RESEARCH

Open Access



Unraveling socioeconomic determinants of health-related behavior, reception of information, and perceptions on disease disclosure at the time of the COVID-19 pandemic: did health insurance curb the disparities in the Philippines?

Josue Antonio G. Estrada^{1*}

Abstract

Background The study uncovers micro and macro socioeconomic disparities in terms of health behavior, disease perception, and reception of information. Furthermore, findings shed light on the possible role of health insurance on access to information, disease perception and the adoption of preventive behaviors in the context of a public health emergency such as the COVID-19 pandemic.

Methods This study employed a cross-sectional design using the Philippine Demographic and Health Survey (DHS). With a total of 29,809 respondents, it evaluated the individual or household and systemwide socioeconomic determinants of four different outcomes: receipt of information, disease perception, uptake of free preventive services, and treatment-seeking behavior. In addition to logistic regression models with the socioeconomic variables as the independent variables, models for the evaluation of the moderating effect of insurance ownership were fitted. Predicted probabilities were reported for the analysis of moderating effects.

Results Findings show that individual and householdsocioeconomic determinants affected health-behavior and access to or receipt of information pertinent to the COVID-19 pandemic. Both education and wealth affected the receipt of information such that individuals in more advantaged socioeconomic positions were at least 30% more likely to have received information on COVID-19. Wealth was also associated to treatment-seeking behavior. Regional differences were seen across all dependent variables. Moreover, the study provides evidence that ownership of insurance can close education-based gaps in the uptake of free vaccination and COVID-19 testing.

Conclusion It is imperative that targeted efforts be maximized by utilizing existing strategies and mechanisms to reach the marginalized and disadvantaged segments of the population. Health insurance may give off added benefits

*Correspondence: Josue Antonio G. Estrada josueantonioestrada@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Page 2 of 15

that increase proficiency in navigating through the healthcare system. Further research may focus on examining pathways by which health insurance or social policies may be used to leverage responses to public health or environmental emergencies.

Keywords Socioeconomic inequalities, COVID-19, Health insurance, Public health emergency, Health behavior, Stigma, Access to information, Developing countries

Introduction

More than 2 years have passed since the severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 virus first emerged and rapidly spread all over the globe, causing a pandemic that has profoundly impacted the lives of billions of people. As of mid-2023, there is an estimated 6.9 million deaths caused by the coronavirus (COVID-19) disease and although the World Health Organization (WHO) has declared the end of the public health emergency, many remain affected by productivity losses, disability, and other persistent health and social effects of the pandemic [1-3]. To make things worse, the mid- and long-term effects on socioeconomic factors and quality of life at both the micro and macro levels are expected to cause a continuing scourge in the years to come [4, 5].

The literature documents inequalities not just in infection and mortality but also in other aspects and effects of the COVID-19 pandemic among and within countries [5-8]. On a larger scale, low- and middle-income countries have taken the brunt of the ill effects of this pandemic while within countries, socioeconomically disadvantaged populations were forced to take several steps further away from achieving a good quality of life [9-12]. Differences in contextual factors such as socioeconomic status give rise to disparities in terms of access to information, healthcare, and social services and even in health-related behavior and disease-associated stigma which subsequently affected infection, mortality rates and the emergence of long-term economic and social effects [13-18].

The Philippines, a lower-middle income country, was one of the most severely affected countries in the Western Pacific and Southeast Asian regions [19-21]. As of July 2023, almost 67 thousand COVID-19 related deaths have occurred in the country- the second highest number of deaths in Southeast Asia [1]. Despite vast improvements in health service quality and coverage and achievement of several important milestones such as the implementation of landmark legislature for universal health care and excise tax for tobacco and alcohol which increased resources for health, the country's healthcare system remains lacking as problems in resource allocation and inadequate capacity remain [22, 23]. At the beginning of the pandemic, the country only had 8 physicians per 100,000 population and 2,335 critical care beds [24, 25]. Health capacity and resources are unevenly distributed with much of these concentrated in urban and highly-developed areas while the rural population, comprising almost half of the total population, rely mostly on primary care centers and community and some tertiary hospitals with limitations on laboratory and diagnostic testing capacity, health personnel, equipment and supplies and as a consequence, possess very limited surge capacity [26-28]. Governance is decentralized hence, while national strategies are in place, local governments are mainly responsible for the crafting of plans and service provision [27]. Localities create disaster risk reduction and management plans but these are crafted mostly for environmental emergencies and natural disasters and do not usually cover plans for the mitigation of the effect of epidemics and other public health emergencies [29]. At the onset of the pandemic, strategies such as "community quarantines", internal movement and travel restrictions, and mass testing were implemented but certain challenges were encountered. For instance, due to limited infrastructure, testing was implemented mostly in urban areas. Additionally, as Filipinos spend more than 10 hours a day in the internet, there was an added challenge on risk communication with the emergence of various sources of misinformation [26, 30, 31]. In the hopes of bringing attention and building more equitable healthcare systems, the study examined the socioeconomic determinants of health and associated disparities in terms of receipt of COVID-19 related information, health behavior at the time of the pandemic, and perceived stigma. This analysis based on the Philippine Health and Demographic Survey (DHS) and done among adults aged 18 and above provide an understanding of the different aspects of the country's response to the COVID-19 pandemic. Furthermore, this study explored and offered insights into the potential role that the national health insurance program (NHIP) under the Philippine Health Insurance Corporation (PHIC), popularly called Philhealth, and other health insurance, play in the curbing of socioeconomic disparities in COVID-19 related behavior, refusal to disclose disease, and access to information. Classical economic theories posit that the possession of health insurance may disincentivize individuals to take preventive efforts to remain healthy. This is termed ex-ante moral hazard and is suggested to stem from an informational asymmetry, where the insurer cannot observed some of the actions of the insured [32, 33]. However, the fact that health insurance covers only

part of the expenses may mean that the extent of moral hazard in terms of health behavior may not be significant enough in most cases [34]. In fact, most empirical evidence has shown, that health insurance can, to some degree, induce health-related behavior change in a beneficial manner [34-37]. The social cognitive theory asserts that individuals require information about health risks and uses these information to develop self-regulatory and risk-reduction skills however self-efficacy, is a key factor to adoption of these skills [38]. Theoretically, insurance ownership may also impart health consciousness and health-related information such as those on risk reduction leading to behavior change and adoption of appropriate health-related behavior. Furthermore, ownership of health insurance may be considered a resource that can impart skills essential for efficient navigation of the healthcare system [39]. In the Philippines, the introduction of reforms towards universal healthcare has, in theory, made health insurance available to everyone through several schemes such as the point-of-care enrolment [23]. However, information asymmetry and poor health literacy resulting from poor communication may hinder individuals from gaining knowledge of their entitlement to health insurance and to financial and nonfinancial benefits that come with it [40]. Therefore, this study measures if entitlement to benefits of health insurance in the Philippine context modifies the relationship between socioeconomic determinants and COVID-19 related behavior and access to information. More than providing a picture of disparities that emerged during the COVID-19 pandemic, results of this study could contribute to the knowledge base of the indirect role of interventions such

 Table 1
 COVID-19 related outcomes and their definition and categorization

Outcome	Definition
Receipt of infor- mation about COVID-19	Those who stated that they have received health information about the COVID-19 pandemic through television, print or digital sources were coded as 1
Refusal to dis- close disease	Those who responded yes or don't know to the question, "If a member of your family got infected with COVID-19, would you want it to remain a secret?" were coded as 1
Uptake of free preventive services	Based on the question, "Which of these health programs initiated by your local government unit (provincial, city/municpal, or barangay) did you or any of your household members avail in the past 30 days?". Those who availed "free COVID-19 vaccina- tion" or "free COVID-19 RT PCR testing" in the past 30 days were coded 1
Treatment-seek- ing behavior	Among respondents who've had COVID-19 or experienced related symptoms since January 2020, those who sought treatment or medical attention were coded as 1

as health insurance in curbing health inequalities or specifically modifying preventive behaviors.

Methods

Study design, sample and data

The study used cross-sectional data from the 2022 Philippine DHS, a nationwide survey conducted from May 2 to June 22, 2022 and included a more than 30,000 households. The Philippine DHS 2022 has a response rate of 99.2% [41]. Included in this study are survey respondents aged 18 and above who are *de jure* or usual residents of the interviewed households. Three sets of analytic samples were considered were used for the study- an overall analytic sample, an analytic sample for the outcome "uptake of free preventive services", and an analytic sample for the outcome "Treatment-seeking behavior" which was derived for those who confirmed having experienced COVID-19 related symptoms since January 2020. Figure S1 in the appendix shows how these analytic samples were derived. Data used was extracted from the household survey module. A complete case analysis was done, hence, observations with missing information for relevant variables were excluded. A multistage stratified sampling design was used for the survey, details of which are discussed in the DHS report [41].

The study used publicly available de-identified data which were requested from the DHS program. The survey has undergone ethical review under the institutional board of ICF International.

Measures

Outcome variables

The study considered a total of four outcome variables, each representing a dimension of health behavior and access to information. These variables are listed in Table 1.

Health-seeking behavior was represented by 2 variables: (a) uptake of free vaccination and testing services and (b) seeking consultation and treatment due to COVID-19 or COVID-19 related symptoms. For the latter, the study considered only those who answered "Yes" to the question: "Since January 2020, have you ever had COVID-19 or COVID-19 symptoms such as fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, or diarrhea?". These variables, to a certain degree, measure risk perception and preventive behavior which affect disease transmission and effectiveness of social measures. In a study by Ye and Lyu [42], risk perception mediated the relationship between public trust and COVID-19 infection. Another outcome variable considered was the respondent's decision to make COVID-19 diagnosis of a family member a secretor refusal to

disclose disease may represent perceptions of stigmatization and has been shown to be an aspect of the overall stigma experience of an individual [43, 44]. Refusal to disclose disease may be related to courtesy stigma or stima-in-association which refers to the perceived and experienced stigma of associates from the general public toward themselves [45]. A related concept, affiliate stigma, on the other hand, is the internalization of stigma among associates and describes the extent of self-stigmatization and cognitive, behavioral and affective responses of the associates [46, 47]. Lastly, access to information, a crucial factor affecting adoption of preventive and healthy behavior, was represented by perceived access to information, which in turn, was assessed through the respondent's receipt of health-related information about COVID-19 [48, 49].

Socioeconomic determinants

There were three socioeconomic determinants considered in the analysis. At the micro level, differences in levels of wealth and education were assessed. Respondents were assessed as either poor (belonging to the poorest 40% of the population) or nonpoor based on the household wealth index of the Philippine DHS. Wealth index scores, a composite measure of a household's cumulative living standard, were estimated using principal component analysis (PCA) from information on a household's ownership of selected assets. The estimation of these scores are described further in relevant documents [50, 51]. For education, highest educational attainment was used and classified as either "with secondary education or higher" or "lower than secondary education". For the macro level determinant, the study used regions classified in quartiles according to the reported poverty incidence in 2021 [52]. The quartiles were classified according to regionwide statistics, with the first quartile containing the regions with the highest poverty incidence.

Health insurance ownership

This study considers knowledge on ownership of insurance which was defined in 3 categories: (1) no health insurance, (2) entitled to PhilHealth and (3) entitled to Philhealth and other health insurance. Those who reported entitlement to PhilHealth are either members or dependents of listed members.

Philhealth, being the national health insurance, is mandatory for employees in public and private institutions while voluntary for the workers in the informal economy. Sponsored members or those whose premiums are subsidized by the government mostly include indigent citizens. As mentioned, the advent of universal health care law has, in theory, made PhilHealth available to everyone, however, as evidenced by results of the DHS, a sizeable proportion of the population is still unaware of their entitlement to the social health insurance [41].

Due to sparse data issues, respondents were classified into the three aforementioned groups based on their responses when asked of their ownership of health insurance. Less than 1% of the overall analytic sample declared being entitled to benefits of other insurance only. However, with the assumption that Philhealth is considered as the main source of health insurance, while health insurance from other sources such as that from the private market is often considered supplementary, the small proportion of respondents who responded having other insurance only were classified as having both Philhealth and other insurance. The potential impact of the adoption of this categorical approach was minimal as illustrated in the appendix (see Appendix 2).

Confounders

A review of literature reveals possible factors which may confound the relationship of socioeconomic factors to COVID-19 response related outcomes [53-58]. Among these, the following variables were considered in the analysis: sex (male or female), age (categorized as < 20, 21-30,31-40, 41-50, 51-60, and 60 and above), area of residence (urban or rural), household size (number of de jure household members categorized as 1-3, 4-6, 7 and above), relationship to household head (categorized as self, spouse, child, or others), awareness of programs on COVID-19 (defined as awareness of free vaccination and COVID-19 testing and classified as aware or unaware), belief that COVID-19 can be prevented (defined as one's belief that COVID-19 can be prevented through vaccination or other social measures and classified as believing or does not believe) and use of internet (defined as use of internet for health-related reasons and classified as yes or no).

Statistical analysis

All analyses were weighted based on the complex survey design of the data in use. Descriptive statistics were calculated for all participants and analyses were conducted using R (version 4.3.1). The threshold for statistical significance was set at an alpha of 0.05.

Binary logistic regression was used to conduct two levels of analysis. The first level included models wherein the main effects of the socioeconomic determinants were determined, and insurance ownership was considered a confounder, together with the other identified variables. Adjusted odds ratios (aOR) and their respective 95% confidence intervals were reported for each socioeconomic determinant. For the second level of analysis, the moderating effect of insurance ownership was assessed through the introduction of interaction terms between each socioeconomic variable and health insurance ownership. The Wald test was used to determine if there were significant differences in the relationship of the socioeconomic determinants with the COVID-19 related outcomes across levels of insurance ownership. Relationships were further elaborated using predictive margins. To provide further illustration, predicted probabilities were plotted.

Results

Descriptive statistics

The total analytic sample is comprised of 29,809 individuals which comprises 98% of the total household sample interviewed in the 2022 Philippine DHS. For assessments involving the outcome, "uptake of free preventive services", the study included 27,999 respondents while for "treatment-seeking behavior", the study included 5,130 respondents who was diagnosed with COVID-19 or exhibited symptoms of the disease. Table 2 shows the descriptive statistics of the overall sample in terms of weighted proportions.

Among those with both PhilHealth and other health insurance, 77% are nonpoor while 89.4% finished at least secondary education. Regions with the least poverty incidence are most represented in the survey with more than 40% of respondents belonging to these regions. Most of the respondents are female, aged 31 and above, living in urban areas, and in households with 4 to 6 members. Respondents are also generally shown to be aware of free vaccination and testing services, and an overwhelming majority are aware of and believe in measures to prevent COVID-19. Lastly, most individuals use the internet for health reasons. This was observed regardless of ownership of insurance.

Figure 1 illustrates the weighted proportion and 95% confidence intervals of the outcomes in the analytic samples. As shown in the figure, approximately 47–49% of respondents availed free preventive services while less than 55% of those who had COVID-19 or related symptoms sought treatment or consultation. Meanwhile, less than 10% of respondents agreed or were uncertain about keeping a diagnosis of COVID-19 in the family a secret. Considering that this is a public health emergency, penetration of information among the respondents can be considered inadequate, with only approximately 70% of respondents reporting receipt of information on the pandemic. Generally, those with Philhealth and other insurance had more favorable outcomes.

Socioeconomic disparities

The first level of analysis revealed that individual socioeconomic determinants affected health-behavior and perceived access to or receipt of information pertinent to the COVID-19 pandemic. Both education and wealth affected the receipt of information such that individuals in more advantaged socioeconomic positions were 30% more likely to have received information on COVID-19. Education and wealth-based disparities were also seen in the uptake of COVID-19 vaccination and free testing services while for treatment-seeking behavior, only wealth was found to be significantly associated. However, if we look at results for the macro-level socioeconomic determinant, regional disparities can be seen across all outcomes considered. Furthermore, regions with the lowest poverty incidence were generally found to have more beneficial outcomes. Table 3 presents the results of the multivariate models.

Insurance ownership as a moderator

Figure 2 shows the plotted predicted probabilities for each socioeconomic determinant across categories of health insurance ownership in each COVID-19 related outcome. Shown in Table 4 are the predicted probabilities of each level of socioeconomic determinant for each study outcome, stratified by the different categories of health insurance ownership. Testing for interaction between the socioeconomic determinants and health insurance ownership revealed that health insurance modified the relationship between education and uptake of free preventive services, specifically vaccination and free COVID-19 testing. Among those without health insurance, the probability of availing preventive services was significantly higher in those with at least secondary education. Ownership of health insurance- either PhilHealth alone or in combination with other health insurance- curbed the disparity between the two levels of educational disposition. Among people with at least Philhealth as insurance, living in regions with the lowest poverty incidence gives significantly higher probabilities of getting vaccinated and availing testing services than living in regions with the highest levels of poverty. When considering people without health insurance, one can see significant differences in the levels of refusal to disclose disease, with "poorer" regions experiencing higher levels of refusal to disclose COVID-19 diagnosis in the family. For populations who own insurance, no regional differences were seen with regards to this outcome. On the other hand, a notable result can be seen in the case of household wealth. Among those who reported that they don't own any health insurance, poorer individuals have shown a higher probability to perceive disclosure of disease negatively but among those who reported ownership of insurance, individuals from nonpoor households were more likely to keep diagnosis of COVID-19 in the family a secret. Differences on predicted probabilities were, however, not significant. Marginally significant results can also be seen with wider socioeconomic disparities among insured populations in terms of (a) education and refusal to disclose disease, and (b) wealth and treatmentseeking behavior.

Table 2 Descriptive statistics on the overall analytic sample using weighted proportions (n = 29,809)

Variable	Insurance ownershipn, n (%wt)				Total			
	Unsure/ No (<i>n</i> = 7,169)	health insurance	With Phil (<i>n</i> = 21,23	health only 8)	With Philhealth (n=1,402)	and other insurance	n (%wt)	
Wealth								
Poor	3,899	(53.9)	7,818	(36.8)	562	(23)	11,953	(40)
Nonpoor	3,334	(46.1)	13,427	(63.2)	842	(77)	17,929	(60)
Educational attainm	ent							
Below secondary	2,235	(30.9)	5,396	(25.4)	362	(10.6)	7,710	(25.8)
At least secondary	4,998	(69.1)	15,849	(74.6)	1,042	(89.4)	22,172	(74.2)
Region ^a								
1	1,259	(17.4)	2,422	(11.4)	180	(11)	3,825	(12.8)
11	1,714	(23.7)	4,993	(23.5)	334	(27.8)	7,112	(23.8)
111	1,548	(21.4)	4,823	(22.7)	309	(16.2)	6,574	(22)
IV	2,712	(37.5)	9,008	(42.4)	581	(45.1)	12,371	(41.4)
Sex								
Male	1,844	(25.5)	5,248	(24.7)	352	(29.2)	7,500	(25.1)
Female	5,389	(74.5)	15,997	(75.3)	1,052	(70.8)	22,382	(74.9)
Age in years								
<20	386	(5.3)	387	(1.8)	37	(1.5)	786	(2.6)
21 to 30	1,468	(20.3)	2,422	(11.4)	191	(13.5)	4,064	(13.6)
31 to 40	1,461	(20.2)	4,525	(21.3)	300	(27.4)	6,395	(21.4)
41 to 50	1,504	(20.8)	4,610	(21.7)	306	(27.3)	6,514	(21.8)
51 to 60	1,584	(21.9)	3,930	(18.5)	270	(17.5)	5,737	(19.2)
61 and above	825	(11.4)	5,375	(25.3)	299	(12.9)	6,365	(21.3)
Area of residence								
Urban	3,660	(50.6)	11,430	(53.8)	751	(61.4)	15,987	(53.5)
Rural	3,573	(49.4)	9,815	(46.2)	653	(38.6)	13,895	(46.5)
Household size								
1 to 3	2,966	(41)	8,519	(40.1)	566	(39.8)	12,042	(40.3)
4 to 6	3,392	(46.9)	9,879	(46.5)	656	(48.7)	13,955	(46.7)
7 and above	875	(12.1)	2,847	(13.4)	183	(11.6)	3,885	(13)
Relationship to hou	sehold head							
Self	2,799	(38.7)	9,475	(44.6)	607	(43.9)	12,909	(43.2)
Spouse	3,197	(44.2)	9,581	(45.1)	630	(45)	13,417	(44.9)
Child	817	(11.3)	1,506	(7.1)	114	(8.3)	2,435	(8.2)
Others	415	(5.7)	680	(3.2)	53	(2.8)	1,130	(3.8)
Awareness of COVID)-19 programs ^b							
unaware	1,938	(26.8)	5,502	(25.9)	369	(29)	7,859	(26.3)
aware	5,295	(73.2)	15,743	(74.1)	1,035	(71)	22,023	(73.7)
Belief in prevention	of COVID-19 ^c							. ,
No	574	(7.9)	1,500	(7.1)	101	(5.6)	2,149	(7.2)
Yes	6,662	(92.1)	19,737	(92.9)	1,303	(94.4)	27,730	(92.8)
Use of internet for h	ealth reasons ^d	. ,				× ,		. /
No	5,446	(75.3)	14,085	(66.3)	951	(52.8)	20,230	(67.7)
Yes	1.787	(24.7)	7.160	(33.7)	453	(47.2)	9652	(32.3)

^aclassification based on poverty incidence with regions in the first quartile having the highest level of weighted regional poverty incidence in 2021

^b defined as awareness of free vaccination and COVID-19 testing and classified as aware or unaware

^c defined as one's belief that COVID-19 can be prevented through vaccination or other social measures

^d defined as use of internet for health-related reasons

Discussion

Results of the study show that socioeconomic disparities at the individual and regional levels were observed in perceived access to information, perceptions, response, and behaviors at the time of the COVID-19 pandemic. At an individual or household level, wealth and education were seen to be related to receipt of health information regarding COVID-19 and uptake of free preventive services. At the regional level, poverty incidence, which



Fig. 1 Weighted proportion and corresponding 95% confidence intervals of the respondents with the outcome, by category of health insurance ownership

Socioeconomic factor	Outcomes aOR (95% Confidence Interval)		
	Receipt of information about COVID-19	Refusal to disclose disease in the family	Uptake of free preventive services	Treat- ment- seeking behavior
Wealth				
Poor	ref	ref	ref	ref
Nonpoor	1.30 (1.18,1.44)*	0.98 (0.82,1.16)	1.15 (1.02,1.3)*	1.74 (1.4,2.18)*
Educational attainment				
Below secondary	ref	ref	ref	ref
At least secondary	1.34 (1.23,1.47)*	0.90 (0.72,1.12)	1.13 (1.004,1.27)*	1.18 (0.92,1.5)
Region				
1	ref	ref	ref	ref
II	1.35 (1.15,1.6)*	0.5 (0.34,0.75)*	1.01 (0.79,1.31)	0.99 (0.77,1.28)
III	0.93 (0.79,1.09)	0.43 (0.28,0.67)*	0.94 (0.7,1.25)	1.22 (0.94,1.59)
IV	1.23 (1.03,1.48)*	0.51 (0.35,0.74)*	1.68 (1.25,2.24)*	1.74 (1.29,2.34)*

Abbreviation aOR- adjusted odds ratio; CI- confidence interval

^aclassification based on poverty incidence with regions in the first quartile having the highest level of weighted regional poverty incidence in 2021

may be indicative of governance efficiency and availability and equitability of social services, has been found to give rise to inequalities in health behavior, receipt of information and refusal to disclose disease. These study's findings are important considering that healthcare navigation and individual responses, including disease perceptions shape, not only the individual's outcome, but on a collective level, the population's health outcomes [59–61]. In the context of the COVID-19 pandemic, these disparities in preventive behavior and disease perception may have implications in dynamics based on disease transmission, severity of outcomes and mid- and long-term health and economic effects. On the other hand, access to information especially in times of public health



Fig. 2 Predicted probabilities of socioeconomic determinant across categories of self-reported health insurance ownership for (A) receipt of information about the COVID-19 pandemic, (B) refusal to disclose disease, (C) uptake of free preventive services, and (D) treatment-seeking behavior

emergencies is essential to mitigate the health and social impacts of the crisis [62]. Acknowledging the disparities in health-related behavior and access to information is an important component of a targeted, comprehensive, and effective response to public health emergencies such as the COVID-19 pandemic.

In terms of perceived access to information and uptake of free preventive services, both wealth and education were considered significant determinants with those in higher socioeconomic positions gaining health advantage more than their poor and less educated counterparts. Health literacy is generally expected to be higher in more educated individuals as they have greater perceived access to information and are more able to interpret and assess the verity of information [63-65]. In the same way, wealth endows greater amounts of financial, informational and social resources. Furthermore, people in higher socioeconomic status are more likely to develop skills that can enable them to maximize use of available resources and adopt beneficial health behaviors that can lead to health advantage. Among individuals who were confirmed to have COVID-19 or showed related symptoms, disparities were primarily driven by differences in levels of wealth such that individuals from nonpoor households were 74% more likely to seek consultation. Disparities in wealth can be partly explained by the fact that the cost of healthcare or possible out-of-pocket

expenditure may outweigh perceived risk. It may also be because patient isolation may entail opportunity costs due to loss of livelihood and considerations about the precarity in the quality of care or conditions and experience of being isolated. While Philhealth provides reimbursements, these may be inadequate when considering factors such as increased cost of high quality or satisfactory care- in the context of a public health emergency involving a highly transmissible infectious agent - and indirect costs associated with treatment-seeking such as waiting time, transportation costs, use of technology with higher transactional costs, and uncertainty of seeing a physician [66, 67]. In general, out-of-pocket (OOP) payments made by PhilHealth members are still significant as, on average, PhilHealth is only able to cover 56% of healthcare costs with limited coverage for outpatient services [68, 69]. In inpatient settings, mild to moderate pneumonia due to COVID-19 can lead to OOP payments ranging from USD 538 to USD 925- a huge amount considering that the median monthly basic pay of timerated workers on full-time basis across all industries in 2020 was only pegged at approximately USD 272 [70, 71]. Another possible explanation is that poor insurance literacy especially on complex administrative processes for claims may deter individuals from seeking care [72]. Furthermore, nonpoor individuals may have enough resources to purchase higher quality care in healthcare

Variable in	teractions	Receipt of inforr	nation abou	it COVID-19	Refusal to discl	lose disease		Uptake of free pi	eventive services		Treatment-see	king behavio	<u>ب</u>
		Predicted probability,%	Differ- ence, pp	p-value	Predicted probability,%	Difference, pp	p-value	Predicted probability,%	Difference, pp p	-value	Predicted probability,%	Differ- ence, pp	p- value
Wealth													
No health	poor	62.6 (60.1,65.1)*	ref	0.3075	8.7 (7.2,10.2)*	ref	0.0351	59.2 (55.9,62.5)*	ref 0.	.3775	23.4 (17.7,29.1)*	ref	0.0895
nsurance	nonpoor	66.9 (63.7,70)*	4.2 (0.3,8.1)*		6.9 (5.4,8.4)*	-1.7 (-3.6,0.1)		61 (56.6,65.4)*	1.8 (-2.6,6.2)		28.8 (23.6,34.1)*	5.6 (-2,13.2)	
with	poor	69.9 (68,71.8)*	ref		5.8 (4.8,6.8)*	ref		59.7 (56.8,62.6)*	ref		26.6 (23.1,30)*	ref	
Philhealth only	nonpoor	75.5 (73.9,77.1)*	5.6 (3.3,7.9)*		6.1 (5.4,6.7)*	0.3 (-0.9,1.4)		63.8 (61.6,66.1)*	4.2 (1,7.4)*		39.2 (35.7,42.7)*	12.6 (7.2,18.1)*	
with	poor	70.2 (62.8,77.6)*	ref		4.3 (2.2,6.4)*	ref		62 (50.9,73.1)*	ref		30.2 (16.2,44.3)*	ref	
Philhealth and other nsurance	nonpoor	79 (74.8,83.1)*	9.4 (0.7,18.1)*		6.9 (4.6,9.3)*	2.5 (-0.6,5.6)		60.4 (54.5,66.2)*	-1.7 (-14,10.6)		59.7 (51.3,68.1)*	29.2 (13.2,45.2)*	
Education													
No health nsurance	lower than secondary	58.6 (55.3,61.8)*	ref	0.3667	9.4 (7.3,11.5)*	ref	0.0585	55.2 (50.5,59.9)*	ref 0.	.0113	29.1 (20,38.3)*	ref	0.2165
	At least	67.3 (65.1,69.6)*	8.6		7.2 (6,8.4)*	-2.1 (-4.2,0.1)		62.2 (58.8,65.6)*	6.9 (2.2,11.6)*		25 (20.2,29.8)*	-4.4	
	secondary		(5.2,12)*									(-15.4,6.7)	
with >hilhealth	lower than	69.5 (67.5,71.6)*	ref		6.1 (4.8,7.4)*	ref		61.1 (58,64.3)*	ref		30.4 (25.6,35.1)*	ref	
lun	secondary												
	At least secondary	74.7 (73.3,76.2)*	5.2 (3.1,7.4)*		5.9 (5.3,6.5)*	-0.2 (-1.6,1.3)		62.8 (60.6,64.9)*	1.6 (-1.6,4.9)		35.7 (33,38.5)*	5.3 (-0.3,11)	
with ^{>} hilhealth	lower than	71 (63,79)*	ref		4.1 (1.2,6.9)*	ref		69.1 (59.1,79.2)*	ref		41.1 (17,65.2)*	ref	
and other	secondary												
nsurance	At least secondary	77.6 (73.8,81.5)*	7.1 (-1.2,15.3)		6.5 (4.5,8.5)*	2.4 (-0.7,5.5)		59.9 (54.3,65.5)*	-9.5 (-20.3,1.4)		56 (48.2,63.7)*	14.7 (-9.8,39.3)	
Region in c	quartiles												

Page 9 of 15

Table 4 (contin	ued)											
Variable interactic	ons Receipt of infor	mation abou	t COVID-19	Refusal to discl	ose disease		Uptake of free p	reventive service:	5	Treatment-seek	cing behavio	
	Predicted	Differ-	p-value	Predicted	Difference,	p-value	Predicted	Difference, pp	p-value	Predicted	Differ-	ط. ا
	probability,%	ence, pp		probability,%	dd		probability,%			probability,%	ence, pp	value
No health	59.9 (55.8,64)*	ref	0.0068	16.9 (12.2,21.7)*	ref	0.0012	60.3 (54,66.6)*	ref	> 0.0001	24.7 (16.8,32.7)*	ref	0.268
insurance II	71.8 (67.8,75.8)*	11.6		5.6 (4.2,6.9)*	-11.2		60.9 (55.6,66.2)*	0.5 (-7.4,8.5)		25.3 (18.2,32.4)*	0.6	
		(6.3,17)*			(-15.9,-6.5)*						(-10.6,11.8)	
=	60.8 (56.3,65.3)*	6.0		5.8 (3.8,7.8)*	-11 (-16,-6)*		54.2 (47.2,61.2)*	-6.1 (-15.4,3.3)		21.9 (14.7,29)*	ŗ.	
		(-4.9,6.7)									(-14.3,8.2)	
\geq	64.1 (60.4,67.8)*	4.1		7.1 (5.3,9)*	-9.7		62.3 (56.3,68.3)*	1.9 (-7,10.8)		31 (21.8,40.1)*	6.5	
		(-1.5,9.8)			(-14.5,-4.9)*						(-6.3,19.2)	
with I	71.1 (68.3,74)*	ref		9.2 (5.3,13)*	ref		53.7 (47.7,59.7)*	ref		29.6 (24.5,34.6)*	ref	
Philhealth II	75.4 (73.1,77.7)*	4.3 (1,7.6)*		6.1 (5.2,7)*	-3.1 (-7.1,1)		55.5 (52.1,58.8)*	1.8 (-4.8,8.4)		27.9 (24.1,31.8)*	-1.6	
only											(-7.9,4.6)	
≡	68.2 (65.6,70.7)*	с-		5.1 (4,6.1)*	-4.1 (-8.2,0)*		56.7 (52,61.5)*	3.1 (-4.2,10.4)		34.4 (29.6,39.1)*	4.8 (-2,11.5)	
		(-6.6,0.7)										
\geq	75.9 (73.4,78.4)*	4.7		5.8 (5,6.7)*	-3.3 (-7.1,0.4)		70.2 (67.1,73.3)*	16.6 (9.6,23.6)*		41.7 (36.8,46.7)*	12.1	
		(0.8,8.7)*									(4.7,19.5)*	
with I	76.3 (66.4,86.2)*	ref		9.2 (4.1,14.2)*	ref		71.3 (61.2,81.4)*	ref		35.6 (25.2,45.9)*	ref	
Philhealth _{II}	79.3 (73.4,85.2)*	3.3		7.3 (3.6,11)*	-1.8 (-7.8,4.2)		58.4 (47.6,69.2)*	-13.2 (-28.2,1.8)		46.6 (32.3,60.8)*	17	
and other		(-9.2,15.7)									(1.4,32.7)*	
insurance	81.4 (74.1,88.7)*	5.6		6.2 (1.9,10.5)*	-2.9 (-9.3,3.6)		29.4 (20.1,38.7)*	-41.9		53 (40.7,65.2)*	27.9	
		(-7.9,19)						(-55.4,-28.3)*			(10.9,44.8)*	
\geq	73.5 (67.1,79.9)*	-3.1		5.2 (2.4,8.1)*	-3.8 (-9.4,1.8)		71 (63,79)*	-0.3 (-13.8,13.2)		63.6 (50.5,76.7)*	10.7	
		(-15.8,9.7)									(-6.2,27.6)	
Abbreviation pp-pe	rcentage points											
^a n-value for interacti	00											
ח-עמומב וטו ווווכו מרני	01											

facilities with safer environments thus the observed disparity [73]. This phenomenon is demonstrated in significant wealth-based disparities which persisted regardless of ownership of insurance.

Results for the macro-level socioeconomic determinant, on the other hand, show that there were regional disparities in the health-related behavior, refusal to disclose disease and receipt of information. People in regions with the highest poverty incidences were clearly disadvantaged across all study outcomes. Receipt of information regarding the pandemic and treatmentseeking behavior were generally better in richer regions. While there is a maldistribution of resources among regions in the Philippines, those considered more developed and highly urbanized have more resources for healthcare in general, and have more efficient local governance, which translates to more available infrastructure, human resource for health and healthcare services and more spending on social protection programs [27, 74]. Efficiency in turn, increases trust, ultimately leading to higher uptake of free services [75, 76].

This analysis also suggests a possible unraveling of the role of health insurance on socioeconomic disparities. Knowledge on entitlement to insurance was associated with better outcomes and nonsignificant socioeconomic disparities in some of the outcomes. A study by Soni [77] also provides evidence that health insurance ownership may help improve health-related behavior especially among people in low socioeconomic positions. For micro-level socioeconomic status, ownership of insurance has shown to curb the education-based disparities in uptake of free vaccination and testing. In the case of free service utilization such as vaccination, information costs are higher than financial costs as trust is a major prerequisite for uptake [78]. This result may demonstrate health insurance's ability to bridge the education-based gap in uptake of preventive services. In this case, possession of insurance may have imparted additional health knowledge or increased health literacy thus increasing one's propensity to avail free services regardless of level of education [63]. Ownership of health insurance may have led to increased access to and interaction with health care providers which may improve knowledge and establish trust with the healthcare system thereby increasing the probability of availing preventive services [79]. The same mechanisms may have also operated when considering differences in the negative perception on disease disclosure across different regions. As seen in the results, higher poverty incidence on a regional level was associated with higher probability for a certain degree of stigmatization of COVID-19. Negative perceptions on disease disclosure or the decision to keep diagnosis of COVID-19 a secret may be indicative of of self-perception of stigma and can arise from low health literacy. Possession of health insurance may increase access to factual information about the disease, hence buffering the effect of differential transmittal of information across regions [80]. Theoretical effects of increased health literacy that comes with having health insurance extend to regional disparities in the uptake of free vaccination. Probabilities of vaccination and free testing were generally higher among those with health insurance. However, a clear difference in uptake of services was seen between the regions with the highest poverty incidence which means that the "richest" regions may have complemented the effects of health insurance with efficiency in the relay of information. It is also important to note that regions with higher incidences of poverty have bigger rural populations, less infrastructure, and less number of health facilities and providers [27, 74].

Notably, in some instances, wider socioeconomic disparities were seen in groups insured with Philhealth only and Philhealth and other insurance. In the case of treatment-seeking behavior, the availability of insurance packages for COVID-19 may encourage individuals to seek care [66, 67, 71]. However, since most facilities are inundated by the volume of patients, accessibility to a facility able to accommodate the individual may require greater financial costs in terms of transportation costs or even time costs [81]. Furthermore, access to quality and safe healthcare services such as telemedicine or the ones provided in high-level healthcare facilities, comes with significant costs as well. Individuals from poor households might have limited capacity and access to resources for this expense. Of note, however, are negative relationships between knowledge of entitlement to health insurance and socioeconomic disparities in the outcome, "refusal to disclose disease". Considering education or wealth, socioeconomic disparities were seen to be wider among insured populations and probabilities of keeping COVID-19 diagnosis of a family member a secret were higher among socioeconomically advantaged populations. Filipinos are culturally family-centered and families in the Philippine context, are usually extended and have closeknit ties, often living together in one roof [82]. Several psychological responses may lead people who are at a higher risk of contagion to perceive courtesy stigma and internalize it [83]. In a study by Duan et al. [83], high level of education was associated with perception of courtesy and affiliate stigma. They further explained that well-educated individuals may be more sensitive to the behavior of others and perceive these as discrimination [84]. In the case of both wealth and education, previous studies indicate that people with higher socioeconomic status have a higher likelihood for mental health problems such as anxiety or depression thus making them more vulnerable to perceive and internalize stigma [85–87]. There is a dearth in literature on the effect of health insurance on

perceptions and experiences of stigmatization in disease. Kagaigai and Greperrud [88] in a study involving voluntary health insurance, however, found a strong relationship between risk aversion and insurance enrolment. This might have aggravated the already existing perceptions of stigma experienced by people in higher socioeconomic status. In the case of this analysis, risk aversion may be related to the risk of psychosocial and mental costs of stigmatization associated with having a family member diagnosed or isolated in a facility [89, 90].

Results of the second level of analysis suggest that, in terms of financial risk protection, Philhealth alone offers inadequate support to close wealth-based gaps in health behavior and access to information. However, beyond this, results may provide a peak into the role health insurance may play in levelling the playing field in terms of access to information and engaging in favorable health behavior. Findings may provide evidence that having a certain level of health insurance literacy may either be a valuable resource in healthcare navigation or an indicator of having health-related behaviors and skills essential in maximizing resource utilization to gain health advantage. In general, results of this study add to the literature on the importance of addressing socioeconomic inequalities to address health problems especially in times of public health emergencies. It also offers insights on the role of health insurance in closing these gaps. There is however, a need to investigate the dynamics of insurance and stigmatization. Further research can focus on the pathways by which different types of health insurance or social policies may be used to leverage responses to epidemics and other natural disasters.

Some limitations should be considered. First, threats to accuracy and measurement exist as data may be subject to errors in recall and social desirability bias. The survey, being done in a way that ensures confidentiality of responses, may alleviate desirability bias concerns. Second, nonresponse to the outcome "uptake of free preventive services" may potentially have resulted to selection bias due to imbalances in the characteristics of responding and nonresponding individuals. Resulting effect estimates and interpretations should be taken with a grain of salt. Third, residual confounding is present due to the exclusion of some important variables. These variables may include incidence or prevalence of COVID-19 in the localities and information on other lifestyle factors or health-related behavior. Fourth, provincial differences may be a more significant determinant of macro-level socioeconomic status as "within-region" differences may still vary greatly, nevertheless, weighted regional estimates may still determine area-specific differences to some extent. Fifth, household wealth may seem to be a less accurate measure of one's ability-to-pay however, studies have shown that the DHS wealth index is similar to other indicators of socioeconomic status and is adequate in the assessment of "absolute economic status" [51, 91]. Lastly, due to the cross-sectional nature of the study, associations found in the study do not assume causality.

Conclusion

Three years after the pandemic emerged, countries have started to loosen restrictions, but the world's experience has given important lessons in building resilience against public health emergencies. This paper shows that individual responses differ by socioeconomic determinant, with socioeconomically disadvantaged population exhibiting less favorable health behavior and experiencing less access to information pertaining to the pandemic. Furthermore, results show empirical evidence of a possible modification of health insurance on the effect of socioeconomic determinants on these outcomes. This may provide proof that health insurance can grant added benefit maybe in the form of increased health literacy or endowment of attributes that increase proficiency in navigating through the healthcare system. In light of the results, the study highlights that preparedness and responsiveness of the healthcare system are key components of an effective response to public health crises and emergencies. It is, therefore, imperative that targeted efforts be maximized by utilizing existing strategies and mechanisms to reach the marginalized and disadvantaged segments of the population. Mitigation of the immediate and long-term effects of such crises requires looking into contextual factors that might affect the equitable distribution of resources and response to healthcare and social needs.

Abbreviations

COVID-19	Coronavirus disease 2019
CI	Confidence interval
DHS	Demographic and Health Survey
OOP	Out-of-pocket
PP	Percentage points
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-024-18264-9.

Supplementary Material 1

Acknowledgements

Many thanks to Miguel Antonio Estrada and Kent Jason Cheng for their unending support. Appreciation is also extended to the DHS Program by the USAID for granting access to the datasets.

Author contributions

As the sole author, J.A.G.E. was responsible for the conceptualization and design of the study, request and acquisition of data, data analysis and management including data visualization and manuscript writing.

Funding

No funding was received to support the development and publication of this paper.

Data availability

The dataset supporting the conclusions of this article is available in the DHS repository, www.dhsprogram.com.

Declarations

Ethical approval and consent to participate

The study used publicly available de-identified data which were requested from the DHS program. This survey has undergone ethical review under the institutional board of ICF and has been designated as "Not Human Subjects Research".

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Independent Researcher, Manila, Philippines

Received: 1 August 2023 / Accepted: 3 March 2024 Published online: 12 March 2024

References

- World Health Organization. WHO Coronavirus (COVID-19) Dashboard. World Health Organization 2023. https://covid19.who.int/ (accessed July 22, 2023).
- Briggs A, Vassall A. Count the cost of disability caused by COVID-19. Nature. 2021;593:502–5. https://doi.org/10.1038/d41586-021-01392-2.
- United Nations. WHO chief declares end to COVID-19 as a global health emergency. UN News: Global Perspective Human Stories 2023. https://news. un.org/en/story/2023/05/1136367#:~:text=WHO%20chief%20declares%20 end%20to%20COVID%2D19%20as%20a%20global%20health%20emergency;-5%20May%202023&text=The%20head%20of%20the%20UN,no%20 longer%20a%20global%20threat. (accessed July 22, 2023).
- Moyer JD, Verhagen W, Mapes B, Bohl DK, Xiong Y, Yang V, et al. How many people is the COVID-19 pandemic pushing into poverty? A long-term forecast to 2050 with alternative scenarios. PLoS ONE. 2022;17:e0270846. https:// doi.org/10.1371/journal.pone.0270846.
- Silva S, Goosby E, Reid MJA. Assessing the impact of one million COVID-19 deaths in America: economic and life expectancy losses. Sci Rep. 2023;13:3065. https://doi.org/10.1038/s41598-023-30077-1.
- Bloem JR, Farris J. The COVID-19 pandemic and food security in low- and middle-income countries: a review. Agric Food Secur. 2022;11:55. https://doi. org/10.1186/s40066-022-00391-4.
- Perry BL, Aronson B, Pescosolido BA. Pandemic precarity: COVID-19 is exposing and exacerbating inequalities in the American heartland. Proc Natl Acad Sci USA. 2021;118:e2020685118. https://doi.org/10.1073/pnas.2020685118.
- Vigo D, Thornicroft G, Gureje O. The Differential outcomes of Coronavirus Disease 2019 in low- and Middle-Income Countries vs High-Income Countries. JAMA Psychiatry. 2020;77:1207–8. https://doi.org/10.1001/ jamapsychiatry.2020.2174.
- Aksunger N, Vernot C, Littman R, Voors M, Meriggi NF, Abajobir A, et al. COVID-19 and mental health in 8 low- and middle-income countries: a prospective cohort study. PLoS Med. 2023;20:e1004081. https://doi.org/10.1371/ journal.pmed.1004081.
- Chackalackal DJ, Al-Aghbari AA, Jang SY, Ramirez TR, Vincent J, Joshi A, et al. The Covid-19 pandemic in low- and middle-income countries, who carries the burden? Review of mass media and publications from six countries. Pathogens Global Health. 2021;115:178–87. https://doi.org/10.1080/2047772 4.2021.1878446.
- Kola L, Kohrt BA, Hanlon C, Naslund JA, Sikander S, Balaji M, et al. COVID-19 mental health impact and responses in low-income and middle-income countries: reimagining global mental health. Lancet Psychiatry. 2021;8:535– 50. https://doi.org/10.1016/S2215-0366(21)00025-0.

- Dasgupta S, Dierckxsens M, Verick S. The impact of the COVID-19 Crisis on Middle-income countries. Indian Economic J. 2021;69:534–52. https://doi. org/10.1177/00194662211023847.
- Xie X, Wu Q, Hao Y, Yin H, Fu W, Ning N, et al. Identifying Determinants of Socioeconomic Inequality in Health Service Utilization among patients with chronic non-communicable diseases in China. PLoS ONE. 2014;9:e100231. https://doi.org/10.1371/journal.pone.0100231.
- Siu JY-M, Cao Y, Shum DHK. Stigma and health inequality experienced by ethnic minorities during the COVID-19 pandemic in a Chinese community: an implication to health policymakers. Front Public Health. 2023;11. https:// doi.org/10.3389/fpubh.2023.1184209.
- Svendsen MT, Bak CK, Sørensen K, Pelikan J, Riddersholm SJ, Skals RK, et al. Associations of health literacy with socioeconomic position, health risk behavior, and health status: a large national population-based survey among Danish adults. BMC Public Health. 2020;20:565. https://doi.org/10.1186/ s12889-020-08498-8.
- Potts LC, Henderson C. Moderation by socioeconomic status of the relationship between familiarity with mental illness and stigma outcomes. SSM -Popul Health. 2020;11:100611. https://doi.org/10.1016/j.ssmph.2020.100611.
- George G, Dilworth-Bart J, Herringa R. Potential socioeconomic effects of the COVID-19 pandemic on Neural Development, Mental Health, and K-12 Educational Achievement. Policy Insights Behav Brain Sci. 2021;8:111–8. https:// doi.org/10.1177/23727322211032248.
- Mena GE, Martinez PP, Mahmud AS, Marquet PA, Buckee CO, Santillana M. Socioeconomic status determines COVID-19 incidence and related mortality in Santiago. Chile Sci. 2021;372:eabg5298. https://doi.org/10.1126/science. abg5298.
- Post LA, Lin JS, Moss CB, Murphy RL, Ison MG, Achenbach CJ, et al. SARS-CoV-2 wave two surveillance in east Asia and the pacific: longitudinal trend analysis. J Med Internet Res. 2021;23:e25454.
- 20. CSIS. South-East Asia COVID-19 Tracker 2020.
- 21. Haw NJL, Uy J, Ho BL. Association of SHI coverage and level of healthcare utilization and costs in the Philippines: a 10-year pooled analysis. J Public Health. 2020;42:e496–505. https://doi.org/10.1093/pubmed/fdz142.
- 22. Republic of the Philippines. Republic Act No. 10351: An act restructuring the excise tax on alcohol and tobacco by amending Sects. 141, 1242, 143, 144, 145, 8, 131, and 288 of Republic Act 8424. otherwise known as the National Internal Revenue Code of 1997, as amended by Republic Act No. 9334, and for other purposes 2012.
- Republic of the Philippines. Republic Act No. 11223: An act instituting universal healthcare for all Filipinos, prescribing reforms in the healthcare system, and appropriating funds therefor 2018.
- 24. Phua J, Faruq MO, Kulkarni AP, Redjeki IS, Detleuxay K, Mendsaikhan N, et al. Critical Care Bed Capacity in Asian countries and regions. Crit Care Med. 2020;48:654–62. https://doi.org/10.1097/ccm.00000000004222.
- World Bank. Physicians (per 1,000 people) Philippines. The World Bank: IBRD-IDA 2023. https://data.worldbank.org/indicator/SH.MED.PHYS. ZS?locations=PH (accessed July 23, 2023).
- Amit AML, Pepito VCF, Dayrit MM. Early response to COVID-19 in the Philippines. Western Pac Surveill Response J. 2021;12:5. https://doi.org/10.5365/ wpsar.2020.11.1.014.
- Dayrit MM, Lagrada LP, Picazo OF, Pons MC, Villaverde MC. The Philippines health system review. Volume 8. New Delhi: World Health Organization. Regional Office for South-East Asia; 2018.
- Alberto NRI, Alberto IRI, Eala MAB, Dee EC, Cañal JPA. Availability of essential diagnostics in the Philippines. Lancet Reg Health– Western Pac 2022;19. https://doi.org/10.1016/j.lanwpc.2021.100375.
- 29. Senate of the Philippines. Republic Act No. 10121: An act strengthening the philippine disaster risk reduction and management system, providing for the national disaster risk reduction and management framework and institutionalizing the national disaster risk reduction and management plan, appropriating funds therefor and for other purposes. 2009.
- Cleofas JV, Rocha ICN. Demographic, gadget and internet profiles as determinants of disease and consequence related COVID-19 anxiety among Filipino college students. Educ Inform Technol. 2021;26:6771–86. https://doi. org/10.1007/s10639-021-10529-9.
- Nicomedes CJC, Avila RMA. An analysis on the panic during COVID-19 pandemic through an online form. J Affect Disord. 2020;276:14–22. https://doi. org/10.1016/j.jad.2020.06.046.
- 32. Dave D, Kaestner R. Health insurance and ex ante moral hazard: evidence from Medicare. Int J Health Care Finance Econ. 2009;9:367–90.

- Stanciole AE. Health Insurance and Lifestyle choices: identifying Ex Ante Moral Hazard in the US market. The Geneva papers on Risk and Insurance. Issues Pract. 2008;33:627–44.
- Courbage C, de Coulon A. Prevention and private health insurance in the UK. The Geneva Papers on Risk and Insurance-Issues and Practice. 2004;29:719–27.
- Chen C, Liu GG, Wang T, Tan J. Ex-ante moral hazard and health insurance: evidence from China's urban residence basic medical insurance scheme. Health Economics 2023;n/a. https://doi.org/10.1002/hec.4738.
- Keeler EB, Rolph JE. The demand for episodes of treatment in the health insurance experiment. J Health Econ. 1988;7:337–67. https://doi. org/10.1016/0167-6296(88)90020-3.
- 37. Cherkin DC, Grothaus L, Wagner EH. The effect of office visit copayments on preventive care services in an HMO. Inquiry 1990:24–38.
- Bandura A. Social cognitive theory of self-regulation. Organ Behav Hum Decis Process. 1991;50:248–87. https://doi.org/10.1016/0749-5978(91)90022-L.
- Shim JK. Cultural Health Capital: A Theoretical Approach to understanding Health Care interactions and the dynamics of Unequal Treatment. J Health Soc Behav. 2010;51:1–15. https://doi.org/10.1177/0022146509361185.
- Tolabing Ma. Carmen C, Kim Carmela C, Mendoza Ophelia D, Nona Rachel MM, Quizon Romeo C, Ma RT, Sandra B, et al. Prevalence of Limited Health Literacy in the Philippines: First National Survey. HLRP: Health Lit Res Pract. 2022;6:e104–12. https://doi.org/10.3928/24748307-20220419-01.
- Philippine Statistics Authority (PSA), ICF. Philippine National Demographic and Health Survey 2022. Quezon City, Philippines and Rockville. Maryland, USA: PSA and ICF; 2023.
- Ye M, Lyu Z. Trust, risk perception, and COVID-19 infections: evidence from multilevel analyses of combined original dataset in China. Soc Sci Med. 2020;265:113517. https://doi.org/10.1016/j.socscimed.2020.113517.
- Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. Health Qual Life Outcomes. 2017;15:115. https://doi.org/10.1186/s12955-017-0691-z.
- Alchawa M, Naja S, Ali K, Kehyayan V, Haddad PM, Bougmiza I. COVID-19 perceived stigma among survivors: a cross-sectional study of prevalence and predictors. Eur J Psychiatry. 2023;37:24–35. https://doi.org/10.1016/j. ejpsy.2022.08.004.
- Goffman E. Stigma: notes on the management of spoiled identity. Simon and schuster; 2009.
- Mak WWS, Cheung RYM. Affiliate Stigma among caregivers of people with intellectual disability or Mental Illness. Res Intellect Disabil. 2008;21:532–45. https://doi.org/10.1111/j.1468-3148.2008.00426.x.
- Mitter N, Ali A, Scior K. Stigma experienced by families of individuals with intellectual disabilities and autism: a systematic review. Res Dev Disabil. 2019;89:10–21. https://doi.org/10.1016/j.ridd.2019.03.001.
- Fattahi H, Seproo FG, Fattahi A. Effective factors in people's preventive behaviors during covid-19 pandemic: a systematic review and meta-synthesis. BMC Public Health. 2022;22:1218. https://doi.org/10.1186/s12889-022-13621-y.
- Li J, Zheng H. Online information seeking and Disease Prevention intent during COVID-19 outbreak. Journalism Mass Communication Q. 2022;99:69–88. https://doi.org/10.1177/1077699020961518.
- USAID. Wealth Index Construction. The DHS Program n.d. https:// dhsprogram.com/topics/wealth-index/Wealth-Index-Construction. cfm#:~:text=The%20wealth%20index%20is%20a%20composite%20measure%20of%20a%20household's,water%20access%20and%20sanitation%20 facilities. (accessed October 3, 2022).
- Rutstein SO, Kiersten J. The DHS Wealth Index. DHS comparative reports No. 6. Calverton. Maryland, USA: ORC Macro; 2004.
- Philippine Statistics Authority (PSA). 2021 Full Year Official Poverty Statistics Table. Philippine Statistics Authority 2022. https://psa.gov.ph/poverty-pressreleases/nid/167972 (accessed July 23, 2023).
- Zheng W, Kämpfen F, Huang Z. Health-seeking and diagnosis delay and its associated factors: a case study on COVID-19 infections in Shaanxi Province, China. Sci Rep. 2021;11:17331. https://doi.org/10.1038/s41598-021-96888-2.
- Chew C-C, Lim X-J, Chang C-T, Rajan P, Nasir N, Low W-Y. Experiences of social stigma among patients tested positive for COVID-19 and their family members: a qualitative study. BMC Public Health. 2021;21:1623. https://doi. org/10.1186/s12889-021-11679-8.
- Zhang X, Chen B, Li G, Dong Y. Exploring the health information seeking behavior of social media users under the background of COVID-19 pandemic: an empirical study based on social cognitive theory. Front Psychol 2022;13.

- Eyeberu A, Mengistu DA, Negash B, Alemu A, Abate D, Raru TB, et al. Community risk perception and health-seeking behavior in the era of COVID-19 among adult residents of Harari regional state, eastern Ethiopia. SAGE Open Med. 2021;9:20503121211036132. https://doi. org/10.1177/20503121211036132.
- Kassie SY, Melese T, Handebo S, Sebastian Y, Ngusie HS. Information seeking about COVID-19 and associated factors among chronic patients in Bahir Dar City public hospitals, Northwest Ethiopia: a cross-sectional study. BMC Infect Dis. 2022;22:325. https://doi.org/10.1186/s12879-022-07315-4.
- Raude J, Lecrique J-M, Lasbeur L, Leon C, Guignard R, du Roscoät E et al. Determinants of Preventive Behaviors in Response to the COVID-19 Pandemic in France: Comparing the Sociocultural, Psychosocial, and Social Cognitive Explanations. Frontiers in Psychology 2020;11.
- Poortaghi S, Raiesifar A, Bozorgzad P, Golzari SÉ, Parvizy S, Rafii F. Evolutionary concept analysis of health seeking behavior in nursing: a systematic review. BMC Health Serv Res. 2015;15:1–8.
- Link B, Hatzenbuehler ML. Stigma as an unrecognized determinant of population health: Research and policy implications. J Health Polit Policy Law. 2016;41:653–73.
- 61. Scott N, Crane M, Lafontaine M, Seale H, Currow D. Stigma as a barrier to diagnosis of lung cancer: patient and general practitioner perspectives. Prim Health Care Res Dev. 2015;16:618–22.
- O'Malley P, Rainford J, Thompson A. Transparency during public health emergencies: from rhetoric to reality. Bull World Health Organ. 2009;87:614–8. https://doi.org/10.2471/BLT.08.056689.
- Tejero LMS, Siongco KLL, Pinlac PAV, Co KCD, Tolabing MCC. Associations of functional health literacy with socioeconomic and demographic status among filipinos. BMC Public Health. 2022;22:2198. https://doi.org/10.1186/ s12889-022-14602-x.
- Chen X, Hay JL, Waters EA, Kiviniemi MT, Biddle C, Schofield E, et al. Health Literacy and Use and trust in Health Information. J Health Communication. 2018;23:724–34. https://doi.org/10.1080/10810730.2018.1511658.
- 65. Jansen T, Rademakers J, Waverijn G, Verheij R, Osborne R, Heijmans M. The role of health literacy in explaining the association between educational attainment and the use of out-of-hours primary care services in chronically ill people: a survey study. BMC Health Serv Res. 2018;18:394. https://doi. org/10.1186/s12913-018-3197-4.
- 66. Philippine Health Insurance Corporation. PhilHealth Circular No. 2020-0004: Enhancement packages related to Coronavirus Infection 2020.
- Philippine Health Insurance Corporation. PhilHealth Circular No. 2020-0012: Guidelines on the COVID-19 Community Isolation Benefit Package (CCIBP) 2020.
- Flaminiano CJA, Puyat VAR, Antonio VAA, Uy J, Ulep VGT. Discussion Paper Series No. 2022-42: Spatiotemporal Analysis of Health Service Coverage in the Philippines 2022.
- 69. Marfori JRA, Dans AML, Bastillo MOC, Paterno RPP, Rey MP, Catabui JT, et al. Equity in Health Benefit utilization and Financial Risk Protection in Outpatient and Inpatient Care: Baseline Survey of two socioeconomic groups of a pilot primary care benefits Scheme in the Catchment areas of a University-Based Health Facility. Acta Med Philipp. 2020;53. https://doi.org/10.47895/amp. v53i1.1621.
- Philippine Statistics Authority (PSA). 2020 Occupational Wages Survey (OWS). Philippine Statistics Authority 2022. https://psa.gov.ph/press-releases/ id/165967 (accessed July 24, 2023).
- Tabuñar SM, Dominado TM. Hospitalization expenditure of COVID-19 patients at the University of the Philippines-Philippine General Hospital (UP-PGH) with PhilHealth Coverage. Acta Med Philipp 2021;55. https://doi.org/10.47895/ amp.v55i2.2809.
- Yagi BF, Luster JE, Scherer AM, Farron MR, Smith JE, Tipirneni R. Association of Health Insurance Literacy with Health Care utilization: a systematic review. J Gen Intern Med. 2022;37:375–89. https://doi.org/10.1007/ s11606-021-06819-0.
- Shadmi E, Chen Y, Dourado I, Faran-Perach I, Furler J, Hangoma P, et al. Health equity and COVID-19: global perspectives. Int J Equity Health. 2020;19:104. https://doi.org/10.1186/s12939-020-01218-z.
- Capuno J. The quality of local governance and development under decentralization in the Philippines. Quezon City, Philippines: University of the Philippines; 2005.
- 75. Goel RK, Hsieh EW. Internet growth and economic theory. Netnomics. 2002;4:221–5.

- Rivera JD. Trust in government actors and COVID-19 vaccination uptake among hispanics and latinos in the U.S. Int J Disaster Risk Reduct. 2023;89:103627. https://doi.org/10.1016/j.ijdrr.2023.103627.
- Soni A. The effects of public health insurance on health behaviors: evidence from the fifth year of Medicaid expansion. Health Econ. 2020;29:1586–605. https://doi.org/10.1002/hec.4155.
- Adhikari B, Yeong Cheah P, von Seidlein L. Trust is the common denominator for COVID-19 vaccine acceptance: a literature review. Vaccine: X. 2022;12:100213. https://doi.org/10.1016/j.jvacx.2022.100213.
- Miller S, Wherry LR. Health and access to care during the first 2 years of the ACA Medicaid expansions. N Engl J Med. 2017;376:947–56.
- Yuan K, Huang X-L, Yan W, Zhang Y-X, Gong Y-M, Su S-Z, et al. A systematic review and meta-analysis on the prevalence of stigma in infectious diseases, including COVID-19: a call to action. Mol Psychiatry. 2022;27:19–33. https:// doi.org/10.1038/s41380-021-01295-8.
- Foo CD, Verma M, Tan SM, Haldane V, Reyes KA, Garcia F, et al. COVID-19 public health and social measures: a comprehensive picture of six Asian countries. BMJ Glob Health. 2022;7:e009863. https://doi.org/10.1136/ bmjgh-2022-009863.
- Morillo H, Capuno J Jr. Views and values on family among filipinos: an empirical exploration. Asian J Social Sci. 2013;41:5–28. https://doi. org/10.1163/15685314-12341278.
- Duan W, Bu H, Chen Z. COVID-19-related stigma profiles and risk factors among people who are at high risk of contagion. Soc Sci Med. 2020;266:113425. https://doi.org/10.1016/j.socscimed.2020.113425.
- Phelan JC, Bromet EJ, Link BG. Psychiatric illness and family stigma. Schizophr Bull. 1998;24:115–26.
- Graham C, Zhou S, Zhang J. Happiness and health in China: the Paradox of Progress. World Dev. 2017;96:231–44. https://doi.org/10.1016/j. worlddev.2017.03.009.

- Qian Z, Pines A, Stone BV, Lipsitz SR, Moran LV, Trinh Q-D. Changes in anxiety and depression in patients with different income levels through the COVID-19 pandemic. J Affect Disord. 2023;338:17–20. https://doi.org/10.1016/j. jad.2023.06.003.
- Wu Y, Dai Z, Xiao W, Wang H, Huang Y, Si M, et al. Perceived stigma among discharged patients of COVID-19 in Wuhan, China: a latent profile analysis. Front Public Health. 2023;11:1111900. https://doi.org/10.3389/fpubh.2023.1111900.
- Kagaigai A, Grepperud S. The role of risk preferences: voluntary health insurance in rural Tanzania. Health Econ Rev. 2023;13:20. https://doi.org/10.1186/ s13561-023-00432-z.
- Romulo SG, Urbano RC. Separation and discrimination: the lived experience of COVID-19 survivors in Philippine isolation centers. Illn Crisis Loss. 2023;31:525–39. https://doi.org/10.1177/10541373221090019.
- Apostol-Nicodemus L, Tabios IKB, Limpoco AGO, Domingo GDP, Tantengco OAG. Psychosocial distress among Family members of COVID-19 patients admitted to hospital and isolation facilities in the Philippines: a prospective cohort study. JCM. 2022;11:5236. https://doi.org/10.3390/jcm11175236.
- Filmer D, Pritchett LH. Estimating Wealth effects without Expenditure Data—Or tears: an application to Educational enrollments in States of India*. Demography. 2001;38:115–32. https://doi.org/10.1353/dem.2001.0003.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.