our patients ask us “how they can feed, who will support?” they say as they have no one who supports them, so this is a challenge.” (P9). This was also described by MDR-TB patient: “The implementation mainly depends on economic status. Ideally, I accept the counseling and recommendations from the care providers, however, in practice there are uncertainties; like economic constraints” (P1). Another TB patient also described this: “It depends on the individual/patient whether to apply or not. The patients may decide themselves based on their economic status” (P3).

In addition, some patients expect nutrition support because of their low socioeconomic status was reported to hinder their compliance for nutrition counseling. This was illustrated as: “…when you tell the patients that their weight has decreased and advise them that they should take food, they expect you to give them nutritional support. They don’t take your advice” (P16).

**Sharing and selling of the supply**

Participants reported that some patients sell the nutritional supply given to them and buy foods that are nutritionally poor as compared to plumpy nut or want to use the money for other purpose. A care provider explained: “…when you give them plumpy nut they decrease its nutritional value by selling it and they want to buy juice” (P10). In addition, sharing of supply with family was also raised as a barrier to implement the nutritional support properly. The program coordinator described: “They[patients] may give it for their families, and they may also sell it with the need for money” (P16).

**Perceived improved status**

Patients’ perception of their prognosis after symptomatic relief from the disease was reported to be barrier for the implementation of nutrition counseling as the patients perceive that they are okay, so they don’t need the service. This was explained by the TB patient as: “The patient is eager to receive the counseling because he wants to be free of the pain and coughing which is common during the first
month. However, after a bit follow up and treatment, during the second month, the patients get relief from cough and pain. Hence, most of patients perceive that they are fully treated and cured so that they refuse the nutritional counseling. Most of patients would not follow the counseling after the second month due to their wrong perception” (P2).

Perceived stigma

Perceived stigma – patients who do not want to be considered as TB patient by other people – was reported to be a barrier as this makes them not to stay and receive services correctly. This idea was mentioned by a TB patient as: “I think TB is thought as a shameful disease. There are patients who intend to hide themselves and don’t want to be seen as TB patients. Some want to come to pick the drug and go back without stay and interact with anyone. So, for the sake of not being seen by others, many patients miss the counseling” (P2).

Patients’ level facilitator of NACS implementation

Motivation to know their status

Participants reported that motivated patients – those who want to know their status and request to be assessed – motivate their care providers to give them the services. The care provider illustrated: “The patients request to be assessed and supported nutritionally” (P10). The patient also described: “Some patients are interested to get counseling services. The professionals are interested to deliver the counseling when they meet such patients.” (P2). A program coordinator also described this as: “…there are patients that implement what the health professionals tell them. This motivates the professional’s intention to bring a change in their community” (P14). In contrast, resistant and hard to follow patients were noted to hinder implementation of the service. This idea was illustrated by TB program coordinator: “There are also patients who are very hard to follow like they don’t take drug, don’t come to the facility even with call” (P14).

Discussion

The current study explored barriers and facilitators of NACS service from organizational, care providers/health professionals and patients’ perspectives. The themes emerged were linked with the socio-ecologic model that depicts multilevel factors – organizational, care providers and individual patient – to the implementation of NACS as used elsewhere [16, 29]. Suboptimal nutritional supply, lack of supportive supervision, lack of adequate work force, staff turn-over, sudden withdrawal of partners and weak link with social service were identified as the barriers to the implementation of NACS at organization level. Lack of commitment was the only barrier at care provider level and socioeconomic status of patients, sharing and selling of supply, perceived improved status, and perceived stigma were the barriers to the implementation of NACS at the patient level. Similarly, training, availability of measurement and educational tools, inclusion of nutrition indicators in the TB register and collaborating partners were identified as facilitators to the implementation of NACS at the organization level and patient motivation to know their health status was found to be the facilitator at the patient level.
Trained staffs, various resources and administrative supports are often required for a health program implementation[30]. In the present study, suboptimal nutritional supply (lack and shortage) in TB care was reported to be a major barrier that hinders implementation of NACS. This is in line with a qualitative study from Uganda showing provision of nutrition supply is the most important source of motivation that enables the providers to improve the quality of nutrition services offered [18].

In the current study, lack of supportive supervision was also identified as a barrier of NACS implementation. This is consistent with the assessment report from four regions of Ethiopia – Dire Dawa, Addis Ababa, Oromia and Amhara – that showed significant improvement in the quality of NACS services for HIV patients due to clinical mentorship [19].

Lack of adequate work forces to provide the service when there is high patient flow and with additional workload was noted to hinder the implementation of NACS. Previous qualitative studies also showed the work load and limited time as barriers of implementation of nutrition services [29, 31]. In addition, the assessment done in developing countries on monitoring of NACS found shortage of work force as a barrier for integration of NACS in the existing health system [32]. Moreover, in the current study, trained staff turn-over was also pointed out as a barrier of NACS implementation. This finding is consistent with a qualitative study conducted in Northwest Ethiopia that reported as high trained staff turn-over hampered the quality of TB service [33].

Nutrition service for TB patients was reported to be heavily dependent on the collaborating partners. When the partners program ends, it used to reduce attention and accountability by health care workers and directors. In line with this finding, a qualitative study done on NACS implementation for HIV patients in Ethiopia showed that the nutrition services had traditionally been supported by partners but not the regional health bureaus which resulted in low attention and accountability of health staffs [19].

Lack of integration of social affairs office and the health facilities to provide support for eligible patients was also found as a barrier that hinders the implementation of nutrition support for TB patients. In line with this, evidences from developing countries reported limited ability to link health facilities to community-based economic strengthening and livelihood programs hinders effective implementation of NACS [32]. A qualitative study finding from Peru also showed importance of social support for effective implementation of TB program [34]. Besides, stakeholders support have long been found to enhance program implementation as well as sustainability[30].

At care providers’ level, lack of provider’s commitment was reported as a barrier of implementation of NACS. This is consistent with finding from a qualitative study that reports professionals’ commitment and motivation as main facilitator of nutrition service [31].

Poor socioeconomic status of the patient was noted to make care providers uncomfortable to counsel them about nutritional issue. It was also noted to prevent the patients to comply the counseling provided for them. This is in line with study findings from Ethiopia that reports economic and food constraints as barriers of compliance to the general TB service that also affects their compliance to nutrition counseling
and education [35, 36]. It is also in line with recommendation that shows interventions that address economic and food needs of entire household are essential to ensure successful treatment of malnourished patients [37].

Sharing and selling of therapeutic food was found to hinder the implementation of NACS in this study. This finding is consistent with study conducted in Ethiopia that demonstrates sharing and selling of therapeutic food as the main challenge for adherence to therapeutic food among HIV patients [38]. Another qualitative study conducted in Ethiopia indicates caregivers of under-five children perceived therapeutic food as a food to be shared and when necessary a commodity to be sold for collective benefits for the household [37].

Perception about their progress –perceived wellness after symptomatic relief from the pain – of the patients was found to hinder implementation of NACS. In line with this, a quantitative study shows patients who have wrong perception about TB disease have higher odds of poor compliance to treatment than their counterparts [39]. It is also consistent with qualitative study finding from Ethiopia that reports patients have intention of withdrawing medication due to perceived wellness [40]. Moreover, perceived stigma was found to hinder implementation of NACS. This finding is consistent with a qualitative study done in Ethiopia that shows stigma as the main problem for TB treatment compliance [41].

Lack of trained professionals and presence of limited number of TB focal persons were barriers of NACS implementation which is in line with a survey conducted in developing countries on understanding monitoring of NACS [32]. This is also supported by a qualitative study that assessed the challenges in tuberculosis control done in Ethiopia that indicated absence of training as one of the challenges of TB care [33].

Provision of integrated TB/nutrition training for TB focal persons and health workers emerged as facilitator of NACS implementation. In line with this, qualitative studies done in Ethiopia and Uganda show strengthening care providers’ nutrition related capacity enables them to provide quality nutrition services [18, 19]. Moreover, provision of training for clinical mentors (supervisors) has increased the mentors knowledge and skill to properly supervise service providers in order to give quality NACS service for people with HIV [19].

Presence of anthropometric measurement tools and teaching aids like broachers and leaflets was noted to facilitate the implementation of NACS. This is in line with the survey report showing presence of equipment as the main facilitator to implement NACS [32].

Inclusion of nutrition parameters in the TB register was identified as facilitator of NACS implementation in the study. In line with this, an interventional study done in Zambia to improve NACS implementation shows that the introduction of data recording tool that includes NACS parameters improves its implementation [42]. This could be explained by the fact that routine health data recording encourages the monitoring and evaluation of overall health system [43].
Moreover, at organization level, partners that provide either technical or financial support were identified as facilitator of implementation of NACS. This is in line with international recommendations set as a guide for national TB programs that strongly suggest collaboration and improving coordination with partners for effective implementation of TB program [44, 45].

Patients’ motivation to be assessed and supported nutritionally was found to be a facilitator that promotes the NACS implementation. This is in line with a qualitative study done in Ethiopia that indicates HIV patients are very motivated to take therapeutic food [46].

Our study has several strengths. The interview guide used was developed through detailed literature review and reviewed by qualitative research experts that allowed for obtaining in-depth information. Credibility and validity of findings were ensured by continued interviews until data saturation occurred. The research team conducted daily debriefing session during data collection in order to follow emerging issues in the subsequent interviews that further ensured the validity of the study findings. The depth and validity of the findings were also further strengthened by inclusion of participants from different levels (from the health facility level including patients to the regional level experts). The depth of information was also further ensured through inclusion of TB patients with different disease status (TB/HIV, MDR-TB, and DS-TB) and place where they are receiving care (hospital and health center).

However, it has also some limitations. To further strengthen the depth of information, use of multiple data collection methods would have been good. In this regard, the current study used only one method of data collection (key informant interview). In addition, though interviews were carefully conducted, there could be over-reporting or underreporting of barriers and facilitators of the implementation due to social desirability bias.

**Conclusion**

Our study is the first to explore the barriers and facilitators of NACS implementation for TB patients. The findings contribute to know the existing strengths and challenges of NACS implementation. Subsequently, the results can be utilized to improve NACS service for TB patients, which in turn helps to improve nutritional status and quality of life of the patients. More importantly, to achieve the national and global END TB goal by 2035, the health systems should consider the multilevel factors to properly implement the NACS.

The barriers and facilitators of NACS found to exist at different levels (organization, care providers’ and patients’ level). Therefore, multifaceted approaches are needed for the health system to successfully implement NACS and to gain its potential impact for the TB patients as well as the society. Collaboration between institutions at the health care system, organizations like social affairs and other relevant stakeholders particularly those supporting the program is also very crucial. Sustained provision of nutrition supply, regular supportive supervision, task sharing, inclusion of tuberculosis patients in social safety nets and income generating activities and strengthening nutrition related capacity and clinical
mentorship aimed at boosting the motivation of the care providers are recommended. Further research might be needed to further explore the potential barriers through mixed data collection techniques.

**Abbreviations**

DS-TB: Drug Susceptible Tuberculosis  
HIV: Human Immunodeficiency Virus  
NACS: Nutrition Assessment, Counseling and Support  
MDR: Multidrug Resistant  
MDR-TB: Multidrug Resistant-Tuberculosis  
TB: Tuberculosis  
TB/HIV: Tuberculosis and Human Immunodeficiency Virus

**Declarations**

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**Availability of data and materials**

Not applicable

**Ethical approval**

Research Ethics Review Committee of College of Health Sciences, Mekelle University approved the study protocol. A written consent was also sought from each participant after purpose of the study was informed and confidentiality was assured.

**Consent for publication**

Not applicable

**Authors contribution**
MGD, AMB, ZHK and ABB were involved in the planning of the study. MGD, ZHK and ABB recruited the participants and carried out the interviews. MGD and ZHK read the transcripts, coded and analysed the data. MGD wrote the main manuscript. All authors participated in the writing process. All authors also read and approved the final manuscript.

**Competing interests**

The authors declare that they have no competing interests.

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