

Article

The Impact of Special Allocation Fund (DAK) for Health on Achievements of Health Development Performance in Indonesia

Agnes Putri Apriliani ¹ and Khoirunurrofik Khoirunurrofik ^{1,2,*} 

¹ Master Program of Economic Planning and Public Policy, Faculty of Economics and Business, Universitas Indonesia, Jakarta 10430, Indonesia; anes.putria@gmail.com

² Department of Economics, Faculty of Economics and Business and Institute for Economic and Social Research (LPEM), Universitas Indonesia, Salemba Raya 4, Jakarta 10430, Indonesia

* Correspondence: khoirunurrofik@ui.ac.id

Received: 4 August 2020; Accepted: 2 September 2020; Published: 7 September 2020



Abstract: In the implementation of decentralization, the Special Allocation Fund (DAK) for health is given to certain areas of Indonesia to support health financing. The performance of this financing, along with national health development priorities' achievements, is illustrated through the indicators of coverage of deliveries in health care facilities (PF) and coverage of first neonatal visits (KN1). Yearly increases in the health DAK budget have not been accompanied by increases in these coverages, and there are still significant disparities between regions. Using secondary data at the district/city level for 2014–2017, this study aims to investigate the impact of health DAK on coverage of PF and KN1. The analytical method deployed is linear regression of panel data using a fixed-effects model. The results show that in the short term, health DAK has a positive but insignificant effect on PF and KN1 coverage. However, health DAK has a positive and significant impact on PF coverage in the second year. Impact on KN1 coverage is unfeasible, even over a period of two years. These results indicate that the processes of planning, budgeting, and administering of health DAK require improvement so that benefits can be felt in the short term through better innovations in health programs. Nevertheless, given that our findings are based on a short period of study, the results from such analyses should consequently be treated with the utmost caution. Therefore, future research should target a longer period of data collection to detect more trusty lagged effects and structural breaks of a policy intervention.

Keywords: decentralization; special allocation fund; health; health care facilities; coverage of first neonatal visits; Indonesia

JEL Classification: E63; I15; I18

1. Introduction

In the implementation of decentralization, the Special Allocation Fund (*Dana Alokasi Khusus*, DAK) has been one of the financing sources made available for Indonesia's regions. DAK for the health sector is given to certain areas to assist with finance sectors that correspond to the national health development priorities for provision, by central and regional governments, of health services that are equal, affordable, and of good quality. Decreases in maternal mortality rate (MMR) and infant mortality rate (IMR) are indicators for Indonesia's health development targets for 2025, as stated in the 2005–2025 Long-Term Development Plan in the Health Sector (RPJPK). The National Medium-Term Development Plan (RPJMN) 2020–2024 also mentions that one of the directions of development policies in the health sector is improving access and quality of health services, including improving the health

of mothers and children. Mother and child mortality remains the main problem of health development in Indonesia. Based on data from [The General Secretary of the Ministry of Health of the Republic of Indonesia \(2017\)](#), the health DAK budget increased by IDR 20.27 trillion from 2014 to 2017 and continues to surge every year.

However, inequality in the performance of health development between regions in Indonesia is still high. This inequality can be seen from the achievement of intermediate indicators for reduction in MMR and IMR, namely coverage of deliveries in healthcare facilities (*Persalinan di Fasilitas Pelayanan Kesehatan*, henceforth called PF) and coverage of first neonatal visits (*Kunjungan Neonatal Pertama*, hereafter, KN1). Data from the 2014–2017 Indonesia Health Profile showed achievements in national PF and KN1 coverage, on average, increased each year, but also revealed that the disparity in achievements between regions remained relatively high. Achievement of these two indicators is still low in eastern Indonesia but high in western Indonesia, suggesting that health development across the country has not been optimal and raising the question of: what is the impact of the distribution of health DAK on the achievement of health performance indicators in Indonesia?

A number of studies have been conducted in several countries to look at the relationship between fiscal decentralization and health outcomes. Some of these show that fiscal decentralization and increases in health spending reduce infant mortality ([Nixon and Ulmann 2006](#); [Asfaw et al. 2007](#); [Anton and Onofrei 2012](#); [Joana et al. 2013](#); [Jiménez-Rubio and García-Gómez 2017](#)). Other research conducted in Indonesia found that decentralization and public spending on health at the district level had no significant impact on improving public health or health system outputs ([Rosalia and Kagungan 2017](#); [Heywood and Choi 2010](#)). Other studies related to decentralization and inequality in health outcomes have also been carried out in Indonesia ([Maharani 2015](#); [Hodge et al. 2015](#); [Nababan et al. 2018](#)) and in Italy ([Di Novi et al. 2019](#)), which imply that health outcomes in Indonesia continue to vary between districts/cities following decentralization, while in Italy, fiscal decentralization does not contribute to health inequalities among regions but can aid in the reduction of health inequalities within the same region. In contrast, research conducted in China reports that fiscal decentralization proliferates the problem of income inequality, and this income gap can adversely affect public health performance ([Hao et al. 2020](#)).

Some previous studies into the influence of fiscal decentralization in health outcomes tend to use government health expenditure as an indicator of fiscal decentralization and MMR and IMR as measures of performance in the health division. However, very little is known about the influence of fiscal decentralization on performance in the health sector using government transfer funds such as health DAK as indicators of fiscal decentralization, or proxies for MMR and IMR, namely PF coverage and KN1 coverage, as indicators of health sector performance. The PF and KN1 coverages are set out as indicators for their feasibility in indicating effective intervention in the prevention of maternal and infant mortality. Intermediate indicators for the diminution of MMR and IMR are achieved by looking at the encouraging of childbirth in a health facility, which is followed by neonatal visiting services aimed at lessening IMR ([Directorate of Family Health 2018](#)).

Utilizing secondary data at the district/city level in Indonesia for the years 2014 to 2017 and applying linear panel data regression analysis with a fixed-effects model (FEM), this study aims to investigate the impact of health DAK on coverage of PF and KN1. The results show that in the short term, health DAK had a positive but not significant effect on the coverage of PF and KN1. Further to this, the results show that health DAK provided a positive and significant effect on PF coverage in the second year, while impact on KN1 coverage was not seen even over a period of two years. A longer period is, therefore, critical to see the impact of health DAK on KN1 coverage. The impact of health DAK on health outputs tends to be different in the short and long term because it can be influenced by factors outside the DAK itself, such as the availability of human resources (HR) and procurement factors related to physical construction of health facilities.

These results indicate that some reforms are of significance in health DAK budgeting that could effectively alleviate both the central government and local governments in providing health services

that are evenly distributed, affordable, and of good quality. Improvement in the process of planning, budgeting, and administration of health DAK is of importance so that the benefits can be felt in the short term (one year). Examples would be budgeting for health DAK across multiple years, and better monitoring and evaluation to enable transparency and accountability in the budgeting and expenditure of these funds at the district/city level.

This paper consists of five parts, beginning with an introduction and a summary of the research. The second part reviews the literature. The third part discusses research methods. The fourth part presents the results and discussion and the final part offers the conclusions and limitations of the study.

2. Literature Review

More and more countries are decentralizing administrative, fiscal, and political functions from the central government to lower levels. Although this decentralization effort is usually politically motivated, it has an economic impact by influencing, among other things, governance in the public sector including public services. Decentralization is often seen as 'bringing government closer to the people' (Azfar et al. 1999, p. 1). The motives for decentralization differ in different countries, but increasing the provision of public goods is often the main goal. However, without good management, decentralization can widen the gap between poor and rich regions (Channa and Faguet 2016). According to Prud'homme (1995), decentralization has enormous potential if properly designed and implemented, including significantly increasing efficiency in the public sector.

The Ministry of Health (known in Indonesia as *Kemenkes*) has largely handed over its responsibilities to the health offices of provinces and districts/cities, in which the health authorities adapt planning, financing, and health care services according to the needs of the region, in the hopes that this will facilitate the improvement of health system performance at the district/city level. Studies of such programs have been conducted in several countries and their results reveal that decentralized fiscal and health expenditure increases the reduction in IMR (Nixon and Ulmann 2006; Asfaw et al. 2007; Anton and Onofrei 2012; Joana et al. 2013; Jiménez-Rubio and García-Gómez 2017). Such results are related to the ability of regional governments to manage their decentralized budgets and are supported by the implementation of political decentralization in escalating their effectiveness. Meanwhile, other research conducted in Indonesia noted that decentralization and public spending on health at the district level did not have a significant impact on improving public health or health system outputs. This failure was due to lack of infrastructure facilities, health workforce, and public financing, which resulted in the achievement of minimum service standards in the health sector not being maximized (Rosalia and Kagungan 2017), and failures of leadership, political, and bureaucratic factors in the health sector (Heywood and Choi 2010).

As was mentioned in the introduction, prior studies on decentralization and inequality in health outcomes in Indonesia generally confirm that such phenomenon continues to be exhibited with its varying degrees between districts/cities. Maharani (2015) particularly purported inconsistent levels of capacities among local governments, which tend to lead to tremendous variations in results. Hodge et al. (2015) asserted that fundamental issues related to financial disbursement from the central to provincial and district levels and limits on decision-making space for service delivery and on local government ownership in the health sector have thwarted the success of the decentralized system in Indonesia. In addition, Nababan et al. (2018) observed that inequality has been identified as a major impediment in maternal health improvements due to the huge inequality within the country regarding access to health services and MMR.

In Italy, fiscal decentralization does not impact health disparities between regions, rather it facilitates the decline of health disparities within regions, depending on the level of economic growth of each region, with richer regions being better at dealing with inequality than poorer ones (Di Novi et al. 2019). Research conducted in China maintains that fiscal decentralization contributes to the local governments' rising fiscal power. However, this is accompanied by an equally increasing concern about income inequality which unfavorably affects public health performance. The problem

of sober income inequality in China may well result in diverse social strata due to a wide range of incomes. Therefore, it is of vital importance to introduce specific policies to improve the health of numerous groups. For example, for low-income individuals in particular, the development of hospitals in the countryside or their communities will increase their access to health services (Hao et al. 2020).

In contrast to some previous studies that utilized health outcomes, namely MMR and IMR, as indicators of performance in the field of health, the present research deploys intermediate indicators for reducing MMR and IMR, namely PF and KN1 coverage, as performance indicators in health development in Indonesia. The selection of deliveries in health care facilities as an indicator reflects that this is not only identified as an effective intervention to prevent maternal and neonatal mortality, but is also a complex intervention that requires a health system capable of providing 24 h facilities with trained staff (Hodge et al. 2015). This indicator is not only able to rate health programs for mothers, it can also rate the public health status because of its sensitivity to health service enhancement, accessibility, and quality (Directorate of Family Health 2018). The selection of KN1 coverage as an indicator reflects the consideration that neonatal visiting is one form of many interventions that can be carried out to lower IMR. This is significant because neonatal mortality contributes to 59% of overall infant mortality in Indonesia (Ministry of Health of the Republic of Indonesia 2017).

3. Research Methods

In this research, we employ secondary data from the district/city level in Indonesia for the years 2014–2017. The data originate from several sources: the Ministry of Health; the Directorate General of Fiscal Balance (DJPK Ministry of Finance); the Ministry of Administrative and Bureaucratic Reform; and the Central Bureau of Statistics (BPS). The dependent variables administered are intermediate variables for MMR and IMR outcomes, namely PF coverage and KN1 coverage. According to the Directorate of Family Health, Ministry of Health of the Republic of Indonesia (2018), decreases in MMR and IMR are detected through efforts relating to the intermediate indicators of encouraging childbirth at a health facility followed by neonatal visit services (as a continuing effort to reduce IMR). PF coverage is measured by the number of women giving birth assisted by health workers in health facilities compared to the target number of women giving birth in a year, expressed as a percentage (Directorate of Family Health 2018). While Heywood and Choi (2010) relayed antenatal care and maternal care, Hodge et al. (2015) applied facility-based delivery as an indicator of childbirth. Meanwhile, coverage of first neonatal visit (KN1) is calculated by comparing newborns who receive their first neonatal visit with the total number of newborns in the area, expressed as a percentage (Directorate of Family Health 2018). The effort to decrease neonatal mortality (0–28 days) is imperative because death in this period contributes 59% to total infant mortality (Ministry of Health of the Republic of Indonesia 2017). Unlike previously mentioned authors, several researchers have advocated IMR as an indicator of childbirth (see e.g., Gupta et al. 2003; Nixon and Ulmann 2006; Asfaw et al. 2007; Cantarero and Pascual 2008; Jin and Sun 2011; Kang et al. 2012).

The independent variable disseminated in this research is DAK for regular physical expenditure in the health sector (subfields are ‘basic health services’, ‘referral health services’, and ‘pharmaceutical services’), described as a percent of realization reflecting regional financial management capacity. As previously pointed out, DAK is one type of financing ushered in the implementation of decentralization. Indicators related to fiscal decentralization have been used in several studies, including Asfaw et al. (2007), Heywood and Harahap (2009), Jin and Sun (2011), and Kang et al. (2012).

In addition to the main independent variable of health DAK, several control variables are conducted: (1) revenue sharing fund (*Dana Bagi Hasil* or *DBH*); (2) the number of pregnant women; (3) ratio of the number of health care facilities (*Fasilitas Pelayanan Kesehatan* or *Faskes*); (4) ratio of the number of health workers (*Tenaga Kesehatan* or *Nakes*); (5) mean years of schooling (MYS); (6) government governance (*Sistem Akuntabilitas Kinerja Instansi Pemerintah* or *SAKIP*); (7) construction cost/price index (CCI); (8) GRDP per capita; and (9) area size. DBH is the fund allocated to an area based on the percentage

given to fund regional requirements and to overcome vertical fiscal imbalances (between the center and the regions), with a focus on allocations to producing regions.

The control variable ratio of the number of health care facilities represents the number of health service amenities per 100,000 of the population, organized by both public and individual health efforts in the primary level (Primary Health Care Centers or *Pusat Kesehatan Masyarakat/Puskesmas*) and community-based health services (Village Health Posts or *Pos Kesehatan Desa/Poskesdes*; Village Maternity Clinics or *Pondok Bersalin Desa/Polindes*). The choice of this variable is related to the effect of availability and distance on health facilities. Distance to the nearest health center or hospital and perceptions of transportation costs and treatment costs are considered to be predictors of the utilization of health services (Girma et al. 2011). The control variable ratio of the number of health workers represents health workers per 100,000 of the population in terms of general practitioners and midwives. The selection of this variable is related to the ability/capacity of health workers to facilitate access to childbirth services and maternal and child health counselling, and to conduct early detection in referral cases. Indicators related to the number of general practitioners or midwives have been used in several studies, including Cantarero and Pascual (2008).

Based on BPS data, the control variable used for mean years of schooling (MYS) is the number of years stated by residents aged 25 years and over in terms of their formal education. Community education in an area is expected to influence knowledge and attitudes in choosing a place of delivery, and education has been used as a variable in previous studies such as Jiménez-Rubio and García-Gómez (2017). The SAKIP control variable shows the level of accountability of government-agency performance in managing revenue and expenditure, including health DAK. Related indicators of governance have been used in the research by Heywood and Choi (2010), Cinar et al. (2013), Rakmawati et al. (2019), and Di Novi et al. (2019).

The CCI control variable indicates levels of construction cost index of district/city compared to a reference city, i.e., Surabaya, as indicated through the index price. CCI is used as a proxy for measuring the degree of geographical difficulty of an area, as greater difficulty will cause the price level in an area to be higher (Central Bureau of Statistics 2017). The per capita GRDP control variable illustrates the growth of the economy per capita of a resident of a region. GRDP is a crucial indicator for indicating the economic condition in a particular area during a particular period. Related indicators have been used in several previous studies, including Anton and Onofrei (2012), Jin and Sun (2011), and Cantarero and Pascual (2008). The control variables of area size and number of pregnant women are characteristics of an area. Area size is also related to the affordability of health facilities for the community.

We utilize panel data linear regression to identify the effects of health DAK on PF and KN1 coverage, which can be grouped based on supplies, including budget variables (health DAK and DBH), health care facilities (*Faskes*), and health workforce (*Nakes*) and the demand side in the form of the mean years of schooling (MYS) that describes the level of community education as related to attitudes towards and knowledge about safe childbirth. The regression model in this study is as follows:

$$PF_{it} = \alpha_{it} + \beta_1 Health_DAK_{it} + \beta_2 DBH_{it} + \beta_3 GRDPcap_{it} + \beta_4 Number_preg.women_{it} + \beta_5 Area_size_{it} + \beta_6 CCI_{it} + \beta_7 RFaskes_{it} + \beta_8 Rnakes_{it} + \beta_9 SAKIP_{it} + \beta_{10} MYS_{it} + e_{it} \quad (1)$$

$$KN1_{it} = \alpha_{it} + \beta_1 Health_DAK_{it} + \beta_2 DBH_{it} + \beta_3 GRDPcap_{it} + \beta_4 Number_preg.women_{it} + \beta_5 Area_size_{it} + \beta_6 CCI_{it} + \beta_7 Rfaskes_{it} + \beta_8 Rnakes_{it} + \beta_9 SAKIP_{it} + \beta_{10} MYS_{it} + e_{it} \quad (2)$$

PF_{it} : coverage of deliveries in health care facilities of district/city I year t

$KN1_{it}$: coverage of first neonatal visit of district/city i year t

$Health_DAK_{it}$: % of DAK for health budget realization in district/city i year t

DBH_{it} : % of DBH budget realization in district/city i year t

$GRDPcap_{it}$: GRDP per capita of district/city i in year t

$Number_preg.women_{it}$: number of pregnant women in district/city i in year t

$Area_size_{it}$: district/city area i in year t

CCI_{it} : construction cost/price index of district/city i in year t

$rFaskes_{it}$: the number of *puskesmas*, *poskesdes*, and *polindes* of district/city i year t per 100,000 population

$RNakes_{it}$: the number of health workers (general practitioners and midwives) in *puskesmas* in district/city i year t per 100,000 population

$SAKIP_{it}$: performance accountability of district/city i year t

MYS : the number of years of formal education stated by district/city residents over 25 years

e_{it} : error term

4. Results and Discussion

We used panel data from 514 districts/cities in Indonesia during the years 2014–2017. Based on data availability, a total of 1276 observations for each variable in all districts/cities in Indonesia between 2014 and 2017 were obtained. In terms of the output value of PF coverage and KN1 coverage for all districts/cities, the average PF coverage was 72.36% and KN1 coverage was 89.90%. The lowest PF coverage was 1% and the highest was 131%, while the lowest KN1 coverage was 7% and the highest was 149%. This indicates disparity between districts/cities. The coverage of some provinces was more than 100% because the BPS target projection data are lower than the real data obtained (Ministry of Health of the Republic of Indonesia 2018).

Chow and Hausman tests were used and showed that a FEM was more appropriate for these data. However, the FEM results in variables that were time-invariant could not be estimated, such as area size. Therefore, the Hausman–Taylor test was used to overcome this problem. Table 1 shows the estimated results of health DAK variables on PF coverage and KN1 coverage using Hausman–Taylor.

Table 1. Estimation of Health Special Allocation Fund (DAK) against Deliveries in Health Care Facilities (PF) coverage and First Neonatal Visits (KN1) coverage.

Variable	(1)	(2)
	PF	KN1
Health_DAK	0.0201 (0.0263)	0.0283 (0.0236)
DBH	0.0293 (0.0227)	0.0508 ** (0.0204)
GRDPcap	0.0634 ** (0.0251)	0.0319 (0.0216)
Number_preg.women	0.000155 *** (0.0000455)	0.0000197 (0.0000401)
RFaskes	−0.000899 (0.0237)	0.0375 * (0.0210)
RNakes	0.0253 ** (0.0102)	−0.0122 (0.00902)
MYS	1.415 (0.871)	−0.233 (0.734)
SAKIP	0.409 *** (0.0671)	0.0378 (0.0593)
CCI	−0.145 *** (0.0511)	−0.162 *** (0.0445)
Area_size	−0.00160 *** (0.000232)	−0.000617 *** (0.000195)
_cons	50.75 *** (10.51)	98.87 *** (9.129)
N	1276	1276

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: authors' results.

4.1. Analysis of the Effect of Health DAK on PF Coverage

The regression results for the effect of health DAK on PF coverage using Hausman–Taylor presented in Table 1 show that the effect of health DAK on PF coverage was positive but not significant. This insignificance may reflect the use of private health facilities for delivery of babies. Based on data from Basic Health Research (*Riskesdas*), in 2018, 29.6% of women delivered in the practice of the health workforce, 17.8% in private hospitals, 16.7% at home, 14.9% in government hospitals, 12.1% in *puskesmas/pustu/pusling*, and 4.9% in clinics. The World Bank (2008) shows that the private sector accounts for almost 65 percent of all spending on health in Indonesia and 75 percent of this is out of pocket expenditure. For many, the private sector is the sector of choice for outpatient care, often because private sector providers and facilities are far more consumer-oriented and comfortable than the public sector. As a result, many doctors and midwives work only in private practices and do not have direct contact with the government, making it relatively difficult for the government to supervise and monitor the quality of private sector services.

These results support previous research which showed no significant effect of fiscal decentralization on health outcomes. In their study conducted in 10 districts in East Java and Central Java Indonesia, Heywood and Choi (2010) showed there had been only a slight increase in the utilization of maternal and child health services following decentralization in 2001, despite the fact that there had also been a significant increase in public funding for health. One indicator used as relevant for assessing changes in the performance of the health system is the use of antenatal care and maternal delivery services. Delivery service indicators improved between 2002–2003 and 2007. According to the study, among deliveries in health care facilities, there were no significant changes over time in the type of facility used; as there was an upward trend in childbirth in health care facilities, mothers continued to choose private sector facilities in preference to public sector facilities for their deliveries. In addition, these results indicate that the dominant provider of maternal and child health services is the private sector, which now accounts for the majority of antenatal care, childbirth in health facilities, and family planning services, including the provision of modern contraception. In their study on Indonesian health performance system, Heywood and Choi (2010) reported that there was no relationship between public spending on health and health system output at the district level. During their study period, there was a failure of political and bureaucratic leadership in the health sector that could have hampered innovation and restricted the ability to build a new health system compatible with Indonesia's health problems.

In addition, the insignificant effect of health DAK on PF coverage might be because there are still women who deliver their babies at home. Data from Basic Health Research (*Riskesdas*) showed that 16.7% of women still deliver in domestic locations (National Institute of Health Research and Development of Ministry of Health 2019). According to the SMERU Research Institute (2019), both internal and external factors contribute to this situation. Internal factors include low public awareness about safe delivery, the existence of family traditions of using traditional birth attendants to assist at child birth, limited costs for accessing health facilities, and the understanding of some communities about the limited operational time for using health insurance for childbirth, as well as using health insurance for medical treatment generally. External factors incorporate poor quality of road infrastructure to health facilities, village health facility operating times that are sometimes erratic, the existence of traditional birth attendants in and around communities, and the application of local regulations at the village level.

Several control variables have a significant effect on PF coverage, namely GRDP per capita, number of pregnant women, the ratio of number of health workers, CCI, area size, and SAKIP. GRDP per capita at current prices reflects people's per capita income and has a positive and significant impact on PF coverage because access to health services will be increasing along with increasing purchasing power at the community level. If the income of the community increases, it is expected that the preference of mothers to deliver in health facilities will also increase. UNFPA Indonesia and Gadjah Mada University Health Policy and Management Center (2014) mentioned that for some women in Indonesian regions, financial problems are a barrier to easy access to good quality maternal health services.

The control variable of number of pregnant women has a positive and significant effect on PF coverage, perhaps reflecting higher levels of public awareness about deliveries in health care facilities. The ratio of number of health workers is also positive and significant for PF coverage because the health workforce can provide the community with health services and information. Increasing the number of health workers and their equitable distribution contributes to achieving improved PF coverage. The Nusantara Sehat program set up in 2015 is an endeavor to strengthen services and fulfil health service essentials. Based on the Republic of Indonesia Health Minister Regulation No. 33, 2018, this program carries out special assignments for the health workforce to health service facilities in disadvantaged, border, and island areas (*Daerah Tertinggal, Perbatasan dan Kepulauan or DTPK*), health problem areas (*Daerah Bermasalah Kesehatan or DBK*), and others, to provide health services to the community. The health workforce plays an important role in improving public health services. The [SMERU Research Institute \(2019\)](#) states that women who have good access to health services are those who have received information about these services from the health workforce such as doctors, midwives, and nurses. As more women benefit from health services, deliveries assisted by the health workforce are expected to reduce MMR. The [World Health Organization \(2008\)](#) stated that delivery assistance by trained health workers would reduce the risk of maternal death. The results from [Anand and Barnighausen's \(2004\)](#) research also indicate that in aggregate, health human resources (doctors, nurses, and midwives) create effects that significantly decrease three health outcome measures; they are maternal, infant, and toddler mortality rates.

The control variables of area size and CCI have negative and significant relationships with PF coverage. The extent of the area can be an ultimate cause of the residents' shortage of access to trustworthy health facilities. Likewise, CCI reflects accessibility conditions in an area. The higher the CCI value of an area is, the more difficult the accessibility conditions will be which, in turn, access to health facilities will likely be difficult. The SAKIP control variable is positively and significantly related to the level of accountability of the performance of government agencies in managing health DAK. This result is in line with research conducted by [Rakmawati et al. \(2019\)](#), which found that because of its real impact on the health system, improvement in performance must begin with governance, which is necessary for policy evaluation and development in priority areas of health services, health personnel, and health financing.

The control variable of ratio of number of health care facilities has negative effects on PF coverage. This may be due to scarce quality of health services, flawed referral systems, and uneven distribution of the number of health facilities. This indicates that despite the number of health facilities increasing, the amount of the public, especially pregnant women, delivering babies in government health facilities equally increases. According to the [SMERU Research Institute \(2019\)](#), one factor that increases risks during labor is gaps in access to health services. Poor access to health facilities is one of the most fundamental causes of pregnant women delivering their babies at home with the help of traditional birth attendants. The control variable of mean years of schooling has a positive but insignificant effect. This can result from other internal factors being more dominant in influencing the decision to choose a place of delivery, for example, family tradition or limited costs for accessing health facilities.

4.2. Analysis of the Effect of Health DAK on KN1 Coverage

The regression results presented in Table 1 for the effects of health DAK on first neonatal visit (KN1) coverage produced via Hausman–Taylor show that health DAK affects positively but not significantly KN1 coverage. This insignificant effect reflects the high level of delivery at home assisted by traditional birth attendants and the level of utilization of private health facilities as labor locations. Neonatal visit services, especially KN1, are generally carried out when mothers are in health facilities at the time of delivery. According to the [Directorate of Family Health \(2018\)](#), attempts to increase the quantity and quality of KN1 are integrated and united with endeavors to encourage deliveries in health care facilities. By giving birth in health care facilities, the newborn babies will receive standardized health

care services. The under-utilization of government health facilities such as *puskesmas* during childbirth results in under-utilization of KN1 services.

Control variables with significant effects on the coverage of KN1 include DBH, ratio of the number of health care facilities, area size, and CCI. The positive and significant effects of the DBH control variable on KN1 coverage is likely because of the DBH's function as a fiscal balance between the center and the regions, which impacts on the capacity of the regional budget in financing development programs such as infrastructural access to health facilities. The control variable of ratio of the number of health care facilities has positive and significant effects on KN1 coverage. This may be related to KN1 services being generally offered/delivered to mothers and babies who are in health facilities at the time of delivery.

The control variables of area size and CCI have negative and significant effects on KN1 coverage, reflecting similar effects on PF coverage. The extent of an area can be one of the major causes of residents who lack access to quality health facilities. Likewise, CCI reflects accessibility; the higher the CCI value of an area is, the more generally difficult it is to access health facilities. Easy access to health facilities increases the chances of communities undergoing examinations and consultations with trained health workers to help them understand their own and their babies' conditions. Mothers' knowledge of examinations, especially the neonatal visit schedule, is essential in order for them to be better prepared for questions such as who the workforce is and how they can assist them with themselves and their newborns.

4.3. PF and KN1 Coverage Analysis with Time Lag Effects

In economics, the dependency of the Y variable (the dependent variable) on other variables X (the explanatory variables) is rarely instantaneous. Very often, Y responds to X after an interval or lag (Gujarati 2003). In the case of DAK in the health sector, this lag means that the distribution of the funds does not directly affect health output in the year in which it is made and in looking at the effect of health DAK on PF and KN1 coverage, a time lag is seen. Due to the limited data available in the time series deployed in this study, only time lags t-1 and t-2 are applied. The regression results from the effect of health DAK on PF coverage and KN1 coverage with t-1 time lag effect using Hausman–Taylor can be seen in Table 2. The results show that the effect of health DAK is negative and not significant to PF coverage and negative and significant to KN1 coverage.

Different results are seen for the effects of the t-2 time lag, as seen in Table 3. The regression results for t-2 time lag effects using Hausman–Taylor show that health DAK has a positive and significant effect on PF coverage, while the KN1 coverage still has a negative effect but has become insignificant.

The regression results of this study being positive and significant for the effects of health DAK on PF coverage with respect to time lags supports the earlier research of Rubio (2011) and Joana et al. (2013). Rubio's (2011) research results reveal that decentralization in Canada has positive and substantial influences on the effectiveness of public policy in improving health in society (as measured by infant mortality). Joana et al. (2013) concluded that devolution of political (and fiscal) authority to the subgovernment level seems to increase health care spending and improve health outputs as measured chiefly through infant mortality.

The regression results show the effect of health DAK on KN1 coverage with a time lag effect has a negative effect, possibly due to the lack of availability of basic emergency neonatal obstetric services (*Pelayanan Obstetrik Neonatal Emergensi Dasar* or *Poned*) in *Puskesmas*. In support of the 2011 Millennium Development Goals Achievement Report for Indonesia, effort has been made to diminish neonatal mortality through the provision of *Poned Puskesmas* a minimum of four times per district/city. These results reinforce the findings of Hodge et al. (2015) that decentralization exacerbates existing problems in the health system, many of which stem from poor governance and technical capacity at the local level. The results presented in the research by Hodge et al. (2015) support the hypothesis that geographic imbalances in the use of health services and outcomes in Indonesia, at least in terms of neonatal health, have worsened since decentralization. Decentralization is likely to be the biggest underlying reason for widening regional disparities. Fundamental problems related to financial disbursement from central to

provincial and district levels, decision space boundaries over service delivery, and local government ownership in the health sector have obstructed the success of the decentralized system in Indonesia.

Table 2. Estimation of health DAK against PF coverage and KN1 coverage with time lag effects t-1.

Variable	(1)	(2)
	PF	KN1
Health_DAKt-1	−0.000973 (0.0321)	−0.0667 * (0.0345)
DBH	0.0523 ** (0.0234)	0.0342 (0.0241)
GRDPcap	0.0590 ** (0.0298)	0.0405 * (0.0240)
Number_preg.women	0.000118 ** (0.0000489)	0.0000751 * (0.0000441)
RFaskes	−0.146 *** (0.0375)	−0.0358 (0.0326)
RNakes	0.0177 (0.0110)	−0.00305 (0.0105)
MYS	1.173 (0.990)	0.393 (0.707)
SAKIP	0.353 *** (0.0873)	0.244 *** (0.0792)
CCI	−0.0582 (0.0819)	−0.0906 (0.0683)
Area_size	−0.00180 *** (0.000289)	−0.000372 * (0.000206)
_cons	52.59 *** (14.06)	84.60 *** (11.95)
N	746	746

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: authors' results.

Table 3. Estimation of health DAK against PF coverage and KN1 coverage with time lag effects t-2.

	(1)	(2)	(3)	(4)
	PF	KN1	PF	KN1
Health_DAKt-1	−0.000973 (0.0321)	−0.0667 * (0.0345)	0.0637 (0.0459)	−0.0321 (0.0355)
Health_DAKt-2			0.0909 * (0.0498)	−0.0536 (0.0385)
DBH	0.0523 ** (0.0234)	0.0342 (0.0241)	0.0605 ** (0.0288)	0.0273 (0.0223)
GRDPcap	0.0590 ** (0.0298)	0.0405 * (0.0240)	0.106 ** (0.0503)	0.0589 (0.0396)
Number_preg.women	0.000118 ** (0.0000489)	0.0000751 * (0.0000441)	0.0000758 * (0.0000414)	0.0000423 (0.0000321)
RFaskes	−0.146 *** (0.0375)	−0.0358 (0.0326)	−0.0152 (0.0465)	−0.0466 (0.0363)
RNakes	0.0177 (0.0110)	−0.00305 (0.0105)	−0.0127 (0.0129)	−0.00222 (0.0100)
MYS	1.173 (0.990)	0.393 (0.707)	1.349 (1.238)	0.977 (0.974)
SAKIP	0.353 *** (0.0873)	0.244 *** (0.0792)	0.318 *** (0.106)	0.321 *** (0.0825)
CCI	−0.0582 (0.0819)	−0.0906 (0.0683)	−0.187 (0.161)	0.0845 (0.125)
Area_size	−0.00180 *** (0.000289)	−0.000372 * (0.000206)	−0.00231 *** (0.000376)	−0.000435 (0.000297)
_cons	52.59 *** (14.06)	84.60 *** (11.95)	51.45 ** (23.92)	60.19 *** (18.62)
N	746	746	382	382

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: authors' results.

The effect of decentralization on health outputs tends to be different in the short and long term because the implementation of regional policies may not immediately follow the implementation of decentralization policies. The new role of the local government following decentralization requires a different set of skills for policy making, planning, and budgeting.

4.4. PF and KN1 Coverage Analysis with Dummy Effect of *Jampersal* Year

Given the insignificant effect of DAK (for regular physical expenditure in the health sector) on PF and KN1 coverage in the short term, it is necessary to explore the possible impact of non-physical health DAK, in particularly Childbirth Assurance (*Jaminan Persalinan* or *Jampersal*). Since 2016, there has been an allocation of *Jampersal* funds in spite of a non-physical DAK in the health sector. Based on Minister of Health Regulation No. 82/2015, the *Jampersal* fund utilizes the provision of birth waiting homes (*Rumah Tunggu Kelahiran* or *RTK*) to enable easy access and prevent delays in services for pregnant women, mothers in labor, postpartum mothers, and newborn babies, especially in areas with difficult access to health facilities. However, due to limited data, this study only covers the use of DAK for regular physical expenditure in health sector. Therefore, to predict the effect of changes in the health DAK policy on PF and KN1 coverage, a dummy variable of the year in which *Jampersal* was introduced is used, namely before and after 2016. A value of 0 is exploited for the year before 2016 and a value of 1 for the year after 2016.

Regression results from the effect of the dummy of *Jampersal* year on PF coverage and KN1 coverage using Hausman–Taylor can be seen in Table 4. The results showed that the dummy *Jampersal* year was able to affect PF coverage and KN1 coverage significantly. The dummy has a positive and significant effect on PF coverage, meaning that the *Jampersal* aspect of DAK is specifically able to increase the number of deliveries in health facilities, while its effect on KN1 coverage is negative and significant, meaning that it has not been able to increase the number of first neonatal visits. This is most likely because *Jampersal* DAK funds are more widely used to mobilize deliveries in health facilities to prevent complications in childbirth through the provision of birth waiting homes (RTK). Moreover, the lack of public knowledge, especially maternity mothers about newborn health services, may be a contributing factor to the insignificant effect of DAK *Jampersal* on KN1 coverage.

In accordance with our empirical results in current and lag time, we have identified a relationship between DAK fund as part of fiscal decentralization and the health output of PF and KN1 at the district level. However, in a short period of time, the estimation results show an insignificant impact on improving public health output. Furthermore, we found that there is a different response of output between PF and KN1 as the impact of health DAK. This impact on KN1 requires a longer time than it does on PF.

Moreover, to make the impact of the health DAK faster, regional governments are expected to be able to carry out various innovations in the field of health services, so that the objectives of national health development can be well achieved. For instance, there are several regions that have succeeded in creating innovations in health service programs, as demonstrated by Banyuwangi's Bumilristi Hunters (high-risk pregnant women), in which health care services are locally financed and mobile vegetable sellers are equipped with smartphones to report Bumilristi in remote areas. Banjarnegara, another innovative district, has developed its well-known program named 'Oce Oke' (One Client One Kader) based in the local *Puskesmas* Pejawaran. This is a form of cadre involvement in monitoring the health of pregnant women through the assistance of One Pregnant Mother by One Regionally Based Cadre (*Siasat Keren*). This program helps minimize causative factors through early detection of pregnant women's life-threatening signs and taking immediate actions upon this matter of (Ministry of Administrative Reform 2019). These thought-provoking innovations can be applied in other regions when utilizing health DAK, and they are expected to contribute to a better achievement of PF and KN.

Table 4. Estimation of health DAK against PF and KN1 coverage with dummy effect of *Jampersal* year.

	(1)	(2)
	PF	KN1
D_JampersalYear	3.764 *** (0.867)	−6.218 *** (0.763)
Heath_DAK	0.00589 (0.0274)	0.0489 ** (0.0246)
DBH	0.0228 (0.0234)	0.0662 *** (0.0207)
GRDPcap	0.0516 ** (0.0230)	0.0434 ** (0.0182)
Number_preg.women	0.000153 *** (0.0000447)	0.0000724 * (0.0000376)
RFaskes	−0.00124 (0.0237)	−0.00410 (0.0202)
RNakes	0.00747 (0.0105)	0.00576 (0.00906)
MYS	0.593 (0.751)	0.628 (0.568)
SAKIP	0.307 *** (0.0729)	0.324 *** (0.0615)
CCI	−0.202 *** (0.0486)	−0.131 *** (0.0396)
Area_size	−0.00160 *** (0.000199)	−0.000501 *** (0.000151)
_cons	69.59 *** (10.25)	74.00 *** (8.339)
N	1276	1276

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: authors' results.

5. Conclusions

This research was conducted with the aim of identifying the distribution impact of health DAK on PF and KN1 coverage. Provision of health DAK is intended to alleviate fund activities in the health sector which are regional affairs in accordance with national health development priorities. Based on the results of the analysis of this research, it can be concluded that in the short term, health DAK has a positive but not significant effect on PF and KN1 coverage. However, the effect is different when using the time lag effect. The health DAK effect is negative and not significant for PF coverage and negative and significant for KN1 coverage at time lag t-1. As indicated by the effects of time lag t-2, health DAK may have a positive and significant influence on PF coverage and negative and insignificant effect on KN1 coverage. This means that health DAK has a positive and significant effect on PF coverage in the second year, while its impact on KN1 coverage has not been seen over a period of two years. A longer period of time is of high importance to reveal the impact of health DAK on KN1 coverage.

The impacts of health DAK on health outputs tend to be different in the short and long term because they can be influenced by factors outside the DAK itself, such as the availability of human resources (HR) and procurement factors related to the physical construction of health facilities. Having identified the insignificant effect of physical health DAK on PF and KN1 coverage in the short term, it is necessary to explore the possible impact of *Jampersal's* non-physical DAK policy. The results of the analysis using the *Jampersal* dummy year indicate that *Jampersal* can predict PF and KN1 coverage significantly, result in positive and significant outcomes for PF coverage, and negative and significant effects on KN1 coverage. This latter one also shows the possible impact of the *Jampersal* health DAK, in particular.

Although we have tried to examine the impact of health DAK on both PF and KN1 in current and lag time, the results may be sensitively affected by a short period of analysis. This implies that the data

might not show ample variations to capture the impacts of health DAK. Furthermore, this short period of study has restricted us from conducting a longer period of observations that can lead to a more reliable estimation.

The different responses of output between PF and KN1 demonstrate that the impact of health DAK on KN1 requires a longer time to take effect compared to PF. Since the DAK health budget allocation increases on an annual basis, it has a potential role for this fund in supporting the achievement of national development targets, including PF and KN1, through equalizing health development of distribution of the supply side of health services. However, it should be noted that this health DAK fund is not the only source of health sector development, and the regional government should take part in the financing of local health development; one of the instruments to achieve national development targets through better innovation health program in utilizing the fund. Furthermore, the planning, budgeting, and administration processes of health DAK need to be carried out more effectively so that the benefits can be felt in the short term as in multi-year health DAK budgeting. In addition, better monitoring and evaluation is needed so that transparency and accountability in budgeting and expenditure of health DAK at the district/city level can be sufficiently achieved.

It is plausible that a number of limitations might have influenced the results obtained. The health DAK variable used is only DAK for regular physical expenditure in health sector including subfields of basic health services, referral health services, and pharmaceutical services. This limitation is due to the unavailability of non-physical DAK health data at the district/city level, where there is a more specific budget for activities that are related to health services for mothers and children, namely childbirth assurance (*Jampersal*). In addition, the time period used is not sufficiently lengthy to accommodate the long-term impacts of health DAK that may arise. Further studies should target those issues.

Author Contributions: Conceptualization, investigation, data collection, methodology, validation, writing—original draft preparation, A.P.A.; Conceptualization, methodology, validation, writing—review and editing, supervision, funding acquisition, K.K. All authors have read and agreed to the published version of the manuscript.

Funding: The authors received research grant—Hibah PITMA B 2019, Universitas Indonesia.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Anand, Sudhir, and Till Barnighausen. 2004. Human resources and health outcomes: Cross-country econometric study. *The Lancet* 364: 1603–9. [\[CrossRef\]](#)
- Anton, Sorin, and Mihaela Onofrei. 2012. Health care performance and health financing systems in countries from central and Eastern Europe. *Transylvanian Review of Administrative Sciences* 8: 22–32.
- Asfaw, Abay, Klaus Frohberg, K. S. James, and Johannes P. Jutting. 2007. Fiscal decentralization and infant mortality: Empirical evidence from rural India. *The Journal of Developing Areas* 41: 17–34. [\[CrossRef\]](#)
- Azfar, Omar, Satu Kähkönen, Anthony Lanyi, Patrick Meagher, and Diana Rutherford. 1999. *Decentralization, Governance and Public Services: The Impact of Institutional Arrangements: A Review of the Literature*. College Park: University of Maryland.
- Cantarero, D., and Marta Pascual. 2008. Analysing the impact of fiscal decentralization on health outcomes: Empirical evidence from Spain. *Applied Economics Letters* 15: 109–11. [\[CrossRef\]](#)
- Central Bureau of Statistics. 2017. *Provincial and Regency/City Construction Cost/Price Index*; Jakarta: Central Bureau of Statistics.
- Channa, Anila, and Jean-Paul Faguet. 2016. Decentralization of health and education in developing countries: A quality-adjusted review of the empirical literature. *The World Bank Research Observer* 31: 199–241. [\[CrossRef\]](#)
- Cinar, Fadime, Erol Eren, and Hatun Mendes. 2013. Decentralization in Health Service and Its Impact: SWOT Analysis of Current Application in Turkey. *Procedia-Social and Behavioral Science* 99: 711–18. [\[CrossRef\]](#)
- Di Novi, Cinzia, Massimiliano Piacenza, Silvana Robone, and Gilberto Turati. 2019. Does fiscal decentralization affect regional disparities in health? Quasi-experimental evidence from Italy. *Regional Science and Urban Economics* 78: 103465. [\[CrossRef\]](#)
- Directorate of Family Health. 2018. *LAKIP the Directorate of Family Health 2017*; Jakarta: Ministry of Health.

- Girma, Fitsum, Challi Jira, and Belaineh Girma. 2011. Health services utilization and associated factors in Jimma Zone, South West Ethiopia. *Ethiopian Journal of Health Sciences* 21: 85–94.
- Gujarati, Damodar N. 2003. *Basic Econometri*, 4th ed. New York: McGraw-Hill.
- Gupta, Sanjeev, Marijn Verhoeven, and Erwin R. Tiongson. 2003. Public spending on health care and the poor. *Health Economics* 12: 685–96. [CrossRef]
- Hao, Yu, Jiahui Liu, Zhinan Lu, Ruijie Shi, and Haitao Wu. 2020. Impact of income inequality and fiscal decentralization on public health: Evidence from China. *Economic Modelling*, in press. [CrossRef]
- Heywood, Peter, and Yoohyoung Choi. 2010. Health system performance at the district level in Indonesia after decentralization. *BMC International Health and Human Rights* 10: 3. [CrossRef] [PubMed]
- Heywood, Peter, and Nida P. Harahap. 2009. Public funding of health at the district level in Indonesia after decentralization—sources, flows and contradictions. *Health Research Policy and Systems* 7: 5. [CrossRef] [PubMed]
- Hodge, Andrew, Sonja Firth, Eliana Jimenez-Soto, and Laksono Trisnantoro. 2015. Linkages between decentralisation and inequalities in neonatal health: Evidence from Indonesia. *The Journal of Development Studies* 51: 1634–52. [CrossRef]
- Jiménez-Rubio, Dolores, and Pilar García-Gómez. 2017. Decentralization of health care system and health outcomes: Evidence from a natural experiment. *Social Science & Medicine* 188: 69–81.
- Jin, Yinghua, and Rui Sun. 2011. Does fiscal decentralization improve healthcare outcomes? Empirical evidence from China. *Public Finance and Management* 11: 234–61.
- Joana, Alves, Peralta Susana, and Perelman Julian. 2013. Efficiency and equity consequences of decentralization in health: An economic perspective. *Revista Portuguesa de Saude Publica* 31: 74–83.
- Kang, Youngju, Wonhyuk Cho, and Kwangho Jung. 2012. Does decentralization matter in health outcomes? Evidence from 22 OECD unbalanced panel data for 1995–2005. *International Review of Public Administration* 17: 1–32. [CrossRef]
- Maharani, Asri. 2015. Decentralisation, Performance of Health Providers and Health Outcomes. Ph.D. thesis, University of Manchester, Manchester, UK.
- Ministry of Administrative Reform. 2019. Reduce Maternal and Infant Mortality Rate with OKe OKe Cool Strategy. Available online: <https://www.menpan.go.id/site/berita-terkini/kurangi-angka-kematian-ibu-dan-bayi-dengan-oke-oke-siasat-keren> (accessed on 6 September 2020).
- Ministry of Health of the Republic of Indonesia. 2017. *Indonesia Health Profile 2016*. Jakarta: Ministry of Health of the Republic of Indonesia.
- Ministry of Health of the Republic of Indonesia. 2018. *Indonesia Health Profile 2017*. Jakarta: Ministry of Health of the Republic of Indonesia.
- Nababan, Herfina Y., Md Hasan, Tiara Marthias, Rolina Dhital, Aminur Rahman, and Iqbal Anwar. 2018. Trends and inequities in use of maternal health care services in Indonesia, 1986–2012. *International Journal of Women's Health* 10: 11–24. [CrossRef]
- National Institute of Health Research and Development of Ministry of Health. 2019. *Riskesdas National Report 2018*; Jakarta: Ministry of Health.
- Nixon, John, and Philippe Ulmann. 2006. The relationship between health care expenditure and health outcomes. Evidence and caveats for a causal link. *The European Journal of Health Economics* 7: 7–18. [CrossRef]
- Prud'homme, Rémy. 1995. The dangers of decentralization. *The World Bank Research Observer* 10: 201–20. [CrossRef]
- Rakmawati, Trisya, Reece Hinchcliff, and Jerico Franciscus Pardosi. 2019. District-level impacts of health system decentralization in Indonesia: A systematic review. *International Journal of Health Planning and Management* 34: e1026–53. [CrossRef] [PubMed]
- Rosalia, Feni, and Dian Kagungan. 2017. The Effect of Decentralization on Health Services: The Experience of Pesawaran District, Lampung Province, Indonesia. *The Social Sciences* 12: 2164–8.
- Rubio, Doroles Jiménez. 2011. The impact of decentralization of health services on health outcomes: Evidence from Canada. *Applied Economics* 43: 3907–17. [CrossRef]
- SMERU Research Institute. 2019. *Thematic Report of the Midline MAMPU Study, Theme 4: Improving Women's Health and Nutrition Status*. Jakarta: The SMERU Research Institute.
- The General Secretary of the Ministry of Health of the Republic of Indonesia. 2017. Health Sector Seminar: Joint Efforts to Improve the Quality of Development. In *The Health Sector in Order to Improve Public Health Standards*. Jakarta: Secretary General Ministry of Health.

UNFPA Indonesia and Gadjah Mada University Health Policy and Management Center. 2014. *Review of Jampersal 2013: Collaborative Research for Ten Regencies of Indonesia*. Jakarta: UNFPA Indonesia. Available online: <https://indonesia.unfpa.org/sites/default/files/pub-pdf/Jampersal%20English%20Rev%20080514.pdf> (accessed on 6 September 2020).

World Bank. 2008. *Invest in Indonesian Health Sector: Challenges and Opportunities for Future Public Expenditure*. Jakarta: World Bank.

World Health Organization. 2008. *Skilled Birth Attendants (Fact Sheet)*. Geneva: World Health Organization.



© 2020 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).