PRIMARY HEALTH CARE AS A PILLAR OF THE END-TB STRATEGY: A SCOPING REVIEW

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ABSTRACT

Background: Primary health care (PHC) may have elements which can contribute to the management of tuberculosis (TB), particularly the 'End TB' effort based on the Sustainable Development Goals target 3.3. The aim of this review was to summarise available evidence in countries of high TB burden to determine if the PHCs in these selected countries fulfil their elements.

Materials and Methods: The Arksey and O'Malley six-stage methodological framework for scoping review was used. MEDLINE/PubMed and Google Scholar were used. Additionally, hand search of the reference lists of journal articles was conducted. Search terms used were "tuberculosis, TB diseases, TB treatment, and primary health care". Inclusion criteria were articles in the English language, of any study methodology and published online between the years 2008 and 2018. Extracted data were tabulated into two standardised templates: the PCC (Population / Concept / Context) framework and template to determine if the PHCs involved in providing TB treatment fulfilled the pre-determined criteria.

Result: Ten of the 16 studies analysed showed that the PHC fulfilled the criteria for primary health care and provided successful TB treatment. Five of 16 studies showed that PHCs which used the community-based approach did better in providing TB management compared to those which relied mainly on the services provided at the static clinic.

Conclusion: Primary Health Care is a promising and important pillar of the End TB Strategy. The core elements and role of PHC as the first contact with the population is the main force in achieving the SDGs generally and ending TB specifically.

Keywords: Primary health care, tuberculosis management, End TB strategy

1.0 Introduction

In 2017, about 1.6 million people died of TB including 300,000 deaths among people living with HIV/AIDS while approximately 10 million people developed TB (World Health Organization (WHO), 2018) Despite the overall reduction in the annual global incidence of TB by 1.5%, the world is still unable to eliminate it (WHO 2006, WHO 2015). Thus, after the end of the Millennium Development Goal era, the World Health Organization (WHO) aimed to end TB by year 2030 through target 3.3 of the Sustainable Development Goals (SDG, 2020).

To achieve the specific target for TB, the WHO has established the 'End TB Strategy 2015'. The objectives were to end the world-wide TB epidemic by decreasing 95% of TB deaths, and to reduce new cases by 90% base on the data in 2015 and 2035. Additionally, this strategy was to ensure that there are no family burdened with high out-of-pocket expenditure due to TB treatment (World Health Organization (WHO), 2017).

Guiding the End TB Strategy for the SDG are three pillars broadly categorised into patient-centred care and prevention, policies and systems with intensified research and innovation (World Health Organization (WHO), 2017). The first pillar is having an integrated, patient-centred TB care and prevention that covers early diagnosis, treatment of TB, preventive treatment from TB including vaccination and collaboration of managing the TB with other comorbidities. The early diagnoses include systematic screening for contacts and high-risk groups and include testing for universal drug susceptibility. Meanwhile treatment for TB patients encompasses drug-resistant TB and support system for the patient. Preventive treatment includes preventive treatment of high-risk persons and vaccination against TB.
The second pillar is having bold policies and supportive systems, such as political commitment, engagement of both public and private health providers, agencies, organization and community, policy for universal health coverage and social protection on other determinants of TB.

The third pillar is having intensified research and innovation efforts. This pillar supports the research and development on new investigations, interventions, and strategies as well as innovations that might enhance the process to stop TB. Interestingly, these three pillars fit nicely with the principles of primary health care (PHC).

Several strategies in TB prevention, diagnosis and treatment have been carried out globally over the years. For example, in the 1990s the Directly Observed Treatment Short-term (DOTS) strategy was introduced. This was followed by the Stop TB Strategy from 2006 to 2015 (Raviglione and Uplekar, 2006). The Stop TB Strategy was intended to achieve the Millennium Development Goals (MDGs) for global TB targets that were to be achieved by the year 2015. With an aim of ending TB by the year 2030, the two main indicators are reduction in number of TB deaths and incidence rate by 90% or more in 2035 compared with 2015.

While efforts to improve TB prevention, diagnosis and treatment were carried out over the years, primary health care has also been expanding in its roles and services, especially since the Alma Ata Declaration in 1978. That declaration acknowledged PHC as an important and successful strategy in improving the population health. Primary health care (PHC) can be

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defined as the first contact of the patient with the health care system, offering continuous, comprehensive and coordinated care to the community without discrimination on a person's status, gender, race, disease or organ system. 'First contact' in this context refers to the accessible care at the time of need, while 'the ongoing and continuous care' means not only does PHC attends to the current care of a person's disease but also on a person's long term health (Atun, 2004) (Atun, 2004). Comprehensive and integrated care' indicate that PHC can provide appropriate wide range of services to the community, while 'coordinated care' refers to the method of approaching the patients' condition from various discipline of medicine, based on the patients' needs (Atun, 2004).

Primary health care is also regarded as the backbone of the entire health system as it connects the community with the health system and other sectors (8). It is a part of public health services and at same time, it is a decentralized version of health care services that is relatively affordable and accessible (Atun, 2004).

The providers of PHC include the public and private sectors which is an ideal circumstance to promote and practice integrated patient-centred care. Integrated care is favoured as services can be easily accessed by patients and managing complicated cases can be done more effectively while maintaining the gate-keeping function for the health system (Pettigrew *et al.*, 2015).

Globally, PHC has contributed in realizing the SDG by improving health education nutrition, poverty, access to safe water, empowering the communities and local people, and advocating for healthy and sustainable living environment (Pettigrew *et al.*, 2015). Based on these successes, it is possible that PHC can help to attain the SDG in stopping TB. Moreover, the End TB Strategy 2015 as proposed by the WHO have pillars that contains elements of PHC, especially that of pillar one described earlier. Therefore, this scoping review aimed to determine if the PHCs can contribute to the end TB strategy based on the PHC elements of accessibility of care, continuous care, comprehensive care and coordinated care.

2.0 Materials and Methods

For this review, the Arksey and O'Malley six-stage methodological framework for scoping review was used. Relevant articles were taken from the following databases: MEDLINE/PubMed and Google Scholar. Additionally, hand search of the reference lists of journal articles was conducted. Search terms used were "tuberculosis, TB diseases, TB treatment, and primary health care". Inclusion criteria were documents which were in the English language, of any study methodology, published online between the years 2008 and 2018.

For the purpose of this study, the search was narrowed down to 12 countries that according to the Global TB Report 2018 was among the 30 high-TB burden countries globally that showed a decreasing trend for new cases and relapses from 2000 to 2017(World Health Organization (WHO), 2018). The countries were Brazil, China, Ethiopia, Kenya, Russia, South Africa, Tanzania, Viet Nam, Lesotho, Namibia, Zambia, and Zimbabwe. As these countries showed

improvement in the trend of TB cases, they were chosen for analysis to see if they had used PHC approach.

After the preliminary search, two authors independently checked the eligibility of all titles and abstracts. Upon the initial review, any studies on TB treatment success (cure or treatment completed), treatment failure, quality of care, integrated treatment, facility management, patient acceptability and feasibility, human resource capacity and challenges in TB management such as missed diagnosis or loss to follow up, were selected.

A detailed review of full text articles was then conducted. At the end of the review, the verdict of the studies was determined, i.e. whether from the studies it was evident that PHC was successful or not in the management of TB.

A total of 568 articles were found. After removing duplicates and further screening of the abstracts and contents, final sample comprised of 16 articles which were empirical studies that were either experimental (randomised control trial and quasi experimental) or observational (cross-sectional and cohort).

Two reviewers extracted data from relevant articles into two standardised templates: the first was a template adapted from the PCC (Population / Concept / Context) framework which is recommended by the Joanna Briggs Institute (JBI) to identify the main concepts in the review questions, and included information on the authors, year and country of publication as well as study design; while the second template sought to determine if the PHCs involved in providing TB treatment in the studies fulfilled the criteria of providing accessible care, continuous care, comprehensive care and coordinated care, in the context of TB management. These decision criteria were based on the following definitions: accessible care means providing care that was spatially and non-spatially available at the time of need, while 'continuous care' meant not only does PHC attends to the current care of a person's disease but also on a person's long term health (Atun, 2004). Comprehensive care' indicated that the PHC could provide appropriate wide range of services to the community, while 'coordinated care' referred to the method of approaching the patients' condition from various discipline of medicine, based on the patients' needs.

3.0 Results and Discussion

A total of 16 articles were analysed. Of the 16 articles, six were from South Africa, Brazil (n=5), Ethiopia (n=2), with one each from China, Kenya, Zimbabwe and Namibia. The study designs were cross-sectional (n=9), retrospective cohort (n=3), quasi-experimental (n= 2), ecological trial (n=1) and community randomized trial (n=1). These data as well as that of the PCC (Population / Concept / Context) are summarized in Table 1.

Table 1. Studies of Primary Health Care of TB Management.

No.	Author and Country	Study design	Population	Context	Content
1.	de Figueiredo *et al.*, 2009 Brazil	Cross sectional	TB patients	Compared access to TB treatment between direct observation of therapy short course (DOTS) program at reference clinic versus program involving home visit.	Although both programs performed poorly, the program involving home visit fared better (score 11.3% versus 4.7%).
2.	Andrade *et al.*, 2013 Brazil	Cross sectional	TB management in the PHC	Compared the performance of primary care versus the emergency medical services in TB diagnosis	Primary care performed better than emergency medical services in diagnosing TB because primary care had better human resource and sputum test facilities.
3.	(Bartholomay *et al.*, 2016) Brazil	Cross sectional	TB patients	Compared between patients who remained in the same health care service (of primary, secondary, and tertiary level) and patients who moved from various levels, in terms of quality of care.	Adherence to DOTS was two times higher in the primary care level compared to tertiary care (OR 2.22; CI: 2.12-2.32).
4.	Popolin *et al.*, 2016. Brazil.	Ecology study	TB management in the PHC	Investigated the factors which contributed the most to the progress of TB management in the PHC.	The PHC seemed to have the best conditions for the early identification of TB cases.
5.	Silva-sobrinho *et al.*,		TB management	A cross sectional study which assessed the performance of	The performance of the OHC was not good in terms of the

	2018. Brazil		in the PHC	PHC located in a municipality with three international borders.	management and organization of human resource, where there was lack of training and high staff turnover rates.
6.	Wei *et al.*, 2015. China	Prospective quasi-experimental study	TB management in the PHC	Compared the process and outcome of active case detection exercise versus no such exercise at primary care facilities.	Active case detection exercise was proven to be feasible and contributes to improved notification rates, as the primary care facilities with ACD had higher detection rates than those without ((38.6 vs 22.9 per 100 000, p=0.016).
7.	Datiko and Lindtjørn, 2009. Ethiopia	Community-randomized trial	TB management in the PHC	Assessed whether the detection of smear positive TB cases and treatment success can be improved with the use of health extension workers (HEWs).	Utilization of HEWs significantly improved the detection and treatment success rates.
8.	Assefa, Klinkenberg and Yosef, 2015. Ethiopia.	Cross sectional study	TB management in the PHC	Evaluated the child contact screening status.	The management of child contact tracing was poor as the majority of children living (60%) with smear positive TB patients were not screened.
9.	Ong'ang'o *et al.*, 2014. Kenya.	Retrospective cohort study	TB patients	Compared adherence to TB treatment of patients who used community health workers' services versus those who did not, both in urban and rural	Patients who used the services of community health workers and lived in the urban areas had better treatment adherence compared of those who were not. Community health workers can help enhance TB

				settings.	treatment adherence.
10.	Zvavamwe and Ehlers, 2009. Namibia.	Quasi-experimental study	TB patients	Compared the outcomes between patients who underwent clinic/self-administered TB treatment versus patients who utilised the community-based treatment option.	Patients who utilized community-based TB treatment option had statistically higher cure rate than those who underwent clinic/self-administered TB treatment.
11.	Cox *et al.*, 2014. South Africa.	Cross sectional study	TB management in the PHC	Investigated the trend of TB case detection and outcome of a community-based program for drug-resistant TB, from the year 2005 until 2010.	Overall improvement in case-detection rates, diagnosis time and treatment success over the years, indicating that community-based drug-resistant TB program is a feasible and successful program.
12.	Jacobson *et al.*, 2015. South Africa.	Retrospective cohort study	TB patients	Evaluated outcomes of treatment among TB patients with HIV, in a decentralized system. In this system, the TB patients were referred downwards from the district level to the primary care level to complete the treatment regime.	More than 80% of patients were successful in their treatment in this decentralised system.
13.	Budgell *et al.*, 2016 South Africa.	Retrospective cohort	TB management in the PHC	Assessed the TB treatment at the primary health clinics.	TB treatment was successful in primary health clinics, with 80% of patients have successful outcomes.

14.	Engelbrecht, Letsoalo and Chirowodza, 2017 South Africa.	Cross sectional study	TB management in the PHC	Assessed the Home-Based Carers' knowledge, skills, challenges, and training needs.	Despite their extensive scope of duties of the Home-Based Carers, their level of knowledge is limited and must be addressed.
15.	Kweza *et al.*, 2017. South Africa.	Cross sectional study	TB patients	Estimated the proportion of TB patients who failed to be diagnosed by primary health clinics.	The rate of TB cases which were missed, among those who had TB-related symptoms and among those who attended the clinic, was high (63-100%)
16.	Chadambuka *et al.*, 2011. Zimbabwe.	Cross sectional study	TB management in the PHC	Investigated why the TB detection rate was low in a district.	The screening rate among symptomatic patients was low (21%) and poor record-keeping resulted in defaulters among diagnosed patients.

As for the the second template which sought to determine if the PHCs the studies fulfilled the criteria of providing accessible care, continuous care, comprehensive care and coordinated care, in the context of TB management, the results were tabulated as in Table 2. Ten of the 16 studies analysed showed that the PHC fulfilled the criteria for primary health care and provided successful TB treatment. Five of 16 studies showed that PHCs which used the community-based approach did better in providing TB management compared to those which relied mainly on the services provided at the static clinic.

Datiko and Lindtjørn (2009) in Ethiopia found that there was improved smear-positive case detection and treatment success rate where health extension workers (HEWs) were involved in sputum collection and treatment. This could be due to improved access to services among these cases. Similarly, a study in Namibia found that the community-based TB care was convenient, acceptable and accessible to the patients (Zvavamwe and Ehlers, 2009). Community-based groups' cure rate was 1.3 times higher (p=0.05) than the clinic/self-administered groups showed, and that 54% of patients in Kenya used CHWs for their TB treatment (Ong'ang'o *et al.*, 2014). Overall treatment adherence of the cohort was almost 80%, with the adherence rate was statistically higher among patients who had utilized CHWs (83%) compared to among those that had not (68%). Adherence rate was two times higher in the urban set-up compare to that of the rural set up. According to the authors, although there was provision of monthly allowance to the worker for each house visits, better income elsewhere was a factor which is associated with the resignation of the workers. This was especially so among CHW who worked in the rural areas because long commutes during home visits resulted in them being able to do less house visits compared to those who worked in the urban areas. Additionally, in the rural areas, there was stigma toward TB and its modern treatment, resulting in patients consuming alternative treatment instead.

Table 2. Elements of Accessibility, Continuous Care, Comprehensive Care and Coordinated Care in the Context of TB Management.

No.	Author	Country	Accessibility	Continuous care	Comprehensive care	Coordinated care
1.	de Figueiredo *et al.*, 2009	Brazil	No	No	Not studied	No
2.	Andrade *et al.*, 2013	Brazil	Yes	Not studied	Yes	Yes
3.	Bartholomay *et al.*, 2016	Brazil	Yes	Yes	Yes	Yes
4.	Popolin *et al.*, 2016	Brazil	Yes	No	No	No
5.	Silva-sobrinho *et al.*, 2018	Brazil	Yes	Yes	Yes	No

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6.	Wei *et al.*, 2015	China	Yes	Yes	Yes	Yes
7.	Datiko and Lindtjørn, 2009	Ethiopia	Yes	Yes	Yes	Yes
8.	Assefa, Klinkenberg and Yosef, 2015	Ethiopia	No	No	No	No
9.	Ong'ang'o *et al.*, 2014	Kenya	Yes	Yes	Yes	Yes
10.	Zvavamwe and Ehlers, 2009.	Namibia	Yes	Not studied	Yes	Yes
11.	Cox *et al.*, 2014	South Africa	Yes	Yes	Yes	Yes
12.	Jacobson *et al.*, 2015	South Africa	Yes	Yes	Yes	Yes
13.	Budgell *et al.*, 2016	South Africa	Yes	Yes	Yes	Yes
14.	Engelbrecht, Letsoalo and Chirowodza, 2017	South Africa	Yes	Yes	Yes	Yes
15.	Kweza *et al.*, 2017	South Africa	Yes	No	No	No
16.	Chadambuka *et al.*, 2011	Zimbabwe	Yes	No	No	No

A study in South Africa also found that community-based DR-TB management was achievable, and contributed to improved case detection, reduced treatment lag and improved survival (Cox *et al.*, 2014). The community-based DR-TB program implementation included training and clinician support, counselling and home visits, tuberculous infection control, a local in-patient service, and routine monitoring. Patients received treatment speedily through their local clinic and were only hospitalised if indicated. In South Africa, it was found that the Home-Based Care approach provided comprehensive care which included provision of TB DOTS, anti-retroviral therapy (ART) medication, adherence support to TB patients, and

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nutritional, psychosocial, and medical care. The HBC team members had adequate knowledge to carry out their multiple duties (Engelbrecht, Letsoalo and Chirowodza, 2017).

Similarly, another five of 16 studies provided evidence that PHC performed better than the emergency medical services in performance for tuberculosis diagnosis and performed better than tertiary care centres in treatment of TB. In Brazil, researchers found that PHC was associated with the adequate provision of inputs and human resources, as well as with the sputum test request (Andrade *et al.*, 2013). Although the emergency department had x-ray equipment, they had work overload, high staff turnover, unavailability of sputum collection pots and they did not often request sputum test. Also in Brazil, researchers found that the majority of the new smear-positive TB cases were diagnosed and treated ta the primary care level, followed by tertiary care and secondary care levels (61.4%, 11.7% and 9.1% respectively). There were about 18% of patients who were diagnosed and treated at multiple levels but 65% of these patients eventually moved into the primary level from tertiary level (Bartholomay *et al.*, 2016). The same study also noted that the tertiary care level was inferior to the primary care level, in terms of poor DOTS implementation and poor outcome. Patients at the tertiary care center had two times the odds of not having DOTS compared to those who went to primary care. Also, prevalence of lost to follow up, death from TB, death with TB, transferred out, or not evaluated) was higher at the tertiary health care level.

Similarly, in South Africa found that decentralized and integrated care was successful for carefully selected TB/HIV coinfected patients (Jacobson *et al.*, 2015). PHCs played a significant role in the continuation of care of HIV/TB coinfected patients who were referred from the district hospital for TB treatment completion if they met specific clinical criteria. After TB treatment initiation, 42.6% were down referred from the district level HIV clinic to PHCs for treatment completion, while 57.4% remained at the district hospital. In total, 82.2% patients experienced treatment success, 10.5% died, and 7.0% defaulted. Those who defaulted were unfortunately at the time of transfer to PHC. Another study in South Africa found that PHCs achieved 80% success rate in treating drug-susceptible TB (Budgell *et al.*, 2016). However, there were several shortcomings in record-keeping in the clinics involved, such as missing laboratory results of follow-up smears, cultures, and drug susceptibility tests, which made it difficult to assess adherence to guidelines. In China, a research proved that active case finding using X-rays in PHCs among smokers with high risks of TB at primary care facilities was feasible and contributed to improved notification rates (Wei *et al.*, 2015). Those with X-rays suggestive of TB were referred to TB dispensaries for diagnosis.

On the other hand, six of the studies, showed that the PHC did not fulfil the criteria for primary health care and did not provide successful TB treatment. In Ethiopia it was found that the of 230 children living with index smear positive tuberculosis patient, 152 (66.1%) were not screened for tuberculosis (Assefa, Klinkenberg and Yosef, 2015). Of the 78 (33.9%) children screened, 2 had tuberculosis, 76 screened negative, of which 3 (3.8%) received preventive treatment. None of the health care workers indicated to routinely record and report

on child contact management. This was an important opportunity lost to prevent tuberculosis in young children.

In Brazil an outreach program was compared with that of a static reference clinic for treatment of TB using DOTS. Both programs performed poorly (de Figueiredo *et al.*, 2009). In the outreach program, it was found that the designated teams have not assumed integrally the treatment of the TB patient where DOTS has been incorporated by only a small fraction of them. While in the reference clinic program, the cost of transport to the patient to commute from work to clinic, and the fear of the patients losing their jobs because they have to take time off work to have their TB treatment caused only a few of them adhered to the DOTS treatment. Also in Brazil, a study was conducted on the performance of Primary Health Care (PHC) in treatment of TB patients in a triple international border municipality (Silva-sobrinho *et al.*, 2018). The study found that the PHC scored low or unsatisfactory in professionals' involvement in TB care and training and external actions on TB control. There were low frequency of training and the turnover influenced the involvement of professionals. An ecological study in Brazil was conducted that uses primary and secondary data to determine the coordination of care for TB cases (Popolin *et al.*, 2016). The results showed that the PHC showed good conditions for the coordination of the Health Care Networks (HCNs). However, the Health Care Networks (HCNs) lack an effective system for reference, lack of co-operative actions between the different health services and also the lack of definition of a single mission and target, related to the supply of, and actions within, health services. In South Africa, a study found that low rates of TB screening and testing by the health system resulted in missed TB patients, where clinic staff screened only 79.1% of participants seeking care for TB-related symptoms and 21.9% of those attending a clinic for other reasons (P < 0.001) (Kweza *et al.*, 2017).

In terms of Pillar One of the End TB strategy which is on patient-centred care and prevention, PHC should fit this role perfectly. This is because the fundamental clinical role of PHC in all countries is as the frontline of healthcare delivery system which emphasizes on patient-centeredness care. Being in the frontline of the health care system means that the population can obtain medical care at the preventive level, early diagnosis and early starting of treatment at PHC. In the context of TB being in the frontline and giving patient-centred care can ensure early detection and treatment of TB patients. In fact, the operational definition of PHC as elaborated in the introduction section includes four main elements which are accessibility to first contact care as necessary, continuous care for long term health, comprehensive range of services appropriate and coordinated care to other specialist services as needed are extremely helpful in fulfilling the Pillar One of the End TB Strategy. Nonetheless, despite successes in TB management, several studies revealed that PHC itself poses some obstacles in realizing the SDG vision to end TB. These studies revealed that there was lack of quality of care in delivering the primary health care service, lack in accessibility appropriate treatment and also limited capacity in view of the resources of primary health care thus leading PHC to be a challenge in stopping TB instead. Lack of knowledge and training of the health care workers (HCW) in managing the patient and also the medical records would cause a poor outcome of

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quality of care as the HCW would not be able to detect, diagnose, handle and manage the TB patients properly hence resulting underreporting of actual data regarding TB trend of disease.

This review has several limitations. Apart from restricting the time frame that allows only quantitative studies limited to the related countries from 2008 to 2018, this study also excluded books and reports, studies involving multiple countries and studies reported in foreign languages. All existing studies conducted were in specific district localities and population thus may not be generalizable to the whole country.

4.0 Conclusion

As a conclusion, PHC is a promising tool for the 'End TB' strategy as PHC not only fulfils the criteria of the three pillars of the strategy but excels at Pillar One, by providing accessible, continuous comprehensive, and coordinated care. The service provision is better if the primary health care uses the community-based or home-based approaches. The core elements and role of PHC as the first contact with the population is the main force in achieving the SDGs generally and ending TB specifically.

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Author's declaration

The authors declare that this manuscript has never been published in any other journal.

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