Gizi Indon 2022, 45(2):183-196
GIZI INDONESIA
Journal of The Indonesian Nutrition Association
p-ISSN: 0436-0265 e-ISSN: 2528-5874

PREVALENCE OF INDONESIA'S ALCOHOL CONSUMPTION, RISK FACTORS, AND ITS CLUSTER MAPPING: AN ANALYSIS OF INDONESIA BASIC HEALTH SURVEY 2018

Prevalensi Konsumsi Alkohol di Indonesia, Faktor Risiko dan Peta Klusternya: Sebuah Analisis dari Riset Kesehatan Dasar (Riskesdas 2018)

Prisca Petty Arfines[1], Rika Rachmalina[1], Rofingatul Mubasyiroh[1], Tities Puspita[1], Fuska Atomita Restu Arfines[2]

[1] National Research and Innovation Agency Republic of Indonesia. B.J. Habibie Building 15th-24th floor, Jl. M.H. Thamrin No. 8, Jakarta Pusat 10340, Indonesia

[2] School of Leadership and Policy Innovation, Universitas Gadjah Mada, Jl. Tevisia, Bulaksumur, Yogyakarta 55281, Indonesia

E-mail: prisca.arfines@gmail.com/prisca.petty.arfines@brin.go.id

Diterima: 24-08-2022 Direvisi: 30-08-2022 Disetujui terbit: 04-09-2022

ABSTRACT

Excessive alcohol consumption increases the risk of non-communicable diseases. This study aimed to analyze the risk factors for alcohol consumption in Indonesia and present a cluster mapping based on the risk factors. The sample of this study was individuals aged 15 years and over who participated in the Indonesia Basic Health Survey 2018, while pregnancy was the exclusion criterion. The sample size for univariate was 542,682 individuals and 539,905 individuals in the multivariate analysis conducted using logistic regression. The prevalence of alcohol consumption was 3.7 percent. The risk factors for drinking alcohol included work as a farmer/fisherman/laborer or other manual occupations (aOR = 1.10; 95% CI 1.04-1.17), smoking (aOR = 4.93; 95% CI 4.62- 5.25), experiencing common-mental disorders (CMD) (aOR = 2.13; 95% CI 1.99-2.28), centrally obese (aOR = 1.21; 95% CI 1.13-1.3) and being overweight/obese (aOR = 1.07; 95% CI 1.01-1.13). On the other hand, the factors that showed a reduced risk of alcohol consumption were being the head of household (aOR = 0.79; 95% CI 0.74-0.85), low education level (aOR = 0.75; 95% CI 0.68-0.83), not working (aOR = 0.74; 95% CI 0.68-0.80), low socioeconomic status (aOR = 0.82; 95% CI 0.75-0.90), and being married (aOR = 0.56; 95% 0.52-0.61) or divorced (aOR = 0.60; 95% CI 0.53-0.67). Type of work as manual workers, smoking, experiencing CMD, being obese centrally, and overweight or generally obese are the main risk factors for alcohol consumption. Specific interventions are needed based on the risk factor cluster of alcohol drinkers.

Keywords: alcoholism, alcohol drinking, obesity, smoking, Indonesia

ABSTRAK

Konsumsi alkohol berlebihan meningkatkan risiko penyakit tidak menular. Penelitian ini menganalisis faktor risiko konsumsi alkohol di Indonesia dan menyajikan pemetaan klaster berdasarkan faktor risiko tersebut. Sampel penelitian ini adalah individu berusia 15 tahun ke atas yang mengikuti Riset Kesehatan Dasar Indonesia (RISKESDAS) 2018, sedangkan kriteria eksklusi adalah kehamilan. Besar sampel untuk analisis univariat adalah 542.682 individu dan 539.905 individu dalam analisis multivariat yang dilakukan dengan menggunakan regresi logistik. Prevalensi konsumsi alkohol adalah 3,7 persen. Faktor risiko minum alkohol meliputi pekerjaan sebagai petani/nelayan/buruh atau pekerjaan manual lainnya (aOR = 1,10; 95% CI 1,04-1,17), merokok (aOR = 4,93; 95% CI 4,62-5,25), mengalami gangguan mental emosional (GME) (aOR = 2,13; 95% CI 1,99-2,28), obesitas sentral (aOR = 1,21; 95% CI 1,13-1,3) dan kelebihan berat badan/obesitas (aOR = 1,07; 95% CI 1,01-1,13). Sedangkan faktor yang menunjukkan penurunan risiko konsumsi alkohol adalah kepala rumah tangga (aOR = 0,79; CI 95% 0,74-0,85), tingkat pendidikan rendah (aOR = 0,75; CI 95% 0,68-0,83), tidak bekerja (aOR = 0,74; 95% CI 0,68-0,80), status sosial ekonomi rendah (aOR = 0,82; 95% CI 0,75-0,90), dan berstatus menikah (aOR = 0,56; 95% 0,52-0,61) atau bercerai (aOR = 0,60; 95% CI 0,53-0,67). Jenis pekerjaan sebagai pekerja manual, merokok, mengalami GME, obesitas sentral, dan overweight atau obesitas merupakan faktor risiko utama konsumsi alkohol. Intervensi khusus diperlukan berdasarkan kelompok faktor risiko peminum alkohol.

Kata kunci: alkoholisme, konsumsi alkohol, obesitas, merokok, Indonesia

Doi: 10.36457/gizindo.v45i2.742
www.persagi.org/ejournal/index.php/Gizi_Indon

INTRODUCTION

In 2016, the Global Burden of Disease found that seven significant causes of death and disability including alcohol consumption accounted for 2 percent for females and 7 percent for males.[1] Excessive use of alcoholic beverages can lead to the occurrence of more than 60 diseases, mainly non-communicable diseases, such as cirrhosis of the liver, cardiovascular, diabetes, some significant types of cancer, and other injuries.[2]

A psychoactive substance in alcohol belongs to an antidepressant and has resulted in dependency. Excessive consumption can cause acute intoxication, which can put anyone at risk of causing an accident and crime.[3] Limitations on the propensity for alcohol consumption may be linked to an individual's level of response to alcohol. It has been reported globally that the use of four standard units or equivalent to 40 grams of pure ethanol has displayed a raised health risk. A recent study showed the recommended level of alcohol consumption is 0 grams of ethanol per week to reduce the risk of ischemic heart disease and diabetes.[4]

A study on alcohol consumption in Indonesia is still very limited and has not been well documented. According to Indonesia Basic Health Survey (Riskesdas) conducted in 2007, the prevalence of alcohol consumption in the last month was 3.0 percent, males 5.8 percent females 0.4 percent (respondents aged >10 years).[5] Meanwhile, in 2018, it has been reported the prevalence of alcoholic beverage consumption in the last month was 3.3 percent, with the consumption prevalence for males at 6.1 percent, and 0.4 percent for females.[6] From the data, it can be concluded that before the pandemic there is a slight increase in national results and prevalence in males. Based on the Statistics Indonesia report, alcohol consumption for people aged over 15 years has decreased from 0.41 liters per capita in 2019 to 0.36 liters per capita in 2021.[7] This situation is somewhat different from systematic reviews in several countries in North and South America, Europe, Asia, and Oceania where alcohol consumption increases during the COVID-19 pandemic, especially on binge drinking.[8] An online study in Indonesia during the pandemic found a higher prevalence of alcohol consumption compared to the results from a national study before the pandemic which reached 9.5 percent of which 44.5 percent of drinkers reported stable alcohol consumption both before and during the pandemic.[9]

However, despite all these facts, alcohol consumption in Indonesia is relatively lower compared to the rest of the world, and public health risks remain high. The data shows illegal alcohol consumption is five times higher than legal alcohol consumption. According to the World Health Organization, illegal alcohol refers to "liquor that is not taxed in the consuming country, because it is usually produced, distributed and sold outside formal channels and government control".[10] In the same line, a study in 2015 shows the ratio of total unrecorded consumption in Indonesia was shockingly high at 83.3 percent. The result may lead to the possibility of real alcohol consumption that could be much higher.[11]

Based on Riskesdas 2007, the characteristics of the determinants of alcohol consumption included: (1) in the age group of 25-34 years, (2) a divorced person, (3) as a grandchild of the head of the household, (4) lived in the rural area, (5) high school graduate, (6) was still undergoing study at school, (7) in the highest socioeconomic status (5th quintile), (8) has ever bought Raskin (Rice for the Poor), (9) low dwelling density with <8 m2/ART, (10) experienced common mental disorder based on SRQ>=6, (11) smoked, (12) BMI>27kg/m2, and (13) had abdominal circumference >90 cm.[12] The results also show that regions in Eastern Indonesia have a high prevalence of drinking alcohol (more than 10%) both from Riskesdas 2007 and 2018. The high proportion of alcohol consumption in the Eastern part of Indonesia is closely related to the strong elements of traditional culture. Several provinces in this region include Bali, East Nusa Tenggara, North Sulawesi, Gorontalo, and Maluku.[5,6] Currently, the Indonesian parliament is faced with deliberating a controversial alcohol ban bill. This bill has been postponed for years and was recently revisited. Some legislators stressed that it is important for the country to have stronger laws regulating the production and consumption of alcohol. On the other hand, regulations prohibiting the production and distribution of alcoholic drinks will reduce the

income of Small and Medium Enterprises (SMEs) and the tourism sector.[13]

A study in 2019 has displayed a mapping of the world alcohol consumption with its trends (from 1990 to 2017) and its projection for 2030.[14] However, the publication has a limitation on showing only on a national scale. Besides, a study using the Riskesdas 2007 only showed a mapping of the prevalence of alcohol drinkers, not a cluster mapping based on risk factors.[5,6] In this regard, the study aimed to analyze a description of the risk factors for drinking alcohol in Indonesia and to provide a mapping of clusters with lifestyle risk factors based on the results of the national health survey.

METHODS

This study used data from the Riskesdas in 2018. Riskesdas is a national survey that aims to assess changes in health indicators of determinants of health status, including risky behavior.[6] Riskesdas has been carried out periodically since 2007, with the implementation period once every five years. This survey was conducted by the National Institute of Health Research and Development, Indonesian Ministry of Health using the 2018 SUSENAS BPS (National Socioeconomic Survey, Statistic Indonesia) sampling frame. The sample of this study was individuals aged 15 years and over who were selected as the 2018 Riskesdas sample. It included individuals from 512 districts/cities in 34 provinces in Indonesia.[6] The sample size in this study was 542,682 individuals who met the inclusion and exclusion criteria and were included in the univariate and bivariate analysis, but the sample size involved in the multivariate analysis was 539,905. The inclusion criterion of this study was to have complete data related to alcohol consumption behavior, while pregnancy was an exclusion criterion from this study.

Riskesdas 2018 used a structured questionnaire developed from the previous survey in 2013. The instruments used consisted of household and individual questionnaires. The household questionnaire collects information on household information, information on all household members, access to health facilities, and data on environmental health. In contrast, the individual survey collected data on infectious diseases, non-communicable diseases, mental health, disability, injuries, traditional health services, health-related behaviors, knowledge, and attitudes towards HIV/AIDS, maternal health, children's health, and measurement & examination. Within the behavior block, data on alcohol consumption has been collected[6]. In detail, this study also collects data on the type, amount, and average standard unit of alcohol consumed. Interviews were conducted using visuals of alcoholic beverage packaging to equate the perception of the size used by the respondent. The standard unit size for alcoholic drinks is determined based on the type of alcoholic drink and the volume of its packaging.

The dependent variable of this study was alcohol consumption. The definition of alcohol consumption was the consumption of alcoholic drinks in the last month which includes a description of the averages for a standard unit of consumption and types of alcoholic drinks commonly drunk. The average standard unit of alcoholic drinks is calculated based on the type of beverage and packaging used (bottles/cans/glasses/shots/others) which are commonly used by those who consume alcoholic beverages. The term "standard drink" described the intensity of alcohol consumption, which can be calculated from the type and volume of alcoholic drinks consumed. One standard drink contains an average of 10 g (between 8 - 13 g) of pure ethanol, which is equivalent to a) Beverages with low alcohol content such as beer: 1 glass of beer/small bottle / can (285 - 330 ml) b) Beverages with moderate alcohol content, such as white wine, champagne, sparkling wine: 1 glass of wine (usually filled with 120 ml) c) Drinks with high alcohol content, such as whiskey, vodka, tequila: 1 shot (30 ml) d) Traditional clear alcoholic drinks: 1/2 cup drink (100 ml) e) Traditional cloudy alcoholic drinks: 1 drinking glass (200 ml) f) bootleg liquor with an alcohol content of about 20 percent or more[6]. The independent variables analyzed can be seen in Table 1.

Table 1
Variables Included in The Analysis

Survey question/ variable	Variable coding (value) *	Notes
Region	Java Bali (0) Sumatera (1) Others/ Eastern Indonesia (2)	Region of residence
Age	>=21 years old (0) 15-20 years old (1)	Age according to last birthday
Sex	Female (0) Male (1)	-
Urban area classification	Urban (0) Rural (1)	District/regency classification is based on Indonesia's statistics (BPS)
Head of the household status	Not a head of household (0) Yes (1)	Relationship with the head of the household
Level of education	High (0) Middle (1) Low (2)	Level of education has been accomplished
Occupation	Civil servant/ Army/ Police/ Private and self-employed employees (0) Farmers/ Fishermen/ Laborers /Others (1) Unemployed / Student (0)	-
Working status	Working (0) Not working/ unemployed (1)	-
Marital status	Not married (0) Married (1) Widowed (1)	-
Smoking status	Not (0) Yes, currently smoking (1)	Smoking status in the past month
Common mental disorder (CMD)	SRQ<6 (0) SRQ>= 6 (1)	CMD categorization is based on the Self Reporting Questionnaire (SRQ) developed by WHO
Nutritional status	Normo-weight (0) Underweight (1) Overweight and Obese (2)	Nutritional status based on the WHO BMI classification. Normoweight if BMI is 18.5–24.9 kg/m^2; underweight if BMI is below 18.5 kg/m^2; and overweight and obese if the BMI is above 25.0 kg/m^2.
Central obesity	No (0) Yes (1)	Central obesity is based on abdominal circumference. Centrally obese if the abdominal circumference is >90 cm in men and >80 in women.
Socioeconomic status	Q5 (0) Q4 (1) Q3 (2) Q2 (3) Q1 (4)	Socioeconomic status is determined based on quintiles. The variable construct was done by Indonesia's statistics

** STATA uses 0 as the reference group value.*

Data management and analysis were carried out using the STATA version 13. Concerning the survey design, the declaration of the study design was conducted before carrying out the statistical analysis test. In addition, a weighting factor is added to this declaration. Univariate analysis was performed to see the statistical description of each independent variable. Meanwhile, bivariate and multivariate analyzes were carried out to see the determinant factors of alcohol consumption using logistic regression. The multivariate analysis was carried out by controlling for several potential covariate variables, including

age, sex, and region of living. Covariates were uncontrolled variables that also affect the dependent variable being tested. Controlling during the analysis will provide a better analysis of the factors related to alcohol consumption.The mapping used cluster analysis so that provinces with similar risk factors for alcohol consumption can be grouped. The grouping is divided into 5 clusters because it may illustrate the similarities of several provincial groups.

There were 3 regional areas in the analysis: the western, central, and other based on a previous survey conducted in Indonesia[15]. The western region (the island of Sumatera), the central region (the islands of Java and Bali), and the other regions (islands that are not included in the western or central regions). The Riskesdas 2018 ethical approval was issued by the National Health Research Ethics Commission, NIHRD, Ministry of Health (No. LB.02.01/2/KE.267/2017). Permission to use the dataset was obtained from the National Institute of Health Research and Development, Ministry of Health of Indonesia. All respondents have given written consent to participate prior to the data collection.

RESULTS

Sociodemographic Characteristics and The Prevalence of Alcohol Consumption

The number of samples in this study was 542,682 of which 52.6 percent were male. Most of the samples were >= 21 years old (mean age 41.1 years ± 16.1 years). According to regulations, this is the legal age for alcohol consumption in Indonesia. More than a half the sample came from the Java-Bali region (60.3%), fairly evenly distributed in both cities and villages (45.1% vs. 54.9%), were not the head of the family (59.9%), had a level of education as medium and low category (49.2% & 42.7%). Meanwhile, based on employment status, most of the samples were working (65.1%) with the main type of occupation being manual work such as fishing/labor/other occupations (36.9%). There was 69.7 percent of respondents were married, most of them not actively smokers (65.8%), and the largest percentage was in the quintile 5 group (25.9%) based on their socioeconomic status. The majority of respondents were in normal nutritional status/normo-weight (56.04%) with the proportion of overweight and obese at 32.90 percent. Meanwhile, based on abdominal circumference, almost one-third of the respondents had central obesity (30.65%). Based on the SRQ score, there was 9.45 percent of respondents experienced a Common Mental Disorder (Table. 2). After conducting a descriptive analysis, the prevalence of alcohol consumption in the last 30 days was 3.7 percent which was equivalent to 6,280,560 in the Indonesian population at the time of the study (Table. 3).

Table 2
Descriptive Analysis of The Sample Study (n sample/unweighted n = 542,682)

Characteristics	Alcohol Consumption in the past 30 days						p-value
	Yes		No		Total		
	n	(%)	n	(%)	n	(%)	
Region							
Java Bali	8,167	1.51	319,260	58.83	327,454	60.34	<0.001
Sumatera	3,457	0.64	111,521	20.55	114,978	21.19	
Others	8,482	1.56	91,768	16.91	100,250	18.47	
Age							
≥ 21 years old	17,393	3.21	456,775	84.17	474,196	87.38	0.0104
15-20 years old	2,713	0.50	65,773	12.12	68,486	12.62	
Sex							
Female	1,183	0.22	256,037	47.18	257,231	47.40	<0.001
Male	18,929	3.49	266,565	49.12	285,451	52.60	

Urban area classification							
Urban	9,974	1.84	287,730	53.02	297,715	54.86	<0.001
Rural	10,137	1.87	234,819	43.27	244,967	45.14	
Head of the household status							
No	9,285	1.71	315,895	58.21	325,229	59.93	<0.001
Yes	10,827	2.00	206,653	38.08	217,453	40.07	
Level of education							
High	1,496	0.28	42,340	7.80	43,849	8.08	<0.001
Middle	11,695	2.16	255,440	47.07	267,162	49.23	
Low	6,919	1.28	224,779	41.42	231,671	42.69	
Occupation							
Civil servant / Army / Police / Private and self-employed employees	6,577	1.21	145,927	26.98	152,982	28.19	<0.001
Farmers / Fishermen / Laborers / Others	10,116	1.86	189,939	35.00	200,033	36.86	
Unemployed / Student	3,415	0.63	186,194	34.31	189,613	34.94	
Working status							
Working	16,693	3.08	336,409	61.99	353,069	65.06	<0.001
Not working	3,415	0.63	186,194	34.31	189,613	34.94	
Marital status							
Not married	7,229	1.33	112,118	20.66	119,336	21.99	<0.001
Married	12,075	2.23	366,039	67.45	378,087	69.67	
Divorced	808	0.15	44,440	8.19	45,260	8.34	
Smoking status							
Not smoking	3,428	0.63	353,612	65.16	357,030	65.79	<0.001
Yes, currently smoking	16,682	3.07	168,937	31.13	185,652	34.21	
Common mental disorder (CMD)							
SRQ<6	17,225	3.17	474,141	87.37	491,399	90.55	<0.001
SRQ>=6	2,955	0.54	48,337	8.91	51,283	9.45	
Nutritional status							
Normo-weight	12,482	2.30	291,637	53.74	304,119	56.04	<0.001
Underweight	2,551	0.47	57,416	10.58	59,966	11.05	
Overweight and obese	5,047	0.93	173,495	31.97	178,542	32.90	
Central obesity							
No	16,557	3.05	359,798	66.30	376,350	69.35	<0.001
Yes	3,550	0.65	162,750	29.99	166,332	30.65	
Socioeconomic status							
Q5	5,535	1.02	135,019	24.88	140,555	25.90	<0.001
Q4	4,613	0.85	112,227	20.68	116,839	21.53	
Q3	4,233	0.78	101,590	18.72	105,823	19.50	
Q2	3,582	0.66	94,861	17.48	98,443	18.14	
Q1	2,116	0.39	78,852	14.53	80,968	14.92	

Table 3
The Prevalence of Alcohol Consumption in The Past 30 days, Riskesdas 2018

Alcohol consumption in the past 30 days	Frequency	
	Weighted counts	%
Yes	6,280,560	3.705
No	163,221,831	96.29

Table 4
Multivariate Logistic Regression for Risk Factors for Alcohol Consumption (n= 539,905)

Variable	Category	Alcohol consumption in the past 30 days			
		*Adjusted OR**	*95% CI*		*p-value*
			Lower	*Upper*	
Urban area classification	Rural	1.01	*0.957*	*1.057*	*0.82*
Head of the household	Yes	0.79	0.736	0.849	<0.001
Level of education	Middle	0.99	0.901	1.084	0.80
	Low	0.75	0.682	0.831	<0.001
Working status	Tidak bekerja	0.74	0.681	0.804	<0.001
Occupation	Farmers / Fishermen / Laborers / Others	1.10	1.044	1.167	<0.001
	Unemployed / Student**	1.00			<0.001
Marital status	Married	0.56	0.518	0.610	<0.001
	Divorced	0.60	0.532	0.673	<0.001
Smoking status	Yes	4.93	4.618	5.255	<0.001
Common mental disorder	SRQ>= 6	2.13	1.992	2.280	<0.001
Central obesity	Yes	1.21	1.134	1.298	<0.001
Nutritional status	Underweight	0.96	0.895	1.031	0.26
	Overweight and obese	1.07	1.005	1.130	0.03
Socioeconomic status	Q4	0.95	0.889	1.024	0.19
	Q3	1.00	0.929	1.073	0.97
	Q2	0.97	0.902	1.050	0.49
	Q1	0.82	0.754	0.896	<0.001

* Odds ratios for each variable controlled by sex, age, and regional area
** Variable omitted in the analysis

Risk Factors and Protective Factors for Alcohol Consumption

Based on the multivariate analysis conducted on 539,905 samples, risk factors and protective factors against alcohol consumption have been obtained.The results of the multivariate analysis showed the risk factors of alcohol drinkers, among others, as follows; occupation as a farmer/fisherman/laborer or other occupations that did not include in the previous category (aOR = 1.10; 95% CI 1.04-1.17), smoking (aOR = 4.93; 95% CI 4.62- 5.25) and experiencing CMD (aOR = 2.13; 95% CI 1.99-2.28), centrally obese (aOR = 1.21; 95% CI 1.13-1.3) and being overweight/generally obese (aOR = 1.07; 95% CI 1.01-1.13). While several factors that have a tendency to lower the alcohol consumption were being the head of household (aOR = 0.79; 95% CI 0.74-0.85), low education level (aOR = 0.75; 95% CI 0.68-0.83), not working (aOR = 0.74; 95% CI 0.68-0.80), low socioeconomic status (aOR = 0.82; 95% CI 0.75-0.90) and being married (aOR = 0.56; 95% 0.52-0.61) or divorced (aOR = 0.60; 95% CI 0.53-0.67) (Table 4).

Table 5
Alcohol Consumption Cluster Categories

Cluster	Description	Provinces
Cluster 1	Provinces with a lower prevalence of CMD compared to the national level, smoking prevalence near the national level, but higher prevalence of alcohol consumption compared to national prevalence.	North Sumatera, East Nusa Tenggara, West Kalimantan, North Sulawesi, South Sulawesi, Southeast Sulawesi, West Papua.
Cluster 2	Provinces with a lower prevalence of CMD and smoking compared to the national level, but a higher prevalence of alcohol consumption compared to national prevalence.	Bali.
Cluster 3	Provinces with a higher prevalence of CMD and smoking compared to the national level, but a lower prevalence of alcohol consumption compared to national prevalence.	West Sumatera, Riau, South Sumatera, Bengkulu, Lampung, Bangka Belitung, West Java, Banten, West Nusa Tenggara
Cluster 4	Provinces with a lower prevalence of CMD, smoking, and alcohol consumption than the national level.	Aceh, Jambi, Kep. Riau, DKI Jakarta, Central Java, DI.Yogyakarta, East Java, Central Kalimantan, South Kalimantan, East Kalimantan, North Kalimantan, West Sulawesi, Papua
Cluster 5	Provinces with CMDs, smoking, and alcohol consumption prevalence higher than the national level.	Central Sulawesi, Gorontalo, Maluku, North Maluku

Notes: The five clusters are explained by an indication of the color gradient where cluster 1 is the group with the lightest color and cluster 5 is the darkest color as shown in the legend on the right side of the figure.

Figure 1
Cluster Map of Alcohol Drinkers in Indonesia, Riskesdas 2018

The Mapping of Alcohol Drinkers in Indonesia

The cluster mapping of alcohol drinkers can be seen in Figure 1. This cluster map was developed following the behavioral risk factors obtained from the multivariate analysis with considerable apparent Odds Ratios, including, smoking and common mental disorder. Information about cluster categories is presented in Table 5.

It can be seen that cluster 5 which consists of provinces in Central Sulawesi, Gorontalo, Maluku, and North Maluku was a category that has criteria related to high alcohol consumption compared to other groups. This cluster represented provinces with a high prevalence of CMD, smoking, and alcohol consumption. Meanwhile, Bali was a province with a cluster that experiences low common mental disorders and smoking prevalence but had a high level of alcohol consumption. Clusters similar to Bali but different in higher cigarette consumption came from group 1 which consists of the provinces of North Sumatera, East Nusa Tenggara, West Kalimantan, North Sulawesi, South Sulawesi, Southeast Sulawesi, and West Papua. This cluster mapping shows that each province has different criteria for factors associated with alcohol consumption.

DISCUSSION

The prevalence of consumption of alcoholic drinks based on the analysis of this study is slightly higher than the national report of Riskesdas 2018 (3.7% vs 3.3%). This difference is related to the inclusion and exclusion criteria used in this further analysis study. If we compare the data from the Riskesdas 2007 to the latest results of the 2018 Riskesdas, this number is still relatively stable with a slight increase. On the other hand, compared to the global alcohol consumption and the Asia Pacific or Southeast Asia region, Indonesia is still in a much lower position[11,16]. This result is related to limitations in reporting, legal restrictions, and cultural and religious values that are adhered to[11,17]. Limitations on reporting are strongly associated with unregistered alcohol consumption, where the production, distribution, and sale of those unofficial alcoholic beverages are not under government control[16].

According to the Global Status Report on Alcohol and Health in 2018, around a quarter of world alcohol consumption is in the form of use that is not officially recorded. In this report, Indonesia's alcohol consumption per year accounted for 0.8 liters, with 0.3 liters being official alcohol consumed and 0.5 liters representing unregistered alcohol consumed[16]. A report from the Center for Indonesian Policy Studies (CIPS) shows that the consumption of mixed drinks is a form of unrecorded alcoholic beverage, which causes a high risk of death. There were 840 deaths due to alcohol which were not recorded during the period 2008-2017[18]. This illustrates the need for special attention to the regulation of production, distribution, and consumption of alcoholic beverages that are not officially recorded.

The results of this study provide updated information on both risk factors and protective factors for alcohol consumption based on national survey data. Risk factors for alcohol drinkers with the highest to lowest odds ratio are as follows smoking, experiencing CMD, centrally obese, working as a manual worker (farmer/fisherman/labor or other occupation that is not included in the previous category), and overweight/obese. This result is in line with the previous 2007 Riskesdas data analysis where several major risk factors for alcohol consumption, including sociodemographic and behavioral factors, including smoking status, CMD, overweight and central obesity[12].

The relationship between alcohol dependence and tobacco dependence has been well documented. Estimated data in the US since the 1980s show that more than 80 percent of those who are alcohol dependent also smoke heavily, and about 40 percent of heavy smokers also experience alcoholism[19]. Room concluded that the relationship between alcohol and smoking is a risk factor for one another. Where the two substances are complementary it means that public health measures to reduce the use of problem substances are likely to also be beneficial in reducing other uses[20]. This needs to be an important concern for the Indonesian government in controlling alcohol when efforts to reduce prevalence are still a formidable challenge. The prevalence of smokers in Indonesia reaches 33.6 percent of the adult population[21]. To date, Indonesia is the only country in the Asia Pacific region that has not ratified the Framework Convention on Tobacco Control/FCTC. WHO estimates that the prevalence of smokers in Indonesia will continue to increase to 38 percent by 2025[22].

The present study shows that people with CMD are at risk for alcohol consumption, which is in line with a cross-sectional study in Ethiopia[23]. The relationship between CMD and alcohol consumption can be thought of as a reciprocal relationship, on the one hand, CMD is

a major disorder with alcohol consumption being used as a measure to overcome CMD[24]. This first assumption is supported by a longitudinal study that shows that adolescents with mental disorders in the form of internalizing and externalizing disorders will develop into adolescents who drink alcohol at various levels[25]. In addition, a longitudinal study in America showed the development of drinking in people who experienced anxiety or depression[26]. On the contrary, alcohol consumption is a behavior that is carried out first which eventually leads to CMD symptoms as a result or consequence, which is also proven from a longitudinal study in America[26]. Although our study contradicts the results in Brazil[27], during the COVID-19 pandemic it is increasingly showing that someone who is under stress will increase their lifestyle in alcohol consumption[28,29].

General and central obesity are associated as risk factors for alcohol consumption. The results of this cross-sectional study, which has a limitation in showing a causal relationship. This underscores the relationship between alcohol consumption and obesity, which variable precedes as a risk factor and outcome. However, studies and a review have shown an association that alcohol consumption causes obesity in both general and central obesity[30–32]. In general, ethanol consumption contributes to the large energy content of 7.1 kcal/gram. So, consumption of alcoholic beverages will increase energy intake which if not balanced with sufficient physical activity and causes positive energy balance[33]. Studies have shown that the frequency and intensity of alcoholic beverages are important factors to consider in alcohol consumption and the effect on the risk of obesity in the short term and the risk of non-communicable diseases in the long term. Light and moderate alcohol consumption did not show an increased risk of NCDs but heavy consumption was at risk for obesity, hypertension, and dyslipidemia[31,34].

This study shows that type of work is related to alcohol consumption. Manual workers such as farmers/fishermen/laborers and other occupations have a higher risk of alcohol consumption compared to the non-manual type of work. This is in line with a survey conducted in the US where manual workers in the mining, transportation, and construction sectors have the highest tendency to consume alcohol while health and education have the lowest[35]. The work environment is very influential on alcohol consumption. The normative context of the workplace appears to have an important effect on alcohol consumption[36].

From the analysis of this study, variables that show as protective factors of alcohol consumption include status as the head of the family, not working, being married and divorced status, as well as educational status and low socioeconomic status. These sociodemographic factors show a tendency for lower alcohol consumption, which may be explained through the sociocultural context[37]. Studies from Malaysia and India, which have regional and sociocultural backgrounds similar to Indonesia, showed similar results that lower alcohol consumption was found in respondents with a lower level of education and lower socioeconomic status[37,38]. Meanwhile, based on marital status, the result of this study is in line with the study in Malaysia that respondents who are married have a lower tendency to consume alcohol than those who are not married[37]. But it is somewhat different in divorced status, which in this study is also shown as protective factor. In addition, the status as the head of the family and currently not working also showed as a protective factor. The possibility that underlies this is the existence of more responsibility for the head of the family and those who are married or divorced in fulfilling the economic needs of the family. In addition, respondents who do not work, do not have enough purchasing power to consume alcohol.

In the analysis of this study, cluster mapping was determined based on lifestyle-related risk factors for alcohol consumption based on its large odds ratio including smoking and the CMD. This study showed that provinces in cluster 5 had a higher prevalence of CMD and consumption of alcohol and smoking than national prevalence. A significant association between CMD with smoking and alcohol consumption in this study may explain these patterns in the population. In addition, cultural norms and practices are related to alcohol consumption[39]. The provinces in cluster 5 are known for their traditional alcoholic beverages which are mostly produced from the sap fermentation of coconut palm, for example, Sopi, Saguer, Tuak, Cap Tikus, etc.[40,41]. The

communities in these regions consumed traditional alcohol for religious and customary purposes, such as childbirth rituals, wedding ceremonies, death rituals, and funeral ceremonies[42].

This study's findings indicated that 4 provinces in cluster 5 should be prioritized for public health initiatives related to alcohol, smoking, and mental health. Assessing geographical variations in alcohol consumption may help to understand different alcohol-related risk exposures and their impact on various health problems[43]. Thus, it helps policymakers formulate targeted initiatives. Regarding the Indonesian regulations, there are two regulations on the production and distribution of alcoholic beverage products, which are Presidential Regulation No.74/2013 and the Ministry of Trade (MOT) Regulation No.20/2014. Currently, The Indonesian House of Representatives is still in the process of discussing the draft of the Law on the Prohibition of Alcoholic Drinks. This process has not yet been decided on whether to ratify or cancel it. Precisely the proposed new regulation, creates a polemic that will encourage the consumption of unrecorded alcohol. A series of policy papers on alcohol regulation in Indonesia underscores the need for the government to focus more on controlling the consumption of unrecorded alcohol, especially adulterated and counterfeit alcohol[18,44]. In addition, special attention needs to be paid to the regulation of online alcohol sales, which are widely found in e-commerce in Indonesia[45].

This study has some strengths. This study uses survey data with national representation which can provide precision in the analysis. In addition, it is an analysis that provides a cluster map of alcohol consumption and associated lifestyle risk factors. The use of cross-sectional design which precludes determinations of causal relationships is identified as a limitation of this study. Despite this constraint, to our knowledge, this is the first study to represent alcohol consumption among different cultures across Indonesia and showed variations in alcohol risk factors across regions.

CONCLUSION AND RECOMMENDATION

Conclusion

The main risk factors for alcohol consumption were the type of work, smoking, common mental disorders, central obesity, and general obesity/overweight. The results of this study were expected to provide input into designing efforts to control alcohol consumption, which also contributes to managing risk factors. Based on the map, there are 5 clusters with the characteristics of a combination of risk factors that affect alcohol consumption in Indonesia. The results of this mapping can be used as a basis for providing specific interventions based on the determinants of each province.

Recommendation

More studies on this topic are needed in the future, especially regarding unrecorded alcohol consumption. Controlling alcohol consumption is related to one of the prevention measures for non-communicable diseases in the future. It is hoped that health interventions regarding alcohol consumption can be carried out in synergy with related lifestyle risk factors, which are smoking and common mental disorders.

ACKNOWLEDGEMENTS

The authors would like to thank the NIHRD, Ministry of Health, for permitting to use of the data. In addition to Nunik Kusumawardani, Ph.D. who has provided support, consultation and time during the analysis, and writing of this article.

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