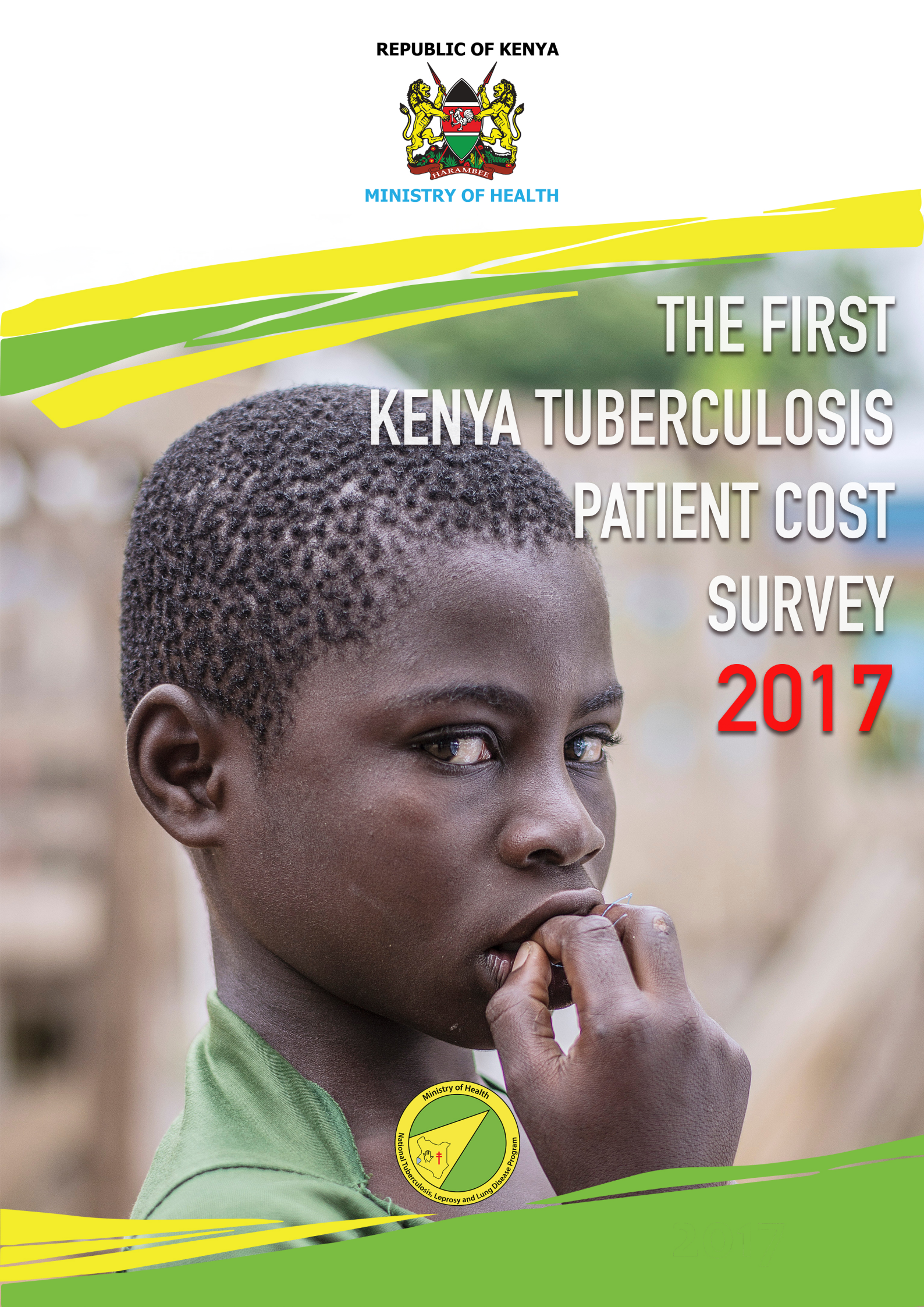
REPUBLIC OF KENYA

MINISTRY OF HEALTH

THE FIRST KENYA TUBERCULOSIS PATIENT COST SURVEY 2017



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ACKNOWLEDGEMENTS

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Dr Kamene Kimenye
Head, NTLD-Program
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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
CAPI	Computer Assisted Personalized Interviewing
CHS	Centre for Health Solutions - Kenya
CHW	Community Health Worker
CSO	Civil Society Organization
CTLC	County Tuberculosis and Leprosy Coordinator
DM	Diabetes Mellitus
DOT	Directly Observed Therapy
DR-TB	Drug Resistant Tuberculosis
DS-TB	Drug Sensitive Tuberculosis
EAC	East African Community
HIV	Human Immunodeficiency Virus
KANCO	Kenya AIDS NGOs Consortium
KDHS	Kenya Demographic and Health Survey
KEMRI	Kenya Medical Research Institute
MDRTB	Multi Drug Resistant Tuberculosis
MTB	Mycobacterium Tuberculosis
NGO	Non-Governmental Organization
NHIF	National Health Insurance Fund
NTLD - Program	National Tuberculosis, Leprosy and Lung Disease Program
NTP	National Tuberculosis Programme
OOP	Out-of-pocket
PI	Principal Investigator
PMM	Predictive Mean Matching
RR	Rifampicin Resistant
SCTLC	Sub-County Tuberculosis and Leprosy Coordinator
SDG	Sustainable Development Goals
TB	Tuberculosis
TB CAB	Global TB Community Advisory Board
UHC	Universal Health Coverage
WHO	World Health Organizations
XML	Extensive Makeup Language

GLOSSARY FOR TERMS USED IN THIS SURVEY

Catastrophic total costs due to TB: Total costs borne by patients in tuberculosis treatment, exceeding a given threshold (e.g. 20%) of the household's annual pre-TB income. The focus is on financial and economic hardship due to direct and indirect costs when accessing health care for TB, which may adversely affect living standards and the capacity to pay for basic needs. The percentage of TB patients (and their households) treated in the NTP network, that incur catastrophic total costs due to TB is one of the three top indicators of the End TB strategy [(1)].

Catastrophic health expenditure: Out-of-pocket payments for health care (for all illnesses, diseases, injuries for all members of the household), exceeding a given fraction (e.g. 25%) of a household's total household expenditure or income. Beyond the threshold (e.g. 25%), spending on health is considered disproportionate. The focus is on financial hardship due to direct out-of-pocket payments when using health services from any type of provider that may adversely affect living standards and capacity to pay for basic needs [(2)]. The proportion of the population with large household expenditure on health as a share of the total household expenditure or income (e.g. greater than 20%) is a measure of financial protection, a key dimension of universal health coverage monitored through Sustainable Development Goal (SDG) indicator 3.8.2, "Lack of financial protection" [(2)]

Direct costs: Out-of-pocket payment for direct medical costs associated with TB care (e.g. doctor's fee, hospitalization, radiology, laboratory procedures etc)

Direct non-healthcare costs: Out-of-pocket payment associated with travel, food bought in relation to travelling to the health care visit, and during visit or hospitalization, patient and household member (e.g. if meals at the hospital are not provided), accommodation and any other expenses incurred in the course of seeking TB diagnosis and treatment.

Indirect costs of seeking TB treatment: Productivity and economic costs of a patient or household incurred as a result of TB health care seeking and hospitalization, during the TB episode. Indirect costs are estimated using two alternative methods: a) self-reported household income loss net of welfare payments (net effect of income change pre as compared to during the TB episode) and b) total period of absence (in hours) multiplied by hourly wage rate of the absent worker. For the latter method (b) several options will be explored in the sensitivity analysis, for the choice of hourly wage rate used.

Household consumption expenditure: Estimated amounts of money spent on consumption activities by the household in the last 12 months before the survey. This is estimated from reported last week's consumption of foods and beverages, last month's expenditure on rent, utilities and household consumables, and last 12 months' expenditure on education, household repairs, household assets and other major expenditure areas.

Household income (before and during the TB episode): Reported amount of money received by the household in the year before and the year during TB episode, respectively, in exchange for labour or services, from the sale of goods or property, or as a profit from financial investments and welfare payments. Alternatively, annual household income estimated based on asset ownership. The indicator of catastrophic total costs (approach 1 – see definition) uses in the denominator, the household income earned before the TB episode, net of welfare payments.

Out-of-pocket payment for health care (medical): Direct payment made to health-care providers by individuals at the time of service use, i.e. excluding prepayment for health services – for example in the form of taxes or specific insurance premiums or contributions – and, where possible, net of any reimbursements to the individual who made the payments. OOP payment (including gratuities and payments in-kind) includes payment to formal medical professionals, informal traditional or alternative practitioners, clinics, health centres, pharmacies and hospitals for medical services and products such as consultations, diagnosis, treatment and medicine [(2)].

Out-of-pocket payment for TB care: Out-of-pocket payments for TB treatment (e.g. consultation fee, drugs, diagnosis, hospitalization etc)

Out-of-pocket payment, non-medical: Out-of-pocket payments made by patient or guardian related to the use of TB health services, such as payments for transportation, accommodation, food etc.

Out-of-pocket payment net: Total out-of-pocket payment (medical and non-medical) minus any reimbursement received for payments made is a net payment.

Public health facilities: Government health facilities and faith based health organizations that are non-profit.

TB episode.: The period of time from self-reported onset of TB-related symptoms until end of treatment or death.

Travel costs: Total payments (including return trip) by the patient for travel to the facility. Travel costs are part of direct non-medical payments for TB treatment.

Welfare payments: Refers to paid sick leave, disability grant, cash transfer for poor families or other cash transfer.

NTP network: Health facilities treating and notifying TB in line with NTP guidelines, which may also include private and NGO facilities collaborating with NTP. Therefore, the operational definition of the catastrophic total cost indicator is "percentage of diagnosed TB patients treated within the NTP network (and their households) facing catastrophic total costs".

EXECUTIVE SUMMARY

Tuberculosis is a disease of major public health importance in Kenya. It is the 4th largest killer responsible for 29,000 deaths in 2016. In addition, over half of all patients who fall ill to the disease go undiagnosed and untreated2. The Ministry of Health has therefore identified improving access to prompt diagnosis and treatment as an important priority for ending TB in Kenya3.

Addressing cost and affordability is a key issue in improving access to care for any disease (3). Patients often incur large out of pocket costs related to illness, as well as in seeking and receiving health care. Such out of pocket costs are barriers that can affect health outcomes and increase risk of transmission of disease (4). The aim of this survey was to determine the proportion of TB patients and their households facing catastrophic costs and document the magnitude and main drivers of different types of costs incurred by TB patients and their households in Kenya. This will guide development of policies to reduce financial barriers to accessing care and minimize the adverse socioeconomic impact of TB. In line with the End TB Strategy, it also provides the baseline upon which to periodically measure the percentage of TB patients and their households who incur catastrophic total costs due to TB. The findings are meant to inform the improved design and implementation of TB care with incorporation of social protection programs for mitigating costs incurred by TB patients and their households.

This nationally representative, two-stage cluster sampled cross-sectional survey was undertaken through interviews with 1,071 drug-susceptible TB (DS-TB) and 282 multidrug-resistant TB (DR-TB) patients from 30 counties in Kenya who had been on treatment for at least two weeks. The patients were queried on direct costs, time losses, household consumption expenditures, asset ownership, and coping measures, income, expenditures and asset ownership. Total costs (direct and indirect) were expressed as a percentage of annual household consumption expenditure, and if they exceeded 20%, the household was classified as "experiencing catastrophic total costs". Overall 26.5% of TB affected households, including 86.4% of DR-TB affected households experienced catastrophic costs. The median total cost borne by patients seeking diagnosis and treatment per TB episode was KES 26,041.49. Median total cost of Kshs 25,874.00 and Kshs 145,109.53 was incurred as a result of an episode DS-TB and DR-TB respectively. Direct non- medical costs due to nutrition and food supplements accounted for 68.5% of expenses (Ksh 17,739.71). To cope, 27.8% of TB patients used negative coping mechanisms like taking a loan, use of savings and sale of assets to meet the expenses.

Significant predictors for experiencing catastrophic costs were coming from a low socio-economic quintile, having no education, having a small household size and presence of DR-TB. The study demonstrates that TB patients and their caregivers lose valuable hours of productivity while incurring huge out of pocket expenditure seeking care, worse among DR-TB patients, which could partly be solved by an adoption of patient centered service delivery approaches that help minimize the time spend in care seeking. The direct non-medical costs due nutrition and food supplements constitute an important cost item while to accessing TB services and can be addressed in the emerging Universal Health Coverage (UHC) and social protection schemes in Kenya. Mere abolishment of direct charges for diagnosis and treatment, without addressing costs related to food/nutritional support, transport and time used seeking care cannot not assure patients affordable health care. Given that the recent TB national prevalence survey reported that only 45% of those who fall sick with TB are diagnosed and treated, reducing financial barriers may encourage more individuals to seek care for TB and help close the current case detection gap.

The survey recommends development of various policy and programmatic interventions to reduce and compensate for costs faced by TB patients and their households. This include linking TB-affected vulnerable households to existing social protection programs; alignment of food support with need by extending it to cover TB patients with moderate to severe malnutrition and malnourished children in TB households while ensuring equity in food support by extending it ti vulnerable groups like men; inclusion of all components of TB care into the NHIF benefit package while increasing coverage of NHIF among TB patients; development and implementation of policies and laws to eliminate discrimination and ensure job security for TB patient; engagement of all health providers in the provision of timely and quality-assured TB care and establishment of a high-level multi-stakeholder coordinating mechanism and forum for the country implementation of the End TB Strategy.

CHAPTER 1 BACKGROUND

Tuberculosis (TB), an infectious disease with high morbidity and mortality, is an important public health problem. In 2016, an estimated 10.4 million people fell ill with TB with 1.7 million TB deaths reported [2]. TB disproportionately affects those aged 25-44 years; the most economically productive age-group [5]. TB is associated with significant economic impact in many countries and may hamper national development [6]. The disease can therefore cause enormous economic and social disruption by reducing both labor supply and productivity. These economic effects of TB affect not only national economies, but also individuals and households. [7]

Tuberculosis patients often incur large costs related to illness, as well as for seeking and receiving health care. Such costs are important access barriers to TB care which can affect health outcomes and increase risk of transmission of disease. These costs also present an economic burden that result in financial difficulties and/or push households into poverty (or poor households further into poverty). In low- and middle-income countries, TB patients face costs that on average amount to half their annual income [8]. In all settings, TB affects the poorest segment of society disproportionately hence aggravating poverty- most to the already vulnerable.

While out-of-pocket direct medical expenditures are important, lost income is often the dominant contributor to economic hardship [9]. Direct non-medical costs, such as costs for travel and food during health seeking are also significant given the often long health seeking period and the six months to twenty four months of treatment [9].

To overcome access and adherence barriers, as well as to minimize the economic burden for TB patients and their households it is essential to identify and address these costs. Interventions are needed to address high medical costs, as well as costs of food and transport, and lost earnings. Therefore, both health financing and delivery models, as well as social protection mechanisms (such as job protection, paid sick leave, social welfare payments, or other transfers in cash or kind) need to be considered [10,11].

One of the three targets for the End TB Strategy is that no TB patient or their household should face "catastrophic total costs" due to TB, and this target should be achieved by 2020 [12].This target is in line with efforts to move health systems closer to universal health coverage (UHC) as it provides the best method to eliminate the barriers to uptake and completion of treatment. The share of the population incurring "catastrophic health care expenditures" (expenditures beyond a defined threshold of a household's capacity to pay) is one measure of financial protection that is commonly used as an indicator of progress towards UHC [2]. The objective measuring TB-affected families facing catastrophic costs due to TB is to help identify and reduce barriers to diagnosis and treatment adherence and not, strictly speaking, to measure financial protection for households.

TB Situation in Kenya

Kenya continues to experience a large burden of TB. In 2015, the country was placed by the World Health Organization (WHO) in all the three lists of countries with either a high absolute or per capita burden of TB, TB/HIV and Multidrug Resistant TB (MDRTB) [6]. This is in spite of the vigorous pursuit of recommended strategies for TB care and prevention of TB. While in the last decade Kenya appeared to be on track to achieve recommended TB care and prevention targets, with a high estimated TB treatment coverage, a high treatment success rate and successfully implementation of TB/HIV collaborative interventions the results of the national TB disease prevalence survey 2015-16 show a high TB burden at 426 per 100,000 incident cases with over 50% of people with TB not detected for treatment. The disease disproportionately affects those aged 15-44 years, males and those residing in urban areas. [13].

The high prevalence can be explained by a combination

of case-detection gaps, possibly significant delays in diagnosis, health system weaknesses, and broader social and economic influences on the TB epidemic. These broader influences include undernourishment that affected 52% of the population in 2016; poverty, with 42% of people living below the national poverty line in 2016; and the low coverage of health insurance and social protection, with coverage of only 15 % in the poorest quintile in 2016, leading to financial barriers to accessing health services and high levels of out-of-pocket expenditures on health care (14,15). The prevalence of HIV in the general population remains below 5.6 % (16) and is also a major factor impact on the TB epidemic. In terms of mortality, TB is the fourth largest cause of death (17) with a national TB response that is largely donor supported (63%) [5]

By policy, the first test for TB diagnosis is Xpert MTB/RIF while smear microscopy is used for patient follow-up. These tests are offered in 146 and 2,170 health facilities respectively. TB diagnostic (except chest x-ray) and follow–up tests including treatment are free of charge in all government and faith based health facilities but are offered at a subsidized rate in private health facilities [18]

Table 1: Kenya Tuberculosis Profile

Incidence	169,000 cases (103,000-250,000); Rate 348 (213-515) per 100,000
Mortality	29,000 deaths (range, 16,000–45,000); Rate 60 (33-93) per 100,000
Population	46 million
Total TB cases new and relapse notified in 2016	77 376
Total MDR/RR TB cases notified in 2016	351
Estimated MDR/RR TB among notified pulmonary TB cases	1,300 (910-1,700)
Treatment success rate (New and relapse TB cases)	87%
Treatment success rate MDR/RR TB	72%
TB treatment sites	4,225
TB microscopy sites	2124
Health facilities with Xpert MTB/Rif	146
HIV prevalence in the 15-49 years population (%/N)	5.9%/- (1.5 million)
TB patients with known HIV-status who are HIV-positive	26,288 (33%)

Summary of Previous TB Patient Costs Surveys

In many countries, TB is diagnosed and treated free-of-charge in public health facilities. However, many studies have shown that this is often not the case and there are often many associated health care costs, including payment for ancillary drugs and extra diagnostic tests, as well as considerable non-medical costs, including expenditures for transport and accommodation. Furthermore, patients and other household members who care for them may suffer reduced incomes due to lower productivity and/or loss of employment opportunities, and may experience the intangible costs related to the social stigma associated with their illness and the potential breakdown of the family unit. As observed in other settings, TB causes enormous economic and social disruption by reducing both labor supply and productivity. The economic effects of TB affect not only national economies, but also individuals and households [7].

The 2008/2009 Kenyan Demographic and Health Survey indicated that financial barriers were a primary cause of delayed health care seeking. In particular, costs related to transportation and fee-based diagnostic tests, as well as lack of nutritional and financial support during the intensive phase of treatment was highlighted [19]. A study undertaken to estimate TB patients' costs in Kitui County, Kenya, found that DS-TB patients incurred substantial direct (out of pocket: USD 55.8) and indirect (opportunity: USD 294.2) costs due to TB. It also showed that inability to work occasioned by the illness was a major cause of increased poverty, confirming an existence of a 'medical poverty trap'[20].

Survey Justification

This survey provides an estimate of proportion of TB patients experiencing catastrophic costs and analyses cost drivers associated with seeking TB diagnosis and treatment in order to inform policies. The survey also provides baseline measurement to be used to monitor the percentage of TB patients and their households experiencing catastrophic costs as a result of TB disease, one of the End TB Strategy high level indicators. It will also inform the development of more in-depth operational research to investigate identified problems and to evaluate proposed solutions.

Survey Objectives

The overall objective of the survey was to document the magnitude and main drivers of TB patient costs in order to guide policies on cost mitigation for the purpose of reducing financial barriers to TB treatment access and adherence.

The Specific Objectives were

1. To determine the proportion of TB patients and their households facing catastrophic costs due to TB.
2. To identify the main costs incurred by TB patients during diagnosis and treatment.
3. To identify the determinants of catastrophic costs during diagnosis and treatment of TB.
4. To determine the association between the incidence of catastrophic cost and the adoption of coping strategies such as borrowing or selling assets to finance health care expenditure (or dissaving).

CHAPTER 2 SURVEY ORGANISATION

Management and Organization of the Survey

The National Tuberculosis, Leprosy and Lung Disease Program (NTLD - Program) took lead in planning and designing of the survey with a core team from the WHO, Kenya Medical Research Institute (KEMRI)and the Health Economics Research Unit (HERU) of the KEMRI-Wellcome Trust Research Programme.

Composition of Survey Team, Roles and Responsibilities

Principal Investigator (PI)

- The PI was responsible for designing the study, ensuring ethical clearance, maintaining the quality of the study's conduct and writing the final study report
- He was the liaison for communication outside the survey, in particular with WHO, public health service, local research institution and possibly the funding agency (securing funds for the survey)
- Ensured that the survey implementation and analysis were conducted according to the protocol and the plan

Survey Coordinator

- Provided regular reports to the principal investigator on the proceedings of the survey
- Was responsible for the day-to-day management of the survey
- Actively coordinated the design of the study
- Prepared training manual and study materials and coordinated the training of the research assistants
- Coordinated the pre-survey meetings to sensitize the counties about the survey and ensured smooth entries to the sampled health facilities
- Supervised the work of data collection by research assistants and received all periodic reports from them.
- Together with the PI, contacted and coordinated with the county governments
- Ensured the quality assurance for all processes is implemented according to the protocol
- Ensured the smooth supplies and all required materials in the survey process
- Supervised the cash flow, fund distribution and their accountability
- Organized the writing of activity reports and final survey report
- Provided all the logistic support for the survey team

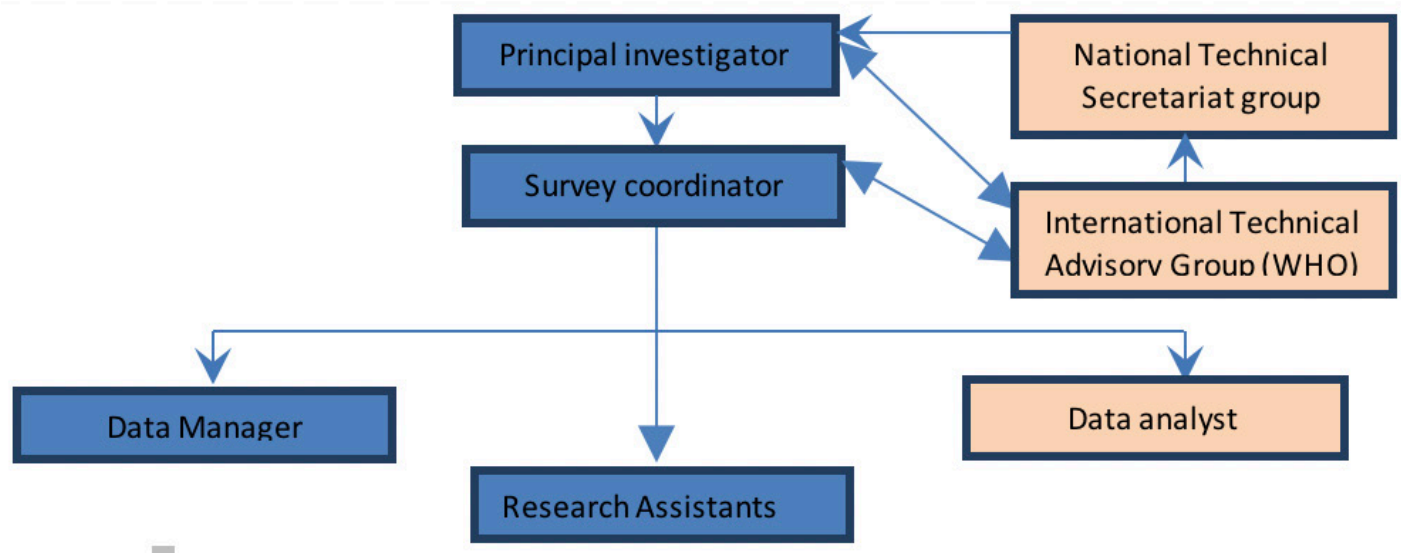
Data Analyst

- Was responsible for technical support towards data cleaning and analysis.
- Was responsible for completion of regular data management reports.
- Advised the data manager on any data collection tool errors to ensure only quality and verifiable data was collected.
- Reviewed data from backups to ensure that the backups were accurate and consistent.
- Run data validation tools against collected data to address any inconsistencies

Data Manager

- Coordinated data management activities for the survey: receiving, batching, cleaning and merging data from different sources.
- Developed and maintained data collection tools using Open Data kit and X-Form technologies.
- Was responsible for the validation of double-entered data
- Ensured that data was properly stored and backed up
- Was responsible for regular validation of data files for systematic errors (cleaning)
- Developed data entry software and tools and provided technical support during data collection
- Prepared database for analysis and data entry screens
- Contributed in the analysis of results
- Liaised with the survey coordinator and principal investigator on a regular basis to ensure collection of quality data

Figure 1: Organogram for Survey Team



- Reported any problems encountered in data management.

Research Assistants

- Hired and trained specifically for this survey.
- Responsible for obtaining informed consent before carrying out the interviews and recording patient records information required in the survey in the electronic data collection tool
- Responsible for ensuring correct patient information as required in the survey was recorded in the electronic data collection tool.
- Were responsible for uploading the survey data collected off-line into the on-line designated software.

National Technical Secretariat Group Function

- Provided technical input during the survey protocol development
- The technical advisory group advised the principal investigator and survey coordinator on all technical aspects of the survey and also on issues such as the survey approval and acceptance process.
- It comprised of experts in Clinical, statistics, Information Technology, epidemiology and health economics and provided technical input during the survey process.

CHAPTER 3 METHODS

Study Area and Design

The study was conducted in 30 sub-counties of Kenya with a nationally representative sample population. This was a cross sectional survey with retrospective data collection and projections. Study sites were health facilities that were within the NTLD - Program network.

Study Population

The study population was all patients (including children) who were on TB or DR-TB treatment (in both continuation and intensive phase) from public and private facilities. These facilities deliver TB care in line with the NTLD - Program guidelines, and also register and record treatment in standard TB treatment cards and registers.

Inclusion/Exclusion Criteria

Patients enrolled into the study had to meet the following criteria; were TB or DR-TB patients registered for treatment at the health facility within the NTLD - Program net-work, minimum of 2 weeks duration into intensive or continuation treatment phase and provide informed consent.

Sample Size Calculation and Sampling

The survey used a cluster sample design for sampling. According to the Kenya Household Health Expenditure and Utilization Survey 2013 Report, the proportion of households reporting catastrophic spending on health was 6.2% [15]. This proportion was used to hypothesize the true proportion p of households experiencing catastrophic total costs due to TB illness.

The minimum sample size estimating a population proportion when using random sampling from a large population was calculated using the following formula [21]:

$$n = D * \frac{p(1-p)z^2}{d^2}$$

where,
D = is the design effect if cluster sampling will be used (3)
p= is the anticipated population proportion (0.062)
d= is the precision required on either side of the proportion (0.02)
z= refers to the cutoff value of the Normal distribution (z = 1.96)
n= Minimum sample size

Using the formula, a minimum sample size of 1117 was calculated for the DS-TB patients, adjusted upwards to 1200 to cater for non-response. Based on the 2016 notification of 445 DR TB patients, the survey purposively enrolled all DR TB patients that were on treatment.

Sub-counties were considered as the primary sampling units of the survey. A total of 30 sub-counties were drawn randomly from the sub-counties list. Sub-county hospitals were selected purposively and two other facilities selected at random.

At each health facility, consecutive patients on TB treatment who visited on the day of survey were selected. Children aged less than 15 years were not excluded, but data collected represented the caregivers' costs. All consenting patients on treatment for drug sensitive (DS) or drug resistant (DR) TB were eligible for the patient survey, if they had been on their current phase treatment for two weeks or more. DS patients were consecutively sampled until the number recruited reached the target cluster size of 40. All the DR TB treatment patients in all DR treatment facilities in the county were included purposively in the survey.

Tool Development

The survey data collection tool was adapted from the tool provided by the WHO protocol for examining the patient costs of TB [1]. It comprised five sections as shown in Figure 2 below, and the complete questionnaire is included in the Annex. The tool was translated into an Extensible Markup Language (XML) format and deployed onto handheld

computer tablets. The informed consent however was a physical form that was read out and issued for participants to sign or fingerprint

The data collection team used an open source survey system X-Form (https://www.w3.org/MarkUp/Forms/). This allowed data to be collected offline and stored on the local handheld computers during the interviews, and later uploaded onto the central database at the NTLD - Program offices in Nairobi. The e-survey data collection tool contained skip patterns based on the participant's type of TB and the treatment phase at the time of interview. This was done to preserve the data format for the different survey participant strata. The data collection tool was programmed to aggregate component costs where needed, and also included validity checks and questionnaire flow prompts.

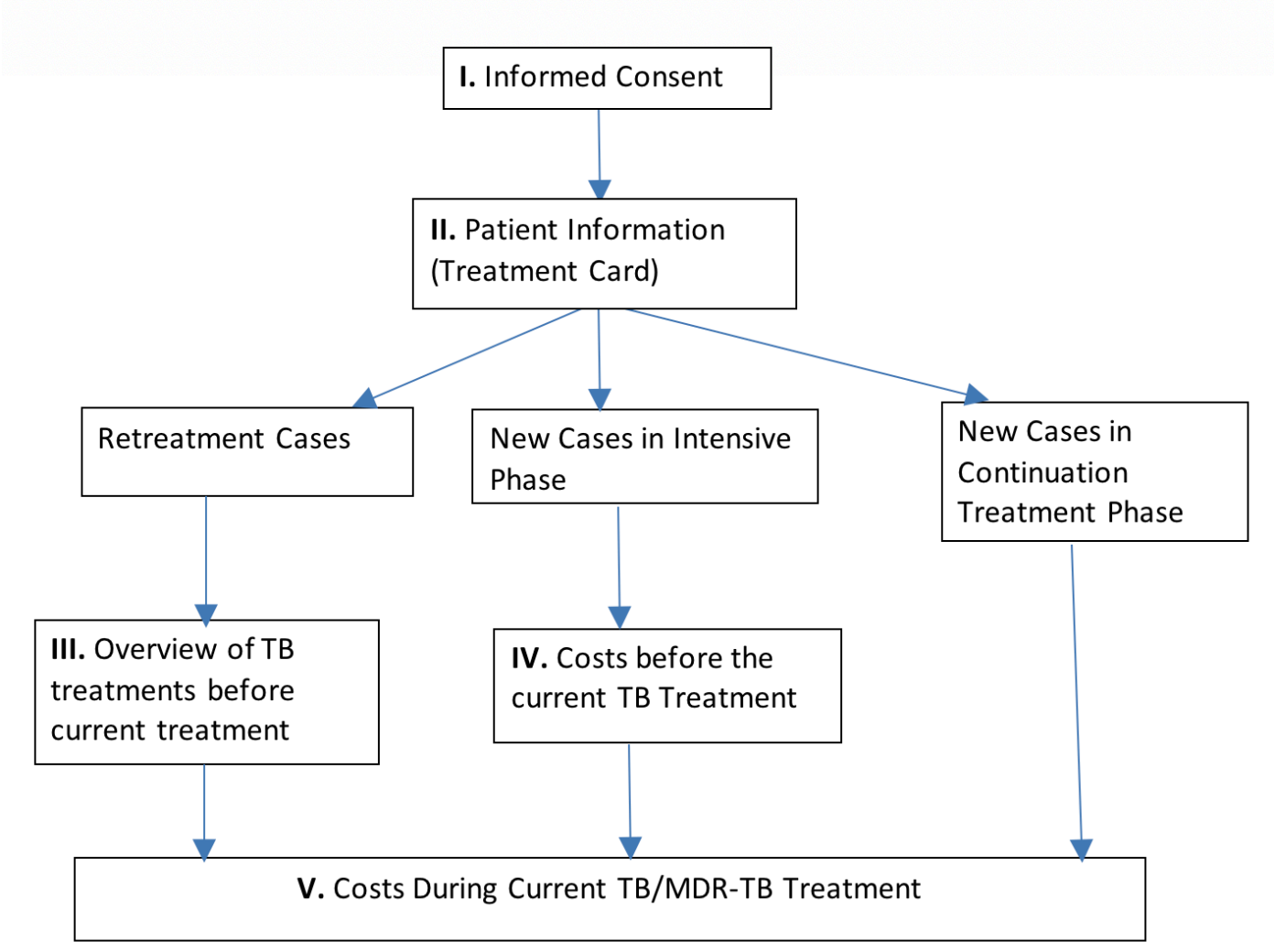
Data Collectors Training and Piloting

Data collection was done by 30 research assistants with training and previous experience conducting health related surveys and were specifically hired for this survey. The research assistants and national level coordinating team were first trained in May 2017 on the data collection tools and familiarized with concepts of computer assisted personalized interviewing (CAPI), navigation of the electronic data forms, and the proper management, transmission and archiving of data. The electronic tools were then piloted through mock interviews and feedback from the data collection teams used to improve the wording of questions and their sequence.

Data Collection

The actual data collection conducted for one month between 16th May 2017 and 28th June 2017. Field visits included courtesy calls and engagement with the county health management team, and respective sub-county TB coordinators. The facility TB treatment register was used as the sampling entry-point. Eligible participants were patients retrieved from the treatment register. Consenting patients attending the TB clinics were interviewed consecutively, until the required sample size was obtained.

Figure 2: Interview Instrument Parts



Each participant was interviewed only once and reported health seeking habits, income expenditures and coping mechanisms. Approximately half of the participants interviewed were in their intensive treatment phase, and the rest in their continuation treatment phase. The patients were randomly selected based on the order of arrival at the clinic and upon meeting the eligibility criteria.

Data Management

Filled questionnaires were synchronized with the national survey database at the end of each day, and a backup of the filled questionnaire was maintained in the local handheld computer. This was done through the electronic data collection tool designed using XML and X-Forms. A data manager conducted weekly routine checks on submitted data, and updated the research assistants on general challenges noted such as incomplete questionnaires or blank submissions.

All data collected was handled with confidentiality. The electronic data collection tool was only accessible from specific identified android devices with enabled password protection. Only the PI, data manager, and the statistician had access to the raw aggregated database. Data was backed up in a local server which only the data manager had access to. The electronic survey tool automatically generated a unique identifier for each participant interviewed. Although patients' names were also collected in the survey, these were only used by the national TB program for administrative purposes during pre-processing of responses, and were not required for the costing analysis. Data collected through electronic tablets was stored in password protected computers and in servers with multiple layers of security (both cloud and local backup server). The physical signed consent forms were kept in lockable cabinets accessible only by the PI.

Preparation for Data Analysis

Data submitted into the national database was extracted to comma separated record files. Patient level repeat records (such as per visit hospitalization records) were separated and linked to the main patient record via unique patient identifiers. A data cleaning script was developed using Stata® Version 13 (StataCorp. 2013). Data cleaning and verification included range and format checks for various variable types, with special attention given to costs and time variables. Consistency checks were also conducted across sections of the questionnaire. Further to this, the national TB program cross checked patients' treatment data against the national TB treatment database to ensure that patients were classified correctly, and that their current treatment phase and duration was accurately captured.

Data Analysis

To present population-representative results, inverse probability weights were calculated stratified by drug resistance status. For the drug sensitive (DS) patients, the formula used to compute probability sampling weights was as follows:

$$\mathrm{IPW_{DS}} = \left[\frac{number\ sampled\ per\ subcounty\ (n)}{Total\ Notifications\ per\ subcounty\ (N)}\right]^{-1} * \left[\frac{ratio\ of\ DS{-}TB\ cases\ in\ 2016\ notifications}{ratio\ of\ DS{-}TB\ cases\ in\ sample}\right]$$

where the first part is the inverse of the probability of selection of patients in a cluster, and the second part is a scaling factor. This was done to ensure that the proportional contribution of DS and DR-TB estimates were representative of the population.

Since the drug resistant (DR) patients were purposively selected from all facilities in the county, the sampling weight was computed as:

$$\mathrm{IPW_{DR}} = \left[\frac{number\ sampled\ per\ county\ (n)}{Total\ Notifications\ per\ county\ (N)}\right]^{-1} * \left[\frac{ratio\ of\ DR{-}TB\ cases\ in\ 2016\ notifications}{ratio\ of\ DR{-}TB\ cases\ in\ sample}\right]$$

Analysis was guided by the WHO Global TB program's reporting guidelines [1], including a description of respondents' sociodemographic and treatment characteristics. This was followed by an estimation of total hours lost seeking care, and total costs incurred during TB treatment. Finally, the incidence of catastrophic expenditures was computed, together with the

proportion of households experiencing "dissavings" (such as taking a loan or selling property or livestock.

Total costs incurred was computed as an aggregate of reported direct medical costs, direct non-medical costs (such as food and transport costs, plus any caregiver / guardian costs) and indirect costs incurred while seeking treatment. Indirect costs were estimated based on the total hours lost while seeking care, assuming that these hours would have been used for productive activity in the absence of TB. The hours were valued using Kenya's minimum wages in 2016, namely KES 13,953.00 for rural and KES 15,980.00 for urban areas respectively [22]. For each respondent, these costs were scaled up based on the proportion of one's treatment duration remaining, in order to get a complete phase treatment cost.

Computation of total costs of treatment involved imputation of a respondent's unobserved phase costs since only one treatment phase could be observed. Health care utilization cost data often doesn't follow a normal distribution, therefore this study adopted a predictive mean matching (PMM) imputation strategy [23]. This involves selecting a missing value randomly from 10 nearest matches [24], matching being done based on the respondents' observed covariates.

Due to the high level of informal sector workers in Kenya, reported household income is liable to more errors than reported household expenditure. The incidence of catastrophic costs was therefore calculated as the proportion of respondents whose total costs exceeded 20% of their annual household consumption expenditure [1]. Sensitivity analysis was conducted using direct medical costs, and using a sum of direct medical and direct non-medical costs as a numerator.

In order to explore economic risk factors of dissavings and catastrophe, respondent households were ranked in ascending order of their annual household expenditure and thereafter grouped into five groups (expenditure quintiles).

The dollar exchange rate used was the average monthly interbank rate for the month of July 2017 which was 102.5 KES per US dollar.

Ethics Approval

All invited participants agreed to participate and provided written informed consent. For children 17 years and below consent was provided by their guardians. In addition, adolescents who were able to comprehend the purpose and procedures of the survey provided informed written consent. The study protocol was approved by the ethics and scientific review committee of Amref Health Africa. (reference: AMREF P322/2017). All participants were reimbursed for their travel costs with an equivalent of Ksh 200.00 (USD 1.95).

CHAPTER 4

RESULTS

Description of the Study Participants

During the study period, 1497 patients on TB treatment in the participating sub-counties were queried to participate in the study and 144 (9.6%) were found not eligible to participate. Majority of those not eligible had just transitioned to continuation phase of drug sensitive TB treatment with less than 2 weeks on anti-TB medication. Their individual characteristics were not different from those of the eligible participants. A total of 1353 patients were eligible (1071 DS-TB and 282 DR-TB patients), accepted to participate and were enrolled between 16 May and 22 June 2017.

Socio-demographic and Clinical Characteristics

The respondents' socio-demographic characteristics are provided on table 2, with unweighted and weighted proportions. From the (unweighted) sample, males were 840 (62.1%), the overall median age was 32 years (range 22–40) and 170 (12.6%) were children under 15 years. The overall median household size was 4 individuals with a median household expenditure pre -TB of KES 144,000 (range 72,000-276,000). Majority of the respondents 958 (70.8%) were seeking care in health facilities located in urban areas and 864 (63.9%) had no schooling or had attended primary school only. 594 (43.9% had informal paid jobs. Only 13.6% of the respondents had the National Health Insurance Fund (NHIF) cover, while 1.6% were insured by private health insurance. Table 3 outlines the clinical characteristics of participants in the survey. The overall TB-HIV co-infection rate was 29.9% with the Drug Resistant (DR-TB) respondents reporting a higher rate at 46.4% compared to 29.8% among the Drug Sensitive -TB (DS-TB) group. Only 295 (21.8%) of the participants had a previous history of TB treatment, but much higher among DR-TB patients at 72.7%. Though randomly selected, the respondents were evenly distributed between intensive (51.4%) and continuation (48.6%) phases of TB treatment. The average time reported from onset of symptoms to initiation of treatment was 2.9 weeks. 573 (42.4%) TB patients were recorded as having moderate to severe malnutrition while 34 (2.5%) self- reported that they were diabetic.

The rest of the results presented on the next page and onwards are the weighted estimates, in order to reflect the true proportions of DRTB and DRTB patients in the population.

Table 2: Descriptive statistics and selected socio-demographic characteristics of survey sample, by DR status

		Unweighted			Weighted	
	DR-TB	DS-TB	All	DR-TB	DS-TB	All
	282	1071	1353	8	1345	1353
Sex, N (%)						
Male	62.1 (56.4 - 67.7)	62.1 (59.2 - 65.0)	62.1 (59.5 - 64.7)	63.1 (56.9 - 69.4)	61.6 (57.9 - 65.4)	61.7 (57.9 - 65.4)
Female	37.9 (32.3 - 43.6)	37.9 (35.0 - 40.8)	37.9 (35.3 - 40.5)	36.9 (30.6 - 43.1)	38.4 (34.6 - 42.1)	38.3 (34.6 - 42.1)
Age						
Age in years, Median [IQR]	36.0 (28.0 - 46.0)	30.0 (21.0 - 41.0)	32.0 (23.0 - 42.0)	37.0 (29.0 - 46.0)	31.0 (22.0 - 40.0)	31.0 (22.0 - 40.0)
Children under 15 years	3.2 (1.1 - 5.2)	15.0 (12.9 - 17.2)	12.6 (10.8 - 14.3)	2.9 (0.4 - 5.4)	14.0 (9.6 - 18.4)	13.9 (9.6 - 18.3)
Household annual income pre-TB (KES)						
Reported, Mean (95% CI)	264780.85 (215317.83 - 314243.88)	248517.33 (217766.38 - 279268.29)	251907.07 (225496.70 - 278317.44)	259227.14 (201471.83 - 316982.46)	246665.48 (206306.17 - 287024.80)	246741.39 (207474.65 - 286008.12)
median (IQR)	138000.00 (72,000.00 - 336000.00)	144000.00 (72,000.00 - 270000.00)	144000.00 (72,000.00 - 288000.00)	144000.00 (72,000.00 - 336000.00)	144000.00 (72,000.00 - 276000.00)	144000.00 (72,000.00 - 276000.00)
Estimated based on assets owned, Mean (95% CI)	273698.30 (224694.61 - 322701.99)	260370.77 (229848.98 - 290892.55)	263148.57 (236943.07 - 289354.07)	269642.55 (214299.47 - 324985.64)	258695.14 (218563.37 - 298826.91)	258761.29 (219716.17 - 297806.40)
median (IQR)	147810.00 (84,000.00 - 336000.00)	151212.00 (94,800.00 - 276000.00)	150000.00 (90,000.00 - 288000.00)	160572.00 (84,000.00 - 336000.00)	156000.00 (96,000.00 - 276000.00)	156000.00 (96,000.00 - 276000.00)
Household annual expenditure, Mean (95% CI)	365796.58 (314412.33 - 417180.82)	357998.93 (334855.19 - 381142.66)	359624.16 (338433.96 - 380814.35)	339556.65 (224861.67 - 454251.64)	344181.10 (274375.75 - 413986.46)	344153.16 (276244.29 - 412062.03)

		Unweighted			Weighted	
	DR-TB	**DS-TB**	**All**	**DR-TB**	**DS-TB**	**All**
	282	**1071**	**1353**	**8**	**1345**	**1353**
median (IQR)	245930.00 (123560.00 - 475860.00)	265880.00 (154940.00 - 465552.00)	262880.00 (148188.00 - 470785.59)	218332.00 (115156.00 - 432620.00)	257960.00 (138120.00 - 455116.00)	257920.00 (138120.00 - 455116.00)
Socio-demographic characteristics of survey sample						
Patient's (guardian's) education status %						
None	9.9 (6.4 - 13.4)	11.9 (9.9 - 13.8)	11.5 (9.8 - 13.2)	10.6 (4.3 - 17.0)	9.3 (5.5 - 13.0)	9.3 (5.5 - 13.0)
Nursery school	8.9 (5.5 - 12.2)	9.4 (7.7 - 11.2)	9.3 (7.8 - 10.9)	8.8 (2.3 - 15.2)	9.0 (5.1 - 13.0)	9.0 (5.1 - 13.0)
Primary school	48.6 (42.7 - 54.4)	41.6 (38.7 - 44.6)	43.1 (40.4 - 45.7)	47.3 (40.1 - 54.5)	42.6 (38.9 - 46.3)	42.6 (39.0 - 46.3)
Secondary school	23.0 (18.1 - 28.0)	28.3 (25.6 - 31.0)	27.2 (24.8 - 29.6)	23.4 (15.7 - 31.2)	30.1 (25.0 - 35.2)	30.1 (25.0 - 35.1)
College	7.8 (4.7 - 10.9)	5.9 (4.5 - 7.3)	6.3 (5.0 - 7.6)	8.0 (4.8 - 11.3)	6.4 (4.6 - 8.2)	6.4 (4.7 - 8.2)
University and higher	1.8 (0.2 - 3.3)	2.9 (1.9 - 3.9)	2.7 (1.8 - 3.5)	1.8 (0.5 - 3.1)	2.6 (1.5 - 3.6)	2.6 (1.5 - 3.6)
Patient was main income earner prior to disease, %	67.0 (61.5 - 72.5)	57.1 (54.2 - 60.1)	59.2 (56.6 - 61.8)	68.0 (61.7 - 74.3)	60.1 (54.8 - 65.4)	60.1 (54.9 - 65.4)
Occupation pre-disease						
Formal paid work	12.8 (8.9 - 16.7)	13.6 (11.6 - 15.7)	13.5 (11.6 - 15.3)	13.5 (9.6 - 17.5)	14.9 (10.8 - 18.9)	14.9 (10.8 - 18.9)
Informal paid work	46.5 (40.6 - 52.3)	43.2 (40.3 - 46.2)	43.9 (41.3 - 46.6)	47.0 (35.9 - 58.0)	45.0 (36.2 - 53.7)	45.0 (36.3 - 53.7)
Retired	0.4 (0.0 - 1.1)	1.1 (0.5 - 1.8)	1.0 (0.4 - 1.5)	0.3 (0.0 - 1.0)	0.9 (0.4 - 1.4)	0.9 (0.4 - 1.4)
Student	8.5 (5.2 - 11.8)	11.8 (9.8 - 13.7)	11.1 (9.4 - 12.8)	8.2 (4.9 - 11.5)	11.6 (8.8 - 14.3)	11.5 (8.8 - 14.3)

		Unweighted			Weighted	
	DR-TB	**DS-TB**	**All**	**DR-TB**	**DS-TB**	**All**
	282	**1071**	**1353**	**8**	**1345**	**1353**
Unemployed	15.2 (11.0 - 19.5)	18.2 (15.9 - 20.5)	17.6 (15.6 - 19.6)	15.0 (8.5 - 21.5)	15.5 (10.9 - 20.0)	15.5 (10.9 - 20.0)
Other	16.7 (12.3 - 21.0)	12.0 (10.1 - 14.0)	13.0 (11.2 - 14.8)	16.0 (6.8 - 25.1)	12.2 (6.3 - 18.2)	12.3 (6.4 - 18.1)
Region of current treatment facility						
Rural	46.1 (40.3 - 51.9)	24.7 (22.2 - 27.3)	29.2 (26.8 - 31.6)	43.4 (25.6 - 61.3)	23.5 (15.5 - 31.5)	23.7 (15.7 - 31.6)
Urban	53.9 (48.1 - 59.7)	75.3 (72.7 - 77.8)	70.8 (68.4 - 73.2)	56.6 (38.7 - 74.4)	76.5 (68.5 - 84.5)	76.3 (68.4 - 84.3)
Ownership of current treatment facility						
Public	88.7 (84.9 - 92.4)	90.5 (88.7 - 92.2)	90.1 (88.5 - 91.7)	85.6 (75.1 - 96.0)	90.6 (84.8 - 96.4)	90.5 (84.8 - 96.3)
Private	11.3 (7.6 - 15.1)	9.5 (7.8 - 11.3)	9.9 (8.3 - 11.5)	14.4 (4.0 - 24.9)	9.4 (3.6 - 15.2)	9.5 (3.7 - 15.2)
Median household size	4.00 (2.00 - 6.00)	4.00 (2.00 - 6.00)	4.00 (2.00 - 6.00)	4.00 (2.00 - 6.00)	4.00 (2.00 - 6.00)	4.00 (2.00 - 6.00)
Insurance status						
None	85.5 (81.3 - 89.6)	84.5 (82.3 - 86.7)	84.7 (82.8 - 86.6)	85.8 (81.8 - 89.7)	84.7 (81.3 - 88.0)	84.7 (81.3 - 88.0)
Private health Insurance	1.1 (0.1 - 2.3)	1.7 (0.9 - 2.5)	1.6 (0.9 - 2.2)	1.2 (0.0 - 2.4)	1.8 (1.0 - 2.7)	1.8 (1.0 - 2.7)
Medical allowance	0.1 (0.1 - 0.4)	0.0	0.0	0.0	0.0	0.0
NHIF	12.8 (8.9 - 16.7)	13.8 (11.7 - 15.9)	13.6 (11.8 - 15.4)	12.2 (8.1 - 16.2)	13.5 (10.2 - 16.9)	13.5 (10.2 - 16.8)

Exchange rate: 1 US$ = 102.5 KES

Table 3: Clinical characteristics of respondents, by TB drug sensitivity status

		Unweighted			Weighted	
	DR-TB	DS-TB	All	DR-TB	DS-TB	All
	282	**1071**	**1353**	**8**	**1345**	**1353**
Clinical characteristics						
Treatment Phase, N (%)						
Intensive	54.3 (48.4 - 60.1)	50.6 (47.6 - 53.6)	51.4 (48.7 - 54.0)	54.7 (46.1 - 63.4)	50.7 (46.8 - 54.5)	50.7 (46.9 - 54.5)
Continuation	45.7 (39.9 - 51.6)	49.4 (46.4 - 52.4)	48.6 (46.0 - 51.3)	45.3 (36.6 - 53.9)	49.3 (45.5 - 53.2)	49.3 (45.5 - 53.1)
Recorded HIV Status, N (%)						
Positive	44.7 (38.9 - 50.5)	26.0 (23.3 - 28.6)	29.9 (27.4 - 32.3)	44.7 (34.5 - 54.9)	28.4 (23.2 - 33.5)	28.5 (23.3 - 33.6)
Negative	54.3 (48.4 - 60.1)	71.8 (69.1 - 74.5)	68.1 (65.7 - 70.6)	53.5 (41.5 - 65.5)	69.3 (64.0 - 74.6)	69.2 (63.9 - 74.5)
Not disclosed	1.1 (0.1 - 2.3)	2.2 (1.4 - 3.1)	2.0 (1.2 - 2.7)	1.8 (0.0 - 4.9)	2.3 (1.3 - 3.3)	2.3 (1.3 - 3.3)
Retreatment status, N (%)						
New	40.8 (35.0 - 46.5)	88.0 (86.1 - 90.0)	78.2 (76.0 - 80.4)	41.7 (34.0 - 49.3)	87.5 (85.6 - 89.4)	87.2 (85.3 - 89.1)
Retreatment/Relapse	59.2 (53.5 - 65.0)	12.0 (10.0 - 13.9)	21.8 (19.6 - 24.0)	58.3 (50.7 - 66.0)	12.5 (10.6 - 14.4)	12.8 (10.9 - 14.7)
Treatment delay in weeks						
Mean (95% CI)	1.9 (1.2 - 2.6)	3.1 (2.7 - 3.6)	2.9 (2.5 - 3.3)	1.9 (1.0 - 2.8)	2.9 (2.1 - 3.7)	2.9 (2.1 - 3.7)
Median (IQR)	0.0 (0.0 - 0.0)	0.0 (0.0 - 4.0)	0.0 (0.0 - 3.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 3.0)	0.0 (0.0 - 3.0)

		Unweighted			Weighted	
	DR-TB	DS-TB	All	DR-TB	DS-TB	All
	282	**1071**	**1353**	**8**	**1345**	**1353**
0 - 1 month	86.2 (82.1 - 90.2)	74.8 (72.2 - 77.4)	77.2 (74.9 - 79.4)	87.1 (83.4 - 90.8)	76.1 (71.0 - 81.2)	76.2 (71.1 - 81.2)
1 - 3 months	7.8 (4.7 - 10.9)	17.1 (14.8 - 19.3)	15.2 (13.2 - 17.1)	7.2 (4.7 - 9.8)	16.8 (13.5 - 20.1)	16.7 (13.5 - 20.0)
3 - 6 months	3.9 (1.6 - 6.2)	5.5 (4.1 - 6.9)	5.2 (4.0 - 6.4)	3.3 (0.9 - 5.7)	4.7 (2.6 - 6.8)	4.7 (2.6 - 6.8)
> 6 months	2.1 (0.4 - 3.8)	2.6 (1.7 - 3.6)	2.5 (1.7 - 3.3)	2.4 (0.4 - 4.4)	2.4 (1.2 - 3.6)	2.4 (1.2 - 3.6)
Recorded DOT Provider						
Family Member	19.9 (15.2 - 24.5)	80.7 (78.3 - 83.0)	68.0 (65.5 - 70.5)	17.0 (5.9 - 28.1)	79.7 (62.9 - 96.5)	79.3 (62.6 - 96.0)
CHW	6.4 (3.5 - 9.2)	3.0 (2.0 - 4.0)	3.7 (2.7 - 4.7)	5.7 (1.3 - 10.1)	2.7 (0.0 - 6.8)	2.7 (0.0 - 6.8)
Healthcare Worker	73.8 (68.6 - 78.9)	16.3 (14.1 - 18.6)	28.3 (25.9 - 30.7)	77.4 (64.4 - 90.4)	17.6 (1.4 - 33.8)	18.0 (1.9 - 34.0)
Recorded nutritional status						
Severely malnourished (BMI below 16.0)	12.8 (8.9 - 16.7)	8.5 (6.8 - 10.2)	9.4 (7.8 - 10.9)	12.3 (7.7 - 16.9)	8.2 (6.0 - 10.4)	8.2 (6.0 - 10.5)
Moderately malnourished	37.6 (31.9 - 43.3)	31.7 (29.0 - 34.5)	33.0 (30.5 - 35.5)	38.5 (32.9 - 44.1)	31.7 (28.9 - 34.4)	31.7 (29.0 - 34.4)
BMI 18.5 and above	35.8 (30.2 - 41.4)	39.3 (36.4 - 42.2)	38.6 (36.0 - 41.2)	35.4 (29.2 - 41.6)	40.6 (36.0 - 45.2)	40.6 (36.0 - 45.1)
Missing BMI data	13.8 (9.8 - 17.9)	20.4 (18.0 - 22.9)	19.1 (17.0 - 21.2)	13.8 (9.5 - 18.1)	19.5 (15.4 - 23.6)	19.5 (15.4 - 23.6)
Proportion with diabetes documented	5.0 (2.4 - 7.6)	1.9 (1.1 - 2.7)	2.6 (1.7 - 3.4)	4.7 (2.6 - 6.8)	1.8 (0.8 - 2.7)	1.8 (0.8 - 2.7)

Model of Care

Majority, 90.1%, of the TB patients were receiving care from public health facilities (Table 2). As outlined in table 4, only 0.5% of the DS-TB respondents were hospitalized at the time of interview compared to a slightly higher proportion of 1.2% of DR-TB patients. However, 15.2% of DR-TB patients and 5.6% of DS-TB patients had gone through at least one episode of hospitalization in their current phase of treatment. DR-TB patients reported a total length of stay at hospital (during current treatment phase) that was twice as long as that of their DS-TB counterparts – median 26 days and 12 days respectively.

DR-TB patients took more visits than DS-TB patients to the health facility for drug collection compared with those with DS -TB (209.1 vs 16.4). Among those patients using a DOT supporter (n=473), DR-TB patients reported thrice as many visits to their supporter compared to DS-TB patients (mean 260.9 and 88.6 visits respectively). Majority of patients reported that their principal DOT provider was a family member (79.7%), followed by healthcare workers at 17.6% and community health workers at 2.7%. On the contrary, majority of DR patients (77.4%) received DOT from a healthcare worker, with 16.5% receiving from family member and 5% from a community health worker.

Table 4: Model of Care for Survey Sample

	DR-TB 8	DS-TB 1345	All 1353
Hospitalization			
Hospitalized at time of interview, %	1.2 (0.0 - 3.6)	0.5 (0.0 - 0.9)	0.5 (0.0 - 0.9)
Hospitalized during current phase, %	15.2 (8.0 - 22.4)	5.6 (3.2 - 7.9)	5.6 (3.3 - 8.0)
Times hospitalized during current phase, Mean (95% CI)	1.2 (1.0 - 1.3)	1.2 (1.1 - 1.2)	1.2 (1.1 - 1.2)
Ambulatory care			
Number of visits: DOT, Mean (95% CI)	260.9 (248.3 - 273.5)	88.6 (84.4 - 92.8)	88.7 (84.5 - 92.9)
Number of visits: follow-up, Mean (95% CI)	3.1 (2.2 - 4.0)	0.6 (0.4 - 0.8)	0.6 (0.4 - 0.8)
Number of visits: drug pick-up, Mean (95% CI)	209.1 (189.2 - 229.0)	16.4 (14.1 - 18.8)	16.5 (14.1 - 18.8)
Number of visits pre-diagnosis, Mean (95% CI)	1.7 (1.4 - 2.0)	2.0 (1.8 - 2.3)	2.0 (1.8 - 2.3)
Number of visits pre-diagnosis (non-public facility), Mean (95% CI)	0.7 (0.4 - 1.0)	0.9 (0.7 - 1.1)	0.9 (0.7 - 1.1)
Number of visits pre-diagnosis (secondary / tertiary facility), Mean (95% CI)	0.9 (0.6 - 1.3)	1.0 (0.8 - 1.2)	1.0 (0.8 - 1.2)
Treatment duration			
Treatment duration: intensive phase, weeks Mean (95% CI)	17.7 (15.8 - 19.6)	5.2 (4.9 - 5.6)	5.2 (4.9 - 5.6)
Treatment duration: continuation phase, weeks Mean (95% CI)	27.6 (24.9 - 30.3)	9.6 (8.9 - 10.4)	9.6 (8.9 - 10.4)

Hours Lost Seeking Or Accessing Care And Reported Individual Income, By Patient And Guardian

Overall the median time lost while seeking diagnosis by TB patients and their caregivers was 4.3 hours (IQR 2.1 - 8.0) respectively with no difference reported between DS-TB and DR-TB patients (table 5). However, during both intensive and continuation treatment DR-TB patients lost more hours (median 174.0 hours, IQR 77.4 - 250.7 during intensive and median 226 hours, IQR 61.0 - 480.0 during continuation) than DS-TB patients (median 9.8 hours, IQR 6.0 - 17.5 during intensive and median 17.4 hours, IQR 10.0 – 39.7 during continuation).

Estimated Total Costs Borne By Patient's Households Affected By TB Or DR-TB, Median Breakdown

The median costs borne by patients seeking diagnosis and treatment per TB episode was KES 26,041.49 (IQR KES 13,810.00 - 48,323.72). This included direct medical costs (consultation fees, diagnostic tests etc.), direct non-medical costs (travel, accommodation while seeking care) and indirect costs (productivity hours lost). The largest cost driver was direct non-medical costs (KES 17,872.71, IQR KES 7,794.00 - 34,730.40), followed by indirect costs (KES 3,612.46, IQR: KES 2,188.93 - 6,453.11) and direct medical costs (KES 950.00, IQR KES 0.00 - 3,904.00). Patients with DR-TB incurred six times higher total costs (KES 145,109.53, IQR KES 86,719.86 - 237062.83) in comparison to DS-TB patients (KES 25,874.00, IQR KES 13,751.49 - 47,754.74) per TB episode. The high costs among the DR-TB were largely attributed to nutritional supplement (KES 6,928.00, IQR 0.00 - 24,248.00 during intensive and 20,784.00, IQR 0.00 - 51,960.00 during continuation phase) and hours of productivity lost during treatment (KES 16,481.98, IQR 7,848.56 - 25,769.45 during intensive and 20,973.75, IQR 6,096.35 - 45,399.48 during continuation phase). For DS-TB patients, the main cost drivers in order of cost were hours lost, nutritional supplements and direct medical costs. Table 6 and 7 outlines the median itemized and overall costs.

Table 5: Hours lost while seeking TB care

	DR-TB		DS-TB		All		Public		Private	
	Median	(IQR)	Median	(IQR)	Median	(IQR)	Median	(IQR)	Median	(IQR)
Hours lost by patient, overall	288.00	(150.76 - 558.55)	29.20	(18.00 - 52.75)	29.33	(18.02 - 53.38)	29.70	(18.25 - 53.57)	29.20	(18.00 - 52.75)
Hours lost by patient, pre-diagnosis	4.0	(1.5 - 9.0)	4.3	(2.1 - 8.0)	4.2	(2.0 - 8.0)	4.2	(2.0 - 8.0)	5.0	(2.3 - 8.5)
Hours lost by patient, intensive phase	174.0	(77.4 - 250.7)	9.8	(6.0 - 17.5)	9.8	(6.0 - 18.0)	9.8	(6.0 - 18.0)	7.5	(4.4 - 17.6)
Hours lost by patient, continuation phase	226.0	(61.0 - 480.0)	17.4	(10.0 - 39.7)	17.4	(10.1 - 39.7)	18.4	(10.4 - 40.0)	17.0	(7.1 - 25.6)
Hours lost by caregiver										
Hours lost by caregiver, pre-diagnosis	3.5	(1.5 - 8.6)	4.5	(2.5 - 8.0)	4.5	(2.5 - 8.0)	4.3	(2.4 - 8.0)	5.0	(3.0 - 9.0)
Hours lost by caregiver, intensive phase	180.0	(91.3 - 253.5)	9.8	(6.0 - 19.6)	9.8	(6.0 - 19.6)	9.8	(6.0 - 19.6)	10.0	(9.0 - 17.6)
Hours lost by caregiver, continuation phase	15.4	(5.7 - 170.8)	21.2	(13.9 - 53.8)	21.2	(13.9 - 53.8)	19.8	(13.5 - 41.1)	28.8	(18.5 - 136.2)

Table 6: Costs incurred over treatment period (KES)

		DR-TB		DS-TB		All	
		Median	[IQR]	Median	[IQR]	Median	[IQR]
Pre-diagnosis	Direct Medical	593.00	(77.00 - 3,724.00)	1,195.00	(250.00 - 3,450.00)	1,195.00	(250.00 - 3,450.00)
	Nutrition supplements	0.00	(0.00 - 8.00)	0.00	(0.00 - 15.00)	0.00	(0.00 - 15.00)
	Travel	114.00	(20.00 - 365.00)	163.00	(58.00 - 331.00)	163.00	(58.00 - 331.00)
	Accommodation & other	0.00	(0.00 - 7.00)	0.00	(0.00 - 1.00)	0.00	(0.00 - 1.00)
	Food	67.00	(0.00 - 300.00)	75.00	(0.00 - 202.00)	75.00	(0.00 - 202.00)
	Caregiver costs	25.00	(0.00 - 154.00)	42.00	(0.00 - 150.00)	42.00	(0.00 - 150.00)
	Hours lost by patient and guardian x Hourly wage	348.83	(149.67 - 872.06)	414.23	(203.19 - 749.06)	414.23	(199.75 - 749.06)
Post-diagnosis: Intensive Phase	Direct Medical	2,580.00	(0.00 - 7,456.00)	2,150.00	(813.00 - 7,268.00)	2,150.00	(600.00 - 7,268.00)
	Nutrition supplements	6,928.00	(0.00 - 24,248.00)	2,598.00	(0.00 - 6,235.20)	2,598.00	(0.00 - 6,495.00)
	Travel	100.00	(0.00 - 406.00)	200.00	(63.00 - 400.00)	200.00	(63.00 - 400.00)
	Accommodation & other	406.00	(0.00 - 2,778.00)	500.00	(200.00 - 3,241.00)	500.00	(200.00 - 3,241.00)
	Food	300.00	(0.00 - 4,232.00)	500.00	(133.00 - 2,052.00)	500.00	(133.00 - 2,052.00)
	Caregiver costs	56.00	(0.00 - 264.00)	88.00	(0.00 - 220.00)	88.00	(0.00 - 220.00)
	Hours lost by patient and guardian x Hourly wage	16,481.98	(7,848.56 - 25,769.45)	1,373.28	(834.88 - 2,521.84)	1,373.28	(834.88 - 2,572.58)
Post-diagnosis: Continuation Phase	Direct Medical	4,519.00	(492.00 - 8,200.00)	11,837.00	(1,220.00 - 21,079.00)	11,837.00	(1,220.00 - 21,079.00)
	Nutrition supplements	20,784.00	(0.00 - 51,960.00)	5,196.00	(0.00 - 14,722.00)	5,196.00	(0.00 - 14,722.00)
	Travel	200.00	(100.00 - 710.00)	200.00	(83.00 - 1,537.00)	200.00 t	(83.00 - 1,537.00)
	Accommodation & other	1,345.00	(463.00 - 7,177.00)	660.00	(100.00 - 4,024.00)	660.00	(100.00 - 4,024.00)
	Food	1,143.00	(342.00 - 24,186.00)	600.00	(50.00 - 1,881.00)	600.00	(50.00 - 1,881.00)
	Caregiver costs	200.00	(89.00 - 373.00)	100.00	(0.00 - 372.00)	100.00	(0.00 - 372.00)
	Hours lost by patient and guardian x Hourly wage	20,973.75	(6,096.35 - 45,399.48)	1,726.17	(990.43 - 3,961.71)	1,729.59	(990.43 - 3,971.29)

Exchange rate: 1 US$ = 102.5 KES

Table 7: Summary of median costs incurred over the treatment course, by TB patients

	DR-TB		DS-TB		All	
	Median	**[IQR]**	**Median**	**[IQR]**	**Median**	**[IQR]**
Medical costs	803.00	(0.00 - 6,821.81)	950.00	(0.00 - 3,904.00)	950.00	(0.00 - 3,904.00)
Non-medical costs	93,883.72	(48,141.00 - 164777.94)	17,739.71	(7,759.00 - 34,442.57)	17,872.71	(7,794.00 - 34,730.40)
Indirect costs	31,327.99	(15,824.03 - 61,294.71)	3,596.12	(2,184.59 - 6,377.02)	3,612.46	(2,188.93 - 6,453.11)
Total	**145,109.53**	**(86,719.86 - 237062.83)**	**25,874.00**	**(13,751.49 - 47,754.74)**	**26,041.49**	**(13,810.00 - 48,323.72)**

Exchange rate: 1 US$ = 102.5 KES

Reported Dissaving Mechanisms and Social Consequences

More than a quarter of the respondents (27.8%) reported that they had to adopt one or more dissaving strategies as shown in Table 8, to meet the cost of accessing TB care. The most commonly adopted strategy was use of savings. When the patients were ranked in ascending order of their total household expenses, the proportion that reported incurring a dissaving strategy slightly increased.

Table 8: Dissaving strategies and coping strategies by expenditure quintiles

	Q1 (Lowest) 271	Q2 272	Q3 270	Q4 270	Q5 (Highest) 270	**Overall 1353**
Dissaving Strategies						
Loan	2.6 (0.0 - 5.8)	7.1 (1.7 - 12.4)	3.3 (0.5 - 6.2)	5.8 (1.9 - 9.6)	4.8 (0.1 - 9.5)	4.7 (2.1 - 7.3)
Use of savings	20.6 (7.5 - 33.7)	18.3 (11.8 - 24.9)	27.8 (20.1 - 35.5)	31.0 (22.2 - 39.8)	27.6 (18.6 - 36.7)	25.1 (19.2 - 31.0)
Sale of assets	2.0 (0.0 - 4.4)	3.6 (0.4 - 6.9)	2.1 (0.0 - 4.7)	1.6 (0.0 - 3.3)	0.8 (0.0 - 1.9)	2.0 (0.5 - 3.6)
Any of the three above	23.0 (8.6 - 37.5)	25.4 (17.7 - 33.1)	30.0 (21.9 - 38.1)	34.3 (25.8 - 42.8)	29.1 (20.0 - 38.1)	28.3 (22.0 - 34.7)
Food insecurity	39.2 (18.9 - 59.5)	25.3 (14.7 - 35.9)	23.1 (10.8 - 35.4)	14.6 (7.3 - 21.9)	7.8 (1.9 - 13.7)	22.0 (12.7 - 31.4)
Divorce or separated from spouse/partner	41.1 (22.2 - 60.0)	26.7 (15.7 - 37.8)	28.8 (16.6 - 41.0)	15.9 (8.7 - 23.1)	8.6 (2.6 - 14.5)	24.2 (15.1 - 33.4)
Loss of Job	36.6 (20.0 - 53.1)	35.7 (27.2 - 44.3)	33.6 (22.9 - 44.2)	36.4 (27.9 - 45.0)	29.6 (22.4 - 36.8)	34.4 (27.8 - 41.0)
Child interrupted schooling	5.5 (0.3 - 10.7)	11.9 (8.0 - 15.8)	8.5 (3.7 - 13.3)	7.7 (2.9 - 12.5)	4.4 (2.3 - 6.4)	7.6 (5.1 - 10.1)
Social exclusion	29.4 (20.2 - 38.5)	34.7 (24.9 - 44.5)	30.7 (19.7 - 41.7)	32.9 (20.5 - 45.3)	27.9 (15.5 - 40.3)	31.1 (23.9 - 38.4)
Overall disruption social life	64.6 (55.6 - 73.7)	72.4 (62.6 - 82.3)	67.5 (57.4 - 77.6)	71.7 (61.2 - 82.1)	63.3 (52.5 - 74.0)	67.9 (60.8 - 75.0)

Almost three quarters of the patients (74%) reported that TB profoundly affected their social life and well-being; 39% lost their jobs, 36% felt socially excluded and 27% experienced food insecurity. In addition, 9.3% of children in the in households affected by TB had to interrupt school.

As demonstrated in Table 9, more men (40.5%) lost jobs compared to women (24.6%). Additionally, more DR-TB patients (57.4%) lost jobs when compared to DS-TB patients (34.2%). More DR patients also experienced food insecurity and reported separation from spouse / partner compared to DS patients.

Table 9: Dissaving strategies and coping strategies by gender and drug resistance profile

	Female 519	Male 834	DR 8	DS 1345
Dissaving Strategies				
Loan	5.8 (2.3 - 9.3)	4.0 (1.6 - 6.5)	3.6 (0.7 - 6.4)	4.7 (2.1 - 7.4)
Use of savings	27.0 (19.0 - 35.0)	23.9 (17.6 - 30.2)	14.9 (8.1 - 21.7)	25.1 (19.2 - 31.1)
Sale of assets	2.5 (0.0 - 4.9)	1.8 (0.2 - 3.4)	1.2 (0.0 - 2.6)	2.0 (0.5 - 3.6)
Any of the three above	**31.4 (23.0 - 39.7)**	**26.5 (19.7 - 33.2)**	**17.6 (9.8 - 25.3)**	**28.4 (22.0 - 34.8)**
Food insecurity	20.6 (11.9 - 29.3)	22.9 (12.8 - 33.0)	46.6 (34.9 - 58.3)	21.9 (12.5 - 31.3)
Divorce or separated from spouse/partner	22.1 (13.4 - 30.8)	25.5 (15.7 - 35.4)	51.6 (40.0 - 63.3)	24.1 (14.8 - 33.3)
Loss of Job	24.6 (18.5 - 30.7)	40.5 (33.2 - 47.8)	57.4 (47.5 - 67.4)	34.2 (27.6 - 40.9)
Child interrupted schooling	9.1 (5.6 - 12.7)	6.7 (4.2 - 9.1)	11.9 (7.3 - 16.6)	7.6 (5.0 - 10.1)
Social exclusion	30.9 (23.0 - 38.7)	31.3 (23.4 - 39.2)	46.3 (34.4 - 58.2)	31.0 (23.7 - 38.3)
Overall disruption social life	**64.4 (55.5 - 73.2)**	**70.1 (63.6 - 76.6)**	**87.4 (80.0 - 94.9)**	**67.8 (60.7 - 74.9)**

The impact of TB diagnosis on patient's income was also reported, and the average income reduced by 68% among the DR-TB patients, and by 44% for DS-TB patients as shown in table 10 below.

Table 10: Annual household income pre-TB diagnosis and at time of survey

	DR-TB		DS-TB		All	
Individual income	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
Pre - diagnosis	138813.80	(109000.93 - 168626.68)	131180.04	(112124.09 - 150235.99)	131226.17	(112686.48 - 149765.85)
At time of interview	44119.27	(22849.94 - 65388.61)	73624.96	(58404.57 - 88845.34)	73446.67	(58639.80 - 88253.55)
Reduction (%)	68.2%		43.9%		44.0%	

The Proportion of Households Facing Catastrophic Costs

The proportion of TB affected households, facing catastrophic costs (that were more than 20% of their annual household consumption expenditure) due to TB was 26.5% (95% CI 20.7% – 32.3%). However, the proportion of DR-TB patients who experienced catastrophic expenditure was 86.4%, (95% CI 78.8% – 94.1%), three times more than that of DS-TB patients at 26.1% (95% CI 20.3% - 31.9%) as shown in figure 3.

Changing the threshold from 20% to 10% of total annual household consumption expenditure would increase the proportion of households facing catastrophic costs due to TB to 52.9%. When proportion of households facing catastrophic costs was compared across household expenditure quintile groups, TB patients in the lowest quintile had a significantly higher incidence of catastrophe. (Figure 5).

Figure 3: Proportion of households experiencing catastrophic costs due to TB, at specified thresholds

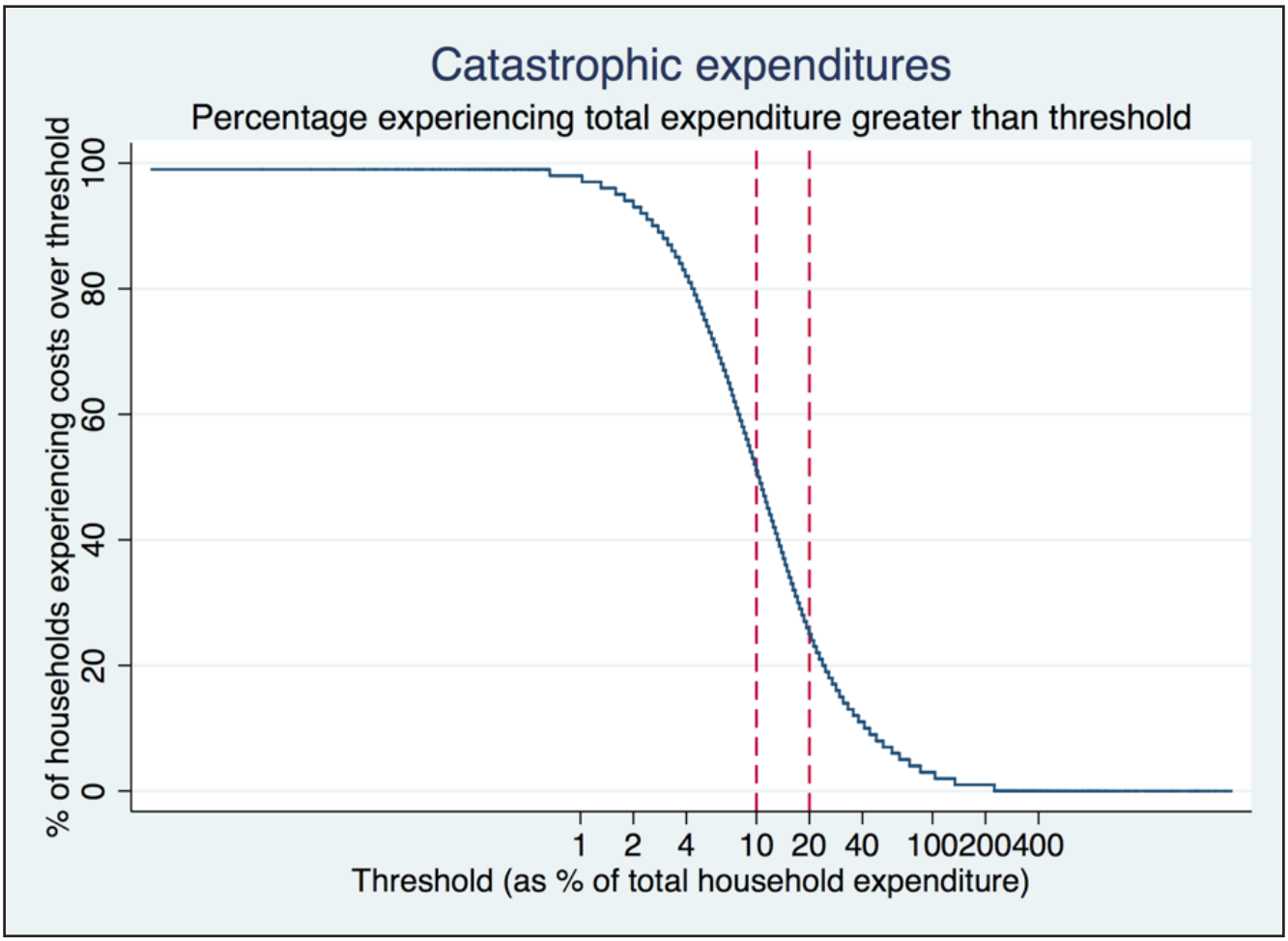
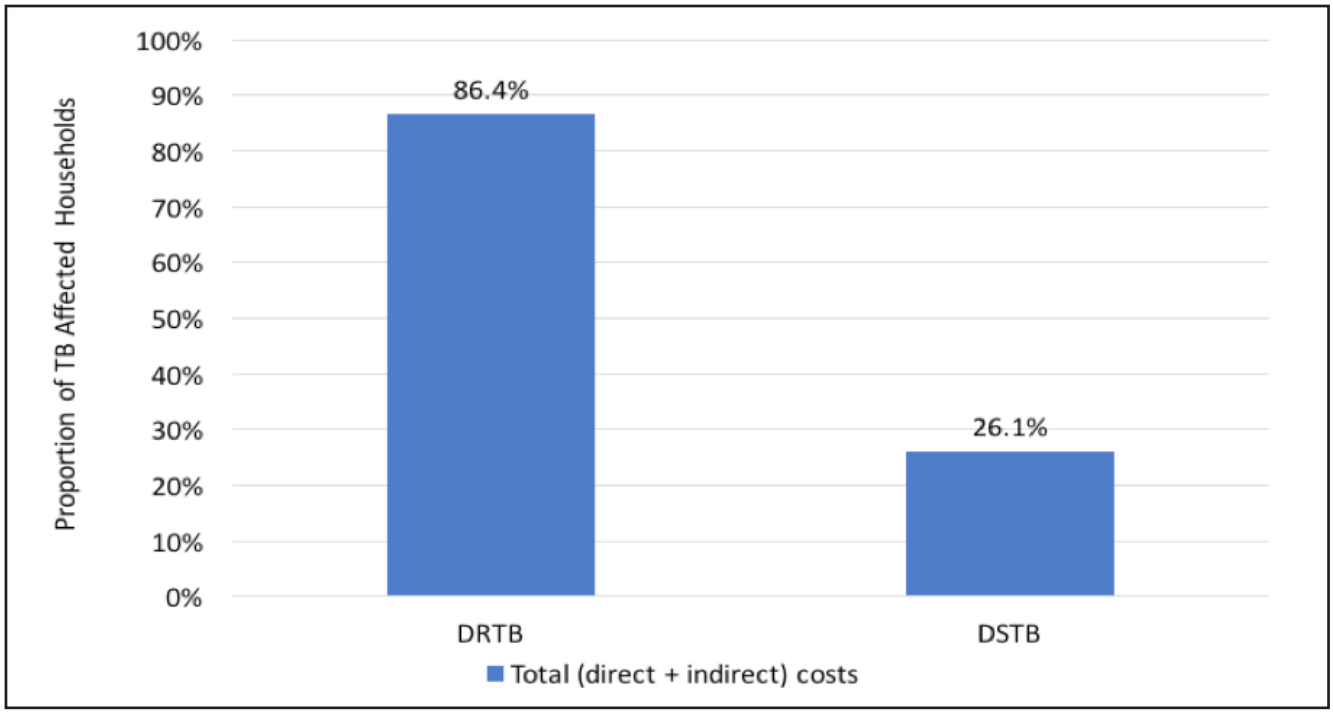


Figure 4: Proportion of households incurring catastrophic costs due to TB (at 20% threshold), by drug susceptibility profile



In order to investigate the factors associated with catastrophic expenditure, crude and adjusted odds ratios were calculated. The following factors were significantly associated with the probability of experiencing catastrophic costs, even after adjusting for other covariates:

a. Number of household members - there was a reduction in risk of catastrophe by 0.86 for each additional household member.
b. Expenditure quintile – being in the lowest expenditure quintile for instance, increased the probability of catastrophic expenditure 19 times, compared to being in the highest quintile.
c. Drug resistance – having DR-TB was associated with 36 times increase in chances of incurring catastrophic costs

Table 11: Risk factors for households experiencing catastrophic costs

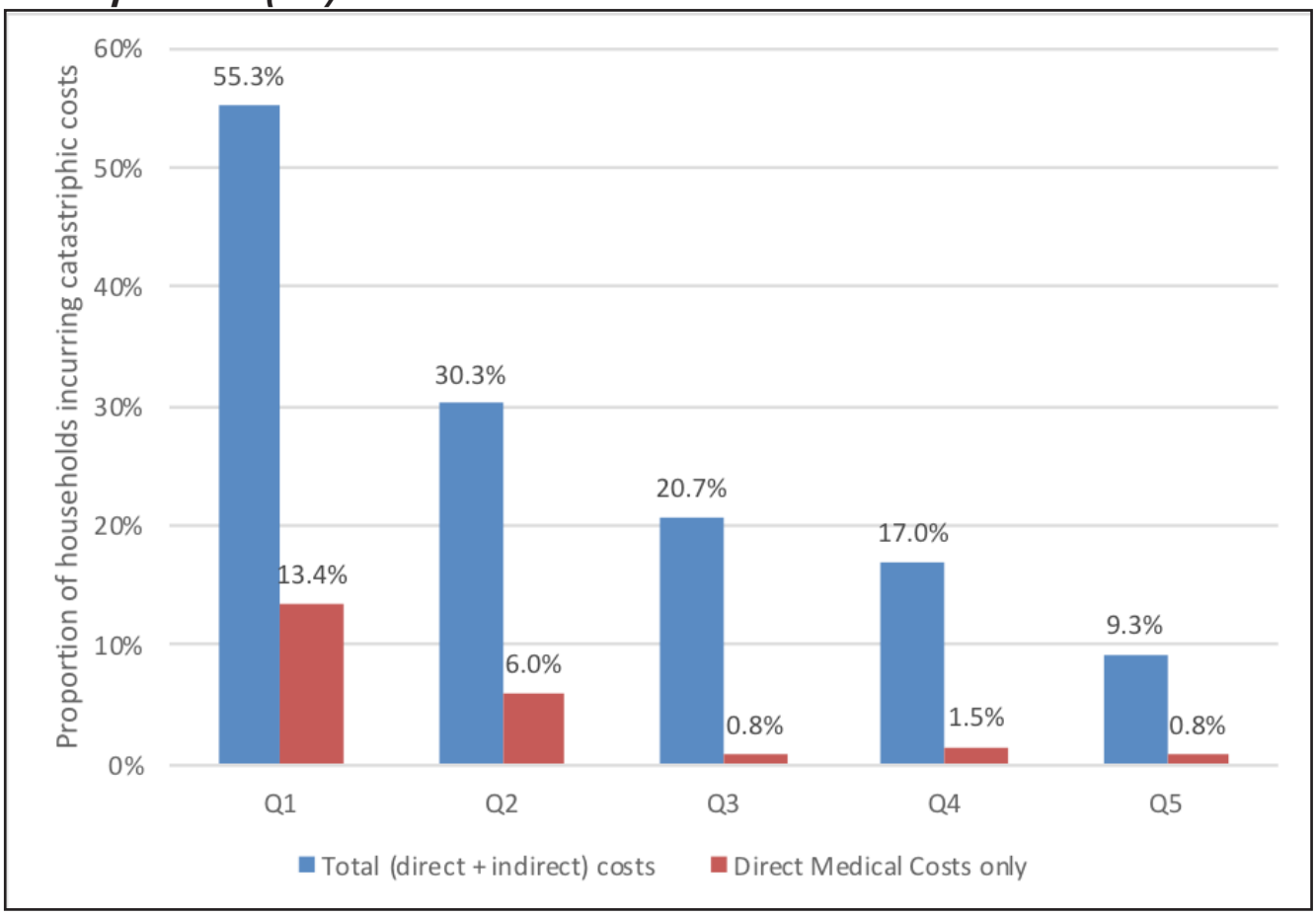
Risk Factor	Unadjusted Odds Ratio (CI)	P	Adjusted Odds Ratio (CI)	P
Age (yrs)	1 (0.99 - 1.02)	0.606	0.99 (0.97 - 1.01)	0.405
Sex				
Female	Reference		Reference	
Male	0.86 (0.56 - 1.31)	0.463	0.95 (0.55 - 1.65)	0.851
Insurance				
No insurance	Reference		Reference	
Private Insurance	0.47 (0.12 - 1.92)	0.350	1.92 (0.41 - 9.04)	0.134
NHIF	1.25 (0.7 - 2.25)		1.98 (0.93 - 4.19)	
Education				
Secondary and above	Reference		Reference	
Primary and below	0.75 (0.44 - 1.27)	0.219	0.94 (0.52 - 1.67)	0.062
No education	1.45 (0.77 - 2.73)		2.25 (1.08 - 4.68)	
Household size	0.93 (0.85 - 1.02)	0.128	0.86 (0.76 - 0.96)	**0.013**
Expenditure Quintile				
Q1	12.3 (5.24 - 28.9)		19.49 (7.73 - 49.15)	
Q2	4.3 (1.87 - 9.9)		6.58 (2.77 - 15.62)	
Q3	2.58 (1.07 - 6.23)	**<0.001**	3.37 (1.39 - 8.16)	**<0.001**
Q4	2.01 (0.79 - 5.13)		2.33 (0.92 - 5.9)	
Q5 (Highest)	Reference		Reference	
Region				
Rural	Reference		Reference	
Urban	1.33 (0.75 - 2.35)	0.314	1.4 (0.72 - 2.72)	0.313
Facility Ownership				
Private	Reference		Reference	
Public	0.72 (0.38 - 1.38)	0.314	0.59 (0.3 - 1.15)	0.117
Treatment regimen				
DS-TB	Reference		Reference	
DR-TB	18.19 (8.66 - 38.22)	**<0.001**	36.5 (17.01 - 78.31)	**<0.001**
Delay before diagnosis				
4 weeks or less	Reference		Reference	
> 4 weeks	1.37 (0.79 - 2.37)	0.249	1.29 (0.69 - 2.42)	0.408

Risk Factor	Unadjusted Odds Ratio (CI)	P	Adjusted Odds Ratio (CI)	P
Current Phase of treatment				
Intensive	Reference		Reference	
Continuation	0.65 (0.42 - 1.02)	0.059	0.69 (0.39 - 1.21)	0.187
HIV Co-infection				
HIV -ve	Reference		Reference	
HIV +ve	1.36 (0.91 - 2.02)	0.127	1.42 (0.89 - 2.25)	0.136
Diabetes Co-infection				
Diabetes -ve	Reference		Reference	
Diabetes +ve	0.72 (0.19 - 2.79)	0.623	1.41 (0.26 - 7.74)	0.681
BMI at diagnosis				
> 18.5	Reference		Reference	
18.5 or less	1.27 (0.82 - 1.95)	0.269	1.12 (0.67 - 1.86)	0.656

Total Costs, and Direct Medical Expenditure, as a Percentage of Annual Household Expenditure, by Expenditure Quintiles

The proportion of patients experiencing catastrophic costs was highest in the lower expenditure quintiles as shown in figure 5.

Figure 5: Proportion of households experiencing total costs above 20% of annual household expenditure (blue), and proportion with direct medical costs above 40% of household non-food expenditure (red)



CHAPTER 5 DISCUSSION

This was the first national survey of costs faced by TB patients and their households in Kenya. It documents the magnitude and main drivers of different types of costs incurred by TB patients and their households, in order to guide policies to reduce financial barriers to accessing care and minimize the adverse socioeconomic impact of TB. In line with the End TB Strategy, it also provides the baseline upon which to periodically measure the percentage of TB patients and their households who incur catastrophic costs due to TB. Despite the progress made in provision of free TB diagnosis and treatment in Kenya, there is a high proportion of TB-affected households experiencing catastrophic costs due to TB. Overall 26.5% of TB affected households, including 86.4% of DR-TB affected households experienced catastrophic costs. The overall median costs borne by patients seeking diagnosis and treatment per TB episode was KES 26,041.49. Median total cost of KES 25,874.00 and 145,109.53 was incurred as a result of an episode drug susceptible TB illness and drug resistant TB (DR-TB) respectively. Direct non- medical costs due to nutrition and food supplements accounted for 68.5% of expenses (KES 17,739.71). To cope, 27.8% of TB patients used dissaving mechanisms like taking a loan, use of savings and sale of assets to meet the expenses. Significant predictors for experiencing catastrophic costs were coming from a low expenditure quintile, having no education, having a small household size and presence of DR-TB.

In Kenya, TB services are provided in both public and private sectors but as data from this survey reveals the level of payments differ substantially. Patients seeking TB services in the private sector paid up to 10 times more than public sector attendees implying that TB diagnosis and treatment costs in the private sector represent a substantial economic burden that can result in catastrophic expenditures. Approximately half of all the health facilities in Kenya are managed by either private for profit or not for profit organizations, therefore a substantial proportion of health care is obtained in the private sector further aggravating the risk of catastrophe [3].

The lower expenditure in public sector are due to subsidies through government that make screening, diagnosis and treatment costs lower. These findings should catalyze the strengthening of public private partnership for provision of affordable TB care in private health sector and further highlights the importance implementing the public private partnership action plan 2018-2021 for TB control in Kenya.

Half of TB patients in Kenya have moderate and severe malnutrition at diagnosis [25], majority from the lower expenditure quintile with an attendant higher risk to catastrophic expenditures as reported in this study. This is in tandem with reports from other studies that TB diagnosis and treatment is closely associated with catastrophic expenditure and that the disease is a major cause of poverty aggravation because people with the disease face the double burden of reduced income and increased expenses on items like food and nutritional supplements. Priority should therefore be placed on designing of holistic TB care programs that go beyond medical aspects and include patient nutrition, transportation, and overall wellbeing as integral parts [26] [27,28].

The fact that fewer TB patients in the lower expenditure quintiles resort to dissaving mechanisms compared to the higher quintiles, may suggest that they forego care when their costs go beyond their capacity to pay. In addition, the poverty perpetuation due to total costs of care may be compounded in patients with co-morbidities such as HIV and DM attending health facilities whose services are not integrated.

The data from the current survey and an article authored by Vankatesan focusing on TB stigma and social injustices point to serious social consequences of TB; loss of jobs, social exclusion, interruption of schooling, spousal separation etc. This likely leads to patients to hide their illness or not seek care from fear of jeopardizing their personal and professional life including marital prospects and schooling.

In addition, such patients will be more hesitant to seek solace with others compounding their psychological trauma and isolation [29].

The current study demonstrates that TB patients and their caregivers lose valuable hours of productivity while incurring huge out of pocket expenditure seeking care, worse among DR-TB patients, which could partly be solved adoption of patient centered service delivery approaches that can help minimize the time spend in care seeking. The direct non-medical costs constitute an important barrier to accessing TB services and have to be addressed in the emerging Universal Health Coverage (UHC) and social protection in Kenya. This is because, as shown in this study the mere abolishment of direct charges for diagnosis and treatment, without addressing costs related to food/nutritional support and transport does not assure patients of affordable health care. The recent TB national prevalence survey reported that only 45% of those who fall sick with TB are diagnosed and treated. Therefore, reducing financial barriers may encourage more individuals to seek care for TB and help close the current case detection gap.

CONCLUSION

The results of this survey of costs faced by TB patients and their households reveal a high economic and financial burden due to TB disease and contributes to inform the multi-sectoral actions required to end the TB epidemic in Kenya. Some of the main cost drivers are costs related to direct non-medical costs related to food support and travel that could be reduced through social support while medical insurance and improved models of TB care can help mitigate the direct medical and indirect costs.

Comparison with other similar catastrophic studies

Seven national surveys had been completed, in Ghana, Myanmar, the Philippines, Republic of Moldova, Timor Leste and Viet Nam. The findings of this survey are similar to those in Myanmar, demonstrating that a high proportion of TB patients are experiencing catastrophic total costs as a result of TB (using a threshold of costs representing more than 20% of household consumption expenditure).The findings also suggest that people with multidrug-resistant TB (DR-TB) face a particularly serious burden, and that some of these costs could be reduced through improved (more patient-centered) models of care and adoption of new tools, while others indicate a need for social assistance and other forms of social protection.

Similar to the current study, four studies [30–33] defined catastrophic costs to be expenditures due to TB care exceeding a threshold of 20% of annual household income. However, unlike the rest, our study used a threshold of 20% of annual household expenditure. In the Vietnam, Philippines, Peru and Ghana studies, the proportion of households that experienced catastrophic costs due to TB were 63%, 35%, 39% and 64% respectively. As earlier mentioned, this Kenyan survey found almost similar findings to Philippines, with 26.1% of households experiencing catastrophic costs due to TB care.

Studies from India, Nigeria, South Africa and Kenya that were reviewed did not include a threshold of annual household income against which they measured catastrophic costs due to TB. India found those who faced catastrophic TB care expenditures amounted to 10%, which was the proportion of different costs in relation to annual household income [34]. A study in South Africa showed the cost associated with a TB episode totaled 22% of the average pre-symptoms individual income [35]. In the Nigerian study, 24.9% of households lost income due to TB illness, additionally, 9.7% of TB patients relied on children of school going age to finance the cost of TB illness (36). Relatedly, this Kenyan survey found that 9.3% of children interrupted schooling due to TB illness in the household. We can infer that the children in the Nigerian study had to interrupt school in order for households to afford to finance TB care for their sick members.

Only Vietnam and Ghana stratified costs experienced per TB episode in terms DS-TB and DR-TB profile. Both studies found that DS-TB patients paid less (USD 1068 and USD 851 for Vietnam and Ghana, respectively) for their care than DR-TB patients (USD 4289 and USD 1716 for Vietnam and Ghana, respectively) [30,32]. These findings are similar for the Kenya survey which revealed that DS-TB patients paid less (KES 25,874.00 or USD 252.4) than DR-TB patients (KES 145,109.53 or USD 1415.7) for their TB care, however these costs could be understated since TB patients were not followed from the beginning of their treatment to the end of their treatment. Similarly the Peru study found that DR-TB patients experienced higher catastrophic costs (54%) than

DS-TB patients (38%) [33]. Similar to the Kenyan survey the main cost drivers for Vietnam, India and Philippines were non-medical costs such as food and transport [31,32,34]. One of the risk factors to catastrophic costs in the Benin study included being in the lowest and lower quintiles [37], which is similar to the Kenyan survey.

Majority of the reviewed studies from Philippines, Nigeria, Benin and Kenya showed that TB patients had to borrow money; 25%, 26.3%, 37% and 57% respectively to finance TB illness [20,31,36,37]. In this Kenyan survey, 4.7 % of TB patients had to borrow money for TB illness. In the Nigerian, South African and Benin studies; 22.8%, 5% and 52% respectively, of households with TB patients had to sell assets to finance TB illness. As earlier mentioned, 2.1% of households with TB patients had to sell assets to finance TB illness in the Kenyan survey. The Benin study, reported that 51% of households depleted their savings to finance TB illness, while the Kenyan survey revealed that 24.2% of households with TB patients used their savings to pay for TB illness [37]. The combined dissaving in Vietnam was almost similar to the findings of the Kenyan survey; 38% versus 27.8% respectively, which includes borrowing money, use of savings and sale of assets [32].

In the Nigerian study, 11.7% TB patients lost their jobs and 4.4% of the TB patients divorced (36) while the Kenyan survey revealed that 39.1% TB patients lost their jobs and 21.3% of the TB patients divorced or separated from their partners due to TB illness. The same study further disaggregated the social impact of TB by gender and found that more men (2.6%) experienced divorce than women (1.8%). Furthermore, more men (7.4%) reported loss of work than women (4.3%) (36). Similarly, the Kenyan survey revealed that more men (43.8%) reported loss of work than women (31.4%). In addition, more women (6.1%) than men (4.8%) indicated disruption of day to day activities, separation from friends and reduced attendance for gatherings.

Other reviewed studies did not report on social exclusion and food insecurity. The Kenyan survey revealed that TB patients suffered from social exclusion (36%) and food insecurity (27.1%). In the Philippines study, at least 50% of the respondents were already poor even before the TB illness. With the illness, the proportion of the poor increased, from 51 to 60% among urban DS-TB patients, 67 to 74% among rural DS-TB patients, and 58 to 71% among DR-TB patients [31]. The Kenyan survey looked at income loss due to TB (44.0%), which reduced the income of DS-TB by almost half and for DR-TB by two thirds. A study conducted in Kitui and Mutomo districts in Kenya to assess access barriers to tuberculosis care, showed that 57% of the patients reported borrowing money and 52% selling assets (20). Other similar studies reported depleted their savings, borrowed money, sold assets or did budget cut as coping strategies [31,32,35–37].

CHAPTER 6

POLICY IMPLICATIONS AND RECOMMENDATIONS FROM THE FINDINGS OF THE STUDY

Programmatic and Policy Implications

1. The study underscores the need to integrate TB care and patient support

This TB patient cost survey shows that TB patients and their households can face debilitating and often catastrophic total costs due to the disease, related to indirect costs such as income loss, direct medical costs transport or food costs. The study underscores the need to integrate patient support into TB treatment and care.

This can be achieved by enhancing TB specific social protection measures and linking eligible patients to existing generic social protection measures schemes. However, TB-specific social protection measures are often quick remedies that may not be sustainable. Linking with generic schemes is more sustainable and scalable. Several countries have recognized this and taken up social protection systems, including cash transfer programmes for poor and vulnerable population's e.g. Brazil, India and the Philippines. In these countries TB-specific social support projects are in place to assist patients by providing food, cash, vouchers, or other economic or psycho-social support. [5,6].

In Kenya, the Ministry of East Africa Community, Labour, and social protection coordinates a safety net programme that disburses KES 2,000.00 per month to eligible individuals like elderly, people with disabilities. In addition, the National Tuberculosis Leprosy and Lung Disease Program (NTLD - Program) operates a Global Fund supported TB specific cash transfer programme that disburses KES 6000 to all DR-TB patients enrolled on treatment. To further strengthen and expand social protection to eligible TB patients, the emerging UHC and existing social protection should be integral parts of TB plans.

Though direct non-medical costs due to nutritional/ food requirement constitute a major cost burden, food support to TB patients in Kenya is neither well aligned to the needs of the patients and is generally not sufficient to reach all the vulnerable patient groups and their households. Strengthening TB nutrition programs collaboration to address these concerns and ensure better access of eligible patients to supplemental food support and food security to all households affected by TB is therefore imperative.

2. Increasing the National Hospital Insurance Fund (NHIF) coverage

TB is primarily "supply-side" financed through central and county governments and hence providing challenges in engagement private sector in its care who according to this survey have costs that were 10 times more than public health sector. The low NHIF coverage among TB patients (13.6% for this study) means that only few patients can benefit. In addition, the provider payment rates are considered insufficient by health providers who then charge extra. Sufficient insurance reimbursements can significantly reduce the cost of TB care borne by patients in private sector and in addition motivate more private providers to participate in TB care. This survey further recommends that key components

of TB care like chest radiography should also be included into the NHIF benefit package.

3. Multi-stakeholder approach to TB programming

The challenges brought to fore by the survey offers a unique opportunity to implement the End TB Strategy since they require interaction across various government ministries, donor agencies, patient communities, Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs) on ways to prioritize addressing TB through a multi- sectoral approach. Such a multi- sectoral forum would have to acknowledge the influence of the various social and economic determinants to TB epidemic in Kenya. Multi-stakeholder fora will also facilitate collaboration between the Ministry of Health, NTLD - Program and existing social protection agencies [4,5]

RECOMMENDATIONS

1. Link TB-related vulnerable households to existing social protection programs in the country
    a. TB should be considered an eligibility criterion for cash transfer programs due to the short-term disability imposed in the duration of treatment and the household children who become vulnerable to infection and loss of education
    a. The Social Protection single registry of vulnerable households and social protection beneficiaries at the Ministry of Labour and Social Protection should be linked to new TB notifications to pro-actively identify vulnerable TB households and trigger assessment of their eligibility for social support
2. Align food support with need by extending it to cover all TB patients with moderate to severe malnutrition and malnourished children in TB households and ensure equity in food support by extending vulnerable groups like men
3. Increase the population coverage of NHIF
4. In collaboration with labour sector authorities, develop and implement policies and laws to eliminate discrimination and ensure job security for TB patients
5. Engage all providers in the provision of timely and quality-assured TB care to reduce delays in accessing diagnosis and treatment
6. Establish a high-level multi-stakeholder coordinating mechanism and forum for the implementation of the End TB Strategy

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APPENDICES

APPENDIX 1: INFORMED CONSENT EXPLANATION FOR ELIGIBLE SURVEY PARTICIPANTS

Title of Study:
An Assessment of the Economic Burden incurred by Tuberculosis Patients and their Households in Kenya

Introduction:
My name is _____ from Ministry of Health. I am here to gather information from you, that will help us assess the costs that people face when they are treated for TB as well as the costs faced while seeking health care before the diagnosis of TB.

Purpose of Study:
This survey is being conducted by the Ministry of Health and its main purpose is to find out what TB patient cost are when seeking health care before diagnosis and during treatment. The survey will also determine how these costs affects the patients and their households, describing the coping mechanisms. This information will help the Ministry of Health plan on how to reduce financial barriers to TB treatment access and adherence.

Procedure to be followed:
All TB patients registered for treatment in the health facility and have received treatment for at least 2 weeks in the first phase (intensive) of treatment or are in the second phase (continuous) of treatment will qualify to be interviewed using the survey questionnaire. The questions to be asked will be about your personal income, the income of your household and on how much you spent while looking for health care before you were diagnosed with TB and during your treatment.

Risks:
Efforts will be taken to maintain confidentiality so that risks of disclosing the information you have given us will be fully minimized. All data collected will be handled confidentially and no names will be included in reports. The data will be stored in computers with passwords and hard copies will be kept in lockable cabinets that have authorised access to the investigators only. We assure you that your eligibility for any existing reimbursement schemes will not be affected by your participation.

Benefits:
There will be no direct benefit to you for your participation. But your contribution will help us to better understand the magnitude and factors related to TB patients costs in the country. This will go a long way in minimizing financial barriers that prevent TB patients receiving optimal care.

Assurance of confidentiality:
All the answers you have provided us will be handled confidentially. Your identity will not be disclosed in any public reports or publications or to any other parties.

Storage of data:
Records relating to your participation in the survey will be stored at the Central Survey Office for analysis. Access to these records will only be to the investigators.

Right to refuse or withdraw:
It is important for you to understand that your participation in this survey is completely voluntary. We would be really grateful if you would agree to participate in this survey, but do feel free to decline. If you decline, there will be no consequence for you and you will receive all the care and treatment you need at the health facility as usual and also you will not lose any benefit

that you are entitled to at the clinic. If you choose to participate in this survey, you may still withdraw from the survey at any stage without giving any explanation for your withdrawal.

Subject: If during the course of this study you have any questions concerning the nature of this research you should contact;
PI, Dr Enos Masini, NTLD (MOH), P.O. Box 20781-00100 Nairobi, Kenya.
Telephone Number: 0710477236

Or

Co-PI, Dr Jane Ong'ang'o, KEMRI/CRDR, P.O. Box 47855-00100 Nairobi, Kenya
Tel Number: 0722 733829

If in case you have a question concerning your rights of participation, you should contact; The Secretary, Ethical Review Committee African Medical & Research Foundation (AMREF- Health Africa) P.O. Box 27691,Nairobi

I _____ have read/been read to the information shown above and had the opportunity to ask questions and all were answered satisfactorily. I hereby give consent for my participation as explained to me.

Survey participant's name: _____
Sign: _____
Date _____

Witness's name: _____
Sign: _____
Date _____

Name of Interviewer: _____
Sign: _____
Date _____

APPENDIX 2: PATIENT INFORMATION AND INFORMED CONSENT FOR PARENT/ GUARDIAN

Title of Study:
An Assessment of the Economic Burden incurred by Tuberculosis Patients and their Households in Kenya

Introduction:
My name is _____ from Ministry of Health. I am here to gather information about your child, that will help us assess the costs that people face when they are treated for TB as well as the costs faced while seeking health care before the diagnosis of TB.

Why do I have talk to you?
Your child has been invited to participate in this survey because your child is diagnosed with a Tuberculosis and is already on treatment. Before you agree that your child can take part in this survey, you need to know the risks and benefits to help you decide. This process is known as "informed consent". This informed consent form tells you about the survey that your child is being asked to participate in. I will take you through the informed consent process and you are free to ask me or any survey staff any questions or even discuss any issues related to the survey. This study has been approved by the Ethical Review Committee African Medical & Research Foundation (AMREF- Health Africa) P.O. Box 27691,Nairobi. Your decision that your child participates in this study is voluntary. This means:

1. You are free to decide if your child participates in this study or not
2. You are free to stop survey-related activities at any time and without the need of giving any reason
3. If you do not want your child to participate in this survey, then this decision will not affect the medical care of your child

Purpose of Study:
This survey is being conducted by the Ministry of Health and its main purpose is to find out what TB patient costs are when seeking health care before diagnosis and during treatment. The survey will also determine how these costs affects the patients and their households, describing the coping mechanisms. This information will help the Ministry of Health plan on how to reduce financial barriers to TB treatment access and adherence.

Procedure to be followed:
All TB patients registered for treatment in the health facility and have received treatment for at least 2 weeks in the first phase (intensive) of treatment or are in the second phase (continuous) of treatment will qualify to be interviewed using the survey questionnaire. The questions to be asked will be about your personal income, the income of your household and on how much you spent while looking for health care before your child was diagnosed with TB and during his/her treatment.

Risks:
Efforts will be taken to maintain confidentiality so that risks of disclosing the information you have given us will be fully minimized. All data collected will be handled confidentially and no names will be included in reports. The data will be stored in computers with passwords and hard copies will be kept in lockable cabinets that have authorised access to the investigators only. We assure you that your eligibility for any existing reimbursement schemes will not be affected by your participation.

Benefits:
There will be no direct benefit to you for your child's participation. But your contribution will help us to better understand the magnitude and factors related to TB patients costs in the country. This will go a long way in minimizing financial barriers that prevent TB patients receiving optimal care.

Assurance of confidentiality:
All the answers you will provide will be handled confidentially. Your child's identity will not be disclosed in any public reports or publications or to any other parties.

Storage of data:
Records relating to your child's participation in the study will be stored at the Central Survey Office for analysis. Access to these records will only be to the investigators.

Right to refuse or withdraw:
It is important for you to understand that your child's participation in this study is completely voluntary. We would be really grateful if you would agree to allow your child to participate in this survey, but do feel free to decline. If you decline, there will be no consequence for your child and he/she will receive all the care and treatment he/she needs at the health facility as usual and also, he/she will not lose any benefit that he/she is entitled to at the clinic. If you choose to participate in this survey, you may still withdraw your child from the survey at any stage without giving any explanation for your withdrawal.

Subject: If during the course of this survey you have any questions concerning the nature of this research you should contact;
PI, Dr Enos Masini, NTLD (MOH), P.O.Box 20781-00100 Nairobi, Kenya.
Telephone Number: 0710477236

Or

Co-PI, Dr Jane Ong'ang'o, KEMRI/CRDR, P.O. Box 47855-00100 Nairobi, Kenya
Tel Number: 0722 733829

If in case you have a question concerning your rights of participation, you should contact; The Secretary, Ethical Review Committee African Medical & Research Foundation (AMREF- Health Africa) P.O. Box2769, Nairobi

I _____ have read/been read to the information shown above and had the opportunity to ask questions and all were answered satisfactorily. I hereby give consent for the participation of my child as explained to me.

Survey participant's name: _____

Name of parent/guardian: _____
Sign: _____
Date _____

Witness's name: _____
Sign: _____
Date _____

Name of Interviewer: _____
Sign: _____
Date _____

APPENDIX 3: PATIENT INFORMATION AND ASSENT ADOLESCENTS 12-17 YEARS OF AGE

Title of Study:
An Assessment of the Economic Burden incurred by Tuberculosis Patients and their Households in Kenya

The Ministry of Health is doing a research survey to find out the costs that people face when they are treated for TB as well as the costs they face while seeking health care before the TB disease is confirmed in them. A research survey is a way to learn more about an issue that affects people. The information from the survey will help the Ministry of Health plan on how to reduce costs that prevent TB patients from receiving TB treatment or completing the treatment. If you decide that you want to be part of this survey, your parents/guardians will be asked questions on your illness and the costs related to the illness. When we are finished with this study we will write a report about what was learned. This report will not include your name or that you were in the study.

What if I have any questions?
You can ask the Survey staff any questions that you have about the study. Every question you have is a good question. If you have a question later that you didn't think of now, you can call Dr Enos Masini/ Dr Jane Ong'ang'o the Principal Investigator on phone number 0710 477236/0722733829

Do my parents know about this?
We talked to your parent(s) (or guardian) about this survey and they said that you could be in it. You can talk this over with them before you say you will or will not be in it.
Your parent(s) or guardians are receiving more information about this survey in a different form. If you want to know about the survey, you may read and talk about the forms that were signed by your parent(s) or guardian.

Do I have to be in the study?
You do not have to be in this study if you do not want to be. If you decide to stop after we begin, that's okay too. Your parents know about the study too.

If you decide you want to be in this study, please sign your name.

I, _____, want to be in this research survey.

_____ _____
(Sign your name here) (Date)

Witness's name: _____
Sign: _____
Date _____

Name of Interviewer: _____
Sign: _____
Date _____

APPENDIX 4: CATASTROPHIC COST ASSESSMENT QUESTIONNAIRE FOR PATIENTS

Part I. Informed consent

Part II. Patient information to be obtained from TB treatment card before interview	
Question	**Answer categories***(circle appropriate number or fill answer on the answer line)*
Date of Interview	(Day/month/year)……/……/……
Name of Region	……..
1. Name of Sub-County	……..
2. Place of interview (facility name)	……..
Interviewer Name	…….
3. Category of treating facility	1. Dispensary 2. Health Center 3. Sub county hospital 4. County 5. National referral Hospital 6. Faith based hospital 7. Private Clinic 8. Private Hospital
4. Name of the patient	
5. TB treatment Registration Number	
6. Age of patient:	____years
7. Sex	1. Male 2. Female
8. HIV status (as indicated on treatment card)	1. positive 2. negative 3. not done
9. a) BMI (as indicated in the treatment register) b) Z-score (for children)	_____ _____
10. a) Is patient receiving nutrition support? b) If Yes, which type (could be multiple answers)	1. Yes 2. No 1. Nutrition counseling 2. Therapeutic Feeds 3. Fortified Blended Flour 4. Vitamin A 5. Pyridoxine
11. Is the patient Diabetic?	1. Yes 2. No
12. A) Is the patient hospitalized at the time of interview?	1. Yes 2. No

12. B) If Yes what was the admission?	(Day/month/year)……/……/…… Not known
13. Bacteriological TB test used	 1. Smear microscopy: not done, done-positive, done negative 2. Culture: not done, done-positive, done negative, done awaiting results 3. Xpert MTB/RIF): not done, done-MTB Detected RS, done-MTB Detected RR, done-MTB detected Indeterminate, done-MTB not detected, done- invalid results
14. Was Chest X-ray done?	1. Yes 2. No
15. Date of Diagnosis	(Day/month/year)……/……/…… not done or unknown
16. Place of diagnosis	1 Dispensary 2. Health Center 3. Sub county hospital 4. County referral hospital 5. National referral Hospital 6. Faith based hospital 7. Private Clinic/Lab 8. Private Hospital
17. Type of TB	1. Pulmonary TB 2. Extra-pulmonary TB
18. Total duration of planned treatment from start	_____months intensive _____months continuation
19. What Treatment regimen are you receiving?	1. DS TB Treatment 2. DR TB Treatment
20. Treatment registration group	DS TB 1. New 2. Relapse 3. Treatment after loss to follow-up 4. Treatment after failure 5. Previous treatment, history unknown DR TB 1. New (initial MDR) 2. Relapse 3. Treatment after loss to follow-up 4. Treatment after failure of 1st-line drugs 5. Treatment after failure of retreatment 6. XDR 7. Other, specify: ……
21. Start date of current TB treatment	(Day/month/year)……/……/……
22. The patient is currently in intensive or continuation treatment phase?	1. Intensive phase, ___weeks of phase completed 2. Continuation phase, ___weeks of phase completed

23. If receiving DOT, who is the current DOT provider/supporter?	1. HCW 2. Community health worker/volunteer 3. Family member/ HH member/Friend

Part III. Overview of TB treatments before current treatment (for re-treatment cases only) This part is to be filled if patient is on first line re-treatment and MDR re-treatment cases only! If new case (MDR or non-MDR treatment): skip to section IV.			
24. How many times have you been treated for TB before?	———	1st	2nd
25. Year of treatment		1. Year; ____ 2. Not Known ____	1. Year; ____ 2. Not Known ____
26. Where were you treated?		1. Dispensary 2. Health Center 3. Sub county hospital 4. County Hospital 5. National referral Hospital 6. Faith based hospital 7. Private clinic 8. Private Hospital 9. Other_____	1. Dispensary 2. Health Center 3. Sub county hospital 4. County Hospital 5. National referral Hospital 6. Faith based hospital 7. Private clinic 8. Private Hospital 9. Other_____
27. Was it 1st line or MDR -TB treatment		1. First line TB treatment 2. MDR-TB treatment 3. Unknown	1. First line TB treatment 2. MDR-TB treatment 3. Unknown
28. How many months of treatment did you complete?		1. __ months 2. Unknown	1. __ months 2. Unknown
29. Were you hospitalized during this treatment?		1. Yes 2. No	1. Yes 2. No
30. If Yes, for how long in total		1. Yes, 1a __days 1b unknown_____ 2. No	1. Yes, 1a __days 1b unknown_____ 2. No

Part IV - Costs before the current TB treatment and Coping (filled for new cases in intensive phase only)

- ***New cases in intensive phase, non-MDR TB treatment, as well as those on MDR-TB treatment.***
- ***For retreatment case or new case interviewed in the continuation phase: skip to Part V***

Out-of-pocket expenditure, reimbursements and time loss before and during TB diagnosis (before start of TB treatment)		
Question	**Answer categories** *(check all that apply or fill answer on the answer line)*	***Instructions and actions for interviewer***
31. Looking back, when do you think you first started having symptoms for this episode of TB? *(For this episode of TB, how many weeks before you were diagnosed with TB did you experience symptoms of the disease)*	Weeks before treatment started:_____	*First construct a timeline of events, either starting with the first TB symptom, or start with time of TB diagnosis and work backwards. Use the locally adapted calendar with main seasonal events that the patient can relate to and use as a reference point for timing. To help the patient remember when the illness started, you can ask which TB symptom was first experienced, after having probed for cough, weight loss, chest pain, night sweats. If there is a problem defining the difference between TB symptoms and other health problems, ask which symptom led the patient to seek care, then ask when that symptom first occurred or became worse and started to worry the patient.*
32. Before your TB treatment started at this facility, from which of the following types of facilities did you seek care or advice for symptoms of the current illness (including hospitalizations; several facility types can be mentioned)? 33. How many weeks before starting TB treatment in the current facility did you visit each of these providers?	1st visit, provider type ☐ Weeks before treatment started:___ 2ndvisit, provider type ☐Weeks before treatment started:___ 3rdvisit, provider type ☐ Weeks before treatment started:___ 4thvisit, provider type ☐ Weeks before treatment started:___ 5th visit, provider type ☐ Weeks before treatment started:___ 6th visit, provider type ☐ Weeks before treatment started:___ 7th visit, provider type ☐ Weeks before treatment started:___ 8th visit, provider type ☐ Weeks before treatment started:___ 9thvisit, provider type ☐ Weeks before treatment started:___	*Enter in chronological order, using one of these provider categories for each visit, and entering how many weeks before TB treatment start each visit was. Also report on table below.* 1. Dispensary 2. Health Center 3. Sub county hospital 4. County hospital 5. National referral Hospital 6. Faith based hospital 7. Pharmacy / Drugstore 8. Herbalist / traditional healer 9. Private clinic 10. Private hospital 11. Community Health Worker 12. Spiritual healer 13. Other:……..

34. How much money and time did you spend for each of these visits before you were diagnosed with TB, including the visit when you actually received your diagnosis?	☐ See table below, and ask for each item ☐ Fill one line per visit ☐ For all that don't apply, mark/select NA ☐ If there were payments for an item, but the patient cannot remember the amount, mark NR ☐ Add more rows if more visits were made before diagnosis of TB!

				Medical out-of-pocket payments, (Total per visit) (A)								Non-medical out-of-pocket payments, (Total per visit) (B)					Out-of-pocket payments (A+B) (Gross)	(C)	Out-of-pocket payments per stay (A+B-C) (Net)
Visit	Type of provider (see list)	Travel time Days: Hours:	Time spentfor visit Days: Hours:	Day charges (for hospitaizations only) A1	Consutation fee A2	Radiogrphy and other imaging A3	Lab tests A4	Other procedure A5	Medicines A6	Other, incl nutriational supplements A7	Medical payments, total ΣA1-7	Travel (patient) B1	Travel of accompanying person	Food during health care visit or hospital stay B2	Other, including accommodation B3	Non-medical out-of-pocket payments (Total) ΣB1-3	Total out-of pocket-paments (ΣA1-7) + (ΣB1-3)	Health insurance reimbursement	
1st		D: H:	D: H:																
2nd		D: H:	D: H:																
3rd		D: H:	D: H:																
4th		D: H:	D: H:																
5th		D: H:	D: H:																
6th		D: H:	D: H:																
7th		D: H:	D: H:																
8th		D: H:	D: H:																
9th		D: H:	D: H:																
10th		D: H:	D: H:																

Total time spent	ΣD: ΣH:	ΣD: ΣH:					
Medical out-of-pocket payment, total			ΣA				
Non-medical out-of-pocket payment, total				ΣB			
Gross out-of-pocket payment, total					ΣA+B		
Reimbursements, total						ΣC	
Net out-of-pocket payment(A)+(B)-(C), total							

Question		Visit 1	Visit 2	Visit 3	Visit 4
35. How did you pay for the Services Received ***[Circle all that apply]***	**MODE OF PAYMENT**	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***
	1.Cash	***1***	***1***	***1***	***1***
	2.Community health insurance scheme	***2***	***2***	***2***	***2***
	3.Given opportunity to pay later (credit)	***3***	***3***	***3***	***3***
	4.Waived/exempted	***4***	***4***	***4***	***4***
	5. Paid in kind	***5***	***5***	***5***	***5***
	6. NHIF	***6***	***6***	***6***	***6***
	7.Private Insurance	***7***	***7***	***7***	***7***
	8.Don't Know	***8***	***8***	***8***	***8***
36. If you indicated in Q35 that you paid in kind, please list down the items and cost them using the prevailing market rates in that region **Items Qty Unit Price** 1…… 2…… 3……		***Total Value In KSh*** _____	***Total Value in KSh*** _____	***Total Value in KSh*** _____	***Total Value in KSh*** _____

37.If you paid by cash, where did you get the funds to pay for the services and how much was paid from each source [Record *all that apply]*	Multiple responses allowed			
Source of funds				
1 Had own cash available				
2. Was given money by (friends, family members & relatives- **No repayment was expected)**				
3. **"Harambee"** contributions				
4. Borrowed money				
6. Sold household assets				
7. Waived/exempted				
8 Reimbursed by well wisher				
9. Given opportunity to pay later (Credit)				
10. Others (specify)				
11. Don't Know *(Enter 00)*				

Part V. Cost during current TB/MDR-TB treatment and Coping (to be filled for all patients) ***For patients in continuation phase ask for hospitalization and visits <u>in the continuation phase only.</u>***		
Question	**Answer categories***(check all that apply or fill answer on the answer line)*	***Instructions and actions for interviewer***
38 a) How much do you estimate is the net pay of your household per month at the time of your diagnosis		

38 b). In the last one month have you missed taking your medication?	1. **Yes** **2. No**	
38 c). If Yes, what was the reason	1. **Lack of transport money to go pick the medicine** 2. **Unable to get time off from work to go pick the medicine** 3. **Too ill to be able to take medication** 4. **Lack of food to support you taking the medicine** 5. **Other (Specify)**	
39. During your TB treatment have you experienced any side effects due to TB medication	**1. Yes** **2. No**	
40. Are you currently hospitalized?	1. Yes 2. No	If yes, the cost data collected applies to the first row of the table below
41 a). During your current TB treatment, have you been hospitalized? 41 b). If Yes, how many times?	1. Yes_____ Times _____ 2. No	1. *Concerns only hospitalization during the current treatment phase: For patients in continuation phase, ask only for hospitalization in this phase.* 2. *Does not include hospitalization before the current TB treatment started:* *For new cases, hospitalizations prior to TB treatment started should be filled in part IV.* *For retreatment cases, hospitalization during previous treatments should be filled in part III.* *If answer to both question 40 and 41 are "no", then skip to question 46*
42. About how much money and time did you spend for each of these hospitalizations?	See table below, and ask for each item. Fill one line per visit. For all that don't apply, mark/select NA If there were payments for an item, but the patient cannot remember the amount, mark NR	

				Medical out-of-pocket payments, (Total per stay) (A)								Non-medical out-of-pocket payments, (Total per stay) (B)					Out-of-pocket payments per stay (A+B) (Gross)	(C)	Out-of-pocket payments per stay (A+B-C) (Net)
Hospitalization	Type of hospital (Q35 see list)	Number of days hospitalised	Travel time	Day charges (total for stay) A1	Consultation fee (total for stay) A2	Radiography and other imaging (total for stay) A3	Lab tests including cost of transporting samples (total for stay) A4	Other procedures, including surgery, biopsy, etc A5	Medicines to treat TB (total for stay) A6	Other medicines, including nutritional supplements (total for stay) A7	Medcal payment-Total) ΣA1-7	Travel (patient) (total for stay) B1	Travel for accompanying persons	Food (total for stay) B2	Other (payment for linen, soap, other services& administrative) (total for stay) B3	Non-medical out-of-pocket payments (Total) ΣB1-3	Total out of pocket payments	Health insurance Reimbursement	
1st																			
2nd																			
3rd																			
4th																			
5th																			
6th																			

Total hospital days (for income loss)	Σ					
Medical out-of-pocket payments, total	Σ A					
Non-medical out-of-pocket payment, total	ΣB					
Grossout-of-pocket payment		Σ(A+B)				
Reimbursement, total			ΣC			
Net out-of-pocket payment(ΣA)+(ΣB)-(ΣC), toptal				Σ(A+B-C)		

Question		Visit 1	Visit 2	Visit 3	Visit 4
43. How did you pay for the services received **[*Circle all that apply*]**	**MODE OF PAYMENT**	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***
	1.Cash	***1***	***1***	***1***	***1***
	2.Community health insurance scheme	***2***	***2***	***2***	***2***
	3.Given opportunity to pay later (credit)	***3***	***3***	***3***	***3***
	4.Waived/exempted	***4***	***4***	***4***	***4***
	5. Paid in kind	***5***	***5***	***5***	***5***
	6. NHIF	***6***	***6***	***6***	***6***
	7.Private Insurance	***7***	***7***	***7***	***7***
	8.Don't Know	***8***	***8***	***8***	***8***
44. If you indicated in Q43 that you paid in kind, please list down the items and cost them using the prevailing market rates in that region **Items Qty Unit Price** 1…… 2…… 3……		***Total Value In KSh*** ____	***Total Value in KSh*** _____	***Total Value in KSh*** _____	***Total Value in KSh*** _____

45.If you paid cash, where did you get the funds to pay for the services and how much was paid from each source [Record *all that apply]*	Multiple responses are allowed

Source of funds				
1 Had own cash available				
2. Was given money by (friends, family members & relatives- **No repayment was expected)**				
3. **"Harambee"** contributions				
4. Borrowed money				
6. Sold household assets				
7. Waived/exempted				
8 Reimbursed by well wisher				
9. Given opportunity to pay later (Credit)				
10. Others (specify)				
98. Don't Know *(Enter 00)*				

Costs for DOT and food costs during ambulatory care		
Question	**Answer categories***(check all that apply or fill answer on the answer line)*	***Action for interviewer***
46. On a daily basis, do you currently take your medicines yourself without supervision or support (self-administered) or do you have a treatment supervisor or supporter (DOT)?	1. Self-administered 2. DOT	☐ *DOT (Directly observed treatment) visit is for the supervision of daily intake of medicines, i.e, what is done every day. These questions are not referring to less frequent trips to pick up drugs (e.g., weekly), which are explored from question 51 onwards.* ☐ *This question concerns the treatment phase the patient is currently in* ☐ *If patient is interviewed in the intensive phase and on DOT go to question 47* ☐ *If patient is interviewed in the intensive phase and on self-administered treatment skip to question 51* ☐ *Responses to be validated against treatment card*

47.If DOT, how many times a week?	(number)	*The maximum will be 7 times a week*
48. If you are now in the continuation phase, did you take your medicines in the intensive phase yourself without supervision or support (self-administered) or did you have a treatment supervisor or supporter (DOT)?	1. Self-administered 2. DOT 3. Patient is now in the intensive phase	*If patient is interviewed in the continuation phase and has been on self-administered treatment both now and in the intensive treatment, skip to question 48* *Responses to be validated against treatment card*
49.If DOT, who is the DOT provider/supporter?	1. Health Care Worker 2. Community health worker/ volunteer 3. Family member/Relative/ HH member/Friend	*Validated against question 25 in the treatment card*
50 a). Did the DOT provider come to you ? *(If NO go to q51)*	1. Yes 2. No	
50 b) If Yes, Was there a fee paid to the provider of DOT?	1. Yes If yes, amount:_____ 2. No	
51. How long did the last DOT visit take, including travel time and waiting time (total turnaround time)?	….. minutes	
52. What was the cost of transport (return) for the last DOT visit, in total for you and any accompanying household member?		
53. How much did you spend on food and drinks for the last DOT visit (on the road, while waiting, lunch etc.), in total for you and any accompanying household member?		

Costs of picking up drugs and food costs during ambulatory care		
54. a) Do you Pick up Drugs for yourself?	1. Yes. 2. No	*This does not concern DOT visits, which should recorded in questions 48 -53, but should be filled if patient or other household member picks up drugs for either bringing to DOT provider or for self-administered treatment.* *If patient is on DOT and patient or household member is* ***not*** *picking up drugs to bring to DOT provider then the answer is no.* *If no, skip to question 58*
54. b) If No, who picks up the drugs for you?	1. household member 2. DOT Supporter 3. Other (Specify)	
55. where do you or your household member pick up your TB drugs?	1. Dispensary 2. Health Center 3. Sub county hospital 4. County 5. National referral Hospital 6. Faith based hospital 7. Private Clinic 8. Private Hospital 9. Other_____	*If the patient has visited different places, tick the most recent one.*
56. How often do you or a DOT supporter or household member pick up TB drugs in the current treatment phase?	Every week Every 2 weeks Every month Every Day Other_____	
57. Was there a fee paid to the drug provider?	1. Yes If yes, amount:_____ 2. No	
58. What accommodation cost did you and any accompanying household member have when you last picked up drugs?		

59. How long did the last visit to pick up drugs take, including travel time and waiting time (total turn-around time)?	….. minutes	
60. What was the cost of transport (return) last time you picked up drugs, in total for you and any accompanying household member?		
61. How much did you spend on food and drinks last time you picked up drugs (on the road, while waiting, lunch etc.), in total for you and any accompanying household member?		

Cost during outpatient visits for medical follow-up (see the doctor or nurse, have tests) *This concerns clinical check-up, follow up, and additional visits due to side effects or other TB related issues. It does not include DOT visits or visits to pick up drugs. For patients in the continuation phase, ask only how many visits since the start of the intensive phase.*

Question	**Answer categories***(check all that apply or fill answer on the answer line)*
62. How many TB-related medical follow-up visits have you had so far during this treatment phase(to see the doctor or nurse, have follow- up tests, etc.)?	____times
63. How long did the last follow-up medical outpatient visit take, including travel time and waiting time (total turnaround time)?	….. minutes
64. What was the cost of transport (return) at the last follow-up medical outpatient visit in total for you and any accompanying household member?	
65 . What accommodation cost did you have for the last visit, in total, for you and any accompanying household member?	
66. What fees did you pay during your last follow-up medical outpatient visit for registration/consultation?	Registration/consultation fee……
67. What fees did you pay during your last follow-up medical outpatient visit for radiography and other imaging?	

68. What fees did you pay during your last follow-up medical outpatient visit for tests, TB tests and others?	Fees for tests……
69. What fees did you pay during your last follow-up medical outpatient visit for other procedures?	
70. What fees did you pay at your last follow-up medical outpatient visit for TB medicines, including prescriptions for medicines bought outside the facility?	Drug fees …….
71. What fees did you pay during your last follow-up medical outpatient visit for other medicines, including nutritional supplements?	
72. What other fees not listed in the previous questions did you pay during your last follow-up medical outpatient visit?	Other fees……

Coping Questions

Question		*Visit 1*	*Visit 2*	*Visit 3*	*Visit 4*
73. How did you pay for the services received [***Circle all that apply***]	**MODE OF PAYMENT**	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***	***Circle code(s)***
	1.Cash	***1***	***1***	***1***	***1***
	2.Community health insurance scheme	***2***	***2***	***2***	***2***
	3.Given opportunity to pay later (credit)	***3***	***3***	***3***	***3***
	4.Waived/exempted	***4***	***4***	***4***	***4***
	5. Paid in kind	***5***	***5***	***5***	***5***
	6. NHIF	***6***	***6***	***6***	***6***
	7.Private Insurance	***7***	***7***	***7***	***7***
	8.Don't Know	***8***	***8***	***8***	***8***
74. If you indicated in Q37 that you paid in kind, please list down the items and cost them using the prevailing market rates in that region		***Total Value In KSh***	***Total Value in KSh***	***Total Value in KSh***	***Total Value in KSh***

Items Qty Unit Price 1…… 2…… 3……	____	_____	_____	_____

75.If you paid by cash, where did you get the funds to pay for the services and how much was paid from each source [Record *all that apply]*	Multiple responses allowed			
Source of funds				
1 Had own cash available				
2. Was given money by (friends, family members & relatives- **No repayment was expected)**				
3. **"Harambee"** contributions				
4. Borrowed money				
6. Sold household assets				
7. Waived/exempted				
8 Reimbursed by well wisher				
9. Given opportunity to pay later (Credit)				
10. Others (specify)				
11. Don't Know *(Enter 00)*				

Costs for nutritional/food supplements	
76 a) Do you buy any nutritional supplements <u>outside your regular diet</u> because of the TB illness, for example vitamins, as recommended by health care staff?	1. Yes 2. No *If no, skip to question 72*

76 b). If yes, how much did you spend on nutritional supplements in the past week approximately?	
77 a) Do you buy any additional food outside of your regular diet because of the TB illness, for example meat, energy drinks, or fruits as recommended by health care staff?	
77 b) If yes, how much did you spend on this additional food in the past week approximately?	

Time loss for guardians

- ***Not to be filled if the patient is under 15 years – for children, all questions concerning costs, time spent, income, and income loss in sections IV and V concern cost for the guardian.***
- ***Note: out-of-pocket costs of transport, food, accommodation for guardian should be included in questions on Part V (tables).***

Question	**Answer categories**
78. Did somebody in your household accompany you for your last: a) DOT visit b) Visit to pick up drugs (or picked up drugs for you) c) Medical follow up visits d) Hospitalization	 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No *Several responses possible* *Time loss to be calculated with previous responses by patient*
79. If yes, did that person lose an income during that time?	1. Yes 2. No *If several responses in question75, ask about the latest visit when a household member accompanied*
80. How much was the income loss from the guardian?	

Health insurance scheme	
Question	**Answer categories** *(check all that apply or fill answer on the answer line)*
81. Do you have health Insurance?	1. Yes 2. No
82. If Yes, which type of health Insurance do you have?	1. National Health Insurance Fund (NHIF) 2. medical allowance 3.community based health insurance 4. Private health insurance 5. Other (specify)

Social position *If patient is under 15 years old, these questions concern the guardian*	
Question	**Answer categories***(circle the most appropriate or fill answer on the answer line)*
83. Have you ever been to school?	1. Yes 2. No
84. If Yes , What education level did you complete?	1. Nursery 2. Primary school 3. Post primary / vocational 4. Secondary school 5. College (middle level) 6. University 7. Other _____
85. What education level did the head of the household/primary income earner in the household complete?	1. Nursery 2. Primary school 3. Post primary / vocational 4. Secondary school 5. College (middle level) 6. University 7. Other _____

86 a) What is your main occupation Currently?	1. Unemployed 2. Formal paid work 3. Informal paid work 4. Retired 5. Student 6. Other (specify):_____
86 b) How much do you earn per month from your occupation?	
87. What was your primary employment, or normal work, or normal other main activity before you contracted TB?	1. Unemployed 2. Formal paid work 3. Informal paid work 4. Retired 5. Student 6. Other (specify):_____

Socioeconomic status Index questions

	Question		Option 1	Option 2	Option 3
88.	Does your household have: a) electricity?		Yes	No	
b)	a television?		Yes	No	
c)	a sofa?		Yes	No	
d)	a cupboard?		Yes	No	
e)	a DVD player?		Yes	No	
f)	a radio?		Yes	No	
g)	a table?		Yes	No	
h)	a clock?		Yes	No	

89	What is the main material	of the floor of your			
	dwelling?		Cement	Earth, sand	Other
90	What is the main material	of the external walls of			
	your dwelling?		Dung/mud/soil	Other	
91	What is the main material	of the roof of your			
	dwelling?		Thatch/grass/ makuti	Other	
92	What type of fuel does	your household mainly use		LPG/Natural	
	for cooking?		Wood	gas	Other
93	What kind of toilet facility	do members of your			
	household usually use?		No facility/bush/ field	Other	

94	How many adult and children regularly sleep in your household? (including patient, if variable, at time of diagnosis)	Adults _____ Children _____

Income (reported) before contracting TB *If patient is under 15 years (or a student with no idea of household income earnings, these questions are for the guardian.*	
95.Were you the person who earned the highest income in your household before you contracted TB?	1. Yes 2. No
96. How many hours a week were you working before you contracted TB? *(This refers to the time before TB symptoms developed).*	_____hours
97. If you were in paid work, how much do you estimate your net income from labour related activities, per month was before you contracted TB?	_____

98. What was the combined monthly pay of members of your Household before you contracted TB? (All family member's income must be counted)	_____
Income changes and social consequences ***If patient is under 15 years, these questions are for the guardian***	
Question	**Answer categories***(circle the most appropriate or fill answer on the answer line)*
99. During intensive phase , have you had to change jobs or profession?	1. Yes 2. No
100. If Yes, has your income changed?	1. Yes, upwards 2. Yes, Downwards 3. No
101. During continuation phase , have you had to change jobs or profession? Yes No	1. Yes 2. No
102. If Yes, has your income changed?	1. Yes, upwards 2. Yes, Downwards 3. No
103 a). How much is your monthly pay now?	_____
103 b). What is the combined monthly pay of members of your household now?	_____
104. Approximately how many working days of income have you lost due to your TB illness overall? *(Working days of income: e.g., if a patient was not able to work for 5 half days and lost income for these, the number of days lost is 0.5*5=2.5. Report for total TB episode, incl. all days before and after job loss.)*	… working days before diagnosis of TB (but due to TB disease) AND … working days after TB diagnosis
105. Did you or your household receive any of the following social protection benefits during this illness?	1. Yes 2. No

106. If yes, what type	1. Paid sick leave 2. Cash transfer for the vulnerable (specify, elderly, OVC,MDR, disability,) 3. Nutritional Support 4. Others (specify)
107. Do you currently receive vouchers or goods in kind to cope with TB illness? If yes, what estimated amount (Kshs) per month *(More than one category allowed.)* *If no, skip to question 111.*	1. Yes 2. No a. Travel voucher: ____per month b. Food support: ____per month c. Other enablers etc___per month 2. No
108. From whom do you receive the voucher/ goods	1. Government 2. NGO 3. Employer 4. Private donation 5. Other, specify
109 a). Has the TB illness affected your social or private life in any way? *(More than one category allowed).* 109 b) If yes, how?	1. No 2. Yes 1. Food insecurity 2. Divorce or Separated from spouse/partner 3. Loss of Job 4. Interrupted schooling 5. Social exclusion 6. Other
109 c). The impact of your household financially since you experienced TB symptoms has been that your household became	1. Richer 2. Unchanged 3. Poorer 4. Much poorer

110	**How much did your household <u>spend in last 7 days</u> on the following key foods and beverages?**	**Kshs**
	1 Oil and fats (include vegetable oil etc.) ……....	
	2 Cereals (including maize grains, maize and wheat flour, beans, rice etc) ……..	
	3 Livestock/ Poultry produce e.g. Milk and eggs……	
	4 Fish …… ……..	
	5 Meat including (/liver, ”matumbo”, chicken, pork etc. ……	
	6 Sugar and beverage (tea, coffee etc. ……..	
	7 Bread …… ……..	
	8 Spices e.g. “Curry powder” ……..	
	9 Vegetables, carrots …….	
	10 Fruits …… ……	
	11 Roots (sweet potatoes, yams, arrow roots etc.) ……..	
	12 Soft drinks (soda, Juice etc) ……	
	13. Beer/ Wines/Miraa (includes wines, beers, spirits, “muratina”/ “karubu”/ “mnazi” etc.)……	
	14. Soap and detergents……	
	15 Meals (Kiosk, restaurant, road side vendors) …….	
	[If you can’t give a break down, please provide the total amount spent on food and beverages]	
	16. Give us an estimate of how much you spend in total of all the above items Amount in KSH…….	

	MONTHLY HOUSEHOLD EXPENDITURE AND CONSUMPTION		
111	How much did your household spend in last one month on the following?	[redacted]	Amount (KSh)
	1) Cosmetics	[redacted]	
	2) Soap and detergent	[redacted]	
	3) Hair dressing/barber	[redacted]	
	4) Rent	[redacted]	
	5) Electricity	[redacted]	
	6) Water	[redacted]	
	7) Kerosene/paraffin	[redacted]	
	8) Telephone bills/Airtime	[redacted]	
	9) Transport	[redacted]	
	10) Charcoal	[redacted]	
	11) Fire wood	[redacted]	
	12) Cooking gas	[redacted]	
	13) Salaries including salaries/wages for domestic workers	[redacted]	
	14) Remittances (in cash and kind)	[redacted]	
	15) Sanitary towels	[redacted]	
	16) Others (Specify)	[redacted]	
	Total amount		
	17) Give us an estimate of how much you spend in total of all the above items Amount in KSH……		

112	**ANNUAL HOUSEHOLD EXPENDITURE AND CONSUMPTION**		
	How much did your household spend in the last one year on the following?		Amount (KSh)
	1) Education (registration, uniforms, books, tuition, exam fees)		
	2) Maintenance and repairs including car and buildings etc.		
	3) Clothing and footwear		
	4) Wedding/dowry including contributions/harambees for the same to other HHs		
	5) Funerals including contributions/harambees for the same to other HHs		
	6) Capital expenditures including cars, plots etc.		
	7) Others (specify)		
	Total amount	…….	
	8) Give us an estimate of how much you spend in total of all the above items Amount in KSH…….		

Thank you for your cooperation! Is there anything you would like to ask or say?			
Comments by Interviewer:			
Date*(dd/mm/yyyy)*:	……/……/…….	**Signature interviewer:**	……

APPENDIX 5: LIST OF CONTRIBUTORS

	Name	Role	Organization
1	Dr. Enos Masini	Principal Investigator	WHO
2	Dr. Jane Ong'ang'o	Co-Principal Investigator	KEMRI
3	Eunice Mailu	Study Coordinator	NTLD-Program
4	Dr. Edwine Barasa	Heath Economics Expert	KEMRI Wellcome Trust
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11	Dr. Maureen Kamene	Co-Investigator	NTLD-Program
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17	Dr. Richard Muthoka	Co-Investigator	NTLD-Program
18	Rose Wambu	Co-Investigator	NTLD-Program
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30	Dr. Poly Kiende	Report Writing	NTLD-Program
31	Jacqueline Limo	Report Writing	NTLD-Program
32	Martin Githiomi	Report Writing	NTLD-Program

APPENDIX 6: LIST OF SAMPLED CLUSTERS

	County	Cluster/Sub County	Sampled Facilities
1	Baringo	Koibatek	Eldama Ravine District Hospital
			Emining Health Centre
			Igure Dispensary
2	Busia	Matayos	Busia District Hospital
			Matayos Health Centre
			Bukalama Dispensary
3	Embu	Mbeere North	Mbeere District Hospital
			Ishiara Sub-District Hospital
			Kanyuambora Dispensary
4	Garissa	Garissa	Garissa Provincial General Hospital (PGH)
			Medina Health Centre
			Utawala Dispensary
5	Homa Bay	Homa Bay	Homa Bay District Hospital
			Miniambo Dispensary
			Asumbi Health Centre
6	Tana River	Tana River	Chewani Dispensary
			Hola District Hospital
			Makere Dispensary
7	Kakamega	Kakamega Central	Kakamega Provincial General Hospital (PGH)
			Bukura Health Centre
			Nabongo Dispensary
8	Kwale	Msambweni	Diani Health Centre
			Msambweni District Hospital
			Gombato Dispensary (CDF)
9	Kirinyaga	Kirinyaga South	Difathas Health Centre
			Kimbimbi Sub-District Hospital
			Thiba Dispensary
10	Kitui	Kitui North	Kitui District Hospital
			Katulani Sub District Hospital
			Kasyala Dispensary

	County	Cluster/Sub County	Sampled Facilities
11	Mombasa	Likoni	Bomu Medical Centre
			Likoni District Hospital
			Mtongwe (MCM) Dispensary
12	Kajiado	Kajiado North	Embul - Bul Catholic Dispensary
			Ngong Sub-District Hospital
			Ongata Rongai Health Centre
13	Makueni	Makueni	Makueni District Hospital
			Matiliku District Hospital
			Kitise Health Centre
14	Marsabit	Marsabit	Dirib Gombo Dispensary
			Marsabit District Hospital
			Tumaini Medical Clinic (Marsabit)
15	Meru	Imenti South	Consolata Hospital (Nkubu)
			Kanyakine District Hospital
			Mitunguu Dispensary
16	Migori	Suna East	Migori District Hospital
			Saro Dispensary
			St Joseph Mission Hospital
17	Samburu	Samburu Central	Maralal District Hospital
			Kisima Dispensary
			Suguta Marmar Health Centre
18	Murang'a	Murang'a South	Makuyu Health Centre
			Maragua District Hospital
			Kenol Hospital
19	Nairobi	Kasarani	Dandora II Health Centre
			Kariobangi Health Centre
			Kasarani Health Centre
20	Nakuru	Naivasha	Naivasha District Hospital
			Mai Mahiu Health centre
			Karagita Dispensary
21	Nandi	Emgwen	Kapkangani Health Centre
			Kapsabet District Hospital
			Kilibwoni Health Centre

	County	Cluster/Sub County	Sampled Facilities
22	Kisii	Kisii Central	Kisii Hospital (Level 5)
			Oresi Health Centre
			Matongo Dispensary
23	Nyandarua	Nyandarua South	North Kinangop Catholic Hospital
			Bamboo Health Centre
			Engineer District Hospital
24	Pokot	West Pokot	Kanyarkwat Dispensary
			Kapenguria District Hospital
			Turkwel Health Centre
25	Siaya	Bondo	Bondo County Hospital
			Got Agulu Sub-County Hospital
			Uyawi Dispensary
26	Kilifi	Malindi	Malindi District Hospital
			Municipal Health Centre
			Jambo Clinic
27	Tharaka Nithi	Maara	Chogoria (PCEA) Hospital
			Muthambi Health Centre
			Magutuni District Hospital
28	Trans Nzoia	Trans Nzoia West	Kitale District Hospital
			Tom Mboya Dispensary
			Bikeke Health Centre
29	Uasin Gishu	Eldoret West	Huruma District Hospital
			Mois Bridge Health Centre
			Turbo Health Centre
30	Kiambu	Gatundu	Gatundu District Hospital
			Igegania Sub-District hospital
			Mangu (AIP) Dispensary


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