Heliyon 7 (2021) e08068

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

The regional and referral compliance of online healthcare systems by Indonesia National Health Insurance agency and health-seeking behavior in Indonesia

Putu Wuri Handayani [a,*], Teguh Dartanto [b], Faizal Rahmanto Moeis [b], Ave Adriana Pinem [a], Fatimah Azzahro [a], Achmad Nizar Hidayanto [a], Denny [a], Dumilah Ayuningtyas [c]

[a] Faculty of Computer Science, Universitas Indonesia, Indonesia
[b] Faculty of Economic and Business, Universitas Indonesia, Indonesia
[c] Faculty of Public Health, Universitas Indonesia, Indonesia

ARTICLE INFO

Keywords:
Referrals
Referral compliance
Health services
Health-seeking behavior
Alternative treatment
Social media
National health insurance
Indonesia

ABSTRACT

Purpose: Whether the provision of online health care referral systems by the Indonesia National Health Insurance Agency has ensured healthcare referral compliance raises much concern due to the continuing deficit. This study examines the pattern of healthcare referral process, regional and referral compliance from 2015 to 2016. To provide comprehensive analysis on how people seek treatment, this study also aims to understand health-seeking behavior in Indonesia, the utilization of alternative treatment, and health information–seeking behavior on social media.

Method: The data come from three data files, namely the National Health Insurance membership master data, the First Level Health Facilities transaction data and the Advanced Referral Health Facilities transaction data of 1,697,452 individuals. The regional compliance applies a logit regression model, while referral compliance applies descriptive statistics of the referral pathway. This study also follows a quantitative approach using an online questionnaire, with 463 respondents who have National Health Insurance which applies an ordered logit model.

Result: We found that several demographic variables and regional health facility availability affect regional compliance. Moreover, we found 19.3% of the transactions did not comply with the prescribed referral sequence. The prescribed referral sequence was mostly followed for patients with malignant diseases. We also found men who perceive that their health condition is healthy will less likely seek health services compared to women. Further, the tendency of alternative treatment increases health-seeking behavior, and the tendency of seeking health information on social media increases the frequency seeking health services.

Conclusion: We recommend the prescribed referral sequence to be re-evaluated especially for patients with malignant disease; the referral process should not be based on hospital classes but on the competency of the healthcare facility which may indirectly address the deficit issue. It is imperative that the government evaluate health promotion approaches to men and women, both direct and indirect through their significant others.

1. Introduction

According to a 2018's report of the World Health Organization (WHO), "Between 2000 and 2016, global spending on health increased every year, growing in real terms at an average annual rate of 4.0%, faster than the 2.8% annual growth of the global economy. Health spending has increased most rapidly in low- and middle-income countries, at around 6% or more annually on average" [1]. As a lower middle-income country in the Development Assistance Committee (DAC) list and the fourth most populous country in the world with five main islands and more than 17,000 small islands [2], it is extremely challenging to implement healthcare system in Indonesia. In January 2014, Indonesian government launched the National Health Insurance (NHI) program and appointed Social Security Agency for Health (BPJS-K), which is a government entity, as the sole operator. NHI is the largest single payer system in the world with total participants more than 216 million people or 82% of the total population in Indonesia [3].

* Corresponding author.
E-mail address: putu.wuri@cs.ui.ac.id (P.W. Handayani).

https://doi.org/10.1016/j.heliyon.2021.e08068
Received 2 June 2021; Received in revised form 27 July 2021; Accepted 22 September 2021

Since the NHI program was launched by the Indonesian government, BPJS-K continues to experience a deficit to settle the healthcare service claims from the First Level Health Facilities (primary care providers) and the Advanced Referral Health Facilities (secondary care providers)[1]. Indeed, almost all countries that have implemented universal health coverage experience deficit. Healthcare deficit means that the existing contributions are less than the claims paid plus operational costs [4]. According to Deloitte [4], among the primary sources of inefficiency in the world's healthcare system are the utilization of excessive procedures, the length of stay in the hospitals, and loss, corruption, and abuse. In 2014, BPJS-K launched the online healthcare referral applications for referral compliance monitoring in a bid to overcome the deficit.

Moreover, a healthy lifestyle and awareness could also prevent infection with a disease, and healthy lifestyles are possible if people have good health-seeking behaviors in which they do not visit health facilities only when sick. Health-seeking behaviors are processes or actions taken by individuals to sustain their state of physical well-being and fitness and allow them to manage their social, physical, and biological environments to maintain their health [5]. Furthermore, Chrisman [6] described the health seeking process refers to the actions and views of non-practitioners, it should be a useful complement to studies of health delivery system (i.e., health referral system). Then, Musinguzi et al. [7] stated that factors influencing health seeking behaviour were related to health systems. However, few studies currently examine the health referral process and system as well as patients' health seeking behaviour. This study will refer to Guevara et al. [11] where referral decision may be made with a referral source such as diagnosis defined by primary care clinician or emergency medicine clinician. We analyse the pattern of healthcare referral process and present the result following the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) checklist which promotes transparency, including the sharing of input data and modelling code [12].

In Indonesia, people's health-related behavior is made more complex due to it being a multicultural, ethnically diverse country with a variety of health providers [13]. This study will also analyze gender differences in health-seeking behavior in Indonesia, the utilization of traditional treatment, and online health information–seeking on social media. Gender disparities in health-seeking have received significant attention from health policymakers and healthcare providers. Based on the Ministry of Health's and the BPJS-K annual reports, since 2014, most activities at primary health facilities have been curative or rehabilitative, rather than preventive. It is therefore important to understand the forms of promotion and health services that could improve the health of men and women. The results of this study can assist the regulators to redefine the healthcare referral process and optimize the currently prescribed healthcare referral sequence. Moreover, the findings of this study will not only address the research gaps in terms of understanding gender perspectives on health-seeking behavior and its relationship with traditional treatment and online health information and consultations, but also provide guidance to the Indonesian Ministry of Health in particular, and to other developing countries in general, on how to promote health programs.

2. Literature review

2.1. Overview of Indonesian healthcare and referral system

Amoah and Philips [8] researched the compliance with the healthcare referral system in Ghana, and discovered that the knowledge, ability, and willingness of healthcare workers to adhere to the referral system were influenced by their immediate and distant social relations. Ahbahlal et al. [9] assessed the primary healthcare physicians' adherence to referral guidelines for acute low back pain in Riyadh. Ahbahlal et al. [9] found that the physicians who were working in one health system had a higher-than-expected adherence to the referral guidelines for back pain related red flags. Meanwhile, Rossem et al. [10] pointed out that the registration of the diagnosis bronchopulmonary dysplasia in a national database in countries with a referral-based health care system may not be accurate; thus, optimizing data collection and monitoring data entry is necessary. Notwithstanding the importance of monitoring compliance, inadequate health intervention is also a primary source of inefficiency in the healthcare system [4]. According to Guevara et al. [11] specialty referral process framework, effectiveness of health system, such as proportion of primary care patients who adhered to a specialists' recommendation, is one of the components to improve the quality of healthcare.

Based on the sizes and medical services coverage, the health facilities in Indonesia are divided into two tiers: primary care providers and secondary care providers [14]. Primary care providers consist of clinics, primary health care centre (*Puskesmas*), and class D-hospitals, whilst secondary care providers consists of classes A to C-hospitals with class A as the highest tier [14]. The higher the hospital "tier", the more coverage of health services are provided. As per February 2018, 21,763 primary care providers (78.58% of all primary care providers in Indonesia) and 2,268 hospitals (82.98% of all hospitals in Indonesia) are BPJS-K partners, which means they provide healthcare services to patients with NHI[2]. Primary care providers who are partners with BPJS-K are grouped into to two types based on how BPJS-K provides payment for the provider, capitation, and non-capitation. Capitation refers to BPJS-K primary care providers that are paid based on the number of BPJS-K participants registered in the BPJS-K primary care facility, whereas non-capitation BPJS-K primary care providers that are paid based on the number of treatments done by the BPJS-K primary care facility.

In the BPJS-K system, each participant is registered to a specific primary care facility which is located near the participant's domicile. BPJS-K participants are expected to comply in utilizing utilize primary care facilities where they are registered. The registration of the BPJS-K to a specific primary care facility allows the BPJS-K to monitor whether a certain primary health facility is over-registered and prevent congestion of the primary health facility. Moreover, the data registration is used for BPJS-K capitation payment. However, the BPJS-K also allows flexibility of utilizing primary health facilities other than where the participant is registered for certain cases, such as routine treatment or emergencies. For non-routine or non-emergency cases, BPJS-K limits the utilization of primary health facilities that are not where the participant is registered up to three times in a month per primary health facility.

With respect to the referral process, there are three health referral processes in Indonesia, namely patient referrals, specimen referrals, and medical personnel referrals [14]. However, until now, only patient referrals have been implemented. The legal basis for the implementation of patient referrals is set out under the Minister of Health's Regulation's 2012 Number 1 concerning Individual Health Referral Systems. As shown in Figure 1, patient referral consists of vertical referrals (i.e. the patients are referred to the higher tier of healthcare facilities which should be from the primary clinics to class D hospitals, class D hospitals to class C hospitals, class C hospitals to class B hospitals, class B hospitals to class A hospitals), back referrals (i.e. the patients are referred to the lower tier of healthcare facilities), and horizontal referrals (i.e. the patients are referred to the same tier of healthcare facilities but with different specialties). The vertical reference process starts from primary care providers to secondary care providers, and the reverse direction for the reconciliation process. Based on the National Referral System Guidelines issued by the Ministry of Health, efficient referral means reducing waiting time in the referring process and reducing unnecessary referrals

[1] https://www.cnnindonesia.com/ekonomi/20190905195403-78-427959/bpjs-kesehatan-akui-tekor-rp15-triliun-setiap-bulan.

[2] https://bpjs-kesehatan.go.id/bpjs/index.php/post/read/2018/671/Tahun-2018-BPJS-Kesehatan-Optimalkan-Kerja-Sama-Fasilitas-Kesehatan.

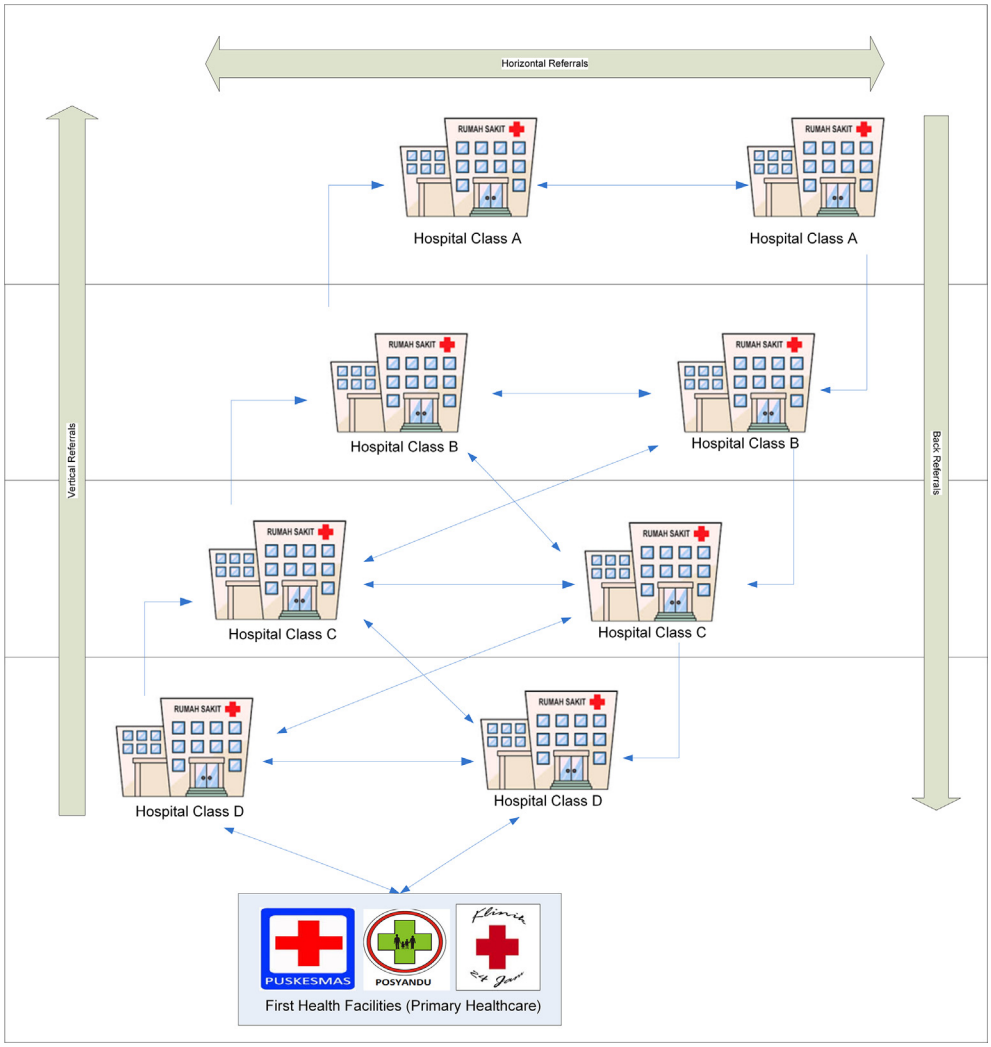

Figure 1. Health referral systems.

[14]. To achieve efficient referral, BPJS-K has implemented online healthcare referral applications, i.e., the Primary Care BPJS-K applications for primary care providers (PCare), and Participant Eligibility (SEP) applications for secondary care providers.

2.2. Health-seeking behaviour

According to Deeks et al. [15], health-seeking behavior is influenced by many patient characteristics, such as sociodemographic variables and gender. Thomson et al. [16] found that men were less likely to seek treatment for mental illness. Then, Elliott et al. [17] showed fewer positive experiences with medical providers for women than men, especially in communication about medicines, discharge information, and cleanliness. Besides the sociodemographic characteristics, another stream of research associate's health-seeking behaviors through formal health facilities with the accessibility of other forms of health service [18], such as traditional treatment [19] and the Internet and social media [20]. It was found that poor people are more likely to seek traditional treatment than visit a health facility, because traditional treatment is perceived to be less costly [21, 22]. The ubiquity of smartphones and social media makes it easier for people to search for health information and health consultations online [23], but whether men's reluctance to go to doctors is exacerbated by the availability of traditional treatment and online health information and consultations has not been examined.

2.3. Research hypothesis

The study aims to analyse three hypotheses:

H1. Indonesia's NHI health referral compliance rate is below 20%.

Newbrander et al. [38] describe that a well-functioning referral system and compliance by caretakers with referrals are essential. The NHI health referral system has currently utilized an online system which has reduced the likelihood of referral non-compliance [4]. The online system prevents transactions to be registered in the system if they do not comply the online system [4]. van Dijk et al. [24] show compliance rate between 63% until 83% in the general population; thus, we propose the NHI health referral compliance below 20%. Moreover, the Ministry of Health has created guidelines regarding the referral system which has improved and increased the efficiency of the NHI referral process [14].

H2. Indonesia's NHI primary health facility regional compliance is affected by the demand and supply of health services

The NHI health regional compliance refers to whether a BPJS-K transaction occurs in the same province where the BPJS-K participant is participated [14]. The regional compliance of BPJS-K participants may be influenced by the demand and supply of health services as these factors influence the congestion of health facilities [14]. A higher demand for health services will increase the congestion of health facilities, whereas an increase of supply for health services (infrastructure or personnel) will reduce congestion of health facilities. In case of

non-emergencies, the reduction of health service congestion may disincentivize regional non-compliance.

H3. Usage of health facilities is affected by gender, perception of health, utilization of traditional treatment, and online health information–seeking on social media

The utilization of formal health facilities depends on sociodemographic factors, social structures, education levels, cultural beliefs and practices, gender discrimination, status of women, economic and political systems, environmental conditions, disease patterns, and the healthcare system itself [15]. Besides formal health providers, Indonesians also visit traditional healers [13]. Many people prefer traditional remedies or alternative treatments, as they are perceived to be "natural" and without chemical additives [13]. Traditional remedies are also used for health boosters [13]; for example, during the coronavirus pandemic, people in Indonesia have been drinking *jamu*, which is a traditional drink made from herbs. Another channel for health-seeking is the Internet and social media. Social media is widely used by individuals to seek health information [20], and previous research [25, 26, 27, 28] has consistently shown that women are more likely to use the Internet to seek health information than men.

3. Research method

3.1. Data collection and analysis

To analyze the compliance of online healthcare referral systems, we use sample data obtained from BPJS-K for the period of 2015 and 2016 with the number of BPJS-K participants totalling 191,463,768 people from 34 provinces in Indonesia. We have obtained consent from BPJS-K (letter number 6353/I.2/0519, 21 May 2019) for this study. Based on BPJS-K Sample Data Guide, BPJS-K apply stratified random sampling method to randomly select from each primary care providers in Indonesia at most ten families (households) with the history of accessing hospital care, ten families with the history of accessing primary care, and ten families without the history of accessing healthcare. If the size of the strata is less than ten families, all the registered families are sampled. The participants' data are obtained by matching the data in the membership database and health services database.

BPJS-K sample data has three data files, namely membership master data, primary care providers transaction data (divided between capitation and non-capitation primary care providers) and secondary care providers transaction data. The input sample data are BPJS-K participants' master data (1,697,452 data observations), capitation primary care providers transactions data (1,733,759 data visits observations), non-capitation primary care providers transactions data (104,456 data visits observations), and secondary care providers transaction data (906,905 data visits observations). The BPJS-K dataset provides individual sample weights that shows how many people at the population level is represented by each sample, thus allowing the BPJS-K sample data to represent population characteristics. The calculation of the individual weight is based on the probability of sample being chosen in its strata. When using the sample weights, the BPJS-K participants' master data becomes representative of 191,463,768 observation, capitation primary care providers become representative of 134,226,047 visits observations, non-capitation primary care providers become representative of 7,555,853 visits observations, and secondary care providers transaction becomes representative of 77,404,394 visits observations.

The participants' master data include the participants' demographic data such as number of family members, date of birth, gender, marital status, source of NHI funding, province of domicile, regency/city of domicile, and health facilities' membership status. The transaction data in primary care providers and secondary care providers include the history of patient visits at the health facilities such as the dates of arrival and return visits, profile of the health facility visited and the origin of the referral, diagnoses and rates claimed for the treatment.

We also utilize the 2014 Village Potential (*Potensi Desa*, Podes) data for the regression analysis. Podes is a data collected by the Indonesia Statistics Agency every 3 or 4 years that survey all villages in Indonesia about their characteristics, such as transportation, economy, and socio-cultural village characteristics and availability of certain infrastructures/facilities, such as schools and health facilities. From the Podes data, we extract the information on the number of hospitals and number of doctors available in the region which we aggregate from village level to province level. We utilize the information as a means to provide the supply of health infrastructure in the region, which if are limited in number may incentivize regional non-compliance (utilizing BPJS-K in health facility abundant regions). The data is then merged the data collected from BPJS-K.

From data provided by the BPJS-K and Podes data, we analyse factors that influence the regional compliance of each BPJS-K transaction at primary health care. Regional non-compliance is defined if a transaction is done in a different province from where the BPJS-K participant is registered at. As the dependent variable (regional compliance) is binary (1 = Comply; 0 = Non-Comply), we apply the logistic regression model. The independent variables used consist of socio-demographic variables (age, gender, marital status, and living in Java) and provincial health facilities characteristics (number of BPJS-K participants, number of hospitals, and number of doctors). The regression also provides marginal effects of each variable as the value of the coefficients in the logit regression cannot be interpreted directly.

For the referral analysis, we exclude the data that have no referral transaction in primary care providers and secondary care providers. However, the BPJS-K data does not provide information regarding the referral process directly such as the referral transaction code. Thus, we merge all possibilities of secondary care transactions pathways through other secondary care transactions from lower secondary care providers or primary care providers based on the ID code of the BPJS-K Participant. To filter the referral data, we assume that the number of days between the referral process may not be negative (which means the transaction happened in the past) or above 90 days. If there are still duplicates of the transaction code, we choose the referral pathway the least days. In the end, we have a total of 316,813 transaction data (which becomes 6,849,172 when using sample weights) from primary care providers to secondary care providers in 34 provinces.

In understanding the phenomena that occur in patient compliance with the referral process, individual health seeking behaviour is analysed to understand the health-seeking behaviour in Indonesia. To analysed health seeking behaviour, we use online questionnaire (purposive sampling) in the Bahasa Indonesia language due to COVID-19 pandemic. The inclusion criterion was Indonesian people who are BPJS-K participant. Respondents were given informed consent to participate in the research and the respondents involved had agreed to the informed consent. Before the questionnaire was distributed, a readability test was conducted with six respondents (two health practitioners, one academic, one student, and two private employees) aged between 23 and 45 years old. The readability test results provided valuable input to improve the understanding of the questions asked. Questionnaire link is distributed online through social media that are widely used by Indonesians such as Facebook and Instagram. Primary data was collected online from 1 to 8 April 2020, and 500 responses were received, with five duplicates that used the same email address. After removing duplicate data and excluding respondents who did not have BPJS-K, 463 respondents remained. We used STATA version 16 to process the data and ordered logistic regression was used to analyze the data. Finally, UCINET and NetDraw version 6 software were used to visualize the referral pathways between health facilities. Figure 2

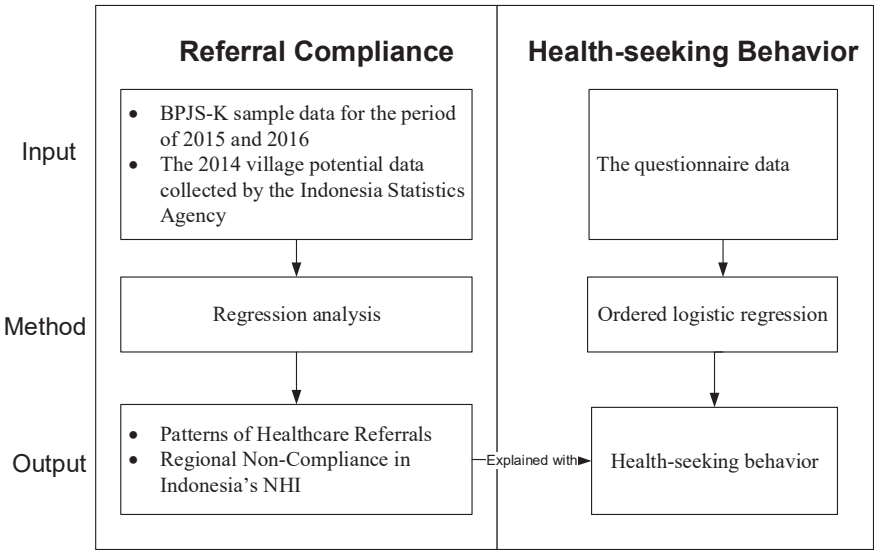

Figure 2. Data collection and analysis method.

Table 1. Profile of BPJS-K participants who had transactions in primary care providers and secondary care providers (Weighted data).

Demographics	Attribute	Number of Unique Participants in Participants' Master File	Number of Unique Participants in Primary Care Providers' File	Number of Unique Participants in Secondary Care Providers' File	All Paired Referral Data	Paired Referral Data with Non-Malignant Disease	Paired Referral Data with Malignant Disease
Gender	Male	98,144,376	15,434,764	8,833,764	1,542,974	1,536,506	12,703
	Female	93,319,318	19,603,265	11,301,932	2,066,805	2,054,656	23,285
	Undefined	74	0	0	0	0	0
Age	0–14 years old	36,254,917	7,336,302	1,311,013	442,159	441,165	1,657
	15–29 years old	48,317,065	7,275,912	3,834,998	617,299	616,024	3,379
	30–44 years old	44,021,372	8,719,266	1,413,756	884,984	880,951	7,166
	45–59 years old	29,643,364	6,115,406	4,856,276	858,696	851,859	13,303
	≥ 60 years old	33,227,050	5,591,143	8,719,653	806,641	801,163	10,483
Marital Status	Single	57,328,634	9,196,292	6,443,902	981,772	979,062	6,037
	Married	55,402,399	12,370,427	9,415,921	2,193,344	2,181,330	24,231
	Divorce	2,605,197	569,497	741,439	134,303	132,674	2,594
	Undefined	76,127,538	12,901,813	3,534,434	300,360	298,096	3,126
Family Status	Single	32,835,914	4,241,230	4,197,232	566,503	561,261	8,562
	With spouse	6,963,098	1,801,998	1,980,799	370,886	367,452	8,026
	With more than 1 spouses	128,824	29,815	34,767	7,044	7,017	27
	With spouse and 1 child	9,845,981	3,581,704	2,811,080	531,262	529,443	6,219
	With spouse and 2 children	9,714,167	4,024,242	2,965,767	686,797	684,446	5,638
	With spouse and more than 2 children	6,454,017	2,697,972	1,882,343	397,150	396,083	2,583
	With more than 1 spouses and more than 2 children	137,853	53,524	55,981	15,979	15,841	204
	With all the family schemes above plus additional membership	10,195,661	3,593,273	2,636,929	394,857	392,941	4,636
Segmentation of Participants Based on Source of NHI Funding	Non-Workers	8,082,380	1,063,301	1,311,013	301,907	300,575	3,335
	PBI APBN	85,296,490	13,493,572	3,834,998	328,376	325,293	4,479
	PBI APBD	16,974,491	1,906,285	1,413,756	107,311	106,078	1,427
	PBPU	21,803,708	4,204,272	4,856,276	878,725	871,459	14,558
	PPU	59,306,699	14,370,599	8,719,653	1,993,460	1,987,757	12,189

Source: Authors' Calculation from BPJS-K Data.

describes the summary of data collection and analysis method used in this study.

3.2. Research instruments

The online questionnaire consisted of two parts. The first asked the respondent's demographic information, including gender, age, marital status, BPJS-K membership, perceived health condition, and the number of visits to primary health facilities in the last year. The second part asked questions regarding health-seeking behaviour related to health facilities, health-seeking behaviour related to traditional treatments, and seeking health information through social media; these questions were answered on a five-point Likert scale (1 indicates strongly disagree and 5 indicates strongly agree). See Appendix B for details on variables used.

4. Findings

4.1. Health referral data demographics

Prior to analysing the data, we evaluated the structure of the data. The evaluation of the data structure reveals incomplete and non-standardized attributes. Moreover, there is no identifier of the medical personnel who make the referrals, which means the behaviour of the medical personnel with regard to the referral process cannot be analyzed.

Table 1 summarizes the profile of BPJS-K participants who had transactions in primary care providers and secondary care providers for the period of 2015 and 2016. While there is an almost equal proportion between male and female, the participants utilizing primary care providers and secondary care providers facilities were mostly female (57.32% and 42.68% respectively). In addition, the BPJS-K participants who had the most treatments at primary care providers and secondary care providers and went through the referral processes were in the age range of 45–59 years old (31.84%). In addition, most of the patients with malignant diseases and went through the referral process were in the age range of 45–59 years (41.77%). Malignant disease is a term in which abnormal cells divide without control and can invade nearby tissues[3] and non-malignant may grow larger but do not spread to other parts of the body[4]. In addition, many patients who had a tiered referral process were married patients (67.48%). However, there are undefined data for marital status due to incorrect input.

Based on the Regulation of BPJS-K's Number 6 regarding the Administration of The Health Insurance Program, the health insurance participants are classified as Contribution Beneficiaries (PBI) and non-PBI. PBI participants are further classified into two types based on their sources of NHI funding: 1) PBI APBD (Regional Revenue and Expenditure Budget), and 2) PBI APBN (State Revenue and Expenditure Budget). Non-PBI participants consist of 1) Wage Recipient Workers (PPU) and their family members, 2) Non-Wage Workers (PBPU) and their family members, and 3) Non-Workers (BP) and their family members. Most BPJS-K participants are PBI APBN (41.57%), which mean that most BPJS-K participants are funded by the central government. We also find that 13.3% participants have more than one partners with more than 10 children and other additional participants; these participants are mostly the PBI APBN participants.

4.2. Patterns of healthcare referrals

From a total of 141,781,900 visits to primary care providers, 77,404,394 (54.59%) were referred to secondary care providers. Based on Table 2, the most visited primary care providers were the Primary Health Care (*Puskesmas*) (51.88%) and Pratama Clinic (32.86%). Although there are more private hospitals than government hospitals, more BPJS-K participants visited government hospitals (50.53%) compared to private hospitals (39.22%).

Table 2. Healthcare facilities visited by BPJS-K participants in primary care providers and secondary care providers (Weighted sample).

Attribute	Number of Patients' Visit	Percentage of Patients' Visit
Health Facilities Visited in Primary Care Providers (Capitation + Non-Capitation)		
Primary Healthcare (Puskesmas)	73,560,766	51.88
Pratama Clinic	46,590,280	32.86
General Doctor's Clinic	20,189,633	14.24
Dentist Clinic	1,298,582	0.92
Laboratories	115,656	0.08
Regencies/cities hospitals class D	26,983	0.02
Temporary (Ad-hoc) Partners	73,560,766	51.88
Total	141,781,900	
Health Facilities Visited in Secondary Care Providers		
Private hospitals	30,357,191	39.22
Regencies/cities owned hospitals	26,548,154	34.3
Provincial owned hospitals	6,935,678	8.96
Ministry of Health-owned hospitals	5,626,306	7.27
Hospitals owned by the Army	3,264,665	4.22
Hospitals owned by State-owned organization	1,801,296	2.33
Hospitals owned by the Police	1,520,025	1.96
Hospitals owned by the Air force	663,343	0.86
Hospitals owned by the Navy	582,765	0.75
Missing Data	104,971	0.14
Total	77,404,394	

Source: Authors' Calculation from BPJS-K Data.

The most visited hospitals were government hospitals classes B and C, followed by private hospitals that are equivalent to government hospitals classes B and C. According to the Practical Guidelines Tiered Referral System from BPJS-K, this condition is not what it is supposed to be – the process did not follow the referral guidelines where the first hospital that the patients should be directed to in the referral process is hospital class D. According to the Practical Guidelines Tiered Referral System from BPJS-K, a patient can be directly referred to hospital class B or C if the diagnosis is a malignant disease, when it is an emergency case, or when there is a disaster as per the Regional or Central Government's announcement, or if there is no hospital class D near the domicile of the patient (geographical considerations and facility availability).

Table 3 shows the top five polyclinics that were most frequently visited in primary care providers and secondary care providers respectively and the top five diagnoses for outpatient care in each of the polyclinics. most of the diagnosis from the polyclinic at primary care providers were respiratory or hypertension-related diseases, while most of the diagnosis from the polyclinic at secondary care providers was follow-up after treatment, hemodialysis or care involving rehabilitation.

The inpatients in secondary care providers were mostly discharged after two days. Table 4 shows the top five diagnoses for two days duration of stay. For the inpatients who stayed in the hospitals for more than three months, the most common diagnosis was schizophrenia; these patients were mostly in West Kalimantan Province. The longest duration of hospitalization was the patients with psychiatric illnesses.

We grouped the healthcare facilities into territorial regions covering several provinces (see Figure 3 for the grouping). We discovered that the most visited secondary care providers were in Regional 1 (65.13%) with a total of 11,431,401 participants followed

[3] https://www.cancer.gov/publications/dictionaries/cancer-terms/def/malignancy.

[4] https://www.cancer.gov/publications/dictionaries/cancer-terms/def/non malignant

Table 3. Top 5 polyclinic and top 5 outpatient diagnosis at primary care providers and secondary care providers.

Healthcare Facilities	Top 5 Polyclinic	Number of BPJS-K Participants	Number of Patients' Visit	Percentage of BPJS-K Participants from the Total Number of Patients' Visit
Primary Care Providers	General Poly	32,355,538	117,967,236	27.43
	Dental Poly	3,311,713	6,594,452	50.22
	Maternal and Child Health Poly	2,521,712	6,017,300	41.91
	Emergency Room	938,194	1,390,799	67.46
	Family Planning Poly	600,035	1,375,459	43.62
	Top 5 Outpatient Diagnosis	**Number of BPJS-K Participants**	**Number of Patients' Visit**	**Percentage of BPJS-K Participants from the Total Number of Patients' Visit**
	Acute upper respiratory infections of multiple and unspecified sites	7,471,632	13,885,585	53.81
	Acute nasopharyngitis (common cold)	5,442,578	9,048,116	60.15
	Essential (primary) hypertension	2,720,847	7,307,489	37.23
	Other soft tissue disorders, not elsewhere classified	3,491,360	5,663,508	61.65
	Gastritis and duodenitis	3,655,203	5,399,395	67.70
Secondary Care Providers	**Top 5 Policlinic**	**Number of BPJS-K Participants**	**Number of Patients' Visit**	**Percentage of BPJS-K Participants from the Total Number of Patients' Visit**
	Internal Medicine Poly	3,176,895	11,313,876	28.08
	Haemodialysis	71,657	5,259,490	1.36
	Nerve Poly	1,055,128	4,885,978	21.6
	Surgical Poly	1,704,022	4,682,346	36.39
	Heart Poly	565,928	3,036,646	18.64
	Top 5 Outpatient Diagnosis	**Number of BPJS-K Participants**	**Number of Patients' Visit**	**Comparison of BPJS-K Participants and Patients' Visit**
	Follow-up examination after treatment	5,764,845	24,763,564	23.28
	Care involving dialysis	54,695	3,403,283	1.61
	Care involving use of rehabilitation	325,696	3,337,519	9.76
	Other surgical follow-up cares	892,996	1,565,381	57.05
	Personal history of certain other diseases	310,201	1,191,540	26.03

Source: Authors' Calculation from BPJS-K Data.

Table 4. Top 5 inpatient diagnosis at secondary care providers.

Top 5 Inpatient Diagnosis at Secondary Care Providers	Number of BPJS-K Participants	Number of Patients' Visit	Percentage of BPJS-K Participants from the Total Number of Patients' Visit
Other gastroenteritis and colitis	227,361	230,095	98.81
Normal birth delivery	209,975	210,582	99.71
Single delivery by caesarean section	180,393	181,038	99.64
Typhoid and paratyphoid fevers	150,751	153,925	97.94
Fetus and new born affected by other complications of labour and delivery	140,617	140,617	100

Source: Authors' Calculation from BPJS-K Data.

by Regional 3. Regional 1 is a densely populated region with the highest number of healthcare facilities and healthcare workers [29], therefore it makes sense that the referral process was mostly carried out in the region. Further, Figures 4, 5, and 6 explain the patterns of referrals between the healthcare facilities for the diagnosis of all paired data, non-malignant and malignant diseases, respectively. The most frequented visits could be seen from the thickness of the line between the healthcare facilities and the number shown on the line shows the number of visits per each path. For all paired and non-malignant diseases data, the most frequented tiered visits were from *Puskesmas*/Pratama Clinic (P) to hospitals class C (C), followed by from *Puskesmas*/Pratama Clinic (P) to hospitals class B (B). For malignant diseases, the most frequented tiered referral visits were from *Puskesmas*/Pratama Clinic (P) to hospitals class B (B), followed by from *Puskesmas*/Pratama Clinic (P) to hospitals class C (C). There was no referral visit from hospitals class D (D) to hospitals class C (C) for malignant diseases. Table 5 shows that the most visited hospital for patients with non-malignant was hospital class C (C); whereas the most visited hospital for patients with malignant disease was hospital class B (B). Similar results also occur for the most referred hospitals.

We found 19.3% of the transactions (13,235,487 transactions) were not carried out sequentially during the referral process between secondary care providers. Moreover, 0.17% of referrals between the hospitals (specifically, D to A and C to A) were not carried out sequentially. This could happen due to nonavailability of type D hospital, or the closest location for the referral hospital, and the availability of specialist care, medical devices, or health facilities (i.e., room) needed based on the condition of the patients. In addition, this could happen due to patients' health seeking behaviour where the patient cannot carry out the referral process recommended by the doctor in primary care or look for alternative treatments that can be carried out.

The longest waiting time occurred at the path from *Puskesmas*/Pratama Clinic to hospital class C and then to hospital class A, which was 55 days for patients who suffer from malignant disease. The longer the patient's referral pathways are, the longer they have to wait until they 'reach' the healthcare facility that is better equipped to treat their illness. Further, we found that the percentage of patients with malignant disease that did not follow the prescribed referral sequence was only 0.07% compared to 22.28% patients with non-malignant disease that did not follow the prescribed referral sequence. In other words, the prescribed referral sequence was mostly followed for patients with diagnosis of malignant disease, whereas patients with non-malignant disease tend not to go through the prescribed referral sequence.

Figure 3. BPJS-K Regional.

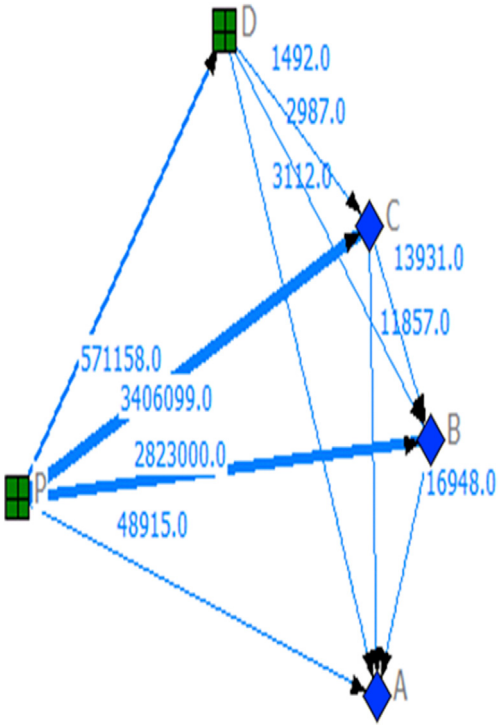

Figure 4. Referral pathways for all paired data. Notes: The figure provides the pathway of referral process. P symbolizes primary health care, whereas A, B, C, D symbolizes the secondary health care services levels. The number represents the number of transactions that go through the referral process between two types of health care services. For example, Figure 4, 571.158 transactions are referred from primary health care (P) to level D health facilities.

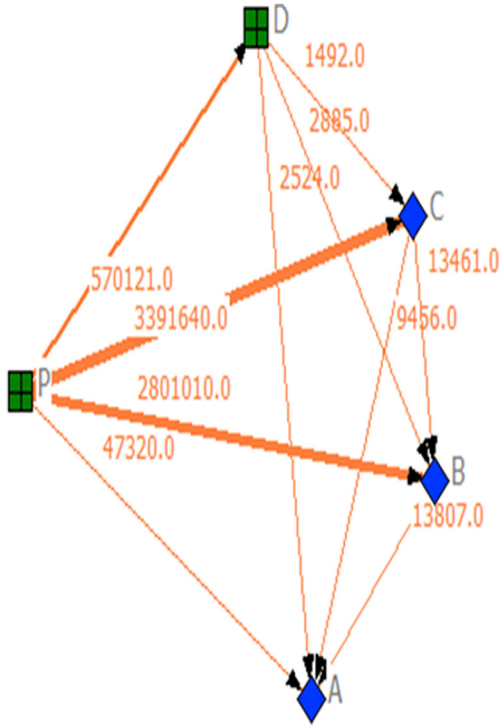

Figure 5. Referral pathways for non-malignant diseases. Notes: The figure provides the pathway of referral process. P symbolizes primary health care, whereas A, B, C, D symbolizes the secondary health care services levels. The number represents the number of transactions that go through the referral process between two types of health care services. For example, Figure 4, 571.158 transactions are referred from primary health care (P) to level D health facilities.

We mapped the top diagnosis of each healthcare referral pathways that did not follow the prescribed sequence. Each transaction code has one primary diagnosis and can have zero or more than one secondary diagnosis. For all paired referred data, we found that the top primer diagnosis that were referred directly from *Puskesmas*/Pratama Clinic to hospitals class A was follow-up examination after treatment for conditions other than malignant neoplasms and its top seconder diagnosis was chronic ischaemic heart disease. The top seconder diagnosis for all paired referral data was hypertension. Further, for malignant referral data that were referred directly from *Puskesmas*/Pratama Clinic to hospitals class A, the top primer diagnosis was follow-up examination after treatment for malignant neoplasms and the seconder diagnosis was malignant neoplasm of cervix uteri. The second top seconder diagnosis for malignant referral data was malignant neoplasm of breast. When the data was grouped per participant, the highest number of secondary diagnoses was 68 secondary diagnoses for one participant, whereas for malignant diagnosis, it was 10 secondary diagnoses for one participant.

4.3. Regional non-compliance in Indonesia's NHI

Furthermore, the findings on factors affecting non-compliance of primary health care utilization are shown in Table 6. We breakdown the results between the capitation primary health care, non-capitation primary health care, and aggregate sample. In general, the results of the capitation primary health care are in line with the aggregate sample. Based on Table 3, in general, female participants, married participants, and participants with higher BPJS-K class will have a higher tendency to not comply compared to their male participants, unmarried participants, and BPJS-K level III participants respectively. Whereas people living in Java have a higher tendency to comply. We also find that compared to 2015, there was a decrease of probability of non-compliance by 0.3% in 2016; this finding indicated improvement in the BPJS-K system to

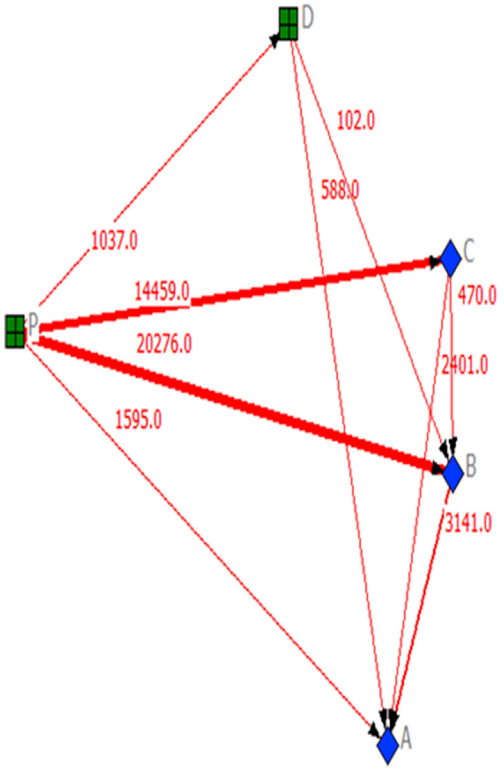

Figure 6. Referral pathways for malignant diseases. Notes: The figure provides the pathway of referral process. P symbolizes primary health care, whereas A, B, C, D symbolizes the secondary health care services levels. The number represents the number of transactions that go through the referral process between two types of health care services. For example, Figure 4, 571.158 transactions are referred from primary health care (P) to level D health facilities.

provide regional health compliance. Moreover, BPJS-K capitation primary health care had a 0.55% lower probability of non-compliance compared to non-capitation primary health care.

It is interesting to note that BPJS-K participants in West Java (45.04%), DKI Jakarta (31.81%) and Central Java (23.13%) did not receive treatment at the primary care providers location where they are registered at. Moreover, the primary care providers that were mostly targeted for treatment other than the primary care providers where the participants are registered at were primary care providers in central Java (37.73%), West Java (34.88%) and Riau (27.38%) provinces. The reasons could be that the referral system allows portability (cross border) for medical treatment and people tend to move between the provinces.

Further, we find that the number of BPJS-K participants in a Province may increase non-compliance. An increase of 1 million BPJS-K in a province will increase non-compliance by 0.07%. This may be due to higher demand causing congestion of BPJS-K facility usage which may drive participants to use other BPJS-K facilities in other regions. We also find that the supply of health facilities contributes to compliance. An increase of one thousand hospitals in the province would reduce the probability of non-compliance by 8.28%. Whereas an increase of a thousand doctors in the province will reduce non-compliance by 0.08%. Thus, it is crucial for the regional governments to be able to provide health facilities and personnel enough for the region to reduce congestion of BPJS-K facilities, thus disincentivizing regional non-compliance.

4.4. Health-seeking behaviour in Indonesia

To understand the reason of referral non-compliance, we analysed the health seeking behaviour in Indonesia. Most respondents were female, aged 15–29 years, and were married. Most respondents lived in Greater Jakarta, were educated to undergraduate level, and were private employees; 57.24% were in good health, 61.12% had used BPJS-K cards for treatment, and 47.08% had visited primary care 1 to 3 times. The form of primary care most visited was clinics (27.86%) and community health centres (21.17%); the most widely performed activity in primary care was medical treatment (61.77%); and the most frequently visited policlinic was general poly (56.16%). In addition to seeking primary care, 80.56% of the respondents sought health information online, through health applications (54.43%), health service provider websites (41.68%), and social media (31.9%). Table 7 shows all respondents' survey responses.

The survey passed a reliability test with a Cronbach's Alpha of 0.841. We then analyse the factors that influence the respondents to visit primary healthcare. We use demographic variables (gender and personal health status) and health seeking behaviour (tendency for alternate medicine and social media searching) as independent variables. For the health seeking behaviour, we created a score based on the health seeking behaviour questions by averaging the Likert scale of two questions. For alternative medicine tendency variable, we averaged the Likert scale for the question whether the respondent would use traditional/alternative medicine if sick and whether the respondent would take their family traditional/alternative medicine if sick. Whereas social media searching tendency whether every month the respondent would use online media to check on health/treatment information and whether every month the respondent would use online media to check on health/treatment information for family members.

We use the ordered logistic regression method due to the dependent variable, number of visits to primary care, was recorded as an ordinal variable and recategorized into 4 categories (never, 1–3 times, 4–6 times, $>$ 7 times.). We examined the interaction between gender and health status perception. From the results, we find that unhealthy women compared to unhealthy men, have no difference in seeking primary care. However, men and women that perceive themselves as healthy, compared to unhealthy men, will less likely go to primary health care. From the coefficient values in Table 8, this lower tendency is higher in men compared to women (the coefficients are lower in all men interaction variables compared to women). Regarding health seeking behaviour, we find that higher alternative medicine tendency scores (indicating higher tendencies) significantly increase the probability of

Table 5. Standardized indegree and outdegree values of all paired, non-malignant and malignant data.

Health Facilities	All Paired Data		Non-malignant Data		Malignant Data	
	Standardized Outdegree Centrality (nOutdeg)	Standardized Indegree Centrality (nIndeg)	Standardized Outdegree Centrality (nOutdeg)	Standardized Indegree Centrality (nIndeg)	Standardized Outdegree Centrality (nOutdeg)	Standardized Indegree Centrality (nIndeg)
A	0	0.006	0	0.005	0	0.095
B	0.001	0.208	0.001	0.208	0.039	0.257
C	0.002	0.250	0.002	0.250	0.035	0.178
D	0.001	0.042	0.001	0.042	0.009	0.013
P	0.503	0	0.502	0	0.461	0

Source: Authors' Calculation from BPJS-K Data.

Table 6. Factors affecting cases of regional non-compliance.

VARIABLES	(1)		(2)		(3)	
	Capitation	Capitation	Non-Capitation	Non-Capitation	All Samples	All Samples
	Logit	Marginal Effect (%)	Logit	Marginal Effect (%)	Logit	Marginal Effect (%)
Sex (1 = Male; 0 = Female)	-0.130***	-0.169***	0.0459***	0.066***	-0.129***	-0.169***
	(0.00154)		(0.00923)		(0.00152)	
Marital Status (1 = Married; 0 = Not Married)	0.123***	0.160***	0.131***	0.189***	0.133***	0.174***
	(0.00188)		(0.00801)		(0.00182)	
Age (Year)	-0.00393***	-0.005***	-0.0382***	-0.055***	-0.00466***	-0.006***
	(4.48e-05)		(0.000256)		(4.39e-05)	
Java (1 = Lives in Java; 0 = Lives in Non-Java)	-0.202***	-0.264***	1.509***	2.177***	-0.109***	-0.143***
	(0.00240)		(0.00891)		(0.00231)	
BPJS Class I (1 = True; 0 = False)	1.172***	1.114***	1.479***	2.189***	1.197***	1.168***
	(0.00239)		(0.0101)		(0.00231)	
BPJS Class II (1 = True; 0 = False)	1.649***	2.077***	2.148***	4.682***	1.676***	2.169***
	(0.00239)		(0.0101)		(0.00231)	
Year (1 = 2016; 0 = 2015)	-0.270***	-0.352***	0.356***	0.514***	-0.236***	-0.310***
	(0.00151)		(0.00653)		(0.00147)	
Number of BPJS-K Participants in Province (Million People)	0.0565***	0.073***	0.0125***	0.018***	0.0507***	0.066***
	(0.000544)		(0.00226)		(0.000528)	
Number of Hospitals in Province (Thousand Facilities)	-5.951***	-7.784***	-12.92***	-18.653***	-6.286***	-8.278***
	(0.0381)		(0.180)		(0.0374)	
Number of Doctors in Province (Thousand People)	-0.0878***	-0.114***	0.217***	0.312***	-0.0591***	-0.077***
	(0.00326)		(0.0146)		(0.00318)	
Capitation (1 = Capitation; 0 = Non-Capitation)					-0.422***	-0.555***
					(0.00317)	
Constant	-4.418***		-3.836***		-4.032***	
	(0.00274)		(0.00999)		(0.00371)	
Observations	133,986,107		7,549,428		141,535,535	

Notes: Standard errors are in parentheses, ***p < 0.01, **p < 0.05.
Source: Authors' Estimation from BPJS-K Data.

higher frequency of primary care visits. On the other hand, higher alternative medicine tendency scores (indicating higher tendencies) significantly increase the probability of higher frequency of primary care visits. Thus, in carrying out the referral process, it should also involve alternative medicine and use social media so that it can increase the patient's desire to seek treatment.

5. Discussion of the findings

The provision of online healthcare referral systems is an excellent initial step in monitoring the referral process and regional compliance. Nevertheless, BPJS-K needs to evaluate the data structure and format to more easily search for the healthcare referral transactions. The data input in primary care providers have lower quality compared to the data input in secondary care providers. This could be because BPJS-K give capitation to primary care providers without checking the transaction data. This is very different in secondary care providers. Secondary care providers can only make a claim to BPJS-K if the transaction data is complete and validated by BPJS-K officers. BPJS-K needs to review the policy on giving capitation to primary care providers. Moreover, looking at the demographic profile of BPJS-K patients, most of the patients were women and young people. This is worrying; the Indonesian government and healthcare institutions should target these demographics for their healthy lifestyle campaigns.

This study found inconsistencies between the diagnoses at primary care providers and secondary care providers in each province (see Appendix A). Thus, a comprehensive education is required for all healthcare workers in all health facilities to refer their patients appropriately, especially in prioritizing the patients with malignant diseases. This condition could also happen due to the limitation of diagnostic procedure, instrument, or specialty unit in the primary care providers. We found that the prescribed referral sequence was mostly followed for patients with diagnosis of malignant disease. According to Aslam et al. [30], a short referral duration for cancer patients does not guarantee the survival rate of the patients but can increase the happiness of the patients because it is handled faster. We urge the Indonesian government to evaluate the existing regulation regarding the referral procedure; the referral procedure should not be based on hospital class but on the competency of the health facility (competence-based referral process) that could provide specialty care in accordance with the capabilities and availabilities of health workers, medical devices and facilities owned.

We had also found that an important factor in influencing regional primary care usage compliance is the demand and supply of health facilities. An increase of number of BPJS-K participants in the province would reduce the probability of regional compliance. Whereas, an increase of number of hospitals and doctors improved the probability of regional compliance. High demand for health services with limited health facilities implies a higher congestion for health services which would incentivize regional non-compliance. To avoid health service congestion and regional non-compliance, the NHI must monitor the dispersion of BPJS-K participants and match the BPJS-K participants based on the BPJS-K primary health facility capacity. Moreover, the increase of health facilities from the government (central and regional) would also reduce health service congestion.

This study also shows that men that are healthy are less likely to seek primary care compared their unhealthy counterparts and have lower tendencies to seek primary care compared to women. Hunt et al. [31] and Lim et al. [32] found that women consult general practitioners more than men regarding common symptoms. Further, according to Thompson

Table 7. Online survey respondents' profiles.

Demographics	Attribute	Number of respondents (%)
Gender	Male	189 (40.82%)
	Female	274 (59.18%)
Age	15–29 years old	235 (50.76%)
	30–44 years old	156 (33.69%)
	45–59 years old	57 (12.31%)
	≥ 60 years old	15 (3.24%)
Marital status	Single	210 (45.36%)
	Married	238 (51.4%)
	Divorced	15 (3.2%)
Domicile	Greater Jakarta	298 (64.36%)
	Java Island outside Greater Jakarta	88 (19.01%)
	Sumatera	17 (3.67%)
	Kalimantan	13 (2.81%)
	Sulawesi	2 (0.43%)
	Bali	42 (9.07%)
	Overseas	3 (0.65%)
Highest education	Middle high school	1 (0.2%)
	High school	60 (12.96%)
	Diploma	30 (6.48%)
	Bachelor	244 (52.7%)
	Master	113 (24.41%)
	Doctor	15 (3.24%)
Occupation	Student	71 (15.33%)
	Civil servant	111 (23.97%)
	Employee of state-owned enterprise	33 (7.13%)
	Private employee	178 (38.44%)
	Entrepreneur	18 (3.89%)
	Housewife or retiree	27 (5.83%)
	Freelance	25 (5.4%)
General state of health	Very unhealthy	9 (1.94%)
	Not healthy	17 (3.6%)
	Quite healthy	119 (25.7%)
	Healthy	265 (57.24%)
	Very healthy	53 (11.45%)
BPJS-K used for treatment	Yes	283 (61.12%)
	No	180 (38.88%)
Number of visits to primary care in the past year	Never	136 (29.37%)
	1–3 times	218 (47.08%)
	4–6 times	69 (14.9%)
	7–9 times	21 (4.54%)
	10–12 times	7 (1.51%)
	>12 times	12 (2.59%)
Types of primary care most visited	Community health centre	98 (21.17%)
	Clinic	129 (27.86%)
	Independent general practitioner practice	79 (17.06%)
	Independent dental practice	21 (4.54%)
	No answer	136 (29.37%)
Activities carried out at primary care (multi-select)	Get treatment	286 (61.77%)
	Health consultation/seeking health information	121 (26.13%)
	Immunization	24 (5.18%)
	Others	25 (5.4%)
	No answer	136 (29.37%)
Most visited policlinic (multi-select)	General poly	260 (56.16%)
	Dental poly	102 (22.03%)
	Maternal and child health poly	39 (8.42%)
	Eye poly	27 (5.83%)
	Internist poly	40 (8.64%)
	Others	23 (4.97%)
	Missing	136 (29.37%)
Have you ever used online media in medical treatment or to look for health information?	Yes	373 (80.56%)
	No	90 (19.44%)
What online media do you often access to seek treatment or health information? (multi-select)	Health applications (e.g., Alodokter, Halodoc, JKN mobile)	252 (54.43%)
	Social media (e.g., Facebook, YouTube)	148 (31.97%)
	Health service provider website (e.g., hospital managed website)	193 (41.68%)
	Others	21 (4.54%)
	No answer	90 (19.44%)
I will get treatment from traditional/alternative treatment if I am sick	Strongly Disagree	164 (35.42%)
	Disagree	125 (27.00%)
	Neutral	118 (25.49%)
	Agree	49 (10.58%)
	Strongly Agree	7 (1.51%)
I will bring family members to traditional/alternative treatment if any are sick	Strongly Disagree	169 (36.50%)
	Disagree	131 (28.29%)
	Neutral	116 (25.05%)
	Agree	42 (9.07%)
	Strongly Agree	5 (1.08%)

Source: Authors' Calculation from Survey Data.

Table 8. Hypothesis testing results.

Number of Visits to Primary Care	Coef.	Std. Err.	p>|z|
gender#personal_health_status			
Male*Quite Healthy	-2.07596***	.5539379	0.000
Male*Healthy	-2.423286***	.5391059	0.000
Male*Very Healthy	-3.124696***	.6354535	0.000
Female*Very Unhealthy/Not Healthy	-0.823297	.7468049	0.270
Female*Quite Healthy	-1.477289***	.5549411	0.008
Female*Healthy	-1.712613***	.5130354	0.001
Female*Very Healthy	-1.373495**	.6206617	0.027
Alternative Medicine Tendency (Score)	0.181014**	.0924786	0.050
Social Media Searching Tendency (Score)	0.191266**	.0870672	0.028
Chi2	58.54		
Observations	463		

Notes: ***p < 0.01, **p < 0.05.
Source: Authors' Estimation from Survey Data.

et al. [33], men are reluctant to consult a doctor until a disease has progressed, and their knowledge of health matters is therefore often poor. Women may be better at health management tasks because they are more likely to seek help and typically maintain stronger emotional ties with others, whereas men are more likely to engage in a variety of masculinity-scripted activities, such as substance abuse and dangerous sports, in response to distress [34].

Due to the development of science and technology, this study found that an increase in alternative treatment tendencies also increase health seeking behaviour. The results of this study are not in line with Chen et al. [35], who investigated patients in Taiwan who used alternative treatment and found that such treatment could delay seeking medical care. Positive perceptions of the use, effectiveness, safety, availability, and affordability of herbal medicine make it popular in the community—even among religious leaders—and people therefore become more amenable to alternative medicine [19]. Although traditional medicine is an option for Indonesians seeking treatment, most Indonesians still choose formal treatment first or sometimes both together [13]. If the formal treatment is not successful, some Indonesians seek alternative treatment [13], although family history is the most common reason for traditional treatment use [36].

Further, this study showed that the tendency of seeking health information on social media increases the frequency seeking health services. This study is in line with research by Kim and Jung [36] where active seeking health information were positively correlated with Korean adults being vaccinated in health facilities. From the results of this study could indicate that the more someone gets information from social media, the more awareness increases social media users to do health seeking behaviour to primary care. Moreover, women may also decide to visit a physician only once they have conducted Internet health information searches [37]. Women use the Internet for health-related information searches more for social motives and enjoyment, and they judge the usability of the Internet medium and of the information gained by health information searches higher than men [37]. Finally, in addition to the need for a competence-based referral process, the government can also integrate alternative medicine into the referral process. In addition, education about the referral process can also be done through social media so that it can increase individual health awareness of health referral compliance. Furthermore, doctors could also communicate with the patients the health referral process using social media, since social media could lead to more equal communication between the patient and healthcare professional [23].

6. Implications

To the best of our knowledge, this study is the first to analyse the compliance of health referral system according to national health data. This study also contributes to enriching the results of research conducted by Widayanti et al. [13] to analyze health seeking behavior in Indonesia. The presence of BPJS-K registered patients seeking treatments at health facilities that are different from the locations where they registered at should be used as the basis for the regulators to evaluate the number, distribution and quality of health facilities and healthcare workers in densely populated areas. The government needs to analyse the adequacy and availability of polyclinic as well as the facilities in each hospital because most of the patients being referred were for outpatient treatment instead of inpatient care. The study also shows that the most common diagnosis for inpatient care was schizophrenia; hence the government should pay more attention on the mental health diseases, such as creating awareness and educating the public to increase their health literacy regarding mental health. In addition to psychiatric illnesses, we found that the most common diseases in Indonesia were hypertension and cancer. Future research is needed to understand why and how to prevent these diseases. Preventive and promotive program by integrating the alternative treatment and social media should also be increased to build patients' awareness; thus, improve his/her health seeking behaviour and can eliminate the length of the referral process carried out by the patient.

Two major limitations of this study should be noted. First, the data we use are based on BPJS-K's stratified random sampling of 191,463,768 BPJS-K's participants (out of more than 216 million participants). Second, from the data we only know the waiting time between each health referral without knowing the reason for the wait.

7. Conclusion

As in other countries, whether the provision of online healthcare referral systems by the Indonesia National Health Insurance Agency has ensured healthcare referral compliance raises much concern. Analysing a two-year data of health referral in Indonesia, this study shows that the online healthcare referral systems are not effective in ensuring compliance to the referral or regional guidelines. Moreover, we noticed some inconsistencies in the coding of the primary and secondary diagnoses by the medical staffs, which means some of these patients might be unnecessarily referred to the hospitals. All these cumulatively contribute to the deficit of the National Health Insurance. Sadly, we found that the longest waiting time in the referral process, which was 55 days, was for patients with malignant disease. We also found that the prescribed referral sequence was mostly followed for patients with malignant diseases. These findings suggest that the government needs to urgently review the healthcare referral policy especially in the mechanism of capitation funding for primary care providers and the tiered referral mechanism based on hospital classes. In addition, it is also important to analyse the health awareness of each gender; the results of this study indicate that healthy men are less likely to seek healthcare are compared to their female counterpart. Furthermore, the use of alternative treatments increases healthcare service–seeking behaviour, and the frequency of seeking health information on social media increases the frequency to seek healthcare services. Further research through in-depth interviews with health workers to identify more details regarding the health-seeking behaviour of Indonesian people could enrich the results of this study. Further research could also design an information system that can support promotional and preventive programs in Indonesia, particularly those aimed at men.

Declarations

Author contribution statement

Putu Wuri Handayani, Faizal Rahmanto Moeis: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Teguh Dartanto: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

Ave Adriana Pinem, Fatimah Azzahro: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data.

Achmad Nizar Hidayanto: Conceived and designed the experiments.

Denny: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

Dumilah Ayuningtyas: Analyzed and interpreted the data; Wrote the paper.

Funding statement

This work was supported by kementerian riset dan teknologi/badan riset dan inovasi nasional (NKB-075/UN2.RST/HKP05.00/2021).

Data availability statement

The authors do not have permission to share data.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

Supplementary content related to this article has been published online at https://doi.org/10.1016/j.heliyon.2021.e08068.

Acknowledgements

Thanks to Kementerian Riset Dan Teknologi/Badan Riset dan Inovasi Nasional for the Grant Hibah *Penelitian Dasar Unggulan Perguruan Tinggi* under contract NKB-075/UN2.RST/HKP05.00/2021.

References

[1] T. Lewis, C. Synowiec, G. Lagomarsino, J. Schweitzer, E-health in low- and midlle-income countries: findings from the center for health market innovations, Bull. World Health Organ. 90 (2012) 332–340.
[2] Badan Pusat Statistik, Statistical Yearbook of Indonesia, Badan Pusat Statistik, Jakarta, Indonesia, 2019.
[3] B.P.J.S. Kesehatan, Jumlah peserta dan fasilitas Kesehatan, Available from: https://bpjs-kesehatan.go.id/bpjs/jumlahPeserta.
[4] Deloitte. Ensuring, The Sustainability of JKN-KIS for the Indonesian People, Deloitte Indonesia Perspectives, 2019.
[5] S.R. Adaramaja, M.T. Ogunsola, Demographic factors as correlates of health-seeking behaviour of the people of Oyo state, Nigeria, Ghana J. Dev. Stud. 11 (2) (2014) 100–110.
[6] N.J. Chrisman, The health seeking process: an approach to the natural history of illness, Cult. Med. Psychiatr. 1 (4) (1977) 351–377.
[7] G. Musinguzi, S. Anthierens, F. Nuwaha, J. Van Geertruyden, R.K. Wanyenze, H. Bastiaens, Factors influencing compliance and health seeking behaviour for hypertension in Mukono and Buikwe in Uganda: a qualitative study, Int. J. Hypertens. (2018) 8307591.
[8] P.A. Amoah, D.R. Phillips, Strengthening the referral system through social capital: a qualitative inquiry in Ghana, Healthcare 5 (2017) 80.
[9] J.M. Ahbahlal, A.A. Alhandi, K.A. Aldihan, O.H. Alsutan, F.A. Alhusain, H.M. Alqahtani, S.I. Aleissa, Primary healthcare physicians' adherence to acute lower back pain referral guidelines in Riyadh, Saudi Arabia, Saudi Med. J. 39 (8) (2018) 838–841.
[10] M.C. Rossem, M. Loo, B.J. Laan, E.S.V. Sonnaville, P. Tamminga, A.H. Kaam, W. Onland, Accuracy of the diagnosis of bronchopulmonary dysplasia in a referral-based health care system, J. Pediatr. 167 (3) (2015) 540–546.
[11] J.P. Guevera, D. Hsu, C.B. Forrest, Performance measures of the specialty referral process: a systematic review of the literature, BMC Health Serv. Res. 11 (2011) 168.
[12] G.A. Stevens, et al., Guidelines for accurate and transparent health Estimates reporting: the GATHER statement, Lancet 388 (2016) e19–23.
[13] A.W. Widayanti, J.A. Green, S. Heydon, P. Norris, Health-seeking behavior of people in Indonesia: a narrative review, J. Epidemiol. Glob. Health 10 (1) (2020) 6–15.
[14] R.I. Direktorat Jenderal Bina Upaya Kesehatan Kemenkes, Pedoman Sistem Rujukan Nasional. Indonesia, Direktorat Jenderal Bina Upaya Kesehatan Kemenkes RI, 2012.
[15] A. Deeks, C. Lombard, J. Michelmore, H. Teede, The effects of gender and age on health-related behaviors, BMC Publ. Health 9 (2009) 213.
[16] A.E. Thomson, Y. Anisimowicz, B. Miedema, W. Hogg, W.P. Wodchis, K. Aubrey-Bassler, The influence of gender and other patient characteristics on health care-seeking behaviour: a QUALICOPC study, BMC Fam. Pract. 17 (2016) 38–45.
[17] M.N. Elliott, W.G. Lehrman, M.K. Beckett, E. Goldstein, K. Hambarsoomian, L.A. Giordano, Gender differences in patients' perceptions of inpatient care, Health Serv. Res. 47 (4) (2012) 1482–1501.
[18] M. Stuttaford, S.A. Makhamreh, F. Coomans, J. Harrington, C. Himonga, G.L. Hundt, The right to traditional, complementary, and alternative health care, Glob. Health Action 7 (2014) 24121.
[19] K. Akhtar, K. Akhtar, M.M. Rahman, Use of alternative medicine is delaying health-seeking behavior by Bangladeshi breast cancer patients, Europ. J. Breast Health 14 (3) (2018) 166–172.
[20] I.A. Nikoloudakis, C. Vandelanotte, A.L. Rebar, S. Schoeppe, S. Alley, M.J. Duncan, C.E. Short, Examining the correlates of online health information–seeking behavior among men compared with women, Am. J. Men's Health 12 (5) (2018) 1358–1367.
[21] B. Begashawa, F. Tessema, H.A. Gesesew, Health care seeking behaviour in Southwest Ethiopia, PloS One 11 (9) (2016), e0161014.
[22] D. Musoke, P. Boynton, C. Butler, M.B. Musoke, Health seeking behaviour and challenges in utilising health facilities in Wakiso district, Uganda, Afr. Health Sci. 14 (4) (2014) 1046–1055.
[23] E. Smailhodzic, W. Hooijsma, A. Boonstra, D.J. Langley, Social media use in healthcare: a systematic review of effects on patients and on their relationship with healthcare professionals, BMC Health Serv. Res. 16 (1) (2016) 442.
[24] C.E. van Dijk, J.D. de Jong, R.A. Verheij, T. Jansen, J.C. Korevaar, D.H. de Bakker, Compliance with referrals to medical specialist care: patient and general practice determinants: a cross-sectional study, BMC Fam. Pract. 17 (2016) 11.
[25] D.M. Carpenter, R.F. DeVellis, S.L. Hogan, E.B. Fisher, B.M. DeVellis, J.M. Jordan, Use and perceived credibility of medication information sources for patients with a rare illness: differences by gender, J. Health Commun. 16 (2011) 629–642.
[26] A. Hallyburton, L.A. Evarts, Gender and online health information seeking: a five survey meta-analysis, J. Consum. Health Internet 18 (2014) 128–142.
[27] J. Powell, N. Inglis, J. Ronnie, S. Large, The characteristics and motivations of online health information seekers: cross-sectional survey and qualitative interview study, J. Med. Internet Res. 13 (1) (2011), e20.
[28] M.J. Stern, S.R. Cotton, P. Drentea, The separate spheres of online health: gender, parenting, and online health information searching in the information age, J. Fam. Issues 33 (2012) 1324–1350.
[29] S.K. Nasution, Y. Mahendradhata, L. Trisnantoro, Can a national health insurance policy increase equity in the utilization of skilled birth attendants in Indonesia? A secondary analysis of the 2012 to 2016 national socio-economic survey of Indonesia, Asia Pac. J. Publ. Health 32 (1) (2019) 19–26.
[30] M.I. Aslam, S. Chaudhri, B. Singh, J.S. Jameson, The "two-week wait" referral pathway is not associated with improved survival for patients with colorectal cancer, Int. J. Surg. 43 (2017) 181–185.
[31] K. Hunt, J. Adamson, C. Hewitt, I. Nazareth, Do women consult more than men? A review of gender and consultation for back pain and headache, J. Health Serv. Res. Pol. 16 (2) (2011) 108–117.
[32] M.T. Lim, Y.M.F. Lim, S.F. Tong, S. Sivasampu, Age, sex, and primary care setting differences in patients' perception of community healthcare seeking behaviour towards health services, PloS One 14 (10) (2019), e0224260.
[33] L. Thompson, T. Reeder, G. Abel, "I can't get my husband to go and have a colonoscopy": gender and screening for colorectal cancer, Health Smailhodzic 16 (2011) 235–249.
[34] L. Verbrugge, Gender and health: an update on hypotheses and evidence, J. Health Soc. Behav. 26 (1985) 156–182.
[35] M. Chen, C. Li, H. Lin, W.W. Shen, P. Hsieh, C. Chen, Health-seeking behavior, alternative medicine, and quality of life in Taiwanese panic disorder patients, Int. J. Psychiatr. Clin. Pract. 17 (2013) 206–215.
[36] J. Kim, M. Jung, Associations between media use and health information-seeking behavior on vaccinations in South Korea, BMC Publ. Health 17 (2017) 700.
[37] S. Bidmon, R. Terlutter, Gender differences in searching for health information on the internet and the virtual patient-physician relationship in Germany: exploratory results on how men and women differ and why, J. Med. Internet Res. 17 (6) (2015) e156.
[38] W. Newbrander, P. Ickx, R. Werner, F. Mujadidi, Compliance with referral of sick children: a survey in five districts of Afghanistan, BMC Pediatr. 12 (2012) 46–58.