THE IMPACT OF INDONESIA'S RAPID MOVE TOWARDS UNIVERSAL HEALTH INSURANCE ON TOTAL HEALTH CARE EXPENDITURE

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ABSTRACT

Social health insurance in Indonesia dates from the 1990s but recently in 2014, the government announced its ambition to achieve universal coverage within five years. *Jaminan Kesehatan Nasional* (JKN) integrates all existing social health insurance schemes under one manager and one payer, the central Ministry of Health. Compared to previous schemes, JKN offers more generous benefits and can be accepted at both public and private facilities. The purpose of this study is to evaluate the impact of JKN on the total cost of health care. The data is derived from the national socio-economic survey in years 2011-2016, supplemented with village-level facility data. We find that JKN has a positive impact on total health care expenditure, increasing it by about 10% on average. The impact is much larger at the top of the total health care expenditure distribution, where health care needs tend to be higher. The part of JKN that is targeted for the poor also has positive impacts at the upper 20% of the total health care expenditure distribution. Future challenges therefore will be to control cost and manage supply to be able to sustain the demand expansion.

Keywords: Health insurance; social protection; total health care expenditure

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1. Introduction

Indonesia has always relied heavily on patients' out-of-pocket payments to health providers to finance its health care system until very recently. In 2014, the government announced its commitment to implement a universal national health insurance program, called *Jaminan Kesehatan Nasional* (JKN), by 2019. JKN ought to remove access barriers in seeking health care for some people due to financial constraints and to reduce the incidence of financial catastrophe and impoverishment due to high medical spending for others who do obtain care. It is reported that the majority (55%) of people who reported being sick do not seek treatment at formal (non-traditional) health facilities (Vidyattama et al., 2014), while some 14% of others who do seek medical treatments spend more than 10% of their household budget to pay for this care (Pradhan and Sparrow, 2002).

As the world's fourth most populous nation, Indonesia is home to over 257 million people. The World Bank has classified Indonesia as a lower–middle income country, with per capita income of $3,603 in 2016 (World Bank, 2017a). The latest figure reports that total health care expenditure absorbs around 3.6% of the national gross domestic product and the share of out-of-pocket payment out of the total health care expenditure was 45% (World Bank, 2016). Paying for health care is thought to be the main barrier to adequate access to health care leading to stagnation in the national health outcomes compared to those in neighbouring countries (PPJK Ministry of Health and the University of Indonesia, 2016; Indonesian Academy of Sciences and National Research Council, 2013; World Health Organization, 2006). For instance, life expectancy in Indonesia is under 69 years old whilst life expectancies in Malaysia and Thailand have reached 75 years old (World Bank, 2017b). Likewise, maternal mortality is still very high at 126 deaths per 100,000 live births compared to 40 and 20 deaths per 100,000 live births in Malaysia and Thailand, respectively.

To accelerate health progression, in 2014, the government announced mandatory enrolment into a national health insurance scheme, *Jaminan Kesehatan National* (JKN), by 2019. The administrative arrangements and implementation of JKN are governed by a single-payer insurance administrator, *Badan Penyelenggara Jaminan Social - Kesehatan* (BPJS-K). All existing social health insurance schemes are merged into one under BPJS. Prior to JKN, there used to be separate health insurance programs for civil servants (*Jamsostek*), military personnel and police officers, staff of state enterprise (*Askes*), social health insurance program for the poor (*Askeskin* which later developed into *Jamkesmas*) and coverage for pregnant women (*Jampersal*). There was also health subsidy program managed by provincial government (*Jamkesda*). JKN aims to create an integrated and sustainable health system that provides equal, on-time, comprehensive basic health care to all Indonesians. Compared to previous schemes, JKN offers more generous benefit package to its members (e.g., including dental and eye care) and can be accepted at both public facilities and participating private facilities, which are growing in number. Three years since its announcement, JKN's enrolment has reached over 170 million citizens

or 70% of the population and is set on target to reach all 257 million citizens by 2019. When this goal is achieved, JKN will be the largest social health insurance program in the world. JKN's first enrollees are those who were previously covered by existing social health insurance schemes. Later, enrolment is opened to informal sector workers and other unemployed population.

In the literature, there have been several studies analysing the impact of various health insurance programs in Indonesia. Hidayat et al. (2004) find that a mandatory insurance scheme for civil servants in the late 1990s increases the probability of outpatient visit to public facilities, while a mandatory insurance scheme for private employees increases the probability of visits to both public and private facilities. Their sample only includes respondents who reported health problems in the last four weeks. Using longitudinal data from several waves of the Indonesian Family Life Surveys, Johar (2009) assesses the 1990's national health card program for the poor and finds that, while providing full coverage for comprehensive care to all household members, the program produces only a limited increase in utilisation at public hospitals. Sparrow et al. (2013) use longitudinal data from a sub-set of households in the national socio-economic survey, SUSENAS, to evaluate the effectiveness of *Askeskin* (a social health insurance scheme for the poor) in 2005-2006. They find that the program increases the utilisation of outpatient care, especially at public health centers. They also conclude that *Askeskin* increases household out-of-pocket health expenditure in urban area. However, there is a problem with this latter result, in that SUSENAS does not actually allow identification of household expenditure. The "expenditure" data in SUSENAS is a composite of households' out-of-pocket expenditure and the imputed value of any subsidy or credit that households received in obtaining goods and services. Accordingly, their inferences about households' catastrophic health expenditure (i.e., out-of-pocket health expenditure exceeded 15% of total household expenditure) are untenable. Assessing the role of various types of health insurance on utilisation using cross section data in 2007, Vidyattama et al. (2014) find that health insurance membership increases the probability of sick individuals using formal health facilities by about 7.5 percentage points and the probability of everyone in general using formal health services by 4.8 percentage points. Disaggregating the effects of different types of insurance, they find that private health insurance, employer-sponsored insurance and *Jamsostek* (a social health insurance scheme for private formal sector workers) had a smaller impact on utilisation compared to other types of insurance. They argue that this can be explained by better health endowment of people insured under these schemes compared to the poorer population which is covered by state insurance. Focusing on maternal health, Wang et al. (2017) find that any type of health insurance (public or private) increases the likelihood of pregnant women making regular visits and giving birth in a health facility. This positive effect however may be driven by women who have private or sponsored insurance who might be more informed about antenatal and post-natal care. Evidences from other developing countries also show mixed results on the effectiveness of social insurance program to encourage health care utilisation

(see for example Nguyen, 2012; Liu et al., 2015; Wagstaff et al., 2009; Lagarde et al., 2009; Trujillo et al., 2005).

The aim of this study is to provide a reliable estimate of the impact of JKN, which restructures the public provision of health insurance in Indonesia, on the total cost of health care to insured households. The total health care expenditure is the sum of private health expenditure and the value of any subsidy. In privately-driven health markets, researches often focus on private, out-of-pocket (OOP) health payment. However, given Indonesia's move towards a universal health system, the total health care expenditure becomes an important quantity to look at, as it impinges on fiscal spending. Difference estimators are used with two control groups. The first control group consists of those covered by previous social health insurance schemes (e.g., *Askes*, *Jamsostek*, *Jamkesmas*, *Jamkesda*, etc). The policy break in 2014 came in as a shock to this group, who can now enjoy bigger benefit packages. The second control group includes uninsured households. The purpose of including uninsured households is to remove any general movement in total health care expenditure that is uncorrelated with JKN.

The sample is derived from households in the national socio-economic survey (SUSENAS) by Statistic Indonesia (*Badan Pusat Statistik*, BPS) in years 2011-2016. SUSENAS is a nationally representative annual cross-section survey across 34 Indonesian provinces covering about 300,000 households and 1.1 million individuals in each wave. We supplement the SUSENAS data with village data from *Survey Potensi Desa* (PODES), containing information about village infrastructure and the accessibility of health providers in that village. This supplementation allows our analysis to take into account variations in the health supply factors, which are often overlooked. In addition to analysing the impact of JKN as a whole, we analyse the part of JKN that is targeted for the poor and near poor, the recipients of fee support or *Penerima Bantuan Iuran* (PBI).

The result shows that JKN has positive impacts on total health care expenditure. On average, the total health care expenditure of insured households increases by around 10%. The impact is larger at the top of the total health care expenditure distribution, where health care needs tend to be greater. For 10% of households with the highest total health care expenditure, JKN increases their total health care expenditure by 56%. For targeted insurance for the poor, we find no significant impact at the mean, but there are positive impacts on beneficiary households with high total health care expenditure beyond the 70th percentile of total health care expenditure of about 14%. In addition, we find that failure to account for variation in local infrastructure and health supply factors results in overestimation of the JKN's impact.

2. National health insurance (*Jaminan Kesehatan Nasional¸* JKN)

Social health insurance program in Indonesia did not really start until the early 1990s. Many programs however have poor implementation with limited coverage or take-up, leaving at least 30% of Indonesians without health insurance as at the end of 2012. In 1992, there was a community-based health insurance program, *Jaringan Pemeliharaan Kesehatan Masyarakat* (JPKM), which is a managed-care model similar to that of health maintenance organisations (HMOs) in the US. There was also a health insurance scheme for private, formal sector workers, *Jaminan Sosial Tenaga Kerja* (*Jamsostek*). In 1994, the first version of the national health card program targeted to the poor was introduced providing full subsidy for health treatments in public facilities. After the Asian financial crisis in 1997-1998, the government accelerated the distribution of health cards. In 2004, health cards were replaced by a health insurance program for the poor, *Asuransi Kesehatan Masyarakat Miskin* (*Askeskin*), to reach the informal sector population. In 2008, the program was extended to cover the "near-poor" population and *Askeskin* evolved into *Jaminan Kesehatan Masyarakat* (*Jamkesmas*). Alongside public insurance, private health insurance market took off in the late 2000s with providers including major banks, national insurance companies and international insurance companies. As at December 2012, about 69% of the population were covered by at least one form of health insurance, public or private. Vidyattama et al. (2014) provide a review of the development of social health insurance schemes in Indonesia while more detail about Indonesia's health system can be found in Mahendradhata et al. (2017).

In January 2014, the Indonesian government announced its commitment to achieve universal health insurance by 2019. The universal national health insurance scheme, *Jaminan Kesehatan Nasional* (JKN), is mandatory for all Indonesian citizens including those who are covered by other health insurance schemes. JKN was introduced alongside the institutionalisation of a single-payer insurance administrator, *Badan Penyelenggara Jaminan Sosial – Kesehatan* (BPJS-K), under the central Ministry of Health. With BPJS-K governing the administrative arrangements and the implementation of JKN, all existing social health insurance schemes such as *Jamkesmas* and *Jamkesda* were merged into one. JKN sets to provide a comprehensive basic service coverage including both curative and preventative care to all Indonesians. There is no restriction on use, type of disease or length of stay, as long as it is qualified as necessary care. JKN is fully financed by the central government and involved both public and private health providers that have opted to join the scheme. The premium for JKN's membership depends on the work status of the enrollees. Formal sector workers share the premium burden with their employers. The premium is proportional to salary with a ceiling: public employers contribute 2% of monthly salary and public employees 3%, whilst private employers contribute 1% and private employees 4%. The insurance covers all members included on the employee's official family card (*kartu keluarga*). For other voluntary enrollees (i.e., those unemployed and informal sector workers),

as at January 2017, JKN's annual premium is Rp.276,000 ($27) per person, which is equivalent to buying 2 kilograms of standard quality rice every month.[1] For those identified as "poor" and "near-poor" under state or local government definition (i.e., the *Penerima Bantuan Iuran*, PBI), they are exempted from paying the premium.

JKN operates on referral-basis. Enrollees must choose a first-level health facility from BPJS, usually a public health center (*puskesmas*). The first treatment must be done here unless it is an emergency. Patient may then be referred to a second-level health facility, mostly to a public hospital. Hospitals registered under BPJS have to allocate at least 20% of total beds (class III room with 4-5 beds) to JKN patients. When these beds are all full, patients may be referred to other hospitals or choose to upgrade to a higher class ward, paying out-of-pocket for the upgrade. Payment for inpatient treatment from BPJS-K is based on capitation. Providers assign a unit cost to each patient that summarises his/her inpatient episode (including ward and doctors but excluding drugs). The initial code during admission is revised upon discharge taking into account length of stay, complexities, use of intensive care, etc. BPJS-K publishes a price list and reimburses providers based on patients' final code. The unit costs vary by diseases and the type of facilities (principal referral hospitals (A), large/medium regional hospital (B-C), etc). Although the reimbursement reportedly occurred without long delay, field survey has gathered that the current unit cost is often insufficient to cover the actual cost of treatment. For outpatient care at primary care center (*puskesmas*), reimbursement is based on the size of patient list.

To minimise pharmaceutical costs, doctors are required to prescribe generic drugs whenever possible. The *Formularium Nasional* (FORNAS) was formed to govern the distribution and monitoring of drugs for JKN patients. Drugs listed under FORNAS are highly subsidised. In cases where a JKN patient requires a drug that is not listed under FORNAS, the treating hospital may have to cross-subsidise from other cases, as the total cost of treatment may exceed the BPJS-K's unit cost.

To summarise, with JKN, all social health insurance schemes are integrated into one under the management of the central Ministry of Health. Enrolment will be compulsory by 2019. There are marked increases in the participation of private hospitals and providers in BPJS-K.[2] Indeed, occupancy rate by JKN patients in private hospitals in some provinces can be as high as 70-80%. Patients get more comprehensive benefit packages than under previous social health insurance schemes.

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[1] See World Bank (2016) for discussions about main challenges in enrolling the informal sector into JKN and different composition of national health expenditure.
[2] While all public providers join BPJS-K, private providers are joining at slower pace. Reimbursement rates are the same for public and private hospitals but they differ for different type/ level of hospitals. These are regulated under MoH's decree number 52/2016 (*Standar Tarif Pelayanan Kesehatan Dalam Penyelenggaraan Program Jaminan Kesehatan*).

Table 1A shows the distribution of any social health insurance by wealth quintile in each year from 2011. Enrolment is distributed quite evenly across the wealth quintile, which is not surprising, since there are social health insurance schemes for public servants, government officials and formal sector workers, many of whom have high paying positions.

Table 1A: Distribution of social health insurance by year and wealth quintile

Quintile	2011	2012	2013	2014	2015	2016
1 (poorest)	24.07	23.10	24.40	24.52	22.21	21.59
2	19.67	19.38	20.95	21.54	19.35	19.21
3	16.98	17.58	18.34	17.73	18.36	18.45
4	17.54	17.75	16.82	17.05	18.21	19.00
5 (richest)	21.74	22.19	19.48	19.17	21.86	21.75

Note: figures in the table are the percentage of households covered by any form of social health insurance in a given wealth quintile. The wealth quintiles are computed from the entire sample of households in SUSENAS in each year with frequency weights to reflect the population wealth distribution in each year. Wealth variables include ownership of motor vehicle, house, other valuable goods and housing characteristics (e.g., type of flooring and roofing, utility connections, etc).

Table 1B isolates out the part of JKN that is targeted for the poor. In Table 1A, these households are grouped together with other insured households which have insurance from formal sector employment. A few papers have reported that, although the insurance scheme is targeted towards the poor, many non-poor households are covered with this type of insurance (Vidyattama et al., 2014 and references within). From Table 1B, it can be seen that, while this targeted insurance is concentrated at the bottom two wealth quintiles, there is a considerable proportion of insured households in the top wealth quintile.[3] Furthermore, the share of insured population in the top wealth quintile increases steadily from 3.55% to 7.2% in 2016 which may raise concern over the current system in identifying the target population.[4]

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[3] One explanation could be that SUSENAS did not capture really wealthy households, so the top wealth quintile actually reflects the 70-80th deciles of the true wealth distribution (Nugraha and Lewis, 2013; Mishra, 2009). The lack of participation by wealthy households is a common problem in voluntary surveys like SUSENAS.

[4] Analysing by region, we find that in Kalimantan, Maluku and Papua, insured households tend to be well-off (in Q4 and Q5). In contrast, in Sulawesi, Jawa and Nusa Tenggara (Barat and Timur), the majority of insured households are in the bottom 2 quintiles (Q1 and Q2). For targeted insurance, ideally the proportion of insured households in the top wealth quintile is very low. However, about 15-20% of households in Kalimantan and Papua with targeted insurance have top wealth.

Table 1B: Distribution of insurance for the poor/near-poor by year and wealth quintile

Quintile	2011	2012	2013	2014	2015	2016
1 (poorest)	37.94	36.89	33.38	33.62	32.90	31.75
2	28.24	27.63	27.09	27.87	25.97	25.39
3	19.15	19.92	20.70	19.51	20.89	20.60
4	11.13	11.68	13.37	13.55	13.49	15.06
5 (richest)	3.55	3.89	5.46	5.44	6.75	7.20

Note: figures in the table are the percentage of households covered by targeted social health insurance for the poor in a given wealth quintile. The wealth quintiles are computed from the entire sample of households in SUSENAS in each year with frequency weights to reflect the population wealth distribution in each year. Wealth variables include ownership of motor vehicle, house, other valuable goods and housing characteristics (e.g., type of flooring and roofing, utility connections, etc).

3. Data and Methodology

3.1. Methodology

Our primary task is to quantify the impact of treatment, which in this case, is the integration and expansion of social health insurance schemes in Indonesia into JKN, on total health care expenditure. The announcement of JKN in 2014 may be seen as a "natural experiment' that creates a break in the health behaviour of those covered by social health insurance schemes. As exits from these schemes are unlikely to be highly dynamic[5], we can estimate the impact of the expansion by comparing the total health care expenditure of those covered by any social health insurance scheme before and after 2014. We define our first control group, C1, as those insured by previous schemes. Let Y_{it} be total health care expenditure of household i in year t, where t indexes the time period (1 for post-JKN era and 0 for pre-JKN era), the simple regression model can be written as:

(1) $Y_{it} = \alpha + \beta \cdot 1(t = 1) + \varepsilon_{it},$

where $1(t = 1)$ is an indicator variable for households in post-JKN era, α and β are parameters to be estimated and ε_{it} is the regression error term. The Ordinary Least Square (OLS) estimate of β is the difference in means before and after the change: $\bar{Y}_1 - \bar{Y}_0$.

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[5] Exits would involve quit or lay off from state enterprise or households are no longer poor. The revision on the eligibility criteria for being poor or near-poor however is only adjusted once in 4-5 years

However, the problem with this estimator is that it is difficult to separate the policy effect from other secular changes. We therefore define the second control group, C2, which includes uninsured households. These households are subjected to the general trend as the insured households, but they do not benefit from the expansion of JKN. With group variation, the augmented regression equation can be written as:

(2) $Y_{it} = \alpha + \beta \cdot 1(t = 1) + \gamma \cdot 1(i \in Insured) + \delta \cdot 1(t = 1) \times 1(i \in Insured) + \varepsilon_{it}$,

where $1(i \in Insured)$ indicates insured households. The OLS estimate of δ can be shown numerically identical to the Difference-in-Difference estimator that is often discussed in the context of panel data. This estimator gives unbiased estimate of the JKN's impact if in the absence of the policy change, the average change in total health care expenditure over time is the same for insured and uninsured households.

Yet, bias may still arise if insured and uninsured households have very distinct characteristics that they are not "comparable" in the first place. To address this problem we use covariates balancing. The balancing test is typically performed after the estimation of the propensity score of being treated (having insurance) on a set of observable characteristics x in propensity score matching (PSM). The obvious choice for x is households' demographic (household composition, rural) and socio-economic conditions (age, sex and education of household head, wealth, farming). In this paper, however, we can go beyond households' characteristics to include village infrastructure characteristics. In other words, we can require insured and uninsured households to be similar not only in their household characteristics but also in terms of their ease of access to health care facilities. A recent report by the World Bank (2014) for instance writes that the "value" of having insurance is limited by the availability of the health facilities where treatment is sought. For each year and region in the sample period, the propensity score of a household having social health insurance is estimated using logit regression. Households at either end of the propensity score distributions - which are either very unlikely or almost certain have insurance, lay outside the region of "common support" and are discarded. Satisfaction of the balance test ensures that households within the region of common support have the same distribution of x independent of the treatment status.[6]

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[6] Detailed results are available upon request. Because we matched by year, region and rural/urban status, there are 36 sets of logit regression results for the two control groups (6 for CI and 30 for C2). Appendix A provides density graphs of the resultant propensity scores, showing large overlapping regions (region of common support) between the distribution of the propensity scores of the control and treated groups in all cases.

3.2. Data

The data is derived from the national socio-economic survey (SUSENAS) years 2011-2016. SUSENAS is a nationally representative household survey conducted since 1963 by Statistic Indonesia (BPS). It is a repeated cross-section data covering all Indonesian provinces. Since 2011, every year SUSENAS has annually sampled about 300,000 households and 1.1 million individuals. Frequency weights are provided to give counts that reflect the nation's true population. SUSENAS includes information at the household-level such as, household size and composition, housing characteristics, insurance status, household consumption, as well as information at the individual-level such as age, sex and education. To capture the infrastructure conditions where household lives, including health care facilities, we supplement SUSENAS with village-level (*kecamatan*) data *Potensi Desa* (PODES).

In SUSENAS 2011-2014, insurance status, including various forms of health insurance, was asked at the household-level. In SUSENAS 2015-2016, this question was asked for each individual. For consistency, we aggregate the latter data into household-level (i.e., if at least one member has health insurance the whole household is assumed to be insured). Only a small number of households have private health insurance (varying rate every year about 2-7%) so we exclude them from the analysis to have a cleaner treatment and control group: insured by social health insurance versus uninsured by any form of health insurance.

The population of interest is users of formal health services. We exclude traditional healers and medicine. The outcome variable is household total health care expenditure. This includes the costs of any use of formal health services (curative and preventive) and prescription medicines, and excludes health insurance premium. In SUSENAS, the total health care expenditure is the sum of out-of-pocket (OOP) health expenditure and any subsidy. This is because SUSENAS's objective is to measure households' consumption, so it has added a replacement cost if a household received any subsidy or transfer, which allows it to defer payment or pay nothing at the point of sale. It is not possible to separate out out-of-pocket from the total cost. The interviewer asked household representative to approximate the cost of the health goods or services that the household received for free, if it was to pay. As a consequence, the recorded total health care expenditure may be inaccurate due to respondents' approximation error. Nevertheless, currently, SUSENAS is the only nation-wide data set of Indonesian households that covers enough periods after the introduction of JKN, so it is the only data set that can be used to study JKN's impact across all Indonesian provinces. It is also the official data set used in government reports. At the macro level, there are other data sources from the Ministry of Health and BPJS-K, which we will use later to verify our results.

Given that our study periods that span between 2011 and 2016, we have to deal with a change in the survey instrument on health items in 2015. Specifically, SUSENAS 2015-2016 recorded households'

total health care expenditure at the annual level, whilst SUSENAS 2011-2014 recorded quarterly total health care expenditure. We therefore converted the annual total health care expenditure to quarterly cost by dividing it by four. However, averaging may lower the conditional mean (non-zero) in 2015 and 2016, because many households would have small, but positive total health care expenditure. These households are those which did not use any health service in the last quarter but used it at least once during the past year. Johar et al (2017) argue that to be able to compare the conditional mean of total health care expenditure across all years, the health care utilisation rate must be comparable. In this case, we find that the annual utilisation rate is about 78% whilst the quarterly utilisation rate is only 62%. They suggest to synchronise the annual health care utilisation rate to the quarterly rate by assuming that households with annual total health care expenditure below a certain level has zero cost would have zero cost had the reference period is a quarter instead of a year. Hence, these households should be excluded from the calculation of the conditional mean. In this paper, we follow their approach and find that a threshold of Rp.14,500 in 2015 and 2016 can be used to lower the annual utilisation rate to 62%.

Figure 1 shows the evolution of the conditional mean quarterly total health care expenditure over time by insurance status. The nominal total health care expenditure is converted to real 2016 Rupiah.[7] We also plot its 25th, 75th and 90th percentiles. Between 2011 and 2016, the conditional mean of insured households increased steadily, whilst that of uninsured and households with targeted insurance for the poor shows a fall in 2015. This fall however is not reflected in the 25th, 75th and 90th percentiles, suggesting that it may be explained by a lower maximum in 2015 compared to that in other years. Unlike the arithmetic mean that is affected by all values in its calculation, the percentile levels are positional measures that are robust to extreme values. Insured households experienced a jump in total health care expenditure post 2014, especially at the top of total health care expenditure distribution. This may suggest that the social health insurance is used by those with high health care needs. It is also interesting to observe that the total health care expenditure distribution of those with targeted insurance for the poor, which was previously to the left of the total health care expenditure distribution of the uninsured, has now overtaken the total health care expenditure distribution of the uninsured.

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[7] GDP deflator is used as the nominal deflator, with 2016 as the base. Source: IMF data.

Figure 1: Health care costs by insurance status over time
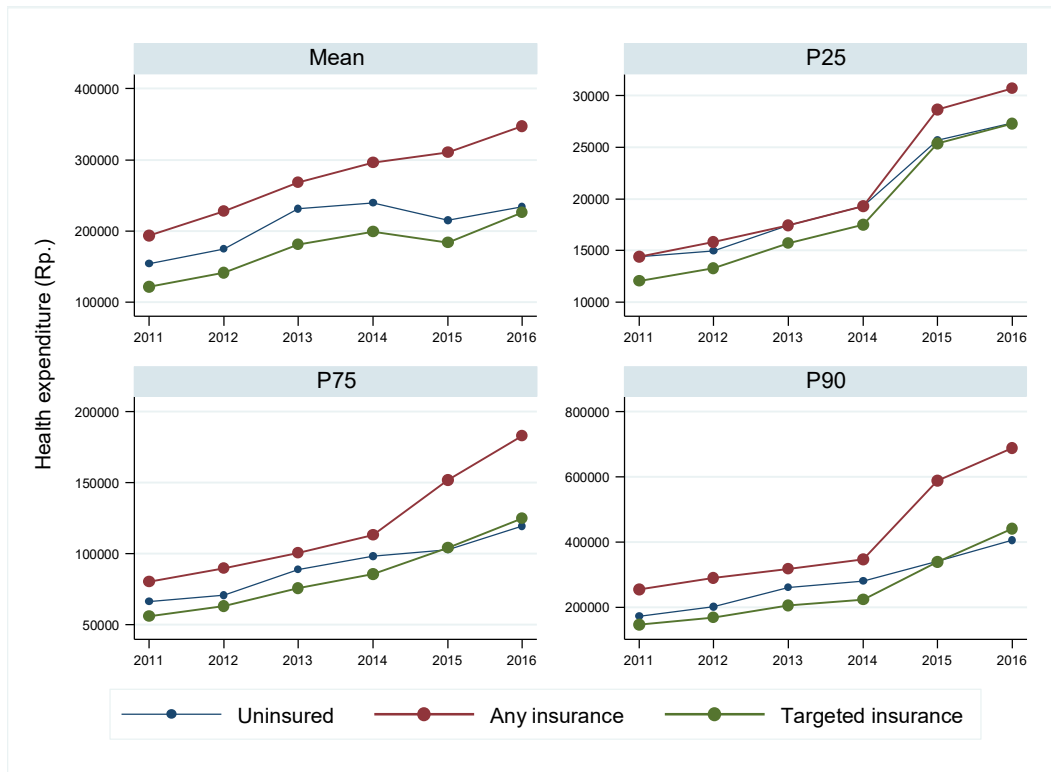
Note: each point in the figure indicates the related statistic derived from non-privately insured households in SUSENAS 2011-2016 using frequency weight. 'Any insurance' refers to membership in any social health insurance programs and 'Targeted insurance' refers to membership in social health insurance program for the poor (*Jamkesmas* or *Jamkesda* pre 2014 and PBI post 2014). 'Uninsured' refers to those without any form of health insurance.

We define 2011-2013 as the pre-JKN period and 2015-2016 as the post-JKN period. 2014 may be a problematic year because of issues in the first year of JKN such as lag in new system adoption and delay in the integration of regional insurance program (*Jamkesda*) in some regions. After the exclusion of 2014, the final sample comprises of 759,854 user households, representing over 183 million user households across Indonesia over 5 years period. Overall, social health insurance rate is 45% in 2011-2013 and 59% in 2015-2016. For targeted health insurance for the poor, the corresponding figures are 27% and 31%.

Tables 2A and 2B report the summary statistics of the conditional mean quarterly total health care expenditure by insurance status in the pre- and post-JKN periods. Table 2A concerns the JKN program as a whole (including targeted insurance for the poor). At the mean, insured households have higher total health care expenditure than uninsured households in both pre- and post-JKN periods, driven by high users of health services (i.e., those with total health care expenditure over the 75th percentile, P75 and P90). At the bottom of the total health care expenditure distribution (P25), there is small difference between insured and uninsured households. Variations in total health care expenditure are very wide,

about 4-7 times the size of the mean. In the post-JKN period, the gap in total health care expenditure between insured and uninsured households widened.

Table 2A: Summary statistics of health care cost by insurance and time

Outcome	2011-2013			2015-2016		
	Insured	Uninsured	Difference	Insured	Uninsured	Difference
Mean	231,484	185,599	45,885	330,028	223,793	106,235
(s.d.)	(1,355,874)	(1,277,498)		(1,458,979)	(1,035,346)	
P25	16,028	15,627	401	30,000	26,628	3,373
P75	91,357	74,841	16,516	167,664	110,345	57,319
P90	288,006	208,724	79,282	642,599	372,648	269,951
N	218,181	227,583		198,005	116,085	

Note: 'Insured' means enrolled in any type of social health insurance scheme. Reported health care cost is conditional on positive value in 2016 Rupiah. Population frequency weights are used. Differences in means are all significant at 1% significance level.

Table 2B focuses on the part of JKN that is targeted for the poor. In the pre-JKN period, we observe opposite trend in total health care expenditure to that in Table 2A: beneficiary households have lower mean total health care expenditure than uninsured households. However, in the post-JKN period, the gap between them gets smaller, as at the upper half of the total health care expenditure distribution, beneficiary households have overtaken uninsured households to have higher total health care expenditure.

Table 2B: Summary statistics of health care cost by targeted insurance status and time

Outcome	2011-2013			2015-2016		
	Insured	Uninsured	Difference	Insured	Uninsured	Difference
Mean	153,201	185,599	-32,398	204,064	223,793	-19,730
(s.d.)	(966,265)	(1,277,498)		(856,259)	(1,035,346)	
P25	14,137	15,627	-1,490	26,316	26,628	-312
P75	66,514	74,841	-8,327	113,844	110,345	3,499
P90	177,167	208,724	-31,557	386,250	372,648	13,602
N	135,816	227,583		111,274	116,085	

Note: 'Insured' means enrolled in social health insurance program for the poor (*Jamkesmas* or *Jamkesda* prior to 2014 and PBI after 2014). Reported health care cost is conditional on positive value in 2016 Rupiah. Population frequency weights are used. Differences in means are all significant at 1% significance level.

Other information used in the analysis includes household's demographic and socio-economic status and housing characteristics. Demographic variables include household size, household composition, the age and sex of the household head. Socio-economic status is captured by the education of the household head, area remoteness and wealth quintiles. The wealth index is given by the first component of a principal component analysis. The inputs follow closely to what have been used in the literature: house

ownership, motor vehicle ownership, white goods (television, telephone, air condition, water heater, fridge, computer) and housing characteristics (roof, wall, floor, water, toilet, main fuel source for cooking). The index is calculated with frequency weight by year before being converted into wealth quintiles.

The last set of variables uses data from PODES. Because PODES is available only in 2011 and 2014, we merged PODES 2011 with SUSENAS 2011-2013 and PODES 2014 with SUSENAS 2015-2016. This assumption is reasonable since infrastructure variables are unlikely to change significantly in a few years. Given that PODES data is recorded at a smaller geographical unit (*kecamatan*) than the geographical unit that can be linked to SUSENAS (*kabupaten*), we take the PODES information into *kabupaten* level. For example, instead of asking whether a facility X is available in *kecamatan* A in *kabupaten* K, we ask whether facility X is available in any of the *kecamatan* in *kabupaten* K. For health facilities, we obtain information about the accessibility of primary health care (health centers and doctors' clinics), secondary care (hospitals) and maternal care (midwives and maternal hospital) in the village. We combine this information with the degree of difficulty in reaching these facilities. This availability/reachability interaction is important because in some Indonesian villages, transport infrastructure is very underdeveloped, limiting the mobility of the local residence to reach the health facility, even if the distance to the health facility is not very far. For primary care, we require at least one provider to be present in the village. For secondary and maternal care, we require at least one that is easily accessed by residents (may not be within the resident's village). The readiness of the health infrastructure is summarised using the first component of a principal component analysis. Villages are then ranked based on their first component, then assigned to quintiles. In a similar way, we construct a village-level development index to capture the quality of the local infrastructure. The inputs include the availability of a post office, modern market, banks, strong telephone signal, asphalt road, garbage collection system, piped water, etc. In any given year, about 85% of households live in villages with above-median infrastructure.

Table 3 reports the summary statistics of some selected control variables by insurance status.[8] Insured households in both periods (treated and C1) are largely similar; although statistically they have different means due to large sample (too powerful tests), the sizes of the differences are economically insignificant. Meanwhile, compared to uninsured households, insured households tend to have more elderly members and live in less developed villages with inferior health infrastructure.[9] These differences highlight the importance of controlling for them in the outcome equation.

Table 3: Selected summary statistics by insurance status and time

	2011-2013			2015-2016		
	Any insurance	Targeted insurance	Uninsured	Any insurance	Targeted insurance	Uninsured
Age of HH head	47.19	47.38	45.21	47.91	48.02	45.99
Male HH head	0.87	0.86	0.90	0.88	0.87	0.89
Wealth Q1	0.22	0.32	0.16	0.18	0.28	0.15
Wealth Q5	0.21	0.05	0.17	0.24	0.08	0.16
# members <5	0.45	0.45	0.45	0.41	0.41	0.43
# members 6-14	0.78	0.82	0.72	0.73	0.78	0.66
# members 60+	0.33	0.35	0.27	0.34	0.36	0.28
Rural	0.50	0.63	0.53	0.47	0.61	0.55
Village Dev Q1	0.05	0.06	0.04	0.04	0.05	0.04
Village Dev Q5	0.31	0.22	0.28	0.32	0.23	0.23
Village health Q1	0.05	0.05	0.03	0.04	0.05	0.04
Village health Q5	0.27	0.21	0.25	0.31	0.26	0.22
N	218,181	135,816	227,583	198,005	111,274	116,085

Note: summary statistics are computed using frequency weight from a sample of non-privately insured households. For wealth and village development and health indices, we only report the bottom and top quintiles but the estimation model includes the remaining quintiles (1 quantile omitted as the base). For household composition, we also include the number of 15-34 year olds and 35-59 year olds. For age of household head, to allow for non-linearity, age enters the estimation model as dummy variables for age brackets: <24 years, 25-39, 40-59, 60+. All differences between 'Any insurance' 2011-2013 and 'Any insurance' 2015-2016 are significant at 1% level (based on two sample mean t-test for continuous variables and chi-squared test of independence for multiple-category variables). Similarly, all differences between 'Any Insurance' and 'Uninsured' in both periods are significant at 1% level.

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[8] The full summary statistics are provided in Appendix B.

[9] Although in any given year, insured and uninsured households within region and urban/rural area have similar characteristics, when these sub-samples were pooled back together, there are variations across sub-samples. In addition, as the covariate balancing exercise was done based on the mono-dimension propensity score, which summarises the influences of various household and village characteristics on the likelihood of receiving treatment, some characteristics have heavier weights than others. As a result, insured and uninsured households may still be different in characteristics that are not so influential to predicting treatment.

4. Results

4.1. Insured households over time

While OLS can provide us with baseline results, hypothesis tests based on normal distribution are likely to be invalid because the total health care expenditure is strictly positive, has wide variance and is highly skewed to the right (Table 2A). Thus, the generalized linear model (GLM) with logarithmic link and variance following the gamma distribution is used.[10] Table 4 reports both OLS and GLM estimates for comparison.

Table 4 column [1] presents a simple model without any control variable. The difference in mean total health care expenditure of insured households pre- and post-JKN is estimated to be Rp.98,544. In column [2], we add household characteristics as covariates and the estimated difference drops to Rp.85,201. In column [3], we add further village characteristics as covariates and the estimated difference drops further slightly to Rp.84,304. Columns [4]–[7] present the result from matched sample. Only a few households do not find common support, which is not surprising, since the control sample (C1) includes only households with previous social health insurance schemes. Under the difference estimator, JKN increases total health care expenditure by 36% from its pre-JKN mean on average (Rp.84,304/Rp.231,484).

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[10] This specification is commonly used for modelling health cost. Suppose the relationship between outcome and all predictors can be written as $Y = X\beta + \varepsilon$. The link function characterises how linear combination of predictors is related to prediction on original scale. With logarithmic link, $\hat{Y} = \exp(X\beta)$. Under the gamma distribution, the variance is proportional to the square of the mean. We confirmed this specification using Pregibon link test and Pearson's correlation test using predicted total health care expenditure and its residuals.

Table 4: The impact of JKN on insured households from difference estimator (Control group C1)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
OLS	98,544***	69,978***	70,453***	98,544***	69,978***	69,975***	70,449***
	(16.78)	(12.05)	(11.99)	(16.78)	(12.05)	(12.05)	(11.98)
GLM	98,544***	85,201***	84,304***	98,544***	85,201***	85,198***	84,300***
	(16.78)	(16.56)	(16.64)	(16.78)	(16.56)	(16.56)	(16.64)
Matched on HH	x	x	x	√	√	√	√
Matched on HH and Village	x	x	x	x	X	√	√
HH control	x	√	√	x	√	√	√
Village control	x	x	√	x	X	x	√
N	416,186	416,186	416,186	416,186	416,186	416,175	416,175

Note: C1 consists only of households with any form of social health insurance. Household characteristics include age, sex and education of household head, household composition and wealth quintiles. Village characteristics include urban/rural status, village development quintiles, health infrastructure quintiles and provincial dummy variables. Frequency weights are used in estimation. Health care costs are in 2016 Rupiah. For GLM, marginal effects are reported. Reduction in sample size is due to households that lie outside the common support. *** denotes statistical significance at 1% significance level.

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Table 5 replicates Table 4 for the part of JKN that is targeted for the poor. Those with social health insurance but not the targeted insurance for the poor are excluded, so the sample only consists of households with targeted insurance and households without any insurance. Controlling for both household and village characteristics, JKN increases total health care expenditure by 24% on average (Rp.36,815/Rp.153,201). However, these estimates are likely to be overly optimistic as they ignore the fact that total health care expenditure in general has increased.

Table 5: The impact of JKN on households with targeted insurance from difference estimator (Control group C1)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
OLS	50,863***	28,071***	25,079***	50,863***	28,072***	28,085***	25,090***
	(10.53)	(5.71)	(4.97)	(10.53)	(5.71)	(5.71)	(4.97)
GLM	50,863***	38,878***	36,760***	50,863***	38,879***	38,935***	36,815***
	(10.53)	(9.42)	(8.83)	(10.53)	(9.42)	(9.43)	(8.84)
Matched on HH	x	x	x	√	√	√	√
Matched on HH and Village	x	x	x	x	X	√	√
HH control	x	√	√	x	√	√	√
Village control	x	x	√	x	X	x	√
N	247,090	247,090	247,090	247,089	247,089	247,076	247,076

Note: see note under Table 4.

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4.2. Insured vs. uninsured households over time

Table 6 reports the JKN's impact with C2, which includes uninsured households. In the simplest specification column [1], the estimate is just over Rp.60,000, which is almost 40% smaller than that predicted by the corresponding difference estimator (Table 4). Controlling for general change, the impact of JKN is to increase total health care expenditure of insured households by Rp.23,441 on average or 10.1% of the mean total health care expenditure pre-JKN. Comparing estimates with and without village controls (column [2] vs. [3] and column [6] vs. [7]), we find that failing to account for the variations in village characteristics and health infrastructure tends to result in overestimation of the JKN's impact. This suggests that good infrastructure and unobserved factors like taste for health products and preferences are positively correlated.

Table 6: The impact of JKN on insured households from difference-in-difference estimator (Control group C2)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
OLS	60,350***	42,389***	38,252***	60,391***	42,397***	42,381***	38,250***
	(7.50)	(5.33)	(4.79)	(7.50)	(5.33)	(5.33)	(4.79)
GLM	61,499***	29,501***	23,441***	61,545***	29,504***	29,518***	23,463***
	(7.59)	(4.18)	(3.39)	(7.59)	(4.18)	(4.18)	(3.38)
Matched on HH	X	x	x	√	X	√	√
Matched on HH and Village	X	x	x	x	X	√	√
HH control	X	√	√	x	√	√	√
Village control	X	x	√	x	X	x	√
N	759,854	759,854	759,854	759,811	759,811	759,801	759,801

Note: C2 includes uninsured households. Marginal effects and standard error for the difference-in-difference coefficient under GLM is computed using non-linear prediction command in STATA. *** denotes statistical significance at 1% significance level. For covariates, see note under Table 4.

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Table 7 reports the results for the part of JKN that is targeted for the poor. Recall that, pre-JKN, this group of households always lower conditional total mean health care cost than uninsured households (Table 2B). In the simplest model, total health care expenditure increases by Rp.12,585 on average or 8% of the mean total health care expenditure pre-JKN. However, this increase can be explained by increases in wealth among beneficiary households. After controlling for wealth and other observable factors, we find no significant evidence that JKN has increased total health care expenditure of its beneficiaries. In the next two sub-sections, we will see whether JKN has larger positive impact in certain parts of the total health care expenditure distribution.

Table 7: The impact of JKN on households with targeted insurance from difference-in-difference estimator (Control group C2)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
OLS	12,668*	-5,491	-12,692*	12,706*	-5,420	-5,485	-12,658*
	(1.73)	(-0.76)	(-1.74)	(1.74)	(-0.75)	(-0.76)	(-1.73)
GLM	12,547*	-733	-7,096	12,585	-686	-709	-7,049
	(1.69)	(0.13)	(-1.17)	(1.69)*	(-0.12)	(-0.12)	(-1.16)
Matched on HH	X	x	x	√	√	√	√
Matched on HH and Village	X	x	x	x	X	√	√
HH control	X	√	√	x	√	√	√
Village control	x	x	√	x	X	x	√
N	590,758	590,758	590,758	590,615	590,615	590,660	590,660

Note: see note under Table 6. * denotes statistical significance at 10% significance level.

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4.3 Sub-sample analyses

Table 8 reports the results with household and village controls from several sub-samples: urban, rural, households with children (under 15 years), households with elderly (60 years and over) and households without children and elderly. The upper panel concerns JKN program as a whole. We find that JKN's impact is concentrated in urban areas: JKN increases total health care expenditure of insured households by about 16% from its pre-JKN mean (Rp.270,053). We find no significant impact in rural sample. On the one hand, differential impact by remoteness maybe explained by differences in health knowledge (e.g., initiative for regular health check-up and preventive care) and disease profile across areas (e.g., the prevalence of chronic diseases is higher in urban areas) that urban householders may be more likely to seek (more expensive) health treatment. However, on the other hand, this result may also be affected by severe underestimation of total health care expenditure of by insured households in rural areas. Disaggregating the sample by dependency status, the largest impact of JKN is found among households without children and elderly members. This may hint that there is a scope to encourage more utilisation by elderly members, who are increasingly susceptible to age-related health problems.

Table 8: The impact of JKN from difference-in-difference estimator for selected samples

	Urban	Rural	Household with children	Household with elderly	Household without children and elderly
Any insurance					
OLS	60,529***	9,875	22,878***	30,886	64,356***
	(4.20)	(1.32)	(2.86)	(1.51)	(2.63)
GLM	44,482***	4,545	15,756**	12,540	34,623**
	(3.90)	(0.72)	(2.19)	(1.04)	(2.01)
N	320,400	439,454	538,420	189,941	119,042
Targeted insurance					
OLS	-6,616	-18,889**	-11,525	-20,450	-25,124
	(-0.47)	(-2.54)	(-1.54)	(-1.13)	(-1.01)
GLM	2,195	-12,758**	-5,722	-7,329	-26,795
	(0.18)	(-2.16)	(-0.93)	(-0.50)	(-1.31)
N	217,467	373,291	423,371	146,972	88,813

Note: in all cases, the regression models include household and village controls. ** and *** indicate statistical significance at 5 and 1%, respectively. We use full sample because the matched sample is almost identical to the full sample.

In the lower panel of Table 8, we report the results for JKN that is targeted for the poor. At the mean, there is no significant impact in the urban sample but negative impact in the rural sample. This result may also be affected by underappraisal of total health care expenditure by beneficiary households. Meanwhile, for the subsample analysis by dependency status, the estimates lack precision with large standard errors. All in all, with the limitations of self-report data, there is no strong evidence that targeted insurance has increased total health care expenditure of its beneficiaries at the mean.

Table 9 reveals that the impact of JKN is driven by 10-12% of households which experienced at least one inpatient episode in the past twelve months. This may capture JKN's usage by those with high health care needs. Although at the mean, the impacts are not statistically significant after controlling for household and village factors, the size of the estimated impacts is quite large.

Table 9: The impact of JKN from difference-in-difference estimator for hospitalised population

	No inpatient episode			Had inpatient episode		
	[1]	[2]	[3]	[1]	[2]	[3]
Any insurance						
OLS	13,627***	7,767**	5,450	220,363***	115,148*	66,843
	(3.74)	(2.14)	(1.50)	(3.21)	(1.72)	(1.01)
GLM	13,823***	4,017	1,445	234,487***	90,780*	51,649
	(3.74)	(1.42)	(0.49)	(3.22)	(1.69)	(1.02)
N	667,642	667,642	667,642	92,212	92,212	92,212
Targeted insurance						
OLS	8,579***	2,700	145	218,524***	82,125	15,659
	(2.53)	(0.79)	(0.04)	(3.25)	(1.26)	(0.24)
GLM	8,823***	2,230	-469	252,599***	21,807	-24,168
	(2.51)	(0.81)	(0.17)	(3.33)	(0.50)	(0.42)
HH control	x	√	√	x	√	√
Village control	x	x	√	x	X	√
N	528,397	528,397	528,397	62,361	62,361	62,361

Note: *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. We use full sample because the matched sample is almost identical to the full sample.

4.4. Quantile regression

Going beyond mean estimates, Table 10 reports the results from quantile regressions every 10th percentile with household and village controls. For convenience, we also reproduce the GLM results in Tables 6 and 7 which give estimates at the mean. We find that JKN has positive impacts throughout the total health care expenditure distribution. At the lowest percentile (p10), JKN increases total health care expenditure by Rp.849, or about 9% of its pre-JKN level. JKN's impact then increases steadily with total health care expenditure, reaching Rp.161,213 at the 90th percentile. Larger JKN's impact at high total health care expenditure is consistent with the sub-sample result by inpatient utilisation in Table 9, suggesting that insurance was used by those with high health care needs, such as those requiring inpatient treatment or complex medical procedure and frequent users of health services. For targeted insurance, we find significant positive impacts at the 10th to 30th percentiles, although the sizes of these impacts are very small (i.e., not economically meaningful), as well as the upper half of the total health care expenditure distribution.

Table 10: The impact of JKN from quantile regressions

	Mean	p10	p20	p30	p40	p50	p60	p70	p80	p90
Any insurance										
Impact	23,463***	849***	1,591***	2,507***	3,664***	5,643***	9,328***	18,607***	48,707***	161,213***
(SE)	(7,050)	(101)	(133)	(189)	(267)	(385)	(591)	(1,210)	(2,649)	(9,096)
Pre-JKN level	231,484	9,617	13,623	19,126	26,182	36,589	49,894	72,347	120,206	288,006
Targeted insurance										
Impact	-7,049	528***	305**	285	239	808**	1,903***	3,962***	11,764***	25,076***
(SE)	(5,991)	(87)	(135)	(193)	(277)	(375)	(555)	(906)	(1,839)	(7,106)
Pre-JKN level	153,201	8,727	12,474	16,028	21,637	29,271	39,915	54,884	83,989	177,167

Note: ** and *** indicate statistical significance at 5 and 1%, respectively. All models include household and village variables as covariates. Population frequency weights are used in estimation. Standard errors are bootstrapped standard errors with 100 repetitions. The sample size for 'Any insurance' regression is 759,801 and the sample size for 'Targeted insurance' is 590,660. The 'Mean' column reproduces GLM results in Table 6 and 7 column [7].

In Figure 2, we plot the 95% confidence interval of the quantile regression estimates in terms of their relative sizes to the corresponding total health care expenditure level in the pre-JKN period. We also plot the 95% confidence interval of the mean estimates which is constant across percentiles. For the general JKN, impacts at the top of the total health care expenditure distribution, particularly beyond the 60th percentile, lie outside the upper bound of the 95% confidence interval of the mean estimate. At the 90th percentile, the relative size of the estimated impact is to increase total health care expenditure by about 56% from its pre-JKN level. For the part of JKN that is targeted for the poor, the estimated impacts lie outside the 95% confidence interval of the mean estimate for total health care expenditure above the 70th percentile. The top 20% of households with the highest total health care expenditure find their total health care expenditure increases by 14%. All of these results indicate that analysis that only looks at the mean estimate neglects significant impact heterogeneity according to the level of the total health care expenditure.

Figure 2: JKN's impact from quantile regressions as a percentage of pre-JKN total health care expenditure
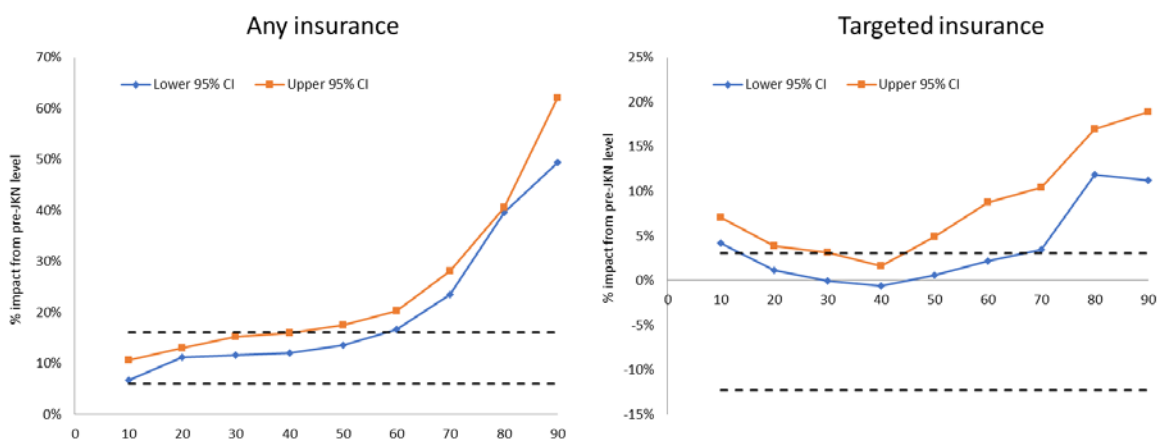
Note: this figure corresponds to quantile regression results in Table 10. Each marker is the lower and upper bound of the 95% bootstrapped confidence interval of quantile regression coefficient at that percentile over the corresponding total health care expenditure for insured (or targeted insured) households in the pre-JKN period. The dashed line plots the 95% confidence interval of the GLM estimates.

6. Discussion

When universal coverage is achieved, *Jaminan Kesehatan Nasional* (JKN) will be the largest social health insurance in the world, providing health coverage to over 257 million individuals. In this paper, we have evaluated the impact of JKN in its first two years of implementation on the total health care expenditure of its members. It is found that JKN has had a significant positive impact on total health care expenditure, increasing it by 10% on average. Quantile analysis further finds that the impact of

JKN is concentrated at the upper part of the total health care expenditure distribution, specifically beyond the 70th percentile (i.e., 30% of households with the highest total health are cost), where people tend to have high health care needs. For the top 10% of households with the highest total health care expenditure, JKN increases the total health care expenditure by a large 56% from its pre-JKN's level. This increasing impact at the upper half of the total health care expenditure distribution is consistent with the sub-sample result, in which relatively larger impact is found among households which had at least one inpatient treatment during the twelve months. For targeted insurance for the poor, we do not find any strong evidence that it increases total health care expenditure at the mean. However, there is evidence that JKN has positive impacts at the upper part of the total health care expenditure distribution (beyond the 70th percentile), increasing total health care expenditure by about 14% from its pre-JKN levels.

Our finding is consistent with macro data on government spending on health care (PPJK Ministry of Health and the University of Indonesia, 2016). In 2010, the government paid 31% of the total health care expenditure, but after the introduction of JKN in 2014, the government share increased to 41.4%. The social health insurance component of the government health spending increased from 4.9% in 2010 to 13% in 2014. From 2013 to 2014 alone, the social health insurance share nearly doubled from 7.4% to 13%, with a nominal value of around Rp.23 trillion.

A caveat in our result is that the total health care expenditure series is measured with errors and is likely to understate the true cost of health services. Furthermore, the measurement errors may be larger in the post-JKN period, because the survey has extended the reference period of health care utilisation. For instance, from the macro data above, in 2014, with JKN's membership at 133.4 million persons, the implied government contribution during the year was Rp.195,000 per person. In SUSENAS 2014, the mean quarterly total health care expenditure (non-zero) at the household-level was Rp.321,450. Interpolating this figure to annual level, and using the sample household size of 4, we get an annual total health care expenditure of Rp.321,450 per person. With a public-private split of 40:60, the implied government contribution in SUSENAS per person is Rp.128,580, which is only 66% of that implied from the macro data. This rough assessment may suggest that, if there is a bias in our result, it is likely to be an underestimation and the impact of JKN could potentially be larger than what we have estimated. Another issue that we lack information in is in relation to "genuine" health care need. With generous benefit packages, JKN may create opportunistic behaviours among its members to over-use medical services for example doing multiple health screenings and registering for cosmetic procedures.

References

Hidayat, B., Thabrany, H., Dong, H. et al. 2004. The effects of mandatory health insurance on equity in access to outpatient care in Indonesia. *Health Policy and Planning* 19(5), pp.322-335.

Indonesian Academy of Sciences and National Research Council. 2013. *The Indonesian Health Care System*: *Reducing Maternal and Neonatal Mortality in Indonesia: Saving Lives, Saving the Future.* National Academies Press. Washington D.C., United States. Retrieved from: https://www.ncbi.nlm.nih.gov/books/NBK201708/

Johar, M. 2009. The Impact of the Indonesian Health Card Program: A Matching Estimator Approach. Journal of Health Economics 28 (1), pp.35–53.

Johar, M., Soewondo, P., Adji, A., et al. 2017. In data we trust? Evaluation of Indonesia's National Socio-Economic Survey data. National Team for the Acceleration of Poverty Reduction (TNP2K), Jakarta, Indonesia.

Lagarde, M., Haines, A., Palmer, N. 2009. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries. *The Cochrane Library*.

Liu, D., Tsegai, D., Litaker, D., von Braun, J. 2015. Under regional characteristics of rural China: a clearer view on the performance of the New Rural Cooperative Medical Scheme. *International Journal of Health Economics and Management* 15(4), pp.407-431.

Mahendradhata, Y., Trisnantoro, L., Listyadewi, S. 2017. The Republic of Indonesia Health System Review. *Health Systems in Transition* 7(1). Asia Pacific Observatory on Health Systems and Policies. Retrieved from: http://apps.who.int/iris/bitstream/10665/254716/1/9789290225164-eng.pdf

Mishra, S. C. 2009. Economic Inequality in Indonesia: Trends, Causes, and Policy Response. Strategic Asia. Retrieved from http://www.strategic-asia.com/pdf/Economic%20Inequality%20in%20Indonesia%20Trends,%20Causes,%20and%20Policy%20Response%20-%20March%202009.pdf

Nugraha, K., Lewis, P. 2013. Towards a better measure of income inequality in Indonesia. Bulletin of Indonesia Economic Studies 49(1), pp.103-112.

Nguyen, C.V., 2012. The impact of voluntary health insurance on health care utilization and out-of-pocket payments: New evidence for Vietnam. *Health economics* 21(8), pp.946-966.

Pradhan, M., Prescott, N. 2002. Social risk management options for medical care in Indonesia. *Health Economics* 11, pp.431–446.

PPJK (*Pusat Pembiayaan dan Jaminan Kesehatan*) Ministry of Health and the University of Indonesia. 2016. Fact Sheet: NHA 2010-2014 & Potret Belanja Kemenkes 2013-2015. (in Indonesian). University of Indonesia publication, Indonesia.

Sparrow, R., Suryahadi, A., Widyanti, W. 2013. Social health insurance for the poor: Targeting and impact of Indonesia's Askeskin programme. *Social science & medicine* 96, pp.264-271.

Trujillo, A.J., Portillo, J.E., Vernon, J.A. 2005. The impact of subsidized health insurance for the poor: evaluating the Colombian experience using propensity score matching. *International journal of health care finance and economics* 5(3), pp.211-239.

Vidyattama, Y., Miranti, R., Resosudarmo, B.P. 2014. The role of health insurance membership in health service utilisation in Indonesia. *Bulletin of Indonesian Economic Studies* 50(3), pp.393-413.

Wagstaff, A., Lindelow, M., Jun, G. et al. 2009. Extending health insurance to the rural population: an impact evaluation of China's new cooperative medical scheme. *Journal of health economics* 28(1), pp.1-19.

Wang, W., Temsah, G., Mallick, L. 2017. The impact of health insurance on maternal health care utilization: evidence from Ghana, Indonesia and Rwanda. *Health Policy and Planning* 32(3), pp.366-375.

The World Bank, The World Bank in Indonesia. 2017a. *Indonesia Overview*. Retrieved from: http://www.worldbank.org/en/country/indonesia/overview

The World Bank, Data. 2017b. *Life expectancy at birth, total (years)*. Retrieved from: http://data.worldbank.org/indicator/SP.DYN.LE00.IN

The World Bank. 2016. Indonesia health financing system assessment: Spend more, right and better. Retrieved from http://pubdocs.worldbank.org/en/633911492102648134/112931-WP-Policy-Note-HFSA-Indonesia-Published.pdf

World Health Organization. 2006. Macroeconomics and health initiatives in Indonesia. Retrieved from: http://who.int/macrohealth/action/Indonesia_finalreport.pdf?ua=1

Appendix A

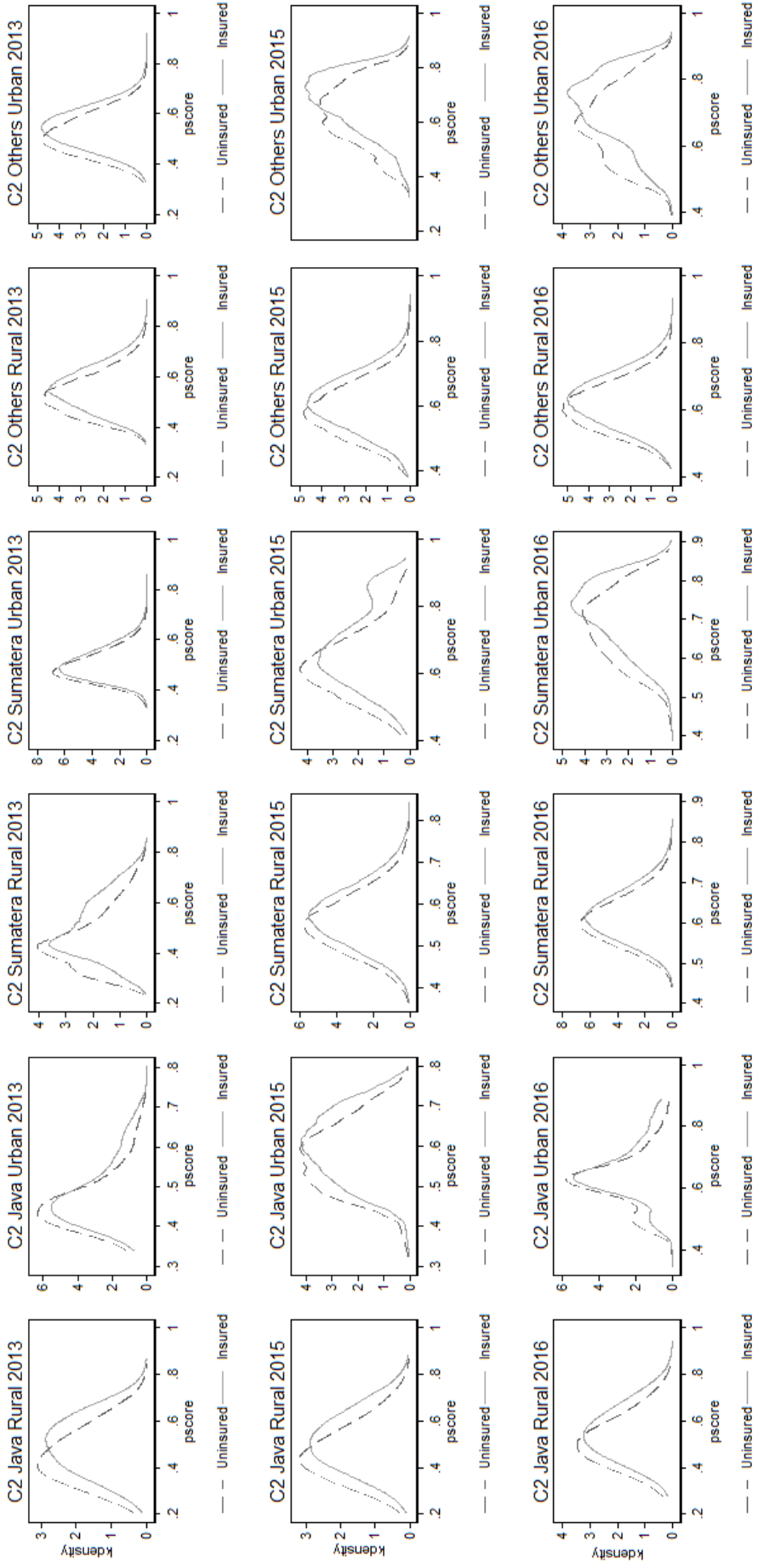Kernel density plots of propensity scores of receiving treatment by sub-sample
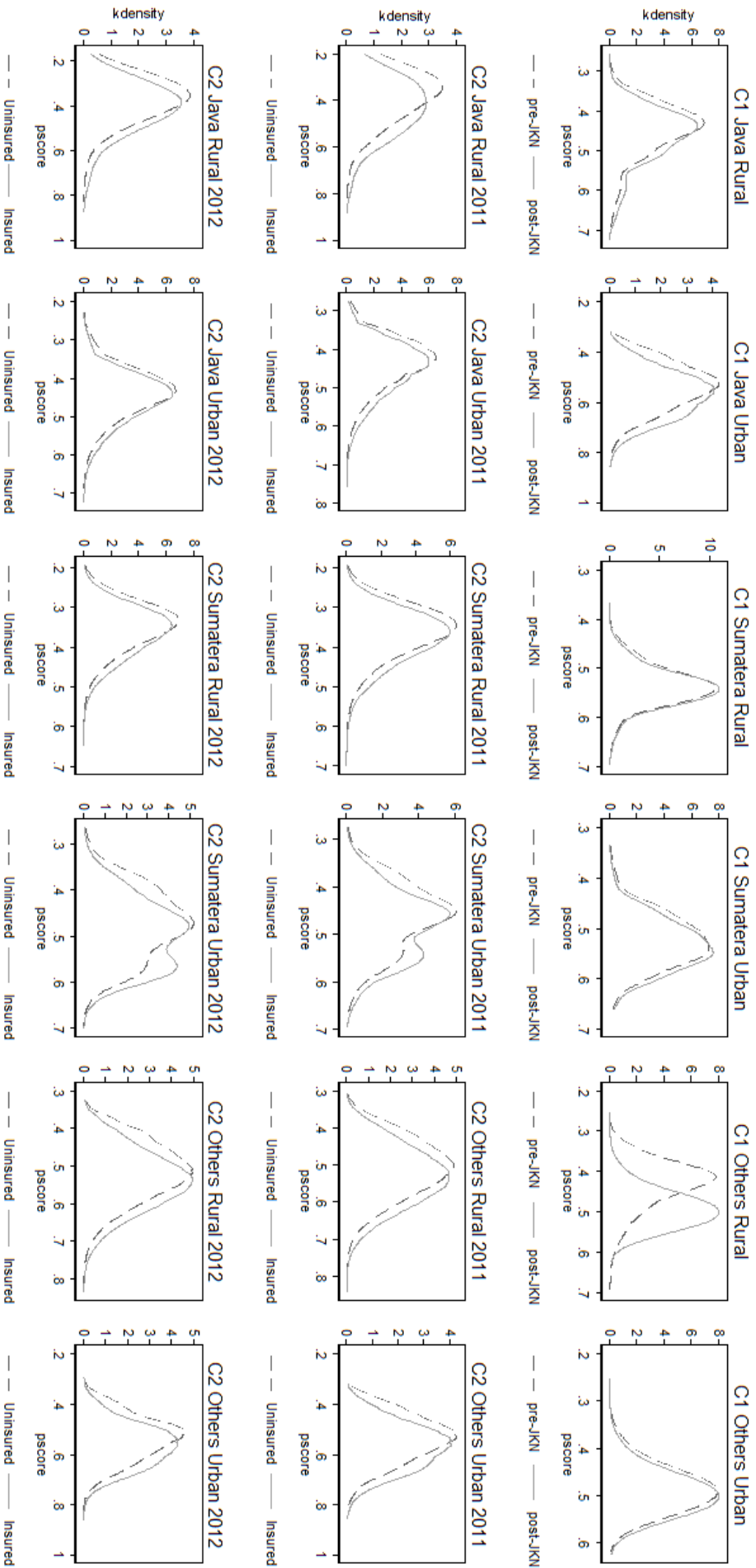
Appendix A (continued)

Note: kernel weights are given by epanechnikov with bandwith of 0.02. C1 refers to control group 1 which is insured households in the pre-JKN period. C2 refers to control group 2 which includes uninsured households. 'pscore' denotes the estimated propensity score using logit model with covariates as listed in Appendix B, except for provincial dummies. Province effects are accommodated through sub-samples: (i) Sumatra: Aceh to Kepulauan Riau; (ii) Java: DKI Jakarta to Nusa Tenggara Timur; and (iii) Others: Kalimantan Barat to Papua.

Appendix B

Summary statistics of all variables used in analysis

	2011-2013			2015-2016		
	JKN	PBI	Uninsured	JKN	PBI	Uninsured
Age of HH head	47.19	47.38	45.21	47.91	48.02	45.99
Male HH head	0.87	0.86	0.90	0.88	0.87	0.89
Wealth Q1	0.22	0.32	0.16	0.18	0.28	0.15
Wealth Q2	0.21	0.28	0.21	0.19	0.26	0.21
Wealth Q3	0.19	0.22	0.23	0.19	0.22	0.24
Wealth Q4	0.18	0.13	0.23	0.20	0.16	0.24
Wealth Q5	0.21	0.05	0.17	0.24	0.08	0.16
No education	0.26	0.35	0.24	0.20	0.28	0.21
Primary (SD/SMP)	0.44	0.52	0.52	0.44	0.53	0.53
Secondary (SMA)	0.22	0.11	0.20	0.25	0.16	0.22
Higher (Tertiary)	0.09	0.01	0.04	0.11	0.02	0.04
Farming	0.17	0.23	0.19	0.15	0.21	0.19
# members aged <5	0.45	0.45	0.45	0.41	0.41	0.43
# members aged 6-14	0.78	0.82	0.72	0.73	0.78	0.66
# members aged 15-34	1.30	1.27	1.28	1.28	1.29	1.23
# members aged 35-59	1.23	1.20	1.18	1.27	1.25	1.18
# members aged 60+	0.33	0.35	0.27	0.34	0.36	0.28
Rural	0.50	0.63	0.53	0.47	0.61	0.55
Village Dev Q1	0.05	0.06	0.04	0.04	0.05	0.04
Village Dev Q2	0.11	0.12	0.10	0.10	0.11	0.10
Village Dev Q3	0.16	0.19	0.17	0.18	0.22	0.22
Village Dev Q4	0.38	0.41	0.41	0.35	0.38	0.42
Village Dev Q5	0.31	0.22	0.28	0.32	0.23	0.23
Village health Q1	0.05	0.05	0.03	0.04	0.05	0.04
Village health Q2	0.12	0.15	0.10	0.11	0.14	0.10
Village health Q3	0.18	0.20	0.21	0.17	0.19	0.21
Village health Q4	0.38	0.39	0.40	0.36	0.37	0.43
Village health Q5	0.27	0.21	0.25	0.31	0.26	0.22

Appendix (continued)

	2011-2013			2015-2016		
	JKN	PBI	Uninsured	JKN	PBI	Uninsured
Aceh	0.033	0.044	0.005	0.032	0.039	0.004
Sumatera Utara	0.032	0.025	0.050	0.040	0.028	0.054
Sumatera Barat	0.018	0.017	0.020	0.019	0.016	0.018
Riau	0.018	0.013	0.023	0.023	0.024	0.025
Jambi	0.008	0.007	0.017	0.009	0.006	0.019
Sumatera Selatan	0.026	0.028	0.034	0.050	0.079	0.011
Bengkulu	0.007	0.007	0.008	0.007	0.006	0.009
Lampung	0.030	0.036	0.039	0.027	0.028	0.043
Bangka Belitung	0.005	0.006	0.004	0.006	0.006	0.007
Kepulauan Riau	0.007	0.003	0.005	0.008	0.004	0.005
DKI Jakarta	0.028	0.006	0.047	0.048	0.026	0.031
Jawa Barat	0.195	0.181	0.207	0.182	0.150	0.219
Jawa Tengah	0.158	0.176	0.142	0.144	0.168	0.142
DI Yogyakarta	0.020	0.021	0.011	0.020	0.023	0.007
Jawa Timur	0.149	0.155	0.193	0.136	0.129	0.204
Banten	0.048	0.038	0.043	0.045	0.030	0.051
Bali	0.017	0.021	0.007	0.025	0.039	0.005
Nusa Tenggara Barat	0.027	0.036	0.019	0.020	0.026	0.022
Nusa Tenggara Timur	0.025	0.034	0.007	0.015	0.017	0.009
Kalimantan Barat	0.015	0.016	0.022	0.013	0.009	0.029
Kalimantan Tengah	0.009	0.007	0.011	0.008	0.006	0.011
Kalimantan Selatan	0.016	0.012	0.018	0.019	0.023	0.015
Kalimantan Timur	0.018	0.015	0.008	0.019	0.019	0.009
Sulawesi Utara	0.008	0.007	0.010	0.009	0.007	0.008
Sulawesi Tengah	0.011	0.012	0.010	0.011	0.012	0.009
Sulawesi Selatan	0.032	0.036	0.017	0.030	0.037	0.015
Sulawesi Tenggara	0.011	0.012	0.005	0.007	0.008	0.005
Gorontalo	0.006	0.008	0.003	0.005	0.006	0.002
Sulawesi Barat	0.005	0.005	0.003	0.005	0.005	0.002
Maluku	0.005	0.004	0.003	0.003	0.003	0.003
Maluku Utara	0.003	0.003	0.002	0.004	0.005	0.003
Papua Barat	0.003	0.003	0.001	0.003	0.004	0.001
Papua	0.007	0.007	0.004	0.007	0.010	0.003
N	218,181	135,816	227,583	198,005	111,274	116,085

Note: summary statistics are computed using frequency weight from a sample of non-privately insured households. All differences between 'Any insurance' 2011-2013 and 'Any insurance' 2015-2016 are significant at 1% level (based on two sample mean t-test for continuous variables and chi-squared test of independence for multiple-category variables). Similarly, all differences between 'Any Insurance' and 'Uninsured' in both periods are significant at 1% level.

Social health insurance in Indonesia dates from the 1990s but recently in 2014, the government announced its ambition to achieve universal coverage within five years. Jaminan Kesehatan Nasional (JKN) integrates all existing social health insurance schemes under one manager and one payer, the central Ministry of Health. Compared to previous schemes, JKN offers more generous benefits and can be accepted at both public and private facilities. The purpose of this study is to evaluate the impact of JKN on the total cost of health care. The data is derived from the national socio-economic survey in years 2011-2016, supplemented with village-level facility data. We find that JKN has a positive impact on total health care expenditure, increasing it by about 10% on average. The impact is much larger at the top of the total health care expenditure distribution, where health care needs tend to be higher. The part of JKN that is targeted for the poor also has positive impacts at the upper 20% of the total health care expenditure distribution. Future challenges therefore will be to control cost and manage supply to be able to sustain the demand expansion.