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Evaluation of Social Access to Safe Surgeries in the Philippines

Editor: Tomasz H. Benedyk

Researchers: Olivia Knutson, Joe Francombe, Michele Calabrese, Emyr Davies, Cheah Qinrong, Markos Prindezis, Yasmine Xuning Kanagalingam, Rachael Barrett, Daniel Tan Yuan An

University of Cambridge

Corresponding author: Tomasz H. Benedyk, Email: thbenedyk [at] gmail.com

Global Surgery

Throughout the last two decades, public health efforts in low-to-middle-income countries (LMIC) have been directed towards improving maternal health, reducing the burden of infectious diseases such as HIV, malaria and tuberculosis, and improving child mortality (UN-MDG 2015).These efforts, partly driven by the United Nations Millennium Development Goals, have led to significant successes as of 2015, including: a reduction by more than half of the global under-five mortality rate, the increase in accessibility and uptake of measles vaccines from 73% to 84% over a 13 year period, and a remarkable boost in the availability of anti-retroviral therapy for HIV infection from 800 000 people in 2003 up to 13.6 million in 2014 (UN-MDG 2015). These are but a few examples of recent achievements in public health; however, such targeted approaches have not been accompanied by equal changes in the healthcare infrastructure nor in the distribution and accessibility of healthcare services across socioeconomic backgrounds.

As the UN established new priorities in the Sustainable Development Goals (SDGs), which aim to provide Universal Health Coverage, it became apparent that a greater focus in managing non-communicable diseases was needed. Specifically, this should lead toward the goal of improving the provision of care and maintenance of good health. Evaluation of the accessibility, safety and affordability of surgical care falls necessarily within the remit of such plans, particularly as 11% of the global burden of disease (GBD) can be attributed to surgically treatable conditions. Interestingly, 11% appears to be a lower bound, with robust estimates by Shrime *et. al* reaching the 28-32% threshold (Kristiansson et al. 2009). Indeed, lack of surgical care, whether for financial or geographical reasons, contributes significantly towards reduced productivity in light of the disability burden borne by patients belonging to disadvantaged groups.

The Lancet Commission on Global Surgery (LCoGS) estimated that a total of 143 million additional surgical procedures ought to be performed to cater for the unmet needs of the worldwide population, with an average of 5000 procedures annually per 100 000 by 2030 as the minimal target. The LCoGS proposed a unified system to assess the quality of surgical care on national levels using suggested six indicators (Meara et al. 2015a).

In this report, our team analyses the Philippine surgical care system in accordance with the six indicators introduced by the LCoGS. We describe the challenges met upon data collection and data analysis, suggesting strategies to overcome some of these difficulties. In general, we highlight the need for a holistic, region-dictated, and socially-accountable approach to alleviating the burden of limited social access to surgical care in the Philippines. We conclude that this should include improving awareness of existing provisions within the system for affordable healthcare, increasing the incentives for rural surgeons, and investing in data-gathering to determine further areas in need of investment.

Content

Indicator I: Surgical Volume

Cheah Qinrong, Yasmine Xuning Kanagalingam

Introduction

Surgical volume (SV) is defined as the number of procedures carried out in an operating theatre per 100 000 people per year. To refine the inclusion criteria of surgical procedures even further, Weiser and colleagues have defined these operations as those '*performed in operating theatres that require general or regional anaesthesia or profound sedation to control pain*' (Weiser et al. 2016). Our team believes that the emphasis on procedures being carried out within an operating theatre is sufficient for the purposes of this evaluation, as detailed information regarding the use of anaesthesia may not be readily available. Moreover, standardising the definition of a 'surgery' according to where it takes place, rather than whether it is major or minor, serves to eliminate differences in practice patterns and reduce discrepancies in data collected. Consequently, the two variables required to calculate this index are the total number of surgical procedures carried out in a country and the national population.

$$SV = \frac{total\ number\ of\ surgeries\ carried\ out\ in\ one\ year}{total\ population\ in\ the\ same\ year} \bullet 100\ 000$$

When evaluating national health patterns, SV and its distribution are important in assessing the availability of such specialised medical services to the population. With the recent trend in diseases tending towards chronic ones (Murray and Lopez 2013), which can be managed by elective surgery, SV is assuming an increasingly important role in public health. SV can therefore indicate whether the surgical demands of a population are being adequately met.

SV can also be used as a proxy for the quality of surgical care proffered to a given population. This has commonly been used in the service evaluation of hospitals, with an inverse relation found between SV and rates of operative mortality (Lucas et al. 2002; Begg et al. 1998). It was found that low-volume hospitals had higher mortality and morbidity rates than high-volume hospitals, despite experiencing a lower proportion of difficult surgeries. This suggested that limited experience available to healthcare providers in low-volume hospitals led to insufficient care for postoperative complications and limited experience for the teams to deal with surgeries (Kitazawa, et al., 2014). There might also be a higher level of integration between different specialists in high-volume hospitals, as well as a larger proportion of better skilled physicians due to more diverse and complicated case load (Ou-Yang, et al., 2015).

Modelling strategy

For the Philippines, online databases such as the World Bank and OECD do not offer data regarding the number of surgical procedures carried out in the country. Contacting the Department of Health has also failed to yield any available statistics regarding the quantity of surgeries performed annually in the country. Information on national population data, however, is available from the World Bank database for the year of 2017[1]. This implies that for our study, the more precise evaluation of SV is limited by the inability to obtain data on the total number of surgeries carried out in the Philippines in any given year. We have, however, managed to use other parameters as proxies for the total number of surgeries.

[1] Population, total | Data. Washington: World Bank; 2017. Available from: https://data.worldbank.org/indicator/SP.POP.TOTL?end=2017&locations=PH&start=2017&view=map [cited 20.07.2018]

In order to address the limitation of data unavailability as alluded to above, T.G Weiser et al. have created models to estimate global SV based on total health expenditure per capita in US$. These models were formulated by calculating SV in countries with the required data available as well as extrapolating SV in countries with only region-specific data. For the remaining countries that had no available data at all, such as the Philippines, these were predicted using the model itself. While there are many other variables that can influence the SV in any given country, statistical analyses using stepwise linear regression have repeatedly demonstrated a strong correlation between total health expenditure per capita and SV. Moreover, after adjustment for total health expenditure per capita, none of the other variables remained significant influences on the SV. Using an imputation model based on this selected independent variable, both studies have been able to derive an estimate of the global SV using the best-fitting line formulated (see Table 1). Nevertheless, the authors acknowledge that the model utilised was aimed for a global estimate only, and that the estimate for any particular country may be imprecise. Further limitations of using such a model include the imprecise reporting of SV in certain countries due to the lack of standardised data reporting, as well as the inability to assess the distribution of SV within different regions of a country.

Table 1: Estimation of the surgical volume in the Philippines based on the modelling strategy, extracted from (Weiser et al. 2016).

Year	Total Health Expenditure (million US$)	Population[2]	Total Health Expenditure Per Capita (THEPC)	Operations per 100 000 population
2012	11,508	96,706,764	119	2,385

In 2012, the Philippines is classified as a low-expenditure country and it falls short of the LCoGS goal of having a minimum of 5000 procedures per 100 000 population. The latest data from 2018[3] shows an increase of THEPC in the Philippines by 12%, reaching $136.5, which indicates a positive trend, potentially resulting in a higher national SV.

[2] Population data obtained from: Population, total | Data. Washington: World Bank; 2017. Available from: https://data.worldbank.org/indicator/SP.POP.TOTL?end=2017&locations=PH&start=2017&view=map [cited 30.07.2018]

[3] THEPC data obtained from: Current health expenditure, per capita | Data. Washington: World Bank; 2018. Available from:https://data.worldbank.org/indicator/SH.XPD.CHEX.PC.CD?locations=PH [cited 08.12.2020]

Overrepresented procedures

Based on studies done in 2016 (Weiser et al. 2016), trends in SV in countries tend to differ based on their respective national healthcare expenditures. The countries considered in these studies were classified into 4 categories and evaluated accordingly (Table 2).

Table 2: Categorisation of countries based on healthcare expenditure per capita (in US$)

Category	Actual health expenditure (US$ per capita)	Number of countries
Very low expenditure	0 – 100	50
Low expenditure	101 – 400	54
Middle expenditure	401 – 1000	46
High expenditure	1000 and above	44

The report further reveals the following key findings:

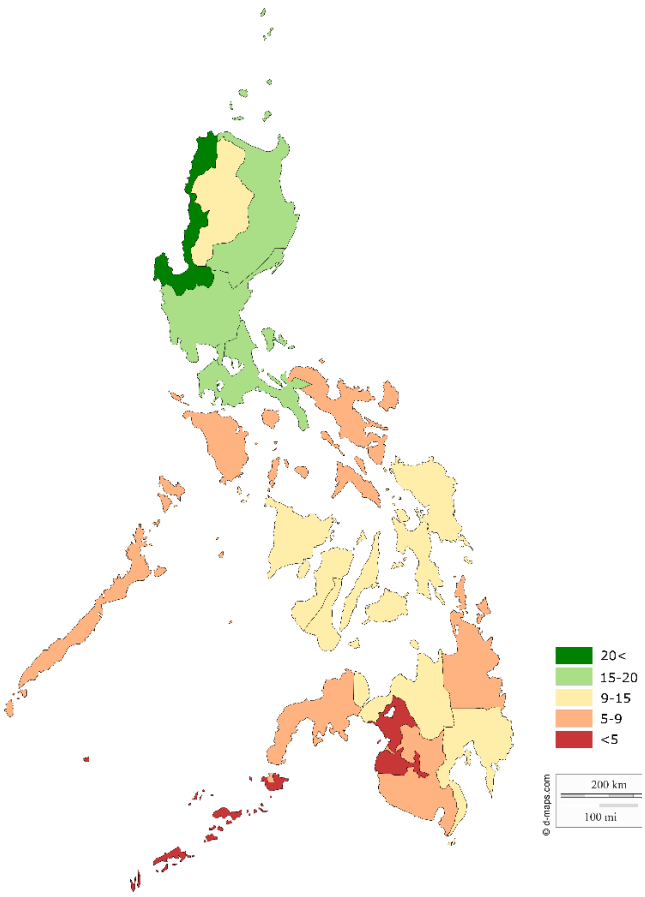
- Of the total global SV, 6.3% was performed in very-low-expenditure countries which accounted for 36.8% of the world's population.
- 59.8% of SV took place in high-expenditure countries which accounted for 17.7% of the world's population.
- The biggest increase (from 2004 to 2012) in the rate of surgery occurred in very-low- and low-expenditure countries.
- Caesarean section (CS) accounted for 29.6% of surgeries performed in very-low-expenditure countries but only 2.7% of surgeries performed in high-expenditure countries.

These highlight the remaining inequality in distribution of surgical resources amongst countries with low-to-middle- and high-expenditures on healthcare. The higher percentage of CS further emphasise the fact that very-low-expenditure countries carry out fewer elective surgeries to cater to the increasing demand for them based on recent disease trends.

SV across the administrative regions

The modelling strategy indicates a likely shortage of surgeries in the Philippines at the national level but does not provide any insight into potential regional disparities of SV. Obstetrical data for the Philippines is widely available and accurate (Figure 1). Expecting high contribution of the CS in the total number of surgeries and equally high demand in each region, we use this as a proxy of access to surgical care expressed in surgical volume. In 2012, the Philippines recorded the total of 1,761,602 births of which approximately 164,000 were delivered by CS. This estimates CS to represent around 7% of the national surgical volume in 2012, according to the modelled figure. The data indicates vast local differences in the preparedness of the surgical system to deliver both elective and emergency caesarean deliveries, which are likely to be indicative of the overall trends in the total number of surgical procedures in those regions.

Region	% Delivered By C-Section	Planned Before Onset Of Labor Pains	Decided After Onset Of Labor Pains
NCR	16.7	10.5	6.2
CAR	13.3	7.7	5.6
I	20.8	9.3	11.5
II	16.3	10.3	6
III	17.8	14.5	3.4
IVA	17	9.1	7.9
MIMAROPA	6.2	3.1	3.1
V	6.5	4.2	2.2
VI	9.9	4.9	5
VII	10.3	6.7	3.6
VIII	9.4	5.2	4.2
IX	8.1	5.6	2.6
X	10	6	3.9
XI	15	6.6	8.4
XII	7	4.7	2.3
CARAGA	6.3	3.5	2.8
ARMM	3.6	2.5	1.1
TOTAL 2017	12.7	7.6	5.1
TOTAL 2013	9.3		
TOTAL 2008	10		



Source: PHILIPPINE NATIONAL DEMOGRAPHIC AND HEALTH SURVEY 2017

Figure 1: Access to CS in the Philippines, by region.

Conclusions

Surgical volume is the most direct parameter of whether the healthcare system meets the demand for surgeries. However, it is also the most challenging one to measure accurately as it requires a thorough and centralized data collection system, which can be particularly difficult or virtually impossible in disadvantaged areas. The partitioning of the Philippine system between public and private sector makes coordination of such effort even more complicated. It has been proposed other methods to estimate the total number of procedures should be employed, using a model based on total healthcare expenditure, which offers a reliable approximation (Weiser et al. 2016). The result from 2012 indicated a shortfall of surgeries in the Philippines, which would have to double to meet the recommended threshold of 5,000 procedures per 100,000 people. As the model implies, this increase could be possible only if the healthcare-related spending rises too. It remains to be assessed whether the gap comes from a lack of appropriate funding or surgical facilities not being prepared to increase the volume of operations.

Another important problem we tackled in this chapter is differences in local surgical volumes. We used the number of CS performed in each region as a proxy of surgical volume distribution across the administrative regions. Although we demonstrate strong disparities between the regions, the suggested model remains to be validated and other factors that may affect the true correlation must be exhaustively investigated.

Indicator II: Perioperative Mortality Rate

Rachael Barrett and Daniel Tan Yuan An

Introduction

The World Health Organisation defines perioperative mortality rate (POMR) as the *'all cause death rate prior to discharge among patients having one or more procedures in an operating theatre during the relevant admission'*[4]. Measuring POMR requires a register of all major surgeries in a hospital as well as survival status within the investigated time frame. The definition of major surgery may differ study-to-study but one such definition is *'surgery involving a risk to the life of the patient; specifically, an operation upon an organ within the cranium, chest, abdomen, or pelvic cavity'*[5]. This, when divided by the total number of surgical procedures, gives the proportion of patients that do not survive.

$$POMR = \frac{All\ cause\ postoperative\ mortality\ within\ defined\ timescale}{All\ major\ surgeries}$$

It should be noted, POMR can be measured over two timescales (depending which is sooner or on practicalities):

- On the day of surgery or within a 24 hours' period after surgery (this includes death in the operating theatre), and
- before discharge from hospital or within 30 days of surgery.

In high income countries, hospitals generally record 30 days post-surgery mortality rate as a range for the POMR as it can inform on the continuous quality improvement process locally. However, many LMICs, such as the Philippines, would struggle to gather data to report 30-day mortality rates. Hence, we advocate for using 'death-before-discharge' as a proxy to identify POMR rates in a widest group of countries and regions (Roa et al. 2020; Watters et al. 2015).

Data collection

Access to accurate data to calculate POMR on a hospital level is the most important factor in terms of any comparative analysis. Public hospitals are obliged to submit the Annual Health Facility Statistical Report to Health Facilities and Services Regulatory Bureau under Department of Health. Recently, there have been attempts to facilitate and digitize the data collection using an online system[6]. The reports would provide detailed insight into POMR across the health facilities, however, it is limited to the public sector, therefore a wider coverage including private hospital is necessary in order to present a complete picture of POMR variations across the regions.

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[4] Perioperative mortality rate. 1787. doi:10.1787/health_glance-2013-en

[5] Major Surgery Medical Definition | Merriam-Webster Medical Dictionary

[6] https://ohsrs.doh.gov.ph/

Risk-adjusted POMR

Minor vs major surgeries

Another issue is the type of surgery. Ideally, surgical procedures, defined by Watters *et al* as '*the incision, excision, or manipulation of tissue that requires regional or general anaesthesia or profound sedation to control pain, undertaken in an operating room*' should be included into the measurement. With limited data in LMICs, a wide range of surgical procedures should be included into the study to assess procedures of varying difficulty. Ariyaratnam *et al* also found when comparing between HICs and LMICs that removing one or two procedures can vastly impact the results and hence this is an important consideration (Ariyaratnam et al. 2015). Minor surgeries and procedures not undertaken in the operating theatre with no risk of mortality can be excluded from the data set as they do not contribute to POMR.

Elective vs emergency surgeries

Furthermore, POMR rates should also be further categorised into elective and emergency surgeries as this gives a better sense of surgical quality. Studies show that emergency surgery tend to be highly variable as compared to elective surgery and this may undercover surgical training and accessibility to trained surgeons (Columbus et al. 2018). Considering that many emergency surgeries may not be performed by appropriate surgeons, especially in rural areas in the Philippines, this may bring to light issues such as lack of training or lack of surgeons. These figures are then combined to identify an average POMR for all surgeries.

Conclusions

POMR, in conjunction with SV, offer a good assessment of the quality of surgical care offered nationally, but also on the regional level. To reliably estimate this indicator, accurate data on the SV has to be available, which proves particularly difficult in disadvantaged areas, similar to SV.

We suggest standardizing the definition of POMR as 'death-before-discharge' to make the data more systemically comparable. To appreciate the true value of this indicator, we further postulate to distinguish the POMRs between elective and emergency procedures, as the latter ones are usually associated with a much higher risk, which often cannot be mitigated. In the near future, this distinction should become even more relevant and necessary to appropriately monitor globally, as large numbers of elective procedures have been facing long delays or even cancellations due to the ongoing SARS-CoV-2 pandemic (COVIDSurg Collaborative 2020; Clarke et al. 2020).

Indicators III and IV: Impoverishing Expenditure and Catastrophic Expenditure

Michele Calabrese and Emyr Davies

Introduction

Healthcare systems must do more than provide quality treatment: they must also protect patients from excessive financial burden. This is a significant problem in the Philippines, where one and a half million people, around 1% of the population, were pushed below the poverty threshold in 2012 as a result of out-of-pocket (OOP) spending on healthcare (Bredenkamp and Buisman 2016). OOP payment has remained high in the Philippines for decades; in 2012, 57.2% of total healthcare was funded OOP. This figure had barely dropped in 2016, standing at 54.2% of total health expenditure[7]. Consequently, rates of catastrophic expenditure (CE), and impoverishing expenditure (IE) show little sign of decline. 7.5% of Philippine households incurred CE in 2012, an increase from 2.5% of households in 2000 (Bredenkamp and Buisman 2016).

These problems persist despite government efforts to create a prepayment system of healthcare. In 1995, the Ramos administration established the National Health Insurance Scheme (NHIS), a hybrid of Bismarkian and Beveridgian systems. In Bismarkian terms, employees and self-employed individuals pay social-insurance contributions to PhilHealth, a government controlled-and-operated health insurance company. Although private insurance companies are also in operation, PhilHealth has a near monopoly of the health insurance market[8]. Meanwhile, in Beveridgian terms, the national government uses revenue generated through taxation to finance PhilHealth insurance for the indigent. In 2011, the national government expanded its sponsorship programme to fully subsidise senior citizens (Tobe et al. 2013). This was accompanied by a dramatic increase in health insurance coverage rates; PhilHealth coverage in 2012 stood at 75% and was reported to be at 89% in 2015 and 92% in 2016. The Department of Health now allocates around a quarter of its budget to the subsidisation of PhilHealth insurance for the indigent (Valerie Gilbert T. Ulep and Nina Ashley O. dela Cruz 2013).

And yet it is clear that the expansion of healthcare coverage has not significantly reduced financial burden on patients. High rates of OOP payment, CE and IE are testament to this. There are three substantive reasons why OOP and CE have remained high in spite of the expansion in PhilHealth coverage:

i) Low support value. PhilHealth insurance does not usually cover the entire cost of treatment. PhilHealth support value was only 56% in 2015, meaning that the remaining 44% had to be financed OOP or via private insurance. By 2018, PhilHealth support value had fallen to 42% of treatment cost (Valerie Gilbert T. Ulep and Nina Ashley O. dela Cruz 2013). Households may face catastrophic or impoverishing expenditure as they struggle to pay for the remainder of treatment not covered by PhilHealth. More positively, 2011 'no-balance billing' legislation prohibits government-owned hospitals from extracting OOP payment from those on the sponsored programme. In theory, this means that the support value of PhilHealth is always 100% for the indigent, as they are not expected to cover any cost that PhilHealth cannot itself cover. In practice,

[7] Department of Health. (2018). National objectives for health Philippines 2017-2022. Manila, Philippines: Department of Health. Page 25.

[8] Dayrit MM, Lagrada LP, Picazo OF, Pons MC, Villaverde MC. The Philippines Health System Review. Vol. 8 No. 2. New Delhi: World Health Organization, Regional Office for SouthEast Asia; 2018. Page 80.

however, sponsored members still incur OOP costs. Indeed, 18% of the claims paid to sponsored members in 2018 did not fall under the 'no-balance billing schema'[9]. Moreover, the policy does not apply to private hospitals.

ii) Low benefit utilisation. Not every patient who is covered by PhilHealth will avail themselves of it, instead paying for the cost of treatment themselves. One significant cause of low benefit utilisation is citizens' lack of awareness that they are covered by PhilHealth. This is especially true for the indigent and senior citizens, many of whom are sponsored automatically by government but might not have been given explicit notice. Although PhilHealth reported that 79% of the population was covered by PhilHealth insurance in 2013, only 60.3% of citizens in 2013 themselves reported that they were covered by PhilHealth[10]. This is indicative of a gap in awareness. In a similar vein, only 47.0% of sponsored members surveyed in 2013 were aware of the no-balance-billing policy (ibid).

iii) The reimbursement problem. PhilHealth payments are often only made retrospectively, leaving the patient to pay a significant upfront cost. Many are pushed under the poverty line as they wait for reimbursement.

Financial burden of surgical treatment is distributed unequally across income groups. The share of total health expenditure financed OOP rises with household income. In 2013, 20.3% of healthcare spending in the first (i.e. poorest) quintile came from OOP payment, and 36.9% in the second quintile. In comparison, 70.8% of came from OOP in the fourth quintile, and 83.1% in the fifth quintile (Racelis, Rachel H. & Dy-Liacco, Fe Vida N. & David, Lilibeth C. & Nievera, Lucille F 2016). In a similar vein, the extent of catastrophic expenditure incurred also rises with household income. The percentage of households incurring catastrophic expenditure in 2012 was 2.5% in the first quintile and 15% in the fifth quintile (Bredenkamp and Buisman 2016). Also, better support value is afforded to the poor than the relatively wealthy. In 2011, PhilHealth had an average support rate of 53.8% for those in the first quintile, 42.7% in the second quintile, 44.2% in the third quintile, 39.3% in the fourth quintile, and 32.9% in the fifth quintile (Valerie Gilbert T. Ulep and Nina Ashley O. dela Cruz 2013).

These figures provide some good news. Those in higher income groups are more likely than the poor to be able to bear the brunt of OOP payment and catastrophic expenditure. Nevertheless, it is still a problem that low-income households are incurring OPP and CE at all given their financial vulnerability. The flaws in the 'no-balance-billing' system are highlighted by the fact that, two years after it was introduced in 2011, the first quintile paid for 20.3% of treatment OOP (Racelis, Rachel H. & Dy-Liacco, Fe Vida N. & David, Lilibeth C. & Nievera, Lucille F 2016). Moreover, we must be wary of whether lower levels of CE amongst the poor do really indicate "a greater degree of financial protection amongst the poor" as Bredenkamp and Brusman claim (Bredenkamp and Buisman 2016). It might be that a relatively small percentage of quintile 1 households incur catastrophic expenditure because members of these households are less likely to seek out healthcare at all. It is well established in the literature that the poorer strata of society are those most likely to be deterred from seeking medical care by the costs of hospitalisation (Kristiansson et al. 2009; Kuuire et al. 2016). Indeed, Ulep and Dela Cruz (Valerie Gilbert T. Ulep and Nina Ashley O. dela Cruz 2013) highlight that, in 2011, quintile 1 and 2 households were less likely to avail PhilHealth when ill than households in the upper three quintiles.

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[9] PhilHealth Stats and Charts (2018). Available from: https://www.philhealth.gov.ph/about_us/statsncharts/snc2018.pdf

[10] Dayrit MM, Lagrada LP, Picazo OF, Pons MC, Villaverde MC. The Philippines Health System Review. Vol. 8 No. 2. New Delhi: World Health Organization, Regional Office for SouthEast Asia; 2018. Page 80.

This reluctance of poor households to seek out healthcare underscores the importance of tackling catastrophic and impoverishing expenditures. Greater financial protection is needed in order to encourage Filipinos to seek out surgical healthcare when they need it, as well as to support those who do. In this section, we analyse two of the six surgical indicators proposed by the Lancet Commission on Global Surgery – protection against impoverishing and catastrophic expenditure – in order to assess performance of the Philippine surgical system. Our purpose is two-fold. First, we demonstrate that there is regional variation in vulnerability to CE and IE, as well as regional variation in PhilHealth coverage. Second, we highlight a sustained disjuncture between healthcare coverage reported by PhilHealth and that reported by Filipinos themselves, in order to stress the need for a campaign for public awareness of PhilHealth.

Methods

Calculating vulnerability to catastrophic and impoverishing expenditure across regions

The analytical flowchart for this work was demonstrated in the study by Massenburg et. al (Massenburg et al. 2017) on the evaluation of the Brazilian surgical system. In their study, the threshold for impoverishing expenditure (IE) was defined as any income below:

$$IE = surgical\ costs\ \bullet\ \%OOP + poverty\ line\ (1)$$

where Out-of-pocket expenditure (*OOP*) describes the proportion of total health expenditure arising from private funds, including cost sharing and informal payments, both in kind and in cash. The heading "*surgical costs*" reflects an estimation of the average costs of hospitalisation for surgical procedures and data from the Philippine National Statistics Authority informed on the "*poverty threshold*". The ratio of incomes above this threshold to all incomes in the distribution provides an estimate of the percentage of protection against impoverishment from health-related payments/contributions.

Furthermore, catastrophic expenditure (*CE*) was defined as *OOP* on surgical and anaesthetic care exceeding 40% of the patient's post-subsistence income. Post-subsistence income refers to household income after food expenditure. The threshold is established as any income below:

$$CE = \frac{surgical\ costs \bullet \%OOP}{0.40} + food\ threshold\ (2)$$

Data from the Philippine National Statistics Authority on subsistence food threshold was chosen as a more suitable parameter than the average food expenditure (Massenburg et al 2018) for the evaluation of CE. This choice is in line with the view that average food expenditure would be variable and not reflect the actual threshold below which any outgoings may compromise an individual's ability to provide for basic food needs.

Quantification of accessibility and affordability of surgical care has been previously modelled (Massenburg et al 2018) on the basis of average costs for surgical inpatient hospitalisations and a γ distribution of incomes based on Gini coefficients and the gross domestic product (GDP) per capita. The γ distribution is a two-parameter distribution that has been validated to fit income data (Salem & Mount 1974). It is characterised by two variables: scale and skewness, indicative of proportionate growth and inequality, respectively.

Gini coefficients are measures of how far an income distribution deviates from a perfectly equal distribution. The values range from zero to one, with zero representing complete equality of incomes across the population and one representing a distribution where all the wealth is concentrated solely with one individual and the remaining population has none.

In this analysis, geographical variations in income distributions in the Philippine were accounted for through region-specific Gini coefficients and Gross Regional Domestic Product (GRDP) data (Table 3), to preserve regional disparities and better encapsulate local income inequalities and their impact on healthcare affordability.

The dataset for this analysis was obtained through the Philippine Statistics Authority and pertains to 2009.

Table 3: Region-specific Gross Regional Domestic Product (GRDP) and Gini coefficient values.

Region	GRDP Per Capita (PHP)	Gini Coefficients
NCR	246,753	0.4081
CAR	90,041	0.4658
I	42,395	0.417
II	41,992	0.456
III	57,862	0.3821
IV-A	68,895	0.4203
IV-B	55,071	0.4116
V	38,022	0.4268
VI	73,077	0.4309
VII	75,220	0.4711
VIII	39,764	0.5008
IX	54,532	0.4915
X	91,453	0.486
XI	85,720	0.4339
XII	64,867	0.4462
CARAGA	41,506	0.4732
ARMM	18,924	0.2991

Data from Philippine Statistics Authority (2009). Regional Gini indices for 2009 and per capita GRDP.

A γ distribution calculator[11] was used to compute income distributions. The thresholds for IE and CE were calculated and these values were input to determine the percentages of incomes vulnerable to impoverishment and catastrophic expenditures by region. In the estimation of IE and CE, it is worthy of note that the average cost of hospitalisation following a surgical procedure is highly variable, depending on the type of procedure and the post-operative progress. It appeared unjustified and arbitrary to select an average value without evidence regarding the types of surgical procedures performed within a specified timeframe. Therefore, it was opted to evaluate IE and CE for a range of hospitalisation costs to demonstrate the extent to which incomes are vulnerable to impoverishment from unspecified surgical expenses.

Calculating PhilHealth coverage by region

We collected and compared data available in the National Demographic and Health Surveys from 2008, 2013, and 2017, as well as data available in the PhilHealth Annual Report from the same years. We included senior citizens, the indigent and sponsored members under the category 'indigent' under the justification that they all have government-sponsored PhilHealth. We combined the remaining groups –

[11] Online applet: *https://homepage.divms.uiowa.edu/~mbognar/applets/gamma.html*

formal employees, the self-employed, overseas workers, and lifetime members – under the category "paying for PhilHealth".

Results

Vulnerability to catastrophic and impoverishing expenditure by region

Data in Figure 2 shows a predictable downward trend in the percentage of incomes protected from impoverishment and catastrophic expenditure respectively as the cost of hospitalisation increases. Discrepancies are noticeable in the trends from different regions. NCR is the least susceptible to impoverishment and catastrophic expenditure of all regions, although it affords protection against IE and CE to only 49% and 38% of incomes respectively for procedural costs of 35 000 pesos. Similarly, the ARMM shows the weakest capability for financial protection in the face of healthcare expenses, with a percentage of protected incomes to IE and CE of only 2.46% and 0.3% respectively for procedural costs of 35 000 pesos. This is in keeping with the respective regional GDP pro capita and the region's occupational structure. Specifically, agriculture and forestry make up only 0.3% of occupations in the capital region of Metro Manila (NCR), while they add up to a 46.4% of the workforce in the Mindanao group of islands (data from 2007) (J.P Lambino 2010). This observation correlates with 2009 data from the Philippine Statistics Authority regarding the poverty incidence among families, pooling at 2.4% in NCR but peaking at 39.9% in ARMM[12].

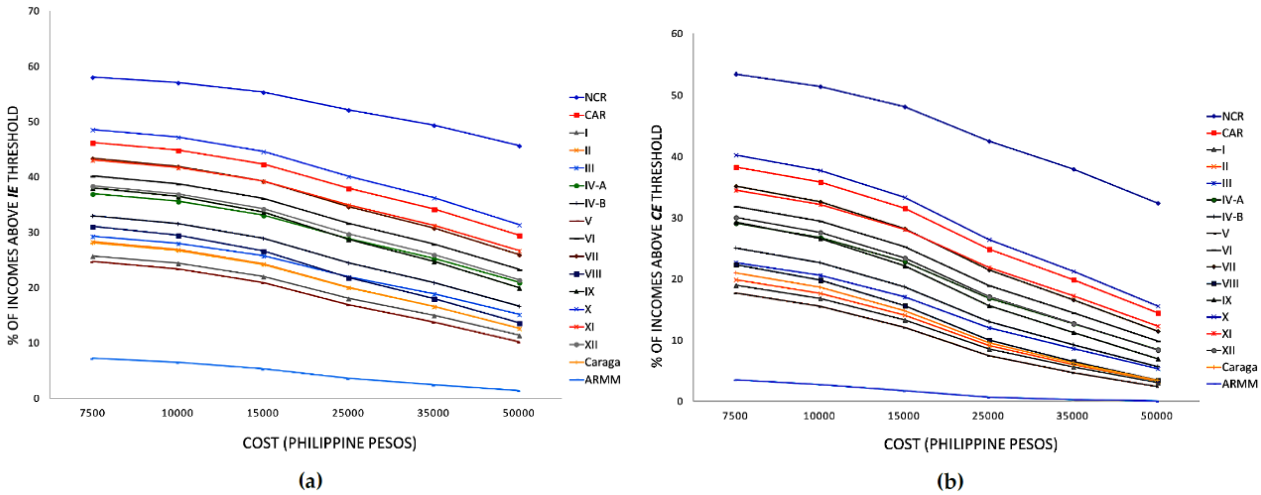

Figure 2: Percentage of incomes above (*a) impoverishing expenditure* or *(b) catastrophic expenditure* shown as a function of procedural costs, per region.

It is not surprising that in regions with economies driven by rural activities, individuals are significantly more vulnerable to economic stressors due to unforeseen or unavoidable healthcare expenses. Data from PhilHealth [13] indicates that the most common surgical procedures include spontaneous, uncomplicated delivery, Caesarian sections, appendicectomies, cholecystectomies, abdominal

[12] Annual Per Capita Poverty Threshold, Poverty Inci- dence and Magnitude of Poor Families, by Region and Province: 1991, 2006, 2009, 2012 and 2015. Philippine Statistics Authority

[13] https://www.healthphilippines.net/2012/02/16- most-common-surgeries-in-the-philippines-philhealth-claims-2011

hysterectomies. The first case rates[14] for these vary from 10 000 to over 60 000 pesos and albeit inclusive of professional and institution fees, it is clear that with an OOP = 55%, patients may be liable for payments in the range of 15 000 to 30 000 pesos, a substantial debt when compared to the poverty threshold and incidence in regions such as ARMM.

Overall, these results showcase the fragility and vulnerability of patients to healthcare expenses in a region-dependent fashion, highlighting the correlation between local economic prosperity and vulnerability to CE and IE.

PhilHealth coverage across the regions

As shown in Table 4, the percentage of the population covered by some form of PhilHealth increased across all seventeen administrative regions of the country between 2008 and 2013. Despite this, regional disparities are evident in the rate of increase. Between 2008 and 2013, there was a 36.6 percentage point difference in the increase of total PhilHealth coverage between the lowest performing region, region X, and the highest performing region, region VIII. This regional disparity is not necessarily undesirable, however. Regions with particularly low rates of increase were those of relatively high GRDP (NCR and region X), whereas regions of high increase were, for instance, region VIII and ARMM. This indicates that financial protection was being offered to those regions most in need of it.

Table 4: Region-specific statistics on changes in PhilHealth coverage in population and the type of membership.

Region	Increase In PhilHealth Coverage (% Regional De Jure Population)		% Regional De Jure Population Paying For Philhealth			% Regional De Jure Population Receiving Philhealth As An Indigent		
	2008-2013	2013-2017	2008	2013	2017	2008	2013	2017
NCR	7.1	16.4	42.2	51.1	64.1	0.9	3.2	7.1
CAR	19.4	9.2	29.8	38.3	26.8	12.5	23.4	24.5
I	16.7	6.8	29.1	30.3	21.9	11.8	30.1	20.9
II	27.4	0.8	25.3	29.0	37.5	10.1	31.5	27.8
III	25.8	5.4	28.0	42.9	49.4	4.3	15.4	16.6
IVA	13.6	6	40.2	48.2	50.6	3.6	11.1	21.8
IVB	32.1	10.4	12.1	15.7	27.0	8.7	41.1	40.4
V	32.1	Minus 6.9	20.1	19.7	20	14.6	48.9	43.6
VI	27.8	0.1	24.6	28.3	25.5	11.7	38.8	41.3
VII	11.8	8.7	31.2	34.1	38.6	8.2	19.7	21.9
VIII	42.3	Minus 2.3	19.9	20.2	22.5	6.2	49.2	44.7
IX	35.4	5.7	20.8	19.0	18.1	5.1	11.9	49.4
X	5.7	Minus 5.9	24.6	23.1	28.8	41.7	48.9	38.2
XI	28.5	3.7	32.9	41.7	36.5	3.3	23.9	33.2
XII	19.1	12	31.7	30.1	28.1	6.9	28.3	33.6
XIII	21	2.9	21.8	30.2	28.7	24.7	37.9	42.9
ARMM	26.5	6.3	11.2	7.7	10.4	5.9	35.8	41.3

Data from National Health and Demographic Surveys

Between 2013 and 2017, there was a 13.3 percentage point difference in the increase in total PhilHealth coverage between the lowest performing region, region X, and the highest performing region, the NCR. Although this figure is considerably lower than its 2008-2013 equivalent, some worrying trends

[14] List of Procedure Case Rates, PhilHealth

come to light in the period 2013-2017. Three regions reported a decrease in total PhilHealth coverage during this period: region V with a decrease of 6.9%; region VIII with a decrease of 2.3%; and region X with a decrease of 5.9%. Commonalities can be identified across these three regions: all three had a high percentage of indigent coverage in 2013 which they failed to maintain into 2017. For instance, indigent coverage fell from 48.9% to 38.2% in region X this period. In other regions too, indigent coverage was widespread in 2013 but dropped by 2017. Region 1 reported a drop from 30.1% to 20.9% between 2013 and 2017. These data are indicative of the difficulty the Philippines has faced in sustaining high levels of PhilHealth coverage amongst the indigent. Further empirical research is needed to understand why.

As for Table 5, our calculations highlight a disjuncture between the levels of PhilHealth coverage reported by citizens and those reported by the PhilHealth organisation itself. In 2008, 2013 and 2017, the indigent and the non-indigent groups both reported lower levels of coverage than the PhilHealth organisation reported. Perhaps surprisingly, this gap was larger for paying members than it was for indigent members – in 2008, 2013, and 2017.

Table 5: Comparison of the national PhilHealth coverage statistics, as reported by PhilHealth Annual Report or NDHS.

	2008	2013	2017
% Population with indigent PhilHealth coverage (PhilHealth Annual Report)	19.0	32.1	41.2
% Population paying for PhilHealth coverage (PhilHealth Annual Report)	57.0	46.6	51.6
% Population with indigent PhilHealth coverage (NDHS)	10.6	29.4	32.3
% Population paying for PhilHealth coverage (NDHS)	26.2	30.0	31.4

Data from PhilHealth Annual Reports and National Health and Demographic Surveys

Conclusions

We have demonstrated that vulnerability to CE and IE varies in a region-dependent fashion, and that rates of PhilHealth coverage also vary by region. In doing so, we have contributed to a burgeoning literature on surgical inequalities in the Philippines. Our analysis underscores the fact that national averages are arbitrary, as they obscure regional idiosyncrasies and therefore hinder public health practitioners in tackling CE and IE. In regions driven by rural economies, individuals are significantly more vulnerable to unforeseen or unavoidable health expenses.

We have also highlighted that rates of indigent coverage fell considerably in many regions between 2013 and 2017. This is a worrying finding, particularly as 16.6% of Filipinos live below the poverty line. And yet, it is scarcely explored in extant literature. Greater attention must be paid to declining levels of indigent coverage. It is possible that government struggled to afford to sponsor as many of the indigent after it operationalised expensive reforms such as the no-balance-billing policy. Further empirical research is needed to confirm whether this is true.

Finally, we have highlighted the disjuncture between official PhilHealth coverage statistics and the coverage rates reported by citizens in the National Demographic and Health Survey. Assuming these figures are accurate, many Filipinos have PhilHealth membership without being aware of it. On this basis, we recommend that the Filipino government, non-governmental organisations, and other actors embark on a campaign of awareness-raising. Here, our analysis supports the claim made by Bredenkamp and Buisman (2016) that issuing PhilHealth membership cards could be a “quick win” in fighting CE and IE, in the sense

that it would boost awareness amongst existing members. More specifically, our data shows that the largest gap in awareness exists amongst the non-indigent rather than the indigent. It is probable that private employers, who often fund PhilHealth membership (Tobe et al 2012), are not making employees aware of their benefits. Further research is needed here, but more effective communication between employers and employees might constitute another quick win in the fight against CE and IE.

Indicator V: Surgical Workforce

Olivia Knutson, Markos Prindezis

Introduction

The specialist surgical workforce density (SSWD) is defined as the total number of specialist surgical, anaesthetic and obstetric physicians working per 100,000 of the population. The formula used for the calculation of SSWD in this report is as follows:

$$SV = \frac{Total\ numer\ of\ surgeons,\ \ anaesthesiologists\ and\ obstetricians}{Total\ populaion} \bullet 100{,}000$$

Calculation of the SSWD allows for a greater understanding of the resources available to a healthcare system for providing surgical care.

The minimum density recommended by the Lancet Commission on Global Surgery (LCoGS) for the surgical workforce is 20 surgical providers per 100,000. This number represents an amalgamation of surgeons, anaesthetists and obstetricians (SAO). It is estimated that in order for the Philippines to reach this target by 2030, 23,612 SAO providers need to be trained (Daniels et al. 2020).

Calculation of the SSWD allows for a greater understanding of the resources available to a healthcare system for use in providing surgical care for its patients. In simple terms, the greater the number of specialist surgical, anaesthetic and obstetric physicians available to a healthcare system, the more prepared that system will be to deliver high quality surgical care. Furthermore, due to the unbiased nature of this indicator, its calculation allows a nation's surgical system to be compared with other countries. In 2015, Holmer *et al.* showed that there was a negative correlation between the SSWD of a nation and its maternal mortality ratio (MMR - maternal deaths per 100,000 live births) (Holmer, Shrime, et al. 2015). Specifically, they found that: *"[e]ach 10-unit increase in density of surgeons, anaesthesiologists, and obstetricians, corresponded to a 13·1% decrease in MMR".* Although the group conceded that a causal relationship could not be inferred from this correlation alone, these data show that in some cases the SSWD of a nation could be used to infer information about that nation's health outcomes.

However, the LCoGS amalgamation of SAO providers into a composite entity has been criticised for being unclear regarding specialty-specific workforce requirements. There have since been attempts to give specialty-specific density recommendations. In 2017, Kempthorne et al published a survey by the World Federation of Societies of Anaesthesiologists (WFSA) which aimed to highlight the relative contribution of anaesthetists to the surgical workforce worldwide. They argued for a minimum anaesthetist density of 5 per 100,000 as a guideline on top of the 20 per 100,000 of SAO providers recommended by LCoGS (Kempthorne et al. 2017). Likewise, Davies *et al.* suggest a minimum of 4 anaesthetists per 100,000. According to the group's analyses, this density gives a median MMR of 52.5 (Davies et al. 2018). Such studies are pertinent to the Philippines, where data suggest an anaesthetist density of only 3.7 per 100,000 (Holmer, Lantz, et al. 2015b). Whether subscribing to the 4 or 5 per 100,000 benchmark, the Philippines seems to fall below an ideal density of anaesthetist providers, in addition to the overall 20 SAO requirement. To date, there do not seem to be any equivalent calculations for the ideal numbers of surgeons or obstetricians in a population.

According to data gathered from the World Bank the global SSWD in 2014 was 30.147[15]. Therefore, as a global community, we have already met the LCoGS target of 20 specialist surgeons per 100,000

[15] The World Bank: Specialist Surgical Workforce in the Philippines

individuals, so why has the target been set at this level? The answer is that there is a profound inequity in the distribution of specialist surgeons worldwide, and this has resulted in many nations failing to meet the LCoGS target. In 2015 a second study by Holmer et al. investigated the global variation in SSWD, and quantified this disparity[4]. Their results are shown in figure 3 and are a striking visual representation of the inequality the exists across the world. Unsurprisingly, high income countries had the highest SSWD, with an average of 56.9, whereas low income countries had an average of just 0.7. The gap between low- and high-income countries was further highlighted by Holmer et al. when they found that low and lower-middle income countries, which contained 48% of the world's population, possessed just 20% of the World's SAO workforce working within them. There is clearly therefore a long way to go if the LCoGS target is to be met by 2030, and this highlights the importance of recording the SSWD, in order to better track our progress to this goal.

Table 6 shows that the distribution of surgical providers in the Philippines between the SAO specialties is not even; the density of surgeons is lower than those of obstetricians or anaesthesiologists.

Table 6: Number of workers in the specified specialization within the Surgical Workforce.

Surgeons		Anaesthesiologists		Obstetricians		Total	
n	Per 100,000	n	Per 100,000	n	Per 100,000	n	Per 100,000
2500	2.6	3611	3.7	3362	3.5	9473	9.8

Source: Holmer, Lantz, et al. 2015c

In order to draw meaningful conclusions from this data, more research needs to be done to determine the appropriate balance of obstetricians and general surgeons to anaesthetists. Then perhaps we can focus on recruitment to particular disciplines, whether that be surgery, anaesthesiology or obstetrics.

Regional distribution of surgeons - results

Accurate population data for the Philippines was gathered from the 2017 Philippine Statistical Yearbook (PSY) ("2017 Philippine Statistical Yearbook" n.d.). For accurate data regarding the region-specific numbers of registered surgeons in the Philippines, we turned to the Philippine College of Surgeons. The data from the college posed a major limitation as the administrative districts featured in the study does not correspond to the regions given in the PSY. We used an approximation of the borders of these regions and to minimize the error, we chose to divide them into 4 major groups: NCR, Luzon, Visayas and Mindanao. The data (figure X) illustrate a great disparity between different regions in the Philippines and the need for region-specific action. This disparity is also reflected in the number of hospital beds per region, with Metro Manila region having 23/10,000 and the rest of Luzon, Visayas and Mindanao only having 8.2, 7.8 and 8.3 beds per 10,000 respectively ("The Philippines Health System Review (WHO)" 2018).

Healthcare workers mobilization strategies

The Philippines' surgical workforce deficit is well known; while providing thousands of health workers for the international market every year, the country nevertheless remains underserved at home. The general out-migration of health workers is due to a number of reasons, including underfunding of the national healthcare system, international incentives to travel abroad, and career and security concerns (Castro-Palaganas et al. 2017) ("The Philippines Health System Review (WHO)" 2018). Attempts to improve medical workforce coverage in underserved regions have included the Magna Carta for Public Health Force Workers of 1992, which aimed to augment the salaries of those serving rural communities. According to individuals interviewed on the ground, this policy has not been successfully implemented (Castro-Palaganas et al. 2017). Further examples of attempts to improve healthcare coverage include bilateral and multilateral agreements with export countries to allow overseas Filipino workers to return home to train the local workforce. These initiatives seem to have been disregarded (Castro-Palaganas et al. 2017). At the same time, the recruitment of thousands of Filipino doctors and nurses to the Middle East and Western countries has created a greater demand for more training schools. According to a review conducted in 2018, this has led to the foundation of private teaching schools that churn out poor-quality nurses, who do not contribute to local demand ("The Philippines Health System Review (WHO)" 2018). Those healthcare workers who remain in the Philippines tend to be concentrated in the cities (see).

Figure 3: Distribution of surgeons across the Philippines four major geo-administrative regions.

More specifically with regard to SAO providers, a large proportion of surgeons registered with the College of Surgeons are ophthalmologists. There are relatively few cardiovascular surgeons, transplant surgeons and other essential surgeons. This suggests other factors at play may be the financial rewards for different specialties; ophthalmology is a particularly lucrative specialty. According to the WHO, there was a large gap between the salaries of government and private-based health workers (Marilyn and Drph 2008). Perhaps because of this, 50% of doctors work in the private sector[16]. This is despite the fact that the majority of Filipinos and the poor in particular seek healthcare in public facilities (Cabral 2016).

In order to make up for lack of pay, the government tried to increase doctors' compensation by allowing them access to PhilHealth reimbursements, the national health insurance company. This has led to accusations of corruption (Cabral 2016).

[16] "The Philippines Health System Review (WHO)" 2018

Deployment programs

Decentralisation in the Philippines in 1991 transferred responsibility for local health units from the Department of Health (DOH) to local government units (LGUs). This created recruitment problems: in isolated areas with low annual incomes, the LGUs were unable to hire doctors to work in their municipalities, according to a DOH website.[17] Other reasons for the difficult in retaining health workers included lack of personal and professional support, heavy workload, poor pay and better incentives elsewhere ("The Philippines Health System Review (WHO)" 2018). Since then, a number of government deployment initiatives have been established to alleviate the workforce crisis.

Doctors of the Barrios (DTTB) was created by the DOH in 1993 to address the doctor deficit in rural communities in the Philippines. 35 batches of doctors have since been deployed to various areas in the Philippines to work in primary care and public health, according to their website. There are 215 doctors currently serving.[18] DOH literature published in 2015 shows that in this year there were 348 DTTB (Almario and Camacho 2015). However, the DTTB program has been criticised by alumni for only partly ameliorating the larger systematic workforce and infrastructural deficits seen in rural communities.[19] Between 2011 and 2017, a total of 2241 doctors were deployed to rural health units ("The Philippines Health System Review (WHO)" 2018).

The Medical Pool Placement and Utilization Program (MP-PUP), established in 2002, assigns physicians and medical specialists to DOH hospitals and provincial hospitals based on their needs.[20] This has been shown to be effective in alleviating the workforce deficit. The MP-PUP doctors also bring additional services with them that contribute to the improvement of hospital provision (Lawas et al. 2016). As of 2016, all regions of the Philippines were served by this program with the exception of ARMM.

Other programs established to support doctorless areas include a Rural Health Midwives Placement program (RHMP), which saw 3,020 placements in 2015 (Almario and Camacho 2015). The program has a return-of-service component: two years for every one year of government scholarship. [21] There is also the Registered Nurses for Health Enhancement and Local Service (RNHeals), an offshoot of the Nurses Assigned in Rural Service (Tuazon, Mary Joan Therese Valera, and Peter James Abad, n.d.); this deploys nurses for six months to rural health units and six months in a hospital.[22] There were 13,371 nurses reported in the scheme in 2015 (Almario and Camacho 2015). It is now called the Nurse Deployment Program. In this way, we can see that the government has tried to use nurses and midwives to mitigate for the lack of SAO providers.

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[17] https://doctorstothebarrios.com/about/

[18] https://doctorstothebarrios.com/about/

[19] https://www.rappler.com/views/imho/159534-life-doctor-barrio

[20] https://www.doh.gov.ph/faqs/What-are-the-deployment-programs

[21] https://www.doh.gov.ph/rural-health-midwives-placement-program

[22] https://www.doh.gov.ph/faqs/What-are-the-deployment-programs

Finally, Barangay[23] Health Workers, volunteers trained in basic healthcare to provide primary services[24], have been employed to mitigate for the lack of trained healthcare workers in the Philippines. They were established in 1995.[25] (Azfar and Gurgur 2008).

Despite these deployment efforts, a more long-term solution to the staffing shortages is required. A government plan called the HRH Master Plan 2014-2030 aims to increase the health workforce; this includes a rural health workforce retention plan, new career options for nurses and the deployment of allied health professionals to rural areas. Furthermore, continuing professional development is an area that has been highlighted as important to address. According the 2018 report, this has been successful so far ("The Philippines Health System Review (WHO)" 2018).

There have also been other attempts to stem the outflow of health workers and to redirect them to underserved regions. The 1994 establishment of a local medical school, Ateneo de Zamboanga University-School of Medicine (ADZU-SOM), in Western Mindanao has improved the workforce density in this area. (Halili et al. 2017). ADZU-SOM is one of two 'socially accountable, community-engaged' health professional education (SAHPE) schools in the Philippines. These schools are part of a global movement to retain rural medical practitioners – the Training for Health Equity Network.[26] ADZU-SOM's accessibility and proximity to the rural population has encouraged more doctors to work in the Western Mindanao region. This mission has been bolstered by scholarships and a curriculum that embeds teaching in the local community. The programme has yielded promising results. A comparative study looking at ADZU-SOM and the University of the Philippines Manila-School of Health Sciences (SHS-Palo) in Eastern Visayas, both SAHPE schools, with two conventional schools in the Philippines has indicated that this community-focused method of teaching has led more Filipino medical graduates to work in rural communities. This has improved the medical coverage in the two regions served by these special schools (Woolley et al. 2018).

However, some criticism of the SAHPE system remains. A recent paper has shown that only 53.6% of medical students at SHS-Palo have returned to their sending communities (Labarda, Del, and Labarda 2019). Lack of opportunities for professional growth and better opportunities elsewhere remain important factors for this. Nevertheless, only 10.4% of these medical students have out-migrated, which is a significant improvement on other publicly funded medical programs (Labarda, Del, and Labarda 2019).

The relationship between the ability of SAHPE schools to retain healthcare workers and the increase of the SAO workforce specifically is unclear. The majority of ADZU-SOM graduates do not choose to specialise in surgical fields compared to graduates from a conventional school in the same region respectively. ADZU-SOM graduates were more likely to specialise in Paediatrics compared with their conventional counterparts (Halili et al. 2017). The study suggests that this is due to the lack of training opportunities for the ADZU-SOM to pursue other specialties and also because of the demand for paediatricians in these areas, according to the paper. These findings suggest that the solution to the question of increasing the SAO provider workforce and maximising workforce distribution remains unclear.

The Philippines is not unique in having an inequitable distribution of SAO providers. People have attempted to use the LCoGS template to assess the state of SAO provision in India. India, like the Philippines,

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[23] A barangay is the smallest political unit in the Philippines, consisting of about 1,000 people residing in a region and administered by a set of elected officials

[24] https://www.doh.gov.ph/faqs/What-is-Barangay-Health-Worker

[25] https://web.archive.org/web/20180206131827/ http://pcw.gov.ph/law/republic-act-7883

[26] https://thenetcommunity.org/about-us/#

is classified as a LMIC by the OECD.[27] The Karad Consensus Statement (KCS), written in 2016 to address issues in Indian rural healthcare, outlines the problems associated with SAO workforce understaffing. These shed light on similar challenges in the Philippines.

Some methods highlighted by the KCS for tackling SAO distribution issues are already implemented in the Philippines, including a return-of-service agreement for MBBS graduates funded by government scholarship. Halili et al show that students selected for these return-of-service scholarships particularly from lower socioeconomic backgrounds are more likely to continue working as rural and municipal health officers after graduation (Halili et al. 2017).

When the KCS was drawn up, Indian post-graduate SAO programs were not extended to rural hospitals. This limited trainee exposure to rural settings and development of broad-based surgical skillsets. This also limited professional connectivity between rural practitioners and urban counterparts.[28] As seen above, the lack of training opportunities in rural settings in the Philippines has also been shown to disincentivise doctors to remain in these communities. The KCS suggests partnerships between rural hospitals and urban hospitals to improve post-graduate training and professional connectivity through extension of training programs. It suggests this would also provide a greater broad-based surgical skillset to trainees. The KCS recommends implementing an online platform that matches the needs of the rural communities with visiting providers.[29] These ideas are perhaps worth considering in the context of the Philippines.

Task-sharing

The LCoGS mentions task-sharing (TS) as a possible means of alleviating the surgical provider workload (Meara et al. 2015b). Task-sharing is already used in the Philippines and is a useful mechanism for making up the shortfall in SAO providers. A study comparing neurosurgery outcomes between TS providers and qualified neurosurgeons in the Philippines indicates that a strategic TS model for emergency neurosurgery produces comparable outcomes to neurosurgeons (Robertson et al. 2020).

Task-sharing is another area that is perceived to be a key component of the workforce in India, according to the KCS. It suggests providing routes for formal qualification for these healthcare workers in order to standardise and improve the quality of informal surgical care in rural areas.[30] Perhaps this is a step that would help to increase the quality of surgical care in the Philippines too. However, more information is needed to determine the current levels of task sharing in the Philippines.

For example, with regard to anaesthesiology, the global numbers of nonphysician anaesthesia providers (NPAPs), including nurse providers, greatly outnumber specialist anaesthesiologists in LMICs globally. In LMICs, NPAPs can account for up to 100% of anaesthesia providers (Kempthorne et al. 2017). While the Philippines had 3,510 physician anaesthesia providers as of 2015, it is unknown how many NPAPs

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[27] https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/DAC-List-of-ODA-Recipients-for-reporting-2020-flows.pdf

[28] https://docs.google.com/forms/d/e/1FAIpQLSeg3wMz4Ht-617MqfA3i418KjZ-JlkKU2fPz198jcx12oH6aA/viewform?c=0&w=1

[29] https://docs.google.com/forms/d/e/1FAIpQLSeg3wMz4Ht-617MqfA3i418KjZ-JlkKU2fPz198jcx12oH6aA/viewform?c=0&w=1

[30] https://docs.google.com/forms/d/e/1FAIpQLSeg3wMz4Ht-617MqfA3i418KjZ-JlkKU2fPz198jcx12oH6aA/viewform?c=0&w=1

the country has.[31] In the field of obstetrics, midwives play an important role in the Philippines as providers in rural communities. Midwives constitute an important facet of the medical workforce globally, and in the Philippines regularly make up for the deficit in available obstetricians; DOH literature indicates that the RHMP program trains midwives to be multitasking health professionals that alleviate the burden on obstetricians in underserved areas. [32] However, the relative contribution made by midwives as task-sharers taking on the responsibilities within the remit of qualified obstetricians is unclear from available sources.

Hiring overseas physicians

According to the 2018 report on the Philippines Health System, it remains illegal for foreign (non-citizen) doctors to work in the Philippines. This is despite being a signatory of the ASEAN Mutual Recognition Arrangements on medical, dental and nursing practitioners ("The Philippines Health System Review (WHO)" 2018). Given the relative economic health of the Philippines in the region as the 3rd fastest growing economy it seems that this could be an area of interest for alleviating the SAO provider workforce crisis. The only work that foreign medical practitioners can undertake in the Philippines is charitable emergency relief and academic study, according to the review.

Charitable programs

The 'Hospital on Wheels' is an example of a charitable attempt to mitigate the rural surgeon shortage in the Philippines. This was an initiative established by a local plastic surgeon. Surgical missions are conducted with a medically equipped van. According to the organisation's website, the vehicle contains two operating tables and six folded operating tables that allow doctors to perform eight surgeries simultaneously.[33] As of 2016 they were intending to increase the fleet number.[34] The current capacity and impact of the charity is unclear.

Conclusions

The SAO provider density in the Philippines is difficult to gauge given the lack of up-to-date information and region-specific data. Access to government data might shed light on the situation. Nevertheless, the government initiatives to incentivise health care workers to rural areas indicates a desire to change disparities in provision. The initiatives have had mixed results and the general consensus is that they are unsustainable. Whether these initiatives can translate into SAO providers in particular in these regions is even less certain. The disparity in specialists, with ophthalmologists topping the list, suggests that more needs to be done to encourage the adoption of SAO specialties. More opportunities in this area, particularly in rural medical settings, would potentially increase supply of SAO providers where they are needed most. As we have seen, the education of socioeconomically poorer students in rural areas seems to be one way that doctors can be attracted to work in rural areas but cannot mitigate for the lack of professional opportunities in these regions. Hence a combined effort to incentivise through training opportunities and increased remuneration, as well as through strategic scholarships, might yield better results.

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[31] https://www.wfsahq.org/component/wfsa_worldmap/countrynew/Philippines

[32] https://www.doh.gov.ph/rural-health-midwives-placement-program

[33] https://thehospitalonwheels.com/news

[34] https://thehospitalonwheels.com/

Indicator VI: Timely Access to Surgery

Joe Francombe

Introduction

The LCoGS defines access to timely essential surgery as '*the proportion of the population in each country that can reach, within two hours, a facility capable of providing the Bellwether Procedures (caesarean section, laparotomy, and treatment of open fracture)*'(Meara et al. 2015a). Applying this indicator therefore involves four key overarching stages: (1) identifying relevant surgical facilities that perform the Bellwether Procedures; (2) plotting these hospitals geographically; (3) calculating two-hour 'service areas' from each; and (4) calculating the percentage of the population that falls within these areas.

Data on the capacity of individual facilities to perform the Bellwether Procedures can be difficult to obtain, with the result that proxy measures are often necessary (Massenburg et al. 2017). In the absence of facility-level data, we adopted a proxy using the Philippines' Department of Health's (DOH) national system of hospital classification (Administrative Order No. 2012 – 0012)[35]. The proxy took hospitals with 'Level 2' and 'Level 3' status, as per the current (2012) DOH guidelines, to be facilities capable of providing the Bellwether Procedures[36]. Data on the classification of each individual facility was obtained from the Philippines DOH.

The geographic location of all relevant hospitals was then plotted, and two-hour service areas created, using ArcGIS geospatial mapping software tools[37]. Two-hour service areas were calculated using the ArcGIS 'drive time areas' tool. The tool models the movement of cars along actual road networks, obeying rules such as speed limits, one-way roads and illegal turns. Finally, the percentage of population within two-hour service areas, at both the regional and the national level, was calculated, also using ArcGIS. For these calculations, population density data (people per square hectare) was acquired from the WorldPop database[38]. The population data reflected the situation as of 2015.

International standards

As a measure of progress towards timely access to essential surgery, LCoGS has set a target of 80% coverage by essential surgical and anaesthesia services within all countries by 2030. The target aligns with the broader World Bank and the World Health Organization target of 80% essential health services coverage by 2030 (World Health Organization, WHO, and World Bank 2015).

At the time of conducting research for this section, we found that LCoGS had conducted assessments of access to timely essential surgery in 14 countries or territories, all of which have exceeded the 80% target. In seven of these (Andorra, Austria, Cayman Islands, Channel Islands, Latvia, Monaco and St Vincent and the Grenadines) 100% of the population had two-hour access to an appropriate facility.

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[35] Administrative Order No. 2012 – 0012: "New Classification of Hospitals and Other Health Facilities". Bureau of Health Facilities and Services. Department of Health, Republic of the Philippines.

[36] Because the DoH classification system applies to public and private medical facilities, we were able to include private hospitals within our analysis, which constitute over 64% of all hospitals in the Philippines. The Philippines in Figures 2017. Philippines Statistical Authority, Republic of the Philippines: 50.

[37] www.arcgis.com

[38] www.worldpop.org.uk

A further five countries (Belize, Finland, Iceland, Sri Lanka and Sweden) recorded coverage of over 95% of the population. In Mongolia and the Seychelles respectively, 83.6% and 83.7% of the population had access to timely essential surgery[39]. Studies performed in Brazil (97.2%) (Massenburg et al. 2017) and Ghana (83.2%) (Stewart et al. 2016) show similarly high rates of access. It is also clear, however, that not all countries enjoy these high levels of coverage. A 2015 study mapping access to medical facilities with *at least one surgeon* in nine low and middle-income countries found that the percentage of the population covered was, in many cases, well below the 80% target. The study recorded the following results: Somaliland (16.9%), Botswana (31%), Ethiopia (39.6%), Rwanda (41.3%), Namibia (43.4%), Zimbabwe (54%), Mongolia (55.5%), Sierra Leone (70.3%), and Pakistan (84.4%) (Raykar et al. 2015). A separate study of Zambia showed a coverage rate of 34.1% (Esquivel et al. 2016).

Results

Our analysis suggests that 73.64% of the Philippines' population has two-hour access to timely essential surgery. Of the 27 countries or territories for which we have found similar assessments, this places the Philippines 18th in terms of population coverage.

Our results (Table 7 and Figure 4) highlighted considerable variation in the access levels between different administrative regions within the Philippines. The percentage of the population with two-hour access ranged from 100% (National Capital Region) to 18% (Region IV-B). The median population coverage across regions was 65%.

Table 7: Percentage of population with two-hour access to timely essential surgery, by region

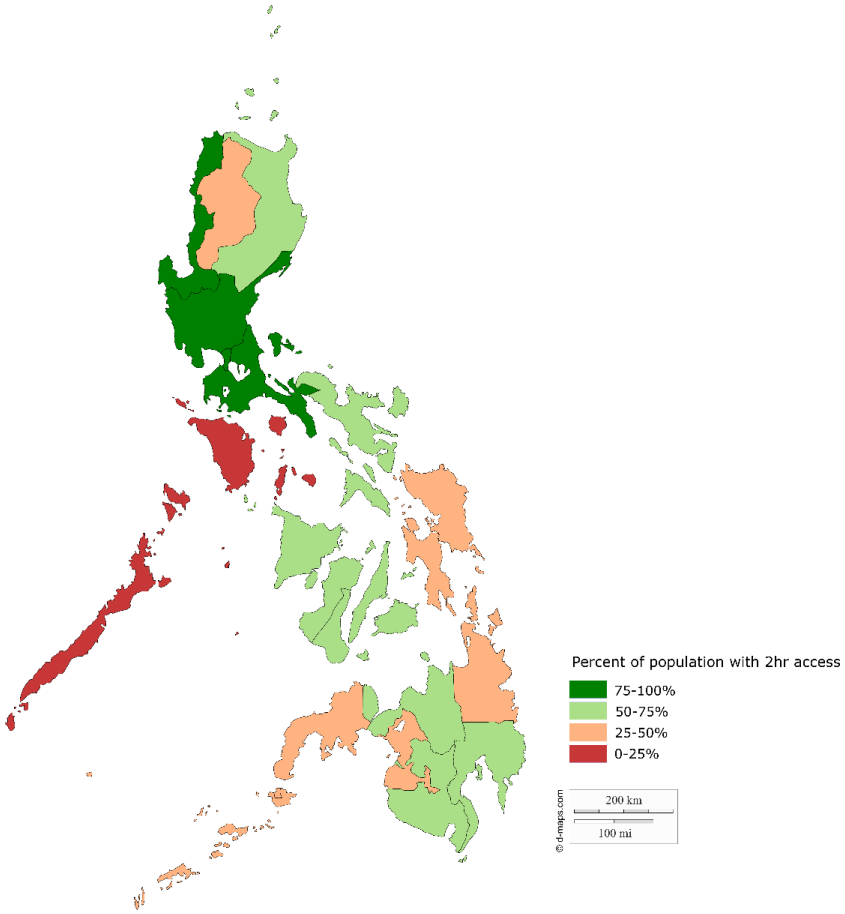
Region	Total Population	Population With Two-Hour Access To Timely Essential Surgery	Percentage Of Population With Two-Hour Access To Timely Essential Surgery (%)
NCR	13,830,634	138,070,11	100
CAR	1,714,044	789,728	46
NIR	4,584,663	2,389,249	52
I	5,078,583	4,448,577	88
II	3,410,883	2,163,458	63
III	10,772,358	10,084,705	94
IV-A	13,410,081	12,205,429	91
IV-B	2,834,506	516,332	18
IX	3,605,644	1,626,128	45
V	5,693,140	3,335,686	59
VI	4,429,634	3,288,244	74
VII	5,831,912	3,931,745	67
VIII	4,375,023	2,015,874	46
X	4,428,275	3,220,853	73
XI	4,617,282	3,395,994	74
XII	4,304,863	3,120,262	72
XIII	2,511,807	1,197,055	48
ARMM	4,513,737	2,065,264	46
TOTAL	99,947,069	73,601,593	73.64%

Source: Population data – WorldPop (2015)

[39] Meara JG et al. Data for the sustainable development of surgical systems; 12

Factors underpinning inter-regional disparities in access to timely essential surgery include the number and location of appropriate surgical facilities, land area, population distribution and connectivity (e.g. road networks and infrastructure). Evidence of inter-regional disparities in access to timely essential surgery aligns with broader evidence concerning inequities in the provision of health services across the Philippines. Level 2 and 3 hospitals and higher service capabilities, for example, are concentrated in certain regions, particular those of Central Luzon and the National Capital Region (Lavado et al. 2010). Regional-level data on the number of hospital beds per 1,000 persons is also indicative of such disparities (Esquivel et al. 2016).

Other measures of access to health facilities in the Philippines highlight similar trends. The National Demographic and Health Survey (NDHS), conducted in 2013 and 2008, found significant (and consistent) variations in the travel times recorded amongst persons who had visited a health facility in the last 30 days. In 2013, for example, regional averages varied from 25 minutes in the National Capital Region to 61 minutes in the Autonomous Region for Muslim Mindanao (ARMM). Across the nation, travel time was also longer for persons in rural than in urban areas (45 and 32 minutes respectively in 2013). Both the 2008 and the 2013 surveys indicated that on average older persons have longer travel time to a health facility than younger persons.[40]



Source: ArcGIS Desktop (10.2)

Figure 4: Map showing percentage of population with two-hour access to timely essential surgery, by region.

Conclusions

There are a number of important limitations to this indicator. The first concerns the proxy used for hospital facilities capable of providing essential surgery. It cannot be guaranteed, for instance, that every Level 2 and Level 3 facility in the Philippines (as per the DoH classification) is actually in a position to perform the 'Bellwether procedures' in a timely manner[41]. Even in cases where a hospital does have technical capacity to perform such procedures, various factors could affect its ability to perform such procedures in practice, when required. A fuller analysis might seek to account for these factors by considering facility-level

[40] National Demographic and Health Surveys (NDHS), 2008 and 2013. http://psa.gov.ph/content/national-demographic-and-health-survey-ndhs

[41] For evidence that many hospitals in developing country settings do not, in practice, meet basic surgical standards, see (Knowlton et al. 2017).

data on the number of surgical personnel, equipment and supplies, infrastructure (e.g. availability of electricity), volumes of surgery, and surgical waiting times.

A second category of limitations concern the calculation of the two-hour 'drive time' service areas surrounding each facility. These service areas do not account for factors such as road conditions or variable traffic flows. Furthermore, they do not account for variations in access to automotive transport. According to data obtained by the Pew Research Centre (2014), only 6% of Filipino households own a car, a low figure by both global and regional standards (Wijeratne and Lau 2015). While the service areas show the proportion of the population that would theoretically – i.e., given a suitable vehicle and optimum road conditions – be able to reach a given hospital within two hours, they do not necessarily equate to an accurate measure of who has such access in practice[42].

Finally, our two-hour distance calculations are based on land travel alone, and do not include water-borne travel. This is a particularly limiting factor given the unique archipelagic geography of the Philippines, where water-based travel may represent a viable means of access to a hospital in some cases. In this regard, some parts of the analysis may underestimate the number of people with access to timely essential surgery.

[42] As noted the LCoGS itself has emphasized, 'the methodology naturally overestimates the proportion of the population living within a two-hour travel time'. Data for the sustainable development of surgical systems, 13.

Final Remarks

- Based on our limited data, we observed consistent underperformance of certain areas in almost all assessed parameters. There is a large disparity between the North (the Capital Region Area in particular) and the South (especially the ARMM) of the Philippines. The major problems facing the Filipino healthcare system and surgery in particular remain insufficient number of medical personnel in the rural areas, accompanied by poor infrastructure and hence limited access to specialized medical help. Enabling more people to overcome financial barriers also remains a crucial element of improving surgical care in the country.

- To recognize the true distribution of access to safe surgeries across the country, it is essential to establish a publicly available, unified reporting system at two levels: internal (within each hospital) and local (administrative regions). This system should include accurate annual data on:
    - The number of elective surgeries and the associated POMR
    - The number of emergency surgeries and the associated POMR
    - The number of surgeons, anaesthesiologists and obstetricians on full-time contracts

- In terms of recruiting more SAO providers, we suggest that to tackle chronic understaffing in the rural Philippines the government should provide more incentives for healthcare professionals to work in these regions. These incentives could include: 1. providing greater training opportunities for local medical students and doctors in rural areas, and 2. increased remuneration for rural doctors. These investments, combined with augmenting the already successful programmes of strategic scholarships in rural areas, might yield better results than the current redeployment programs. However, further studies with more granular data from private as well as public hospitals are required to support these preliminary suggestions.

- With regard to infrastructure, it is difficult to ascertain the extent of the challenges facing Filipinos wishing to access surgical care given the lack of data. More investigations into how far travel by sea mitigates for difficult terrains and lack of land infrastructure and vehicle ownership would be helpful in the future.

- PhilHealth remains an important means of enabling access to surgical care in the Philippines. We suggest that more research needs to be done into its accessibility so that it remains a sustainable option for citizens of the Philippines in light of recent signs of changes in uptake. Awareness campaigns to increase uptake of PhilHealth, particularly for more middle-class Filipinos, could be one way of effectively cutting down on the incidence of catastrophic expenditure due to health costs.

- Altogether, this analysis has shed light on the multifaceted nature of regional disparities in social access to surgical care across the Philippines. Ameliorating these entrenched inequalities will not be easy and will require further research and substantial investments, but as this report has shown, efforts are already underway with promising results in a number of areas. We are hopeful that with further strategic actions the future of surgical care for everyone in the Philippines is bright.

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