Inequalities in Access to Tuberculosis Services in South Africa: Does Gender Matter?

Mina Haji (mina.haji@yahoo.com)
University of Cape Town Faculty of Health Sciences https://orcid.org/0000-0001-9388-8413

Susan Cleary
University of Cape Town Faculty of Health Sciences

Research

Keywords: South Africa, Tuberculosis, Healthcare access, Adherence, Gender

Posted Date: February 23rd, 2021

DOI: https://doi.org/10.21203/rs.3.rs-222720/v1

Inequalities in access to tuberculosis services in South Africa: Does gender matter?

Mina Haji[a*] and Susan Cleary[b]

[a, b] School of Public Health and Family Medicine, Health Economics Unit, University of Cape Town, Cape Town, South Africa

*corresponding author: Mina Haji. Address: Health Economics Unit, School of Public Health and Family Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, 7925, South Africa. E-mail: mina.haji@yahoo.com. Cell-phone: +2771746 2372

Inequalities in access to tuberculosis services in South Africa: Does gender matter?

Background: Tuberculosis (TB) remains the leading cause of death in South Africa. As an infectious respiratory disease, control of TB includes antibiotic treatment over a number of months in order to cure the disease and reduce transmission to others. The need to adhere to treatment over an extended period highlights the importance of reducing access barriers to TB services. While gender related access barriers have been identified as critical in the treatment and control of other conditions such as Human Immunodeficiency Virus (HIV), no quantitative analyses currently exist that assess the gender-related dimensions of access to TB services in South Africa.

Methods*:* This study aims to assess the gender-based differences in access to TB services in South Africa, from the perspective of TB patients. Using a comprehensive framework where access is defined as the opportunity to use services, we interviewed 1,229 TB patients using services in four provinces of South Africa. Comparisons of access barriers and adherence between men and women were examined using multivariate linear and logistic regressions.

Results*:* There was no significant association between levels of adherence and gender (all p-values>0.05). Among availability-related variables, men spent significantly less time at the clinic to fetch TB medication compared with women (coefficient, -7.06; 95% CI, [-13.5, -0.7]). Regarding affordability, men were significantly less likely to receive a disability grant (AOR, 0.48; 95% CI, [0.36, 0.63]). Concerning the acceptability dimension, men were less likely to report that queues to visit a healthcare provider were too long or the cleanliness of the facility to be sub-standard (AOR, 0.69; 95% CI, [0.52, 0.91], and AOR, 0.67; 95% CI, [0.46, 0.97], respectively).

Conclusions*:* Our findings indicate that there is no association between the level of adherence to TB treatment and gender. Moreover, there was no evidence of systematic gender-based inequalities in access to TB services. However, the findings reveal concerns about the condition

and cleanliness of health facilities that may impact the patients' adherence and be a barrier, specifically, in women's use of TB services.

***Key Words**:* South Africa; Tuberculosis; Healthcare access; Adherence; Gender

Introduction

As the leading cause of death in South Africa, treatment and control of tuberculosis (TB) is a critical public health challenge [1, 2]. In 2018, there were an estimated 301,000 new cases, at a rate of 520 per 100,000 population, of which 111,000 cases were among women, 163,000 were among men and 27,000 cases were among children. During that same year, the country experienced 64,000 deaths from TB [3]. While TB-related mortality decreased by 21% between 2013 and 2015, the rate of decrease is too slow to meet the targets contained in the 2030 Sustainable Development Goals (SDGs) or the 2035 End TB Strategy [4]. Inferring from World Health Organization (WHO) estimates, South African TB incidence would need to decrease to less than 167 cases per 100,000 population, and mortality to 9,800 per year in order to meet these targets [5].

While South Africa's burden of TB has a long history, since the mid-1990s the control of TB has been exacerbated by the high prevalence of Human Immunodeficiency Virus (HIV) - where HIV-positive people are at a higher risk of developing active TB [4]. More recently, the emergence of various strains of drug-resistant TB has further emphasized the urgency of mounting an adequate response to TB control [6]. Reducing access barriers to TB treatment is crucial if we are to reduce morbidity and mortality, control the transmission of TB and prevent the emergence of drug resistant strains [7, 8].

In South Africa, the majority of TB treatment is delivered via an extensive network of public primary healthcare facilities where services, including for TB treatment, are free at the point of use. Since 1996, the government's approach to treatment has been based on the World Health

Organization's Directly Observed Treatment, Short-Course strategy (DOTS) [6, 9, 10]. Care and treatment for TB includes the administration of antibiotics over an extended period of time (generally 6-9 months) with frequent laboratory investigations in order to monitor treatment success. The 'directly observed' aspect of DOTS is also of relevance. In some South African settings, patients are required to visit health facilities on a daily basis to be observed taking their treatment, while in other settings patients are required to attend facilities on a weekly or monthly basis. While daily observation is intended to improve treatment success, research indicates that daily clinic-based DOTS may have poor outcomes, as proxied by self-reported adherence to care [8]. Moreover, in an assessment of the affordability of key health services in South Africa, the monthly out of pocket costs for TB care were higher than for HIV care, with a third of TB patients incurring costs higher than 10% of per capita household expenditure [11]. While South African research has therefore unpacked some of the access barriers to TB services, a number of gaps in the literature remain, including with reference to some of the key social determinants of health, such as gender.

Gender-related barriers to care have been identified as important across a range of conditions and settings, where 'gender' can be understood to comprise the cultural, behavioral and social norms that determine a person's identity [12-14]. Although the social construct of gender may give men substantial control over assets, power, and authority, it can damage men's overall health and health seeking behavior [12]. For example, in research documenting access barriers to primary healthcare services for HIV/AIDS in South Africa, men were found to access HIV testing later and to be less likely to disclose their HIV-positive. However, once they had gained entry to the HIV-treatment service, men reported similar if not better accessibility than women. The researchers concluded that these inequalities in access seemed to be more related to gender norms than to health system factors [15]. However, while men comprise close to 60% of those with TB in South Africa, systematic evaluations of access barriers by gender remain a key research gap [3, 16].

82 The aim of this study is therefore to document the access barriers to TB services from the
83 perspective of 1,229 users of TB services interviewed within 30 public primary healthcare
84 facilities. We define access as the 'degree of fit' between population needs and health system
85 responses along the dimensions of availability, affordability and acceptability [17].

86 **Methods**

87 ***Conceptual framework of access***

88 Following the literature [17, 18] access can be understood as a multidimensional phenomenon
89 associated with the capacity or opportunity to use health services. For the purposes of this study,
90 factors that might limit this opportunity to use services (i.e. act as access barriers) have been
91 explored through the collection of data corresponding to three key dimensions of access.
92 Availability (or geographical access) variables include travel time to reach the TB facility, the mode
93 of travel and the waiting time at the facility. Affordability (or financial access) variables include
94 receipt of a government chronic care (disability) grant, borrowing money to assist with health-
95 related costs as well as a range of variables associated with out of pocket payments made while
96 seeking care. While public sector TB treatment is free at the point of use, out of pocket payments
97 could include expenditure incurred while visiting the TB facility (e.g. travel costs), user fees
98 incurred seeking healthcare at private facilities, as well as any other out of pocket expenditure on
99 special foods, traditional healers or medicines. These costs were expressed on a monthly basis
100 and were compared to the respondent's reported monthly per capita household expenditure.
101 Catastrophic healthcare expenditure was computed as expenditure on healthcare exceeding 10%
102 of per capita household expenditure. Finally, for the dimension of acceptability (or cultural
103 access), participants were asked to report their perceptions of staff attitudes (proxied by questions
104 regarding whether they felt respected by staff and whether the staff were too busy to answer their
105 questions), the length of queues, cleanliness of waiting areas and toilets, and stigma (proxied by
106 whether the participant felt that people in the community judge them negatively for attending the

107 TB facility for their treatment). While each dimension is specific and concentrates on distinct
108 variables, it is the interlinkages between dimensions that influence access [17]. Following
109 Braveman and Gruskin [19], inequities in access emerge if access barriers are systematically
110 different for individuals with distinct levels of social advantage, including with respect to their
111 gender [19].
112

113 ***Study setting & sampling***

114 This study relies on data drawn from the Researching Equity in Access to Healthcare (REACH)
115 project, a study of health system access in South Africa conducted between May 2007 and April
116 2012. Four sub-districts were purposively selected for the study through consultation with key
117 officials in the national and provincial health departments [20]. These sub-districts belonged to
118 four provinces representing two rural settings (Bushbuckridge in Mpumalanga Province and
119 Hlabisa in KwaZulu-Natal) as well as two urban settings (Mitchells Plain in the Cape Metropole,
120 Western Cape Province; and Soweto in the City of Johannesburg, Gauteng Province).

121 In each sub-district, two-stage sampling was used: firstly, we selected a representative sample of
122 public primary healthcare facilities, and secondly we selected a representative sample of TB users
123 within chosen facilities [20]. Since most public primary healthcare facilities in the country provide
124 TB services, a minimum of five facilities was selected in each sub-district using the probability
125 proportional to size (PPS) method, based upon the total number of TB users in each facility.
126 Thereafter, a random sample of patients was interviewed until the proposed facility sample size
127 was met. Respondents were eligible if they were over the age of 18, were judged by clinical staff
128 to be sufficiently well to be interviewed and had been on TB treatment for at least eight weeks.
129 After obtaining informed consent from participants in the study, the interview was conducted by
130 trained fieldworkers in the language of the respondent's choice using a purpose-built exit
131 interview-style questionnaire. Both questionnaires and consent forms were translated into all

relevant languages. In this way, we collected socioeconomic and demographic data (including gender, education, employment and marital/partnership status); data regarding the individual's housing characteristics (including type of house, toilet facility, water supply, source of energy for cooking) and household assets (including fridge, stove, television, bicycle, motorcar); an estimate of monthly household expenditure; as well as data regarding each dimension of access as described above. Finally, in order to assess adherence, two intermediate self-reported proxy variables were used. These included having ever missed a TB clinic visit or having ever missed a dose of TB medication.

Data analysis

Data were analysed using Stata/IC 15.0. A composite asset index was computed via a multiple correspondence analysis on housing characteristics and household assets [21, 22]. Fisher's exact or Mantel-Haenszel chi-square tests were used to compare the association between categorical variables while associations between continues variables were assessed using the Mann–Whitney *U* test (for medians) and Student's t-test (for means). A p-value less than 0.05 was accepted as statistically significant. Multivariate logistic and linear regressions were run in order to test for differences in access barriers by gender after controlling for age, socioeconomic status (asset index), level of education, employment status and sub-district setting. In this way, we focus on gender-related inequalities in access while holding the other measures of social (dis)advantage constant.

Results

Study sample characteristics

A representative sample of 1229 TB patients was interviewed within 30 TB facilities across the four settings (approximately 300 participants per setting). Table 1 documents the socioeconomic, demographic, and service-related characteristics of the study participants, stratified by gender.

156 **Table 1** Characteristics of TB users, in total and by gender.

	All respondents (n=1229)	Men (n=586; 47.7%)	Women (n=643; 52.3%)	p-value*
Variables:				
Mean (median) age in years	37.4 (36)	40.1 (38)	34.9 (33)	<0.001
Married / living with partner (%) (vs single)	25.8	36.7	15.9	<0.001
Respondent employed (%)	16.5	20.3	13.1	0.001
Mean (median) years of schooling	7.9 (9)	7.4 (8)	8.4 (10)	<0.001
Urban setting (%)	51.3	52.7	50.1	0.353
Receiving a disability grant (%)	73.7	66.7	80.1	<0.001
Asset index (% in poorest half)	50.0	49.0	51.0	0.476
African/black (%) (vs colored and white)	94.8	93.9	95.7	0.159
New TB patients (%) (vs re-treatment)	96.9	96.1	97. 7	0.107
Clinic DOTS# (%) (vs others)	33.4	34.6	32.4	0.699
Never missed TB doses or visits (%)	82.0	81.6	82.4	0.696
Never missed TB doses (%)	85.4	84.8	86.0	0.554
Never missed TB visits (%)	86.6	86.2	86.9	0.697

157 *p-values computed using Wilcoxon-Mann-Whitney test for quantitative data; chi-squared goodness of fit test for binary data.
158 # Clinic DOTS is defined as the observed administration of TB medication on a daily basis at the primary healthcare facility.

159 Approximately equal numbers of men and women were interviewed, and, as per the design of the
160 study, approximately half were living in an urban setting. As is shown, women reported a higher
161 number of years in school and more women reported receiving the government's disability
162 (chronic care) grant. In contrast, more men reported that they were employed, as well as married
163 or living with a partner. There was no significant difference in the asset index, with men and
164 women having similar asset-based socioeconomic status. Since the study sample is based on
165 patients who attended primary healthcare facilities and who were well enough to participate, those
166 with more severe illness were less likely to be included. As such, the majority of participants
167 reported that this was the first time they were treated for TB. Concerning the type of DOTS, nearly
168 one-third of respondents reported daily observed therapy at clinics (clinic DOTS) with the
169 remainder reporting weekly or even monthly clinic attendance. Self-reported adherence was high,
170 with 82% reporting that they had never missed TB visits or doses of medication, including 81.6%
171 of men and 82.4% of women.

172 ***Inequalities in access to TB treatment by gender***

173 Table 2 presents the results of the bivariate and multivariate analyses on inequalities in each
174 access variable by gender. The results of multivariate regressions are presented as coefficients

175 or adjusted odds ratio (AOR). Considering women as the referent, these results summarise
176 differences between men and women respondents across each dependent access variable, after
177 controlling for age, SES (asset index), level of education, employment status, and setting.

178 **Table 2** Access and adherence, by gender (Controlling for age, SES (asset index), education, employment
179 status, and site).

	Bivariate analysis				Multivariate analysis		
	All respondents (n=1229)	Men (n=586; 47.7%)	Women (n=643; 52.3%)	p-value	AOR or estimated regression coefficient	p-value	95% confidence interval
Availability							
Mean travelling time to the clinic (minutes)	35.5	34.5	36.4	0.012	`-1.70	0.340	(-5.22, 1.81)
Transport by foot (%)	56.6	57.4	55.9	0.592	1.04	0.733	(0.81, 1.34)
Mean waiting time at clinic for doctor/nurse visit (minutes)	83.6	77.2	89.5	0.002	-10.7	0.059	(-22.01, 0.42)
Mean waiting time at clinic to collect TB medication (minutes)	34.7	31.6	37.6	0.333	-7.06	0.029	(-13.54, -0.70)
Respondent receives clinic daily DOTs as service delivery model (%)	33.5	34.7	32.4	0.393	1.38	0.128	(0.91, 2.10)
Affordability							
Respondent receives disability (chronic care) grant (%)	73.7	66.7	80.1	<0.001	0.48	<0.001	(0.36, 0.63)
Expenditure on self-care in past month (ZAR) (mean)	30.7	33.3	28.4	0.892	0.09	0.347	(-0.10, 0.29)
Expenditure to reach and during TB facility visits in past month (ZAR) (mean)	42.4	38.5	46.0	0.102	-0.11	0.305	(-0.33, 0.10)
Total expenditure on healthcare in past month (ZAR) (mean)	99.8	98.8	100.7	0.305	-0.01	0.875	(-0.26, 0.22)
Households incurring healthcare costs >10% of household expenditure (%)	33.0	31.9	34.0	0.468	0.93	0.652	(0.71, 1.23)
Respondent borrowed money to pay for healthcare in the past month (%)	18.6	17.6	19.6	0.364	0.87	0.422	(0.63, 1.20)
Acceptability							
Respondent agrees that queues are too long (%)	28.0	23.9	31.8	0.002	0.69	0.009	(0.52, 0.91)
Respondent agrees that some staff do not treat patients with sufficient respect (%)	19.1	17.1	20.9	0.095	0.90	0.535	(0.67, 1.22)
Respondent agrees that the healthcare facility is dirty (%)	11.1	9.6	14.0	0.017	0.67	0.033	(0.46, 0.97)
Respondent feels that people in the community judge him/her negatively for attending the TB facility (%)	13.1	12.5	13.7	0.524	0.97	0.877	(0.68, 1.38)
Respondent reports that health worker was too busy to answer their questions (%)	11.0	10.8	11.2	0.811	0.96	0.857	(0.66, 1.40)
Adherence							
Missed doses and missed visits (%)	18.0	18.4	17.6	0.696	1.18	0.287	(0.86, 1.62)
Missed visits (%)	13.4	13.8	13.0	0.697	1.20	0.296	(0.84, 1.75)
Missed doses (%)	14.6	15.2	14.0	0.554	1.20	0.195	(0.90, 1.76)

180 Concerning availability, at the multivariate level, women participants on average spent
181 significantly longer time at the clinic to collect their TB medication compared with men. On

182 affordability, women were more likely to receive a disability grant compared with men. Regarding
183 acceptability, a higher percentage of women felt that queues were too long and that the health
184 facilities were dirty compared to men. Being negatively judged as the result of attending TB clinics
185 is used as a proxy for stigma in this study. Findings showed that a slightly higher percentage of
186 women (13.7%) reported that they felt that they had been judged for their TB status, when
187 compared with men participants (12.5%); however, the association was not statistically significant.
188 As illustrated in Table 2, the multivariate analysis reveals that there is no statistically significant
189 difference in adherence by gender. In Table 3 we further unpack this finding by presenting a sub-
190 group analysis where respondents are grouped as adherent (no missed doses or visits); as
191 missing visits; or as missing doses.

192 **Table 3** Access and gender, at different adherence levels.

	Respondents reporting adherence to visits and doses (n=1008; 82%)			Respondents reporting missed visits (n=165; 13.4%)			Respondents reporting missed doses* (n=179; 14.6%)		
	Men	Women	p-value	Men	Women	p-value	Men	Women	p-value
Availability									
Mean travelling time to the clinic (minutes)	36.0	37.4	0.043	24.0	27.4	0.064	29.2	31.8	0.221
Transport by foot (%)	55.1	53.4	0.580	74.0	65.5	0.230	64.0	70.8	0.337
Mean waiting time at clinic for doctor/nurse visit (minutes)	79.5	89.2	0.016	61.6	91.3	0.012	72.6	93.0	0.063
Mean waiting time at clinic to collect TB medication (minutes)	34.0	40.3	0.366	17.8	23.4	0.845	22.5	24.3	0.771
Affordability									
Respondent receives disability (chronic care) grant (%)	68.0	80.6	<0.001	60.5	79.8	0.007	60.7	76.7	0.021
Expenditure on self-care in past month (ZAR) (mean)	35.6	31.7	0.690	3.9	5.7	0.423	27.6	13.3	0.171
Expenditure to reach and during TB facility visits in past month (ZAR) (mean)	40.3	44.5	0.087	32.1	65.7	0.292	33.8	51.2	0.426
Total expenditure on healthcare in past month (ZAR) (mean)	105.7	103. 6	0.529	44.3	100.2	0.031	77.3	78.0	0.830
Households incurring healthcare costs >10% of household expenditure (%)	33.5	35.3	0.561	22.4	31.7	0.211	26.1	25.3	0.920
Respondent borrowed money to pay for healthcare in the past month (%)	18.6	80.6	0.742	8.6	21.4	0.022	14.6	17.8	0.565
Acceptability									
Respondent agrees that queues are too long (%)	23.2	30.4	0.011	29.6	38.6	0.228	28.1	38.2	0.152
Respondent agrees that some staff do not treat patients with sufficient respect (%)	16.0	20.8	0.049	17.3	19.1	0.769	23.6	17.8	0.337
Respondent agrees that the healthcare facility is dirty (%)	8.8	13.2	0.027	12.4	20.2	0.171	12.4	15.6	0.537
Respondent feels that people in the community judge him/her negatively for attending the TB facility (%)	12.6	13.6	0.627	13.6	11.9	0.747	11.2	14.4	0.521

193 * 123 participants (approximately 10%) reported both missed visits and missed doses.

194 For each sub-group, we present a bivariate analysis of the association between each access
195 variable and gender. Overall, 82% (1008) of participants met the criteria for adherence. Of those
196 classified as non-adherent, 13.4% (165) reported missed visits and 14.6% (179) reported missed
197 doses. In terms of availability, among those who were adherent to TB treatment, the mean
198 travelling time and the mean waiting time for a doctor/nurse visit reported by women was
199 significantly higher than men. Similarly, among participants who reported missed visits, mean
200 waiting time for women was significantly higher. In terms of affordability women were significantly
201 more likely than men to report receipt of a disability grant across all subgroups, while women
202 reporting missed visits recorded significantly higher expenditure on healthcare as well as the need
203 to borrow money to cover healthcare costs. In terms of acceptability, in adherent respondents,
204 relatively more women reported that the queues were too long; that some staff don't treat patients
205 with sufficient respect; and that the healthcare facility was dirty. There were no significant
206 differences in acceptability for non-adherent respondents by gender.

207 **Discussion**

208 This study has assessed inequalities in access to TB services from the perspective of 1,229
209 participants interviewed in 30 facilities within two rural and two urban health sub-districts in South
210 Africa. Gender-based differences in access barriers were appraised after controlling for
211 differences in age, socioeconomic status (asset index), level of education, employment status,
212 and study site.

213 Before interpreting the results, it is important to mention the limitations of this study. First, this
214 analysis is based on the experiences of participants who have gained entrance to primary
215 healthcare facilities, who are well enough to be interviewed, and have been using TB treatment
216 for a minimum of eight weeks. The results of our study are therefore not applicable to those facing
217 barriers to diagnosis or who have never gained entrance to services; indeed, using a longitudinal
218 approach, Foster et al [23] found that the greatest affordability related barriers to TB treatment

219 were experienced in the period between developing symptoms and starting treatment, which by
220 definition is a period that is excluded from our study [23]. In addition, re-treatment patients and
221 those with drug-resistant forms of TB are less likely to have been part of our study given the
222 restriction that all patients included were judged to be well enough to participate. Our results are
223 therefore most applicable to understanding access barriers from the perspective of those using
224 drug susceptible TB treatment. Second, adherence is assessed through patient reports of missed
225 treatment doses and clinic visits. There is debate in the literature regarding whether
226 measurements of adherence to treatment should be outcome-oriented (using the final results of
227 treatment as an index to measure success) or process-oriented (using intermediate variables to
228 measure adherence) [24]. In this analysis, the level of adherence is assessed through a process-
229 oriented approach based on patient self-reports. Consequently, there is a potential for recall and
230 reporting biases that may have over-estimated the level of adherence. Third, despite the
231 conceptual importance of evaluating both health worker and patient perspectives on access
232 barriers to health services, this study is based on patient's views and health worker perspectives
233 are not captured. Fourth, access barriers are likely to be context specific, hence results from the
234 four included settings may not be generalizable to other countries or to the rest of South Africa.
235 Finally, while the dataset used for this analysis is relatively old, it remains the only South African
236 dataset with a rich array of socioeconomic and access variables. That said, a key limitation to the
237 use of these data include a number of changes to the TB treatment guidelines in the intervening
238 period. These include the introduction of a new diagnostic test (Xpert MTB/RIF) as well as new
239 second-line regimens [6]. Because this study focused on users of TB services as opposed to
240 those seeking diagnosis, the change in diagnostic should not influence our findings; however, the
241 addition of new second-line regimens may improve adherence to treatment in retreatment
242 patients.
243 To our knowledge, this is the first study to present a quantitative exploration of inequalities in
244 access to TB services in South Africa comparing the experiences of men versus women.

245 Following the literature, access to TB services can have gender dimensions given that the social
246 context can affect care-seeking behaviour, vulnerability to infection as well as treatment
247 adherence [25]. While our study did find some significant differences in access barriers by gender,
248 the majority of the access variables were perceived to be similar by men and women respondents.
249 With regards to the availability dimension of access, a key difference between men and women
250 was the waiting time at the clinic to fetch TB medication. In contrast, the findings of a systematic
251 review on gender-related barriers and delays in accessing TB services showed that both men and
252 women reported long waiting time as a barrier [26]. Considering the affordability dimension of
253 access, the only detected difference was receiving the disability grant where women reported
254 better access to the grant. This grant was available to patients who were unfit to work as a result
255 of illness and who had an annual income below R29 112 for single people or R58 224 for married
256 people, at the time of primary data collection for the REACH project [27]. Based on the descriptive
257 analysis of our study, a higher proportion of women were single and unemployed and therefore
258 might face financial barriers to accessing TB services. In this way, we can argue that receipt of
259 the disability grant may be protective against inequities in access. Similar results were found in a
260 review of the literature where a number of studies documented that women experienced higher
261 financial barriers to seeking TB service than men particularly because they were more likely to be
262 unemployed and financially dependent on their family members [28]. Finally, findings concerning
263 the acceptability dimension of access in our study show that there were differences between
264 women and men in their perception of cleanliness of facilities as well as length of queues.

265 Our findings therefore suggest varied experiences of access barriers on the part of men and
266 women. Govender reported [29] on qualitative research into the role of gender in patient-provider
267 trust for TB services in South Africa, and found that gender is an important source of vulnerability
268 for both men and women, with manifestations of gender being displayed in access to resources
269 (e.g. employment, disability grant) and social roles (e.g. social support) amongst others. The

author argues that accommodation for these gender aspects would include improved outreach services in order to address the opportunity cost of women's time (e.g. in domestic work and income generation) and men's time (e.g. in income generation) and to reduce transport and time costs which are important to all participants. Within primary healthcare facilities, the author similarly recommends additional flexibility regarding appointment times and opening hours in order to mitigate against barriers introduced through gender roles [29]. Our research strongly supports these recommendations.

Conclusion

This analysis has documented inequalities in access to TB treatment by gender. Results indicate a number of differences between the way that men and women perceive and experience TB services. Women's higher receipt of the disability grant might be one way that services have been able to mitigate some of the financial barriers to access that women might face. However, the findings of this analysis reveal concerns about longer waiting time at facilities for women participants as well as the condition and cleanliness of health facilities, which also may be more of a barrier for women. Future qualitative research should further unpack the implications of these findings from a gender perspective.

List of abbreviations

AIDS: Acquired Immunodeficiency Syndrome**; AOR:** Adjusted Odd Ratio**; CI:** Confidence Interval**; DOTS:** Directly Observed Treatment Short-course; **HIV:** Human Immunodeficiency Virus**; HIV/AIDS:** Human Immunodeficiency Virus Infection and Acquired Immune Deficiency Syndrome**; PPS:** Probability Proportional to Size**; REACH:** Researching Equity in Access to Health Care**; SANAC:** South African National Aids Council**; SDGs:** Sustainable Development Goals**; SES:** Socio-Economic Status**; TB:** Tuberculosis**; WHO:** World Health Organization**.**

Declarations

Ethics approval and consent to participate

This study was a substudy of the REACH project. Ethical approval for the initial study was obtained from committees at the Universities of KwaZulu-Natal, Cape Town and Witwatersrand and permission to conduct the research was acquired from provincial and local health authorities. The approval for the ethical clearance has been granted by the University of Cape Town (REC REF 460/2006) to Professor Di McIntyre, one of the principal investigators of the REACH project. Further approval for the analysis presented in this paper was obtained from the University of Cape Town Human Research Ethics Committee (ethical clearance Number: HREC REF: 756/2018).

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from Centre of Health Policy, School of Public Health at University of Witwatersrand as REACH Database, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available and the request could be addressed to Dr. Susan Cleary who is one of co-investigators of REACH Project and the co-author of this research article. Her email address is: susan.cleary@uct.ac.za.

Competing interests

The authors declare that they have no competing interests.

Funding

The REACH project was carried out with support from the Global Health Research Initiative, a collaborative research funding partnership of the Canadian Institutes of Health Research, the Canadian International Development Agency, Health Canada, the International Development

Research Centre, and the Public Health Agency of Canada (103460-054). However, the funders were not involved in study design or data collection and they do not necessarily share the views expressed in this paper.

Authors' contributions

MH is the main investigator for this study. SC and MH both contributed in general design of this paper as well as in analysis and interpretation of quantitative data. SC assisted MH in overall writing. Both authors read and approved the final manuscript.

Acknowledgements

The dataset for this paper was collected as part of the REACH project. REACH was carried out with support from the Global Health Research Initiative, a collaborative research funding partnership of the Canadian Institutes of Health Research, the Canadian International Development Agency, the International Development Research Centre and the Public Health Agency of Canada, Health Canada. We would like to thank the REACH team, the patients, as well as the health workers who agreed to be involved in this project.

References

1. Statistics South Africa. Mortality and causes of death in South Africa, 2015: Findings from death notification. In: Statistical release. Pretoria. 2017. https://www.statssa.gov.za/publications/P03093/P030932015.pdf. Accessed 10 Nov 2019.

2. SANAC. Let our actions count: South Africa's national strategic plan for HIV, TB and STIs 2017-2022. The South African National AIDS Council. 2017. https://sanac.org.za/wp-content/uploads/2017/06/NSP_FullDocument_FINAL.pdf. Accessed 8 Nov 2019.

3. World Health Organization: Global Tuberculosis Report 2019. https://apps.who.int/iris/bitstream/handle/10665/329368/9789241565714-eng.pdf?ua=1 (2019). Accessed 15 Dec 2019.

4. World Health Organization: Global Tuberculosis Report 2017: Leave no one behind - Unite to end TB. https://www.who.int/tb/publications/global_report/gtbr2017_main_text.pdf (2017). Accessed 10 Dec 2019.

5. Naidoo P, Theron G, Rangaka MX, Chihota VN, Vaughan L, Brey ZO, Pillay Y. The South African tuberculosis care cascade: estimated losses and methodological challenges. The Journal of infectious diseases. 2017 Nov 6;216(suppl_7):S702-13.

6. Moshabela M, Black J, Mlisana K, Jassat W, Nicol M, Dickson-Hall L, Loveday M, Grant A, Cox H, Vanleeuw L, Kielmann K. Drug-resistant tuberculosis in South Africa: history, progress and opportunities for achieving universal access to diagnosis and effective treatment. South African Health Review. 2017 Dec 1;2017(1):157-67.

7. Sabaté E, Sabaté E, editors. Adherence to long-term therapies: evidence for action. World Health Organization; 2003.

8. Birch S, Govender V, Fried J, Eyles J, Daries V, Moshabela M, Cleary S. Does treatment collection and observation each day keep the patient away? An analysis of the determinants of adherence among patients with Tuberculosis in South Africa. Health policy and planning. 2016 May 1;31(4):454-61.

9. South African National Department of Health. National Tuberculosis Management Guidelines 2008. 2008. https://www.who.int/hiv/pub/guidelines/south_africa_tb.pdf. Accessed 9 Oct 2019.

10. Lawn SD, Zumla AI. Tuberculosis Lancet. 2011; 378 (9785): 57–72. PubMed Article.

11. Cleary S, Birch S, Chimbindi N, Silal S, McIntyre D. Investigating the affordability of key health services in South Africa. Social science & medicine. 2013 Mar 1;80:37-46.

12. Sen G, Östlin P. Unequal, Unfair, Ineffective and Inefficient Gender Inequity in Health: Why it exists and how we can change it. Women and Gender Equity Knowledge Network. 2008. http://repositorio.cedes.org/bitstream/123456789/4019/1/wgekn_final_report_07.pdf. Accessed 9 Nov 2019.

13. Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P. WHO European review of social determinants of health and the health divide. The Lancet. 2012 Sep 15;380(9846):1011-29.

14. Clayton JA, Tannenbaum C. Reporting sex, gender, or both in clinical research?. Jama. 2016 Nov 8;316(18):1863-4.

15. Schneider H, Govender V, Harris B, Cleary S, Moshabela M, Birch S. Gender differences in experiences of ART services in South Africa: a mixed methods study. Tropical Medicine & International Health. 2012 Jul;17(7):820-6.

16. Vissandjee B, Mourid A, Greenaway CA, Short WE, Proctor JA. Searching for sex-and gender-sensitive tuberculosis research in public health: finding a needle in a haystack. International journal of women's health. 2016;8:731.

17. McIntyre DI, Thiede M, Birch S. Access as a policy-relevant concept in low-and middle-income countries. Health Econ. Pol'y & L.. 2009;4:179.

18. Mooney G. Is it not time for health economists to rethink equity and access. Health Econ. Pol'y & L.. 2009;4:209.

380 19. Braveman P, Gruskin S. Defining equity in health. Journal of Epidemiology & Community
381 Health. 2003 Apr 1;57(4):254-8.

382 20. Schneider H, McIntyre D, Birch S, Eyles J. Researching Equity in Access to Health Care
383 (REACH): Final technical report. Centre for Health Policy/RADAR, School of Public Health,
384 Faculty of Health Sciences, University of the Witwatersrand, Health Economics Unit, School of
385 Public Health and Family Medicine, Health Sciences Faculty, University of Cape Town, McMaster
386 University, African Centre for Health and Population Studies, University of KwaZulu-Natal, School
387 of Public Health, University of the Western Cape; 2012. Report No.: 103460-054.

388 21. Frikkie Booysen S. van der B. Using an asset index to assess trends in poverty in seven sub-
389 saharan african countries. World Dev. 2008;36:1113-30.

390 22. Cleary SM, Birch S, Moshabela M, Schneider H. Unequal access to ART: exploratory results
391 from rural and urban case studies of ART use. Sexually transmitted infections. 2012 Mar
392 1;88(2):141-6.

393 23. Foster N, Vassall A, Cleary S, Cunnama L, Churchyard G, Sinanovic E. The economic burden
394 of TB diagnosis and treatment in South Africa. Social science & medicine. 2015 Apr 1;130:42-50.

395 24. Van Den Boogaard, J., Boeree, M.J., Kibiki, G.S. and Aarnoutse, R.E., 2011. The complexity
396 of the adherence-response relationship in tuberculosis treatment: why are we still in the dark and
397 how can we get out?. Tropical medicine & international health, 16(6), pp.693-698.

398 25. van den Hof S, Najlis CA, Bloss E, Straetemans M. A systematic review on the role of gender
399 in tuberculosis control. Report prepared for Tuberculosis Control Programme (TB CAP)
400 September. 2010 Sep.

401 26. Krishnan L, Akande T, Shankar AV, McIntire KN, Gounder CR, Gupta A, Yang WT. Gender-
402 related barriers and delays in accessing tuberculosis diagnostic and treatment services: a
403 systematic review of qualitative studies. Tuberculosis research and treatment. 2014 Jan 1;2014.

404 27. Govender V, Fried J, Birch S, Chimbindi N, Cleary S. Disability Grant: a precarious lifeline for
405 HIV/AIDS patients in South Africa. BMC health services research. 2015 Dec;15(1):1-0.

406 28. Yang WT, Gounder CR, Akande T, De Neve JW, McIntire KN, Chandrasekhar A, de Lima
407 Pereira A, Gummadi N, Samanta S, Gupta A. Barriers and delays in tuberculosis diagnosis and
408 treatment services: does gender matter?. Tuberculosis research and treatment. 2014 Jan 1;2014.

409 29. Govender V. The role of gender in patient-provider trust for tuberculosis treatment
410 [dissertation on the Internet]. University of Cape Town; 2017. Available from:
411 https://open.uct.ac.za/bitstream/handle/11427/27432/thesis_hsf_2017_govender_veloshnee.pdf
412 ?isAllowed=y&sequence=1.