

Factors Associated with Uptake of Isoniazid Preventive Therapy among Children under 5 Years Tuberculosis Contacts in Greater Kibaale, Uganda

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Abstract Isoniazid Preventive Therapy (IPT) is a chemoprophylaxis which reduces the risk of the first episode of TB occurring in people exposed to an infection or with latent infection and the risk of a recurrent episode of TB. WHO recommends isoniazid taken at a daily dose of 5 mg/kg (maximum 300 mg) for at least six months. In Uganda, only 16% of 15957 children contacts of smear-positive TB index cases are on preventive treatment. The objective of this study was to assess factors associated with uptake of isoniazid preventive therapy among children under 5 years' tuberculosis contacts in Greater Kibaale. An analytical cross-sectional study design utilizing both quantitative and qualitative methods was conducted among 207 children under 5 years' tuberculosis contacts. They were recruited using convenience sampling methods. The caregiver of the children completed a structured questionnaire in English and translated into Lunyoro. Data was single-entered and analyzed using SPSS version 22. Bivariate, univariate and multivariate Logistic regression analysis methods were used to identify factors associated with uptake of isoniazid preventive. Of the 207 participants, the uptake IPT was low at 36.7%. Being in the age group of 35-44 years (AOR=15.856, 95% CI: 11.568-27.115), being married, AOR=17.867, 95% CI: 4.631-215.769, p=.008) being separated (AOR=4.4.35, 95% CI: 1.056-6.530, p=0.047), having a monthly income of 40,000-100,000 shillings (AOR=9.917, 95% CI: 6.380-15.450, p=.000), finding it easy to talk to other people about TB problem AOR=.012, 95% CI: .004-.303, p=.007), not screening for TB (AOR=0.391, 95% CI: .242-.791, p=.000) and receiving continuous counselling (AOR=0.004, 95% CI: .001-.142, p=.002) were independently associated with uptake of isoniazid preventive. Conclusively, the level of uptake of IPT was low. Contact screening seems a good entry point for delivery of Isoniazid Preventive Therapy to at-risk children when routinely practised as recommended by WHO.

Keywords: Isoniazid Preventive Therapy (IPT), Tuberculosis (TB), health care, barriers, facilitators, quality of care

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1. Introduction

1.1. Background of the Study

Isoniazid Preventive Therapy (IPT) is a chemoprophylaxis which reduces the risk of a first episode of TB occurring in people exposed to infection or with latent infection and the risk a recurrent episode of TB [1]. WHO recommends isoniazid taken at a daily dose of 5 mg/kg (maximum 300 mg) for at least six months [1].

Isoniazid Preventive Therapy is an essential public health strategy for prevention of TB among HIV infected individuals [2]. The IPT has been shown in various randomized controlled trials and Cochrane reviews to significantly reduce the risk of developing active TB

among those living with HIV who have latent TB infection; with a 70 to 90% reduction [3].

According to WHO global reports in 2017, a total of 292,182 children had access to TB preventive therapy and only 23% of the estimated 1.3 million children under 5 years of age eligible for preventive therapy in TB households received this in 2017 [4]. Nevertheless, 6 months' duration of IPT, may not be optimal for implementation in regions where there are a high number of contacts per TB index case [5].

Globally, an increase in the uptake of IPT is recorded and yet the rate of uptake is still below acceptable levels, especially in the resource-poor settings [6]. The World Health Global TB Report for 2015 showed that only 2.5% children contact of TB patients received IPT [6].

In order for South Africa to reduce the incidence of TB from 9800 per million in 2010 to 1500 per million in 2050

and TB-associated mortality from 2180 per million in 2010 to 200 per million in 2050, IPT must be scaled up to 75% by 2035 [7].

The recorded low uptakes, irrespective of the geographical settings, have been linked to patients' related factors such as non-adherence, non-disclosure of TB status and lack of social support and health care related factors such as the levels of knowledge of the health care providers, and facilities being out of stock, amongst others [8,9,10].

There is paucity of data on IPT uptake and completion among children contact. The limited data available demonstrates suboptimal IPT uptake with slightly better treatment completion rates. A cross-sectional study conducted in Ethiopia reported a low IPT uptake of 37% with a completion rate of 67.9% [11]. A similar study conducted in three health facilities in Nairobi, Kenya, reported a 53.2% IPT uptake with a relatively good completion rate of 88%. To reduce the burden of TB among children contact and improve health outcomes in these children, every perceived barrier to TB prevention should be addressed [12].

The active contact screening and IPT are recommended by the National TB Programme (NTP) in Uganda but TB case detection strategy is limited to passive screening. Although guidelines for IPT have been in existence since 2015, their implementation has not been assessed. For a few years, particular attention has been given to TB in children by Uganda's NTP since TB treatment is recognized as an opportunity that prevents and addresses an important cause of child mortality [13,14,15].

According to Ugandan MOH [16], 20896 TB smear positive patients were identified, 15957 were under 5 contacts identified of which 2512 (16%) were initiated on IPT which is far below the 90% of all children in contact with TB to be initiated. Relatedly Hoima region in which greater Kibaale falls it was reported that 2608 under 15 contacts were listed and evaluated of which only 29 (1.113%) were initiated on IPT still below WHO recommendation. Thus, this study is aimed at assessing factors associated with uptake of Isoniazid preventive therapy among children under 5 years' tuberculosis contacts in Greater Kibaale.

In Uganda, IPT administration is recommended for children aged less than 5 years who have been exposed to an open case of TB and screen negative for TB, and for HIV infected adults who screen negative for TB [13,16].

Therefore, this study seeks to determine factors associated with uptake of isoniazid preventive therapy among children under 5 years tuberculosis contacts in Greater Kibaale in order to help in the development of appropriate interventions that can support and maintain proper implementation and uptake of IPT among children under 5 years tuberculosis contacts and reduce health care costs associated with TB treatment.

1.2. Research Questions

The study had the following research questions;

- 1) What was the uptake of isoniazid preventive therapy among children under five TB contacts in greater Kibaale region?

- 2) What care-givers factors were associated with uptake of isoniazid preventive therapy among under five TB contacts in greater Kibaale region?
- 3) What child related factors were associated with uptake of isoniazid preventive therapy for under five TB contacts in greater Kibaale region?
- 4) What health facility related factors were associated with uptake of isoniazid preventive therapy for under five TB contacts in greater Kibaale region?

2. Materials and Methods

2.1. Study Design

This was an analytical cross-sectional design was used for this research employing a mixed method study involving quantitative and qualitative components. In which data is generated into numerical data, analyzed using statistics, relationships are determined between two or more variables and data was collected at a specific point in time. It was designed to determine the factors associated with uptake of isoniazid preventive therapy among children under 5 years' tuberculosis contacts in Greater Kibaale. This was appropriate for describing exposure and outcomes at the same point in time as well as establishing exposure-outcome relationships.

2.2. Study Population and Sample Size Determination

The study population was Children contacts of adult patients diagnosed with Sputum Smear Pulmonary TB (SPPTB), index cases, from April to June 2020. Population also included health workers in selected health facilities who provided Directly Observed Therapies (DOTs) services and implemented IPT services.

The sample size was determined using Kish and Leslie formula;

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

Where

n = Sample size

Z^2 is the abscissa of the normal curve that cuts off an area α at the tails ($Z=1.96$ at 95% Confidence Interval)

d is the desired level of precision (margin of error) (5%)

p is the estimated proportion of an attribute that is present in the population (16%) (MoH, 2018).

q is (1-p).

Thus,

$$n = \frac{1.96^2 * 0.16(1-0.16)}{0.05^2} = 206.5$$

= 207 Children contacts participants.

2.3. Sampling Procedure

A list of all health facilities providing TB treatment and prevention services were obtained from the Kibaale region head. At the level of the facility, eligible child contacts

were conveniently recruited, starting with those facilities reporting the highest number of child contacts eligible for IPT until the required sample size was obtained. Health workers for the key informant interview (KII) were purposively selected and interviewed using key informants interview guide.

2.4. Data Analysis

This was done at all levels using SPSS version 22. Univariate analysis obtained the frequency and distribution of study variables. Bivariate analysis used Chi-square test to determine the association between the two variables. Where $P < 0.05$ were considered significant. Multivariate analysis was performed to control the confounding variables by logistic regression analysis. Variables with $P < 0.05$ at bivariate analysis were put into model to establish factors independently associated with patient satisfaction.

2.5. Ethical Consideration

Approval to conduct the study was obtained from Uganda Martyrs University Research and Ethic Committee and all the other required ethical approvals made as required in research concerning human subjects. Other administrative approvals were obtained from the respective District Health Office (DHOs) in greater Kibaale. Informed consents were obtained from respondents after explaining adequately the aim, procedures and anticipated benefits of the study.

3. Results

3.1. Socio-demographic Characteristics of Respondents

The socio-demographic characteristics of the respondents were examined by univariate analysis and the results are summarized in table below.

Table 1. Socio-demographic Characteristics of Respondents

Variable category	Frequency (n=207)	Percentage %
Age		
18-24 years	25	12.1
25-34 years	46	22.2
35-44 years	62	30.0
>44 years	74	35.7
Marital status		
Single	15	7.3
Married/cohabiting	122	58.9
Divorced/Separated	45	21.7
Widowed	25	12.1
Sex		
Male	129	62.3
Female	78	37.7
Current level of education		
No formal education at all	38	18.4
Primary education	136	65.7
Secondary education	29	14.0
Above secondary education	4	1.9
Place of residence		
Urban/peri-urban	20	9.7
Rural	187	90.3
Religion		
Anglican/Pentecostal	59	28.5
Catholics	144	69.6
Traditionalist	4	1.9
Occupation of the caregiver		
Peasant	186	89.9
Formally employed	5	2.4
Business person	8	3.9
Casual labourer	8	3.9
Monthly income in shillings		
<UGX40,000/=	84	40.6
UGX40,000/= - UGX100,000/=	76	36.7
UGX100,001/= - UGX300,000/=	29	14.0
>UGX300,000/=	20	9.7

Primary data.

3.2. Prevalence of Uptake of Isoniazid Preventive Therapy (IPT)

The prevalence of uptake of Isoniazid Preventive Therapy (IPT) among under five TB Contacts was determined. See [Figure 1](#) below

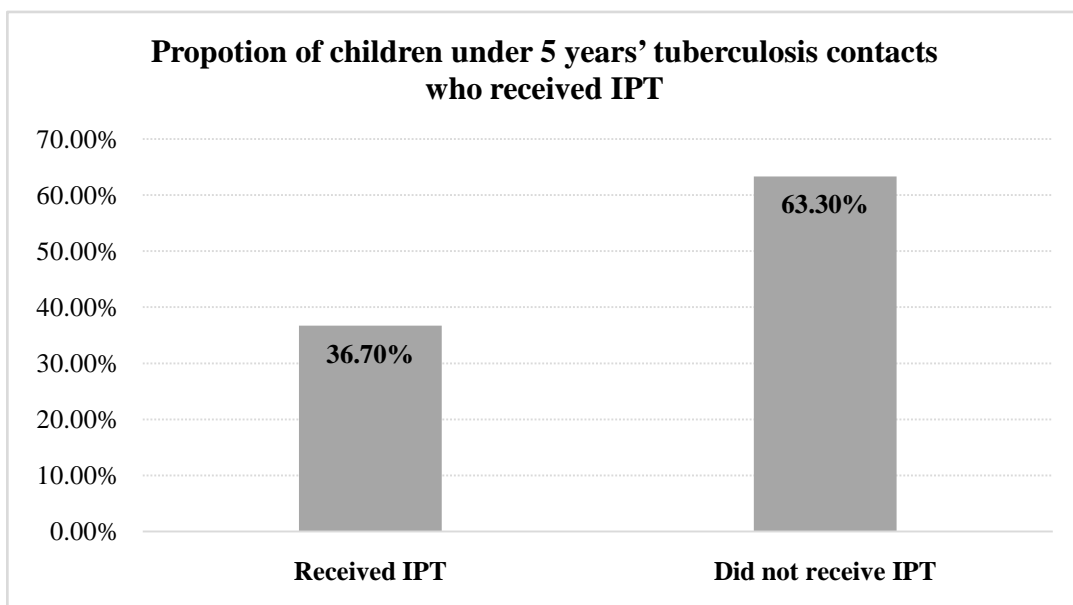


Figure 1. Prevalence of IPT Therapy Uptake Among Children Under Five TB Contacts

Figure above shows that majority 63.3% of the children whose caregivers were studied did not received Isoniazid Preventive therapy while 36.7% of the children had received Isoniazid Preventive therapy.

3.3. Care-givers Factors Associated with Isoniazid Preventive Therapy (IPT) Uptake

Care-givers factors associated with Isoniazid Preventive Therapy (IPT) Uptake was determined. See [Table 2](#) below.

Table 2. Bivariate Analysis of Care-givers Factors Associated With IPT Uptake

Care-giver Variables	IPT uptake		COR	95% CI		P-value
	Yes (%)	No (%)		L	U	
Age						
18-24 years	12(5.8%)	13(6.3%)	1.0			
25-34 years	24(11.8%)	22(10.6%)	.846	.319	2.243	.737
35-44 years	16(7.7%)	46(22.2%)	2.654	1.007	6.995	.048*
>44 years	24(11.8%)	50(24.2%)	1.923	.764	4.842	.165
Marital status						
Single	11(5.3%)	4(1.9%)	1.0			
Married/cohabiting	51(24.6%)	71(34.3%)	3.828	1.154	12.706	.028*
Divorced/Separated	6(2.9%)	39(18.8%)	17.875	4.273	74.784	.000*
Widowed	8(3.9%)	17(8.2%)	5.844	1.413	24.171	.015
Sex						
Male	36(17.4%)	93(44.9%)	1.0			
Female	40(19.3%)	38(18.4%)	.368	.204	.662	.001*
Current level of education						
No formal education at all	12(5.8%)	26(12.6%)	1.0			
Primary education	48(23.2%)	88(42.5%)	.846	.392	1.826	.670
Secondary education	12(5.8%)	17(8.2%)	.654	.239	1.790	.408
Above secondary education	4(1.9%)	0(.0%)	.000	.000	.	.999
Place of residence						
Urban/peri-urban	8(3.9%)	12(5.8%)	1.0			
Rural	68(32.9%)	119(57.5%)	1.167	.454	2.995	.749
Religion						
Anglican/Pentecostal	16(7.7%)	43(20.8%)	1.0			
Catholics	60(28.9%)	84(40.6%)	.521	.269	1.011	.054
Traditionalist	0(.0%)	4(1.9%)	6.011E8	.000	.	.999
Fear of the child get infected with TB						
Yes	48(23.2%)	99(47.8%)	1.0			
No	28(13.5%)	32(15.5%)	.554	.300	1.023	.059
Occupation of the caregiver						
Peasant	60(28.9%)	126(60.7%)	1.0			
Formally employed	0(.0%)	5(2.4%)	7.693E8	.000		.999
Business person	8(3.9%)	0(.0%)	.000	.000		.999
Casual labourer	8(3.9%)	0(.0%)	.000	.000		.999
Heard of benefits of IPT						
Yes	68(32.9%)	40(19.3%)	1.0			
No	8(3.9%)	91(43.0%)	.337	.104	.973	.000*
Source of information						
Hospital	68(32.9%)	40(19.3%)				
IPT uptake in children below five years is importance						
Yes	68(32.9%)	83(40.1%)	1.0			
No	8(3.9%)	48(23.2%)	.416	.178	.697	.000*
Monthly income in shillings						
<40,000	36(17.4%)	46(22.2%)	1.0			
40,000-100,000	27(13.0%)	49(22.7%)	1.420	.748	2.696	.283
100,001-300,000	5(2.4%)	24(11.6%)	3.757	1.305	10.817	.014*
>300,000	8(3.9%)	12(5.8%)	1.174	.434	3.176	.752
Current TB treatment status of patient						
First treatment	76(36.7%)	122(58.9%)	1.0			
Re-treatment	0(.0%)	9(4.3%)	1.006E9	.000		.999
It easy to talk to other people about TB problems						
Yes	44(21.3%)	107(51.7%)	1.0			
No	32(15.5%)	24(11.6%)	.308	.163	.582	.000*

Primary data, *- Significance, COR=Crude Odd Ratio, CI=Confidence Interval, L=Lower limit, U=Upper limit.

Caregiver being in the age group of 35-44 years (Crude OR=2.654, 95% CI: 1.007-6.995) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts, participants who were aged 35-44 years had higher chances of having their children receive IPT.

Being married (Crude OR=3.828, 95% CI: 1.154-12.706) and separated (Crude OR=17.875, 95% CI: 4.273-74.784) were significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts. Participants who were married and separated had higher chance of children receiving IPT.

Being a female caregiver (Crude OR=.368, 95% CI: .204-662) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who were female had lower chances of having children receive IPT.

Having not heard the benefits of IPT (Crude OR=.337, 95% CI: .104-973) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who have heard about the benefits of IPT were less likely to have children received IPT.

Thinking that it is IPT uptake in children below five years is not importance (Crude OR=.416, 95% CI: .178-.697) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who thought IPT uptake in children below five years is not importance had lower chance to having the children receive IPT.

Household monthly income (Crude OR=3.757, 95% CI: 1.305-10.817) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who had household monthly income of 100,000-300,000 shillings had higher

chance of having their children receive IPT.

Having a feeling that it is not easy to talk to other people about TB problem (Crude OR=.308, 95% CI: .163-.582) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers felt it was not easy to talk to other people about TB problem had low chance of having their children receive IPT.

The qualitative aspects mentioned that;

"[...] The community would want to get their children on IPT because it prevents under 5 contacts from acquiring and reducing TB prevalence under 5" - **Clinician**

"[...] Use of IPT among contacts children is dependent on attitude of caregiver and information on benefits and bad outcomes of TB. Those who are well informed will definitely have the children enrolled on the IPT unlike those who themselves miss treatment as well as low perceived benefits affect the uptake in children contacts [...]" - **Clinician**

In addition, another clinician mentioned that,

"Negative perception about IPT uptakes since <5years have no sign of TB so that feels like a burden to the child from the caregivers look [...]"

"One of the facilitators of IPT uptake perceived risk to infect their children, doing home visits to deliver drugs, multi drug dispensing (6 months course)[...]" - **Clinician**

3.4. Child Related Factors Associated with Isoniazid Preventive Therapy Uptake

The result of child-related factors associated with Isoniazid Preventive Therapy uptake are show in [Table 3](#) below

Table 3. Bivariate analysis of Child-related Factors Associated with IPT Uptake

Child-related Variables	IPT uptake		COR	95% CI		P-value
	Yes (%)	No (%)		L	U	
Age of the child						
≤12 months	4(1.9%)	13(6.3%)	1.0			
13-24 months	20(9.6%)	32(15.5%)	.492	.141	1.722	.267
25-36 months	36(17.4%)	25(12.1%)	.214	.062	.732	.014*
>36 months	16(7.7%)	61(29.5%)	1.173	.337	4.089	.802
Child's sex/gender						
Male	40(19.3%)	77(37.2%)	1.0			
Female	36(17.4%)	54(26.1%)	.779	.441	1.377	.390
Nutritional status of the child						
Normal	72(34.9%)	123(59.4%)	1.0			
Moderately malnourished	4(1.9%)	8(3.9%)	1.171	.341	4.025	.802
BCG scar on the right upper						
Yes	76(36.7%)	109(52.7%)	1.0			
No	0(0.0%)	22(10.6%)	11.263	.000		.998
Parental relationship with the index case						
Parent	44(21.3%)	59(28.5%)	1.0			
Non-parent	32(15.5%)	72(34.9%)	1.678	.948	2.696	.076
Indicate relationship if Non-parent						
Grandparent	44(21.3%)	59(28.5%)	1.0			
Sister/brother	28(13.5%)	55(26.6%)	1.465	.808	2.668	.212
Uncle/aunt	4(1.9%)	17(8.2%)	1.678	.485	5.803	.414
Child screened for TB						
Yes	68(32.9%)	49(23.3%)	1.0			
No	8(3.9%)	82(39.6%)	.224	.105	.309	.000*

Primary data, *- Significance, COR=Crude Odd Ratio, CI=Confidence Interval, L=Lower limit, U=Upper limit.

Being a child aged 25-36 months (Crude OR=.214, 95% CI: .062-732) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; children who were aged 25-36 months had low chance of receiving IPT.

Not being screened for TB (Crude OR=.224, 95% CI: .105-.309) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years'

tuberculosis contacts; children who were not screened had low chance to have received IPT.

3.5. Health Facility Related Factors Associated with IPT Uptake

The result of analysis for health facility related factors associated with IPT uptake are summarized in [Table 4](#) below

Table 4. Bivariate analysis of health facility related factors associated with IPT Uptake

Health Facility Variables	IPT uptake		COR	95% CI		P-value
	Yes (%)	No (%)		L	U	
Distance to the health facility						
≤5km	44(21.3%)	49(23.7%)	1.0			
5-10km	20(9.7%)	24(11.6%)	1.078	.525	2.213	.839
10-15km	4(1.9%)	21(10.1%)	4.714	1.502	14.801	.008*
>15km	8(3.9%)	37(17.8%)	4.153	1.747	9.872	.001*
Quality of TB services						
Excellence	36(17.4%)	76(36.7%)	1.0			
Good	36(17.4%)	55(26.6%)	.724	.406	1.290	.273
Fair/or fairly good	4(1.9%)	0(0.0%)	.000			.999
Difficulties in coming to receive TB health services						
Yes	48(23.2%)	90(43.5%)	1.0			
No	28(13.5%)	41(19.8%)	.781	.431	1.415	.415
Received IPT-associated health education						
Yes	20(9.7%)	22(10.6%)	1.0			
No	56(27.1%)	109(52.7%)	1.769	.891	3.514	.103
Attitude of the health workers						
Excellence	44(21.3%)	64(30.9%)	1.0			
Good	32(15.5%)	67(32.4%)	1.439	.814	2.545	.210
Perceived waiting time						
Short	32(15.1)	80(38.6%)	1.0			
Long	44(21.3%)	51(24.6%)	.464	.261	.824	.009*
Health workers always present						
Yes	72(34.8%)	131(63.3%)	1.0			
No	4(1.9%)	0(0.0%)	.000	.000		.999
TB preventive drugs always available						
Yes	76(36.7%)	122(58.9%)	1.0			
No	0(0.0%)	9(4.3%)	.000	.000		.999
Nearest health facility provide TB health services						
Yes	16(7.7%)	57(27.5%)	1.0			
No	60(28.9%)	74(35.7%)	.346	.181	.664	.001*
Rate the way health workers handle TB patients						
Calm/friendly/or welcoming	76(36.7%)	131(63.3%)				
Health workers discuss TB patients with other people						
Yes	32(15.5%)	110(53.1%)	1.0			
No	44(21.3%)	21(10.1%)	2.139	1.072	3.267	.000*
Health workers offer continuous counselling						
Yes	28(13.5%)	105(50.7%)	1.0			
No	48(23.2%)	26(12.6%)	.144	.077	.272	.000*
Agree that information is adequate/or enough						
Yes	40(19.3)	100(48.3%)	1.0			
No	36(17.4%)	31(15.0%)	.344	.188	.630	.001*
Some TB information that are provided to TB patients						
Adherence to TB treatment	36(17.4%)	31(23.7%)	1.0			
Avoid alcohol and smoking	4(1.9%)	28(13.5%)	8.129	2.568	25.737	.000
Avoid sharing utensil like cup	12(5.8%)	40(19.3%)	3.871	1.732	8.652	.001
TB is curable	4(1.9%)	24(11.6%)	6.968	2.179	.22	.001
Taking medicine on time	4(1.9%)	4(1.9%)	18760	.000	.279	.999
TB management and prevention	12(5.8%)	4(1.9%)	1.161	.268	5.034	.842
Duration of TB treatment	4(1.9%)	0(0.0%)	.000			.999
Records IPT information in the register						
Yes	76(36.7%)	114(55.1%)	1.0			
No	0(0.0%)	17(8.2%)	10789	.000		.998

Primary data, *- Significance, COR=Crude Odd Ratio, CI=Confidence Interval, L=Lower limit, U=Upper limit.

Living 10-15km and more than 15km from the health facility (Crude OR=4.714, 95% CI: 1.502-14.801) and Crude OR=4.153, 95% CI: 1.747-9.872) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts respectively; caregiver who lived more than 5km from the health facility has high chance of having their children receive IPT.

Long perceived waiting time (Crude OR=.214, 95% CI: .062-732) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; children who were aged 25-36 months had low chance of receiving IPT.

Having nearest health facility not providing TB services (Crude OR=.346, 95% CI: .181-.664) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who the nearest facility were not offering TB services had low chance of their children receiving IPT.

Having health workers not discussing TB patients with other people not involved in their treatment (Crude OR=2.139, 95% CI: 1.072-3.267) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who did not discuss by health workers with other people had high chance of having children receive IPT.

Not having health workers offer continuous counselling to TB patients (Crude OR=.144, 95% CI: .077-.272) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregivers who were not offered continuous counselling had low chance of their children receiving IPT.

Agreeing that information provided on IPT is adequate (Crude OR=.344, 95% CI: .188-.630) was significantly associated with Isoniazid Preventive Therapy uptake among children under 5 years' tuberculosis contacts; caregiver who did not agree that information is adequate had low chance of their children receive IPT.

Lack of interoperability between the clinic and pharmacy databases; it was noted that at the clinic and the pharmacy run two independent records care and databases for the clinic and pharmacy respectively. The clinicians enter the patients' information in the Care database and then write paper-based prescriptions that the patients present to the pharmacists to have the drugs dispensed. The pharmacists then enter the drugs written on the prescription into the ADT database before dispensing the drugs to the patients. The healthcare providers reported that in some instances, patients' information is lost across the care continuum.

"[...] Sometimes the clinician may initiate a patient on IPT but for some reason, the patient fails to present the prescription to the pharmacist. The pharmacist has no way of knowing this and will therefore dispense only the ARVS ... The patient's records in the clinic will therefore show that the patient was started on IPT but there will be no records in the pharmacy." **Pharmacist.**

"...the barriers to IPT uptake include; transport to facility in most cases they are represented, pill burden, side effects, poor attitude of the caregiver and male partners not willing to bring contacts to hospital for screening[...]." - **clinician**

"[...] Eligible clients, stock available, client's knowledge about the news to have three children take IPT, health workers are knowledgeable, follow up by either physical or phone calls[...]" - **clinician**

"[...] Negative attitude care takers, recurrent coughs/URTI for HIV+ children this under IPT initiation, poor completion rates due lost to follow up." - **Nursing officer**

"[...] known benefits of IPT among care givers, conducting home visits to identify contacts, stock availability and knowledge of IPT among health workers [...]" - **clinician**

"[...] Other barrier: wrong information of contacts (Biodals and number of contacts), recurrent coughs, and development of cough during the course of IPT leading to stopping of IPT [...]" - **Nursing Officer**

Table 5. Multivariate Analysis of Factors Associated With Uptake Of IPT Among Children Under 5 Years' Tuberculosis Contacts

Variable	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age of the respondents				
18-24 years	1.0		1.0	
25-34 years	.846(.319-2.243)	.737	8.512(.182-38.031)	.275
35-44 years	2.654(1.007-6.995)	.048*	15.856(11.568-27.115)	.014*
>44 years	1.923(.764-4.842)	.165	.902(.131-6.203)	.916
Marital status				
Single	1.0		1.0	
Married/cohabiting	3.828(1.154-12.706)	.028*	17.867(4.631-215.769)	.008*
Divorced/Separated	17.875(4.273-74.784)	.000*	4.435(1.056-6.530)	.047*
Widowed	5.844(1.413-24.171)	.015	5.440(.268-10.381)	.270
Monthly income in shillings				
<40,000	1.0		1.0	
40,000-100,000	1.420(.748-2.696)	.283	4.843(.560-8.872)	.152
100,001-300,000	3.757(1.305-10.817)	.014*	9.917(6.380-15.450)	.000*
>300,000	1.174(.434-3.176)	.752	7.045(.750-10.962)	.070
It easy to talk to other people about TB problems				
Yes	1.0		1.0	
No	.308(.163-.582)	.000*	.012 (.004-.303)	.007*
Child screened for TB				
Yes	1.0		1.0	
No	.224 (.105-.309)	.000*	0.391(.242-.791)	.000*
Continuous counselling				
Yes	1.0		1.0	
No	.144(.188-630)	.000*	.004(.001-.142)	.002

Primary data, *- Significance, **COR**=Crude Odd Ratio, **CI**=Confidence Interval, **L**=Lower limit, **U**=Upper limit.

Children of caregivers who were in the age bracket of 35-44 years were 15.856 times more likely to have received Isoniazid Preventive therapy compared to those who were aged 18-24 years.

Children of caregivers who were married/cohabiting and divorced/separated and widowed were 17.867 times and 4.435 times more likely to have received Isoniazid Preventive therapy respectively compared to those whose caregivers were single.

Children of caregivers who had household monthly income of 100,001-300,000 shillings were 9.917 times more likely to have received Isoniazid Preventive therapy compared to those household monthly income was less than 40,000 shillings.

Children of caregivers who don't find it easy to talk to people about TB issues were 0.012 times less likely to have received Isoniazid Preventive therapy compared to those whose caregiver finds it easy to talk to people about the TB issues.

Children who were not screened for TB were 0.391 times less likely to have received Isoniazid Preventive therapy compared to those who were screened for TB.

Children whose caregivers were not offered continuous counselling by health workers at the facility were 0.004 times less likely to have received Isoniazid Preventive therapy compared to those who were offered continuous counselling by health workers at the facility.

4. Discussion

4.1. Prevalence of Uptake of IPT among under Five TB Contacts

The study found that the uptake of IPT among under five TB contacts was 36.7% and the completion rate of 73.7%. This is inconsistent with Tadesse et al. [17] who found that Isoniazid Preventive Therapy uptake rate of 64% and a completion rate of 80% and studies conducted in the Benin [18] and Gambia [19] have reported a 99% and 89% of Isoniazid Preventive Therapy uptake respectively. Khaparde *et al.* [20] reported screening of 65% child contacts and 63% initiation of Isoniazid Preventive Therapy even after an active intervention in Rajnandgaon district of central India [20]. On the contrary, Zawedde-Muyanja et al. [21] also found that of 910 eligible child contacts, 670 (74%) started preventive therapy, 569 (85%) of whom completed therapy and 52% were initiated on Isoniazid Preventive Therapy and 201 (94%) completed Isoniazid Preventive Therapy. No person in the Isoniazid Preventive Therapy-initiated group developed Tuberculosis (TB) [22]. The study difference was due to difference in the study methods and designs.

4.2. Care-giver Factors Associated with Uptake of IPT

The study found that age of the caregiver was significantly associated with uptake of isoniazid preventive therapy among under five TB contacts; being in the aged group of 35-44 years had an increased uptake of Isoniazid Preventive therapy. This is in line with another study [23] in 2019 which found that index cases

aged 21-30 years [OR=34.712; (95% CI: 4.801-250.998); $p < 0.001$] and 31-40 years [OR=10.094; (95% CI: 1.472-69.200); $p = 0.019$], was associated with Isoniazid Preventive Therapy uptake. Similarly, Osman et al. [24] in 2013 found a similar results and another study [25] which found that factors associated with uptake of Isoniazid Preventive Therapy age of 0- 14 years (AOR 0.16; 95% CI: 0.06-0.44); age 15- 19 years (AOR 0.23; 95% CI: 0.08- 0.63); age 20- 29 years (AOR 0.62; 95% CI: 0.46-0.82).

Again, in this study, household monthly income was significantly associated with uptake of isoniazid preventive therapy among under five TB contacts; having household monthly income of 100,001-300,000 shillings was associated with increased Isoniazid Preventive therapy. This is dissimilar to with other studies [25] which found that factors associated with uptake of Isoniazid Preventive Therapy having middle income level (AOR 1.14; 95% CI: 1.05-1.23).

The study found that gender of the respondents was not significantly associated with uptake of isoniazid preventive therapy for under five TB contacts. This is not in line with a study by (Black et al. [25] who found that Contacts of male patients and retreatment index patients were at lower chance of uptake of Isoniazid Preventive Therapy [25]. Contrasting our findings, Okwara, et al. in 2017 [26] also found that Male patients reported fewer child contacts (odds ratio (OR) 0.6; 95% CI 0.42 - 0.86) and were less likely to bring contacts for screening [26]. The difference in the finding could be because of the differences in the study designs.

4.3. Child Related Factors Associated with Uptake of IPT

The study found that age of the child was not significantly associated with uptake of isoniazid preventive therapy for under five TB contacts. This is contrary to a study by Zelner et al. [27] who found that Isoniazid Preventive Therapy confers protection against incident TB among HIV-negative contacts younger than 30 years (RR, 0.33; 95% confidence interval, 0.20-0.54). Low uptake of Isoniazid Preventive Therapy associated with latent TB infection is greatest for children younger than 5 years and decreases with age. Furthermore, Singh et al. [28,29] also found Isoniazid Preventive Therapy confers protection against incident TB among HIV-negative contacts younger than 30 years (RR, 0.33; 95% confidence interval, 0.20-0.54). Low uptake of Isoniazid Preventive Therapy associated with latent TB infection is greatest for children younger than 5 years and decreases with age and that Age of the child was found to be independent predictors of Isoniazid Preventive Therapy uptake, children who were 3 years or older (adjusted odds ratio [AOR] = 2.46, 95% confidence interval [CI] = 1.16–5.24) [30].

The study found that sex of the child was not significantly associated with uptake of isoniazid preventive therapy for under five TB contacts. This was also found in another study [31] that Male (AOR: 0.68; CI: 0.49–0.96) was independently associated with lower likelihood of uptake of Isoniazid prophylaxis and those who were female (AOR = 1.52, 95% CI = 1.15–3.68) had higher odds of Isoniazid Preventive Therapy uptake [30].

4.4. Health Facility Related Factors Associated with Uptake of IPT

In this study, offering continuous counselling by the health workers was significantly associated with uptake of isoniazid preventive for under five TB contacts; having continuous counselling by health workers at the facility had an increased uptake of Isoniazid Preventive therapy. This is similar to Gebretsae et al. [32] in 2020 who found that health education on TB to HH contacts by HEWs (AOR = 4.28, 95% CI: 2.04-9.00), HH visit by HEWs within 6 months prior to the programme assessment (AOR = 5.84, 95% CI: 2.81-12.17) and discussions about TB activities by HEWs with Women Development Army (WDA) leaders (AOR = 9.51, 95% CI: 1.49-60.75) were significantly associated with household contact TB screening by HEWs. Similarly, Belgaumkar et al. [33] found that Lack of TB screening and Isoniazid Preventive Therapy provision for child contacts was associated with inadequate HCP counseling (aOR 19.5, $P < 0.001$), a non-parent index case (aOR 3.72, $P = 0.008$) and lack of postgraduate HCP qualification (aOR 19.12, $P = 0.04$) and Jacobson et al. [34] in 2017 also found that that successful Isoniazid Preventive Therapy uptake was associated with appropriate counseling and education for individual patients and addressing inefficiencies within the health care system in order to minimize patients' financial and logistical burden.

5. Conclusions and Recommendations

Generally the prevalence of IPT therapy uptake among children under five TB contact was low at 36.7% with most of the 73.7% completed the treatment course.

Caregivers age of 35-44 years, being married and separated and having household monthly income of 100,000-300,000 shillings were positively associated with uptake of isoniazid preventive therapy among under five TB contacts meaning that IPT uptake was high among children whose caregivers who were aged 35-44 years, married, separated and having a monthly income of 100,00-300,000 shillings. While caregivers felt it is not easy to talk to other people about TB problem was negatively associated with uptake of isoniazid preventive therapy for under five TB contacts. Being screened for TB was positively associated with uptake of isoniazid preventive therapy for under five TB contacts meaning children who were screened were taking the IPT more. Being offered continuous counselling on IPT was positively associated with uptake of isoniazid preventive therapy for under five TB contacts. Based on the findings of this study, we recommend intensification of IPT-related continuous health education and counselling, adoption of short-course TB preventive treatment regimens and establishment of an effective IPT monitoring and evaluation system in the HIV care centres. Focusing on patient-centred care, enhancing community and health-care worker education and securing stable medication supply to effectively deliver this therapy is crucial in order to reduce childhood morbidity and mortality from tuberculosis. Further studies are needed to better understand factors contributing to IPT interruption early in

the course of therapy, the feasibility of delivering IPT in kit form, and the long-term benefits of IPT in terms of reducing TB-related morbidity and mortality among under-five child contacts of SS+ TB cases.

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Declaration

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Contributorship

TI conceptualized the study and wrote the proposal, collected data and did preliminary analysis.

OK supervised the study, curated the analysis and provided all the necessary expertise to finalize the study. He drafted the manuscript and he is the corresponding author for this work

References

- [1] World Health Organization. *Global tuberculosis report 2013*. Geneva: WHO, 2018a.
- [2] World Health Organization. *The Stop TB Strategy*. Geneva: WHO, 2018b.
- [3] Semu, M., Fenta, T.G., Medhin, G. and Assefa, D. 2017. Effectiveness of isoniazid preventative therapy in reducing incidence of active tuberculosis among people living with HIV/AIDS in public health facilities of Addis Ababa, Ethiopia: a historical cohort study. *BMC Infectious Diseases*. 20 (7), pp.17-25.
- [4] World Health Organization. *WHO treatment guidelines for isoniazid-resistant tuberculosis: Supplement to the WHO treatment guidelines for drug-resistant tuberculosis*, Geneva: WHO, 2018c. Available at: <http://apps.who.int/iris/bitstream/handle/10665/260494/9789241550079-eng.pdf>.
- [5] Burmen, B., Mutai, K. and Malika, T. 2019. Isoniazid Preventative Therapy uptake for child household contacts of tuberculosis index cases, Kisumu County, Kenya, 2014-2015. *Journal of public health in Africa*, Vol. 10, Issue 1, 2019.
- [6] World Health Organization. *Global tuberculosis control: a short update to the 2010 Report*. Geneva: WHO, 2010.
- [7] Dye, C., Glaziou, P., Floyd, K. and Ravignone, M. Prospects for tuberculosis elimination. *Annu Rev Public Health*, 13(34), pp.271-86, 2014.
- [8] Mindachew, M., Deribew, A., Memiah, P. and Biadgilign, S. Perceived barriers to the implementation of isoniazid preventive therapy for people living with HIV in resource constrained settings: a qualitative study. *Pan African Medical Journal*, 14(17), pp.26, 2014.
- [9] Nyamathi, A. M. C. A., Nahid, P., Gregerson, P. and Leake, B. A randomized controlled trial of two treatment programs for homeless adults with latent tuberculosis infection. *Int J Tuberc Lung Dis*, 7(10), pp. 775-82, 2016.

- [10] Szakacs, T. A., Wilson, D., Cameron, D. W., Clark, M., Kocheleff, P. and Muller, F. J. Adherence with isoniazid for prevention of tuberculosis among HIV-infected adults in South Africa. *BMC Infect Dis*, 13(6), pp. 6:97, 2016.
- [11] Fentahun, N., Wasihun, Y., Mamo, A. and Gebretsadik, L. A. Contact Screening and Isoniazid Preventive Therapy Initiation for Under-Five Children among Pulmonary Tuberculosis-Positive Patients in Bahir Dar Special Zone, Northwest Ethiopia: A Cross-Sectional Study. *Tuberculosis research and treatment*, 6(7), pp.346-75, 2020.
- [12] Omesa, E.N., Kathure, I.A., Masini, E., Mulwa, R., Maritim, A. and Owiti, P.O. Uptake of isoniazid preventive therapy and its associated factors among HIV positive patients in an urban health Centre, Kenya. *East African Medical Journal*, 93(10), pp.47-54, 2016.
- [13] Ministry of Health, *National Guideline for the Management of Drug Resistant Tuberculosis*, Kampala: Uganda, 2017. Available at: <https://www.moh.gov.bt/wp-content/uploads/afdf-files/2018/09/National-Guideline-For-The-Management-of-Drug-Resistant-TB-2017.pdf>.
- [14] Katende, J. N., Omona, K., User - provider perspectives to overcome the challenges of TB/HIV service integration at Mulago National Referral Hospital, Kampala. *Afri Health Sci*, 21(1): 248-53, 2021.
- [15] Omona, K., Laban, S. Factors associated with uptake of community client-led ART delivery model at Mulago adult HIV clinic, Mulago National Referral Hospital, *Cogent Medicine*, 8 (1), 2021.
- [16] Ministry of Health. *MINISTRY OF HEALTH MANUAL OF THE NATIONAL TUBERCULOSIS AND LEPROSY PROGRAMME, 2nd Ed.*, Kampala: MOH, 2010. Available at: https://www.who.int/hiv/pub/guidelines/uganda_tb.pdf.
- [17] Tadesse, Y., Gebre, N., Daba, S., Gashu, Z., Habte, D., Hiruy, N., Negash, S., Melkieneh, K., Jerene, D., K Haile, Y., Kassie, Y., Melese, M. & G Suarez, P. Uptake of Isoniazid Preventive Therapy among Under-Five Children: TB Contact Investigation as an Entry Point. *PLoS one*, 11(5), pp.155-525, 2016.
- [18] Adjibimey, M., Masserey, E., Adjonou, C., Gbénagnon, G., Schwoebel, V., Anagonou, S., and Zellweger, J. P. 2016. Implementation of isoniazid preventive therapy in children aged under 5 years exposed to tuberculosis in Benin. *The international journal of tuberculosis and lung disease*, 20(8); 1055-1059, 2016.
- [19] Egere, U., Sillah, A. and Togun, T. 2016. Isoniazid preventive treatment among child contacts of adults with smear-positive tuberculosis in the Gambia, *International Journal of Tuberculosis and Lung Diseases*, 6 (4), pp. 226-231, 2016.
- [20] Khaparde, K., Jethani, P., Dewan, P. K., Nair, S. A., Deshpande, M. R., Satyanarayana, S., Mannan, S. and Moonan, P. K. Evaluation of TB Case Finding through Systematic Contact Investigation, Chhattisgarh, India. *Tuberculosis research and treatment*, 6(7), pp.16-27, 2015.
- [21] Zawedde-Muyanja, S., Nakanwagi, A., Dongo, J. P., Sekadde, M. P., Nyinoburyo, R., Ssentongo, G., Detjen, A. K., Mugabe, F., Nakawesi, J., Karamagi, Y., Amuge, P., Kekitiinwa, A. and Graham, S. M. Decentralisation of child tuberculosis services increases case finding and uptake of preventive therapy in Uganda. *The international journal of tuberculosis and lung disease* 22(11), pp.1314-1321, 2018.
- [22] Nyathi, S., Dlodlo, R. A., Satyanarayana, S., Takarinda, K. C., Tweya, H., Hove, S., Matambo, R., Mandewo, W., Nyathi, K., Sibanda, E. and Harries, A. D. Isoniazid preventive therapy: Uptake, incidence of tuberculosis and survival among people living with HIV in Bulawayo, Zimbabwe. *PLoS one*, 14(10), pp.223-6, 2019.
- [23] Sabasaba, A., Mwambi, H., Somi, G., Ramadhani, A. & Mahande, M. J. Effect of isoniazid preventive therapy on tuberculosis incidence and associated risk factors among HIV infected adults in Tanzania: a retrospective cohort study. *BMC Infectious Diseases*, 19 (62), 2019.
- [24] Osman, M., Hesselting, A. C., Beyers, N., Enarson, D. A., Rusen, I. D. and Lombard, C. 2013. Impact of isoniazid preventive therapy on mortality among children less than 5 years old following exposure to tuberculosis at home in Guinea-Bissau: a prospective cohort study. *BMJ Open*, 3(3), pp.101-136, 2013.
- [25] Black, F., Amien, F. and Shea, J. An assessment of the isoniazid preventive therapy programme for children in a busy primary healthcare clinic in Nelson Mandela Bay Health District, Eastern Cape Province, South Africa. *South African medical journal*, 108(3), pp.217-223, 2018.
- [26] Okwara, F. N., Oyore, J. P., Were, F. N. and Gwer, S. Correlates of isoniazid preventive therapy failure in child household contacts with infectious tuberculosis in high burden settings in Nairobi, Kenya - a cohort study. *BMC infectious diseases*, 17(1), pp. 623, 2017.
- [27] Zelner, J. L., Murray, M. B., Becerra, M. C., Galea, J., Lecca, L., Calderon, R., Yataco, R., Contreras, C., Zhang, Z., Grenfell, B. T. and Cohen, T. Bacillus Calmette-Guérin and isoniazid preventive therapy protect contacts of patients with tuberculosis. *American journal of respiratory and critical care medicine*, 189(7), pp. 853-859, 2014.
- [28] Singh, M., Mynak, M., Kumar, L., Mathew, J. and Jindal, S. Prevalence and risk factors for transmission of infection among children in household contact with adults having pulmonary tuberculosis. *Arch Dis Child*, 90(6), pp. 624-628, 2015.
- [29] Singh, A.R., Kharate, A., Bhat, P., Kokane, A.M., Bali, S., Sahu, S., Verma, M., Nagar, M. and Kumar, M.A.M.V. Isoniazid Preventive Therapy among Children Living with Tuberculosis Patients: Is It Working? A Mixed-Method Study from Bhopal, India. *Journal of Tropical Pediatrics*, 63, (4), pp. 274-285, 2017.
- [30] Jalo, R.I. 2020. Uptake of isoniazid preventive therapy for tuberculosis among HIV patients in Kano, Nigeria. *Niger J Basic Clin Sci*, 13(17), pp.57-63, 2020.
- [31] Anger, H. A., Proops, D., Harris, T. G., Li, J., Kreiswirth, B. N., Shashkina, E. and Ahuja, S. D. Active case finding and prevention of tuberculosis among a cohort of contacts exposed to infectious tuberculosis cases in New York City. *Clin Infect Dis*, 54(9), pp. 1287-1295, 2012.
- [32] Gebretnsae, H., Ayele, B.G. and Hadgu, T. Implementation status of household contact tuberculosis screening by health extension workers: assessment findings from programme implementation in Tigray region, northern Ethiopia. *BMC Health Services Research* 20(1), pp.72, 2020.
- [33] Belgaumkar, V., Chandanwale, A., Valvi, C. Barriers to screening and isoniazid preventive therapy for child contacts of tuberculosis patients. *Int J Tuberc Lung Dis*, 22(10), pp1179-1187, 2018.
- [34] Jacobson, K. B., Niccolai, L., Mtungwa, N., Moll, A. P., & Sheno, S. V. It's about my life: facilitators of and barriers to isoniazid preventive therapy completion among people living with HIV in rural South Africa. *AIDS care*, 29(7), pp.936-942, 2017.

APPENDIX I: QUESTIONNAIRE

QUESTIONNAIRE NUMBER.....

Date of data collection: _____/_____/_____ (date/month/year).

Health facility characteristics

Name of health facility _____	Level of health facility _____	Ownership of health facility 1. Government 2. Private-not-for profit
----------------------------------	-----------------------------------	--

SECTION A: Care-givers factors associated with IPT uptake

1. How old are you? (Completed years)
2. Marital status
 - a) Single [....]
 - b) Married/cohabiting [....]
 - c) Divorced/Separated [....]
 - d) Widowed [....]
3. What is your sex?
 1. Male [....]
 2. Female [....]
4. What is your current level of education?
 - a) No formal education at all [....]
 - b) Primary education [....]
 - c) Secondary education [....]
 - d) Above secondary education [....]
5. Place of residence
 1. Urban/peri-urban [....]
 2. Rural [....]
6. What is your religion?
 1. Anglican/Pentecostal [....]
 2. Catholics [....]
 3. Muslim [....]
 4. SDA
 5. Traditionalist
7. Were (are) you afraid your child could also get infected with TB?
 1. Yes [....]
 2. No [....]
8. What is the occupation of the caregiver?
 1. Peasant [....]
 2. Formally employed [....]
 3. Business person [....]
 4. Casual laborer [....]
 5. Other [....]
9. Have you ever heard (been told) about the benefits of IPT?
 1. Yes [....]
 2. No [....]
10. If yes, where do you hear about it from?

11. Do you think IPT uptake in children below five years is importance?
 - a) Yes [....]
 - b) No [....]
12. If yes, what are the importance of IPT in children under five years?

13. What is the monthly income of the household in shillings?

14. What is the current TB treatment status?
 1. First treatment [....]
 2. Re-treatment [....]
15. Do you find it easy to talk to other people about TB treatment related problems?
 1. Yes [....]
 2. No [....]

SECTION B: Child related factors associated with IPT uptake

16. How old are the child? _____ (In months)
17. What is the child's sex/gender?
1. Male [....]
 2. Female [....]
18. What is the nutritional status of the child? (*MUAC tape should be used to assess nutrition status*)
- a) Normal [....]
 - b) Mild [....]
 - c) Moderately malnourished [....]
 - d) Severely malnourished [....]
19. Does the child have BCG scar on the right upper arm? (*This should be examined and observed by the interviewer*)
- a) Yes [....]
 - b) No [....]
20. What is the parental relationship with the index case?
- a) Parent [....]
 - b) Non-parent [....]
21. If, non-parent in the above question, please indicate the relationship?
-
22. Was the child screened for TB?
1. Yes [....]
 2. No [....]

SECTION C: Health facility related factors associated with IPT uptake

23. How long is the estimated distance between where you stay and the health facility that provides TB treatment?
_____kilometers
24. How do you rate the quality of TB services in the health facility?
1. Excellence [....]
 2. Good [....]
 3. Fair/or fairly good [....]
 4. Poor/bad [....]
25. Do you have difficulties in coming to receive TB health care services at this health facility?
1. Yes [....]
 2. No [....]
26. Have you ever received IPT-related training ?
1. Yes [....]
 2. No [....]
27. How do you rate the attitude of the health workers who provide TB services to TB patients at the health facility?
1. Excellence [....]
 2. Good [....]
 3. Fair/or fairly good [....]
 4. Poor/bad [....]
28. What is the perceived waiting time at the health facility?
1. Short [....]
 2. Long [....]
 3. Too long [....]
29. Are health workers always present at the health facility to provide TB health services to you?
1. Yes [....]
 2. No [....]
30. Are TB preventive drugs always available at the health facility to when you need it?
1. Yes [....]
 2. No [....]
31. Does the nearest health facility to you provide TB health services?
1. Yes [....]
 2. No [....]
32. How to you rate the way health workers handle TB patients at the health facility?
1. Rude/not friendly/ or not welcoming [....]
 2. Calm/friendly/or welcoming [....]
33. Do health workers at the health facility discuss TB patients with other people who are not involved in providing health services?
1. Yes [....]
 2. No [....]

- 34. Do health workers at the health facility offer continuous counselling to TB patients' whenever they visit the health facility?
 - 1. Yes [...]
 - 2. No [...]
 - 35. Do you agree that information on TB services and treatment that are provided to TB patients at the health facility is adequate/or enough?
 - 1. Yes [...]
 - 2. No [...]
 - 36. If, yes, what are some TB information that are provided to TB patients?
-
- 37. Do health workers at the health facility records IPT information in the IPT register? *(Need to be verified at the health facility)*
 - 1. Yes [...]
 - 2. No [...]

SECTION D: Uptake of IPT

- 38. Child contact receive Isoniazid Preventive therapy (IPT uptake)?
 - 1. Yes [...]
 - 2. No [...]
- 39. Did the child contact finish the six months course of Isoniazid Preventive therapy (treatment completion)?
 - 1. Yes [...]
 - 2. No [...]
- 40. Was your child's IPT discontinued by a health care worker?
 - 1. Yes [...]
 - 2. No [...]
- 41. If yes to 33 above what was the cause
 - 1. Side effect [...]
 - 2. Stock out [...]
 - 3. Others specify.....

APPENDIX II: INTERVIEW GUIDE FOR HEALTH WORKERS

Date...../...../.....Venue/health facility.....
 Interviewer's name.....
 Designation of the Key informant.....
 Time: Start..... Finish.....
 Time for discussion: 45minutes.

INSTRUCTIONS

- 1. Greet the interviewee. Introduce yourself and ask the interviewee to do the same.
- 2. State the purpose of the interview and inform the interviewee that in order to capture all the data from the interview, session will be recorded
- 3. Assure key informant of confidentiality.
- 4. Ask key informant for their informed consent to participate in the discussion.

QUESTIONS

- 1. Can you please tell me your personal perspectives about the use of isoniazid preventive therapy (IPT) to prevent TB amongst child contacts exposed to adults with smear positive pulmonary tuberculosis (SPPTB)?

- 2. Do you think the use of IPT has been effective since its implementation? Probe: If yes why do you think so? If no why do you think so?

- 3. In other words, what are the facilitators and/or barriers of IPT uptake by child contacts of SPPTB?
- 4. Why do you think not all child contacts receive this prevention?

- 5. Can you please tell me ways to address the challenges of IPT since its implementation?
.....
.....
- 6. Can you please tell me other suggestions that you think might be helpful to address the use of IPT to prevent TB amongst child contacts exposed to adults with SPPTB?
.....
.....
- 7. If nothing more, thank you.



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