ACCEPTABILITY OF A PROTOTYPE POINT OF CARE TEST FOR HUMAN TAENIOSIS AND CYSTICERCOSIS DIAGNOSIS, IN MBEYA AND SONGWE REGIONS, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PUBLIC HEALTH AND FOOD SAFETY OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

The proto-type *Taenia solium* taeniosis/cysticercosis point of care test (*TSTC*-POC test) is a combined *T. solium* taeniosis / cysticercosis diagnostic test that enables immediate diagnosis of individuals suffering from taeniosis or cysticercosis or both, and hence, enabling immediate interventions. A cross-sectional study was carried out in selected District health facilities (Ifisi, Makandana and Vwawa) of Mbeya and Songwe Regions, Tanzania to assess perceptions and factors influencing the acceptability of the *TSTC*-POC test among individuals who were tested during a *TSTC*-POC test proto-type evaluation. The assessment of acceptability of the *TSTC*-POC test was carried out through application of Health Belief Model (HBM), a social science theoretical framework. A total of 260 persons were interviewed using a structured questionnaire immediately after they undertook the *TSTC*-POC test. Data were analyzed using SPSS 16.0 where descriptive statistics and association between variables using Chi-square test were computed. Statistical significance was established at 95% confidence level and p value <0.05. The acceptability of the POC test was high (95.4%). The main factor making the test acceptable was the short time it took between testing and getting the result (45.3% of the respondents). Factors that motivated individuals to undergo the *TSTC*-POC test include the perceived threat of the disease (death and disabilities), trust in health practitioners and the diagnostic tool itself. Acceptability of *TSTC*-POC test was not influenced by study hospital, age groups, gender, education level and primary occupation of study participants. It is concluded that the *TSTC*-POC test is acceptable among study population of Mbeya and Songwe region, southern Tanzania. Information on the test's sensitivity and specificity is required to guide its adoption and promotion for control of TSTC in Tanzania, a potential breakthrough in TSTC surveillance.

DECLARATION

I, **THOMAS Emil,** do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done and that it has neither been submitted nor being concurrently submitted for a degree award in any other institution.

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DEDICATION

I dedicate this work to all my family members. Their love and support during my study time gave me strength and wisdom to accomplish my goal.

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LIST ABREVIATIONS AND SYMBOLS

Abbreviation	Descriptive meaning
CC	cysticercus cellolosae
CDC	Centre for Disease Control and Prevention
CT scan	Computed Tomography scan
CVMBS	College of Veterinary Medicine and Biomedical Sciences
DC	District Council
DNA	Deoxyribonucleic Acid
MPH	Master of Public health
mRDTs	Malaria Rapid Diagnostic Test (s)
EDCTP	European and Developing Countries Clinical Trials Partnership
ELISA	Enzyme-linked immunosorbent assay
FAO	Food and Agriculture Organization of United Nations
FPC	Finite population correct
HBM	Health Belief Model
HC	Human cysticercosis
HIV	Human Immunodeficiency Virus
MRCC	Medical Research Coordinating Committee
MRI	Magnetic Resonance Imaging
NCC	Neurocysticercosis
NIMR	National Institute for Medical Research
OIE	*World Organization for Animal Health Office International des Epizooties*
OPD	Outpatient Department
PC	Porcine cysticercosis
PCR	Polymerase Chain Reaction
PI	Principal Investigator
POCs	Point of care tests
RAS	Regional Administrative Secretary
RC	Regional Commission
SPSS	Statistical Package for the Social Sciences
SUA	Sokoine University of Agriculture
TALIRI	Tanzania Livestock Research Institute
TSTC- POC	*T. solium* taeniosis taeniosis /cysticercosis- Point of care test
UK	United Kingdoms
URT	United Republic of Tanzania
USD	United States of America Dollar
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Taenia solium is a parasite of both public health and economic importance especially in low income countries. Taeniosis is a form of the disease caused by *T. solium* in humans when the adult parasite inhabits the gastrointestinal tract following ingestion of undercooked or raw pork infected with cysticerci (larval form). *T. solium* is a neglected parasite in many developing countries and it is endemic in several areas of Tanzania including the southern highlands (Engels *et al.,* 2003; Phiri *et al.,* 2003; Ngowi *et al.,* 2004; Mwanjali *et al.,* 2013; Braae *et al.,* 2014; WHO, 2015). Patients with taeniosis suffers from no or only mild intestinal symptoms and signs including abdominal pain, loss of appetite, weight loss, and sometimes passage of proglottids in faeces. When a taeniosis patient defecates in the open, scavenging pigs may feed on the infected faeces and get infected. Infected pigs with *T. solium* suffer from the cystic form of the disease (cysticercosis) whereby the larvae lodge in the muscles and other organs. Apart from taeniosis; humans may also acquire cysticercosis through consumption of water or food contaminated with *T. solium* eggs. In human cysts may lodge in different parts of the body such as muscles, brain and visceral organs. When the cysts lodge in the brain, they may cause a fatal disease called neurocysticercosis (NCC).

Lack of knowledge on the mode of transmission of *T. solium*, poor hygiene, pig management, and inadequate medical services in rural areas are potentially major driving forces of *T. solium* infections and transmission in Tanzania (Mafojane *et al.,* 2003). In low income countries a significant proportion of pig rearing is practiced as free range production systems, with inadequate animal health services as well as poor personal

hygiene manifested by lack or shortage of household latrines and use of unsafe sources of water that exaggerate the problem (Phiri *et al.,* 2003; Ngowi *et al.,* 2004; Mwanjali *et al.,* 2013; WHO, 2015). Porcine cysticercosis leads to economical losses among farmers due to condemnation of infected carcasses (WHO/FAO/OIE, 2005; Garcia *et al.,* 2010; Nkwengulila, 2014). Human cysticercosis, especially NCC causes severe neurological conditions, including epilepsy. NCC has been found to account for most of late onset epilepsy in developing countries (Bern *et al.,* 1999; WHO/FAO/OIE, 2005; WHO, 2015; Zammarchi *et al.,* 2017).

Diagnosis of cysticercosis in pig is through tongue palpation for cysts, meat inspection and serology. In humans, the commonly available diagnostic methods for active cysticercosis include serological tests like Ag-ELISA, computed tomography (CT scan), magnetic resonance imaging (MRI) and polymerase chain reaction (PCR) (WHO/FAO/OIE, 2005; Garcia *et al.,* 2010*;* WHO, 2015; Zammarchi *et al.,* 2017). Taeniosis in humans is also diagnosed by faecal examination with a microscope identifying *Taenia* eggs although the species (*T. solium* and *T. saginata*) cannot be differentiated (WHO, 2015). Diagnostic tools for NCC in low income countries such as CT scan, MRI and PCR are expensive and rarely available (WHO/FAO/OIE, 2005; Garcia *et al.,* 2010*;* WHO, 2015). Alternative cost effective, rapid and simple point of care tests (POC) are urgently needed to improve case management in resource poor endemic countries and for effective control of cysticercosis (WHO, 2015). Point-of-care tests (POC-tests) are diagnostic tests conducted close to the patient, with rapid turnaround of results that enables immediate diagnosis and treatment (Price *et al.,* 2004; Shaw, 2016).

The performance of prototype point of care *T. solium* taeniosis/cysticercosis (*TSTC*-POC) testis evaluated. This test was developed at The Centre for Disease Control and

Prevention (CDC) in Atlanta, USA. Point-of-care tests (POCs) are diagnostic tests conducted at the nearest health facility attended by patients or even at community levels. The test should yield rapid and precise results that enable immediate diagnosis and treatment (Price *et al.*, 2004; Shaw, 2016). The *TSTC*-POC test combines the diagnosis of (neuro) cysticercosis with the diagnosis of *T. solium* taeniosis, a serological test which is based on detection of antibodies from the patient using a lateral flow principle. During this study, the test was under evaluation in Tanzania (Mbeya region and Songwe region) and Zambia. At the start of this study more than 800 individuals attending hospitals for various illnesses in Mbeya region had been tested for taeniosis and cysticercosis using the test. The performance of the test needed to be assessed, but equally important was to understand whether the *TSTC*-POC test and the logistics related to the process of testing were acceptable to tested individuals in the framework of the health belief model and the constructs of perception, beliefs and modifying variables (Rosenstock, 1974; Vahidi *et al.*, 2015; Jones *et al.*, 2016). The current study assessed perceptions and factors influencing acceptability of the *TSTC*-POC test among individuals suspect for taeniosis/cysticercosis, aged 11 years and above tested with the *TSTC*-POC test in selected district hospital outpatient department (OPD) and mental clinics in Mbeya Rural District Council (DC) and Rungwe DC (Mbeya region) and Mbozi DC (Songwe region) in the southern highlands of Tanzania.

1.2 Problem Statement and Justification of the Study

Lack of cost effective, sensitive, specific user friendly and timely *TSTC*-POC test diagnostic tools are drawbacks to effective control of *T. solium* infection. While efforts are underway in finding solutions for control and preventive measures of *T. solium* infection, including *TSTC*-POC quick diagnostic tests, perception and acceptability of such measures to the local situations is not known. Infections and diseases caused by *T.*

solium in humans and pigs remain problems of public health and food safety concern in many areas of sub-Saharan Africa including Tanzania. The infections by *T. solium/cysticercosis* lead to different disease conditions in humans, including epileptic seizures and taeniosis, and substantial economic losses due to health care of patients and time lost by the patients. A study in Tanzania reported financial loss of around 78 592 to 5 million USD per annum being (Nkwengulila, 2014; Trevisan *et al.,* 2017) associated with care of epileptic patients. For pig farmers and pork traders, the economic losses due to condemnations of affected pigs, pork and costs for the control of the disease were approximated to USD 144, 449 to 3 million USD annually in Tanzania (Nkwengulila, 2014; Trevisan *et al.*, 2017).

Studies in Tanzania have estimated the prevalence of taeniosis to be about 4.1% (Mwanjali *et al.*, 2013), pig cysticersis between 6.0% to 32% (Ngowi *et al*., 2004; Komba *et al.*, 2013; Braae *et al.*, 2014) and neuro-cysticercosis (NCC) to be up to 4.0% (Hunter *et al*., 2017). The northern and southern highlands of Tanzania are the areas with the highest pig populations and where most of the cysticercosis cases in humans and pigs have been reported (Mwang'onde *et al*., 2012; Mwanjali *et al.*, 2013; Kavishe *et al.*, 2017). Keeping pigs in a free range system, lack or limited availability of pit latrines, eating of undercooked or raw pork, eating raw vegetables and drinking untreated water are among the predisposing factors to *T. solium* infection and prevail in the rural areas of the northern and southern highlands of Tanzania. The current study assessed perceptions and other factors influencing acceptability of a proto type *TSTC*-POC test among patients who undertook the test in selected hospitals in Mbeya and Songwe regions, southern Tanzania.

1.3 Objectives

1.3.1 General Objective

Determination of perceptions and factors influencing the acceptability of the *TSTC*-PTC test among individuals suspect for *T.solium* taeniosis/cysticercosis in selected hospitals of Mbeya and Songwe regions, southern Tanzania.

1.3.2 Specific objectives

i. To assess patients' perceptions regarding *T.solium* taeniosis/cysticercosis point of care test;
ii. To determine factors influencing acceptance of the *T.solium* taeniosis/cysticercosis point of care test.

1.4 Research Questions

i. What are the tested individuals' perception`s regarding the *T.solium* taeniosis/ cysticercosis point of care test?
ii. What are the factors influencing acceptance of the *T.solium* taeniosis/cysticercosis point of care test?

1.5 Conceptual Framework

The health belief model (Glanz *et al.*, 2002); was adopted for assessment of factors influencing acceptance of the *TSTC*-POC test among tested individuals. The health belief model is described in Figure 1.

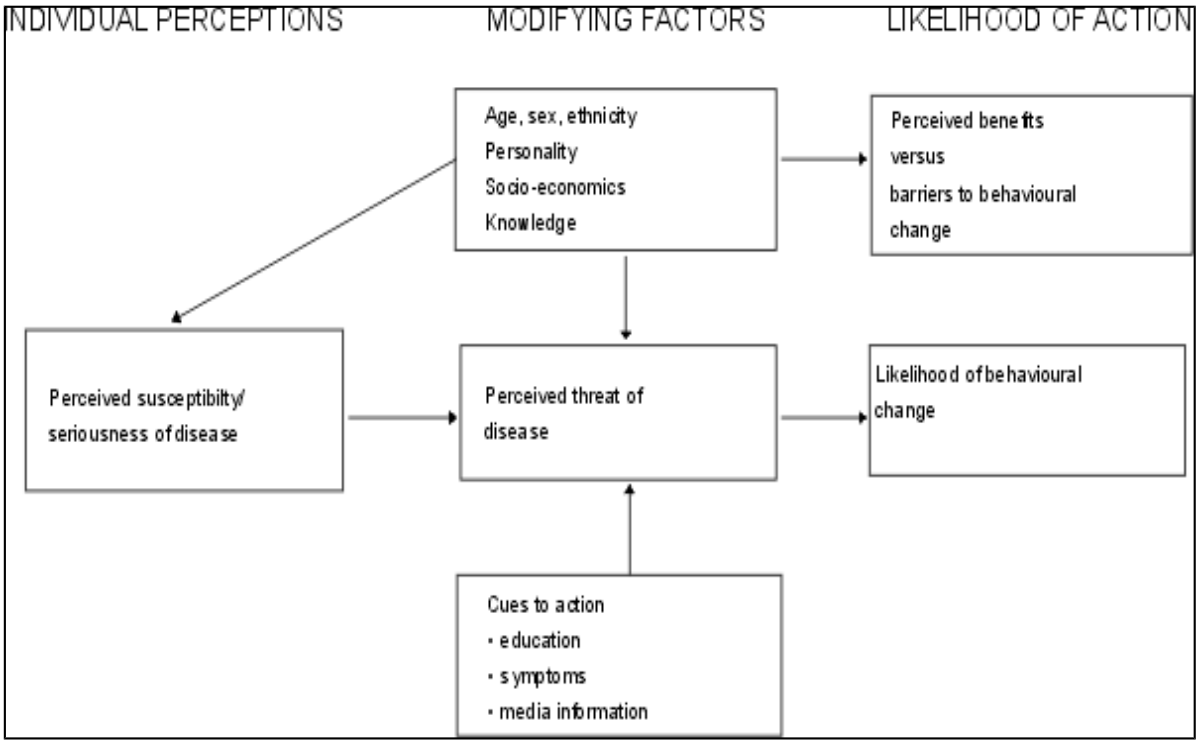

Figure 1: Conceptual health belief model Source: Glanz *et al.* (2002)

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Status of Human cysticercosis, Porcine Cysticercosis and Epilepsy due to NCC in Tanzania

Several studies on human cysticercosis (HC) and porcine cysticercosis (PC) in East Africa including Tanzania have revealed high prevalence of the diseases. A study by Mwanjali *et al.* (2013) indicated that *T. solium* infection in humans was highly endemic in the southern highlands of Tanzania. Antibody sero-prevalence of HC in Mbulu District of northern Tanzania was estimated at 16.3% (Mwang'onde *et al*., 2012) while PC was 17.4% based on lingual examination (Ngowi *et al*., 2004). A study by Kavishe *et al.* (2017) on PC reported a sero-prevalence of 25% in Babati District (northern Tanzania) based on Ag-ELISA test. A study by Braae *et al.* (2014) using Ag-ELISA reported PC prevalence of 15% in Mbeya District (southern Tanzania) while Komba *et al.* (2013), reported PC prevalence of 11.7% and 32% in Mbozi District (southern Tanzania) based on lingual examination and Ag-ELISA, respectively and 6% and 30.7% in Mbeya Rural district (southern Tanzania), by lingual examination and Ag-ELISA, respectively. Epilepsy due to NCC in Tanzania was estimated to 17 853 cases and 212 deaths associated with epilepsy due to NCC in (2012) (Trevisan *et al.*, 2017).

2.2 *Taenia solium* Life Cycle

The life cycle of *T. solium* require two hosts (human and pig). Adult worm in definitive host (human) undergo development and the intermediate host (pig) host the larvae stage after ingestion of *T. solium* eggs from the environment (Johansen *et al.*, 2014; WHO, 2015). Humans acquire taeniosis by ingestion of undercooked or raw pork infected with

cysticercus cellolosae (CC) and cysticercosis when they ingest *T. solium* eggs, water, vegetables and other food materials contaminated with eggs. The Taenia larvae lodge in tissues like muscles, eyes, visceral organs and brain. Pigs get infected by eating human feces containing *T. solium* eggs that develop into CC (Sikasunge *et al.*, 2008; Bern *et al.*, 2010). The detailed *T. solium* life cycle is shown in (Figure 2).

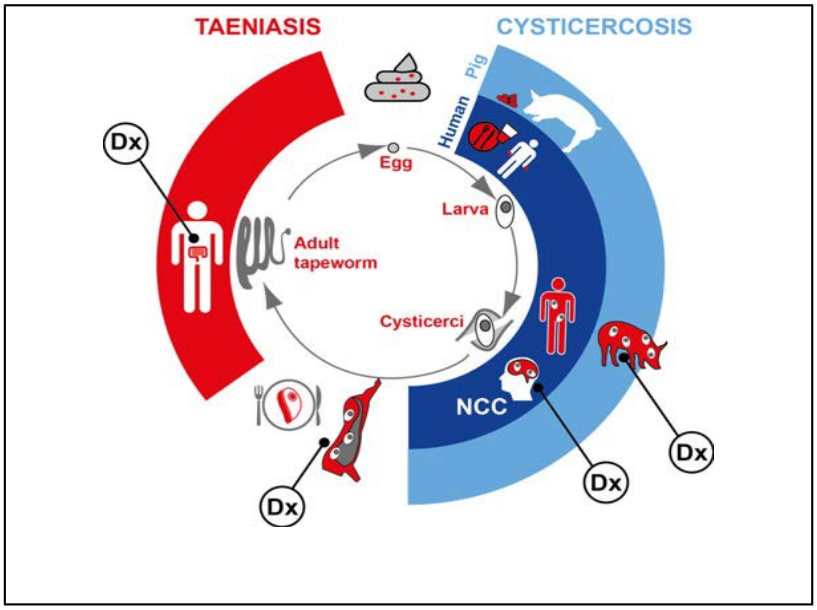

Figure 2: *T. solium* life cycle summary Source: (WHO, 2015)

2.3 Risk Factors For Taeniosis Or Cysticercosis Infection In Humans And Pigs

Risk factors for taeniosis or cysticercosis are related to the level of sanitation, pig husbandry practices and eating habits of people (WHO, 2015). Other risk factors include eating undercooked or raw pork, poor sanitation due to lack of household latrines, inadequate environment sanitation, informal slaughter of pigs without inspection, drinking untreated water, as well as consumption of raw vegetables and fruits in endemic areas and free ranging pig keeping system (Gweba *et al.*, 2010; Mwape *et al.*, 2012; Mwang'onde *et al.*, 2014; Kungu *et al.*, 2015b; Trevisan *et al.*, 2017).

2.4 Taeniosis and Cysticercosis Diagnosis in Humans and Pigs

The current human cysticercosis diagnosis is based on serological tests like ELISA and lateral flow tests that detect antigens and antibodies; molecular tests like Polymerase Chain Reaction (PCR) for detection of DNA for *T. solium* cysticercosis. Other methods are CT scan and MRI. All these test methods are expensive, limited to research and rarely available. This makes the resource-poor people unable to afford the tests for routine diagnosis (WHO/FAO/OIE, 2005; Foyaca-Sibat *et al.,* 2009; Garcia *et al.,* 2010*;* Ramahefarisoa *et al.,* 2010; WHO, 2015). Affordable point-of-care tests (POC-tests) for taeniosis or cysticercosis and neuro imaging can help to identify individuals with epilepsy and the likely suffering from NCC, but these facilities are not readily available in most countries of sub-Saharan Africa (Trevisan *et al.,* 2017). Clinical diagnosis of taeniosis is not specific or sensitive except for, presence of *T. solium* eggs in stool by microscopy, although the techniques are relatively inexpensive but indicate unspecific presence of taenia eggs (WHO, 2015). Diagnosis of cysticercosis in pig is done through tongue palpation for cysts, meat inspection and serology (WHO/FAO/OIE, 2005; WHO, 2015).

2.5 Treatment and Control of Taeniosis or Cysticercosis in Humans and Pigs

Treatment of taeniosis or cyticercosis in human and pig is through use of anthelmintics such as albendazole, praziquantel and oxfendazole for pig (Gonzales *et al.,* 1996; Trevisan *et al.,* 2017). Control of PC can be achieved through establishment of effective meat hygiene and inspection, pig confinement, and effective health education on the risks and prevention of cysticercosis and vaccination of pigs (TSOL18 vaccine) (WHO/FAO/OIE, 2005; Trevisan *et al.,* 2017). Control of human taeniosis /cysticercosis can be achieved through use of household latrines, improved personal hygiene, thoroughly cooking of pork, developing simple, fast and least costive effective diagnostic tools and health education on *T. solium* parasite life cycle (WHO, 2015).

2.6 Point-of-Care test (POC-tests) Diagnostic Tools

Point-of-care tests (POC-tests) are diagnostic tests conducted close to the patient, with rapid test results that enables immediate diagnosis and treatment (Price *et al.,* 2004; Shaw, 2016). POC diagnostic tools have the potential to improve healthcare access in rural settings that have limited laboratory infrastructure, low income and inadequate health facilities with few adequate human resources (Mashamba-Thompson *et al.,* 2017). POC diagnostic tools should be affordable, sensitive, specific, rapid and user friendly (Pai *et al.,* 2012; Drain *et al*., 2014). However, the challenges in the implementation of POC diagnostic tools may be the perception among health care providers and tested individuals (Engel *et al.,* 2015).

2.7 Health belief Model

The demographic and socio-economic characteristics such as level of income, gender, education level, and ethnicity, influence preventive health-related behavior patterns and adoption and utilization of health services (Rosenstock, 1974). The five major constructs of perception beliefs and modifying variables (perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, self-efficacy and modifying variables like education level, culture and past experience) and cues to action are the appropriate tools in assessing health intervention services (Becker, 1974; Rosenstock, 1974; Janz and Becker, 1984; Moattar *et al.,* 2014; Vahidi *et al.,* 2015; Jones *et al.,* 2016). In the present study, some of these constructs were used to assess factors influencing perceptions of the *TSTC*-POC test.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Description of the Study Area

The study was conducted in Mbeya and Songwe regions in Ifisi hospital Mbeya District Council, Makandana hospital Rungwe District Council and Vwawa hospital Mbozi District Council. Mbeya and Songwe regions are located in the south-western corner of the southern highlands of Tanzania (Figure 3). Mbeya and Songwe regions are among the areas with the highest pig population in Tanzania with a total of 346 466 pigs (URT, 2013). The total human population in Mbeya and Songwe Region is 2 707 410 (NBS, 2012). Administratively, Mbeya Region is divided into 5 districts with 7 Local Government Authorities namely: Chunya, Mbeya, Kyela, Rungwe, Mbarali, Busokelo and Mbeya City (URT, 2016). Administratively, Songwe Region is divided into five Councils namely Songwe, Ileje, Mbozi, Momba and Tunduma Town Council. The region is also divided into four districts; Songwe, Ileje, Mbozi and Momba (URT 2015).

Ecologically Mbeya and Songwe Regions are generally tropical with marked seasonal variations in temperature and rain patterns. Temperature averages range between 16^0 C in the highlands and 25^0 C in the lowland areas. The rainy season starts in October and continue to May (annual rainfall varies from 650 mm to 2600 mm (URT, 2015; URT, 2016) followed by a dry and cold season between June and September. Data were collected between January and March 2019.

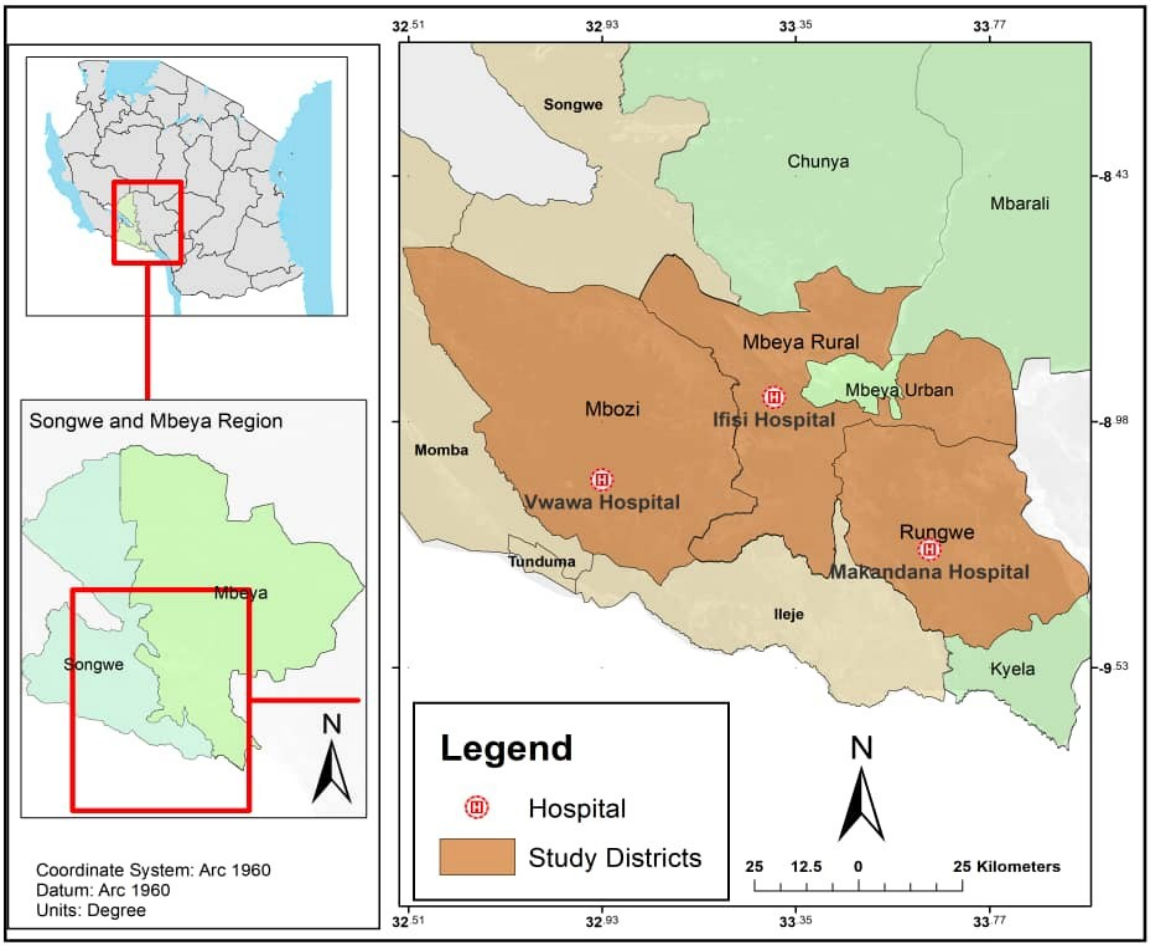

Figure 3: Map of Mbeya and Songwe Regions showing study sites

3.2 Study Design

The study adopted a cross-sectional design where quantitative and semi-qualitative data were collected using a structured questionnaire with both close-ended and open-ended questions administered orally (one-to-one) to individuals who were tested with the *TSTC*-POC test in the three district hospitals.

3.3 Study Population

The study population was individuals attending medical care including those attending mental health clinics (epileptic patients), suspected for taeniosis due to signs and

symptoms and every tenth patient attending for any ailment. Patients were enrolled following informed written consent.

3.4 Sample Size Calculation

Sample size was calculated by using (Martin *et al.,* 1987) equation one and finite population correction factor (F.P.C) equation two; assuming a 95% of confidence level and precision of 5%, and 50% acceptability (p) of *T. solium* taeniosis taeniosis /cysticercosis-POC test.

Equation 1; $n_o = Z^2pq/L^2$. Where Z= 1.96, p= 50%, L= 5%, q= 1-p

Equation 2; $$n = \frac{no\ .N}{no + (N-1)}$$

Where*:* N (800) was the population of *TSTC*-POC tested individuals and *no* is the initial sample size=384, *n* is expected sample size, L =level of precision at 5%. The study enrolled a sample size of 260 respondents.

3.5 Sampling Frame and Inclusion Criteria

The sampling frame was patients tested with the *TSTC*-POC test. The inclusion criteria were: (i) individuals aged 11 years old and above (ii) individuals who gave written consent to be tested with the *TSTC*-POC test.

3.6 Sampling Procedures and Selection of study Participants

A convenience sampling technique was adopted for individuals who were attending hospitals for various illnesses. Study participants for *TSTC*-POC testing were recruited based on three categories Pink (epileptic patients), Yellow (suspected for taeniosis due

to signs and symptoms) and Blue (every tenth patient attending for any ailment as per SOLID project protocols). Data were collected during exit interviews. Every patient exiting *TSTC*-POC test room was asked for written consent/assent to be interviewed (Appendix 1 and Appendix 2). The interviews were conducted in privacy (separate room) to secure confidentiality.

3.7 Ethical Consideration

A research permit was provided by the Vice-Chancellor of SUA (Appendix 3 and Appendix 4) and the permission letter at district level (Appendix 5) was obtained from the District Commissioner`s office of Rungwe District, and (Appendix 6) for Mbeya District council in Mbeya Region. In Songwe Region research permit was obtained from the Regional Administrative Secretary (RAS) direct to hospital authority since Vwawa is now a regional referral hospital see (Appendix 7). In addition, the ethics review subcommittee of the Medical Research Coordinating Committee (MRCC) also issued ethical approval with number NIMR/HQ/R.8c/Vol. I/1110 (Appendix 8); and (Appendix 9) for college Research Innovations and Publication Committee of CVMBS at SUA with number SUA/CVMBS//R.1/2018/9 before the research that involved patients. Participation in the study was voluntary. After explanation of the purpose and importance of the study participants were asked to sign the consent/assent form (Appendix 1); and (Appendix 2) which abided with the rules and regulations of research in human subjects from MRCC. Confidentiality of the study participants was strictly observed.

3.8 Data Collection Questionnaire

A structured questionnaire with both closed-ended and open-ended questions was administered (Appendix 10) and the information collected included: socio-

demographic characteristics of respondents, knowledge on the disease, perceptions about own susceptibility to infections, perceptions on the seriousness of the disease, perceptions and reasons for participating in the POC test, perceptions on own test results and willingness to be tested in the future.

3.8.1 Pre- testing of data collection tools

Pre testing of the questionnaire was done to check potential errors and logical flow of questions, at Vwawa Hospital. Eight respondents were interviewed and their answers were used to correct errors in the questionnaire. Pre-testing was conducted by the principal investigator (PI) and two research assistants. The questionnaire was translated into Kiswahili.

3.8.2 Recruitment and training of research assistants

Two graduates were recruited as research assistants and trained for one day. Training included: study objectives, familiarization with the study questions and data confidentiality aspects, ethical consideration and how to get consent from a study participant.

3.9 Data Collection Methods, Processing and Analysis

3.9.1 Data collection methods

Interviews were conducted in the designated room after a participant exited the *TSTC*-POC test room. Before conducting face to face interviews, respondents were asked if they were willing to participate in the study. Data were collected between January and March 2019 while monitoring and verification of data were conducted on weekly basis.

3.9.2 Data processing and analysis

Questionnaire data were; verified, coded and entered into a Microsoft Excel spread-sheet, cleaned, labeled and cross checked before importing them into SPSS 16.0 for analysis. Descriptive statistics were used for categorical (frequency or percentage) and Chi-squire test to check for factors influencing acceptance of *TSTC*-POC test. Statistical significance was established at 95% confidence level and p value < 0.05.

CHAPTER FOUR

4.0 RESULTS

4.1.1 Socio-demographic characteristics of respondents

A total of 260 respondents were recruited. Table 1 shows the socio-demographic characteristics of the respondents. The variables that were assessed include study location, respondent's age, gender, level of education and primary occupation. The majority 143 (55%) of the respondents had primary education and those engaging in small scale farming were 159 (61.2%).

Table 1: Social demographic characteristics of respondents (n=260)

Variable	Category	Number of respondents	Percent
Study location	Mbozi D C - Vwawa hospital	139	53.5
	Mbeya D C - Ifisi hospital	72	27.7
	Rungwe D C - Makandana hospital	49	18.8
Age group (Years)	11-30	111	42.7
	31-50	89	34.2
	51-70	49	18.8
	≥71	11	4.2
Gender	Male	109	41.9
	Female	151	58.1
Level of education	No formal education	48	18.5
	Primary school education	143	55.0
	Secondary school education	44	16.9
	Tertiary education	25	9.6
Primary occupation	Smallholder farmer	159	61.2
	Business man/woman	20	7.7
	Other	81	31.2

4.1.2 Awareness on pig tapeworm, cysticercosis and transmission cycle

Table 2 summarizes the results on respondents' awareness on taeniosis, cysticercosis and transmission cycle. The level of awareness was <50% for both taeniosis and cysticercosis. Awareness on how taeniosis infection could be acquired was 68.1% who reported that a

person could acquire taeniosis through eating infected and improper cooked pork. Awareness on cysticercosis infection and transmission was zero; with 40.2% of the respondents reporting that eating infected and improperly cooked pork was the way a person could acquire cysticercosis.

Table 2: Awareness on taeniosis/cysticercosis and its transmission

Question	Response	No. of respondents	Percent
Awareness on taeniosis (N=260)	Yes	119	45.8
	No	141	54.2
Know local name for taeniosis (Only for those who know taeniosis, n=119)	Yes	16	13.4
	No	103	86.6
Awareness on cysticercosis	Yes	122	46.9
	No	138	53.1
Know the local name for cysticercosis (Only for those who know cysticercosis, n=122)	Yes	41	33.6
	Don`t know	81	66.4
Awareness on Taeniosis acquisition	Don't know	18	15.1
	Eating infected and improper cooked pork	81	68.1
	Shaking hands with one after toilet visit	2	1.7
	Eating unwell washed fruits and vegetables	2	1.7
	Improper washing of hands after toilets	3	2.5
	Eating infected and improper cooked pork, shaking hands after toilet and unwashed fruits and vegetables	12	10.1
	Eating infected and improper cooked pork and drinking water contaminated by *T. solium* eggs	1	0.8
Cysticercosis acquisition	Don't know	26	21.3
	Eating infected and improper cooked pork	49	40.2
	Shaking hands with someone after toilet	3	2.5
	Eating infected and improper cooked pork , fruits and vegetables	7	5.7
	Urinating in shrubs	2	1.6
	Touching someone falling due to epilepsy	3	2.5
	Touching some one`s feaces/urine with epileptic seizures	5	4.1
	To bewitched and cursed by demons	1	0.8
	Cysts to lodge into brain due to delay in taeniosis treatment	22	18.0
	A bite by someone with epilepsy	1	0.8
	Inheritance from parents	1	0.8
	Eating with some with epilepsy	2	1.6

4.1.3 Awareness on symptoms of patients with taeniosis or cysticercosis

As shown in Table 3, key symptoms of taeniosis and cysticercosis were unknown by 29 respondents (24.4%). For cysticercosis, 30 respondents (24.6%) reported shivering, epileptic seizures, poor vision and sudden fall to be key symptoms.

Table 3: Awareness on symptoms of patients suspecting taeniosis or cysticercosis

Question	Response	No. of respondents	%
Reported symptoms of a person suffering from taeniosis (n = 119)	Don't know	29	24.4
	Abdominal discomfort	22	18.5
	Headache	2	1.9
	General body weakness	7	5.9
	Abdominal discomfort and headache	27	22.7
	General body weakness, abdominal discomfort and headache	14	11.8
	General body weakness, abdominal discomfort and loss of appetite	17	14.3
	Backache and prolonged menstrual cycle	1	0.8
Symptoms of a person suffering from cysticercosis (n = 122)	Don't know	19	15.6
	Headache	18	14.8
	Suddenly fall and loss of consciousness	25	20.5
	Headache and suddenly fall	9	7.4
	Headache and abdominal pain	13	10.7
	Shivering, epileptic seizures, poor vision and suddenly fall	30	24.6
	Vision problems, epileptic seizures and inability to talk	5	4.1
	Headache and epileptic seizure	3	2.5

4.1.4 Reported outcome of taeniosis/cysticercosis in human

Table 4 shows that 52 respondents (43.7%) reported death to be the most dangerous outcome of taeniosis infection in human. For cysticercosis, 63 respondents (51.6%) reported death and disabilities as the most dangerous outcome.

Table 4: Outcome of tapeworm/cysticercosis in human

Question	Response	No. of respondents	Percent

Outcome of tapeworm in human (n = 119)	Don't know	25	21.0
	Death	52	43.7
	Epileptic seizure	22	18.5
	General body weakness	12	10.1
	Death and epileptic seizure	6	5.0
	Abdominal discomfort	1	0.8
	Headache	1	0.8
Outcome of cysticercosis in human (n = 122)	Don't know	19	15.6
	Death and disabilities	63	51.6
	Blindness and epileptic seizures	6	4.9
	Epileptic seizure	18	14.8
	General body weakness	4	3.3
	Epileptic seizure and death	6	4.9
	Social stigmatization	6	4.9

4.1.5 Sources of awareness on taeniosis/cysticercosis

Table 5 shows that 79 respondents (66.4%) reported that they heard about taeniosis at hospital and 73 respondents (59.8%) reported that they also heard about cysticercosis at hospital.

Table 5: The Source of awareness about taeniosis/cysticercosis

Question	Response	No. of respondents	Percent
Source of knowledge about taeniosis (n = 119)	At hospital	79	66.4
	In community	14	11.8
	Workshops	6	5.0
	College	8	6.7
	At home	2	1.7
	From village livestock officer	2	1.7
	Reading brochure	4	3.4
	Seminars	1	0.8
	Mass media	3	2.5
Source of awareness about cysticercosis (n = 122)	At hospital	73	59.8
	In community	32	26.2
	Workshops	4	3.3
	At school/college	7	5.7
	In community and at hospital	2	1.6
	Reading brochure	2	1.6
	Radio broadcasting	1	0.8
	At witchdoctors	1	0.8

4.1.6 Perceptions about own risk to taeniosis/cysticercosis infections

Respondents who had knowledge about taeniosis/cysticercosis were asked whether they felt themselves at risk to become infected. A total of 103 respondents (86.6%) thought that they could contract taeniosis while 77 (63.1%) thought that they could contract cysticercosis (Table 6).

Table 6: Perceptions about own risk to taeniosis/cysticercosis infections

Question	Response	No. of respondents	Percent
Do you believe that you could contract taeniosis? (n = 119)	Yes	103	86.6
	No	6	5.0
	Don`t know	10	8.4
Do you believe that you Could contract cysticercosis? (n=122)	Yes	77	63.1
	No	12	9.8
	Don’t know	33	27.0

4.1.7 Risk factors associated with infection with *T. solium*

Table 7 shows risk factors associated with infection with *T. solium*. Seventy-nine respondents (66.4%) believed that they can contract taeniosis by consuming improperly cooked infected pork.

Table 7: Risk factors associated with *T. solium* infection (n=119)

Risk factor taeniosis infection	Response	Frequency	Percentage
Don’t know		10	8.4
Consuming improperly cooked infected pork	YES	79	66.4

Improper washing fruits/vegetables and hands	YES	13	11.0
Shaking hands with infected person	YES	4	3.4
Smelling pork	YES	1	0.8
Shaking hands with a person eating infected pork	YES	6	5.0
Not a pork consumer	NO	3	2.5
Well cooked pork	NO	1	0.8
Observation of health safety measures	NO	1	0.8
In the mighty name of Jesus	NO	1	0.8

4.1.8 Risk factors associated with cysticercosis infection

Risk factors for a person to contract cysticercosis are shown in Table 8. Forty six respondents (37.7%) believed that they can contract cysticercosis by consuming *T.solium* eggs from improper cooked infected pork.

Table 8: Risk factors for a person to contract cysticercosis (n=122)

Risk factor cysticercosis infection	Response	Frequency	Percentage
Don't know		33	27.0
Consuming *T.solium* eggs from improper cooked infected pork	YES	46	37.7
Delay in treatment to human with taeniosis	YES	8	6.6
Not observing health safety measures	YES	7	5.7
Can`t explain	YES	8	6.6
Shaking hands with a person eating infected pork	YES	2	1.6
Touching epileptic patient after toilet visit	YES	2	1.6
Receiving objects from cysticercosis patient and not washing hands	YES	3	2.5
When cysts lodges into brain	YES	1	0.8
Not a pork consumer	NO	8	6.6
God protection	NO	1	0.8
Not from epileptic patient family history	NO	2	1.6
Having education about the disease transmission	NO	1	0.8

4.1.9 Perceptions on the seriousness of the diseases

Twenty four respondents (27.6%) reported social stigmatization as the worst side of taeniosis and cysticercosis and worst perceived outcome was death 3 (3.4%) (Table 9).

Table 9: Perceptions on seriousness of the diseases (n=87)

Outcomes of taeniosis and cysticercosis to worry about	Frequency	Percent
Don't know	2	2.3
Death	3	3.4
Fall in water and fall on fire	2	2.3
Body injuries	3	3.4
Epileptic seizures	12	13.8
Fall on fire and death	1	1.1
Fall in water, fall on fire, blindness and death	14	16.1
Death and epileptic seizures	13	14.9
Death and fall in water	2	2.3
Headache, abdominal pain and eye problems	5	5.7
Fall in water, fall on fire and body injuries	6	6.9
Social stigmatization	24	27.6

4.2.0 Perceptions and reasons for participating in *TSTC*-POC test

A total of 159 respondents (61.2%) came to hospital for other than taeniosis and cysticercosis problems and the reason for participating in *TSTC*-POC testing was because they wanted to know their personal health status 144 (55.4%) (Table 10).

Table 10: Perceptions and reasons for participating in the *TSTC*-POC test (n = 260)

Question	Response	Frequency	Percent
Blood-sampled for POC test	Yes	260	100
	No	0	0.0
Reasons to visit hospital	I have come specifically for the POC test	100	38.5
	I have come for other problems	159	61.2
	Other explanations	1	0.4
Reasons to agree to have POC test	In order to Know my health status	144	55.4
	Doctor`s recommendation	76	29.2
	Because I am sick, I need to be treated	40	15.4

4.2.1 Respondent opinions regarding the *TSTC*-POC test

Table 11 show respondents' opinions regarding the *TSTC*-POC test.

Table 11: Respondents' opinions regarding the *TSTC*-POC test participated (n = 260)

Question	Response	Frequency	Percent
Time taken to collect blood-sample	Short	80	30.8
	Average	170	65.4
	Long	10	3.8
Pain during blood sampling	None	58	22.3
	Average	180	69.2
	Very painful	22	8.5
Time to getting results	Don't know	18	6.9
	Approximately 10 minutes	13	5
	Approximately 15 minutes	32	12.3
	Approximately 20 minutes	154	59.2
	Approximately 30 minutes	43	16.3
Interesting thing on POC test	Nothing	9	3.5
	Results are released within short time	118	45.3
	Little painful	3	1.2
	Knowing my health status	76	29.22
	Good service and education provided	40	15.4
	The disease has started to receive priority like other	1	0.4
	The test is modern	7	2.7
Non interesting thing on POC test	Nothing	248	95.4
	Long time waiting	5	1.5
	Negligence of health care providers by not wearing gloves	7	2.7
General opinion about the POC test	The test takes short time to release results	7	2.7
	The test is good and helpful thus let it continue	164	63.1
	Conduct community outreach	4	1.5
	More education on a disease	14	5.4
	Nothing to say	25	9.6
	Many people should be tested	40	15.4
	Confidence in drugs I receive after the test results	1	0.4
	Test kits should be available in all health facilities	5	1.9

4.2.2 Perceptions on own *TSTC*-POC test results

Table 12 show results on perceptions on own test results.

Table 12: Believe in *TSTC*-POC test results (n = 260)

Question	Response	Number	Percent
Received your POC test results	Yes	260	100.0
	No	0	0.0
Results given by	Don't know	44	16.9
	Nurse	182	70.0
	Laboratory technician	34	13.1
Believe in received results to reflect personal health status in relation to taeniosis/cysticercosis POC test	Yes	256	98.5
	No	4	1.5
Instructed to take any further step after results provisional	Yes	35	13.5
Request to do after receiving personal POC test results	Submit additional samples (blood and stool)	35	13.5
Comfortable with the request to further submit additional samples	Yes	35	13.5

4.2.3 Willingness to continue with further *TSTC*-POC test screening

Table 13 shows results on willingness to continue with TSTC –POC test study after receiving test results for which 259 (99.6%) of respondents agreed to submit additional samples for examination in case they are asked to do.

Table 13: Willingness to continue with further *TSTC*-POC test screening (n = 260)

Question	Response	Frequency	Percent
Willingness to submit additional samples for examination in case asked	Yes	259	99.6
	No	1	0.4
Willingness to receive results for additional samples as well	Yes	259	99.6
	No	1	0.4
Willingness to receive any treatment as a result of personal POC test or additional test results	Yes	260	100.0
	No	0	0.0
Like any provided treatment due to POC test results	Yes	260	100.0
	No	0	0.0

4.2.4 Perceptions on *TSTC*-POC testing procedures

Respondents were asked on their perception on *TSTC*-POC testing procedures and the results are summarized in Table 14. Majority of respondents 257 (98.8%) said that the *TSTC*-POC testing are good and 250 (96.2%) of respondents recommend nothing to be improved on the testing procedures.

Table 14: Perceptions on *TSTC*-POC test procedures (n = 260)

Question	Response	Frequency	Percent
Received any advice from the health workers during POC testing	Yes	249	95.8
	No	11	4.2
General say about the entire POC testing procedure undertaken	Its good	257	98.8
	Its challenging	3	1.2
Recommendations of things to be improved in relation to the POC test procedure	Nothing to say since all are right	250	96.2
	Adding more practitioners	8	0.8
	Increase in carefulness during blood sampling	1	0.4
	Time shortening in order to test more	7	2.7

4.2.5 Willingness to be tested if the *TSTC*-POC testing became routine in the future

Table 15 shows that all respondents would accept to be tested with the *TSTC*-POC testing in the established future screening schedule and 154 respondents (59.2%) found that re-testing at a 3 month interval was feasible.

Table 15: Willingness to be tested in the established *TSTC*-POC testing future screening schedule (n = 260)

Question	Response	Frequency	Percent
Recommend other people to check their taeniosis/cysticercosis status by POC test	Yes	260	100.0
	No	0	0.0

Willingness to testing for taeniosis/cysticercosis using the POC test procedure on a regular basis	Yes	260	100.0
	No	0	0.0
More practical screening schedules for regularly POC testing	3 month's basis	154	59.2
	6 month's basis	51	19.6
	12 month's basis	22	8.5
	Every month	33	12.7

4.2.6 Beliefs that the results received reflect personal health status in relation to taeniosis/cysticercosis

Table 16. Shows that 256 respondents (98.5%) believed that the results they received reflect personal health status in relation to taeniosis/cysticercosis.

Table 16: Believe that the results received reflect personal health status in relation to taeniosis/cysticercosis (n = 260)

Question	Response	Explanation	Frequency	Percentage
Believe that the received results reflect personal health status in relation to taeniosis/cysticercosis	YES	I have trust in practitioners released the results	63	24.2
	YES	Self witnessed blood sampling procedures and results	55	21.2
	YES	The test cant lies	66	25.4
	YES	Because I see my symptoms	68	26.2
	YES	I am a pork consumer	1	0.4
	YES	I am not a pork consumer	3	1.2
	NO	Not sure since I am still sick	3	1.2
	NO	I am sick, the results should be positive	1	0.4

4.2.7 Willingness to received treatment

Table 17 shows the reasons for respondents to accept cysticercosis treatment after the release of positive *TSTC*-POC test results. Majority of respondents 230 (88.5%) liked to receive any treatment with the reason of need of cure and good health. Only 2 (0.8%) did not like to receive any provided treatment to avoid stress.

Table 17: Willingness to received treatment (n = 260)

Question	Response	Explanation	Frequency	Percentage
Reasons to accept treatment	YES	Need of cure and good health	230	88.5
	YES	Health relief due to drugs received	14	5.5
	YES	Can't explain	7	2.7
	YES	It will protect my family from infection	1	0.4
	YES	Protection/stopping infection to other people	6	1.2
	NO	It will bring stress	2	0.8

4.2.8 Association between individuals' social-demographic characteristics and acceptability to *TSTC*-POC testing in the selected hospitals

Table18 shows the association between individuals' social-demographic characteristics and acceptability to *TSTC*-POC testing. There were no statistical significant difference on the level of acceptability and individuals' social-demographic characteristics.

Table 18: Association between social-demographic characteristics and acceptability of *TSTC*-POC test (n = 260)

Variable	Category	Number (%) of respondents	$\chi 2$ p value
Study location			0.993
	Mbozi D C - Vwawa hospital	132 (95.0)	
	Mbeya D C - Ifisi hospital	69 (95.8)	
	Rungwe D C - Makandana hospital	47 (95.9)	
Age group (Years)	11-30	105 (94.6)	0.249

	31-50	88 (98.9)	
	51-70	45 (91.8)	
	≥71	11 (90.9)	
Gender	Male	104 (95.4)	0.553
	Female	151 (95.4)	
Level of education			0.685
	No formal education	47 (97.9)	
	Primary school education	136 (95.1)	
	Secondary school education	42 (95.6)	
	Tertiary education	23 (92.0)	
Primary occupation			0.667
	Smallholder farmer	153 (96.2)	
	Business man/woman	19 (95.0)	
	Other	76 (93.8)	

CHAPTER FIVE

5.0 DISCUSSION

The results revealed that 61.2% of respondents visited hospital due to symptoms unrelated to taeniosis/cysticercosis and 55.4% accepted *TSTC*-POC testing because they wanted to know their personal health status (Table 10).

This study has provided useful information regarding acceptability of a quick test intended for diagnosis of human taenisosis and/or cysticercosis caused by *T. solium*. Very high acceptability of the *TSTC*-POC test was revealed in this study (Table 11) Patients were impressed with the short time taken from blood sample collection to results acquisition. In addition, the minimal pain experienced during blood sampling was rated as acceptable. The high acceptability of the *TSTC*-POC test is similar to findings from the study on acceptability of HIV POC test in Kenya where 97.6% of respondents agreed to be tested and receive the test results (Negin *et al.*, 2009). The most common reason for accepting the *TSTC*-POC test in the present study was the quick release of test results. This is contrary to finding by Prost *et al.* (2009) in UK where the main reason for accepting HIV -POC test was because it was offered as "part of a checkup". Long time waiting before testing and negligence of healthcare providers by not wearing gloves were rarely reported to be among factors that led people to dislike the *TSTC*-POC test. In general, more than half of the respondents reported the *TSTC*-POC test to be good and helpful and recommended the test to continue.

All respondents trusted the TSTC-POC test results (Table 16) and this finding is in congruent with the study by Asiimwe *et al.* (2012) on mRDTs –POC test in Uganda where health workers reported a belief that a positive mRDT result was true. For positive

TSTC-POC test results respondents were requested to submit additional samples, of which they submitted comfortably and willingly. There was a high degree of willingness to continue with *TSTC*-POC test study after receiving test results. Majority of respondents suggested that re-testing at a 3 month interval was feasible. The majority of respondents (98.8%) said that the *TSTC*-POC testing procedure was good and they recommend nothing to be improved on the test.

The adopted health belief model constitutes five major constructs of health perceptions, which include, perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, self-efficacy and modifying variables like study location, sex, age groups, education level, occupation and knowledge on a disease together with cues to action. The perceived threat of taeniosis/cysticercosis in human influenced acceptability of *TSTC*-POC test considerably (Table 4). Many respondents (43.7%) reported death to be the most dangerous threat of taeniosis infection in human while (51.6%) of respondents perceived the threat of cysticercosis infection in human to be death and disabilities. The perceived benefits among study participants on *TSTC*-POC test were; knowing personal health status, doctor`s recommendation, a need to be treated from personal illnesses and quick test results (Table 11). On the other hand, perceived barriers for *TSTC*-POC test (as mentioned by few respondents) were long time waiting before testing and negligence of healthcare providers in wearing gloves.

About one third of the respondents had heard about taeniosis and cysticercosis at the hospital. This study indicates that awareness of taeniosis was below 50% contrary to study by Kungu (2015a) who reported awareness of taeniosis to be high, with zero awareness about *T. solium* cysticercosis transmission cycle (Table 2). About a third of respondents perceived that they would be susceptible to infections with taeniosis or

cysticercosis. Perceived susceptibility did not influence acceptability of *TSTC*-POC test. This is in accordance with a study by Moattar *et al.* (2014) that showed that participants had low perceived susceptibility to disease. The finding is contrary to the findings by Fylkesnes and Sizya (2004) in Zambia where perceived risk of HIV infection had a major influence on VCT acceptability. Self-efficacy of respondents having belief in practitioners undertaken the *TSTC*-POC test, self witnessing the blood sampling procedures, belief in a *TSTC*-POC test itself, personal feeling on self symptoms of the disease influenced significantly to acceptability of *TSTC*-POC test.

Modifying variables including study hospital, age groups, sex, education level and occupation of study participants had no significant statistical influence on acceptance of *TSTC*-POC test among tested individuals. This implies that acceptability of *TSTC*-POC tested was not influenced by study hospital, age groups, gender, education level and primary occupation of study participants. The study finding was contrary to health belief model (HBM) by Glanz *et al*. (2002). All respondents would accept to be tested and majority of respondents suggested that re-testing at 3 month interval was feasible.

The study collected limited data regarding the acceptance of the *TSTC*-POC test and only from individuals who were attending medical care in selected hospitals; the study did not capture perceptions of individuals from the general population. This is the first study on *TSTC*-POC test to be conducted thus there were lack of enough reference research work to cite for comparison of results findings. The results are based in Mbeya and Songwe regions southern Tanzania and thus may not be generalized to individuals in other geographic areas. The study was cross-sectional and therefore there was limited time for fall up and therefore a longitudinal research would be necessary to assess impacts of the associated treatment for *TSTC*-POC test positive test results individuals.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

It is concluded that *TSTC*-POC test is highly acceptable, motivated by perceived threat of a disease, trust in health practitioners, self witnessing the *TSTC*-POC testing to results procedures as well as belief in the diagnostic. Modifying variables including demographic characteristics and geographical locations seemed to have no influence on the test acceptability.

It is recommended that;

i. There is a need for community participatory approach for awareness creation on taeniosis and cysticercosis transmission, diagnosis and treatment in order to protect the public health.
ii. The *TSTC*-POC test should be accessible in all primary health care facilities in endemic areas to be used as early and primary diagnostic tool for taeniosis and cysticercosis.
iii. There should be community outreach on *TSTC*-POC testing so as to reach more vulnerable individuals in village who keep pigs and consume pork with little awareness on the parasite transmission.
iv. Information on the TSTC- POC test sensitivity and specificity is required to guide its adoption and promotion for control of TSTC in Tanzania, a potential breakthrough in TSTC surveillance.

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APPENDICES

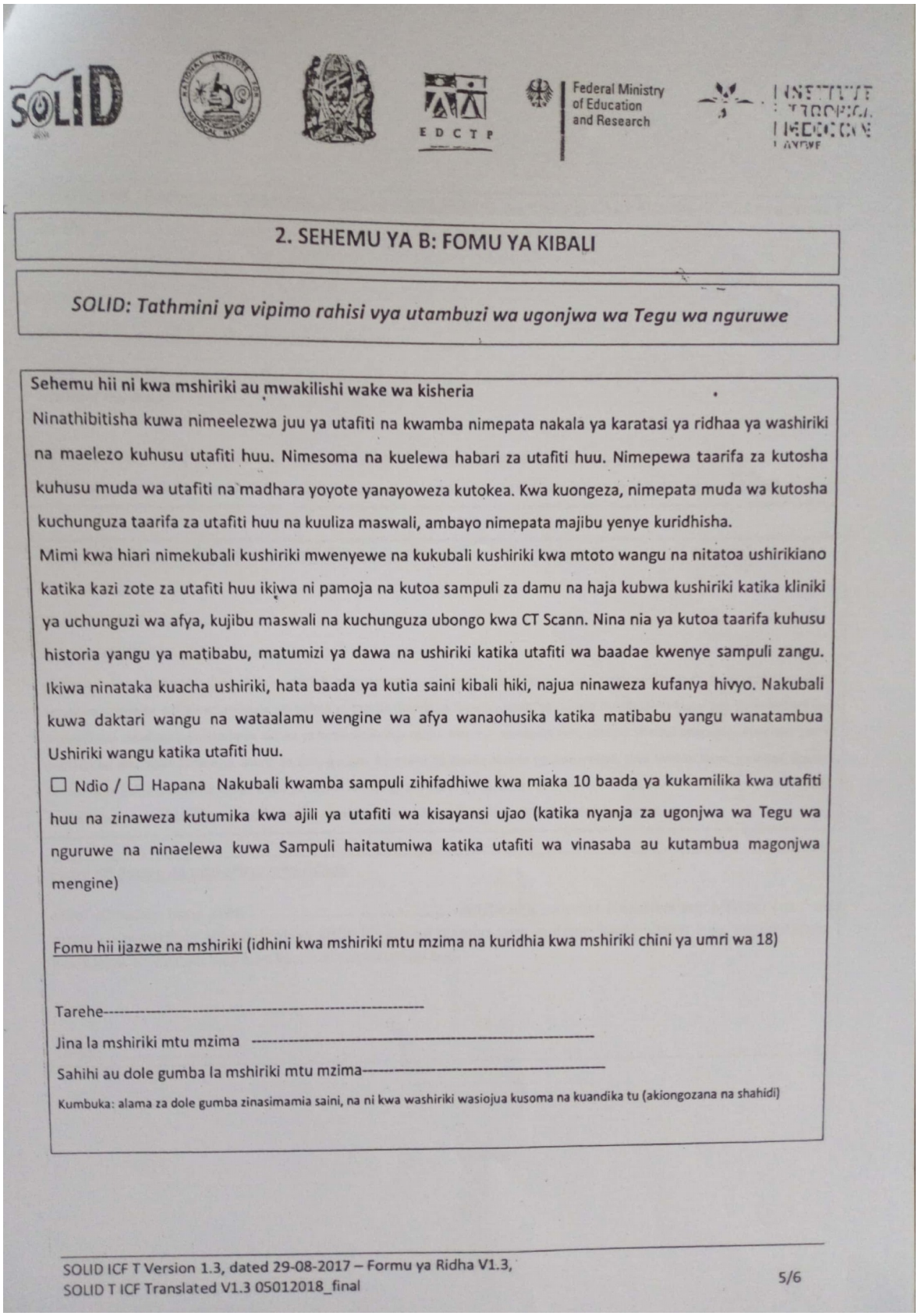
Appendix 1: Informed consent form for adults (> 18 years) respondents
Informed consent and confidentiality of interviews
Good morning/afternoon,
Mr/Mrs……
I am **Emil Thomas** one of the project team and Msc. Student from **Sokoine university SUA)** that has been involved in the pilot study of the proto-type point of care test (POC) in which you have participated**.** The project is known as SOLID concerning with human taeniosis/cysticercosis diagnosis in selected hospitals of Mbeya and Songwe Regions, Tanzania. Now, the project is ongoing and I am conducting a survey among tested individuals, so that I could learn a few things from you regarding the test that you have participated. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question.

All the information we obtain will remain strictly confidential and your answers and name will never be revealed. Also, you are not obliged to answer any question you do not want to, and you may stop the interview at any time in case of emergency and then come to continue afterwards. I am not expecting you give a specific answer; I would like you to answer questions honestly, telling me about what you experienced in relation to the testing with the POC test. Feel free to answer questions at your own pace and the interview will take about or less than 30 minutes.

Do you agree to participate in this interview?
Yes ___ No ___ [*If yes, continue to the next question; if no, stop the interview*.]
Do you have any question before signing the consent form and starting of the interview? (*Answer questions*).
Now you may sign the consent form so that we start the interview?

Signature of respondent/ Thumb print ……
Date……
Interviewer signature.....
Date.....
Please can we start the interview now?
Contacts: Emil Thomas, Mob: 0656917829/0767535643, email: emiltjumanne@gmail.com

Appendix 2: Assent form for participants < 18 years



SOLID

EDCTP

Federal Ministry of Education and Research

2. SEHEMU YA B: FOMU YA KIBALI

SOLID: Tathmini ya vipimo rahisi vya utambuzi wa ugonjwa wa Tegu wa nguruwe

Sehemu hii ni kwa mshiriki au mwakilishi wake wa kisheria

Ninathibitisha kuwa nimeelezwa juu ya utafiti na kwamba nimepata nakala ya karatasi ya ridhaa ya washiriki na maelezo kuhusu utafiti huu. Nimesoma na kuelewa habari za utafiti huu. Nimepewa taarifa za kutosha kuhusu muda wa utafiti na madhara yoyote yanayoweza kutokea. Kwa kuongeza, nimepata muda wa kutosha kuchunguza taarifa za utafiti huu na kuuliza maswali, ambayo nimepata majibu yenye kuridhisha.

Mimi kwa hiari nimekubali kushiriki mwenyewe na kukubali kushiriki kwa mtoto wangu na nitatoa ushirikiano katika kazi zote za utafiti huu ikiwa ni pamoja na kutoa sampuli za damu na haja kubwa kushiriki katika kliniki ya uchunguzi wa afya, kujibu maswali na kuchunguza ubongo kwa CT Scann. Nina nia ya kutoa taarifa kuhusu historia yangu ya matibabu, matumizi ya dawa na ushiriki katika utafiti wa baadae kwenye sampuli zangu. Ikiwa ninataka kuacha ushiriki, hata baada ya kutia saini kibali hiki, najua ninaweza kufanya hivyo. Nakubali kuwa daktari wangu na wataalamu wengine wa afya wanaohusika katika matibabu yangu wanatambua Ushiriki wangu katika utafiti huu.

☐ Ndio / ☐ Hapana Nakubali kwamba sampuli zihifadhiwe kwa miaka 10 baada ya kukamilika kwa utafiti huu na zinaweza kutumika kwa ajili ya utafiti wa kisayansi ujao (katika nyanja za ugonjwa wa Tegu wa nguruwe na ninaelewa kuwa Sampuli haitatumiwa katika utafiti wa vinasaba au kutambua magonjwa mengine)

Fomu hii ijazwe na mshiriki (idhini kwa mshiriki mtu mzima na kuridhia kwa mshiriki chini ya umri wa 18)

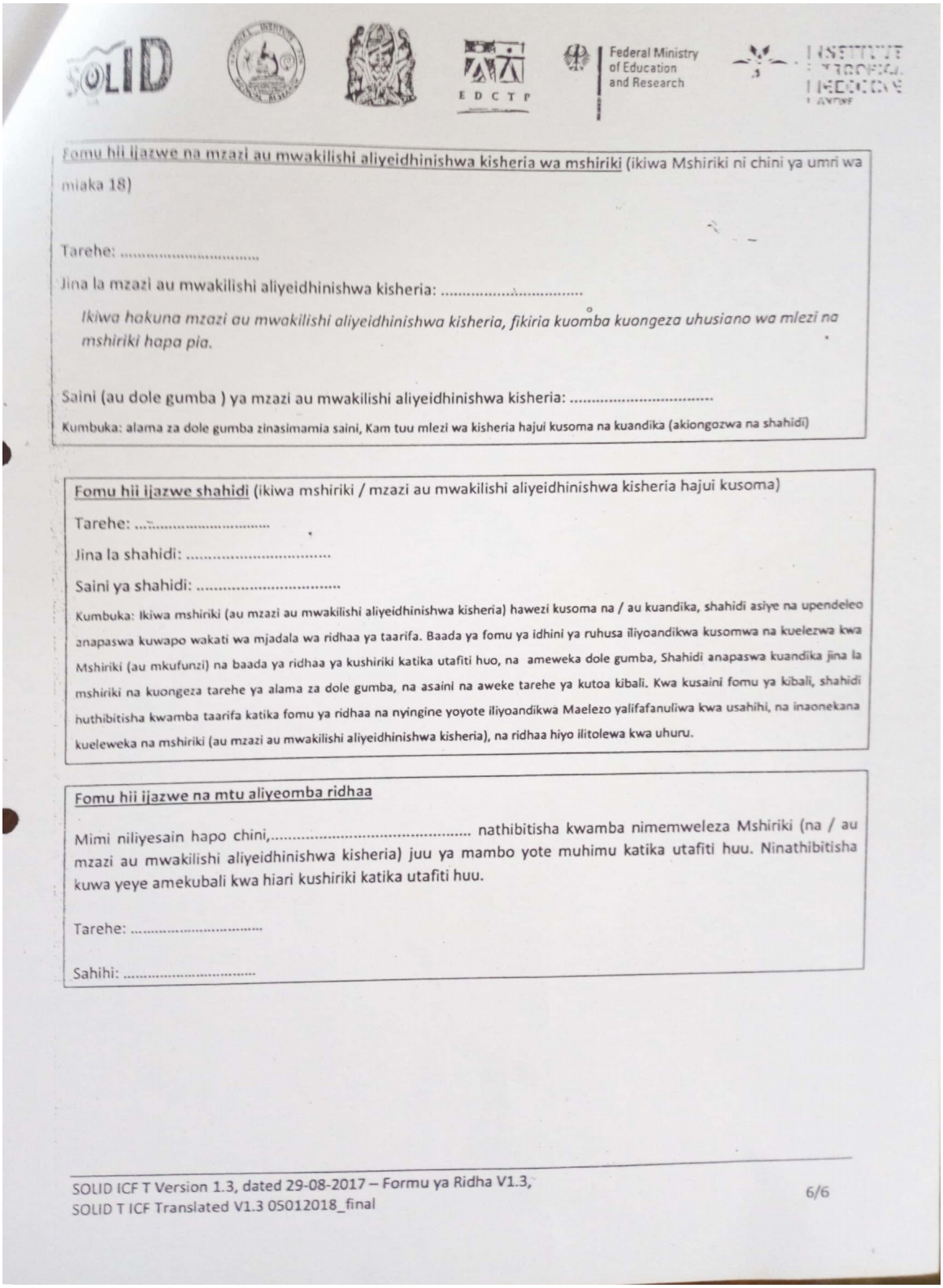
Tarehe----------

Jina la mshiriki mtu mzima ----------

Sahihi au dole gumba la mshiriki mtu mzima----------

Kumbuka: alama za dole gumba zinasimamia saini, na ni kwa washiriki wasiojua kusoma na kuandika tu (akiongozana na shahidi)

Appendix 3: Assent form for participants <18 years



Fomu hii ijazwe na mzazi au mwakilishi aliyeidhinishwa kisheria wa mshiriki (ikiwa Mshiriki ni chini ya umri wa miaka 18)

Tarehe: .....

Jina la mzazi au mwakilishi aliyeidhinishwa kisheria: .....

Ikiwa hakuna mzazi au mwakilishi aliyeidhinishwa kisheria, fikiria kuomba kuongeza uhusiano wa mlezi na mshiriki hapa pia.

Saini (au dole gumba) ya mzazi au mwakilishi aliyeidhinishwa kisheria: .....

Kumbuka: alama za dole gumba zinasimamia saini, Kam tuu mlezi wa kisheria hajui kusoma na kuandika (akiongozwa na shahidi)

Fomu hii ijazwe shahidi (ikiwa mshiriki / mzazi au mwakilishi aliyeidhinishwa kisheria hajui kusoma)

Tarehe: .....

Jina la shahidi: .....

Saini ya shahidi: .....

Kumbuka: Ikiwa mshiriki (au mzazi au mwakilishi aliyeidhinishwa kisheria) hawezi kusoma na / au kuandika, shahidi asiye na upendeleo anapaswa kuwapo wakati wa mjadala wa ridhaa ya taarifa. Baada ya fomu ya idhini ya ruhusa iliyoandikwa kusomwa na kuelezwa kwa Mshiriki (au mkufunzi) na baada ya ridhaa ya kushiriki katika utafiti huo, na ameweka dole gumba, Shahidi anapaswa kuandika jina la mshiriki na kuongeza tarehe ya alama za dole gumba, na asaini na aweke tarehe ya kutoa kibali. Kwa kusaini fomu ya kibali, shahidi huthibitisha kwamba taarifa katika fomu ya ridhaa na nyingine yoyote iliyoandikwa Maelezo yalifafanuliwa kwa usahihi, na inaonekana kueleweka na mshiriki (au mzazi au mwakilishi aliyeidhinishwa kisheria), na ridhaa hiyo ilitolewa kwa uhuru.

Fomu hii ijazwe na mtu aliyeomba ridhaa

Mimi niliyesain hapo chini,..... nathibitisha kwamba nimemweleza Mshiriki (na / au mzazi au mwakilishi aliyeidhinishwa kisheria) juu ya mambo yote muhimu katika utafiti huu. Ninathibitisha kuwa yeye amekubali kwa hiari kushiriki katika utafiti huu.

Tarehe: .....

Sahihi: .....

Appendix 4: **DVC Sokoine University of Agriculture research clearance for Mbeya Region**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA

SOKOINE UNIVERSITY OF AGRICULTURE
OFFICE OF THE VICE-CHANCELLOR
P.O. Box 3000 CHUO KIKUU, MOROGORO, TANZANIA
Phone: 255-023-2640006/7/8/9, Direct VC: 2640015; Fax: 2640021;
Email: vc@suanet.ac.tz;

Our Ref. SUA/ADM/R.1/8/267 **Date:** 6th November, 2018

The Regional Administrative Secretary,
Mbeya Region,
P.O. Box 754,
MBEYA.

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act No. 7 of 2005 and SUA Charter, 2007 which became operational on 1st January 2007 repealing Act No. 6 of 1984. One of the mission objectives of the university is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

To facilitate the research function, the Vice Chancellor of the Sokoine University of Agriculture (SUA) is empowered to issue research clearance to staff, students, research associate and researchers of SUA on behalf of the Tanzania Commission for Science and Technology.

The purpose of this letter is to introduce to you **Mr. Thomas Emil** a bonafide **MSc. (Public Health and Food Safety)** student with registration number **MPH/D/2017/0008** of SUA. By this letter **Mr. Thomas Emil** has been granted clearance to conduct research in the country. The title of the research in question is **"ACCEPTABILITY OF A DEVELOPED POINT OF CARE TEST FOR HUMAN *Taeniosis* AND *Cysticercosis* DIAGNOSIS IN MBEYA AND SONGWE REGIONS, TANZANIA".**

The period for which this permission has been granted is from **November, 2018** to **February, 2019**. The research will be conducted in **Mbeya Region.**

Should some of these areas/institutions/offices be restricted, you are requested to kindly advice the researcher(s) on alternative areas/institutions/ offices which could be visited. In case you may require further information on the researcher please contact me.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,

Prof. Peter R. Gillah
FOR: VICE-CHANCELLOR

Copy to: Student – **Mr. Thomas Emil**

Appendix 5: DVC Sokoine University of Agriculture research clearance for Songwe Region

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA

SOKOINE UNIVERSITY OF AGRICULTURE
OFFICE OF THE VICE-CHANCELLOR
P.O. Box 3000 CHUO KIKUU, MOROGORO, TANZANIA
Phone: 255-023-2640006/7/8/9, Direct VC: 2640015; Fax: 2640021;
Email: vc@suanet.ac.tz;

Our Ref. SUA/ADM/R.1/8/268 **Date:** 6th November, 2018

The Regional Administrative Secretary,
Songwe Region,
SONGWE.

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act No. 7 of 2005 and SUA Charter, 2007 which became operational on 1st January 2007 repealing Act No. 6 of 1984. One of the mission objectives of the university is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

To facilitate the research function, the Vice Chancellor of the Sokoine University of Agriculture (SUA) is empowered to issue research clearance to staff, students, research associate and researchers of SUA on behalf of the Tanzania Commission for Science and Technology.

The purpose of this letter is to introduce to you **Mr. Thomas Emil** a bonafide **MSc. (Public Health and Food Safety)** student with registration number **MPH/D/2017/0008** of SUA. By this letter **Mr. Thomas Emil** has been granted clearance to conduct research in the country. The title of the research in question is **"ACCEPTABILITY OF A DEVELOPED POINT OF CARE TEST FOR HUMAN *Taeniosis* AND *Cysticercosis* DIAGNOSIS IN MBEYA AND SONGWE REGIONS, TANZANIA".**

The period for which this permission has been granted is from **November, 2018** to **February, 2019**. The research will be conducted in **Songwe Region.**

Should some of these areas/institutions/offices be restricted, you are requested to kindly advice the researcher(s) on alternative areas/institutions/ offices which could be visited. In case you may require further information on the researcher please contact me.

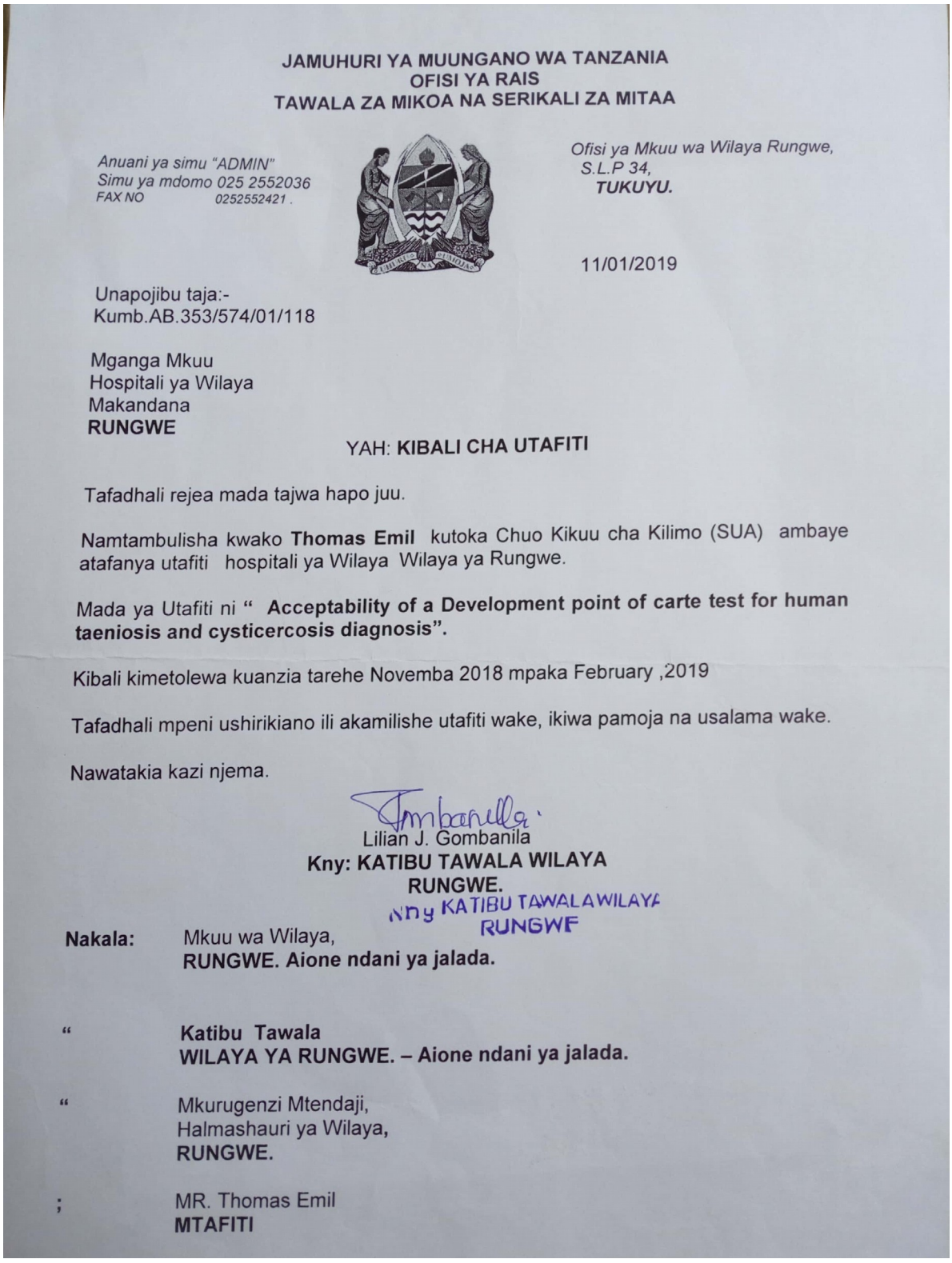
We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,

Prof. Peter R. Gillah
FOR: VICE-CHANCELLOR

Copy to: Student – **Mr. Thomas Emil**

Appendix 6: Rungwe DC research permit



JAMUHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

Anuani ya simu "ADMIN"
Simu ya mdomo 025 2552036
FAX NO 0252552421 .

Ofisi ya Mkuu wa Wilaya Rungwe,
S.L.P 34,
TUKUYU.

11/01/2019

Unapojibu taja:-
Kumb.AB.353/574/01/118

Mganga Mkuu
Hospitali ya Wilaya
Makandana
RUNGWE

YAH: **KIBALI CHA UTAFITI**

Tafadhali rejea mada tajwa hapo juu.

Namtambulisha kwako **Thomas Emil** kutoka Chuo Kikuu cha Kilimo (SUA) ambaye atafanya utafiti hospitali ya Wilaya Wilaya ya Rungwe.

Mada ya Utafiti ni " **Acceptability of a Development point of carte test for human taeniosis and cysticercosis diagnosis".**

Kibali kimetolewa kuanzia tarehe Novemba 2018 mpaka February ,2019

Tafadhali mpeni ushirikiano ili akamilishe utafiti wake, ikiwa pamoja na usalama wake.

Nawatakia kazi njema.

Lilian J. Gombanila
Kny: KATIBU TAWALA WILAYA
RUNGWE.
Kny KATIBU TAWALA WILAYA
RUNGWE

Nakala: Mkuu wa Wilaya,
RUNGWE. Aione ndani ya jalada.

" **Katibu Tawala**
WILAYA YA RUNGWE. – Aione ndani ya jalada.

" Mkurugenzi Mtendaji,
Halmashauri ya Wilaya,
RUNGWE.

; MR. Thomas Emil
MTAFITI

Appendix 7: Mbeya DC research permit

HALMASHAURI YA WILAYA YA MBEYA

SIMU: 025 - 2502260
Fax: 025 - 2500128

Ofisi ya Mkurugenzi Mtendaji (W)
S.L.P. 599
MBEYA.

Barua pepe: ded@mbeyadc.go.tz

Kumb.Na.MDC/S.10/8/VOL V/

14.01.2019

Mganga Mfawidhi,
Ifisi Hospital,
Mbeya.

YAH: KIBALI CHA KUFANYA UTAFITI MR. THOMAS EMIL

Husikeni na kichwa cha habari hapo juu.

Napenda kumtambulisha Mr. Thomas Emil kutoks Sokoine University of Agriculture (SUA) kwa ajili ya kufanya Utafiti kuanzia mwezi Novemba, 2018 hadi Februari, 2019.

Juu ya ***"Acceptability of a Development point of care test for Human taeniosis and cysticercosis diagnosis"*** katika Halmashauri ya Wilaya ya Mbeya

Tafadhali mpeni Ushirikiano.

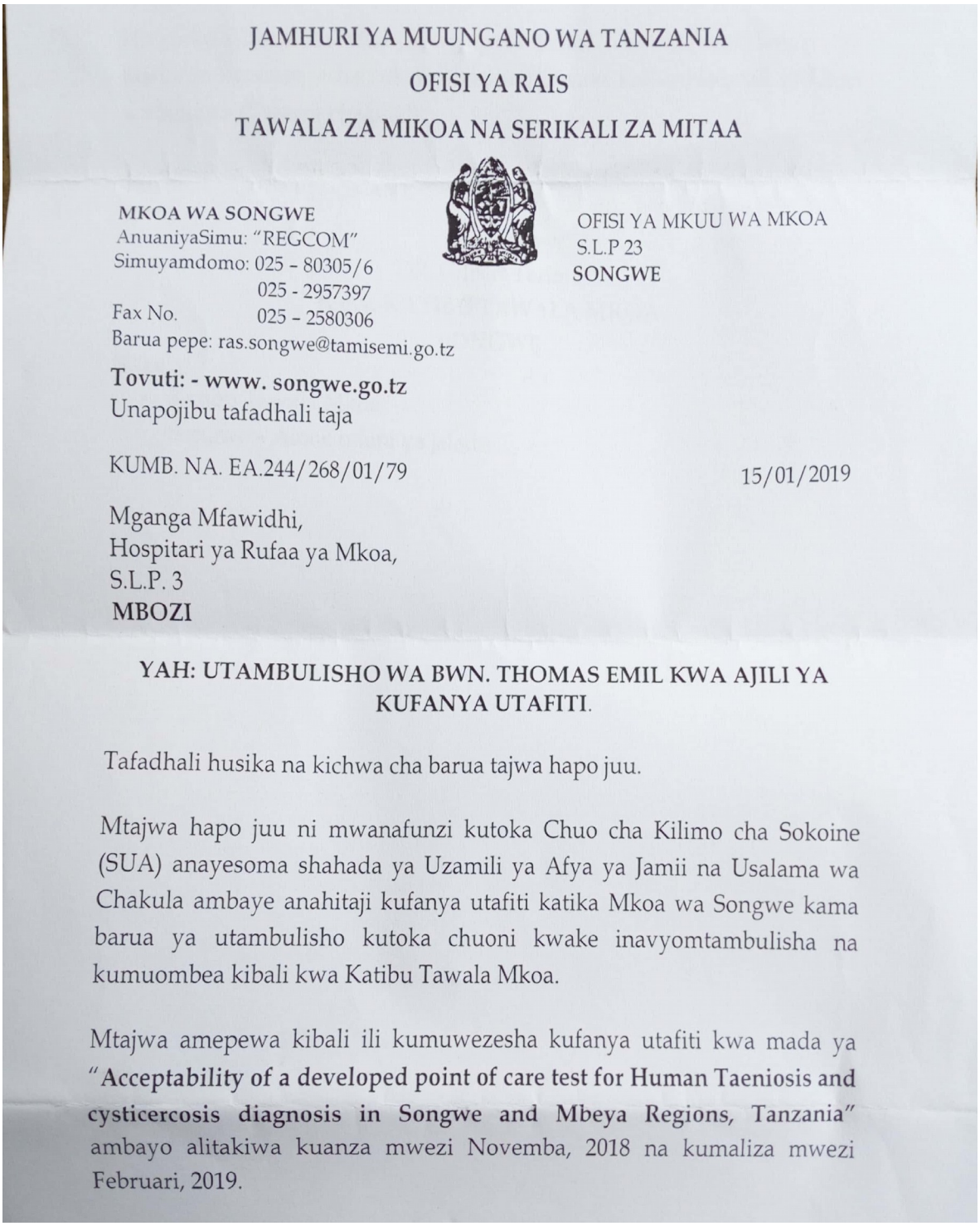
Podii Zuberi
Kny: Mkurugenzi Mtendaji (W)
MBEYA

Nakala:
Mr. Thomas Emil,

K.n.y. Mkurugenzi Mtendaji
Halmashauri ya Wilaya ya Mbeya

Vice Chancellor,
Sokoine University of Agriculture,
P.O Box 3000,
MOROGORO – TANZANIA.

Appendix 8: Songwe Region research permit



JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS

TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA SONGWE
AnuaniyaSimu: "REGCOM"
Simuyamdomo: 025 - 80305/6
025 - 2957397
Fax No. 025 - 2580306
Barua pepe: ras.songwe@tamisemi.go.tz

Tovuti: - www. songwe.go.tz
Unapojibu tafadhali taja

OFISI YA MKUU WA MKOA
S.L.P 23
SONGWE

KUMB. NA. EA.244/268/01/79

15/01/2019

Mganga Mfawidhi,
Hospitari ya Rufaa ya Mkoa,
S.L.P. 3
MBOZI

YAH: UTAMBULISHO WA BWN. THOMAS EMIL KWA AJILI YA KUFANYA UTAFITI.

Tafadhali husika na kichwa cha barua tajwa hapo juu.

Mtajwa hapo juu ni mwanafunzi kutoka Chuo cha Kilimo cha Sokoine (SUA) anayesoma shahada ya Uzamili ya Afya ya Jamii na Usalama wa Chakula ambaye anahitaji kufanya utafiti katika Mkoa wa Songwe kama barua ya utambulisho kutoka chuoni kwake inavyomtambulisha na kumuombea kibali kwa Katibu Tawala Mkoa.

Mtajwa amepewa kibali ili kumuwezesha kufanya utafiti kwa mada ya "**Acceptability of a developed point of care test for Human Taeniosis and cysticercosis diagnosis in Songwe and Mbeya Regions, Tanzania**" ambayo alitakiwa kuanza mwezi Novemba, 2018 na kumaliza mwezi Februari, 2019.

Appendix 9: MRCC research ethical clearance permit

THE UNITED REPUBLIC OF TANZANIA

National Institute for Medical Research
3 Barack Obama Drive
P.O. Box 9653
11101 Dar es Salaam
Tel: 255 22 2121400
Fax: 255 22 2121360
E-mail: headquarters@nimr.or.tz/ethics@nimr.or.tz

Ministry of Health, Community Development, Gender, Elderly & Children
University of Dodoma, Faculty of Arts and Social Sciences
Building No 11
P.O. Box 743
40478 Dodoma

NIMR/HQ/R.8a/Vol. IX/2597

25th October 2017

Dr. Bernard James Ngowi
National Institute for Medical Research
NIMR Muhimbili
P. O. Box 3436
Dar es salaam

RE: ETHICAL CLEARANCE CERTIFICATE FOR CONDUCTING MEDICAL RESEARCH IN TANZANIA

This is to certify that the research entitled: Evaluation of an antibody detecting point-of-care test for the diagnosis of *Taenia solium taeniosis* and (neuro) cysticercosis in district hospital settings of highly endemic resource poor areas in Tanzania. (Ngowi B.J. *et al)* has been granted ethical clearance to be conducted in Tanzania.

The Principal Investigator of the study must ensure that the following conditions are fulfilled:

1. Progress report is submitted to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research, Regional and District Medical Officers after every six months.
2. Permission to publish the results is obtained from National Institute for Medical Research.
3. Copies of final publications are made available to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research.
4. Any researcher, who contravenes or fails to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III Section 10(2).
5. Site: Mbeya and Songwe

Approval is valid for one year: 10th October 2017 to 9th October 2018.

Name: Prof. Yunus Daud Mgaya

Signature
CHAIRPERSON
MEDICAL RESEARCH
COORDINATING COMMITTEE

Name: Prof. Muhammad Bakari Kambi

Signature
CHIEF MEDICAL OFFICER
MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY &CHILDREN

CC: RMOs of Mbeya and Songwe
DMO/ DED of selected districts

Appendix 10: Sokoine University of Agriculture research ethical clearance permit

SOKOINE UNIVERSITY OF AGRICULTURE
COLLEGE OF VETERINARY MEDICINE AND BIOMEDICAL SCIENCES
P.O BOX 3015 CHUO KIKUU MOROGOROTANZANIA
TEL. 255 23 2 603511/4; DIR. 255 23 2 604542
FAX. 255 23 2 604647. TELEX 55308 UNIVMOG-TZ
TELEGRAMS "UNIAGRIC" MOROGORO

Our Ref.: SUA/CVMBS/R.1/2018/9 **Your Ref.** **Date:** October 15, 2018

THOMAS EMIL
College of Veterinary Medicine & Biomedical Sciences
Morogoro

ufs: DR. H. E. NONGA
Principal Supervisor,
CVMBS, SUA

Re: ACCEPTABILITY OF A DEVELOPED POINT OF CARE TEST FOR HUMAN TAENIOSIS AND CYSTICERCOSIS DIAGNOSIS IN MBEYA AND SONGWE, TANZANIA

The heading above referred,

We are glad to inform you that your proposal has been reviewed and approved. Reference number for your ethical approval is **SUA/CVMBS//R.1/2018/9**. This approval is valid from 30-10-2018 to 30-10-2019.

The College Research Innovations and Publication Committee of CVMBS, strongly recommends for observation and adherence to the approved protocols. In cases where you will be compelled to make changes during the implementation of your project, please make sure that you submit an amendment for review and approval.

Furthermore, you are required to submit progress report by 31st December of each calendar year of your research.

The committee congratulates you and your supervisors for this innovative project and looks forward to its success.

Yours sincerely,

A.B. Matondo
For the Chairperson, CRIPC

cc Principal, CVMBS

Forwarded and Congratulations

Appendix 11: A questionnaire to assess acceptability of a proto type point of care test for T*aenia solium* taeniosis and cysticercosis (POC test) among tested individuals in selected hospitals of Mbeya and Songwe Regions, Tanzania

Objectives

General Objective

Assessment of the acceptability of a proto-type *Taenia solium* taeniosis and cysticercosis point of care POC test among tested individuals in selected hospitals of Mbeya and Songwe regions, southern Tanzania.

Specific objectives

i. To assess patients' perceptions on the proto-type *T. solium* taeniosis/cysticercosis POC test;
ii. To determine factors influencing acceptance of a proto-type *T. solium* taeniosis/cysticercosis POC test.

A: Respondents general information

(To be filled in by a researcher)

Date of Interview_____District _____

Ward _____ Health facility where the test undertaken _____

A. Personal Information

1. Name_____
2. Age (years) _____
3. **Sex:** (1) Male (2) Female
4. Mob: _____
5. Level of Education
   (1) No formal education (2) Primary school education
   (3) Secondary school education (4) Tertiary school education
6. Occupation
   (1) Smallholder farmer (2) Business man/woman (3) Other (mention)……..

B: AWARENESS ON PIG TAPEWORM, CYSTICERCOSIS AND THE TRANSMISSION CYCLE

7. Do you know or have your ever heard about an infection in human known as taeniosis?
   - Yes
   - No (**go to question 14**)
8. What is the local name for taeniosis? .....
9. How can a person acquire taeniosis? .....
10. What are key symptoms of a person suffering from taeniosis? .....
11. What is the most dangerous outcome of this infection in human? ....
12. Where did you get the knowledge about taeniosis? .....
13. Do you know or have your ever heard about an infection in human known as cysticercosis?
    - Yes

- No (**go to question 19**)

14. What is the local name for cysticercosis? .....
15. How can a person acquire cysticercosis? .....
16. What are key symptoms of a person suffering from cysticercosis? ....
17. What is the most dangerous outcome of this infection in human? ....
18. Where did you get the knowledge about cysticercosis? .....

C. **PERCEPTIONS ABOUT OWN SUSCEPTIBILITY TO INFECTIONS**
(To be asked only if the respondent knows taeniosis/cysticercosis based from his/her responses under section B)

19. Do you believe that by chance you could contract taeniosis?

- Yes (explain) ……
- No (explain) ……
- Don't know

20. Do you believe that by chance you could contract cysticercosis? (***To be asked only if he/she know question 13above***)

- Yes (explain) ……
- No (explain) ……
- Don't know

D. PERCEPTIONS ON THE SERIOUSNESS OF THE DISEASES (to be asked only if the respondent knows taeniosis/cysticercosis based from his/her responses under section B)

21. What do you consider as the most bad side (outcomes) of taeniosis or cysticercosis that you would worry about? (list as many as you can);

.....
.....

E. PERCEPTIONS AND REASONS FOR PARTICIPATING IN THE POC test

22. Have you been blood-sampled at the ..... hospital and informed that the blood would be tested for taeniosis/cysticercosis? The test is known as POC test.

- Yes
- No *(If yes continue, otherwise end the interview and thank the participant)*

23. Why have you visited the hospital?

- I have come specifically for the POC test
- I have come for other problems
- Other explanations.....

24. Why you have agreed to have the POC test? .....
25. What is your opinion regarding the following in relation to the POC test you have participated?

i. Time taken to collect blood-sample (short/average/long)……..…
ii. Pain during blood sampling (none/average/very painful) ……

iii. Time to getting your results (provide an average time) ……

26. What have you been interested on POC test? ……
27. What has not been an interesting thing on the POC test? ……
28. Give your general opinion about the POC test.

……

F. **PERCEPTIONS ON OWN TEST RESULTS**

29. I will not ask you what your test results were. Nevertheless, have you received your POC Test results?
    - Yes
    - No (**Go to Qn 35**)
30. If you have received your POC test results, who gave you your results?

    ……
31. Do you believe that the results you have received reflect your health status in relation to taeniosis/cysticercosis?
    - Yes (explain) ……
    - No (explain) ……
32. Have you been instructed to take any further step after you have received your results
    - Yes (explain) ……
    - No (**go to question 38**)
33. If Yes to the question above, what have you been required to do after receiving your POC test results?
    - Submit additional samples (mention them) ……
    - Others (explain) ……
34. Are you comfortable with the action you have been asked to do after having your POC Test results?
    - Yes (give reasons) ……
    - No (give reasons) ……

G: WILLINGNESS TO CONTINUE WITH FURTHER TAENIOSIS/CYSTICERCOSIS POC TEST SCREENING

35. In case you're asked to submit additional samples for examination, will you agree?
    - Yes
    - No (**Go to Qn40**)
36. If yes to the question above would you like to receive results for these samples as well?
    - Yes
    - No (explain) ……
37. Would you like to receive any treatment as a result of your POC test or additional test results?
    - Yes
    - No
38. If you are receiving/will receive any treatment as a result of your POC test results, have you liked/ will you like it? (*both early and additional samples*)
    - Yes (explain) ……

- No (explain) ……

H: PERCEPTIONS ON POC TESTING PROCEDURES

39. Have you received any advice from the health workers who attended you?
    - Yes
    - No
40. What can you speak generally about the entire taeniosis/cysticercosis POC -testing procedure you have just undertaken?
    ……
41. What are things that you would recommend be improved in relation to the POC testing procedure?
    ……

I. WILLINGNESS TO BE TESTED IN THE FUTURE

42. Would you recommend POC test to other people to check their taeniosis/cysticercosis states?
    - Yes
    - No (explain) ……
43. If you are advised to be tested for taeniosis/cysticercosis using the POC testing procedure on a regular basis, would you be willing?
    - Yes
    - No (explain) ……
44. If yes to the question above, which of the following screening schedules would you find more feasible for you to regularly be POC tested if all of them were suitable?
    - 3 months basis
    - 6 months basis
    - 12 months basis
    - Others (specify)
45. Do you have any comment or question that you would like to raise to me? …… …… ……

THIS IS THE END OF THE QUESTIONNAIRE. THANK YOU VERY MUCH FOR YOUR COOPERATION AND PROVISION OF VALUABLE INFORMATION