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Attributes of funding flows and quality of maternal health services in a mixed provider payment system: A cross-sectional survey of 108 healthcare providers in Indonesia

Dorit Talia Stein[1,2] | **Mukhammad F. Rakhmadi**[3] | **Arin Dutta**[2,4] | **Jorge I. Ugaz**[2]

[1]Department of Global Health and Population, Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA

[2]Palladium, Health Policy Plus Project, Washington, District of Columbia, USA

[3]Palladium, Health Policy Plus Project, Jakarta, Indonesia

[4]Asian Development Bank, Manila, Philippines

Correspondence

Jorge I. Ugaz, Palladium, 1331 Pennsylvania Ave NW #600, Washington, DC 20004, USA.
Email: jorge.ugaz@thepalladiumgroup.com

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Abstract

Strategic purchasing of health services requires developing a coherent set of incentives across financing sources. In many countries, including Indonesia, healthcare providers engage with multiple financing sources. It is not well known how multiple funding flows in these mixed provider payment systems may interact at the facility level to influence provider behavior, quality of care, and ultimately health outcomes. Our study explored the association between facility capacity to provide high-quality maternal and newborn care at delivery and various attributes of facility funding, including funding flexibility, sufficiency of funds to cover direct costs, predictability of funds in timing and amount, and facility autonomy to make management decisions (decision space). We used survey data collected from primary and secondary maternal healthcare providers ($n = 108$) across eight provinces in Indonesia. We constructed a technical quality index that measures facility capacity to provide high-quality delivery care and several financing measures that summarize provider perceptions of flexibility, sufficiency, predictability of fund flows, and provider decision space. We found a statistically significant association between the decision space index score and the technical quality index score among hospitals and public primary care providers. One additional point on the decision space index was associated with an additional 0.15 ($p = 0.021$; 95% confidence interval: 0.024–0.275) on the quality index score after controlling for provider characteristics and geographic location. Our findings suggest that increasing facility autonomy to make management decisions may be one avenue for improving facility capacity to provide high-quality care in systems where providers deal

with multiple fund flows with varying attributes. Design of strategic purchasing reforms must consider the full context in which providers operate to streamline incentives and ensure providers have the capacity to respond to those incentives appropriately.

KEYWORDS

healthcare quality, maternal health, provider payment, strategic purchasing

Key points

- Healthcare providers in mixed provider payment systems like Indonesia receive funding from many funding sources with varying attributes and requirements that may interact at the facility level to influence provider behavior and quality of care.
- We found that increased facility independence in making administrative, management, and service delivery decisions was associated with higher capacity to manage obstetric and neonatal complications and provide high-quality delivery care among a sample of maternal healthcare providers in Indonesia.
- Design of strategic purchasing reforms in mixed provider payment systems must consider the full context in which providers operate in order to streamline incentives and ensure providers have the capacity to respond to those incentives appropriately.

Improved maternal and neonatal health (MNH) outcomes are a priority in the Government of Indonesia's medium-term health sector development plans, given that mortality rates remain higher than those in comparable countries in the region. Indonesia's rate of 305 maternal deaths per 100,000 live births has shown only slow improvement over the past two decades despite more women delivering in facilities with skilled birth attendants (Agustina et al., 2019). Reform of payment systems with a strategic purchasing lens can contribute to the country's MNH goals by improving the quality of care provided to women and newborns at the facility level.

Strategic purchasing of health services is a tool used to influence the efficiency and quality of health service delivery (Busse et al., 2007; World Health Organization, 2010). This includes designing payment systems that purposefully purchase a mix of services from selected health providers via payment mechanisms and contractual arrangements that are designed to encourage efficient and effective service delivery, based on a coherent set of provider performance incentives. Although strategic purchasing is usually discussed in the context of a single purchaser or payment mechanism, in many countries, providers are required to engage with multiple purchasers and funding flows that may employ different payment mechanisms, and that may be governed by different laws and regulations (Busse et al., 2007; World Health Organization, 2010; World Health Organization, 2017). The combination of all provider payment mechanisms constitutes a mixed provider payment system (World Health Organization, 2010).

In Indonesia, the use of multiple, nonaligned funding flows with multiple payment methods to purchase health services can make strategic purchasing complex, leading to unpredictable or

unintended effects on provider behavior and ultimately health outcomes (Cashin et al., 2015; Feldhaus & Mathauer, 2018; Langenbrunner et al., 2009). MNH providers in Indonesia engage with multiple financing sources, with only the National Health Insurance Scheme (Jaminan Kesehatan Nasional [JKN]) conducting some active purchasing of services, and the other sources providing passive funding. JKN payments to providers, however, were estimated to represent only 21% of total health expenditure in 2017 and the scheme's share of provider income, although growing, is similarly estimated to be low (Dutta et al., 2020). Effective strategic purchasing for MNH services through JKN will therefore require more than an understanding of how providers respond to JKN payments in isolation. It will require a holistic assessment of the complex funding landscape for health services that comprises most provider income in the country. Proposed frameworks based on qualitative evidence have described the potential influence of varying fund flow attributes on provider behavior (Mbau et al., 2018). However, there is limited quantitative evidence on how funds flowing to facilities in multiple revenue streams with varying attributes may interact at the facility-level to influence quality of care.

Evidence on how Indonesia's multiple fund flows for MNH services may—or may not—enable delivery of high-quality care is essential to inform the design of strategic purchasing reforms that the Ministry of Health is considering. To generate this evidence, we collected data from a sample of healthcare facilities in Indonesia to assess the relationship between a facility's capacity to provide high-quality delivery care and various attributes of facility funding—including the perceived sufficiency, flexibility, and predictability of overall provider funding, as well as provider autonomy to make management and service delivery decisions. The findings of our study can be used to inform strategic purchasing reforms aimed at MNH services. The findings also contribute to greater understanding of how multiple funding flows in mixed provider payment systems can influence provider behavior, the quality of care, and, ultimately, health outcomes.

METHODS

Analytical framework

For this study, we relied on a multiple funding flow framework proposed by Mbau et al. (2018), which suggests the possible attributes of funding flows that can influence provider behavior—including how much each fund flow contributes to total provider revenue, the adequacy of the fund flow to cover costs of providing services, the level of managerial

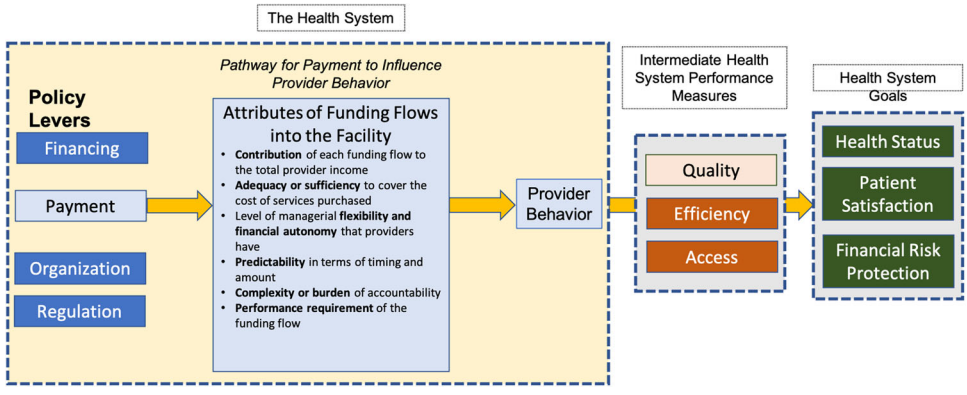

FIGURE 1 Analytical framework. Framework adapted from Roberts et al. (2008) and Mbau et al. (2018).

flexibility and financial autonomy that facilities have, the predictability of funding, and the complexity of accountability and performance requirements. Figure 1 illustrates how attributes of multiple funding streams may influence provider behavior, the quality of care, and health system goals, additionally drawing on a broader health systems framework proposed by Roberts et al. (2008). In this study, we aimed to measure these fund flow attributes and assess their association with facility capacity to provide high-quality delivery care.

Study setting

Several elements of the Indonesian health financing and delivery system are relevant for understanding the strategic purchasing context for this study, including decentralized governance of the health sector and the mixed provider payment system for MNH services.

Decentralization

Indonesia's health system is decentralized with local governments (districts and provinces) playing a substantial role in health financing and service delivery through investments in supply-side service readiness. More than half (65%) of public health spending in Indonesia is from subnational government budgets (Pinto et al., 2016). Even though subnational budgets are mostly funded by fiscal transfers from the central government, most transfers are unconditional with only one fund—the health special allocation fund—being earmarked for health spending, allowing subnational governments to allocate flexible transfers based on their own priorities (Dutta et al., 2020). In practice, this means there can be significant variation in the level of total health spending at the local level that compounds geographic inequities in supply-side service readiness (World Bank Group, 2018). In addition to budget allocations, local governments are responsible for ensuring minimum service standards are met, which are detailed technical standards for quality provision of mandatory health services including MNH services (Teplitskaya et al., 2021).

Mixed provider payment for MNH services

In Indonesia, MNH services provided in public facilities are financed by funding flows from various purchasers that employ different payment mechanisms (Figure 2). JKN pays primary healthcare providers through capitation for most primary care services but pays for MNH services through fee-for-service. Hospitals are paid for maternal health services through Indonesia case-based groups, a form of diagnosis-related group payments. Public healthcare providers additionally receive funding through budget allocations from local government, which are mostly fiscal transfers from central government earmarked for health but also from local (own-source) revenues and block grants for specific district programs. Public and private providers also collect revenue through patient out-of-pocket payments (Stein & Dewi, 2020). Private midwife practices can contract with JKN only through already empaneled primary healthcare facilities. Payments from JKN to midwives are thus first sent to the primary healthcare facility and then forwarded to the midwife who provided the services.

Some government-owned hospitals and primary healthcare facilities in Indonesia can be designated as local community service agencies (Badan Layanan Umum Daerah [BLUD]). BLUDs are granted considerable autonomy and flexibility in financially managing the facility

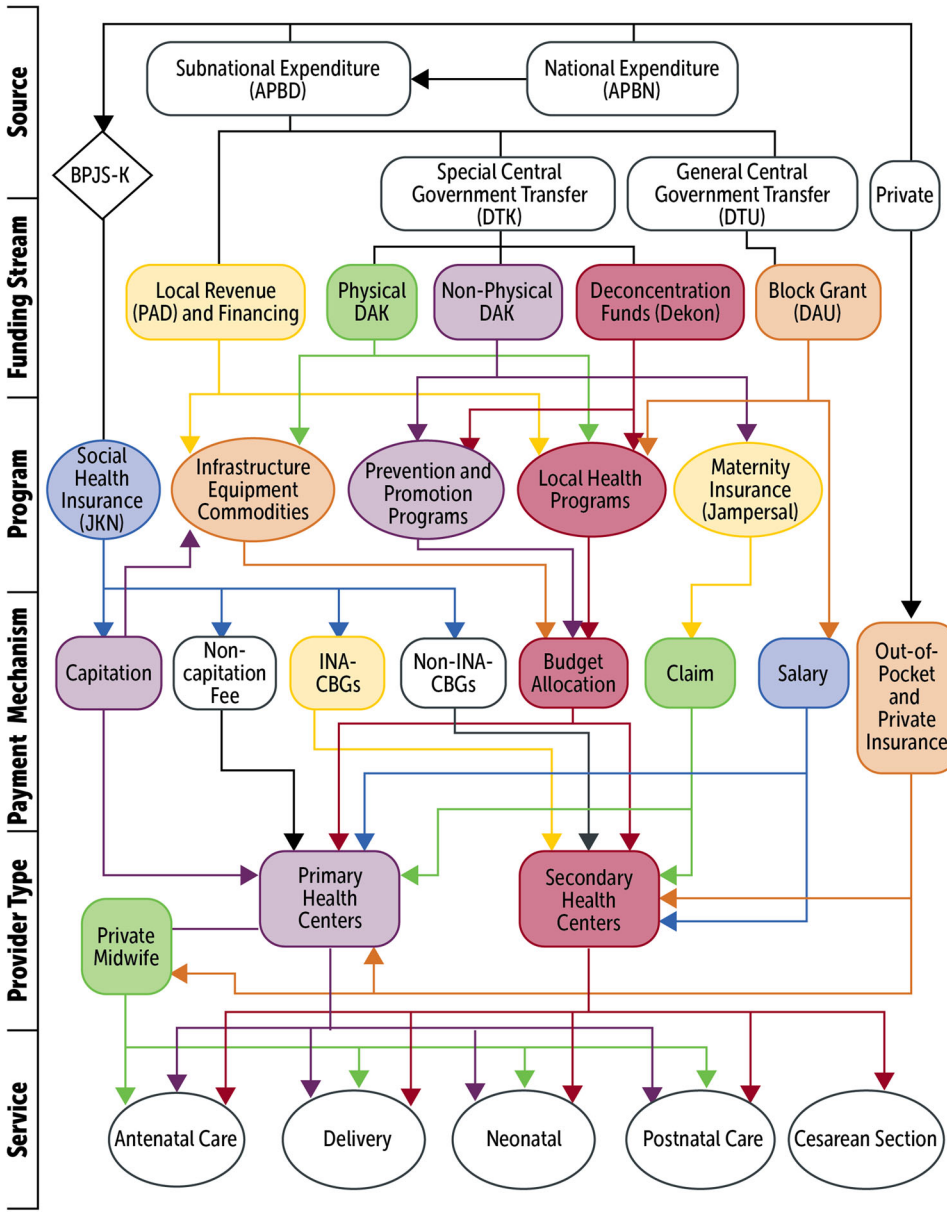

FIGURE 2 Funding flows from source to service for maternal and neonatal health service delivery in Indonesia, among public providers. This funding flow diagram is only applicable to public primary and secondary healthcare providers and does not include village-level financing (i.e., the Dana Desa village fund) or providers below the primary healthcare level, including puskesmas pembantu, posyandu, polindes, and others. APBD, Anggaran Pendapatan dan Belanja Daerah; APBN, Anggaran Pendapatan dan Belanja Negara; BPJS-K, Badan Pelaksana Jaminan Sosial Kesehatan; DTK, Dana Transfer Khusus; DTU, Dana Transfer Umum; PAD, Pendapatan Asli Daetah; DAK, Dana Alokasi Khusus; DAU, Dana Alokasi Umum; Jampersal, Jaminan Persalinan; JKN, Jaminan Kesehatan Nasional; INA-CBGs, Indonesian Case-Based Groups.Source: Figure from Stein & Dewi, 2020

(Harmadi & Irwandy, 2018). In the context of MNH payments, among other management benefits, BLUDs can directly receive payment from JKN and keep revenue from user fees, whereas payments to non-BLUDs must be routed through local governments (via district treasury offices) that then pool and reallocate facility revenue through the local budgeting process. This can result in delays and potential reprioritization of facility funding (Kolaborasi Masyarakat dan Pelayanan untuk Kesejahteraan [KOMPAK], 2017).

Study design and sample

We collected data from multiple types of facilities across a sample of provinces and districts in Indonesia. We used a multiple-stage mixed sampling strategy, combining both purposive and random sampling methods. First, a total of 8 provinces out of 34 were purposively sampled, considering that these provinces were identified as priority areas for MNH services by the Directorate of Family Health and Sub-Directorate of MNH. Within each province, we selected two rural and one urban district for a total of 24 districts by simple random sampling. Supporting Information: Appendix Table A shows the final provinces and districts selected for the study. Supporting Information: Appendix Table B displays the number of each type of facility in the final sample ($n = 108$) for this study.

Within each of the 24 districts, we sampled five facilities: two public primary care facilities (Puskesmas) with basic emergency obstetric and neonatal care capacity, one public primary care facility without inpatient services, one private primary care facility (a nonspecialist joint practice private clinic called Klinik Pratama), one private or public hospital (Rumah Sakit), and one private midwife practice (Bidan Praktek Mandiri). We selected the primary care facilities using stratified random sampling by facility type using master facility lists and included only facilities that were empaneled into JKN and that reported providing at least one of antenatal care, delivery, or postnatal care services.

As there was no sampling frame available and we wanted to survey private midwife practices that contract with JKN through our sampled primary care facilities, we selected private midwife practices using snowball sampling: we asked the sampled primary care facilities to identify and share contact information from one private midwife practice in their district that contracted with JKN and we selected the most-mentioned private midwife to be interviewed. We also used snowball sampling to identify and select one referral hospital per district. To ensure we sampled the most likely hospitals that maternity patients would be referred to for higher-level care, we asked the sampled primary care facilities in each district to inform us which hospital—public or private—they most referred to for MNH complications.

Data were collected on tablets using the Computer-Assisted Personal Interviewing program in the CS-Pro data entry software system. Interviews were recorded for quality checks. The survey instrument was translated from English to Bahasa Indonesia and back into English, to ensure a proper and effective translation. The survey instrument was also piloted before being deployed by trained data collectors in all sampled districts.

Measures

Dependent variable

Our main dependent variable was facility capacity to handle obstetric and newborn complications and thus provide high-quality delivery care. We measured this by constructing

a 16-item technical quality index using previously validated process of care measures (Gabrysch et al., 2012; Tripathi et al., 2015). The index measures the reported performance of signal functions in the last three months that are essential for preventing maternal and newborn mortality during delivery (signal functions included in the index are listed in Supporting Information: Appendix Table C). By definition, the index ranges between 0 (when no signal functions were reported performed) and 1 (when all 16 signal functions were reported performed). Survey questions measuring performance of signal functions were adapted from Columbia's Averting Maternal Death and Disability Toolkit (Columbia University Mailman School of Public Health, 2010).

Independent variables

Guided by the analytical framework (Figure 1), we constructed and included measures to represent provider perceptions of funding flow attributes that may influence provider behavior and quality of care. First, we calculated the contribution of each fund flow to overall facility revenue using reported facility revenues from 2018. Next, for each facility we assessed the perceived flexibility of its total revenue by creating a flexibility score. This score represents the proportion of facility revenue that was rated as being "very limiting" when trying to spend it (compared to "somewhat limiting," "not limiting at all," and "not having any earmarks or restrictions"). Respondents rated the flexibility of each revenue stream and we weighted the ratings by the proportion of facility revenue coming from that revenue stream. This flexibility score thus represents providers' perception of how limiting or inflexible their revenue is to use. Facilities with higher flexibility scores are operating under a perceived scenario of more restrictive—less flexible—funding.

We also calculated a sufficiency score for JKN payments for MNH services (Supporting Information: Appendix Table D). This score represents the proportion of MNH services provided by the facility whose costs were reported either as always or often fully covered by JKN. If providers said that JKN payments for services "always" or "often" covered direct costs (compared with "sometimes" or "never"), we assigned that service a value of 1. We then divided the sum by the number of MNH services the facility reported providing. Thus, the sufficiency score represents provider perceptions of the proportion of MNH services provided for which JKN payments were deemed to sufficiently cover the service provision costs.

We calculated a decision space score that represents the independence of facilities to make administrative, financing, and service delivery decisions. This decision space measure was based on the decision space framework proposed by Bossert (1998). We used survey questions adapted from the decision-making section of the healthcare facility instrument from the Indonesia Family Life Survey (Strauss et al., 2016) (Supporting Information: Appendix Table E includes the list of decisions considered). We assigned each facility a score of one when it reported making a decision independently; facilities with other responses (such as "the facility makes a recommendation to a higher authority" and "facility mainly follows the decision/order of a higher authority") were given a score of 0. Using the scores for nine types of decisions, we built an overall decision space score that represented the proportion of the nine decisions that each facility reported making independently.

Lastly, we calculated predictability scores. For this, we measured providers' perceptions of the predictability—in terms of both timing and amount—of their revenue streams. We calculated the proportion of each facility's revenue that was reported as

"predictable" or "somewhat predictable" in timing (when the funding will be available) and amount (how much funding will be disbursed). The predictability scores thus represent the proportion of each facility's revenue that facilities considered certain or predictable.

We included in the analysis other control variables that may be related to provider capacity to provide high-quality delivery care. These include dummy variables for facility type (primary or secondary care facility, or private midwife practice), ownership (public or private facility), and local community service agency status (BLUD or non-BLUD). Only hospitals and public primary care facilities can be classified as BLUD or non-BLUD and, as explained above, BLUD facilities have more financial autonomy compared to non-BLUD facilities.

Statistical analysis

For our analysis, we first described the reported contribution of each funding flow to overall provider income by provider type. Next, we described key variables included in the analysis, including capacity to provide high-quality delivery care, flexibility, sufficiency, decision space, and predictability scores to assess measure variation by facility type, ownership status, and BLUD status.

We ran multivariable linear regression models to assess the association between facility capacity to provide high-quality delivery care and each of the financing measures (flexibility, sufficiency, decision space, and predictability scores). The regression models included province-level fixed effects to control for geographic distribution of facilities and time-invariant health system differences across provinces. We also included dummy variables for facility type (primary care, secondary care, or midwife practice) and ownership status (public or private). SEs were clustered at the district level in all regression models. Lastly, we ran the same models but restricted the sample to hospitals and public primary care providers (i.e., excluding private clinics and midwives) to additionally control for facility BLUD status that is only applicable to those two facility types. All analyses were conducted in Stata v16.1.

RESULTS

Of the 108 healthcare facilities surveyed for this study, we retained 87 for this analysis (Table 1), as 21 facilities reported not providing delivery services and thus a technical quality index could not be constructed. Almost 60% (52) of the facilities were public, and among hospitals and puskesmas, 43.9% (25) were BLUD. Table 1 also shows the mean number of ANC visits, live births, and prenatal care visits and facility infrastructure variables among facilities in the analytical sample.

The contribution of JKN to total provider revenue was highest among private providers. JKN payments accounted for 67% of private clinic revenue, 48% of private midwife revenue, 43% of puskesmas revenue, and 31% of hospital revenue in 2018 (Figure 3). All provider types received revenue from client out-of-pocket payments, donors, and/or private sources, with private midwife practices relying mostly on "other" funding (accounting for 51% of overall revenue). Puskesmas and hospitals also received national government funding (11% of puskesmas revenue and 10% of hospital revenue) and subnational government funding (27% of puskesmas revenue and 35% of hospital revenue).

TABLE 1 Facility sample characteristics ($N = 87$)

	n (%)/Mean (SD)
Facility type	
Hospital	22 (25.3)
Puskesmas with inpatient	23 (26.4)
Puskesmas without inpatient	12 (13.8)
Private clinic	12 (13.8)
Private midwife practice	18 (20.7)
Facility ownership status	
Public	52 (59.8)
Private	35 (40.2)
BLUD status[a] ($N = 57$)	
BLUD	25 (43.9)
Non-BLUD	32 (56.1)
Service delivery volume (Year 2019)	
Antenatal care visits ($N = 81$)	788.3 (945.9)
Live births ($N = 83$)	379.0 (706.0)
Postnatal care visits ($N = 76$)	308.9 (624.5)
Facility infrastructure	
Inpatient beds ($N = 54$)	61.7 (81.9)
Inpatient maternity beds ($N = 64$)	7.2 (8.7)
Functional blood bank ($N = 69$)	12 (17.4)

Abbreviation: BLUD, Badan Layanan Umum Daerah.

[a]Only applicable among hospitals and public primary care providers.

Table 2 shows the average quality and financing measures by facility type, ownership status (public and private), and BLUD status. The average technical quality index is significantly higher among hospitals compared with primary care facilities (which includes puskesmas, private clinics, and private midwife practices; $p < 0.001$), higher among public facilities compared with private ($p = 0.050$), and higher among BLUD facilities compared to non-BLUD facilities ($p = 0.016$). Flexibility scores were higher among public facilities compared to private ($p < 0.001$), meaning public facilities judged that a higher proportion of facility revenue (56%) was very limiting when trying to spend compared with private facilities (7%). There were no differences in flexibility scores comparing hospitals with primary care providers ($p = 0.358$) or comparing BLUD and non-BLUD facilities ($p = 0.824$).

By facility type, on average, hospitals reported higher levels of sufficiency for JKN payments to cover direct costs of the MNH services than did primary care providers ($p = 0.025$). Likewise, public providers reported higher levels of JKN payment sufficiency compared with private providers ($p = 0.003$) and BLUD rated sufficiency higher than did

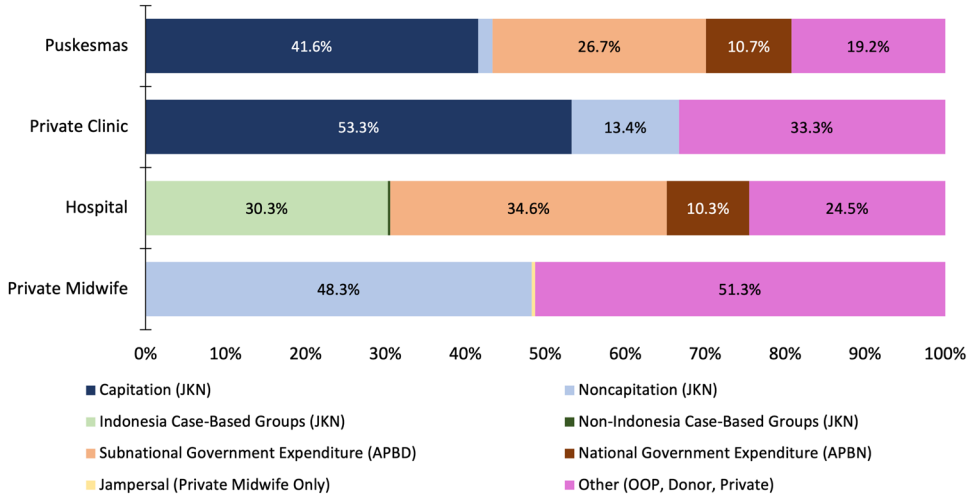

FIGURE 3 Proportion contribution of revenue sources to total revenue, by provider type. Jampersal refers to Jaminan Persalinan or childbirth services guarantee/insurance. Capitation payments are only relevant for public primary healthcare facilities (Puskesmas), whereas noncapitation payments are only relevant for primary healthcare facilities (Puskesmas, private clinics, and private midwife practices). Indonesia Case-Based Groups and Non-Indonesia Case-based Group payments are only relevant for hospitals.

non-BLUD facilities ($p = 0.042$). In terms of autonomy to make management decisions, hospitals, on average, reported a greater degree of autonomy to make decisions independently (see decision space) compared with primary care facilities ($p = 0.017$). Private facilities reported significantly higher decision space scores compared with public facilities ($p < 0.001$), whereas there was no difference in decision space between BLUD and non-BLUD facilities ($p = 0.148$). Public facilities rated a higher proportion of their revenue as predictable in timeliness ($p < 0.001$) and amount ($p < 0.001$) compared with private facilities. BLUD facilities reported lower scores in terms of predictability of their revenue amount compared with non-BLUD facilities ($p = 0.034$) but there were no differences in predictability scores in terms of timing ($p = 0.662$). There were no significant differences between hospitals and primary care providers on the predictability scores ($p = 0.401$ for timing and $p = 0.248$ for amount).

Among BLUD-eligible facilities, we found a statistically significant association between the decision space index and the technical quality index score (Figure 4). According to our estimates, one additional point on the decision space index was associated with an additional 0.15 ($p = 0.021$; 95% confidence interval: 0.024–0.275) on the quality index score after controlling for provider characteristics and geographic distribution. This translates to an additional 2.4 signal functions being performed for every additional point on the decision space index. The association between decision space and the technical quality index almost reached significance in the full sample ($p = 0.076$). There were no significant associations between the sufficiency, flexibility, and predictability scores and the capacity to provide high-quality delivery care in the full sample or in the sub-sample of BLUD-eligible facilities (hospitals and puskesmas only). Coefficients and 95% confidence intervals for all the regressions can be found in Supporting Information: Appendix Table F.

TABLE 2 Mean quality index and financing measures by facility type, ownership status, and BLUD status

	Quality index, mean (SD)	Financing measures, mean (SD)				
		Flexibility	Sufficiency	Decision space	Predictability (timing)	Predictability (amount)
Facility type						
Hospital, $N = 22$	0.88*+ (0.11)	0.52 (0.45)	0.63*+ (0.40)	0.52*+ (0.28)	0.55 (0.37)	0.52 (0.41)
Puskesmas, $N = 35$	0.51 (0.09)	0.51 (0.41)	0.49 (0.40)	0.24 (0.23)	0.67 (0.31)	0.62 (0.36)
Private clinic, $N = 12$	0.45 (0.17)	0.09 (0.30)	0.45 (0.33)	0.62 (0.33)	0.60 (0.41)	0.32 (0.39)
Private midwife, $N = 18$	0.49 (0.08)	-	0.21 (0.23)	-	-	-
Ownership status						
Public, $N = 52$	0.62* (0.19)	0.56* (0.41)	0.57* (0.40)	0.30* (0.24)	0.62* (0.33)	0.58* (0.38)
Private, $N = 35$	0.54 (0.20)	0.07 (0.26)	0.29 (0.29)	0.66 (0.32)	0.27 (0.41)	0.19 (0.35)
BLUD status						
BLUD, $N = 25$	0.72* (0.21)	0.50 (0.44)	0.66* (0.35)	0.41 (0.27)	0.60 (0.36)	0.46* (0.40)
Non-BLUD, $N = 32$	0.59 (0.19)	0.53 (0.42)	0.45 (0.42)	0.30 (0.29)	0.64 (0.33)	0.68 (0.33)
Overall						
	0.59 (0.20)	0.45 (0.43)	0.46 (0.38)	0.39 (0.31)	0.49 (0.40	0.43 (0.41)
	$N = 87$	$N = 67$	$N = 87$	$N = 69$	$N = 85$	$N = 85$

Note: Mean values are reported in the table and SDs are in parantheses. BLUD (local community service agency) is only applicable to hospitals and public primary care providers. Among the financing measures, only sufficiency was measured for private midwife practices.

Abbreviation: BLUD, Badan Layanan Umum Daerah.

*Statistically significant ($p < 0.05$) difference between groups.

+For comparison between hospitals and primary care facilities (which includes puskesmas, private clinics, and private midwife practices).

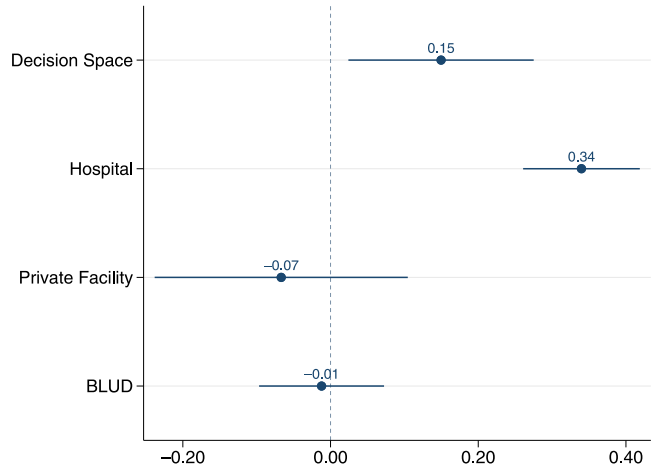

FIGURE 4 Coefficient plot from linear regressions to assess association between technical quality index and decision space, among BLUD-eligible facilities ($N = 57$). Horizontal bars represent 95% confidence intervals (CIs). Model included indicators for facility type (primary care or hospital), ownership status (private or public), BLUD status, and province fixed effects with SEs clustered at the district level. Regression coefficient values and 95% CIs can be found in the Supporting Information: Appendix Table F.

DISCUSSION

Overall, the mechanics of resource flows and extent of decentralization in Indonesia have led to an increasing yet variable degree of autonomy for facilities to make management decisions and flexibility in use of their revenue (World Bank Group, 2018). The impact of this autonomy and flexibility on the quality of healthcare delivered is hence of interest. In our study, we found that increased facility independence in making administrative, management, and service delivery decisions was associated with higher capacity to manage obstetric and neonatal complications. Each additional decision that facilities can make independently was associated with an additional 2.4 signal functions essential for preventing maternal and newborn mortality being performed in the last three months, after controlling for relevant covariates. Albeit this finding does not imply causality and is mainly descriptive, our findings support the claim that increasing facility autonomy to make decisions may be one avenue for improving facility capacity to provide high-quality delivery care. Across several settings, decision space has been found to be associated with improved facility performance and response to incentives, and many performance-based financing programs also prioritize improvements in facility managerial autonomy (de Walque et al., 2017; Duran et al., 2020; Friedman et al., 2016). Strategic purchasing reforms that aim to influence provider behavior as a means to improve the quality of services should then be cognizant of facility autonomy to adapt to incentives. Facilities need to be empowered and must have the managerial autonomy to use resources to solve problems with local strategies and to respond to the needs of the populations they serve (Cashin et al., 2017).

We also found important differences in the perceived flexibility of facility funding by ownership status. Private facilities in our sample rated 7% of their overall facility revenue as limiting to use compared with public facilities, which rated 56% of their revenues as limiting to use. Public facilities receive a higher proportion of their overall revenue from government sources (i.e., central and subnational government budgets) and these government funding sources were rated more limiting to use on average compared with JKN funding and private

funding (which account for the majority of private facility revenue). It is likely that the lack of flexibility of input-based, noninsurance government revenue and the potential delays in receiving facility funding that must be routed through local governments, will limit facilities' ability to respond to incentives that JKN or other payers provide in their purchasing schemes. This finding is consistent with the finding of the Ministry of Health-led Strategic Health Purchasing Working Group for MNH that the lack of flexibility of facility revenue may be a greater barrier for improving quality of MNH services than is budget insufficiency (Indonesia Ministry of Health, n.d.). As a side effect of this inflexibility, facilities' dependence on more stable and flexible sources of funds, such as capitation payments from JKN, has risen over time (KOMPAK, 2017). This premise is associated with a broader issue of alignment between health finance policy and public financial management systems (Cashin et al., 2017).

Our study has several limitations. First, we collected data across a small sample of facilities that may not be generalizable to all facilities in Indonesia. The purposive, nonrandom, sampling of provinces may also bias our findings. Our analysis may have also been limited by low statistical power to detect associations between our outcomes and covariates of interest. Second, the technical quality index was based on the performance of signal functions as reported by facility staff; we did not observe performance of these signal functions. The technical quality index thus may not represent the actual quality of care provided by sampled facilities. Third, the financing measures were constructed based on perceptions as reported by facility staff; their perceptions and, thus, the financing measures may vary depending on which facility staff answered the survey questions. Lastly, we did not conduct a robust causal inference study and we therefore caution against any interpretation of our findings as causal.

Our findings have several implications for policymaking in countries with mixed-provider payment systems, which is the case for most countries (Feldhaus & Mathauer, 2018). Countries attempting to implement strategic purchasing reforms in such systems must consider the full health financing, payment, and regulatory context in which facilities operate. Our results imply that efforts to improve the quality of MNH care provided in Indonesia through strategic purchasing reforms may be hampered by limited facility autonomy to make management decisions and inflexibility of the majority of facility funding, even when national health insurance payments are perceived to be flexible.

AUTHOR CONTRIBUTIONS

Dorit T. Stein and Mukhammad F. Rakhmadi implemented the data analysis. Dorit T. Stein wrote the first draft of the manuscript. Mukhammad F. Rakhmadi, Jorge I. Ugaz, and Arin Dutta edited the manuscript. Jorge I. Ugaz and Arin Dutta oversaw data collection and analysis, and contributed to conceptual development of the research question with Dorit T. Stein.

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ETHICS STATEMENT

The University of Gadjah Mada, Yogyakarta, granted ethical clearance for this study (reference number: 6476/UN1.P.III/DIT-LIT/LT/2019). We obtained U.S.-based IRB approval from Health Media Lab. We also received permission from the respective Provincial Health Offices and from all participating facilities and respondents.

ORCID

Dorit Talia Stein http://orcid.org/0000-0001-9938-3272

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AUTHOR BIOGRAPHIES

Dorit Talia Stein, MS, is a health systems and policy researcher and current PhD student in Global Health Systems at Harvard University. Her research applies decision science, economic, and epidemiological methods to inform health policy and planning.

Mukhammad F. Rakhmadi was a Data Analyst with the Health Policy Plus project in Indonesia.

Arin Dutta, PhD, is a health economist currently working as a Senior Health Specialist with the Asian Development Bank. His research has focused on health financing, health policy, and resource allocation decisions over health interventions in low- and middle-income countries.

Jorge I. Ugaz, PhD, is a Senior Technical Advisor on Health Economics and Finance for the Palladium Group. He is also the Project Director of the USAID-funded Rwanda Integrated Health Systems Activity (RIHSA).

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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