Socio-Demographic Characteristics, Income, and Lifestyle of Internists Across Indonesia: A National Cross-Sectional Survey

Lugyanti Sukrisman[1], Evy Yunihastuti[1], Sally Aman Nasution[1], Eka Ginanjar[1], Simon Salim[1], Andhika Rachman[1], Ceva Wicaksono Pitoyo[1], Rudy Hidayat[1], Adityo Susilo[1], Hayatun Nufus[2], Hermawan Susanto[3], Darmadi Darmadi[4], Hery Djagat Purnomo[5], Andi Makbul Aman[6], Anggoro Budi Hartopo[7], Selfie Selfie[8], Ervita Ritonga[9], Gede Wira Mahadita[10], Radiyanti Umi Partan[11], Azzaki Abubakar[12], Nur Samsu[13], Wachid Putranto[14], Reinaldo Alexander[15], Dani Rosdiana[16], Cecilia Hendratta[17], Akmal M. Hanif[18], Astried Indrasari[19], Erwanto Budi Winulyo[20], Lukman Pura[21], Djallalluddin[22], Giri Satriya[23], Andi M. H. Panjaitan[24], Elfiani[25], Budiman Gunawan[26], Annisa Puspitasari Nachrowi[1], Kurniakin W. S. Girsang[27], Erwin A. Pangkahila[28], Joko Anggoro[29], Dayang Nurbayati[30], Fahmi R. Darkuthni[31], Petrus Irianto[32], Komariatun[33], Annelin Kurniati[34], Haeril Aswar[35], Nelyan H. Mokoginta[36], Leily D. Pawa[37], Edwin Ambar[38], Riswan[39], Samuel Pratama[1], Imam Adli[1], Nurul Inayah Rahmani[1], Amalia Zahra Afifah[1], Muhamad Ilham Fajar[1], Monika Herliana[1], Zahra Nuril Anwar[1], Mariska Andrea Siswanto[1]*

[1]Faculty of Medicine Universitas Indonesia, Cipto Mangunkusumo Hospital, Jakarta, Special Capital Region of Jakarta, Indonesia
[2]Faculty of Medicine Universitas Indonesia, Persahabatan Central General Hospital, Jakarta, Indonesia
[3]Faculty of Medicine Universitas Airlangga, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia
[4]Faculty of Medicine Universitas Sumatera Utara, Medan, Indonesia
[5]Faculty of Medicine Universitas Diponegoro, Dr Kariadi Hospital, Semarang, Indonesia
[6]Universitas Hasanuddin Hospital, Makassar, Indonesia
[7]Faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada, Dr. Sardjito Hospital, Yogyakarta, Indonesia
[8]Balaraja Hospital, Tangerang, Indonesia
[9]Faculty of Medicine Universitas Padjadjaran, Hasan Sadikin Hospital, Bandung, Indonesia
[10]Faculty of Medicine Universitas Udayana, Prof. dr. I Goesti Ngoerah Gde Ngoerah General Hospital, Denpasar, Indonesia
[11]Faculty of Medicine Universitas Sriwijaya, Mohammad Hoesin General Hospital, Palembang, Indonesia
[12]School of Medicine Universitas Syiah Kuala, Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia
[13]Faculty of Medicine Universitas Brawijaya, Saiful Anwar General Hospital, Malang, Indonesia
[14]Faculty of Medicine Universitas Sebelas Maret, dr. Moewardi General Hospital, Surakarta, Indonesia
[15]Siloam Hospitals Bekasi Sepanjang Jaya, Bekasi, Indonesia
[16]Faculty of Medicine Universitas Riau, Arifin Achmad General Hospital, Pekanbaru, Indonesia
[17]Faculty of Medicine Universitas Sam Ratulangi, Prof. dr. R. D. Kandou Hospital, Manado, Indonesia
[18]Faculty of Medicine Universitas Andalas, Dr. M. Djamil General Hospital, Padang, Indonesia

[19]Abdul Wahab Sjahranie Regional General Hospital, Samarinda, Indonesia
[20]Hermina Hospital, Bogor, Indonesia
[21]Faculty of Medicine Lampung University, Dr. H. Abdul Moeloek General Hospital, Lampung, Indonesia
[22]Faculty of Medicine Universitas Lambung Mangkurat, Ulin Hospital, Banjarmasin, Indonesia
[23]Juanda Hospital, Kuningan, Indonesia
[24]Emanuel Hospital, Banjarnegara, Jawa Tengah
[25]Faculty of Medicine Universitas Jambi, Raden Mattaher Hospital, Jambi, Indonesia
[26]Kharitas Bhakti Hospital, Pontianak, Indonesia
[27]Engku Haji Daud Hospital, Bintan, Indonesia
[28]Karitas Weetabula Hospital, West Sumba, Indonesia
[29]Faculty of Medicine University of Mataram, West Nusa Tenggara Regional General Hospital, Mataram, Indonesia
[30]dr. Doris Sylvanus Hospital, Palangkaraya, Indonesia
[31]Faculty of Medicine Universitas Tadulako, Palu, Indonesia
[32]Jayapura Regional General Hospital, Jayapura, Indonesia
[33]Faculty of Medicine, Universitas Bangka Belitung, Indonesia
[34]Harapan dan Doa Regional Hospital, Bengkulu, Indonesia
[35]Faculty of Medicine Universitas Hasanuddin, Makassar, Indonesia
[36]Dr. Aloei Saboe Regional Hospital, Gorontalo, Indonesia
[37]Piru Regional General Hospital, West Seram, Indonesia
[38]Faculty of Medicine Universitas Negeri Khairun, Chasan Boesoirie General Hospital, Ternate, Indonesia
[39]Faculty of Medicine Universitas Papua, John Piet Wanane Regional Public Hospital, Sorong, Indonesia

***Corresponding Author**:
Lugyanti Sukrisman, MD., PhD. Department of Internal Medicine, Faculty of Medicine Universitas Indonesia - Cipto Mangunkusumo Hospital. Jl. Diponegoro No. 71, Jakarta 10430, Indonesia. Email: lugyanti@gmail.com

ABSTRACT

Background: *Internal medicine specialists have always been one of the pillars that support the health of Indonesian people. Currently, there is no available survey regarding the socio-demography, lifestyle, and income of any medical specialist in Indonesia. This study aims to report this gap of knowledge amongst internists across Indonesia.* ***Methods:*** *This study was a nationwide cross-sectional study and was conducted via online questionnaires by The Indonesian Society of Internal Medicine Specialists (INASIM) between December 2023 and March 2024. Participants from the existing 39 INASIM branches were selected using cluster random sampling, with a target of 20% of registered internists per branch. Of 1,568 internists invited, 1,082 (69.0%) completed the questionnaire and were included.* ***Results:*** *A total of 1,082 internists participated in this study, mostly male (57.7%), aged 35-49 years old (57.7%), non-academic staff (64.3%), practicing as general internists (76.3%) in 3 locations (70.9%). Distribution discrepancy was observed with 58.0% of general internists and 71.5% of subspecialists practicing in urban areas only. Income analyses showed significant positive correlations with age, working years, working hours, and number of practices. Male internists had higher income than their counterparts, indicating a gender-related income gap. The location of practice did not affect income significantly. Amongst internists, there were approximately 11.1% with a history of smoking, 55.9% with daily coffee consumption, 62.9% with sleep deprivation, and more time spent being sedentary.* ***Conclusion:*** *This study identified distribution discrepancy, a gender-related income gap, and unhealthy lifestyle patterns among Indonesian internists, which are issues that warrant targeted policy responses. Nevertheless, these findings may support future policies on equitable workforce distribution, appropriate incentive systems, and physician wellness programs in Indonesia.*

Keywords: *Internal medicine, Social, Demographics, Income, Lifestyle.*

INTRODUCTION

Indonesia is the fourth most populous country in the world, with an increasing population of 281 million inhabitants in 2024.[1] Approximately 70% of the total population are aged 20 or above.[2] Increasing health burdens of both communicable and non-communicable diseases are to be expected as the life expectancy has also been increasing, from 67.2 years in 2000 to 68.3 years in 2021, as reported by the World Health Organization (WHO).[3] The availability of adequate health care centers and medical workers has been a major concern accompanying this rapid increase in population and health burdens.

In 2023, the Indonesian Ministry of Health reported a 10% increase in hospital numbers throughout Indonesia, along with 151,826 active general practitioners and 51,201 active medical specialists. There was a 15% increase in the number of medical specialists when compared with the data from 2022, with around 39% of all medical specialists being internists, pediatricians, surgeons, and obstetric and gynecologists.[4] Taking account of the total population, the WHO reported a ratio of 5.24 medical doctors per 10,000 Indonesian population in 2022. This number was far from the ideal ratio of 10:10,000 recommended by the WHO or even from neighboring countries, such as Malaysia and Singapore (ratios of 23.41 and 28.34, respectively).[5] Furthermore, the report also highlighted the distribution discrepancy of medical specialists, with almost 85% of all specialists concentrated in Jakarta, Java Island, Bali, and Sumatra.[4] Many factors might have contributed to this discrepancy, such as population density, geographical challenges, socio-cultural differences, transportation system, security, and availability of facilities or equipment. Economic opportunities and provision are also a major concern for medical doctors; hence, they often opt to live and to work in large urban cities.

Internists play a strategic role in health systems because they coordinate comprehensive adult care, manage a large burden of chronic and multisystem diseases, and frequently function as referral gatekeepers within hospital services. As a result, their distribution, workload, and well-being have direct implications for healthcare access, system efficiency, and quality of care. Currently, there is no available survey or report regarding the socio-demography, lifestyle, and income of any medical specialist in Indonesia. This study was conducted to describe the socio-demographic characteristics, income profile, and lifestyle patterns of internal medicine specialists across Indonesia. In addition, we explored potential associations between these characteristics and income level, as well as patterns of workforce distribution. This nationwide survey was done by The Indonesian Society of Internal Medicine Specialists (INASIM, also known as *Perhimpunan Dokter Spesialis Penyakit Dalam Indonesia* or PAPDI) in 2024. Identifying this gap is crucial, as such data can inform national health policy, guide equitable workforce distribution, and address internists' well-being. Evidence from this survey can support targeted interventions, training policies, and incentive programs, ultimately improving health service delivery nationwide.

METHODS

Study Design

This study was designed as a nationwide cross-sectional study and was conducted by the INASIM between December 2023 and March 2024. The methodology of this study has been reviewed and approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Indonesia, and Dr. Cipto Mangunkusumo National Hospital, with an ethical clearance number of KET-1366/UN2.F1/ETIK/PPM. 00.02/ 2023.

The subjects were INASIM members based on the latest database. They were selected using cluster random sampling across the existing 39 INASIM branches. Sampling was conducted proportionally to branch size, with the number of invited participants from each INASIM branch determined according to the total number of registered internists in that branch. The sample size calculation was aligned with the methodology of a related study, which required a minimum of 10% of the target population.[6] Our study is part of the INASIM project entitled *"Cardiometabolic Profile among Indonesian*

Internists", in which 20% of internists across Indonesia were included as participants.[7,8] We therefore adopted the same 20% proportion to ensure consistency with the INASIM framework. Furthermore, selecting 20% of internists allowed us to achieve balanced geographic representativeness while maintaining operational feasibility. The inclusion criteria for this study were internal medicine specialists registered in the INASIM, who provided electronic informed consent and completed the online questionnaire within the study period. The exclusion criteria were respondents with incomplete data.

All information was acquired via a standardized online questionnaire form, which was distributed personally by the appointed site investigators across all 39 INASIM branches in Indonesia (Appendix 1). All participants had signed an electronic informed consent form before filling in the questionnaires. For this analysis, sociodemographic and income variables were defined as age group, gender, marital status, employment status, academic role, working years, subspecialty, number and location of practice sites, and income range. Exact cut-offs used in analysis are as shown in **Table 1**. The responses collected were all anonymous.

Operational Definitions

The age reported was the participant's age in years at the time of the survey. They were later divided into 4 age groups, which were below 35 years old, 35 to 49 years old, 50 to 64 years old, and 65 years old or above. Gender was divided into male or female. Marital status was divided into married, unmarried, and divorced. Employment status was divided into civil servants, retired civil servants, non-civil servants, and Indonesian armed forces (TNI) or Indonesian national police agency (POLRI). Academic roles were divided into active academic staff, retired academic staff, or non-academic staff in a medical or non-medical faculty. Working hours were divided into below 55 hours per week or 55 hours per week or more. Working hours were self-reported and not standardized across clinical, administrative, and on-call activities, which may have introduced measurement variability. Working years as an internist were categorized into below 5 years, 5 to 9 years, 10 to 19 years, and 20 years and above.

Subspecialty was selected based on the available subspecialties of internal medicine in Indonesia. The number of locations for practice might include hospitals and clinics, with a maximum of 3 locations (based on the registration certificate limitation). The location of practice was categorized into urban area, rural area, or both urban and rural areas. The classification of urban and rural areas was defined in accordance with the data provided by the Indonesian National Statistic Organization (BPS) in 2020.[9] Income was self-reported by respondents and reflected their estimated total monthly earnings. The questionnaire did not distinguish between gross and net income, nor between clinical and non-clinical sources; therefore, reported values likely represent combined earnings from multiple professional activities. Income ranges were divided into 7 groups, with the lowest being under 10 million rupiah per month and the highest being above 300 million rupiah per month. The distribution of internists was acquired from the latest INASIM database. All analyses were exploratory in nature and intended to describe associations rather than establish causal relationships.

Data Analysis and Presentation

Statistical analysis was done using SPSS version 26.0. Descriptive analysis was conducted to describe the findings of the study. Categorical data were presented using percentages. The data were summarized in the form of tables, with suitable diagrams to provide better visualization. Specifically for the distribution of survey participants, a choropleth map was used to provide a better presentation. Statistical analyses were done to calculate statistical significance for some comparisons. The Mann-Whitney test was performed to compare the significance between two independent variable groups, whereas the Kruskal-Wallis test was performed to compare more than two independent variable groups.

RESULTS

Participants of the Study

Of the 1,568 internists invited to participate, 1,134 (72.3%) submitted the questionnaire.

The reasons for non-participation are listed in **Figure 1**. Among submitted questionnaires, 1,082 (69.0%) were complete and included in the analysis. The remaining 52 questionnaires were excluded due to incomplete data. Most exclusions were due to partially completed questionnaires, in which multiple key variables (particularly income, practice characteristics, and lifestyle items) were left unanswered.

The distribution of survey participants and overall response rate by province can be observed in **Figure 2**. This nationwide survey included all provinces in Indonesia. The number of participants was dependent on the total number of internists for each province. As observed, most of the internists were practicing in Jakarta (832), West Java (699), East Java (625), Central Java (566), and North Sumatra (341) provinces. On the other hand, only a few internists were working in Bengkulu (32), Gorontalo (27), Maluku (24), West Papua (24), and North Maluku (23) provinces.

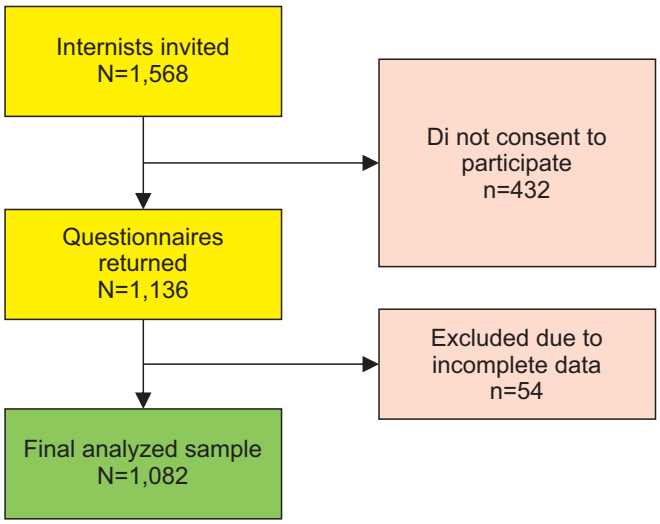


Figure 1. Flowchart of participant recruitment and data processing in the national survey of internists across Indonesia.

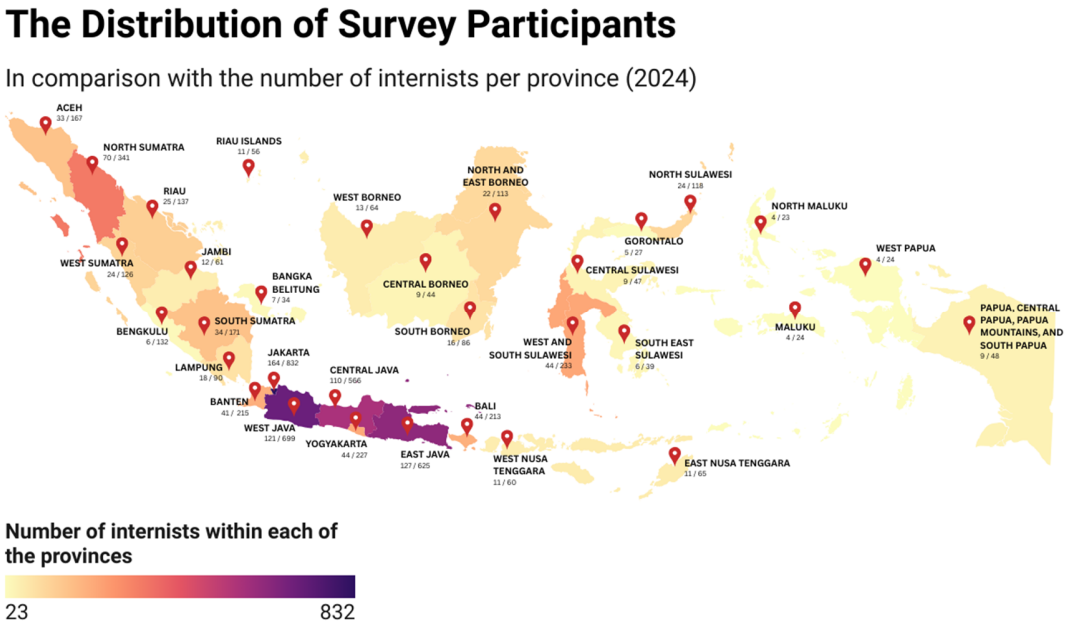


Figure 2. The distribution of survey participants in a choropleth map. The map was created using the Datawrapper website with modifications.

Baseline Characteristics

The characteristics of the study participants are summarized in Table 1. Most of the participants were aged between 35 and 49 years old (57.7%), males (57.7%), and married (88.5%). Female internists accounted for 42.3% of respondents. This proportion is notable in light of the observed income differences between genders, which are further explored in the income analysis. There was only a small difference between civil servants and non-civil servants in terms of employment status (48.6% and 44.2%, respectively). Two-thirds of the internists were not active academic staff (64.3% for non-academic staff and 2.3% for retired academic staff). There were slightly more internists working 55 hours or more per week (52.7%) and had under 5 years of working experience as an internist (33.4%). A large proportion of 76.3% internists were general internists (i.e., had no subspeciality), with the rest being divided into 11 subspecialities. Most internists worked in 3 locations (70.9%) with income ranging from 50 to 99 million rupiah per month (35.9%). This dominance of multiple practice locations may reflect systemic workload demands and the need for physicians to distribute their practice across several facilities. The locations of practice are divided into urban areas, rural areas, or both urban and rural areas. The number of internists working in urban areas almost tripled that of those working in rural areas.

Table 1. The characteristics of the study participants.

Variables	Results n (%)	Variables	Results n (%)
Age Groups (Years old)		Subspeciality	
< 35	97 (9)	General Internist	826 (76.3)
35 - 49	624 (57.7)	Nephrology and Hypertension	47 (4.3)
50 - 64	296 (27.4)	Endocrinology Metabolic and Diabetes	36 (3.3)
≥ 65	65 (6)	Cardiology	35 (3.2)
Gender		Gastroenterology and Hepatology	35 (3.2)
Male	624 (57.7)	Hematology Medical Oncology	28 (2.6)
Female	458 (42.3)	Tropical Medicine and Infectious Diseases	19 (1.8)
Marital Status		Geriatric	16 (1.5)
Married	958 (88.5)	Pulmonology and Critical Care Medicine	16 (1.5)
Unmarried	80 (7.4)	Allergy and Clinical Immunology	10 (0.9)
Divorced	44 (4.1)	Rheumatology	10 (0.9)
Employment Status		Psychosomatic and Palliative Care Consultant	4 (0.4)
Civil Servant	526 (48.6)	Number of Practice Locations	
Non-Civil Servant	478 (44.2)	Not Practicing	3 (0.3)
Retired Civil Servant	73 (6.7)	1 Location	98 (9.1)
TNI / POLRI	5 (0.5)	2 Locations	214 (19.8)
Academic Role		3 Locations	767 (70.9)
Academic Staff	361 (33.4)	**Location of Practice** (n = 1079)	
Retired Academic Staff	25 (2.3)	Urban Area	660 (61.2)
Non-Academic Staff	696 (64.3)	Rural Area	232 (21.5)
Weekly Working Hours (Hours)		Both Urban and Rural Areas	187 (17.3)
< 55	512 (47.3)	**Monthly Income** (Million IDR/ Month)	
≥ 55	570 (52.7)	< 10	28 (2.6)
Working Years as an Internist (Years)		10-29	208 (19.2)
< 5	361 (33.4)	30-49	327 (30.2)
5-9	289 (26.7)	50-99	388 (35.9)
10-19	270 (25)	100-199	111 (10.3)
≥ 20	162 (15)	200-299	15 (1.4)
		> 300	5 (0.5)

Abbreviations: TNI: Indonesian National Armed Forces (*Tentara Nasional Indonesia*); POLRI: Indonesian National Police (*Kepolisian Negara Republik Indonesia*)

Income Analysis

Sub-analyses on the income range of internists were done and reported in **Figure 3 (A-G)**. The sub analyses include age groups, working years as an internist, gender, employment status, working hours, location of practices, and number of practices. The complete data of these sub-analyses are available in the supplementary material, **Appendix 2**.

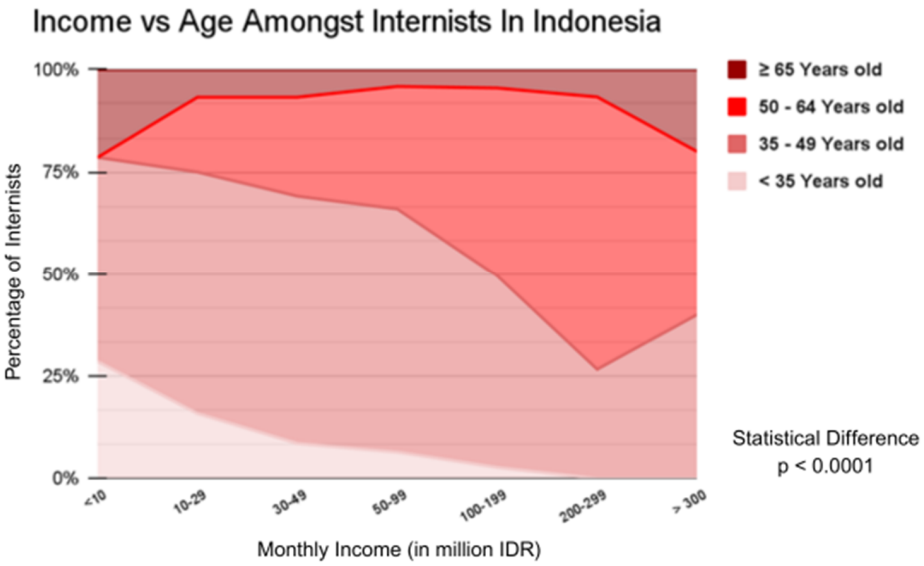
In **Figure 3A**, it can be observed that internists below 35 years old had the lowest average income, with 34% earning between 10-29 million rupiah per month. The income gradually increases with age, as 31.7% of internists aged 35-49 years old earned around 30-49 million rupiah per month, and 39.2% of internists aged 50-64 years old earned around 50-99 million rupiah per month. However, this increasing trend was not reported in the last age group (above 65 years old), as the majority (33.8%) earned around 30-49 million rupiah per month. Similar trends can also be seen when the income was compared with working years as an internist (**Figure 3B**). Internists with 5 years of experience or less generally earned 30-99 million rupiah per month (67%), with one fourth earning 10-29 million rupiah per month. The majority (35.3%) of internists with 5-9 years of working experience earned 50-99 million rupiah per month, and 12.1% of them earned 100-199 million rupiah per month. Likewise, 40.4% of internists who had been working for 10-19 years earned around 50-99 million rupiah per month, with 16.7% of them earning 100-199 million rupiah per month. Interestingly, the majority (34.6%) of internists with more than 20 years of working experience earned 50-99 million rupiah per month. Nevertheless, around 2% of internists in this group earned more than 300 million rupiah per month.

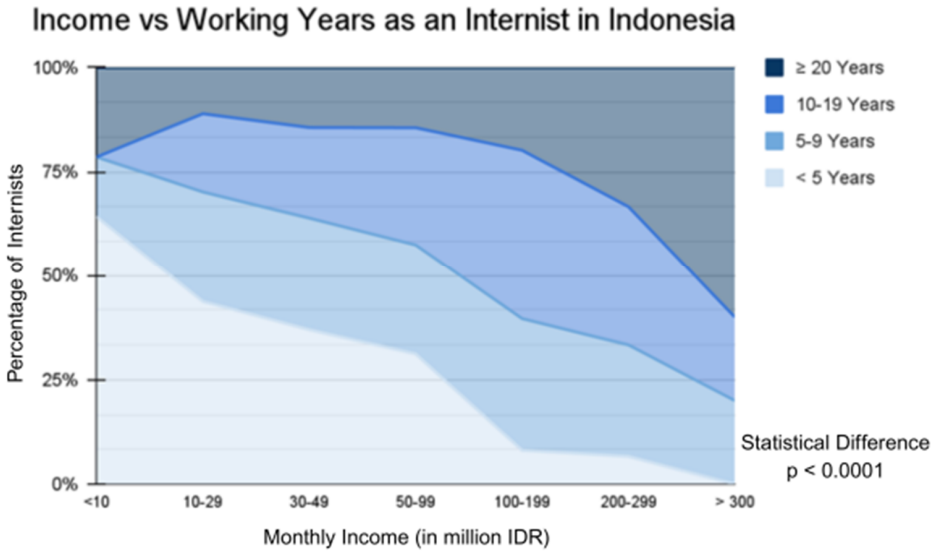
The comparison of income between genders showed a statistically significant difference, in which most female internists earned 30-49 million per month (34.9%). Whereas male internists were reported to have higher income, with almost 40% reported 50-99 million rupiah per month as their income. Male internists were also dominating in the higher income groups (**Figure 3C**). In terms of academic roles, the average income amongst active academic staff was higher when compared with non-academic staff (**Figure 3D**). The retired academic staff group had the lowest average income, with more than one-third earning less than 29 million per month.

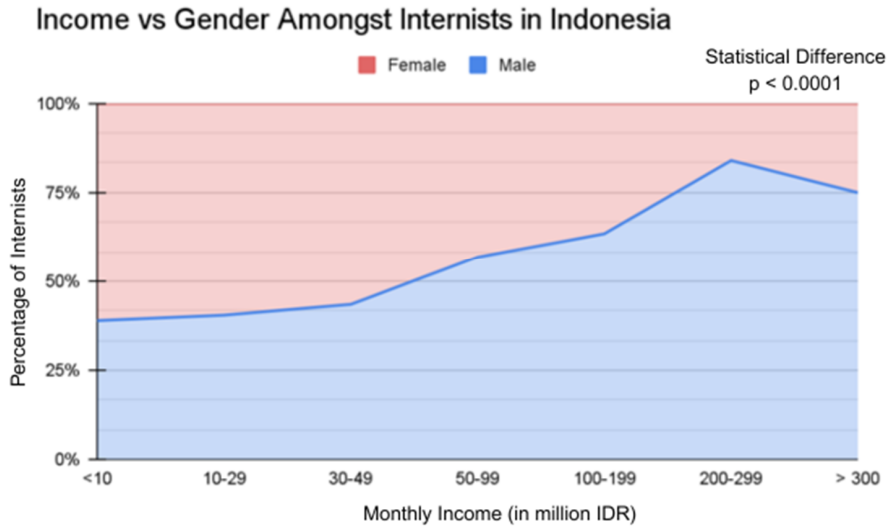
Working hours were shown to be positively and significantly correlated with income, as higher income groups were dominated by internists working 55 hours per week or more (**Figure 3E**). The location of practice did not significantly affect the income of internists, as most internists in all three groups earned around 50-99 million rupiah per month (**Figure 3F**). Although a larger portion of internists working in only urban areas earned 100-199 million rupiah per month, compared with other locations (12.3%). Sub-analysis on the number of practices showed similar results with prior analysis of working hours, as internists working in 3 locations were shown to earn more compared with others (**Figure 3G**). It is important to note that 3 internists who were not practicing were excluded from the chart, as all three of them earned less than 10 million rupiah per month.

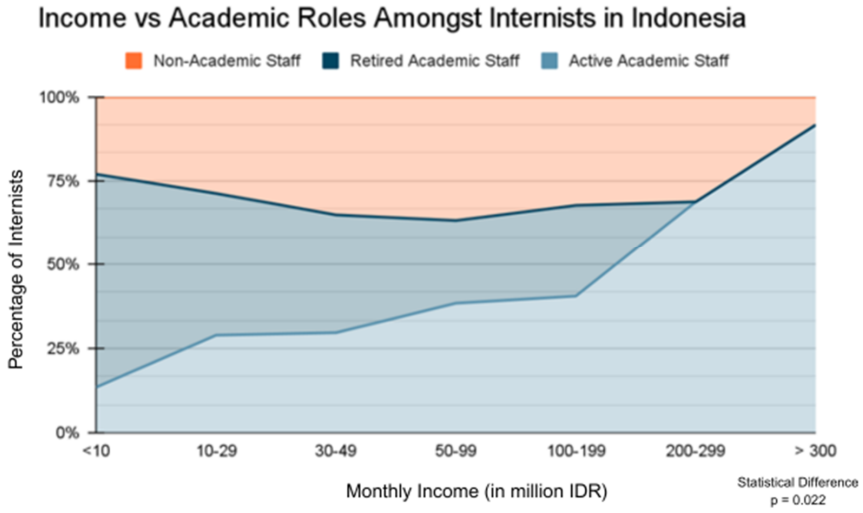
Lifestyle Analysis

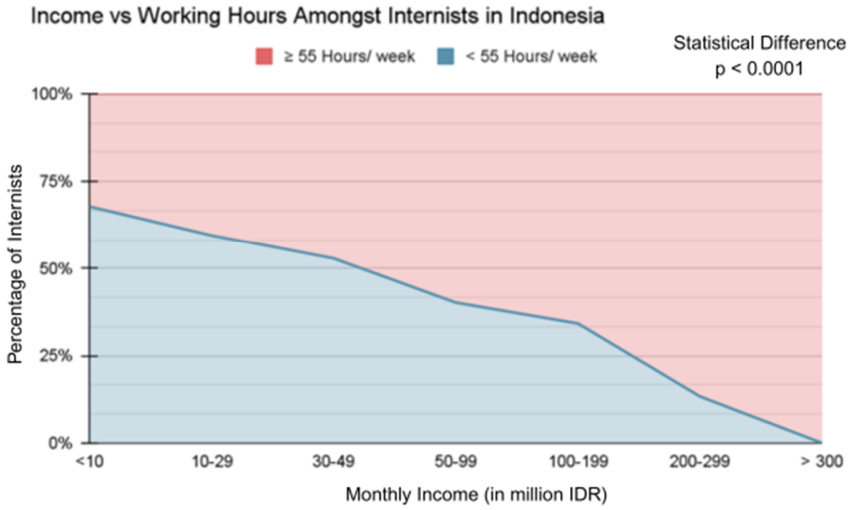
Several data on lifestyles were acquired, such as smoking, alcohol consumption, coffee and sweetener consumption, sleep duration, walking duration, sitting duration, daily physical activity, and physical training habit (**Table 2**). The survey showed that 11.1% of internists had a history of smoking, with 3% of them still actively smoking cigarettes. The median duration of smoking habit amongst the smoker cohort was 7 years, with half of them having below 6 cigarettes daily. Only a few of the subjects reported routine alcohol consumption (3.7%), in contrast to the majority reporting routine coffee consumption (55.9%). In addition, 58% of them used additional sweeteners for their beverages. It was observed that 62.9% of internists slept for less than 7 hours daily and, on average, spent an hour walking and 5 hours sitting. The median duration of daily physical activity was 45 minutes for high intensity and 50 minutes for moderate intensity. The percentages of internists who routinely had physical training per week were only 23.8% for high intensity, 42.2% for moderate intensity, and 27% for resistance training.

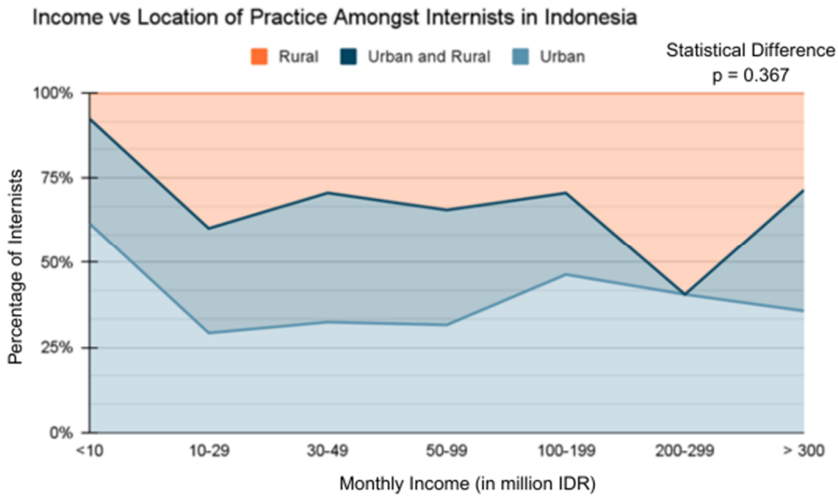

Income vs Age Amongst Internists In Indonesia
100%
75%
50%
25%
0%
Percentage of Internists
≥ 65 Years old
50 - 64 Years old
35 - 49 Years old
< 35 Years old
Statistical Difference
p < 0.0001
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)


Income vs Working Years as an Internist in Indonesia
100%
75%
50%
25%
0%
Percentage of Internists
≥ 20 Years
10-19 Years
5-9 Years
< 5 Years
Statistical Difference
p < 0.0001
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)


Income vs Gender Amongst Internists in Indonesia
Female
Male
Statistical Difference
p < 0.0001
100%
75%
50%
25%
0%
Percentage of Internists
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)


Income vs Academic Roles Amongst Internists in Indonesia
Non-Academic Staff
Retired Academic Staff
Active Academic Staff
100%
75%
50%
25%
0%
Percentage of Internists
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)
Statistical Difference
p = 0.022


Income vs Working Hours Amongst Internists in Indonesia
≥ 55 Hours/ week
< 55 Hours/ week
Statistical Difference
p < 0.0001
100%
75%
50%
25%
0%
Percentage of Internists
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)


Income vs Location of Practice Amongst Internists in Indonesia
Rural
Urban and Rural
Urban
Statistical Difference
p = 0.367
100%
75%
50%
25%
0%
Percentage of Internists
<10
10-29
30-49
50-99
100-199
200-299
> 300
Monthly Income (in million IDR)

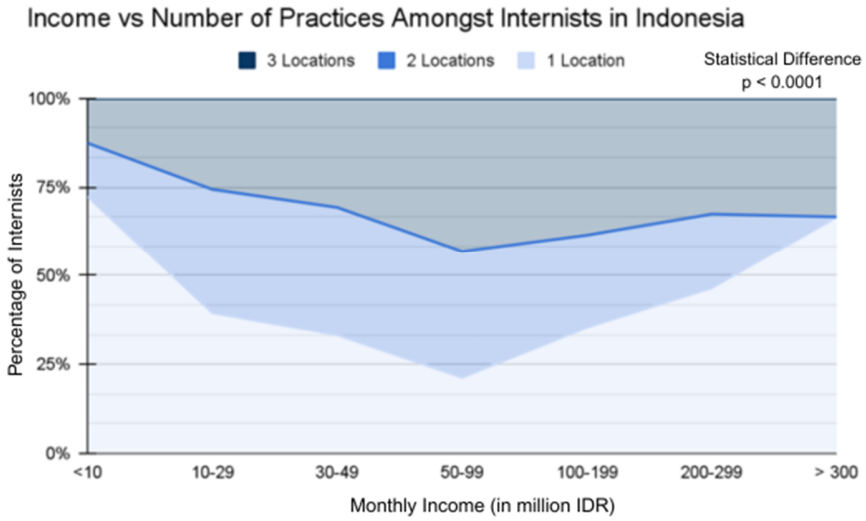


Figure 3A-G. The sub-analyses on the income of internists in Indonesia. (A) Income based on age. (B) Income based on working years as an internist. (C) Income based on gender. (D) Income based on academic roles. (E) Income based on weekly working hours. (F) Income is based on the location of practice. (G) Income is based on the number of practices.

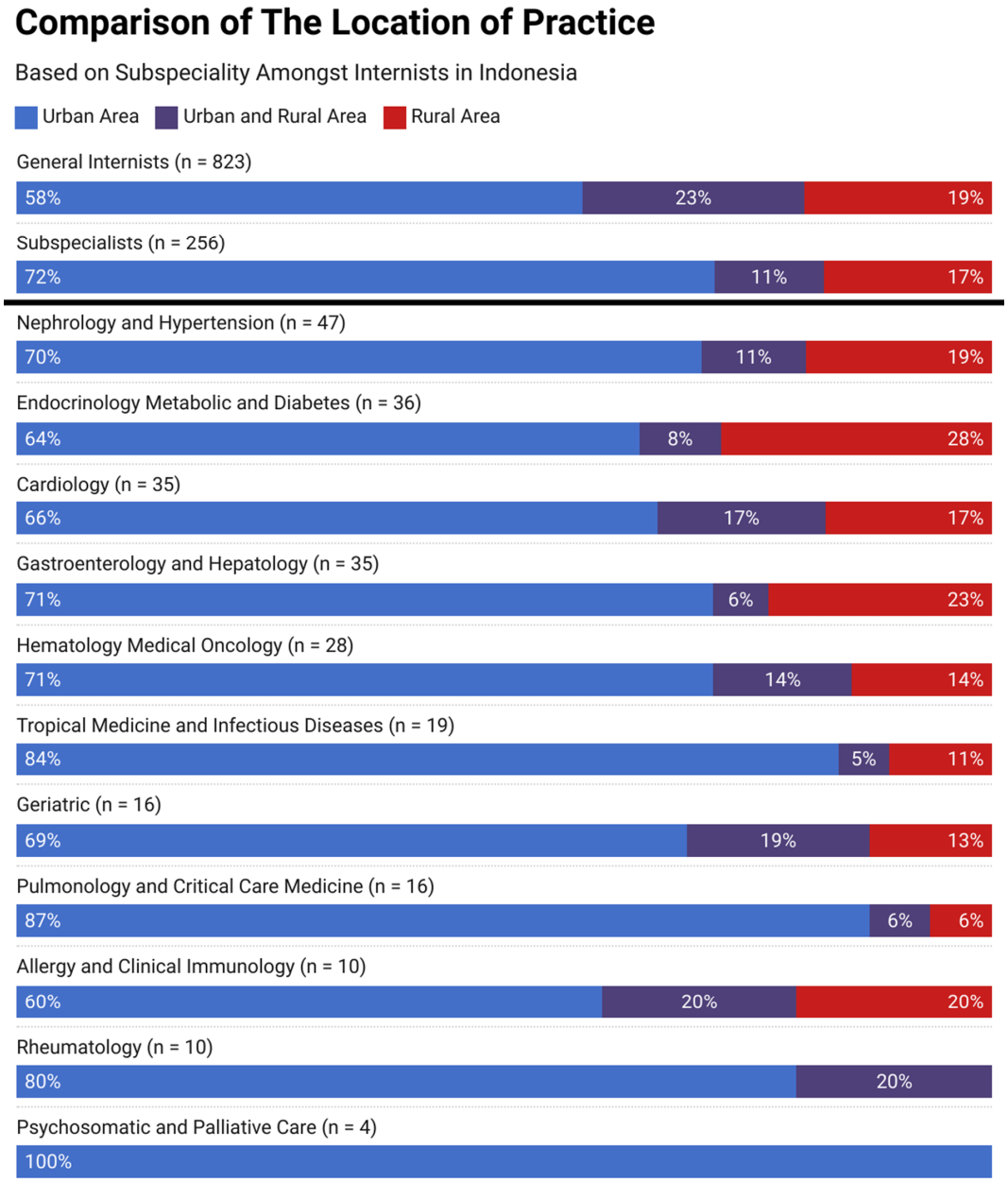
Table 2. Analyses on the social aspects and habits of internists in Indonesia.

Variables	Results n (%)	Variables	Results n (%)
History of Smoking		**Sleep Duration** (hours per day)	
No history of smoking	962 (88.9)	< 7	681 (62.9)
Used to smoke	88 (8.1)	≥ 7	401 (37.1)
Still actively smoking	32 (3.0)	**Walking Duration** (minutes per day)	
Duration of Smoking Habit (years)		Median (IQR)	60 (110)
Median (IQR)	7 (8)	**Sitting Duration** (hours per day)	
Cigarette Consumption (per day)		Median (IQR)	5 (2.5)
< 6	61 (50.8)	**High Intensity Physical Activity Duration** (minutes per day)	
6 - 12	39 (32.5)	Median (IQR)	45 (30)
≥ 12	19 (15.8)	**Moderate Intensity Physical Activity Duration** (minutes per day)	
Electronic cigarette	1 (0.9)	Median (IQR)	50 (35)
Alcohol Consumption (glasses per week)		**High Intensity Physical Training** (per week)	
Not consuming alcohol	1042 (96.3)	Not doing	567 (52.4)
< 1	35 (3.2)	Not routinely	257 (23.8)
≥ 1	5 (0.5)	< 75 minutes	145 (13.4)
Coffee Consumption (cup per day)		≥ 75 minutes	113 (10.4)
No daily coffee consumption	468 (43.3)	**Moderate Intensity Physical Training** (per week)	
1	350 (32.3)	Not doing	274 (25.3)
2	198 (18.3)	Not routinely	341 (31.5)
3	36 (3.3)	< 150 minutes	281 (26.0)
> 3	21 (1.9)	≥ 150 minutes	186 (17.2)
No data	9 (0.8)	**Resistance Training** (per week)	
Additional Sweetener Consumption		Not doing	530 (49.0)
With	351 (58.0)	Not routinely	260 (24.0)
Without	254 (42.0)	< 2 times	129 (11.9)
		≥ 2 times	163 (15.1)

Abbreviations: IQR, Interquartile Range

Subspeciality Analysis

Comparisons between general internists and subspecialists, also amongst different subspecialties, were made regarding their location of practice and income. For the location of practice, a significant discrepancy between general internists and subspecialists can be observed in Figure 4A. General internists seemed to be more distributed, with 58% in only urban areas, 22.8% in both urban and rural areas, and 19.2% in only rural areas. On the other hand, subspecialists were more concentrated in urban areas (72%), with only 17% working in rural areas only and 11% working in both urban and rural areas. Moreover, there were some differences between subspecialists, though they were not statistically significant. About 60% of allergy and clinical immunology subspecialists



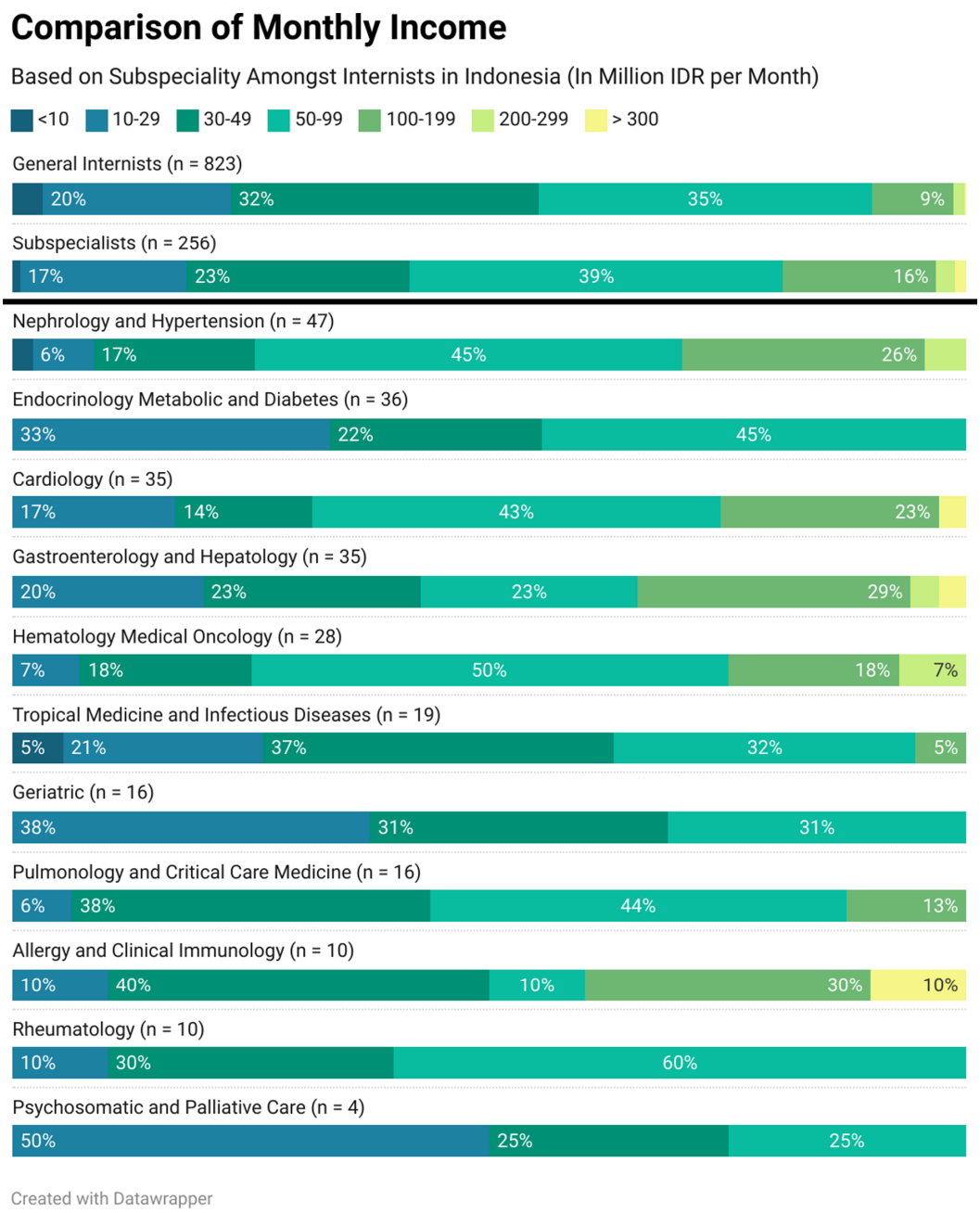


Figure 4A-B. Comparison between sub-specialties in Internal Medicine. (A) Comparison of the location of practice. (B) Comparison of monthly income. The charts were created using the Datawrapper website with modifications.

were working in only urban areas, followed by 63.9% of Endocrinology Metabolic and Diabetes subspecialists, 65.7% of cardiology subspecialists, 68.8% of Geriatric subspecialists, 70.2% of nephrology and hypertension subspecialists, 71.4% of Gastroenterology and Hepatology subspecialists, 71.4% of Hematology Medical Oncology subspecialists, 80% of Rheumatology subspecialists, 84.2% of Tropical Medicine and Infectious Diseases subspecialists, 87.5% of pulmonology and critical care subspecialists, and lastly 100% of psychosomatic and palliative care subspecialists working in only urban areas. The complete data of these sub-analyses are available in the supplementary material, Appendix 3.

The analysis of income between subspecialties is reported in Figure 4B. General internists reportedly earned between 50 and 99 million rupiah per month in most of the cohort (34.9%). Meanwhile, subspecialists reported a significantly higher income, with 19.1% of subspecialists earning more than 100 million rupiah per month. Different subspecialties seemed to have a wide range of income. Most psychosomatic and palliative care subspecialists and Geriatric subspecialists earned 10-29 million rupiah per month (50% and 37.5% respectively). Tropical Medicine and Infectious Diseases subspecialists (36.8%), along with allergy and clinical immunology subspecialists (40%), typically earned 30-49 million rupiah per month. Whereas Endocrinology Metabolic and Diabetes subspecialists (44.4%), Cardiology subspecialists (42.9%), Hematology, Medical Oncology subspecialists (50%), Pulmonology and Critical Care Medicine subspecialists (43.8%), and Rheumatology subspecialists (60%) typically earned 50-99 million rupiah per month. Gastroenterology and Hepatology subspecialists seemed to be one of the top earners, with 28.6% of them earning 100-199 million rupiah per month. Other subspecialities with high percentages in the 100-199 million rupiah per month income range were allergy and clinical immunology subspecialists (30%), nephrology and hypertension subspecialists (25.5%), and cardiology subspecialists (22.9%). The complete data of these sub-analyses are available in the supplementary material, Appendix 4.

DISCUSSION

The shortage and distribution discrepancy of medical specialists are well-known problems in Indonesia, as observed as well in the results of this study. As of 2024, the ratio of internists per 100,000 inhabitants aged 20 or above was estimated to be 2.9, with 5,609 registered internists. The distribution discrepancy can be easily noticed as 56.4% of internists were practicing in Java Island and 61.2% working in urban areas. Even greater discrepancies were reported amongst subspecialists when compared to general internists. Establishing new medical schools in collaboration with existing medical schools, increasing the quota for specialist education programs, and providing various scholarships are possible solutions to tackle the shortage of both primary and specialist medical providers.[10,11] Indeed, the density of internists is higher in regions with specialistic medical schools, for example, in Jakarta, Bandung, Surabaya, Malang, Semarang, Yogyakarta, Bali, North Sumatra, and South Sulawesi. Moreover, as an effort to lessen the distribution discrepancy, the Ministry of Health established the medical specialist utilization program in 2017. A total of 586 specialists, 132 of whom were internal medicine specialists, were distributed across 38 provinces in Indonesia.[4] Improvements on general population distribution, quantity and quality of healthcare centers, regional partnerships, and policies to ensure provisions for medical professionals are also critical to encourage well-distributed medical specialists.

Income has also been a sensitive and private issue to be discussed, explaining the lack of reports and analysis in Indonesia. Although being only one of the factors contributing to physicians' welfare, such reports and analyses are important to give a big picture of the aforementioned issue.[12] Reports on physicians' income and wellness have been made and published in other countries.[12–14] The positive associations between income and age, working years, working hours, number of practices, and subspeciality are somewhat predictable and logical. However, the high proportion of internists practicing in three locations might suggest a structurally high workload environment, which may have implications for physician wellbeing and service continuity. The apparent plateau in income among the oldest age group and those with long working experience may reflect reduced clinical workload, transition to advisory or academic roles, or partial retirement, which are common in later career stages. In addition, this study found no significant difference in income based on the location of practice (i.e., rural or urban areas). This finding may represent a policy-relevant opportunity, suggesting that improving infrastructure, professional support, and career incentives in rural settings could enhance specialist distribution without necessarily

compromising income expectations.

The income gap based on gender is an interesting finding, with male internists earning more than female internists. This disparity has also been observed in several reports amongst both surgical and non-surgical specialists, with a widening pay gap over time.[13–15] Other literature has reported that female physicians earned, on average, 8 to 29% less than their male counterparts.[16,17] Several differences, such as in the number of visits, days worked, and visit time, might be contributing factors.[17] Nevertheless, efforts to reduce the gap and to ensure fair payment corresponding to the workload amongst Indonesian medical professionals are urged. This finding warrants further qualitative and policy-focused investigation to better understand structural, institutional, and practice-related contributors to the disparity. Developing more transparent remuneration structures and monitoring systems may be important steps toward reducing inequities and ensuring fair compensation practices across genders.

The survey regarding lifestyle resulted in some concerning findings. There are approximately 11.1% of internists with a history of smoking, 3.7% with routine alcohol consumption, 55.9% with daily coffee consumption, and 62.9% with sleeping duration below 7 hours per day. Moreover, internists seem to spend more time sitting, rather than walking or having moderate or high-intensity physical activity. The proportion of internists who do physical training routinely is also lower than the counterpart. These patterns are clinically relevant, as sleep deprivation, prolonged sedentary time, and insufficient physical activity have been associated with increased risk of physician burnout as well as long-term cardiometabolic disease. A meta-analysis by Besson et al. reported that the smoking prevalence amongst 497,081 physicians was 21% (95% CI 20 to 23%), with the highest percentage being in Europe and Asia.[18] A systematic review by Wilson et al. reported a 4-35% of problematic alcohol consumption amongst 51,680 physicians.[19] High consumption of coffee amongst health professionals was also observed in a European study, in which age, specialty, gender, and hierarchical position greatly affected the quantity of coffee consumed.[20] Sedentary behaviors amongst health professionals are not a new issue, as it has been reported in many studies.[21] Analyses about the health issues amongst internists in Indonesia are done and published in another report of the CARMEINA Study.[7,8] As frontline health professionals who often counsel patients on lifestyle modification, internists serve as implicit role models; therefore, the observed lifestyle risks may indirectly affect the credibility of patient counseling and public health messaging.

From a policy perspective, these findings have several implications for health workforce planning in Indonesia. The observed urban concentration of internists and subspecialists highlights the need for strategies that promote more equitable specialist distribution, including improved infrastructure, professional support, and targeted incentive schemes for underserved regions. At the same time, the high workload patterns and lifestyle risks observed in this study suggest that physician well-being programs, workload regulation, and supportive institutional policies may be necessary to sustain workforce capacity and quality of care. Together, these findings provide baseline evidence that may inform national workforce policies and professional development strategies.

There are some limitations to this study. Firstly, the cross-sectional design of this study limits causal inference, and the observed associations should be interpreted as descriptive rather than directional relationships. Secondly, the use of self-administered online questionnaires introduces the possibility of information bias, as responses were based on self-report and could not be independently verified. This may have led to under- or overestimation of certain variables, particularly sensitive ones such as income or lifestyle behaviors. Lifestyle behaviors such as smoking, alcohol use, sleep, and physical activity may be affected by social desirability bias, potentially leading to underreporting of unhealthy behaviors. Thirdly, income data were reported in ranges and may have included earnings from non-clinical sources, limiting precision and comparability. Lastly, while the sample was geographically

diverse, non-response and the voluntary nature of participation may limit generalizability, particularly to internists less engaged with INASIM activities or those practicing in remote areas. In addition, some subspecialty groups had relatively small sample sizes, which may limit the precision of comparisons and warrant cautious interpretation of subspecialty-specific findings. Despite these limitations, the study's internal validity is supported by the use of a standardized questionnaire, consistent data collection procedures across all INASIM branches, and a relatively high response rate. The sample included internists from all provinces, reflecting the national geographic distribution.

CONCLUSION

This study, with a total of 1,082 internists as respondents, reported a significant distribution discrepancy, with 61.2% practicing only in urban areas and heavily concentrated on Java Island. Most of the internists earned around 50 to 99 million rupiah per month, though sub-analyses showed that many factors were significantly involved. These factors included age, working years, academic roles, working hours, number of practices, and even gender. The survey and analyses on lifestyles showed a high percentage of smoking history, coffee consumption, lack of sleep duration, and lack of physical activity and training amongst internists. Furthermore, subspecialists were shown to be more concentrated in urban areas and to have higher incomes when compared to general internists. Future studies with a larger and more diverse sample are recommended to explore additional factors influencing internists' distribution, lifestyle, and income. These could include workload and patient volume, practice environment, regional healthcare infrastructure, and measures of professional well-being such as burnout and job satisfaction, which were beyond the scope of the present study. Moreover, these findings should inform national workforce policies, incentive structures, and physician well-being programs to help ensure a sustainable, equitable, and resilient internal medicine workforce in Indonesia.

CONSENT FOR PUBLICATION

A written informed consent form was obtained from each participant after being recruited to the study. It includes the consent for joining the study and the publication of the results. All authors have read and approved to publish this manuscript.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

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AUTHORS CONTRIBUTIONS

All authors have greatly contributed to the making of this manuscript, with details as follows: Conceptualization: LS, EY, SAN, EG, SS, AR, CWP, RH, AS; Methodology: LS, EY, SAN, EG, SS, AR, CWP, RH, AS; Project administration: LS, EY, SAN, EG, SS, AR, CWP, RH, AS; Funding acquisition: LS, EY, SAN; Supervision: LS, EY, SAN, EG, SS, AR, CWP, RH, AS; Investigation: HN, HS, D, HDP, AMA, ABH, S, ER, GWM, RUP, AA, NS, WP, RA, DR, CH, AMH, AI, EBW, LP, D, GS, AMHP, E, BG, APN, KWSG, EAP, JA, DN, FRD, PI, K, AK, HA, NHM, LDP, EA, R; Formal analysis: LS, EY; Data curation: LS, EY; Writing – original draft and visualization: SP, IA, NIR, AZA, MIF, MH, ZNA, MAS; Writing – review and editing: LS, EY.

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SUPPLEMENTARY MATERIALS

Appendix 1. The questionnaire used in the study. This version has been translated into English from Bahasa Indonesia in the original questionnaire.

Title: *Health Profile and Cardiometabolic Risk among Indonesian Internists*

Introduction and Consent to Participate Page

Section A. Demographic Characteristics

- Age (years)
- Sex (Male/Female)
- City of residence
- Number of practice(s)
- Practice location(s) (Public/Private/Both)
- Marital status (Single/Married/Divorced)
- Employment status (Civil servant/Non-civil servant/Retired)
- Teaching status (Academic staff/Non-academic staff)
- Subspecialty (if any)
- Years practicing as an internist
- Monthly income (categories: <10 million IDR; 10–30; 30–50; 50–100; 100-199; 200-299; > 300 million)

Section B. Workload and Lifestyle

- Average working hours per week
- Smoking history and status
- Alcohol and coffee consumption
- Sleep duration
- Physical activity (IPAQ-SF): moderate, vigorous, muscle-strengthening, walking, sedentary time

Closing Question

- Willingness to be contacted for follow-up studies (Name, optional)

Appendix 2. Sub-analyses on the income range amongst internists in Indonesia.

	Income (Million IDR/ month) n (%)								Statistical Difference
	<10	10-29	30-49	50-99	100-199	200-299	> 300	Total	
Age Groups (Years old)									
< 35	8 (8.2)	33 (34)	28 (28.9)	25 (25.8)	3 (3.1)	-	-	97	p < 0.0001[b]
35 - 49	14 (2.2)	123 (19.7)	198 (31.7)	231 (37)	52 (8.3)	4 (0.6)	2 (0.3)	624	
50 - 64	-	38 (12.8)	79 (26.7)	116 (39.2)	51 (17.2)	10 (3.4)	2 (0.7)	296	
≥ 65	6 (9.2)	14 (21.5)	22 (33.8)	16 (24.6)	5 (7.7)	1 (1.5)	1 (1.5)	65	
Working Years as an Internist (Years)									
< 5	18 (5)	91 (25.2)	121 (33.5)	121 (33.5)	9 (2.5)	1 (0.3)	-	361	p < 0.0001[b]
5-9	4 (1.4)	55 (19)	88 (30.4)	102 (35.3)	35 (12.1)	4 (1.4)	1 (0.3)	289	
10-19	-	39 (14.4)	71 (26.3)	109 (40.4)	45 (16.7)	5 (1.9)	1 (0.4)	270	
≥ 20	6 (3.7)	23 (14.2)	47 (29)	56 (34.6)	22 (13.6)	5 (3.1)	3 (1.9)	162	
Gender									
Male	13 (2.1)	100 (16)	167 (26.8)	249 (39.9)	78 (12.5)	13 (2.1)	4 (0.6)	624	p < 0.0001[a]
Female	15 (3.3)	108 (23.6)	160 (34.9)	139 (30.3)	33 (7.2)	2 (0.4)	1 (0.2)	458	
Academic Role									
Active Academic Staff	6 (1.7)	69 (19.1)	97 (26.9)	134 (37.1)	43 (11.9)	8 (2.2)	4 (1.1)	361	
Retired Academic Staff	2 (8)	7 (28)	8 (32)	6 (24)	2 (8)	-	-	25	p = 0.022[b]
Non-Academic Staff	20 (2.9)	132 (19)	222 (31.9)	248 (35.6)	66 (9.5)	7 (1)	1 (0.1)	696	
Weekly Working Hours									
< 55	19 (3.7)	124 (24.2)	173 (33.8)	156 (30.5)	38 (7.4)	2 (0.4)	-	512	p < 0.0001[a]
≥ 55	9 (1.6)	84 (14.7)	154 (27)	232 (40.7)	73 (12.8)	13 (2.3)	5 (0.9)	570	
Location of Practice									
Urban	21 (3.2)	117 (17.7)	198 (30)	230 (34.8)	81 (12.3)	10 (1.5)	3 (0.5)	660	p = 0.367[b]
Rural	1 (0.4)	56 (24.1)	63 (27.2)	88 (37.9)	18 (7.8)	5 (2.2)	1 (0.4)	232	
Urban and Rural	3 (1.6)	35 (18.7)	66 (35.3)	70 (37.4)	12 (6.4)	-	1 (0.5)	187	
Number of Practices									
Not Practicing	3 (100)	-	-	-	-	-	-	3	p < 0.0001[b]
1	9 (9.2)	26 (26.5)	31 (31.6)	19 (19.4)	10 (10.2)	2 (2.0)	1 (1.0)	98	
2	4 (1.9)	50 (23.4)	73 (34.1)	69 (32.2)	16 (7.5)	2 (0.9)	-	214	
3	12 (1.6)	132 (17.2)	223 (29.1)	300 (39.1)	85 (11.1)	11 (1.4)	4 (0.5)	767	

Abbreviations: IDR, Indonesian Rupiah.
[A statistical] analysis with the Mann-Whitney U Test
[b] Statistical analysis with Kruskal-Wallis Test

Appendix 3. Sub-analysis on the location of practice based on subspeciality.

	Urban Area n (%)	**Urban and Rural Area** n (%)	**Rural Area** n (%)	Total	Statistical Difference
General Internists	477 (58)	188 (22.8)	158 (19.2)	823	p < 0.0001[a]
Subspecialists	183 (71.5)	29 (11.3)	44 (17.2)	256	
Subspeciality					
Nephrology and Hypertension	33 (70.2)	5 (10.6)	9 (19.2)	47	
Endocrinology Metabolic and Diabetes	23 (63.9)	3 (8.3)	10 (27.8)	36	
Cardiology	23 (65.7)	6 (17.1)	6 (17.2)	35	
Gastroenterology and Hepatology	25 (71.4)	2 (5.7)	8 (22.9)	35	
Hematology Medical Oncology	20 (71.4)	4 (14.3)	4 (14.3)	28	
Tropical Medicine and Infectious Diseases	16 (84.2)	1 (5.3)	2 (10.5)	19	p = 0.686[b]
Geriatric	11 (68.7)	3 (18.8)	2 (12.5)	16	
Pulmonology and Critical Care Medicine	14 (87.5)	1 (6.25)	1 (6.25)	16	
Allergy and Clinical Immunology	6 (60)	2 (20)	2 (20)	10	
Rheumatology	8 (80)	2 (20)	-	10	
Psychosomatic and Palliative Care	4 (100)	-	-	4	

[A statistical] analysis with the Mann-Whitney U Test

[b] Statistical analysis with Kruskal-Wallis Test

Appendix 4. Sub-analysis on income based on subspeciality.

	Income (Million IDR/ month) n (%)								**Statistical Difference**
	<10	10-29	30-49	50-99	100-199	200-299	> 300	Total	
No Subspeciality	26 (3.2)	163 (19.7)	267 (32.3)	288 (34.9)	70 (8.5)	10 (1.2)	2 (0.2)	826	p < 0.0001[a]
Subspecialists	2 (0.8)	45 (17.5)	60 (23.4)	100 (39.1)	41 (16.1)	5 (1.9)	3 (1.2)	256	
Subspeciality									
Nephrology and Hypertension	1 (2.1)	3 (6.4)	8 (17)	21 (44.7)	12 (25.5)	2 (4.3)	-	47	
Endocrinology Metabolic and Diabetes	-	12 (33.3)	8 (22.2)	16 (44.5)	-	-	-	36	
Cardiology	-	6 (17.1)	5 (14.3)	15 (42.9)	8 (22.8)	-	1 (2.9)	35	
Gastroenterology and Hepatology	-	7 (20)	8 (22.8)	8 (22.8)	10 (28.6)	1 (2.9)	1 (2.9)	35	
Hematology Medical Oncology	-	2 (7.1)	5 (17.9)	14 (50)	5 (17.9)	2 (7.1)	-	28	
Tropical Medicine and Infectious Diseases	1 (5.3)	4 (21.0)	7 (36.8)	6 (31.6)	1 (5.3)	-	-	19	p < 0.0001[b]
Geriatric	-	6 (37.5)	5 (31.25)	5 (31.25)	-	-	-	16	
Pulmonology and Critical Care Medicine	-	1 (6.25)	6 (37.5)	7 (43.75)	2 (12.5)	-	-	16	
Allergy and Clinical Immunology	-	1 (10)	4 (40)	1 (10)	3 (30)	-	1 (10)	10	
Rheumatology	-	1 (10)	3 (30)	6 (60)	-	-	-	10	
Psychosomatic and Palliative Care	-	2 (50)	1 (25)	1 (25)	-	-	-	4	

[A statistical] analysis with the Mann-Whitney U Test

[b] Statistical analysis with Kruskal-Wallis Test