

**IN DATA WE TRUST?
AN ANALYSIS OF INDONESIAN
SOCIO-ECONOMIC SURVEY DATA**

**Meliyanni Johar, Prastuti Soewondo, Ardi Adji,
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In Data We Trust?

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ABSTRACT

What if a popular data set that has generated a long stream of literature has been misunderstood and has led to misleading inferences? In this paper, we use the case of household expenditure in the Indonesian National Socio-Economic Survey data, SUSENAS, which started over 50 years ago. Appropriate use of SUSENAS for policy analysis requires an understanding that the expenditure variable in SUSENAS does not measure a household's out-of-pocket expenditure, because it includes the approximated value of any subsidy received by the household in obtaining goods and services. Inferences about private expenditure and income, which are often derived from the expenditure variable, need to be carefully considered. We also draw attention to an abrupt change in survey instrument in SUSENAS 2014 onwards that extends the reference period of several expenditure items. Using health items as a case study, we demonstrate that this change generates movement in health expenditure that can be misinterpreted as a result of a major national health insurance reform introduced in the same year to lower households' health care burden. Accordingly, we propose a way to account for this synthetic movement in the health expenditure variable.

Keywords: survey data; Indonesia; health policy

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1. Introduction

Indonesia has only one nationally representative data set on socio-economic conditions called *Survei Sosial Ekonomi Nasional* (SUSENAS). SUSENAS is collected by *Badan Pusat Statistik* (Statistics Indonesia) since 1963. It is a repeated cross-section data every year or two covering all Indonesian provinces. The first wave of SUSENAS involved 14,670 households, but since 2011, its sample size has grown to some 300,000 households and 1.1 million household members. Frequency weights are provided which give counts that reflect the nation's true population. In 2007, a subset of SUSENAS households (about 27%) was followed for a year to study poverty within a relatively small geographic area (*kabupaten*). SUSENAS can be linked to various Indonesian data sets, such as *Potensi Desa* (PODES) at district (*kabupaten*) level, *Riset Kesehatan Dasar* (RISKESDAS) and *Survei Angkatan Kerja Nasional* (SAKERNAS) at group-level (e.g., age-sex group) to give a richer picture of the life of Indonesian households. As such, SUSENAS has been widely used by national and international researchers to answer various research questions, including income inequality (Sidique et al., 2014; Nugraha and Lewis, 2013; Sumarto et al. 2007; Asra, 2000; Cameron, 2000; Akita et al., 1999; Akita and Lukman, 1995), health care behaviours (Sparrow et al., 2014; Van Doorslaer et al., 2010; Kruse et al., 2012; Pradhan and Prescott, 2002), education outcomes (Suryadama, 2012; Akita and Miyata, 2008; Sparrow 2007; Thomas et al., 2004), fertility choice (Grimm et al., 2015; Kim 2010), labour market outcomes (Pasay et al., 2011; Comola and De Mello, 2011; Bird and Manning, 2008), as well as policy evaluation studies (Sparrow et al., 2013; Nugraha and Lewis, 2013; Sumarto et al., 2007; Van Doorslaer et al., 2006; Sumarto et al., 2005; Levinshon et al., 2003; Waters et al., 2003).

The purpose of this paper is to highlight two major shortcomings of the expenditure variable in SUSENAS which makes SUSENAS unsuitable for studies on household expenditure and income. These shortcomings have not been noted by policymakers and researchers, who when making inferences about household expenditure, are using SUSENAS. First, we discuss that the expenditure variable in SUSENAS does not actually measure private expenditure by households, because this variable includes the approximated value of any subsidy that households received in obtaining goods and services. Instead, the SUSENAS's expenditure may capture *total* expenditure, financed by households' out-of-pocket and/or other payers, including government subsidies. Second, we draw attention to an abrupt change in the reference period of several expenditure items in SUSENAS 2015 onwards that may confound analysis of expenditure trend. We use health items as a case study, in which the abrupt change in the reference period creates movement in health expenditure that can be misinterpreted as the impact of a major health policy introduced in 2014 to reduce households' health care burden.

2. Expenditure in SUSENAS

Buku Pengeluaran (expenditure book) in SUSENAS asks each household's representative: "How much did the household spend on [item] in the past [reference period]?"¹ For food items, the reference period is the past 7 days. For non-food items, there are variations in the reference period in the last few waves of SUSENAS. Up to 2014, expenditures on all non-food items are available for each month in the past three months. In contrast, in SUSENAS 2015-2016, some items have a reference period of a month while others have a reference period of a year. Previous month's expenditures are available for rent payments, utilities, fuels for cooking and vehicles, telephone bills, internet bills, hygienic products, newspapers and salaries of domestic workers. Meanwhile, durable goods, home renovation costs, insurance premiums and taxes, clothing expenses, health goods and services, motor vehicle service costs, postage, party and ceremonial supplies and the costs of running own generator at home have a reference period of twelve months.

Although the questionnaire asks "How much did you spend?", the values recorded in the data are not purely private spending. For instance, if a household did not pay for, say, its gas bill because of government subsidy, then the interviewer would prompt the respondent to estimate the cost of the gas bill if he/she had to pay. Similarly, if the household received free rice, the value of the rice would also be estimated by the respondent. In general, if a household was able to postpone or avoid paying for goods or services, the replacement cost, which is the value of any subsidy estimated by the respondent with the help of the interviewer, would be added to the household's private expenditure. In the case of an item bought by credit, the full purchase price of the item was recorded. Replacement cost has been used in all SUSENAS waves but this has not been previously documented.² The observed expenditure in SUSENAS, therefore, is the *total* expenditure, equal to a household's private out-of-pocket plus any replacement cost. This is the first misunderstanding surrounding the expenditure variable in SUSENAS, in that it does not measure households' private expenditure. Previous studies that have misinterpreted the expenditure variable in SUSENAS as households' private expenditure are likely to overestimate the purchasing power of these households, especially the purchasing power of low-income households who are likely to receive various kinds of economic assistances. This argument extends to the creation of an income variable from the expenditure variable. Because self-reported income is often unreliable (e.g.,

¹ There is no explicit writing on the SUSENAS's *Keterangan Konsumsi/ Pengeluaran Makanan dan Bukan Makanan, Dan Pendapatan/ Penerimaan Rumah Tangga* module (Indonesian version) about how the interviewer asks each expenditure question to household respondents. However, there are titles to each section in the booklet (e.g., *Pengeluaran Untuk Barang-Barang Bukan Makanan Selama Sebulan dan Setahun Terakhir (Dalam Rupiah)*) with the health spending located in BLOK IV.2), which can be translated like this in English.

² Unfortunately, there is no indicator as to which item(s) include a replacement cost. There is some information about the use of credit in earlier SUSENAS waves but it is insufficient to identify the size of the credit for each item.

due to underreporting), income is typically proxied by the sum of expenditures on all items. Since SUSENAS's expenditure contains subsidies, however, households may appear to have high income when some parts of this income were actually subsidies.

To examine the reliability of the income variable derived from the sum of all expenditures in SUSENAS, we compare it against another measure of households' economic power, wealth. To measure wealth, we summarise a household's possession of motor vehicles, house and other valuable goods and housing characteristics (e.g., type of flooring and roofing, utility connections, etc) as wealth indicators using a principle component analysis. For each year, income and wealth quintiles are created. Households are ranked according to their income, weighted by the population frequency weight, then divided into quintiles. Income quintile 1 represents 20% of income-poorest households and income quintile 5 represents 20% of income-richest households. In a similar manner, households are ranked according to their wealth index, weighted by population frequency weight, then divided into quintiles. Wealth quintile 1 represents 20% of the least wealthy households and wealth quintile 5 represents 20% of the wealthiest households.

Table 1 cross-tabulates the quintiles of income and wealth. We use the last six waves of SUSENAS in years 2011-2016. The diagonal entries in Table 1 give the proportion of households in a given income quintile that belong to the same quintile of wealth. For instance, 46.19% of households in income quintile 1 (bottom 20% of the income distribution) also belong to the first quintile of wealth (bottom 20% of the wealth distribution). This indicates that a large proportion of households that are poor in income are also poor in wealth. Likewise, 58.46% of households with the highest income (top 20% of the income distribution) are also the wealthiest (top 20% of the wealth distribution). While the diagonal entries give the highest proportion in each row, there are considerable shares in the off-diagonal cells. Among the richest households, 8.54% are in the bottom two wealth quintiles. Similarly, almost 25% of households in the 4th income quintile are in the bottom two wealth quintiles.

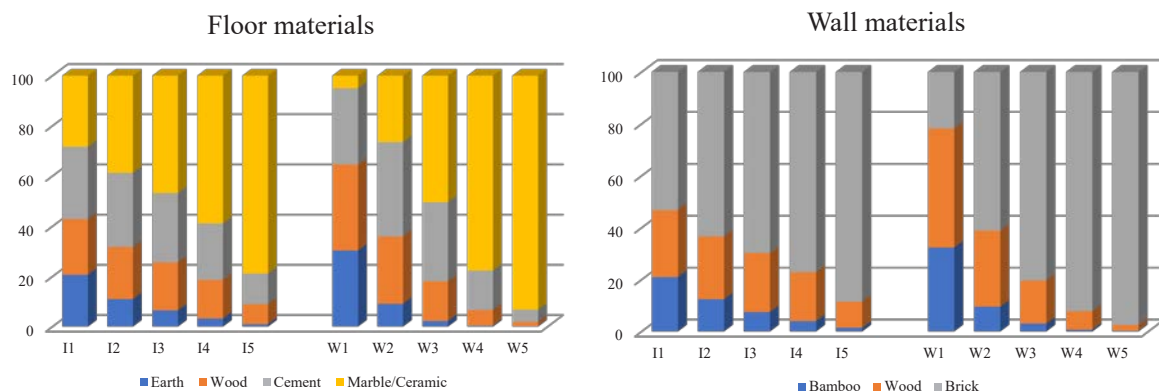
Table 1: Cross-tabulation of income and wealth quintiles 2011-2016

| Income/Wealth | 1 (least wealthy) | 2 | 3 | 4 | 5 (wealthiest) |
|--------------------|----------------------|-------|-------|-------|-------------------|
| 1 (income poorest) | 46.19 | 28.87 | 16.65 | 7.14 | 1.15 |
| 2 | 26.96 | 27.90 | 24.39 | 16.61 | 4.14 |
| 3 | 16.61 | 22.93 | 25.53 | 24.51 | 10.43 |
| 4 | 8.69 | 15.15 | 21.56 | 30.07 | 24.53 |
| 5 (income richest) | 2.52 | 6.04 | 11.45 | 21.54 | 58.46 |

Note: the proportions in each row add up to 100%. The row gives income quintile and the column gives wealth quintile. The income and wealth distributions are computed for each year from all households in respective SUSENAS wave using population frequency weight.

In Figure 1, we single out two housing characteristics, floor and wall materials, and relate them with income and wealth. This picture, perhaps, is more concrete than Table 1, as the wealth index is a summary measure. We can see that some households with the highest income (I5) still live in a house with earth or wooden flooring and non-brick wall. In contrast, almost all wealthiest households (W5) live in brick houses with marble or ceramic floors. This picture suggests that if one wants a variable that captures households' economic power in SUSENAS, wealth might be a better variable to use instead of income derived from expenditure.

Figure 1: Floor and wall materials in households at various income and wealth quintiles 2011-2016



Note: each I1-I5 indicates income quintile 1-5. Each W1-W5 indicates wealth quintile. The width of each region in each bar represents the proportion of households in a given income-wealth quintile with a given housing characteristic.

3. A case study: health care expenditure

In this section, our aim is to show that taking SUSENAS' expenditure at face value can lead to misleading conclusions. Health is an interesting example for at least two reasons.

First, for health services and medical goods, adding a replacement cost for any health subsidy received to households' out-of-pocket expenditure poses a particularly big problem. Unlike subsidies for utilities and rice, which can be estimated by researchers, for example, through housing characteristics and household size, the size of a health subsidy is difficult to calculate because health goods and services vary greatly in both type and intensity. SUSENAS has relied on appraisal value from the household's representative. However, people in general do not know the exact price of health services until they see their medical bills. For subsidy recipients, this bill does not exist. It is very unlikely that household representatives can accurately price medical treatments, especially when these treatments involve hospitalisation episode(s), complex procedures and prescription medicines. As a result, the *level* of health expenditure in SUSENAS is likely to be underestimated, especially among subsidised

households with high medical needs. The *growth* in health expenditure, on the other hand, may be less affected since the replacement cost has always been added to households' out-of-pocket expenditure.

Second, the reference period for expenditure on non-food items and health care items changed in SUSENAS 2015-2016. Prior to 2015, expenditure on health goods and services in the past month and three months were recorded but in 2015 and 2016, the reference period was changed to the past twelve months. The longer reference period affects mean health expenditure, conditional on positive value (i.e., the conditional mean), which measures the intensity of households' health care utilisations. To define a health expenditure variable that is comparable across all survey waves, the annual health expenditure in 2015-2016 may be converted to monthly or quarterly health expenditure to match those in SUSENAS 2014 and prior. The problem is that there would be fewer zero observations under the one-year reference period. Many households would have small, but positive monthly and quarterly health expenditure in 2015-2016 because of averaging, not because their health care utilisation has truly increased. Averaging also smooths out the full cost of an adverse health shock. All in all, the conditional mean health expenditure in 2015 and 2016 are likely to be smaller than that in 2014 and prior. In addition, longer reference period entails bigger recall bias, especially for occasional outpatient visits and drugs, so households may fail to report all health care consumption during the past year.

Table 2 reports the proportion of households with zero expenditure on all health items and the mean total health expenditure under various scenarios. The total health expenditure is the sum of expenditures on all formal health services and prescription medicines, not including expenditure on any health insurance premium. Only 2-7% of the sample has positive health insurance premium. The nominal expenditure is converted to real 2016 Rupiah. As expected, the proportion of households with zero total health expenditure is the highest under one-month reference period: 52-54%. When the reference period is expanded to one year in 2015-2016, the proportion of households with zero total health expenditure falls dramatically to 23-26%. As a result, the conditional mean monthly total health expenditure is severely affected: it falls dramatically in 2015 and does not return to the 2014's level. The mean expenditure in 2015-2016 are italicised to indicate that they are derived from annual total health expenditure. We note that there was neither a massive expansion of health infrastructure nor a major discount in the supply price of health goods and services in the country during 2014-2015, so market condition cannot explain the sharp fall in monthly total health expenditure.

The transition is less dramatic had the quarterly series been used in 2011-2014, instead of the monthly series. The conditional mean quarterly total health expenditure also falls in 2015, but not extreme, and increases again in 2016, surpassing the 2014's level.

Table 2: Total health care expenditure under various reference periods

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--------------------------|------------|------------|------------|------------|-------------------|-------------------|
| Reference: 1 month | | | | | | |
| Proportion 0 expenditure | 0.535 | 0.528 | 0.535 | 0.521 | 0.228 | 0.260 |
| Unconditional mean | Rp.37,931 | Rp.44,782 | Rp.55,828 | Rp.63,307 | <i>Rp.58,587</i> | <i>Rp.66,233</i> |
| Conditional mean | Rp.81,560 | Rp.94,861 | Rp.120,103 | Rp.132,053 | <i>Rp.75,865</i> | <i>Rp.89,493</i> |
| Reference: 3 months | | | | | | |
| Proportion 0 expenditure | 0.367 | 0.365 | 0.383 | 0.377 | 0.228 | 0.260 |
| Unconditional mean | Rp.103,698 | Rp.116,361 | Rp.136,441 | Rp.156,771 | <i>Rp.175,761</i> | <i>Rp.198,699</i> |
| Conditional mean | Rp.163,713 | Rp.183,344 | Rp.221,165 | Rp.251,657 | <i>Rp.227,594</i> | <i>Rp.268,478</i> |

Note: total health care costs are in real 2016Rp. In 2015-2016, the means are italicised to indicate that they are imputed from the annual total health expenditure observed in the data. Monthly level is derived by dividing the annual level by twelve whilst the quarterly level is derived by dividing the annual level by four. All figures are computed using population frequency weight.

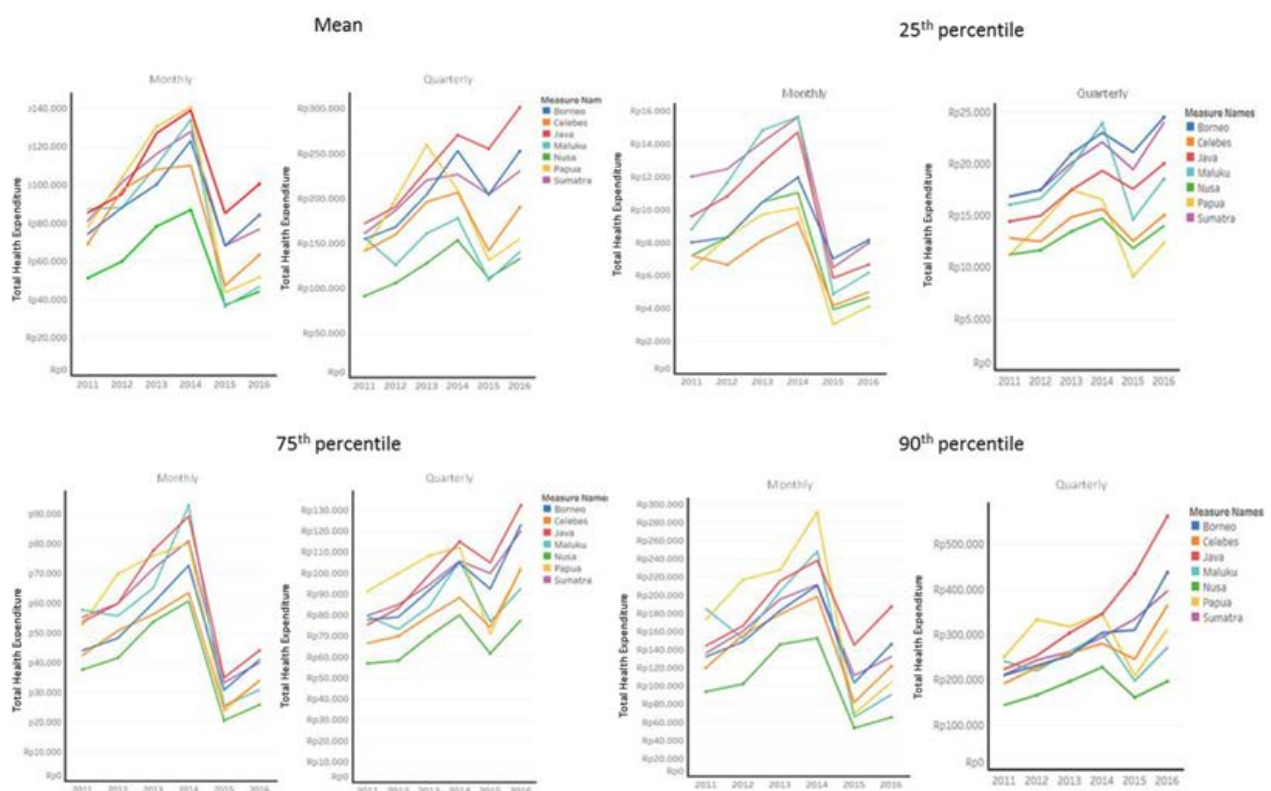
Figure 2 plots the evolution of the conditional mean, 25th, 75th and 90th percentiles total health expenditure over time to give picture of the entire total health expenditure distribution. It shows a dramatic fall in the monthly total health expenditure at the mean and all percentiles in 2015, before rising again in 2016, but not to their respective levels in 2014. For quarterly expenditure, except at the top 10% (i.e., 10% households with the highest total health expenditure), total health expenditure also falls in 2015, but rises again in 2016. At the top 10%, total health expenditure increases steadily over time with a sharp increase in 2016.

Figure 2: The evolution of conditional total health expenditure

Note: series are based on authors' calculation from SUSENAS 2011-2016 using population frequency weight. The total health expenditure are in real 2016 Rupiah. 'Monthly' total health cost is derived from total health expenditure in the past 30 days from the survey date and 'Quarterly' total health expenditure is derived from the total health expenditure in the past 3 months from the survey date. Conditional total health expenditure is derived only from households with positive total health expenditure.

Figure 3 disaggregates the conditional distribution at the national level to regional level. For monthly expenditure, the trend at the national level is replicated in all regions: total health expenditure falls sharply in 2015 and does not return to 2014's level. This picture supports the hypothesis that the fall in the total health expenditure in 2014-2015 is driven by other factors, not by health market factors because otherwise, different regions with different health infrastructure would have different trends. For quarterly series, we observe some variations across regions, especially in Maluku and Papua. In these two regions, households experienced a sharp fall in total health expenditure in 2015 that does not return to the 2014 level by 2016. In other regions, the trend is similar with the national trend.

Figure 3: The evolution of conditional total health expenditure by region



This abrupt change in the reference period coincided with a major policy change in the national health market. In 2014, *Jaminan Kesehatan Nasional (JKN)*, a national health insurance scheme, was introduced to ensure access to basic health care by all Indonesians and to protect households from very high out-of-pocket health expenditure. JKN's enrolment is mandatory (by 2019) and its coverage includes unlimited amount of outpatient care at primary health facilities and inpatient care at public hospitals and participating private hospitals. Naturally, health researchers and policymakers are interested in the JKN's impact on households' health care burden. For instance, a recent World Bank report has used SUSENAS 2014–2015 to make inferences about the movement of out-of-pocket health expenditure after JKN when this quantity is unidentifiable in SUSENAS (World Bank, 2016). Indeed,

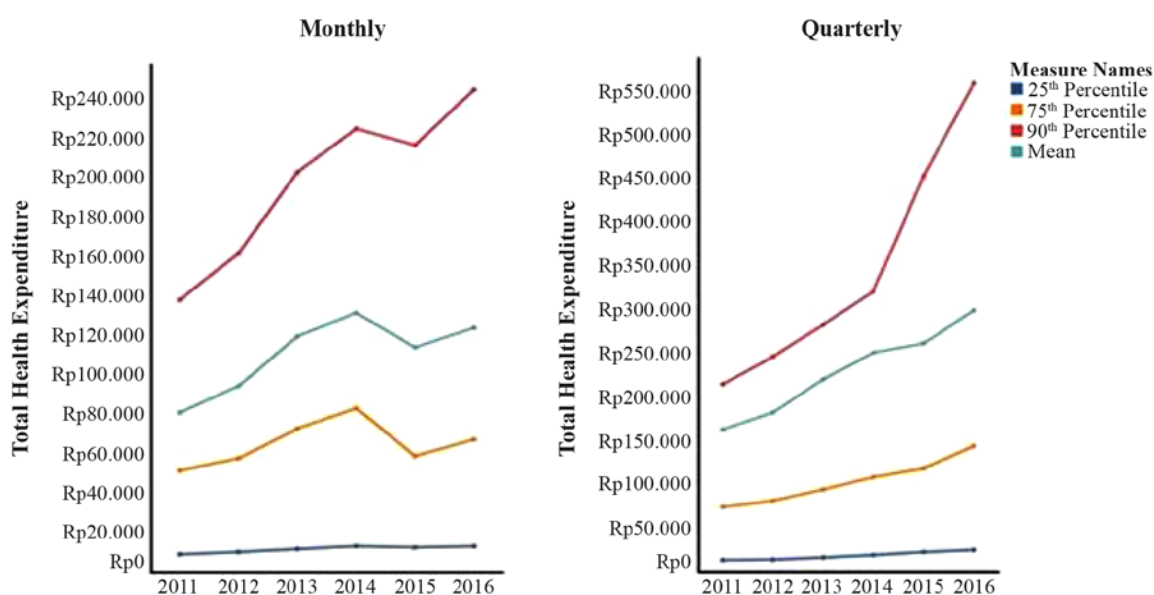
SUSENAS cannot be used to make any inference about households' health care burden, incidence of catastrophic health spending or impoverishment due to health spending – which definition rests under the assumption that consumption is financed entirely by households' own earned (labour) incomes –, because SUSENAS's health expenditure includes the contribution of other payers.

The fall in the monthly total health expenditure in 2015 may be misinterpreted as a change due to JKN. The downward movement in total health expenditure would be celebrated as JKN's success in lowering households' health care burden by ignorant researchers. However, the change in the reference period of expenditures on health items in SUSENAS 2015-2016 alone can generate movement in total health expenditure. A way to deal with this survey-driven change may be to synchronise the proportion of households with zero total health expenditure in 2015-2016 to that in 2011-2014 (Table 2). We ask the question: “what is the level of total health cost, x , that would make the proportion of households with zero total health expenditure under one year reference period similar to that under one month reference period?” We find x to be Rp.7,900 in both 2015 and 2016. Below this level, 50% of households actually have total health expenditure less than Rp.4,330 and 75% of households have total health expenditure less than Rp.6,039. Given that an average Indonesian household has 4 members and that the fees at *puskesmas* (the main public primary care provider) is about Rp.6,000 per person per month (repeat visits are not charged), households with monthly total health expenditure below Rp.7,900 would tend to be occasional or low users of health services. These households may seek health care once or twice in a year but may not use any health services every month. If so, it might be reasonable to assume that, had the reference period of health items remained unchanged at one month through to 2016, these households would have zero monthly total health expenditure and they would be excluded from the calculation of the conditional mean. By similar argument, we can adjust the implied quarterly total health expenditure in 2015 and 2016 with x calculated to be Rp.11,000.

Figure 4 shows the evolution of the conditional monthly and quarterly total health expenditure after applying the above method to synchronise the proportion of zero observation from 2011 through to 2016. We find quite a different trend to that in Figure 2 and 3, especially at the bottom and the top of the health expenditure distribution. At the 25th percentile, total health expenditure increases in the last 2 years, which may capture first-time users of primary health services. At the 90th percentile, total health expenditure has a steep upward trend, especially in the quarterly series. In 2014, 10% of households with the highest quarterly total health expenditure have quarterly total health expenditure over Rp.320,000. In 2016, this percentile level increased to over Rp.560,000. Comparing monthly and quarterly series, we find that the quarterly series is more stable than the monthly series, as we could not find a valid reason for the one-time fall in the monthly total health expenditure in 2015. A potential reason could be timing of the interview. There are 4 collection points for SUSENAS 2011-2014: March,

June, September and December. In contrast, there is only one collection point for SUSENAS 2015-2016 in March. It is possible that, because none of the month prior to the collection months in 2011-2014 coincides with a holiday season, health care providers' availability is high. In effect, the monthly total health expenditure in 2011-2014 is higher relative to that in 2015-2016, which covers some holiday seasons. One other hand, three months prior to the collection months in 2011-2014 always coincides with some holiday periods. As such, when compared to the implied quarterly total health expenditure from the annual total health expenditure in 2015-2016, the trend in quarterly total health expenditure is more stable. We recommend using quarterly total health expenditure for trend over time analysis.

Figure 4: The evolution of conditional total health expenditure with comparable zero rate across waves



Note: see note underneath Figure 3. For monthly series, the adjustment in 2015-2016 involves the exclusion of total health expenditure less than Rp.7,900. For quarterly series, the adjustment in 2015-2016 involves the exclusion of total health expenditure less than Rp.11,000.

4. Discussions

As the official survey of Indonesian households, SUSENAS has informed much economic policy and social assistance programs. Numerous academic papers rely on SUSENAS. The objective of this paper is to help future studies avoid making misleading inferences about household expenditure and income when using information from SUSENAS. We have focused on the misunderstanding concerning the expenditure variable in SUSENAS, which actually comprises of private households' out-of-pocket expenditure plus the contributions of other payers. In this sense, SUSENAS's expenditure reflects *total* expenditure or total cost of consumption. There is also issue about the accuracy of this variable due to approximation error in the value of other payers' contributions by households' representative. This error

may be related to the characteristics of the respondent, such as education level and unobserved motive to understate external assistance, or it may increase over time as the national credit market grows and the amount of social assistance increases.

We have also demonstrated that caution is required when using the latest two waves of SUSENAS (SUSENAS 2015-2016). In the case of expenditures on health goods and services, SUSENAS 2015-2016 records health expenditure in the last year whilst earlier SUSENAS waves record health expenditure in the last three months. The change in the reference period creates an artificial movement in the health expenditure that is not due to a real change in health market activities. There are also other data issues, albeit minor, which are important for researchers. In SUSENAS 2015-2016, there is a health item number, number 183, assigned to the heading of the medication sub-section. This item should not have any entry, but in 2015, it has non-negligible positive value that is not equal to the total expenditure of the various types of medication listed under this sub-section. Adding this item would inflate the total health expenditure in 2015, but perhaps for the wrong reason. There is also ambiguity in the question about the use of modern medicine. In particular, the questionnaire asks whether during the reference period, the household has consumed “any medicine with prescription from a health practitioner” (“*obat yang dibeli dengan resep dari tenaga kesehatan*”) and “any modern medicine without prescription from a health practitioner” (“*obat modern yang dibeli tanpa resep dari tenaga kesehatan*”). While the former question is clear, the latter may be interpreted as (i) a modern medicine that is bought based on a health practitioner’s advice but available over-the-counter and does not require a prescription (e.g., vitamin D supplement for patients with osteoporosis, medicines according a pharmacist’s advice, paracetamol, cough medicine, etc) or (ii) a modern medicine that is bought to self-medicate and the individual has never seen a health practitioner. This issue is relevant for researchers who want to calculate total health expenditure related to doctors’ visitations. If interpretation (ii) applies then the non-prescription medicines should not be included in the total health expenditure but if interpretation (i) applies then it should be part of the total health expenditure.

Currently, only a few studies have used SUSENAS 2015-2016. However, one can imagine that over time the number of applications of this data for policy analysis will increase. Having raised the issues in this paper to Statistic Indonesia, we have good news that the design of SUSENAS 2018 will enable researchers to identify out-of-pocket health expenditure, increasing its usefulness for the evaluation of JKN.

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What if a popular data set that has generated a long stream of literature has been misunderstood and has led to misleading inferences? In this paper, we use the case of household expenditure in the Indonesian National Socio-Economic Survey data, SUSENAS, which started over 50 years ago. Appropriate use of SUSENAS for policy analysis requires an understanding that the expenditure variable in SUSENAS does not measure a household's out-of-pocket expenditure, because it includes the approximated value of any subsidy received by the household in obtaining goods and services. Inferences about private expenditure and income, which are often derived from the expenditure variable, need to be carefully considered. We also draw attention to an abrupt change in survey instrument in SUSENAS 2014 onwards that extends the reference period of several expenditure items. Using health items as a case study, we demonstrate that this change generates movement in health expenditure that can be misinterpreted as a result of a major national health insurance reform introduced in the same year to lower households' health care burden. Accordingly, we propose a way to account for this synthetic movement in the health expenditure variable.

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