EXAMINING INCENTIVES FOR TB TREATMENT AND DIAGNOSIS: AN ANALYSIS OF INSURANCE CLAIMS AND INTERVIEW DATA IN INDONESIA

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SUMMARY:
Background. The recent expansion of national health insurance in Indonesia brings increased opportunities to influence provider behaviors via financial levers. However, the current provider payment methods (capitation at primary care and Indonesia-Case Based Groups at secondary care) of the national health insurance scheme do not encourage optimal tuberculosis case finding, notification or efficient case management at the primary or secondary care level.

Objectives. This study examines provider behavior and incentives for TB service delivery under the national health insurance payment systems. It uses national health insurance claims data and provider interviews to assess the service use patterns of individuals with TB symptoms and confirmed TB cases, provider incentives for providing services or referring, and the cost to BPJS-K of treating uncomplicated TB in secondary care. Results from the analysis are used to understand how current challenges with TB service delivery might be improved through revisions in purchasing arrangements.

Methodology. We conducted focus group discussions attended by representatives of 22 primary care facilities and 14 hospitals in five provinces to assess provider behavior and incentives for TB service delivery. Quantitative claims data analysis was conducted using a 1% sample dataset of Indonesia national health insurance (BPJS-K) claims from 2015-2016 (revised) released by BPJS-K to explore the characteristics of TB patients and services both at primary and secondary care. We distinguish between those with TB symptoms and confirmed TB cases and between TB cases with and without complications.

Results. The number of patients and visits for TB services was much higher in secondary care compared to primary care. Private primary care clinics referred more than half (58%) of their confirmed TB cases to secondary care for treatment while public primary care centers referred closer to one quarter (27%). Private primary care providers reported a lack of interest due to weak financial incentives for providing TB services. Referral patterns for confirmed TB showed that 81% of visits that were referred from primary to secondary care were for uncomplicated TB cases. This pattern of referring uncomplicated TB cases was almost the same for public and private facilities. This goes against clinical guidelines, which indicate that uncomplicated TB should be treated in primary care where outcomes are better, and care is more cost-effective. These uncomplicated cases were treated via outpatient secondary care at a cost to BPJS-K of IDR 188 Billion.

Conclusion. We found several service delivery patterns that go against clinical guidelines and are driven by incentives. Decisions to avoid treating TB cases in primary care and refer uncomplicated TB patients to secondary care are influenced by provider payment methods. The result is overtreatment of uncomplicated TB in expensive hospital outpatient departments and low back-referral to primary care. Optimizing contracting arrangements and payment methods in a way that creates stronger incentives for providers to avoid excessive use of secondary care and provide more efficient delivery of high-quality, cost-effective services in primary care would achieve more value for money for TB care in Indonesia

Keywords: Tuberculosis, Indonesia, strategic health purchasing, referral

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ABBREVIATIONS

TB	Tuberculosis
MoH	Ministry of Health
JKN	National Health Insurance (*Jaminan Kesehatan Nasional*)
NTP	National TB Program
WHO	World Health Organization
PHC	Primary Health Care
IDR	Indonesia Rupiah
BPJS- K	National Health Insurance Agency (*Badan Penyelenggara Jaminan Sosial-Kesehatan)*
Puskesmas	Public primary care (*Pusat Kesehatan Masyarakat)*

1. PROBLEM

The TB burden in Indonesia ranks the second highest in the world (WHO, 2020) and TB remains the leading cause of death by communicable diseases in Indonesia (IHME, 2019). Approximately 875,000 people are estimated to develop TB in Indonesia each year, and there were 97,000 people who died due to TB in 2018 (WHO, 2020). Although there has been a 19% decline in mortality from 2007 to 2017, TB remains a major health challenge in Indonesia.

TB care is guaranteed by the government and TB drugs and diagnostic supplies are provided free to public and private health facilities by the National TB Program (NTP). Indonesia's national health insurance program, Jaminan Kesehatan Nasional (JKN), is also important to provide access to diagnostic and treatment services for patients with TB and is expected to provide financial protection to TB patients. JKN has made tremendous progress since its inception in 2014 – most notably by extending coverage to over 80% of the population or more than 220 million people (BPJS Kesehatan, 2019). However, TB consumes substantial resources and leads to catastrophic costs to the patients (Fuady et al., 2018; Tanimura et al., 2013). The adequacy of funding for TB diagnosis and treatment, the degree of financial protection for patients, and the payment incentives for providers remain a concern. The Government of Indonesia has adopted the global commitment to end TB by 2030, but the country still faces various challenges in implementing its TB response. Improving the financing arrangements for TB diagnostic and treatment services is an important part of a more effective response.

Qualitative evidence suggests that an excess of TB treatment is being provided in hospitals in Indonesia, where care is more expensive both to the health system and to the patient. This has become one of the biggest challenges of the TB program in Indonesia. TB medication monitoring is poor in both public and private secondary care, and treatment outcomes are consistently worse compared to outcomes at the primary health care (PHC) level (JEMM, 2017). The payment arrangements applied in JKN may partially explain the dominance of hospital-based treatment. Wells (2019) found that using capitation to pay for TB in primary care led to excessive up-referrals of TB patients due to the absence of additional payment for long-term management of costly TB patients. This work also found that Indonesia's bundled, case-based payments (i.e. INA-CBGs) at the hospital level encouraged hospitals to retain TB patients in secondary care for treatment rather than down-refer uncomplicated TB clients to primary care for treatment and monitoring (Wells et al., 2019).

Another challenge is the large number of "missing cases" of TB, attributable to a combination of under-detection and under-reporting. An inventory study of 2017 (published in 2018 WHO Global TB Report) found that 18% of incident cases in Indonesia were truly "missing" – not detected and not reported. Twenty-nine percent (29%) were found but not reported, and 53% were found and reported. The financial incentives of capitation payment may also negatively affect active case-finding and diagnosis, since primary care providers are not paid for the diagnostic services or the additional costs of treating a case once it is detected. Stronger incentives for primary care providers to increase case finding and notification could help address the problem of missing cases.

The purchasing agency for the national health insurance scheme in Indonesia, BPJS-K, is exploring options to manage growth in expenditure per member, while at the same time improving service delivery and quality of care. Improving case-finding and reporting of TB cases and shifting more treatment to the more cost-effective primary care setting could help BPJS-K achieve both of these objectives. In this report, we analyze a BPJS-K claims dataset to quantitatively characterize service delivery patterns for TB diagnosis, referral and treatment, and use qualitative analysis to better understand the role of purchasing and payment incentives in the observed patterns.

2. OBJECTIVES

This activity was conducted as part of a series of activities for improving strategic purchasing for TB service delivery in Indonesia. The work is expected to characterize provider behavior, identify areas of focus for improving purchasing arrangements to get more value for money in National Health Insurance (JKN), and inform the Government of Indonesia. Specifically, the analysis aims to:

1. Characterize service utilization patterns of tuberculosis patients using JKN claims data, especially related to diagnosis, referral, and treatment location
2. Assess financial incentives that drive the observed patterns in TB diagnosis, referral, and treatment location
3. Understand the costs to BPJS-K (hospital level) of current service delivery patterns
4. Explore how purchasing arrangements could be used more strategically to change provider behavior and achieve better value for money

3. METHODS

This report outlines results from two related analyses – an analysis of National Health Insurance claims data and a qualitative analysis of interview responses (referred to as an "incentive mapping"). Future work will estimate the potential budget impact of reducing spending on inefficient care to reinvest in more cost-effective parts of the system. Ethical clearance for this research was obtained from University of Gadjah Mada, Indonesia, ethical committee approval no: KE/FK/0934/EC/2019.

3.1. BPJS-K Claims Analysis of Sample Data

In February 2019 BPJS-K released a representative 1% sample dataset of health service utilizations for 2015-2016 (revised edition) in Indonesia across all districts to support analysis for evidence-based policy making. BPJS-K collected data from provider reports to BPJS (e-claim/v-klaim at hospital and p-care at primary care). Providers at both primary and secondary care are required to include the ICD-10 codes in their reporting. However, the data is less robust in primary care. This may be explained by the fact that the ICD-10 coding does influence case base payments at secondary care but not the capitation payment at the primary care. Three main groups of services are included in this dataset--health services at primary level (capitation claims), fee-for-service claims for selected health services at primary care facilities (non-capitation claims), and health services at hospitals (INA-CBG claims). We did not do any additional sampling. The BPJS sampling methodology considered representativeness of the population, regions, population demand for health services, member registration at one primary care facility, and feasibility of hardware and software to process the analysis. Detailed steps taken to prepare the dataset by BPJS-K can be found in Figure 1.

Datasets and variables

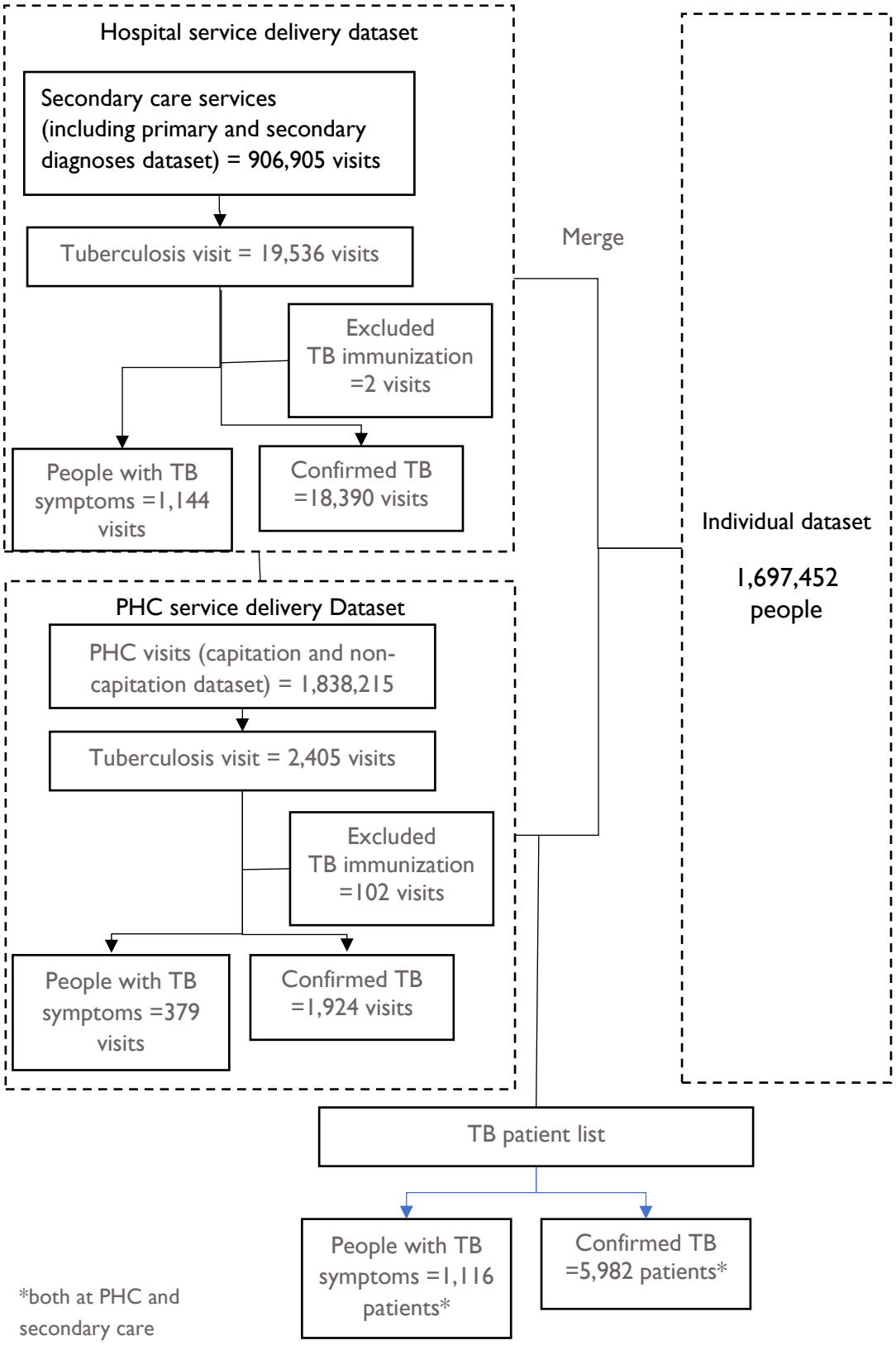
To analyze TB services using the BPJS-K claims sample, we analyzed the following datasets:

1. Individual dataset to explore the characteristics of patients
2. Primary care service delivery dataset to explore the characteristics of TB services at the primary care level.
3. Secondary care service delivery dataset to explore TB services in hospitals.

We added the secondary care dataset to the primary care data set and merged them with the individual dataset to identify patients with TB diagnosis. We reviewed the third primary care service (non-capitation) dataset which was mostly for inpatient and maternal health claims, but because it did not include any TB confirmed patients, we excluded it from the final analysis. An attempt was made to match referrals made from primary care to referrals received in secondary care in order to trace the patient pathways across datasets. Unfortunately, the data was not robust enough to do this. There was significantly higher TB utilization recorded at the hospital level compared to primary care. For example, there are differences in the total number of TB visits and patients between the primary care

and secondary care datasets, and findings differ depending on the dataset examined. A detailed list of variables utilized in the analysis can be found in **Annex A**. A flow chart is below:

Figure 1. Process to identify TB patient list



Analysis

The unit of analysis used was the patient visit (i.e. outpatient visit or inpatient admission). Descriptive analysis was conducted to explore the characteristics of the TB patients and services at both primary and secondary care levels. In some instances, sample weights were applied to ensure that the metrics derived from the dataset were representative of the sample population. Sample weights were applied for statistical analyses related to the full sample, for example, to identify the number of TB cases among all cases, but not for analyses that were TB specific, e.g. the number of visits for complicated TB among all TB visits (see **Annex A**). Analysis for primary and secondary care facilities was done separately using the respective databases. All findings refer only to patients enrolled in JKN.

In this analysis, patients with presumptive/ suspected TB are referred to as "patients with TB symptoms". To distinguish between people with TB symptoms and confirmed TB patients, we used the ICD-10 code of Z03.0 for observation of presumptive tuberculosis, as indicated in Ministry of Health regulation no. 76 (2016) on *Indonesian Case Based Groups Guidelines for National Health Insurance implementation*. A variable was generated to identify complicated vs. non-complicated TB in primary and secondary care facilities. This was done using the general practitioner's competency standard (2012), which indicates diagnoses that should be treated in primary care vs those that should be referred. A variable was generated by extracting the ICD 10 codes for primary and secondary diagnoses from TB cases. The authors then identified the complicated or uncomplicated cases. For example, primary respiratory tuberculosis that was confirmed bacteriologically and histologically (A15.7) was categorized as uncomplicated, while pneumoconiosis[1] associated with tuberculosis (J65) was categorized as complicated. Additional details on the main diagnoses included in each variable are included in the results section and in **Annex B**. In addition, we categorized patients as complicated if they had more than two diagnoses.

3.2. INCENTIVE MAPPING ANALYSIS

Qualitative interviews with providers were used to explore if and how decisions related to provision of TB diagnostic and treatment services and referral were influenced or driven by incentives created by JKN provider payment methods. The analysis was conducted as part of a district level "Fact Checking" activity with the Strategic Health Purchasing Core Working Group led by the MoH Centre for Health Financing and Insurance (PPJK), with input from NTP, BPJS Kesehatan, an independent TB expert (consultant to the World Bank), representatives from the Primary and Secondary Health Services Directorates of the MoH, and international development partners with expertise in health financing and strategic health purchasing. An analytical team supported by the USAID TB Private Sector Project, in partnership with the team from the USAID Health Financing Activity, led the development of the interview guide for TB, led focus group discussions with TB stakeholders, and compiled and analyzed the data from the fact checking activity to inform policy recommendations.

We conducted individual interviews, focus group discussions, and a document review on TB health services and financing. Interviews aimed to map out the TB services and drugs provided by different providers along the TB continuum of care, the different sources of financing and payment arrangements used to purchase each service, the incentives created by the different purchasing arrangements, and the consequences for delivery of TB services. There were five main topics discussed with key stakeholders including: policy and regulations related to TB services and JKN, TB service delivery, TB financing, TB infrastructure and reporting and monitoring systems.

[1] Pneumoconiosis is a group of interstitial lung disease caused by breathing in certain kinds of dust particles that damage your lungs

The activity was conducted in five provinces[2] agreed upon by the SHP TWG core working group. The technical team[3] developed a questionnaire, trained all interviewers, and conducted semi structured interviews using the interview tools. The lead analyst participated in all interviews to minimize variation in the interview approach. Interviews were done at 40 health facilities: 22 primary care facilities (12 Puskesmas, 8 private clinics, 2 private GPs), 14 hospitals (7 public hospitals, 7 private hospitals), two laboratories (one public and one private lab), and two private pharmacies. Qualitative data analysis in excel was used to identify themes that emerged from the interviews. Instruments are available from the authors on request. This analysis builds on previous USAID-funded analyses (Boston Consulting Group (BCG) et al., 2018b, 2018a)

3.3. NATIONAL TB CLINICAL GUIDELINES

The main legal and technical framework for national TB health services is MOH Regulation No 67 (2016) on National TB Management Guidelines (*Penanggulangan Tuberkulosis*). Further, the MOH decree HK.01.07-MENKES-755-2019 (*Pedoman Nasional Pelayanan Kedokteran Tata Laksana Tuberkolosis*) outlines the appropriate diagnostic, referral and treatment pathways for drug sensitive and drug resistant TB.

According to the guidelines, the diagnosis of pulmonary TB in adults must be made first by bacteriological examination using smear microscopy, culture, or a rapid molecular test (i.e. GeneXpert). Health facilities that have access to GeneXpert should use it as the first choice for diagnosis of people with TB symptoms. If referral is necessary to access GeneXpert, the patient (or specimen sample) should be referred to an appropriate provider based on the GeneXpert mapping network managed by the Regional Health Office. If there is no GeneXpert access (for example, tool utilization exceeds capacity, needs inspection, equipment is damaged etc.), TB diagnosis should be done by smear microscopy with two test samples. If both samples yield negative microscopic examination results, TB diagnosis can be made clinically by a doctor with supportive test results (chest X-ray examination or prolonged symptoms after non-TB medication). The guidelines clearly state that using thoracic radiology as the sole means of diagnosis is not justifiable, and notes that chest X-rays do not always give a clear picture of pulmonary TB and can lead to over or under-diagnosis. A standard checklist is used to determine if a patient is at high risk for drug-resistant TB (DR-TB). Patients that meet the criteria for suspected DR-TB are deemed to be "high risk" and should be immediately referred to an appropriate facility for GeneXpert testing.

Uncomplicated pulmonary TB is one of the diseases that should be fully managed at the primary care level (competence 4A – provision of clinical diagnosis to treatment) according to MOH regulation No. 5 year 2014 on Clinical Practice Guidelines for Physicians in primary health care. Referral procedures for treatment are also regulated by MOH. Primary care facilities that do not have adequate capacity to conduct TB medication monitoring should refer patients to the nearest public primary care clinic (i.e. Puskesmas) with adequate facilities. Criteria for TB patients to be referred to secondary care for treatment include TB with complications (diabetes melitus, HIV, pregnancy, hepatitis, renal function impairment, extra-pulmonary TB, severe adverse drug reactions), and presumptive drug-resistance (DR-TB). Drug sensitive patients without complications that are diagnosed in secondary care should be down-referred to primary care for treatment and medication monitoring. General practitioners and private clinics are expected to cooperate with Puskesmas for TB health services especially on case notification, medication, and TB outcome reporting.

[2] West Java (Kabupaten Bogor, Kota Bandung); Banten (Kota Serang); East Java (Kota Surabaya, Kabupaten Sidoarjo); South Sulawesi (Kota Makassar, Kabupaten Gowa); North Sumatera (Kota Medan, Kabupaten Deli Serdang)

[3] Technical team consists of PPJK, Yankes, NTP, USAID TBPS, USAID HFA, and World Bank

4. FINDINGS

Key findings for both analyses are outlined below. Additional findings from the fact checking analysis can be found in Annex C and Annex D.[4]

4.1. CHARACTERISTICS OF PEOPLE WITH TB SYMPTOMS AND CONFIRMED TB CASES

The number of patients and visits for TB services was much higher in secondary care compared to primary care. This was true both for people with TB symptoms and confirmed TB cases. Claims data analysis showed that there were 2,303 visits for TB services (people with TB symptoms + confirmed TB) in primary care facilities compared to 19,534 visits (people with TB symptoms + confirmed TB) in secondary care facilities. The number of people with TB symptoms and confirmed TB patients (as opposed to visits) in primary care was also less than that in secondary care. The total number of people with TB symptoms in primary and secondary care facilities were 280 and 848 respectively, while the number of confirmed TB patients at primary and secondary care was 1094 and 5249 respectively (see Table 1).

Table 1. Overall people with TB symptoms and confirmed TB utilization by location (unweighted)

Health facilities	People with TB symptoms number	People with TB symptoms visits	TB confirmed patients	TB confirmed visits
Primary care	280	379	1,094	1,924
Secondary care	848	1,144	5,249	18,390

The differences in the number of TB services between primary and secondary care could be because of how the data was coded. Our assumption is that more TB visits and patients are captured in the secondary care dataset due to the ICD-10 coding of the hospital dataset, and that hospitals are doing a better job of recording the visits because they are being paid per case. It could also be true that the data rightly reflects a trend of more patients going to secondary care facilities for diagnosis and treatment. Results from the incentive mapping analysis indicate that both are true – we found informal practices for communicating referral status of TB patients between primary and secondary care, for example via WhatsApp, and a strong trend of referring TB patients to secondary care facilities for diagnosis, where they are then treated.

In secondary care, the average number of visits was 3.5 and 1.3[5] for confirmed and people with TB symptoms respectively, while at the primary care level the average number of visits was 1.8 and 1.4 for confirmed and people with TB symptoms. The number of visits for confirmed TB patients, particularly at the primary care level, was much lower than expected. National treatment guidelines indicate that patients with drug-sensitive TB need to visit health facilities twice a month in the intensive phase for two months and every month in the continuation phase for four months for clinical assessment and collecting TB drugs. The low number of patient visits could mean that primary care providers are not sufficiently recording data for TB patients, that patients are

[4] For further elaboration on the issues discussed in Annexes C and D, please see Boston Consulting Group (BCG) et al., 2018b, 2018a)

[5] It is calculated from Table 1 (The average number of visits = total number of visits/ total number of patients)

prescribed and dispensed larger quantities of meds and asked to return less frequently, or that patients are not adequately adhering to TB treatment and are dropping out.

The majority of confirmed TB patients were male, within the economically productive age range, and enrolled in the subsidized JKN scheme. In total, 4,500 confirmed TB patients, or 0.27% of the sample (people with TB symptoms were excluded from the table below) were recorded in the BPJS data sample in 2015-2016 (out of 1,697,452 total BPJS sample), where slightly more than half of them were male. The majority of patients with confirmed TB were within the productive age range (17 to 65), which is similar with the characteristic of total BPJS sample (71% of the total BPJS sample were within productive age (15 to 64)). Most TB patients (87%) were from the employee scheme, informal sector scheme, or APBN-subsidized scheme of JKN, and sixty-two percent of the total patients were registered at a Puskesmas (see Table 2). This is compared to the total BPJS sample, where a majority were in the APBN-subsidized scheme (45% of total BPJS sample) and employee scheme (31% of total BPJS sample) and 77% were registered at Puskesmas.

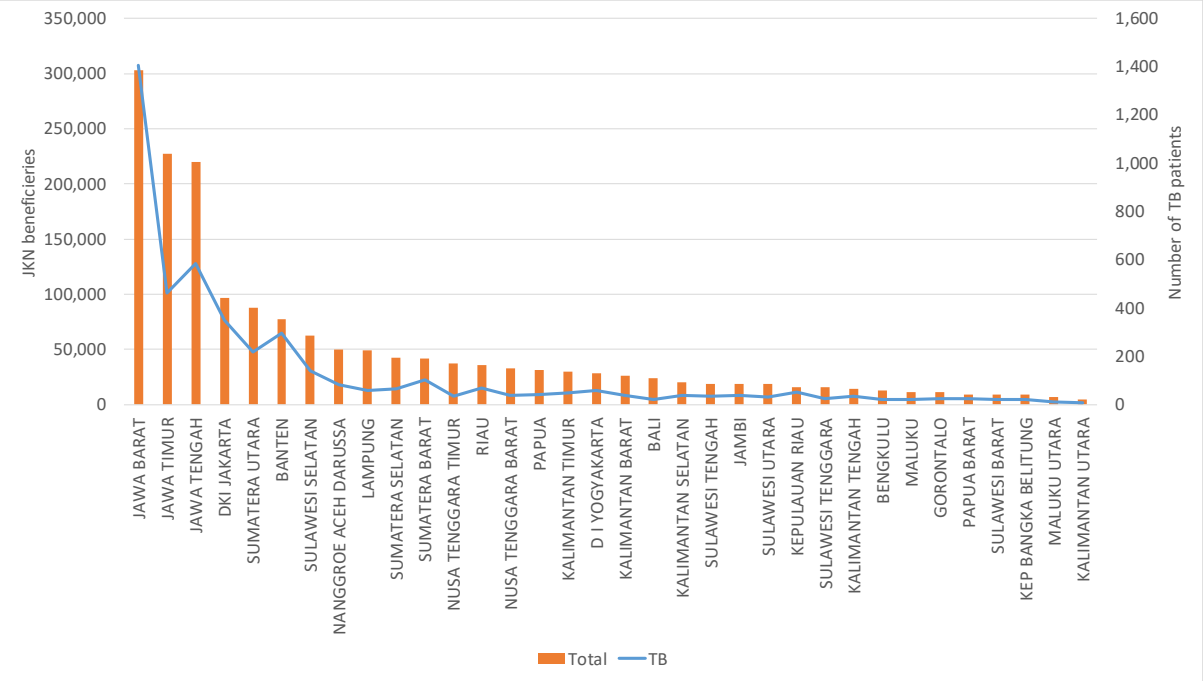
Table 2. TB Patient characteristics

Description	Freq.	(%) *	Freq.	(%)**
Total	5,982	(100)	4,510	(100)
Sex				
Male	3,450	(58)	2,561	(57)
Age				
up to five years	526	(9)	409	(9)
6 to 16	597	(10)	427	(9)
17 to 65	3,940	(66)	2,937	(65)
over 65 years	919	(15)	738	(16)
Segment				
Subsidized APBN scheme	1,491	(25)	1,018	(23)
Subsidized APBD scheme	293	(5)	294	(7)
Informal	1,781	(30)	1,416	(31)
Employee	2,007	(34)	1,476	(33)
Non-employee (employer, pension)	410	(7)	306	(7)
Health facility registered				
Puskesmas	2,973	(50)	2,813	(62)
Private clinics	1,727	(29)	1,259	(28)
Private GP	1,282	(21)	438	(10)

*sample unweighted; **sample weighted

Figure 2 shows provinces with a high number of TB patients, with West Java, Central Java, East Java and Banten having the highest number of TB patients. Overall, there was a positive correlation between the total number of beneficiaries and TB patients. However, in Central Java and East Java the number of beneficiaries did not correspond to the total number of TB patients. This could indicate that the incidence of TB is actually lower in Central and East Java compared to West Java, or it may indicate a lower notification rate of TB cases in those provinces. IHME data from 2016 indicates similar incidence rates between East, Central, and West Java, and findings from the incentive mapping indicate that the detection rate of East Java reached 49% in 2018, which is below the national target (IHME, 2017).

Figure 2. Total beneficiaries and TB patients by province



4.2. TB Cases in primary care[6]: Diagnosis location, treatment location and referral behavior

People with TB symptoms in primary care

One-third of all primary-level visits for people with TB symptoms were referred to secondary care facilities for diagnosis, and 62% (78 of 125 of these referrals were made by private primary care (see Table 3). The primary care dataset showed that 54% (78 of 145) of visits for people with TB symptoms in private primary care facilities were referred to secondary care. People with TB symptoms visiting public primary care facilities did not have the same referral pattern – only 20% of patients were coded as referrals. Overall, 58% of all referred people with TB symptoms were referred to a public hospital, where GeneXpert machines are more likely to be. The remaining 42% were referred to private hospitals, which are less likely to have GeneXpert machines. Data on horizontal referral, such as from a private clinic to a public clinic (i.e. Puskesmas), was not available.

Table 3. Referral status of people with TB symptoms at primary care facilities (unweighted, N=375, 4 missing)

Referral status	Public PHC (n=230)	Private PHC (n=145)	Total* (n=375)
	n (% of column)	n (% of column)	n (% of column)
Not referred	**183 (80)**	**67 (46)**	**250 (67)**
Referred	**47 (20)**	**78 (54)**	**125 (33)**
To Public Hospital	39 (83)	33 (42)	72 (58)
To Private Hospital	8 (17)	45 (58)	53 (42)

*data indicates # of PHC visits of people with TB symptoms

[6] Data from the primary care level dataset

There are weak incentives for private primary care facilities to invest in TB diagnostic capacity. During the incentive mapping analysis, only a few of the private clinics interviewed offered TB diagnosis or treatment services. Private facilities indicated that the low capitation amount does not encourage case finding, case notification, or retention of resource-intensive TB patients at the primary care level for diagnosis or treatment. Private providers noted that using capitation to cover services for TB patients is particularly challenging because they do not have access to the same subsidies for TB services as public facilities. This includes medical supplies needed for microscopy (i.e. sputum pots, reagents, slides, and other lab materials), GeneXpert testing (including cartridges), and X-rays (including film), along with personal protective equipment for health workers, patient masks, and printed referral forms, which are provided in-kind only to public primary care centers and public hospitals by the Ministry of Health.

"We don't provide TB care, first because we don't have sufficient facilities, and we have no capacity since we don't get any training yet. Before we had a TB service, but we don't have the separated room for TB, so if we mixed them with other patients, it might infect other patients. So, we decided to discontinue the service." (Private clinic 2)

"According to the contract, we should refer to Puskesmas, but it is also left to the patient [to decide]. Sometimes, the patient doesn't have any patience, they want to be referred for chest radiograph directly. So, we refer them to hospital, but afterward they continue treatment at hospital. It's around 30% of total patients referred to puskesmas, the remaining are sent to hospital" (Private clinic 2)

Most private facilities conducted only symptom-based diagnosis for people with TB symptoms, and then referred them to a puskesmas or hospital for microscopic testing, x-ray and/or GenXpert testing. In most cases the patient indicated their preferred referral location, which was then used for the referral letter.

Most puskesmas had an MoU with private clinics allowing them to make horizontal referrals for diagnosis, but the MoUs did not always include agreements on the payment arrangements. Puskesmas indicated in interviews that they were already equipped with sufficient diagnostic tools and could access the information system for specimen transportation (SITRUST[7]) to send the sputum samples for GeneXpert testing. However, several stakeholders at private clinics still preferred to refer the people with TB symptoms to a hospital rather than to a puskesmas due to the ease of referral, patient preference (patients preferred going to the hospital because there is long waiting time at puskesmas), perceived unavailability of services in puskesmas, patient perception of puskesmas as 'lower class' and the private clinic's obligation to transfer its capitation payment to the puskesmas if it made such a referral. Providers that did refer to puskesmas tended to have informal relationships with staff at the puskesmas which contributed to easier coordination and encouraged them to refer.

According to our interviews with private facilities, private sector providers did not conduct outreach or contact tracing. Capacity for these functions in the public sector was also stretched due to shortages of human resources, logistical limitations due to inappropriate planning, insufficient access to transportation funds for staff (and/or confusion on the use of existing funds for covering transportation costs), and the fragmentation of the information system which makes TB reporting administratively burdensome.

Information gained from fact-checking analysis also showed that the involvement of private providers in formal case-notification was limited, and that regulations related to mandatory notifications are not strong enough to encourage increased TB notifications, especially given the financial disincentives.

[7] A tracking application for specimen transportation for tuberculosis laboratory examinations

Clinics that did report cases tended to use informal mechanisms for notification and documentation of referral of the people with TB symptoms (e.g. WhatsApp).

"We don't have a partnership regarding the payment arrangement with private clinics, thus the BPJS patient who is referred to the Puskesmas and continues their TB treatment there will become a general patient and should pay OOP" (Puskesmas 2)

"There is no payment arrangement, so the BPJS - patient pays OOP if referred to Puskesmas" (Private clinic 1)

Confirmed TB cases in primary care

Private primary care clinics referred more than half (58%) of their confirmed TB cases to secondary care facilities for treatment (see Table 4 Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**).** The BPJS-K claims data analysis of TB treatment services at the primary care level showed that, of *all* confirmed TB cases in primary care, 42% were referred to secondary care for treatment. This was primarily driven by private clinics, who referred 58% of their confirmed TB cases; puskesmas referred closer to 1 out of every 4 (27%) of their confirmed TB patients for treatment. Of all primary-level cases referred for treatment, 65% (509 of 782) came from private clinics.

During the interviews, GPs reported the following reasons for their lack of interest in providing TB services - additional administrative burden, risk of infection exposure for themselves and their non-TB patients (i.e. which may influence their business and revenue), investment requirements (i.e. providing a separate TB room, human resources, long training requirements), confusion on the role of and responsibilities between public and private sectors (i.e. no clear regulations on private facility access to subsidized diagnostics, drugs and medical supplies), interest in treating more 'profitable' diseases, and no incentives to provide TB services (either monetary or non-monetary). Additionally, the regulation requiring facilities to transfer their capitation to cover patients that were horizontally referred creates a situation where JKN patients with confirmed TB either receive drugs at puskesmas and have consultations at the clinic or pay out of pocket for care at puskesmas. This causes fragmentation of treatment, which some providers indicated caused problems with adherence to treatment and incentivized patients to request referral for treatment in secondary care.

With the right incentives, private primary care providers indicated that they are willing and able to increase TB service provision. Patients with diabetes melitus that were also infected with TB were treated as an exception by the private providers interviewed. Diabetes melitus is included as part of the PROLANIS program in Indonesia – a chronic disease management program. As part of PROLANIS, providers receive incentives for patient education (medical consultation, conducting PROLANIS club activities, SMS gateway program) and disease management (disease monitoring, home visits, medication) which is paid in addition to the capitation budget. In addition, PROLANIS has become one of the indicators of *capitation-payment based on performance.* The number of diabetes patients infected with TB encouraged some clinics to provide TB care so that they could retain their patients enrolled in PROLANIS and receive the benefits from BPJS-K.

For both public and private primary care facilities, almost all confirmed TB cases that were referred to secondary care for treatment were uncomplicated TB cases (see Table 4**).** We manually identified the diagnoses that are considered to be complicated in primary care. More than 50% were miliary (disseminated) tuberculosis, which occurs when TB bacteria travels through the bloodstream to one or more organs (see Table 5). Of the confirmed TB cases that were referred to secondary care for treatment, 81% were considered uncomplicated cases. This goes against clinical guidelines, which indicate that uncomplicated TB should be treated in primary care. Our analysis shows that a higher percentage of all referred TB cases from public facilities were uncomplicated, compared

to private facilities (85% vs 79%), but the absolute number of uncomplicated TB cases referred from private primary care facilities was higher (233 vs 404 visits). This only captures referral to secondary care. Horizontal referral was not recorded in the data. It is also interesting that that among 136 *complicated* TB cases only 40 (30%) were referred to secondary care from the public sector but it was more than 66% (105/157) in private sector (See Table 4). Additional details on complicated vs. uncomplicated coding can be found in **Annex B**.

Table 4. Referral and complication status of confirmed TB in primary care (N=1872, 52 missing -unweighted-)

Referral and Complication status	Public PHC	Private PHC	Total*
	n (% of column)	n (% of column)	n (% of column)
Not referred	**726 (73)**	**364 (42)**	**1090 (58)**
Uncomplicated	630 (87)	312 (86)	942 (86)
Complicated	96 (13)	52 (14)	148 (14)
Referred for treatment	**273 (27)**	**509 (58)**	**782 (42)**
Uncomplicated	233 (85)	404 (79)	637 (81)
Complicated	40 (15)	105 (21)	145 (19)

*data indicates # of PHC visits of confirmed TB patients

Table 5. Top five diagnoses of complication in primary care (unweighted)

No	Diagnoses	Freq.	Percent
1	A199 Miliary tuberculosis, unspecified	94	32%
2	A192 Acute miliary tuberculosis, unspecified	44	15%
3	A190 Acute miliary tuberculosis of a single specified site	36	12%
4	A178 Other tuberculosis of nervous system	29	10%
5	A198 Other miliary tuberculosis	20	7%

4.3. TB Cases in secondary care[8]: Diagnosis location, treatment location and referral

People with TB symptoms in secondary care

Of people with TB symptoms who were referred to secondary care for diagnosis, 70% (819 of 1136) went to public facilities and most 77% (421 of 550) were referred from public primary care (see Table 6). This finding was drawn from analysis of the hospital dataset and differs from the findings in the primary care dataset (Table 3). The primary care data showed that in proportion, private clinics referred most people with TB symptoms. However, in the secondary care dataset, public primary care facilities contributed 48% of all cases with TB symptoms referred for diagnosis, while 40% came from private primary care facilities. Further analysis is needed to explore the discrepancy between primary and secondary data results. Analysis shows that 11% of people with TB symptoms were referred from one secondary care facility to another for diagnosis, which indicates that not all hospitals have the capacity to diagnose TB. There were very few people with TB symptoms that self-referred to the hospitals, and these are assumed to be emergency cases.

[8] Data from the hospital claims dataset

Table 6. Referral status of people with TB symptoms who visit secondary care (unweighted, N= 1,144)

Eventual treatment site /Referral status	Private specialist clinic	Public Hospital	Private Hospital	Total*
	n (% of column)	n (% of column)	n (% of column)	n (% of column)
Self-referred	- (0)	6 (1)	2 (1)	8 (1)
Referred from other	93 (100)	819 (99)	224 (99)	1,136 (99)
Referred from				
Public PHC	48 (52)	421 (51)	81 (36)	550 (48)
Private PHC	40 (43)	292 (36)	127 (57)	459 (40)
Public secondary care	- (0)	99 (12)	- (0)	99 (9)
Private secondary care	5 (5)	5 (1)	15 (7)	25 (2)
Other	- (0)	2 (0)	1 (0)	3 (0)

*data indicates # of visits of people with TB symptoms

Confirmed TB Cases in secondary care

Most of the confirmed TB cases referred to secondary care for treatment were uncomplicated (see Table 7**).** This aligns with findings from the primary care dataset. Of TB confirmed cases referred to secondary care facilities, the number of uncomplicated TB visits was almost double that of complicated TB. The largest proportion of referred uncomplicated TB cases were found in public hospitals (56%), followed by private hospitals (42%) and private specialist clinics (2%) (see Table 7), demonstrating that this non-alignment with treatment guidelines is far from being restricted to the private sector. In private specialist clinics, 80% (273 of 339) of all visits for confirmed TB were for uncomplicated TB. This figure was 70% (4,883 of 6,993) in private hospitals and 60% (6,457 of 10,723) in public hospitals. Self-referred cases of confirmed TB in secondary care were mostly found at public facilities. Most self-referred cases were classified as complicated. Overall, self-referred patients were a small minority (1%) of the total patients seen in secondary care.

Table 7. Referral and complication status of TB confirmed cases (unweighted, N=18,362, 28 missing)

Treatment site / Referred and	Private specialist clinic	Public Hospital	Private Hospital	Total
Complication status	n (%)	n (%)	n (%)	n (%)
Self-referral	1 (0)	225 (73)	81 (26)	307 (100)
Uncomplicated	- (0)	41 (73)	15 (27)	56 (100)
Complicated	1 (0)	184 (73)	66 (26)	251 (100)
Referred from other	339 (2)	10,723 (59)	6,993 (39)	18,055 (100)
Uncomplicated	273 (2)	6,457 (56)	4,883 (42)	11,613 (100)
Complicated	66 (1)	4,266 (66)	2,110 (33)	6,442 (100)

Most TB treatment in secondary care facilities is outpatient care, and nearly all outpatient care is for uncomplicated cases (see Table 8**).** This was the case for both public and private secondary care. An analysis of hospital services categorized by outpatient and inpatient services showed that outpatient treatment for uncomplicated TB was slightly more frequent in public secondary facilities compared to private secondary care (55% vs 42%). Private secondary care had a higher proportion of uncomplicated outpatient TB cases compared to complicated ones, while public secondary care had a higher absolute number. Almost three quarters (4,874 of 6,609, or 74%) of all outpatient TB treatment visits in private hospitals were for uncomplicated cases. This figure was 87% in private specialist clinics and 67% in public hospitals. Ten percent (1,879 of 18,362) of the confirmed

TB cases were admitted, and most of these cases were complicated. The majority of admitted patients were treated in public secondary care (75%).

Table 8. Services and complication status of TB treatment at secondary care (unweighted, N=18,362, 28 missing)

Referred and Complication status	Private specialist clinic n (%)		Public Hospital n (%)		Private Hospital n (%)		Total n (%)	
Outpatient	**335**	**(2)**	**9,539**	**(58)**	**6,609**	**(40)**	**16,483**	**(100)**
Uncomplicated	290	(2)	6,439	(55)	4,874	(42)	11,603	(100)
Complicated	45	(1)	3,100	(64)	1,735	(36)	4,880	(100)
Inpatient	**5**	**(0)**	**1,409**	**(75)**	**465**	**(25)**	**1,879**	**(100)**
Uncomplicated	-	(0)	147	(70)	62	(30)	208	(100)
Complicated	5	(0)	1,262	(76)	403	(24)	1,671	(100)

We identified most diagnoses that were considered to be complicated at secondary care. Almost half of the patients were designated as complicated based on a follow-up examination after other treatment for other conditions (*Table 9*)

Table 9. Top five TB primary diagnoses with complication at secondary care (unweighted)

No.	Diagnoses	Freq.	Perc.
1	Z098 Follow-up examination after other treatment for other conditions	3,011	45%
2	Z111 Special screening examination for respiratory tuberculosis	301	4%
3	Z097 Follow-up examination after combined treatment for other conditions	261	4%
4	Z760 Issue of repeat prescription	187	3%
5	B909 Sequelae of respiratory and unspecified tuberculosis	167	2%

Back Referral from hospitals to primary care

Several themes captured from the interviews were related to incentives (and disincentives) for treatment in primary vs. secondary care. The incentives for hospitals to treat uncomplicated TB were strong, and several factors discouraged hospitals from down-referring TB patients. These included financial motivations, patient demand, flexible referral letters to bypass treatment guidelines, and the inability to track down-referred patients. Primary care providers indicated that it was relatively easy to make a referral for an uncomplicated TB case (MOH regulation No 5 year 2014 on Clinical Guidelines for Physicians in primary care clearly stated that Pulmonary TB should be fully managed in primary care). *Puskesmas* and private GPs were able to adjust referrals or renew them every 3 months as needed to maintain treatment in secondary care. During the interviews with secondary care facilities, there was variation in the number of visits and tests billed to BPJS-K throughout treatment. One private hospital estimated 11 visits per case, each billed at 185,000 IDR per visit, for a total reimbursement of IDR 2 million for an uncomplicated TB case. Several hospitals did not find it financially beneficial to keep patients for treatment and referred back to primary care if there was a high perceived burden and small compensation for the intensity of treatment needed.

Several hospitals also noted non-financial incentives that influenced their decisions to refer patients back to primary care. For example, if there was a 'reminder' from BPJS-K (in the form of a stamp on medical record, which was only done in North Sumatra), they were more likely to back-refer. On the other hand, providers reported several concerns that might also influence back-referral, including no

health information system to trace back referral, and patient preferences to be treated in the hospitals for a "one stop service" (Boston Consulting Group (BCG) et al., 2018a).

4.4 Other Service Delivery Patterns for TB

Diagnostic Approaches

Primary care providers were more likely to confirm cases bacteriologically or histologically compared to secondary care providers, where clinical confirmation was more common. We reviewed both primary and secondary diagnoses to identify TB services. Forty-five percent of TB patients in primary care had a diagnosis of respiratory TB that had been "bacteriologically and histologically confirmed"[9]. It is assumed that the primary care facilities diagnosed TB patients using smear microscopy. In contrast, the majority of TB in secondary care was coded as TB without bacteriological and histological confirmation. Bacteriologically and histologically confirmed TB in secondary care (as indicated in primary and secondary diagnosis) was only 1% and 20%, respectively (see Table 11 and Table 12). It is assumed that secondary care facilities diagnosed TB patients using chest X-ray or clinical diagnosis, rather than the recommended bacteriological or histological confirmation outlined in the national guidelines. Providers in secondary care indicated that they tend to code tuberculosis as *A16 - Respiratory tuberculosis, not confirmed bacteriologically or histologically* even though they conduct other examinations, as coding will not affect the reimbursement rate. It is also possible that hospitals receive more referrals of patients who have already tested negative for bacteriological tests, and thus require a clinical diagnosis.

Table 10. TB confirmed diagnosis in primary care (unweighted)

Diagnosis	Freq	%
A15 Respiratory tuberculosis, bacteriologically and histologically confirmed	858	46%
A16 Respiratory tuberculosis, not confirmed bacteriologically or histologically	620	33%
A19 Acute miliary tuberculosis of a single specified site	205	11%
B90 Sequelae of central nervous system tuberculosis	106	6%
Z11 Special screening examination for infectious and parasitic diseases	20	1%
A17 Tuberculosis of nervous system	29	2%
Z20 Contact with and exposure to communicable diseases	16	1%
J65 Pneumoconiosis associated with tuberculosis	17	1%

*Table 11. Primary diagnosis at secondary care (unweighted)**

Primary diagnosis	Freq	%
Z09 Follow-up examination after treatment for conditions other than malignant neoplasms	12,788	70%
A16 Respiratory tuberculosis, not confirmed bacteriologically or histologically	604	3%
B90 Sequelae of tuberculosis	596	3%
Z86 Personal history of certain other diseases	580	3%
Z76 Persons encountering health services in other circumstances	465	3%
Z11 Special screening examination for infectious and parasitic diseases"	301	2%
J18 Bronchopneumonia, unspecified	202	1%
Z54 Convalescence	194	1%

[9] A bacteriologically confirmed TB case is one from whom a biological specimen is positive by smear microscopy, culture or WHO-approved rapid diagnostics (such as Xpert MTB/RIF). Histological confirmation means there was histopathological examination highlighting specific tuberculous granulomas

A15 Respiratory tuberculosis, bacteriologically and histologically confirmed	182	1%
Z87 Personal history of other diseases and conditions	137	1%

**Diagnosis was included for all patients diagnosed with "tuberculosis" in all diagnosis column*

Table 12. Secondary diagnosis of TB cases at secondary care (unweighted)

Secondary diagnosis	Freq	%
A16 Respiratory tuberculosis, not confirmed bacteriologically or histologically	11,900	69%
A15 Respiratory tuberculosis, bacteriologically and histologically confirmed	3,503	20%
B90 Sequelae of tuberculosis	1,090	6%
A19 Miliary tuberculosis	79	0%
A09 Other gastroenteritis and colitis of infectious and unspecified origin	62	0%
A01 Typhoid and paratyphoid fevers	50	0%
E11 Type 2 diabetes mellitus	44	0%
K30 Functional dyspepsia	39	0%
A18 Tuberculosis of other organs	36	0%
J44 Chronic obstructive pulmonary disease with acute lower respiratory infection	30	0%
Other	470	3%

There were several patterns in providers' behaviors related to adherence to diagnostic guidelines that were captured from the district level interviews. The claims data analysis indicated a pattern of overusing chest X-rays and under-using smear microscopy and GeneXpert in secondary care. While it is unclear to what extent this reflects actual diagnostic practices, the incentive mapping reinforced that there is a preference for using chest X-ray in TB diagnosis. Providers indicated that chest X-ray was used in secondary care for patients that had already conducted a smear test before being referred to the secondary care. However, we also found that providers in secondary care tended to combine sputum microscopy with X-ray or conduct X-ray 'alone' to diagnose TB, rather than sputum microscopy.

> *"First we do chest-radiography, if the result turns out positive, then we do the microscopic. The whole process takes 3-4 days" (Private hospital 5)*

> *"If patient doesn't improve after several months, we refer them to get GeneXpert test, usually they become rifampicin resistant" (Public hospital 2)*

This pattern of behavior was not in line with guidelines for TB diagnosis (Permenkes no 67/2016), which direct facilities to diagnose people with TB symptoms with either smear microscopy test or GeneXpert (according to the equipment available in each facility) before using chest X-ray. Previous research has determined that chest X-ray has poor specificity (65.4%) and high sensitivity (98.7%) compared to the GeneXpert as the gold standard (Neto et al., 2018). The sensitivity of chest X-ray had led to increased interest in using it earlier in the diagnostic algorithm, but its use may lead to verification bias or overdiagnosis (false positives; (Assefa et al., 2019) unnecessary expense and, when used alone, a missed opportunity to identify drug resistance as early as possible to ensure effective treatment. For these reasons, chest X-ray cannot be used as an independent testing method (Saminathan et al., 2019) The utilization of GeneXpert varied in every visited district. Providers in several districts noted long waiting times due to high demand to use the machines.

Excess Cost of Inappropriate Service Delivery Patterns

The cost of treating uncomplicated TB cases in outpatient secondary care is high. By extrapolating the costs from the 1% sample to estimate the total BPJS-K cost, we find that an estimated 264 Billion rupiah (USD 18.8 million) is spent in secondary care for uncomplicated TB cases in a single year, most of which was for uncomplicated outpatient care (IDR 188 billion, USD 12.7 million). Estimated spending for TB inpatient services totaled more than 1 trillion rupiah for 167,568 admissions. A large portion of this spending needs further research to explore the appropriateness of the diagnosis code, and incentives in the system. For example, several hospitals scheduled diagnostic tests sequentially for patients using JKN, in order to get more revenue from multiple diagnostic encounters. This means that the payment mechanism at the hospital is not linked to adherence to guidelines and creates incentives for inappropriate, unnecessary or non-patient-centered services.

Table 13. Cost of TB services by type of health services

Services at hospital	Median	Mean	SD	Utilization*	Total Cost**
Outpatients	**162,400**	**176,921**	**61,457**	**1,538,285**	**272,155,056,621**
Uncomplicated	162,400	172,810	47,672	1,087,915	188,002,808,733
Complicated	165,400	186,851	85,279	450,370	84,152,246,333
Inpatients	**4,673,800**	**6,039,904**	**7,964,964**	**167,568**	**1,012,095,237,462**
Uncomplicated	4,169,300	4,075,864	1,436,913	18,781	76,550,228,336
Complicated	4,927,300	6,287,825	8,405,076	148,787	935,544,731,928

*Extrapolated from 1% dataset to estimate BPJS-K cost for all TB services **Total cost = Mean x Utilization

5. DISCUSSION

This work has produced a clear descriptive analysis of where diagnosis and treatment for TB happens in Indonesia, at least for those patients and services covered by JKN, and has identified specific service delivery patterns that are counter to clinical guidelines and are affected by insurance-related incentives.

The number of patients and visits was likely under-recorded for people with TB symptoms compared to those with confirmed TB. Claims analysis identified only 1523 visits by those with TB symptoms and 20,314 TB confirmed visits. The number of visits by people with TB symptoms and those with TB confirmed might be expected to be similar, since there are up to 10 people with TB symptoms for every TB patient, but then each of those confirmed TB patients requires up to 10 visits over the course of treatment (biweekly in the intensive phase, and monthly in the continuation phase). In the year examined, Indonesia treated over 300,000 TB patients, leading to perhaps ~3 million visits for TB treatment. Thus, a 1% sample of these 3 million visits is not far from the 20,314 TB confirmed visits from the JKN sample, especially considering the incomplete coverage of JKN at the time. The number of recorded visits by people with TB symptoms, however, is far less, suggesting that these screening and diagnosis visits may be recorded in a different way by many providers, and thus not captured in the current analysis.

We found that private primary care facilities referred 54% of people with TB symptoms, and the majority of confirmed TB cases to secondary care facilities. Public primary care facilities did not tend to refer their patients as often for diagnosis or treatment. Contrary to clinical guidelines, the majority of all patients referred (by both public and private primary care providers) were uncomplicated cases. We also found an overuse of chest X-rays and under-use of smear microscopy and GeneXpert, which did not adhere to guidelines. TB also differs from the other infectious diseases (ICD code A09 – other gastroenteritis and colitis of infectious and unspecified origin) with more visits at the primary care level (41.458 visits) compared to visits at the secondary care (12.363 visits) reported, according to the analysis of BPJS-K (BPJS Kesehatan, 2019).

The analysis also identified a pattern of overtreatment of uncomplicated TB in expensive hospital outpatient departments and low back-referral to primary care. While outpatient secondary care for TB is not inherently bad, there are both economic and service delivery concerns that make it sub-optimal. First is the burden to the patient. There are fewer hospitals than primary care facilities, meaning it is likely that treatment in secondary care would increase the distance to care. Evidence suggests that in rural settings TB patients who traveled the farthest to access care achieved the worst outcomes, including death and drop-out (Sahyog et al., 2018). Second, TB medication monitoring by hospitals is also poor and there is no mechanism or accountability to ensure that patients are not lost-to-follow-up. Outpatient secondary level TB care is also less efficient than outpatient TB care at the primary care level. The unit cost of secondary care is likely to be higher due to more advanced technologies and higher salaries of pulmonary specialists. Patient visits are also reimbursed via case-based payments - an open-ended payment system which leaves open the possibility of up-coding and excessive visits to increase revenue and can lead to an unnecessarily high cost-per-episode of TB care. These excess costs represent money that could be used more efficiently to address TB in primary care for less cost and better outcomes.

The results showed a comprehensive picture of TB services under JKN and confirm that decisions to avoid treating TB cases in primary care facilities and instead treat uncomplicated TB patients in outpatient secondary care settings are influenced by BPJS-K payment methods. While there are instances where referral for diagnosis is the correct course of action, we also found that primary care providers have weak incentive to provide TB services and prefer to up-refer TB patients for diagnostic or treatment purposes to avoid using their capitation for these patients. However, up-referral behavior is also reinforced by client preferences- clients may choose secondary care facilities as they offer complete services (clinical, diagnostic, and pharmacy services are available in one place) (Boston Consulting Group (BCG) et al., 2018a). Changing the strong financial incentives secondary care facilities face is critical to influencing provider behavior, but this alone likely will not be sufficient to reach the objective of treating most uncomplicated patients in primary care. Improvements in supply-side readiness to increase diagnosis and treatment capacity at the primary care level, the availability of MoH subsidized diagnostic reagents and fixed-dose combination drugs in the private sector, and the provision of supportive public health functions (e.g., notification and adherence support) to private primary care providers must also improve.

The BPJS-K provider payment mechanisms can be revised to improve efficiency and quality. We saw that incentives created by the PROLANIS program had an important influence on provider behavior, which gives an idea of how to create incentives to manage TB patients with co-morbidities. PROLANIS is a chronic disease management program developed by the government of Indonesia and targeted for diabetes and hypertension. Outpatient secondary level care for uncomplicated TB costs up to 188 billion rupiah annually. There is a high potential to reduce the expenditure per case if the majority of uncomplicated TB cases were treated by primary care facilities. This does not mean that large savings will be immediately realized. Stronger financial incentives for primary care providers will be necessary, and labor, diagnostics, and supplies all have a tangible cost even at the primary care level. However, there is evidence to suggest that treatment in primary care would also improve outcomes if a case manager exists and is functional, as the inferior performance of secondary care facilities in tracing loss to follow up may lead to a decrease in treatment success (Wells et al., 2019).

A reform is needed both in the payment mechanism and enforcement from the government. Episode based payments implemented in Taiwan succeed in decreasing the default rate (Tsai et al., 2010), increasing the cure rate, and decreasing the length of treatment (Li et al., 2010). We suggest using an episode-based payment for outpatient treatment and paying the same rates at both primary and secondary care levels. This will incentivize primary care facilities to provide treatment, weaken incentives for secondary care facilities to provide treatment, and increase the number of TB patients back-referred to primary care for treatment. We also suggest making a clear link between payment

and case notification. An additional fee-for-service payment for diagnosis will further incentivize primary care facilities, especially private providers, to participate in TB service delivery. Fee-for-service for diagnosis would also decouple diagnosis (which may require more specialized personnel or equipment) from treatment monitoring (which is typically something that all providers can carry out), and avoid the current challenges about potentially having to transfer capitation payments. Second, the change in payment mechanism should be supported by the provision of supportive public health functions (e.g., notification and adherence support) to private primary care providers. There may also be a role for enforcement through contracting arrangements in order to increase the participation of private facilities in TB service provision and clearly link payment to quality of services delivered.

Efforts to design and implement pilot projects to test these purchasing arrangements are ongoing under Government of Indonesia activities, supported by USAID Indonesia. A more comprehensive technical design proposal related to the recommendations above is available from the authors upon request.

Limitations. The claims data sample has several limitations, including

- This dataset is only 1% sample of Indonesia national health insurance (BPJS-K) claims from 2015-2016 (revised), and may not represent the most recent situation for TB in Indonesia. However, this is the latest available data released by BPJS-K.
- While this 1% dataset was purposively selected by BPJSK expert and can represent all diseases at the national level, it is not specific for TB.
- No information about horizontal and back-referral
- No information about the quality of services
- Only includes patients enrolled in JKN.

The qualitative methodology used in fact-checking analysis has some limitations, including the potential for bias in sampling, and the potential for the conclusions to be influenced by certain people and/or different people in different sites. Additional analysis is needed on other national-level data (e.g., SITT, SITB) to explore other providers' behavior in TB service provision. Further analysis is also required related to the BPJS Kesehatan sample dataset, including a budget impact analysis to estimate the cost to the payer of different scenarios and cost savings from reduced hospital-based care.

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ANNEX A BPJS-K Dataset Overview

SAMPLING

1. Sampling frame of family. List of 73,441,160 families were used based on 31st December 2016 data.
2. Strata development. Combination of two variables, include PHC (22,024 facilities) and family (three categories) were utilized to develop the strata. Three categories of family consist of 1) family that never utilize health services; 2) family that utilized PHC; 3) family that utilized PHC and hospitals. If all PHC have all the three categories, 3 x 22,024 = 66,027 strata.
3. Stratified random sampling to choose family sample. 10 families were chosen in each strata, or all families if have less than 10 families in the strata. This process generated 586,969 families.
4. Generate sample data by individual membership. Membership sample data were generated from master file via family code (step 3 result). This step generated total of 1,697,452 individual sample membership.
5. Generate sample data of services by type of health facility (i.e. PHC and hospitals). Health services were retrieve from masterfile using membership code that were chosen in step 4.

Sampling weight. An individual weight variable was generated to ensure sample can represent population characteristic in the analysis. As described, stratified random sampling was utilized and sample was not chosen proportionally, thus there are variation of individual weight. The probability, p of family, i, is estimated to generate family weight, w_i.

$$w_i = \frac{1}{p_i}$$

For example, strata number 3 (PHC 1 and category 3) with 6,200 family and 20 families were chosen. Each family has a probability of 20/6,200 to be chosen. Sample family weight is 6,200/ 20 = 310. One family represent 310 family in the population. Variation of population in each strata causes variation of weight in different strata. Next, individual weight was estimated as the ratio of family weight and number of family member. Table 1 illustrate the calculation of family and individual weight.

Table 1 Illustration of family weight in six strata

No	PHC code	Family category	Number of family	Number of sample	Probability, p_i	Family weight, w_i	Number of family member	Individual weight
1	1	1	150	20	0,133	7.5	3	2.5
2	1	2	400	20	0,050	20	4	5.0
3	1	3	6200	20	0,003	310	5	62.0
4	2	1	200	20	0,100	10	4	2.5
5	2	2	500	20	0,040	25	5	5.0
6	2	3	5900	20	0,0003	295	3	98.3

Five main files were generated: 1) Individual sample dataset; 2) Health services at PHC (capitation), 3) Health services at PHC (non-capitation), 4) Hospital services and 5) Secondary diagnosis sub-set. There are 1,697,452 unique list of individual data, consist of demographic characteristics (e.g. age, sex, marital status) and membership information (e.g. health facility registered, segment). More than 1.7 million of PHC services (capitation) visit, 104 thousand of non-capitation visits, and 906 thousand visits at hospital with 700 thousand secondary diagnosis observation. Health services dataset include health facility characteristics (e.g. type, ownership), diagnosis, and claim of the services.

Data and Variables

Here the list of variables utilized in the analysis

Table 2 List of variables utilised

No.	Variable	Description	Variable constructed and assumption
1	PSTV01	Unique individual ID	
2	PSTV03	Date of birth	Age by 31st of December 2016
3	PSTV04	Family membership	
4	PSTV05	Sex	
5	PSTV06	Marital status	
6	PSTV08	Membership segment	
7	PSTV09	Province	
8	PSTV12	Health facility registered	
9	PSTV15	Individual weight	
10	FKP03	Date visit at PHC	
11	FKP04	Date discharge at PHC	
12	FKP09	Type of PHC	
13	FKP10	Type of services at PHC	
14	FKP13	Discharge status	
15	FKP14	Diagnosis at PHC	Generate new variable to identify tuberculosis diagnosis with inclusion criteria of "tuberculosis" and exclude "Z23.2 Need for immunization against tuberculosis (BCG)"
16	PNK03	Visit date at PHC (non-capitation)	
17	PNK05	Discharge date at PHC (non-capitation)	
18	PNK10	Type of PHC	
19	PNK11	Type of services at PHC (non capitation)	
20	PNK13	Diagnosis at PHC (non-capitation)	Generate new variable to identify tuberculosis diagnosis with inclusion criteria of "tuberculosis" and exclude "Z23.2 Need for immunization against tuberculosis (BCG)"
21	PNK18	Claim verified	
22	FKL03	Visit date at hospital	
23	FKL04	Discharge date at hospital	
24	FKL09	Type of hospitals	
25	FKL10	Type of services at hospital	
26	FKL14	Discharge status	
27	FKL15	Primary diagnosis	Generate new variable to identify tuberculosis diagnosis with inclusion criteria of "tuberculosis" and exclude "Z23.2 Need for immunization against tuberculosis (BCG)"

Ethical

Author obtained permission from BPJS kesehatan to use the BPJS Kesehatan sample dataset (revised edition), and it is publicly available from BPJS Kesehatan and anonymously, thus we cannot re-identify any patients.

ANNEX B CLASSIFICATION OF UNCOMPLICATED TB

Uncomplicated TB Diagnosis at Primary Care Facilities

- A157 Primary respiratory tuberculosis, confirmed bacteriologically and histologically
- A158 Other respiratory tuberculosis, confirmed bacteriologically and histologically
- A159 Respiratory tuberculosis unspecified, confirmed bacteriologically and histologically
- A167 Primary respiratory tuberculosis without mention of bacteriological or histological confirmation
- A168 Other respiratory tuberculosis, without mention of bacteriological or histological confirmation
- A169 Respiratory tuberculosis unspecified, without mention of bacteriological or histological confirmation
- B909 Sequelae of respiratory and unspecified tuberculosis
- Z201 Contact with and exposure to tuberculosis

Uncomplicated Primary Diagnosis at Secondary Care

- J209 Acute bronchitis, unspecified
- J00 Acute nasopharyngitis [common cold]
- J029 Acute pharyngitis, unspecified
- J159 Bacterial pneumonia, unspecified
- J40 Bronchitis, not specified as acute or chronic
- Z509 Care involving use of rehabilitation procedure, unspecified
- Z548 Convalescence following other treatment
- Z549 Convalescence following unspecified treatment
- R05 Cough
- Z719 Counselling unspecified
- Z719 Counselling, unspecified
- R42 Dizziness and giddiness
- K30 Dyspepsia
- Z048 Examination and observation for other specified reasons
- Z049 Examination and observation for unspecified reason
- Z011 Examination of ears and hearing
- Z833 Family history of diabetes mellitus
- Z836 Family history of diseases of the respiratory system
- Z824 Family history of ischaemic heart disease and other diseases of the circulatory system
- Z831 Family history of other infectious and parasitic diseases
- R509 Fever, unspecified
- Z088 Follow-up examination after other treatment for malignant neoplasm
- Z098 Follow-up examination after other treatment for other conditions
- Z094 Follow-up examination after treatment of fracture
- Z089 Follow-up examination after unspecified treatment for malignant neoplasm
- Z099 Follow-up examination after unspecified treatment for other conditions
- R51 Headache
- E785 Hyperlipidaemia, unspecified
- Z289 Immunization not carried out for unspecified reason
- T814 Infection following a procedure, not elsewhere classified
- Z760 Issue of repeat prescription
- Z017 Laboratory examination
- Z038 Observation for other suspected diseases and conditions
- Z039 Observation for suspected disease or condition, unspecified
- R104 Other and unspecified abdominal pain

- R268 Corrosion of other parts of eye and adnexa
- B99 Other and unspecified infectious diseases
- Z008 Other general examinations
- A158 Other respiratory tuberculosis, confirmed bacteriologically and histologically
- A168 Other respiratory tuberculosis, without mention of bacteriological or histological confirmation
- Z718 Other specified counselling
- K318 Other specified diseases of stomach and duodenum
- Z518 Other specified medical care
- Z018 Other specified special examinations
- M478 Other spondylosis
- R529 Pain, unspecified
- Z751 Person awaiting admission to adequate facility elsewhere
- Z870 Personal history of diseases of the respiratory system
- Z861 Personal history of infectious and parasitic diseases
- Z929 Personal history of medical treatment, unspecified
- Z928 Personal history of other medical treatment
- A157 Primary respiratory tuberculosis, confirmed bacteriologically and histologically
- A167 Primary respiratory tuberculosis without mention of bacteriological or histological confirmation
- A159 Respiratory tuberculosis unspecified, confirmed bacteriologically and histologically
- A169 Respiratory tuberculosis unspecified, without mention of bacteriological or histological confirmation
- B909 Sequelae of respiratory and unspecified tuberculosis
- A160 Tuberculosis of lung, bacteriologically and histologically negative
- A150 Tuberculosis of lung, confirmed by sputum microscopy with or without culture
- A153 Tuberculosis of lung, confirmed by unspecified means
- A162 Tuberculosis of lung, without mention of bacteriological or histological confirmation
- J22 Unspecified acute lower respiratory infection
- M1090 Gout, unspecified, multiple sites
- M1098 Gout, unspecified, other sites

Uncomplicated secondary diagnosis at Hospitals

- A16 Respiratory tuberculosis, not confirmed bacteriologically or histologically
- A15 Respiratory tuberculosis, bacteriologically and histologically confirmed
- B90 Sequelae of tuberculosis
- J40 Bronchitis, not specified as acute or chronic
- J18 Pneumonia, organism unspecified
- J06 Acute upper respiratory infections of multiple and unspecified sites
- R50 Fever of other and unknown origin
- J20 Acute bronchitis
- Z01 Other special examinations and investigations of persons without complaint or reported diagnosis
- B99 Other and unspecified infectious diseases
- J98 Other respiratory disorders
- R62 Lack of expected normal physiological development
- J00 Acute nasopharyngitis [common cold]
- R51 Headache
- Z03 Medical observation and evaluation for suspected diseases and conditions, ruled out
- Z11 Special screening examination for infectious and parasitic diseases
- R11 Nausea and vomiting
- Z09 Follow-up examination after treatment for conditions other than malignant neoplasms

- K02 Dental caries
- R63 Symptoms and signs concerning food and fluid intake
- G44 Other headache syndromes
- Z86 Personal history of certain other diseases
- R53 Malaise and fatigue
- R05 Cough
- Z87 Personal history of other diseases and conditions
- J02 Acute pharyngitis
- Z71 Persons encountering health services for other counselling and medical advice, not elsewhere classified
- R42 Dizziness and giddiness
- Z02 Examination and encounter for administrative purposes
- A91 Dengue haemorrhagic fever
- Z76 Persons encountering health services

ANNEX C. SUMMARY OF RESPONSE BY HEALTH FACILITIES AND SERVICES

Table 3. Summary of response by health facilities (Public PHC, private PHC, Independent practitioner, Pharmacy) and services

Services	Public PHC	Private PHC	Independent practitioner	Pharmacy
Screening	● Puskesmas conduct contact investigation and screening ● Puskesmas build partnership with community health worker and CSO for visiting the patient ● Transportation fee for reaching out the patient is taken from BOK budget	● Most clinics do not conduct screening or contact investigation, as there are no incentives to take on this additional burden	● None of the independent practitioners (GP) conducted screening or contact tracing due to high cost, lack of facilities, and no incentives to take on additional burden	Referring to nearest Puskesmas
Diagnostic	● Most Puskesmas provide clinical diagnosis, microscopic test, HIV and blood glucose test ● Two Puskesmas already have GeneXpert. Several districts still applied utilization criteria (9 criteria for GeneXpert) due to the long queue and under capacity. ● Puskesmas can access SITRUST (Information System for Specimen Transportation), a sputum transportation system which bridges the health facilities that do not have GeneXpert machine to those that have machine. ● Puskesmas charge the non-insured for the diagnostic services. Some also charge JKN patients if they are registered in a private facility and will not move the capitation ● Puskesmas receive subsidy from DHO in the form of reagent, sputum pot	● Most clinics only provide clinical diagnosis due to lack of infrastructure/expensive investment needed and lack of capacity, flexibility on the referral system, and risk of infection/stigma. ● Non-insured patient pay OOP for diagnosis (ranged from 35,000 to 50,000 IDR) ● One out of 8 private clinics provided x-ray for TB diagnostic ● Some private clinics report TB cases through SITT (two clinics) or Wifi TB (two clinics). One clinic did not report the TB cases. (No information for other three clinics)	● GPs only provided clinical diagnosis then refer the patient for additional diagnosis to other healthcare facilities. ● GPs charge the non-insured for clinical diagnosis (ranged from 90,000-100,000 IDR) ● GPs who had informal relationships with puskesmas were more likely to refer to puskesmas for diagnosis ● Different referral facilities for insured and non-insured patient, non-insured get faster yet more costly diagnostic tests.	Not applicable

Services	Public PHC	Private PHC	Independent practitioner	Pharmacy
Treatment	● Most Puskesmas treat drug sensitive TB (DS-TB). However, only 5 out of 11 Puskesmas involved as MDR TB satellite ● In several Puskesmas, non-insured patient should pay for the registration fee every visit ● Absence of transferred capitation lead to fragmentation of treatment and OOP payments for JKN patients	● Only a few private clinics participated in DS-TB service ● Three out of eight private clinics receive fixed-dose combination (FDC) drugs from DHO and Puskesmas ● No clinics provide MDR TB services ● General unwillingness to provide TB services – responsibility is left to the Puskesmas. ● Lack of facility, staff, infectious disease become excuses for clinic to not open TB service ● Lack of engagement due to requirement for facilities and training	● One GP provides TB care for DS-TB ● GPs receive FDC drugs from DHO ● However, GP does not record or report the TB cases ● Willingness in transferring capitation due to small number of TB patients, which will not impact the revenue ● Absence of transferred capitation lead to segmented TB treatment ● Unwillingness of treating TB due to the intensive and difficulties in reaching out the patient ● Doctor benefits from informal relationship with Puskemas, for facilitating the shortage of logistics	Loose drug is provided but limited. No FDC from NTP program.
Prevention	● Unavailability of services (Mantoux, PPINH, HIV test, blood glucose test) lead to non-optimal screening activity ● Several Puskesmas experience shortage of INH supply	Not applicable	Not applicable	Not applicable
Outreach	● Suboptimal outreach activity due to greater distance, territorial boundary, small and absence of incentive, limited TB staff, less knowledge in arranging BOK budget. ● Innovation on outreach activity (sarabaeyo -giving food supplements, religious activity for TB staff) optimizes outreach activity ● Shift responsibility to CSO and community worker to reduce burden of outreach activity	● Clinic which has a lot of TB patients with diabetes to conduct outreach activity for ● Clinic with high capitation budget has autonomy in allocating funds to TB care	Limited to none outreach activity	Not applicable

Table 4 Summary of response by health facilities (Public and private hospitals, laboratory) and services

Services	Public Hospital	Private Hospital	Laboratory
Screening	● Hospitals conduct passive screening activity, only advise the patient's family to get screening ● Hospitals conduct screening, including HIV and blood glucose test ● Providers rely on Puskesmas for screening ● Financial incentive has significant impact on case finding (GF incentives and small allocated transportation fee)	● Hospital tend to have passive screening activity (screening with simple form), and even this may not be conducted regularly ● Not every hospital requires the patient to get HIV and blood glucose tests ● HIV and blood glucose are not provided as not mandatory	Not applicable
Diagnostic	● Diagnostic services provided by public hospital are clinical diagnosis, microscopic test, xray, GeneXpert ● Non-insured patients are charged for diagnostic service ● Hospital receive subsidies, in the form of reagent and sputum pot from DHO ● Diagnostic services are paid through INA-CBG claim for insured patient and OOP for non-insured patient	● Diagnostic services provided by private hospital are clinical diagnosis, microscopic test, and xray ● Only one private hospital employs GeneXpert tool ● Hospital receive subsidies, in the form of reagent and sputum pot from DHO ● Diagnostic services are paid through INA-CBG claim for insured patient and OOP for non-insured patient	● Public Laboratory conducts diagnosis for cross checking to fulfill DHO request, not for commercial use ● Private laboratory conducts TB diagnosis for commercial purposes and is not willing to lower price due to quality assurance. ● Laboratory is willing to provide TB diagnosis due to financial motives
Treatment	● Most hospital treat DS-TB. However, only two out of 7 public hospitals have MDR-TB services. ● Two public hospital in South Sulawesi have not began MDR-TB service yet, even though already listed on KMK ● Public hospital receives FDC drug supply from DHO ● Several hospitals still receive buffer from local government ● All hospitals use microscopic test for monitoring TB patient ● Payment mechanism (small service fee) create incentive for provider to avoid the patient with complicated disease (down refer patient) ● Payment mechanism and complication of coding create incentive for provider to upcode the INA-CBG ● BPJS innovation (stamp on the medical record) to optimize down referral ● Tiered referral imposes unnecessary cost (patient should be hospitalized in hospital type C first, before being referred to hospital type B)	● Most hospitals have DS-TB services but no private hospitals provide MDR TB services. ● Hospital uses microscopic test for monitoring treatment. RS Al-Islam utilize GeneXpert in monitoring TB patient ● Hospital discourages down referral of patients due to patient's preference to remain and flexibility of referral letter, payment for treatment, and inability to monitor adherence	Not applicable
Prevention	● Mantoux is not available in one public hospital	Unavailability of INH for TB prevention	Not applicable

Services	Public Hospital	Private Hospital	Laboratory
	• Absence of INH logistic reporting cause shortage of INH		
Outreach	• Limited to "none" outreach activity • Unwillingness to provide outreach for patients living far away • Provider shifts the responsibility to Puskesmas, DHO, PHO for outreach of LTFU patient • Sub optimal outreach due to small financial incentive	• No providers do home visit • Provider doesn't conduct any outreach activity • Provider informs the wasor about LTFU patients • Provider prefers to shift responsibility to community health worker or CSO for outreach activity	Not applicable

ANNEX D. PROBLEM SYNTHESIS OF TYPE OF FACILITIES AND OBJECTIVES

Table 5 Problem synthesis of type of facilities (Public, private PHC and pharmacy) and objectives

Objectives	Public PHC	Private PHC	Pharmacy
Provide diagnostic	Incentive: - subsidy from government for equipment, reagent - obligation/responsibility to public health service	Incentive: Private clinic has diagnostic tool (xray)	Not applicable
	Disincentive: none	Disincentive: -lack of infrastructure/expensive investment needed -lack of capacity -flexibility on the referral system -risk of infection/stigma	Not applicable
Improve case-notification	Incentive: - supervision from DHO - obligation to achieve the target	Incentive: -the legal requirement for starting the business set by local authorities (Wifi TB) -the simplicity of Wifi TB form -clinic having MoU with DHO - having informal relationship with Puskesmas (the GP is head of the Puskesmas) *independent practitioner	Not applicable
	Disincentive: - reporting burden - complicated HIS	Disincentive: - the reporting burdens - complicated HIS - no obligation to report the case - less supervision from DHO	Not applicable
Adherence to diagnostic and referral guideline	Incentive: - supervision from DHO - subsidy and availability of diagnostic tools	Incentive: -MoU -rigidity of online referral system -informal relationship with referral facilities	Incentive: -MoU
	Disincentive: - long waiting time for GeneXpert test - flexibility on referral system	Disincentive: - complicated HIS - unclarity of the guideline - no access to SITRUST - patient's demand (long waiting time, distance) - unavailability of services in the referral facilities - good relationship with other health care facilities - absence of MoU - Perception of Puskesmas as "lower class"	Disincentive: -Complicated HIS
Partnership with private	Incentive:	Not applicable	Not applicable

Objectives	Public PHC	Private PHC	Pharmacy
	- having MoU - enforcement from local government		
	Disincentive: - absence of transferred capitation - absence of MoU with private sector	Not applicable	Not applicable
Conduct screening/outreach	Incentive: - obligation to achieve the target - having territorial authority - financial incentives (GF incentives, donor) - having MoU with public institution (prison)	Incentive: - responsibility in improving success rate/treatment completion - having sufficient funding (high capitation budget) to support the activity	Not applicable
	Disincentive: - lack of staff - small transportation fee - greater distance and territorial authority (outreach patient that reside outside their territorial boundary) - absence of financial incentive - having partnership with CSO and community worker (delegate the task)	Disincentive: - unavailability of screening tools - needs of expensive investment	Not applicable
Provide treatment	Incentive: - receive money from GP - receive government's subsidy for equipment, reagents, drugs - Puskesmas require to do public health service - patient is willing to pay OOP	Incentive: - many diabetes patients have TB and clinic want to keep diabetes patient due to Prolanis - patient is willing to pay OOP - staff capacity (get training)	Incentive: -dispensing fee or profit from selling FDC
	Disincentive: - No transfer of capitation from PHC facilities - high workload - high risk of infection	Disincentive: - lacking of infrastructure/expensive investment needed - lacking of staff and skill (never get training) - easy to refer to hospital - having risk of infection/stigma - want to treat other 'more profitable' disease (NCD which is included in Prolanis) *independent practitioner	Disincentive: -limited number of demands
Adherence to treatment guideline	Incentive: - supervision from DHO	Incentive: - sufficient staff capacity (get training) - sufficient funding (high capitation budget) - having tools (xray)	Incentive: -none
	Disincentive: - lack of skill in patient's education - high workload	Disincentive: - Lack of capacity in terms of staffing and skill - No subsidy	Disincentive: -doctors request

Objectives	Public PHC	Private PHC	Pharmacy
Adherence to referral guideline	Incentive: - rigidity of the referral system	Incentive: - the existence of horizontal referral - having MoU with referral facility - small number of TB patient which won't affect the payment *independent practitioner	Incentive: MoU
	Disincentive: - less knowledge of the guideline - unclarity of the guideline - problem on the networks and error system (SISRUTE)	Disincentive: - no enforcement from DHO - obligation to transfer the capitation - behavior of referral facilities (remain the patient due to financial incentives) - patient's preference	Disincentive: reporting

Table 6 Problem synthesis of type of facilities (Public and private hospital, laboratories) and objectives

Objectives	Public hospital	Private hospital	Laboratory
Adherence to diagnostic guideline	Incentive: - Subsidy for equipment reagent, drugs - No additional financial incentive (paid by salary) - Availability of GeneXpert at the hospital	Incentive: - Availability of GeneXpert at the hospital	Incentive: profit by test
	Disincentive: - Confidence in xray - No enforcement of guideline for sputum microscopic - Payment not linked to adherence of guideline (schedule test sequentially)	Disincentive: - Confidence in xray - No enforcement of guideline for sputum microscopic - Payment not linked to adherence of guideline (schedule test sequentially) - No access to SITRUST	Disincentive: less incentive to invest for TB specific test.
Improve case-notification	Incentive: - Supervision from DHO	Incentive: Supervision from DHO	Not applicable
	Disincentive: - reporting burden - complicated HIS - lack ability of TB DOTs in enforcing/controlling other units - weak of internal networking (coordination between TB DOTs and other units) - assumption that notification is puskesmas' responsibility	Disincentive: - reporting burden - complicated HIS - lack ability of TB DOTs in enforcing/controlling other units - assumption that notification is Puskesmas' responsibility - weak of internal networking (coordination between TB DOTs and other unit)	Not applicable

Objectives	Public hospital	Private hospital	Laboratory
Conduct screening/outreach	Incentive: financial incentive (GF incentives)	Incentive: None	Incentive: profit in screening process
	Disincentive: - small transportation fee - having good external networking with DHO and Puskesmas (shift responsibility to Puskesmas) - greater distance - having good partnership with CSO	Disincentive: - screening is not mandatory - having good/strong partnership with DHO/PHO - Inability to reach out patient who lost to follow up - having partnership with CSO and community health worker - inefficiency of the activity due to lack of staff	Disincentive: no resrouces to do outreach
Increase down referral rate	Incentive: - BPJS-K stamp on medical record for DS TB - Payment for service fee is small (paid by salary and flat rate per month) - Inability of hospital to track if patient lost to follow up - High job burden (too many patients) - patient need intensive and complex treatment - patient has greater distance	Incentive: - BPJS-K stamp on medical record for DS TB - High job burden (too many patients)	Not applicable
	Disincentive: - Patient's demand - Flexible referral letter (3 month referral letter) - Payment for treatment - Inability to monitor adherence of referred patient (cannot track whether the patient go to referral facilities)	Disincentive: - Patient's demand (distance and want to be treated by specialist) - Flexible referral letter (3 months referral letter) - Payment for treatment - Inability to monitor adherence of referred patient (cannot track whether the patient go to referral facilities)	Not applicable
Adherence to treatment guideline	Incentive: supervision from DHO	Incentive: - supervision from DHO - sufficient skill (staff get training) - service linked to accreditation	Not applicable
	Disincentive: - Unclarity of guideline - Influence from "specialist association" on intensity of treatment schedule - Drug supply is not linked with referral regulation (referred hospitalized patient should take meds at Puskesmas) - Limited enforcement from TB DOTs - Lack of skill (doctor never get training) - Drug regulation is not linked with the demand/condition of patient (e.g. prescribing 9-month FDC for TB with diabetes, prescribing loose drug)	Disincentive: - Unclarity of guideline - Influence from "specialist association" on intensity of treatment schedule - Lack of capacity (high turnover of TB staff and untrained staff) - Limited enforcement from TB DOTs - Drug regulation is not linked with the demand/condition of patient (e.g. prescribing 9-month FDC for TB with diabetes, prescribing loose drug) - High workload (too many patient) and double job burden	Not applicable

Objectives	Public hospital	Private hospital	Laboratory
		- assumption that the guideline and BPJS regulation is not correct (visit once per month is overlong) - shortage of drug supply (prescribe loose drug) - limited supervision from DHO	