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Effects of performance-based capitation payment on the use of public primary health care services in Indonesia

Novat Pugo Sambodo [a,b,*], Igna Bonfrer [a,c], Robert Sparrow [d,e,j], Menno Pradhan [f,g,h], Eddy van Doorslaer [a,i]

[a] Erasmus School of Health Policy & Management, Erasmus University Rotterdam, Rotterdam, the Netherlands
[b] Department of Economics, Faculty of Economics and Business, Universitas Gadjah Mada, Indonesia
[c] Erasmus Centre for Health Economics Rotterdam (EsCHER), Erasmus University Rotterdam, Rotterdam, the Netherlands
[d] Wageningen University, Wageningen, the Netherlands
[e] Australian National University, ACT, Australia
[f] University of Amsterdam, Amsterdam, the Netherlands
[g] Vrije Universiteit Amsterdam, Amsterdam, the Netherlands
[h] Amsterdam Institute for Global Health & Development, the Netherlands
[i] Erasmus School of Economics, Erasmus University Rotterdam, Rotterdam, the Netherlands
[j] International Institute of Social Studies (ISS), Erasmus University Rotterdam, The Hague, the Netherlands

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ABSTRACT

The Indonesian national health insurance agency BPJS Kesehatan, the largest single-payer system in the world, is among the first to combine capitation-based payments with performance-based financing. The Kapitasi Berbasis Komitmen (KBK) scheme for puskesmas (community health centres) was implemented in province capitals between August 2015 and May 2016. Its main goal was to incentivize the substitution of secondary by primary care use. We evaluate its effect on its three incentivized outcomes: the fraction of insured visiting the puskesmas, the fraction of chronically ill with a puskesmas visit and the hospital referral rate for insured with a non-specialistic condition. We use BPJS Kesehatan claims data from 2015 to 2016 from a stratified one percent sample of its members. Comparable control districts were identified using coarsened exact matching. We adopt a Difference-in-Differences (DID) study design and estimate a two-way fixed effects regression model to compare 27 intervention districts to 300 comparable non-capital control districts. We find that KBK payment increased the monthly percentage of enrolees contacting a puskesmas with 0.578 percentage points. This is a sizeable increase of 48 percent compared to the baseline rate of just 1.2% but it still leaves most puskesmas far below the "sufficient" KBK threshold of 15%. For chronically ill patients, a small increase of 1.15 percentage points was estimated, but it leaves the rate even further below the program's "sufficient" threshold of 50%. We find no statistically significant effect on referral rates to hospitals for conditions not requiring specialist care. While we find positive effects of KBK on two out of three outcomes, all estimated effect sizes leave the actual rates far below the program targets. Our findings suggest that the KBK performance-based capitation reform has not been very successful in substituting secondary care use by greater primary care use.

Introduction

Indonesia's national health insurance scheme *Jaminan Kesehatan Nasional* (JKN) is the largest single-payer system in the world, covering a broad spectrum of primary to more advanced hospital care services (Agustina et al., 2019). JKN plays an important role in Indonesia's path towards Universal Health Coverage (World Health Organization, 2010) and provides a significant share of Indonesia's health care funding. It also has the potential to influence health care provider behaviour (Stein et al., 2020). The national Indonesian health insurance agency *Badan Penyelengara Jaminan Sosial Kesehatan* (BPJS Kesehatan) introduced *Kapitasi Berbasis Komitmen* (KBK), a performance-based financing scheme for primary care provided to JKN enrolees in 2016. The KBK was applied on top of the capitation payment program for community health

* Corresponding author. Erasmus University Rotterdam, Erasmus School of Health Policy & Management, P.O. Box 1738, 3000 DR, Rotterdam, the Netherlands.
E-mail address: sambodo@eshpm.eur.nl (N.P. Sambodo).

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centres (*Pusat Kesehatan Masyarakat* – Puskesmas) in 27 out of 34 province capitals for a total of 560 puskesmas (BPJS Kesehatan, 2015a). In 2014, a capitation scheme, moving away from earlier fee for service payments, was introduced and the performance-based element was added in 2015 (Presiden Republik Indonesia, 2013a). The goals of this performance-based capitation scheme were to improve accountability of puskesmas, promote better quality of puskesmas service delivery, and increase efficiency and effectiveness of Indonesia's national health insurance scheme (BPJS Kesehatan, 2015a). The expected shift from hospital to community health care should improve efficiency of spending in the health sector (Teplitskaya et al., 2021).

With the introduction of performance-based capitation, Indonesia joined policy makers from a range of low-and middle-income countries (LMICs) adopting financial incentives to change health care provider behaviour. While rigorous evidence on the effects of performance-based financing (PBF) schemes in LMICs, especially in Asia, remains scarce (Chalkley et al., 2020), the evidence base has slowly been expanding (Diaconu et al., 2021). PBF schemes adopted in LMICs are highly heterogeneous and cover a range of approaches (Diaconu et al., 2021).

Introducing performance-based financing (PBF) as a supplement to capitation-based payment is to our knowledge unique in the world, with only two exemptions. Plan Nacer in Argentina also combines capitation and PBF, specifically for maternal care delivery (Cortez, 2009). However, the capitation-based payments in Argentina were paid to provincial provinces by the National Ministry of Health, not directly to health care facilities (de Walque et al., 2022). The KBK performance-based capitation program also bares some similarities to China's Capitation Global Budget intervention to reduce antibiotic prescription (Yip et al., 2014) and improve prescription quality (Sun et al., 2016). However, China's global budget approach differs from capitation payment because the total annual budget based on among others number of hospitalizations has already been set at the beginning of the year and is therefore not directly dependent on the number of patients or insurance enrolees.

PBF as an independent mechanism, not linked to other payment routes such as capitation, has been implemented widely throughout low- and middle-income countries since the late 2000s. More than 2.5 billion USD has been invested in PBF projects in primary health service delivery in low-income countries (de Walque et al., 2022), but not as an add-on to a capitation based health care financing system as is the case in Indonesia. A recent report by the World Bank evaluating evidence on the effectiveness of independent or stand-alone PBF projects, suggests that performance pay has led to gains in primary health service delivery, but does not necessarily reduce gaps in physical infrastructure and availability of drugs and supplies (de Walque et al., 2022).

This study aims to evaluate the effects of KBK on its three incentivized monthly outcomes: the number of JKN insured patients with a visit to the puskesmas per 100 enrolees, the number of JKN insured chronically ill with a visit to the puskesmas per 100 enrolees and the hospital referral rate for insured with a non-specialistic condition. If the program has been successful, we would expect an increase in the first two outcomes and a decrease in the latter. To our knowledge, this is the first study to quantitatively evaluate the effects of the KBK program as it was implemented in province capitals. Most earlier evaluations of the KBK program have relied on case studies (Hasri et al., 2019; Widaty, 2017), adopted a qualitative approach (Aryani, 2022; Maharanti and Oktamianti, 2018; Widaty, 2017) or have not been peer-reviewed (Hidayat et al., 2017).

This study adds to existing knowledge by providing insights about the effectiveness of a combined PBF and capitation based health care system which might address some of the shortcomings of a stand-alone PBF intervention. The latter tends to have limited effectiveness when the existing health care system has no operating budget provided to frontline health facilities (de Walque et al., 2022). With a capitation based system, we would expect funding to be in place to ensure availability of a basic facility structure and equipment. Using this facility and equipment, performance-based incentives can motivate health care providers to deliver effective services. Furthermore, contrary to the majority of earlier work on PBF, this study focuses not on maternal and child health services but on primary care provision in general, also for chronically ill patients.

Background

Indonesia is a large middle-income country with 270.2 million inhabitants and a modest economic growth. Between 1960 and 2001, the medical care infrastructure grew from virtually no primary health care to 20.900 facilities (Agustina et al., 2019). With the introduction of JKN, the National Health Insurance System, more than 80 percent of the total Indonesian population has now gained coverage (BPJS Kesehatan, 2019). Approximately 12.000 primary health care providers participate in the JKN program and about three quarters of these are puskesmas (Ariawan et al., 2019). The other 25 percent primary care facilities are general practitioners and private clinics. Indonesians not participating in JKN, pay their health care expenditures out-of-pocket (Nugraheni et al., 2020). In some cases, patients paying out-of-pocket are prioritised for inpatient beds, leading to shorter waiting times for this select group (Mahendradhata et al., 2017). Public doctors can have a dual practice, also providing private care on a fee-for-service basis for non-JKN enrolees after their working hours in public facilities, which can result in some cases in substandard performance of providers in the public facilities (Gonzalez et al., 2017).

Puskemas provide primary care and act as gate-keepers for all health care services in Indonesia (Stein et al., 2020). Primary care services in Indonesia face challenges in providing quality health services (Bappenas/Kementerian PPN, 2019) including a wide rural-urban gap in supply-side readiness (World Bank, 2018) and wide variation in catchment populations ranging in size from 2000 to about 98,000 JKN enrolees (World Bank, 2018). While JKN enrolees can choose their primary care provider, they cannot seek care at higher-level healthcare facilities, such as hospitals, without a referral (Stein et al., 2020) unless they pay out-of-pocket. Emergency care is exempted, enabling JKN enrolees to directly go to any hospital (Presiden Republik Indonesia, 2013b).

In 2015, BPJS Kesehatan funding accounted for more than half of the total budget of puskemas, supplemented with funds from local governments and donors (World Bank, 2018). The average revenues per puskesmas increased from 22.000 USD in 2013 to 81.000 USD in 2015 (Appendix 1). Hospital care accounted for 82 percent of total JKN expenditure in 2015, primary care for 17 percent and the remaining 1 percent is for health promotion activity.

The KBK performance-based capitation for primary care providers was accompanied by a reform of the referral system to improve efficiency and effectiveness of service delivery and access to health services (Agustina et al., 2019). Rising costs at the hospital level for avoidable advanced care provided one of the main rationales for BPJS Kesehatan to introduce financial incentives for community health centres (BPJS Kesehatan, 2016a). These incentives aimed to encourage more contacts between users and primary care providers, increase the number of primary care visits for chronically ill and discourage hospital referrals for a subset of so-called "non-specialistic" conditions, which should fall within the standard competency of general practitioners (Indonesian Medical Council, 2012) such as asthma, tuberculosis and dengue (BPJS Kesehatan, 2016b). The underlying assumption was that by strengthening the gate keeper mechanism for chronically ill in primary care facilities, a share of hospital care can be avoided, for example through the effective management of hypertension and diabetes mellitus type 2 (BPJS Kesehatan, 2014). In addition to avoiding unnecessary hospital care through increased primary care provision, the lower case load for hospitals was expected to reduce waiting times and improve quality (Agustina et al., 2019). The intervention was also anticipated to increase financial accountability of primary care providers and local governance (Indonesian Corruption Watch, 2018).

Study setting

From December 2014 to May 2015, BPJS Kesehatan implemented a performance-based capitation pilot for community health centres providers serving JKN enrolees in 62 puskesmas in Padang, Pekanbaru and Jambi. All puskesmas in Padang and Pekanbaru received the intervention, and puskesmas in Jambi served as control district. During the first month of the pilot, health care utilization in the intervention group did not differ significantly from the control group. After six months, utilization in the intervention facilities did increase and reached the predetermined targets (contact rate, non-specialistic referral rate, proportion of facility's enrolee transfer to other primary care provider and chronic disease patients visit rate) (BPJS Kesehatan, 2015b). These promising results provided the impetus to develop and implement an adjusted version of the KBK scheme (BPJS Kesehatan, 2015c) that was implemented in province capitals, and which is the focus of this study.

KBK was implemented in province capitals, non-randomly and stepwise between August 2015 and May 2016, with the majority of districts joining the program in January 2016. A province capital is a district that is determined by national government as a capital where the governor's office and other province institution are located. Local district governments decided when their puskesmas joined the KBK program. Table 1 shows the timing of KBK implementation by district. BPJS Kesehatan published the nationwide "Regulations on KBK implementation" on the July 28, 2015 (BPJS Kesehatan, 2015a) containing the three incentivized outcomes with the associated targets and malus/bonus percentages. Following the pilot, the BPJS Kesehatan's first plan was to introduce KBK for 995 puskesmas (out of 9345 JKN registered puskesmas) catering for JKN enrolees in 33 out of 34 province capitals (BPJS Kesehatan, 2015a; 2015d) on August 1, 2015. However, as some of the capital cities were not ready, the timing was relaxed and the province capitals were allowed to start KBK by January 1, 2016 (BPJS Kesehatan, 2015d). From 2017 onwards the KBK program was implemented nationwide, limiting the opportunities to evaluate the effects of the program in the absence of a comparable control group. This study evaluates the implementation of KBK in province capitals, after the pilot and before the nationwide rollout.

The intervention group consists of 30 out of 34 province capitals. Padang (West Sumatera) and Pekanbaru (Riau) participated in the pilot, while Surabaya (East Java) only implemented KBK in 2018, after the nationwide roll out, so these cities are excluded from the treatment group. Surabaya was added as potential control district but was not selected based on our matching criteria. In addition, the districts in the Special Capital Region of Jakarta, the nation's capital, are also excluded because of structural wage difference with other cities in Indonesia (Badan Penelitian dan Pengembangan Kesehatan, 2018) and KBK is therefore unlikely to significantly impact puskesmas staff income in Jakarta.

The KBK program used three performance indicators, as shown in Table 2. The "contact rate" reflects the fraction of JKN enrolees that used primary health care at least once in a specific month (Ministry of Health and BPJS Kesehatan, 2017). This includes care provided on an individual basis in community health centres as well as during public health promotion gatherings outside the puskesmas. For a facility to perform "sufficiently", the contact rate is required to be at least 15 per 100 registered JKN enrolees in a facility in a given month. For "excellent" performance the threshold was at least 25 per 100 enrolees. The second performance indicator, the "chronic disease contact rate", reflects the fraction with at least one monthly visit to the puskesmas for the subset of JKN enrolees with hypertension and/or diabetes mellitus type 2. These two diseases were selected by BPJS Kesehatan as tracer conditions since these are two leading causes of death and disability in Indonesia (BPJS Kesehatan, 2014; IHME, 2019) that generate the highest disease burden among JKN enrolees (Mahendradhata et al., 2017). Sufficient and excellent performance are reached with respectively 50 and 90 out of 100 chronically ill enrolees visiting the puskesmas at least once per month. The third incentivized outcome is the "non-specialistic referral ratio" which is based on a referral structure that identifies a total of 144 diagnoses for which primary care providers are considered competent to provide the necessary care and should therefore not be referred to secondary care (BPJS Kesehatan, 2015a). A puskesmas does not reach the "sufficient" threshold when more than five percent of the overall number of referrals in the facility that month relate to non-specialistic patients i.e. those with a diagnosis from the list of 144 diagnoses. For the excellence threshold, this should be less than one percent.

The monthly bonus or malus was dependent on the share of performance indicators reached at either sufficient or excellent level. Table 3 shows the percentage of the capitation amount paid out to puskesmas based on their performance on each of the three indicators. Puskesmas not meeting at least the sufficient target for any of the three performance indicators incurred a 25 percent malus on their capitation-based payment. Facilities performing excellent on all three indicators received a 15 percent bonus on their capitation payment.

The base capitation amount is determined by the number of registered JKN enrolees in a facility (Presiden Republik Indonesia, 2014) amounting to 6000 Indonesian Rupiah (IDR) or 0.46 USD per enrolee per month for puskesmas with at least two medical doctors (see Appendix 2). Payments are made directly to a specific puskesmas. BPJS Kesehatan uses a non-capitation or claim scheme for maternal delivery, immunisation, and inpatient services.

BPJS Kesehatan regulates the allocation of capitation payments from

Table 1
Timing of KBK implementation.

Capital City	Province	Start KBK implementation
Jayapura	Papua	August 2015
Tanjung Pinang	Riau Islands (Kepulauan Riau)	September 2015
Jambi	Jambi	September 2015
Bengkulu	Bengkulu	October 2015
Batam	Riau Islands (Kepulauan Riau)	November 2015
Pangkal Pinang	Bangka Belitung	December 2015
Sorong	West Papua	March 2016
Banjarmasin	South Kalimantan	May 2016
Other 22 capital cities	Other 22 provinces	January 2016

Source: (BPJS Kesehatan, 2021a)

Table 2
KBK monthly performance indicators.

	Sufficient	Excellent
Contact rate	>15 per 100	> 25 per 100
Chronic disease contact rate	> 50 per 100	> 90 per 100
Non-specialistic referral rate	<5 per 100	<1 per 100

Note: (BPJS Kesehatan, 2015a).

Table 3
Performance-based capitation payout based on number of performance indicators meeting the thresholds.

Not sufficient out of 3	Sufficient out of 3	Excellent out of 3	Percentage of KBK capitation paid out
3	0	0	75%
2	1	0	80%
1	2	0	90%
0	3	0	100%
0	2	1	105%
0	1	2	110%
0	0	3	115%
2	0	1	90%
1	1	1	95%
1	0	2	98%

Source: (BPJS Kesehatan, 2015a)

puskesmas to health staff and operational activities. The minimum allocation for health staff is 60 percent from the total capitation amount received by puskesmas. The share of operational cost depends on the total capitation minus the share paid to health staff. The allocation is determined by the district regent (Bupati) or major (Walikota). The allocation of funds to the health staff depends on the type of health staff (general practitioner, nurse, midwife, pharmacist), level of education, working experience as well as the attendance of the health staff in that month (Ministry of Health, 2016).

To avoid gaming, BPJS Kesehatan introduced a Monitoring and Evaluation (M&E) team and an Assessment team in each local BPJS Kesehatan office. The M&E team monitors progress in facilities in response to the KBK introduction and assessed "service commitment fulfilment". Based on random unannounced visits to facilities, the M&E team aims to reduce fraud and provides recommendations and suggestions for program improvements to BPJS Kesehatan (BPJS Kesehatan 2015). The assessment team facilitates monthly data entry and processing to determine bonus and malus percentages for each facility based on the performance indicators (Table 2).

Data

We use BPJS Kesehatan claims data from a stratified one percent sample of JKN household members, covering health care use between January 2015 and December 2016 (Ariawan et al., 2019; Hidayat, 2019). These data cover seven months before and seventeen months after the KBK announcement. However, the actual implementation start date differs for some districts (see Table 1). We calculate monthly district averages over a total of 24 months using claims data from 817,552 JKN insurance enrolees in 327 districts (27 out of 34 province capitals and 300 control districts).

The one percent sample data are representative at national, province and district level (Ariawan et al., 2019). Further details can be found in Fuad (2019) and the BPJS Kesehatan data sample manual (Ariawan et al., 2019). The subsample is obtained as a stratified random draw executed by BPJS Kesehatan in three strata: Category 1 individuals who never filed any claims for health care i.e. "non-users", Category 2 individuals who claimed only primary care i.e. "primary care users", and Category 3 those who claimed both primary and hospital care i.e. "primary and hospital care users". For each puskesmas, ten households were randomly drawn from each of the three categories. We know for each claim in which district health care was used but we do not observe which specific puskesmas, from a total of 22,024 primary care facilities, provided the care.

BPJS Kesehatan provides individual weights to make the sample data representative of the JKN enrolees population. The household weights are obtained by dividing a facility's JKN enrolee population by the ten households sampled for each of the three categories. The individual weight is the household weight divided by the household size (Ariawan et al., 2019). We multiply this individual weight with the health care used based on the claims data from that JKN enrolees. Appendix 3 shows an example, using hypothetical data, of the calculation of the individual weights for each of the three categories by BPJS Kesehatan.

One limitation of our data is that BPJS Kesehatan stratified the household sampling at the end of the observation period. While the weighting process for our data may be correct for the last month, i.e. December 2016, it is possible that in January 2015, only a subset of the 30 households per facility were already JKN enrolees. Some households may have joined later, especially given that enrolment was increasing over the study period. Therefore, the weights may potentially lead to a downward bias of our contact rate estimates since the usage in earlier months in that district is not fully captured.

We include 77.3% of JKN enrolees registered at puskesmas (Ariawan et al., 2019). We only use claims data for health care utilization in puskesmas and exclude primary care provided by other providers such as general practitioners (GPs) and private clinics since these were not included in the KBK scheme. Visits to private clinics and GPs accounted for 33.7% and 14.5% of total visits respectively. We include all available claims of individuals from Categories 2 and 3 households using care in a puskesmas. We use the JKN enrolees hospital admission data to identify referrals for individuals in Category 3 from puskemas to hospitals. We subsequently aggregate utilization data to district level so we can compare districts that applied KBK to non-KBK district. We cannot use individual level data because we only have access to the one percent sample and do not know in which Puskesmas an individual was enrolled. Using district level data allows us to compare district average outcomes to the KBK targets. We assume the district average is representative of the performance of puskesmas within that district.

Control group

The KBK assignment is non-random, through a step-wise roll out across province capitals. We applied Coarsened Exact Matching (CEM) (Iacus et al., 2012) to identify control districts that are most similar to the province capital districts. The main advantage of CEM over other matching methods such as Propensity Score Matching (PSM) is that it reduces model dependency. CEM improves balance for a covariate without reducing balance for another covariate, and automatically restricts estimates to those on common support. CEM also allows for ex-ante informed decisions about which matching criteria are most fitting (e.g. covariates, thresholds) (Iacus et al., 2012). CEM does imply a trade-off between bias and precision: more matching strata is likely to reduce bias due to differences between intervention and control group but also reduces the number of observations in the subsequent analyses.

We include three matching variables in the CEM, all at baseline in 2015, reflecting both puskesmas and district characteristics: average puskesmas size, puskesmas enrolee per doctor ratio and average capitation payment per JKN enrolee. Ideally, our baseline reference period is January–July 2015, i.e. before August 2015. However, since we could not obtain reliable data for this period on puskesmas at district level we had to resort to data from the Ministry of Health and BPJS-Kesehatan for December 2015. Average puskesmas size is the total number of JKN enrolees per district divided by the number of puskesmas in that district (Ariawan et al., 2019; Ministry of Health, 2015). The puskesmas enrolee per doctor ratio is the number of JKN enrolees in a district divided by the number of doctors working in all puskesmas of a district (Ariawan et al., 2019; Ministry of Health, 2015). Finally, the capitation obtained per JKN enrolee is derived from the total capitation received by a district divided by the number of JKN enrolees in that district (BPJS Kesehatan, 2017). The latter covers capitation for not only puskesmas but all primary care providers in a district since more detailed data are not available. We use the standard Sturge's rule (Iacus et al., 2021) to define bins for the capitation per JKN enrolee criteria. We set the bins at 0–3500; 3501–5000 and 5001–10,000 IDR for the capitation per JKN enrolee in line with the thresholds defined for capitation based on puskesmas' characteristics (see Appendix 2). This results in 27 out of 30 districts matched to a total of 300 out of 437 control districts, see also Appendix 4. We check the robustness of results to only allowing for control districts that are located in the same province as the intervention district.

Methods

Outcome measures

We estimate effects on three outcomes that proxy the three KBK monthly performance indicators (see Table 2) i.e. the contact rate, the chronic disease contact rate and the non-specialistic referral rate. The contact rate used in the KBK scheme includes both individual visits to a primary care provider and participation in public health promotions through larger gatherings. The latter events do not result in separate individual claims and are therefore not observed in our dataset.

We define CP_{kt}, as the percentage of JKN enrolees registered in puskesmas with at least one visit in a month, and refer to this as the contact percentage. This outcome measure is derived from VM_{kt} which denotes the number of enrolees in a district k who visited a puskesmas in month t by multiplying each enrolee with a least one visit with its individual weight. Then, the total number of enrolees who visited at least once in month t is divided by the puskesmas enrolees size PM_{kT} in district k at the end of the study period (T, December 2016). The denominator is constant over time because we assume that the sample of enrolees remains the same between January 1, 2015 and December 31, 2016. The resulting fraction is multiplied by 100 to obtain an estimate per 100 JKN enrolees, to allow comparison to the KBK monthly performance indicator. Equation (1) describes the percentage with a monthly visit.

$$CP_{kt} = \frac{VM_{kt}}{PM_{kT}} \text{ x } 100 \quad (1)$$

The second outcome measure, the chronic disease contact percentage ($CDCP_{kt}$) in district k at month t, as shown in Equation (2), is estimated using the number of visits for individuals diagnosed with diabetes mellitus type II and hypertension, as indicated in the KBK guidelines (BPJS Kesehatan 2015). If an enrolee visits the puskesmas multiple times in a month, this is counted as one. To estimate the total number of enrolees with chronic disease visits, CVM_{kt}, we multiply each visit to a puskesmas by a enrolee diagnosed with hypertension and/or diabetes type 2 in a month with the associated individual weight. This results in an estimation of the number of visits as part of the Chronic Disease Management Program *Prolanis*. Prolanis includes activities to support JKN enrolees with a chronic disease by proactively involving participants, health facilities and BPJS Kesehatan (BPJS Kesehatan, 2021b). Next, we divide the aggregate number of visits for diabetes type 2 and hypertension by the estimated *Prolanis* enrolees in a district. The BPJS Kesehatan data from the stratified one percent sample is largely representative of the population data on incidence of hypertension and diabetes type 2 (Husnayain, 2020), justifying our use of individual weights. Husnayain (2020) analysed BPJS Kesehatan sample data using individual weights and found that the data for chronic diseases, malaria, and dengue are representative at the district level compared to population data on incidence. Because the number of puskesmas enrolees categorised as *Prolanis* participants per district is not publicly available, we estimate a puskesmas's total number of adult enrolees with diabetes type 2 or hypertension in a district $PCDM_k$. This is the share of the population aged 18 years and older in a district multiplied by the total number of puskesmas enrolees in a district i.e. the combination of adults and children in the one percent sample data, subsequently multiplied by the national prevalence rates of hypertension and diabetes type 2 (9.5% and 1.5% or equal to 11% for both diagnoses combined (Ministry of Health, 2018). The BPJS Kesehatan set 50 contact per 100 Prolanis enrolees per month as the "sufficient" performance target and 90 per 100 Prolanis enrolees as the "excellent" target (see Table 2).

$$CDCP_{kt} = \frac{CVM_{kt}}{PCDM_k} \text{ x } 100 \quad (2)$$

The third and final monthly performance indicator of the KBK program is the non-specialistic referral rate $NSRR_{kt}$ in district k at time t as shown in Equation (3). The $NSRR_{kt}$ is estimated based on all referrals related to the 144 non-specialistic diagnoses identified within KBK for which primary care providers are considered competent to provide the necessary care and should therefore not refer to secondary care. Unlike the data on puskesmas visits, these data are derived from the JKN enrolees hospital admission data. Each non-specialistic referral is multiplied with the individual weight, as also used for the puskesmas contact percentage, to obtain the district k aggregate in month t. The total number of non-specialistic referrals from puskesmas, NSR_{kt} is divided by TR_{kt} the total number of referrals in a district k in month t.

$$NSRR_{kt} = \frac{NSR_{kt}}{TR_{kt}} \text{ x } 100 \quad (3)$$

Model specification

Initially, the KBK reform was targeted to province capitals only. This selection is indeed a source of endogeneity because of the non-random roll out of the KBK. Both the targeting (only province capitals) and the timing of implementation (based on district readiness) are not exogenous. Since the targeting is based on time-invariant pre-intervention criteria (i.e. being a province capital ready to implement), our key strategy to identify causal effects is to compare treated and control districts over time.

The main threat to the parallel trend assumption comes from unobserved time-varying confounders. While we cannot completely rule these out, we can assess the credibility of our strategy by comparing the pre-intervention trends for treated and controls in the 7 months before KBK was announced (Clarke and Tapia-Schythe, 2021; Dimitrovová et al., 2020). We see very similar patterns during this period. In addition, applying CEM further reduces initial imbalances (in particular for monthly visits and chronic diseases visits, where the weighted pre-trends are almost identical for treated and controls), increasing the likelihood that the parallel trend assumption holds.

To estimate the effect of KBK we adopt a two-way fixed effects regression model to compare province capital (intervention) districts (n = 27 covering a total of 560 puskesmas) to matched non-capital (control) districts (n = 300 covering a total of 5696 puskesmas) to estimate monthly effects on the three incentivized outcomes (Wing et al., 2018).

We estimate two models. The first model considers the effect of the KBK announcement on July 28, 2015, where the KBK announcement variable $KBK(Announcement)_{kt}$ equals 1 for each month starting from Aug 1, 2015 to December 31, 2016 (17 months) for KBK districts:

$$Y_{kt} = a_k + b_t + \delta KBK(Announcement)_{kt} + \varepsilon_{kt} \quad (4)$$

The district level outcome variable of interest, Y_{kt}, is either the number of monthly contact percentage CP_{kt}, chronic disease contact percentage $CDCP_{kt}$ or non-specialistic referral rate $NSRR_{kt}$. The district fixed effect a_k represents the combined effect of all time-invariant characteristics of district k, b_t represents the time fixed effects, and ε_{kt} is a random error. Lastly, δ is the effect of KBK announcement.

In the second model, we aim to split the impact of KBK into an anticipation and an implementation effect, by separately including two treatment effects, $KBK(A)_{kt}$ and $KBK(I)_{kt}$:

$$Y_{kt} = a_k + b_t + \beta_1 KBK(A)_{kt} + \beta_2 KBK(I)_{kt} + \varepsilon_{kt} \quad (5)$$

The anticipation variable $KBK(A)_{kt}$ equals 1 for each month between Aug 1, 2015 and the district specific implementation date. Thus, while this anticipation period equals 5 months for most districts (with starting date January 1, 2016), it varies from zero months (for early adopter Papua) to ten months (to late adopter South Kalimantan) (see also Table 1). The treatment variable $KBK(I)_{kt}$ takes value 1 if district k has actual implementation of KBK in month t and zero otherwise. Thus, β_1 captures the anticipation effect of KBK announcement, while β_2 identifies the treatment effect of KBK implementation. The announcement effect δ in equation (4) is then a weighted average of these two effects. All analyses were performed using STATA, version 16.

Results

Balance of characteristics

Table 4 presents descriptive statistics of outcome variables and baseline characteristics for both treated and control districts. Overall, on average, KBK districts show a significantly higher contact percentage and a lower non-specialistic hospital referral rate at baseline. The

Table 4
District level summary statistics by KBK Status at baseline (2015).

Number of Observations (district x month)	Without Matching			After Matching		
	KBK	Non-KBK	Difference KBK – Non KBK (*t*-test)	KBK	Non-KBK	Difference KBK – Non KBK (*t*-test)
	360	4835		321	2627	
Outcomes						
Contact percentage	1.17	0.99	0.17***	1.21	1.04	0.16**
Chronic diseases contact percentage	1.26	0.93	0.33***	1.32	1.01	0.31***
Non specialistic referral rate (%)	18.68	25.16	−6.48***	18.95	25.16	- 6.21***
District characteristics						
Number of Observations (district)	30	469		27	300	
District average puskesmas size	16,283	13,215	3068*	15,371	13,023	2348*
Puskesmas enrolees per doctor ratio	7799	12,213	−4414	7638	9100	−1462
Capitation IDR disbursed per JKN enrolee per month	5818	6388	−570	6165	5716	449

Notes: *p < 0.10, **p < 0.05, ***p < 0.01. The number of puskesmas and doctors per district are obtained from the Ministry of Health (2015). The amount of capitation originates from BPJS Kesehatan unpublished data (BPJS Kesehatan, 2017).

differences in contact percentage may indicate a healthcare access gap between treated and control districts. Province capitals are more likely to have infrastructure that allows easier access to puskesmas compared to more rural areas. Meanwhile, the non-specialistic referral rate in KBK districts is lower since its puskesmas may have more capacity to handle non-specialistic cases (Putri, 2019). The summary statistics at baseline also indicate that treated districts have a larger average puskesmas size, higher capitation per JKN enrolee and a lower enrolee to puskesmas GP ratio. Suggesting that puskesmas GPs in KBK districts may be less burdened by the volume of patients coming to their facility.

While Table 4 reveals some statically significant differences in outcomes and characteristics at baseline between KBK and matched non-KBK districts, Fig. 1 shows that the trends in contact percentage and chronic disease contact percentage were parallel up to July 2015 (month = −1), just prior to KBK announcement. The time trends for the non-specialistic referral rate show a more erratic pattern.

For a more informative graphical illustration of our treatment effects, we present a standard event study graph in Fig. 2 with the month-specific effects of announcement – estimated from a modification of equation (4) where the treatment variable is replaced by the interactions between the KBK treatment group and month dummies. The figure shows the estimated coefficients and their confidence intervals by creating lead and lags from the month that was KBK announced (month −1). In line with Fig. 1, the results support the parallel trend assumption, as the coefficients are stable near zero for the period −7 to −1, and then slowly increase during the 17 months after KBK announcement for

Fig. 1. Coarsened Exact Matching weighted outcomes – months away from KBK announcement. Source: BPJS Kesehatan sample data (2015–2016).

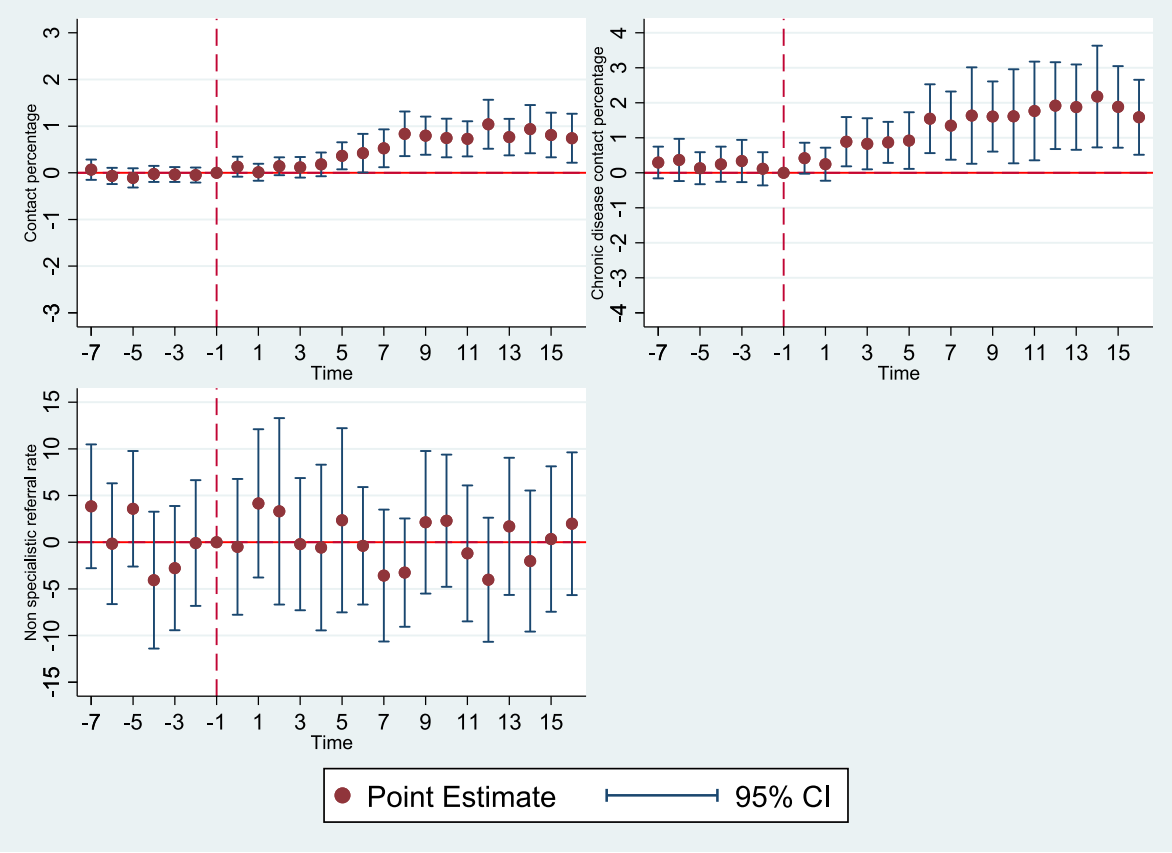

Fig. 2. Event study graph of the announcement effect and confidence intervals of KBK per month. Note: Event study leads and lags coefficients estimates for each KBK targeted outcome and 95% confidence intervals. We use month −1 (July 2015) as the reference month.

the contact percentage and chronic disease contact percentage. These results are consistent with the estimates of Model 2 (equation (5)) where the anticipation effect is identified as the treatment effect observed between the time of announcement and implementation of KBK.

There are two factors that may explain the anticipation effect from August 2015 onwards. First, BPJS Kesehatan performed a pilot study of KBK, the results of which were published in June 2015 (BPJS Kesehatan, 2015c). In that same period, BPJS conducted a workshop about KBK in 12 provinces preceding implementation of performance-based capitation (BPJS Kesehatan, 2015c). Second, the detailed KBK regulations were already made public on July 28, 2015 (BPJS Kesehatan, 2015a).

Impact estimates

Table 5 reports estimation results of the two-way fixed effects regression models. The first panel reports estimates for a conventional difference-in-difference model using the August 2015 announcement as treatment (equation (4)). The second panel reports the separate estimates for anticipation (from August 2015) and implementation (from the actual implementation date). The results are consistent across both models, suggesting positive impacts for contact percentage and chronic disease contact percentage, but not for non-specialist referral rate. As expected, the combined effect from equation (4) appears to be a weighted average of the anticipation and implementation effects from equation (5). There is clear evidence of a significant anticipation effect. Based on the estimation results, we conclude that KBK implementation raised the contact percentage by 0.735 points, following an anticipation effect of 0.146 percentage points (Equation (5)). Combined, this caused an increase of 0.578 percentage points since the announcement of the KBK (Equation (4)),

The KBK effects are positive for the contact percentage and the chronic disease contact percentage (p-value <0.10), in line with the intention of the program. The non-specialist referral rate does not appear to have been affected, as neither of the effect estimates is statistically significant. Compared to baseline values, the monthly contact

Table 5
KBK effect estimates from CEM weighted two-way fixed effects regression model with announcement starting from August 2015 compared to separate anticipation and implementation estimates.

		CEM Weighted DiD		
		(1)	(2)	(3)
		Contact percentage	Chronic disease contact percentage	Non specialistic
Sufficient threshold		15	50	5
Baseline value		1.21	1.32	18.95
Model 1	KBK (announcement)	0.578***	1.149***	0.101
		(0.0534)	(0.147)	(1.084)
	N	7795	7795	7334
Model 2	KBKI (actual implementation)	0.735***	1.377***	−0.340
		(0.165)	(0.402)	(1.402)
	KBKA (anticipation)	0.146**	0.520***	1.320
		(0.0646)	(0.161)	(2.004)
	N	7795	7795	7334

Notes: robust standard error in parentheses * p < 0.10, **p < 0.05, ***p < 0.01. Monthly dummies and district dummies are not presented. Model 1 refers to Equation (4), Model 2 to Equation (5). N = 327 of which 27 KBK and 300 non-KBK.

percentage increased by about 48% due to the announcement of KBK. While this may sound like a large relative rise, a 0.578 increase from the baseline rate of 1.21 per 100 enrolees per month in 2015 is still very far below the target rate of 15 per 100 enrolees. The chronic disease contact percentage shows a relative increase of 1.15 per 100 chronically ill enrolees as a result of KBK while the non-specialistic referral rate effect is far from statistically significant. We checked the robustness of our findings from our main model (equation (4)) to the use of different matching regimes to identify the control group (see Appendix 5) i.e. no CEM weights, CEM allowing for only one exact match, CEM weights while also requiring control districts to be in the same province as the intervention district and the latter while also allowing only one exact match. These robustness checks do not qualitatively change the findings of our study.

Discussion

The national Indonesian health insurance agency *Badan Penyelengara Jaminan Sosial Kesehatan* (BPJS Kesehatan) introduced *Kapitasi Berbasis Komitmen* (KBK), a performance-based financing scheme for primary care providers in province capitals in 2016. This health care financing scheme is unique because it combines existing capitation-based payments with performance-based payouts. We estimate the impact of the KBK program on primary care utilization and hospital referrals and find that effects on the two incentivized outcomes are statistically significant (monthly contact percentage and chronic disease contact percentage) and in the intended direction. However, while the magnitudes of the treatment effects are substantial relative to the counterfactual, the KBK did not manage to bring these anywhere close to the target rates with only around ten times as small as the objective. Our findings are similar to those of Hidayat et al. (2017) who used puskemas level BPJS Kesehatan data, as opposed to our district level estimates, to estimate KBK effects. They find significant but modest effects on contact rate and chronic disease contact rate, but not on the non-specialistic referral rate, in line with our findings.

We hypothesise five reasons why the KBK intervention seems to have failed to achieve its objectives. First, the KBK targets seem to have been set unrealistically high for the providers to meet given current capacity constraints. With inadequate staff levels and multitasking problems, most puskesmas cannot cope with almost 15 monthly visits per 100 enrolees per month. A puskesmas self-assessment performed in 2017 suggested that only about 33% of all puskesmas had the capacity to provide services according to the minimum standards (Bappenas/Kementerian PPN, 2019). Further, Fuady (2019) argues that the preparation in province capitals for the KBK rollout caused controversy since its implementation was done quickly, without much consideration of readiness and with considerable variability of facility readiness. Fuady (2019) also mentions the lack of communication with the Indonesian Medical Association (Indonesian Medical Association, 2015).

Second, the underperformance in KBK targets may be due to the wide variation in reporting knowledge and managerial capacity in puskesmas. Widaty (2017) highlights the technical problems incurred in the online reporting to BPJS Kesehatan system through P-Care, an information system that created for primary care providers to record JKN enrolees health condition and utilization (Kurniawan et al., 2017). A qualitative assessment held in March 2017 suggests that Primary care facility staff in Surabaya (East Java) often experienced errors in BPJS online application (Widaty, 2017).

Third, if an enrolee has already had a contact at a puskesmas in a specific month, there is no financial incentive to provide any further primary care to that month. There is also no financial incentive for private care users to switch to a puskesmas. In an urban setting, a private clinic is more accessible because it is usually open after office hours while this is not the case for puskesmas. Our exercise using the National Socio-Economic Survey 2016 also show that larger districts record greater use of the private primary care, but the difference is modest. Another possible pathway is that JKN enrolees registered at a puskesmas can still substitute care by going elsewhere i.e. to a GP or private clinic using their JKN enrolment. We found such substitution to take place only very infrequently: 2.7% and 4.17% of puskemas enrolees also use private clinics and GP practices, respectively. As a result, such private utilization is unlikely to significantly affect our effect estimates.

Fourth, the additional incentive from the KBK program cannot always be paid out to health care facilities because of financial bureaucracy creating a barrier effectively setting an upper and lower bound on the capitation. The Ministry of Health restricts the capitation tariff to the range of 3000–6000 IDR per enrolee per month. This implies for example that certain puskesmas scoring "excellent" on all three indicators do not receive the expected 6900 IDR per enrolee per month but only the maximum of 6000 IDR. Also on the other side of the spectrum, low performing puskemas under the KBK program, will not receive less than 3000 IDR per enrolee per month even when they do not reach any of the predefined KBK targets while this should in theory result in only 2250 IDR per enrolee per month. This discrepancy suggests that the KBK regulation from BPJS Kesehatan has not (yet) been aligned with the financial regulations on payment standards set by the Ministry of Health (Ministry of Health Regulation Number 52 Year, 2016 on Standard Tariff for Health Service on JKN).

Fifth, incentives provided to puskesmas under KBK might not or insufficiently be passed on to individual health care providers (Widaty, 2017) given that (a minimum of) 60 percent of total capitation flows to health workers, diluting the direct incentive.

Our analysis is subject to various limitations. The first limitation is that, due to data constraints, our estimates do not include healthcare promotion meetings which are also part of KBK's contact rate performance measure. As a result, our contact rates may severely underestimate the extent to which some puskesmas manage to approach the target contact rates.

Secondly, it would have been preferable to use puskesmas level data rather than average district level data, but these were not publicly available. Nevertheless, district-level analysis in primary care is of value because the implementation of KBK itself was rolled out at the district level. Since each district local government has the authority to allocate the health budget and decide on the proportion of capitation in its puskesmas (BPJS Kesehatan, 2015a), district policy can influence KBK impact.

Finally, the intervention also aimed to increase accountability of puskesmas, strengthen local governance, reduce waiting times and increase quality. Our data did not allow an assessment of the effects of the program on these additional outcomes.

Conclusion and policy recommendations

We estimated the impact of the introduction of Indonesia's performance-based capitation scheme KBK. Using a difference-in-differences approach we find a small increase in primary care visits but the overall effects of the program were far below the targets initially set. The program increased the contact percentage by 0.578 per 100, and the chronic disease contact percentage by 1.15 per 100. KBK did not significantly improve the non-specialistic referral rate in the treated districts.

We recommend the Indonesian government to initially lower the targets and subsequently increase these step by step on an annual basis. According to the Ministry of Health, only 2962 puskesmas (out of 9767 puskesmas i.e. 30%) are able to provide health care services according to a set minimum standard (Ministry of Health, 2017) and it might also be very hard for these facilities to reach the set utilization targets. Setting moderate goals will likely produce better results than setting targets that are beyond reach (Locke and Latham, 2002).

Setting the same targets for all puskesmas may have discouraged some to act if these targets were out of reach, while for relatively well-endowed facilities less effort is required to meet the KBK targets. A target

based on previous achievements or of that of a group of puskesmas with a similar achievement level might provide a greater incentive to change provider behaviour. While a gradual approach, also based on past performance, may prove to be more effective than enforcing a uniform performance threshold, the goal should remain to move towards universal health coverage as the program is rolled out nationwide.

Credit author statement

Novat Pugo Sambodo:Formal Analysis, Writing - Original Draft. Igna Bonfrer: Supervision, Writing - Review & Editing. Robert Sparrow: Supervision, Writing - Review & Editing. Menno Pradhan:Supervision, Writing - Review & Editing. Eddy van Doorslaer: Supervision, Writing - Review & Editing.

Ethical approval

Ethical approval was not required as this research did not directly involve human-subjects nor face-to-face interactions. We used anonymised secondary administrative data from the national Indonesian health insurance agency *Badan Penyelengara Jaminan Sosial Kesehatan*.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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