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Research Article

Socioeconomic impacts on medication adherence among patients with hypertension: A multicentre cross-sectional study in Lombok, Indonesia

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Abstract

Socioeconomic impacts on adherence are understudied, particularly in disadvantaged areas. This study aimed to evaluate socioeconomic factors on medication adherence among patients with hypertension in Lombok, Indonesia. A cross-sectional survey was conducted in all six public hospital outpatient clinics in Lombok in 2017. Data was obtained using a validated questionnaire to which the Morisky Green Levine Adherence Scale (MGLS) questionnaire was used to assess medication adherence. Binary logistic regression was performed to determine independent socioeconomic associations. A total of 693 patients with hypertension were included (response rate 84%). The majority had low adherence (76.2%). Significant independent associations were reported between setting and education with adherence (rural *versus* urban setting: odds ratio 3.54, $p<0.001$; primary *versus* university level education: odds ratio 5.39, $p<0.001$). Socioeconomic associations provide some basis for the development of patient and population-based interventions to improve adherence among patients with hypertension in Indonesia, particularly in disadvantaged areas.

Keywords

socioeconomic, medication adherence, hypertension, Indonesia, developing country

Introduction

Indonesia is the largest archipelagic country and one of the most populous in the world, with more than 250 million people (MoH-RI 2014). In recent decades, the burden of cardiovascular diseases (CVD) in Indonesia have increased significantly, with stroke and coronary heart diseases being ranked the first and second leading causes of death in 2014 (21.1% and 12.9%, respectively) (MoH-RI 2014). Hypertension, defined as elevated blood pressure (BP, mm Hg) ≥140 systolic and/or ≥90 diastolic, has been identified as the leading risk factor in terms of its contribution

to the burden of CVD (MoH-RI 2014). Based on the data from Basic Health Research, the prevalence of hypertension among adults aged ≥18 years in Indonesia had risen from 25.8% or 42.1 million in 2013 to 34.1% of the population in 2018 (MoH-RI 2013; MoH-RI 2019a). This has resulted in increased cost of hypertension related services each year, with expenditures of 2.8 trillion Indonesian Rupiah (IDR) in 2017 to 3 trillion IDR in 2018 (MoH-RI 2019a). Hence, the Indonesian Government has included hypertension management as one of the national health indicators (RoI 2015).

Strategies to control hypertension include prescribing antihypertensive medications in conjunction with behavioural and lifestyle modifications (Whelton et al. 2017). It was reported, however, of those treated in high income countries with medications, approximately 50% maintained good adherence one year after initiation and achieved well controlled BP. This level was even lower in low-middle income countries (Hill et al. 2011; Burnier and Egan 2019). While many factors might contribute to the lack of adherence; lower socioeconomic conditions have been frequently considered as barriers for adherence to treatment in some previous studies (Basu and Millet 2013; Sandoval et al. 2018; de Terline et al. 2019). Socioeconomic status can be seen as a multidimensional construct referring to an individual's position relative to other people in the community; it is commonly measured by level of income, educational attainment, and occupational group (Stringhini et al. 2018).

Indonesia is a developing country and is classified as a low-to-middle income country (MoH-RI 2019b). With a wide geographical area, varied socioeconomic status across the country may impact on adherence rates in specific regions.West Nusa Tenggara is a province located in the eastern part of Indonesia, which is considered to be disadvantaged compared to its western counterparts; based on the 2018 survey, the Human Development Index (HDI) – to measure quality of life based on three dimensions (i.e. health, literacy, and standard of living) – in this province was 67.3 which was lower than the national figure of 71.9 (MoH-RI 2019b). This is further complicated with limited health resources in this province which is possibly affecting access. The ratio of primary health centres (*Puskesmas*) is 1.43 per 30,000 population; while the ratio of hospital beds per 1000 population was 0.71, which are the lowest across Indonesia (BPS NTB 2017).

It was reported that West Nusa Tenggara ranked 15 out of 33 provinces in Indonesia with the highest prevalence of hypertension being 24.3% in the year 2013, and has tended to increase each year (MoH-RI 2013). Previous small studies in Indonesia have mainly reported the levels of adherence among patients with hypertension which is variable across Indonesia, ranging from 20%–59% (Chusna et al. 2014; Liberty et al. 2017; Sinuraya et al. 2018; Rahmadani and Sari 2018); however, the impact of socioeconomic status variations on adherence are understudied. The knowledge of any such association would be of importance, particularly in the disadvantaged areas with limited health resources such as West Nusa Tenggara, in helping practitioners to prioritise patients who are less likely to adhere to their treatment. Such data would also provide a basis for the development of patient-based and population-based hypertension services to address the regional needs to improve public health. This initial study aimed to evaluate socioeconomic impacts on adherence to medications among patients with hypertension in hospital outpatient settings in Lombok Island, West Nusa Tenggara Province, Indonesia.

Methods

The data collection instrument and methodology used in this study were approved by the Ethics Committee of University of Surabaya, Indonesia (No. 007/KE/XII/2017), and the research study granted official permission from each hospital.

Study setting and participants

The study was conducted in Lombok, one of the main islands in the West Nusa Tenggara Province, Indonesia. It is 20,124 km^2 in area with a population of approximately five million in 2018 (BPS NTB 2019).The island consists of five regions: Mataram City, West Lombok, Central Lombok, East Lombok, and North Lombok. There are six public hospitals on the island: one regional hospital in each of the regions *plus* one provincial hospital located in Mataram City (BPS NTB 2017). Hospital outpatient clinics are one of the main providers of primary health care services in Indonesia, and act as gatekeepers to secondary/tertiary services (Agustina et al. 2019).

A cross-sectional questionnaire survey was conducted to include patients with hypertension in the six hospital outpatient clinics in Lombok Island. All patients aged ≥ 18 years diagnosed with hypertension and been prescribed at least one hypertensive medication were recruited; the recruitment process was conducted during September to November 2017. Pregnant women and patients with mental illnesses were excluded from this study.

Survey instrument

A questionnaire was developed to collect data on patients' characteristics and adherence to medication. The first section explored patients' characteristics, including: age, gender, socioeconomic factors, and some important clinical factors (i.e. duration of hypertension, antihypertensive medication regimens and number of comorbidities). Treatment for patients with hypertension in these settings were covered under the National Health Insurance scheme *(Jaminan Kesehatan Nasional, JKN)*. Based on the literature, the socioeconomic factors included were education, income, and occupation (Stringhini et al. 2018). The hospital setting was also included to reflect patients' area of residence or environment, which is often linked as a soci-

oeconomic marker (Schultz et al 2018). It should be noted that the National Health Insurance (*Jaminan Kesehatan Nasional*, *JKN*) requires outpatients to be referred to the health facility near their residence (Agustina et al. 2019). In this case, hospital outpatient clinics located in Mataram city (i.e. Hospitals A and B) would be considered as 'urban setting', while those located outside the city (i.e. Hospital C, D, E, and F) would be regarded as 'rural setting'.

The second section included Morisky Green Levine Adherence Scale (MGLS) to assess patient adherence to hypertensive medications over the previous month. The MGLS consists of four composite items: "Q1: Do you ever forget to take your hypertensive medication?"; "Q2: Do you ever have problems remembering to take your hypertensive medication?"; "Q3: When you feel better, do you sometimes stop taking your hypertensive medication?"; and "Q4: Sometimes if you feel worse when you take your hypertensive medication, do you stop taking it?" (Morisky et al. 1986; Elsous et al. 2017). The questionnaire was translated into Bahasa Indonesia and was checked for its consistency with the original English version by two bilingual academics. The questionnaire was validated with 20 patients with hypertension to ensure all items were understandable; Cronbach's alpha value for internal consistency for the second section (MGLS) was 0.64, which was categorised as acceptable (Morisky et al. 1986).

Different tools and measurements have been developed to assess adherence. Self-reported methods, such as questionnaires, are among the most inexpensive and simple procedures for measuring adherence (Anghel et al. 2019). Some of the questionnaires commonly used are: Medication Adherence Report Scale (MARS), Belief about Medicines Questionnaire (BMQ), Morisky Medication Adherence Scale (MMAS) as well as Morisky Green Levine Medication Adherence Scale (MGLS) (Beyhaghi et al. 2016; Anghel et al 2021). The four-item MGLS has been considered to be simple, inexpensive, and easily adapted in any settings (Beyhaghi et al. 2016). It also has been widely used and validated in the Indonesian setting (Widjaja et al. 2020).

Data collection

All patients with hypertension visiting the six hospital outpatient clinics in Lombok were approached while waiting for their medications to be dispensed; in each setting, patients were recruited over one week during the clinic opening hours. The data collection was conducted from September to November 2017. Patients were informed about the nature of the study, and were asked for participation. Written consent forms were obtained from those who agreed to participate; if the person could not read or write, they were asked to make thumb impressions to indicate agreement.Those who provided consent were asked to complete the questionnaire; this process was assisted with four data collectors who read the questions and wrote down responses from patients in the questionnaire sheets. The data collectors attended a briefing session and simulations until they could perform the data collection without errors.

Data analysis

Descriptive analysis was used to summarise data on the patients characteristics recruited from these six outpatient settings. Continuous data were presented as mean ± standard deviation, while categorical data would be presented as absolute and relative (%) frequencies. Responses to the MGLS was used to assess patient adherence to their hypertensive medications. The scale consists of four items in a 'Yes/No' format; 1 point was given for a "Yes" answer, and 0 points were given for a "No" answer. The degree of adherence was determined by counting of all "Yes" answers; a score of 0 indicated high adherence, a score of 1 or 2 illustrated intermediate adherence, and a score of 3 or 4 indicated low adherence (Morisky et al. 1986; Elsous et al. 2017). All calculations were done for patients in each setting as well as for the total.

Univariate analysis with chi-square was used to test the association of individual socioeconomic factors (i.e. education, occupation, employment, or setting) with patient adherence to medication. To explore independent socioeconomic associations with adherence, a binary logistic regression, that controlled for the other variables (i.e. age, gender, and the clinical factors), was performed. To create a binary dependent variable, intermediate and high adherence were grouped as 'adequate adherence' while low adherence was labelled as 'poor adherence'. All factors were entered into the model and then removed sequentially until those remaining had p-values <0.05. Odds ratio (OR) together with 95% confidence interval (CI) more than 1 and p-value less than 0.05 indicated a statistically significant association. IBM SPSS Statistics version 20.0 (IBM Corp, Armonk, NY, USA) was used for data analysis.

Results

Of 822 patients with hypertension approached, 693 patients with hypertension in six hospital outpatient settings in Lombok consented: hospital A (n=237/262), hospital B (n=104/127), hospital C (n=107/131), hospital D (n=90/115), hospital E (n=107/126) and hospital F (n=48/61), giving a total response rate of 84%. Hospitals A and B were located in Mataram City (urban setting), while the other four were located outside of the city (rural setting). More female patients with hypertension volunteered than males, in all settings. The majority of participants were in the age group of >50 years (74.5%),and were diagnosed with hypertension between 1 to 5 years or more than 10 years (48.5% *versus* 26.6%, respectively). More than 60% of the patients were being treated with combination antihypertensive agents, and the majority reported two or more associated comorbidities. The characteristics of participants in each setting and in total are summarised in Table 1.

Table 1 also presented patients' socioeconomic data. Approximately 50% of the partipants had a basic level of

Table 1. Participating patients' characteristics and level of adherence across six hospital outpatient clinics.

	Hospital A (urban setting) N=237 n (%)	Hospital B (urban setting) N=104 n (%)	Hospital C (rural setting) N=107 n (%)	Hospital D (rural setting) N=90 n (%)	Hospital E (rural setting) N=107 n (%)	Hospital F (rural setting) N=48 n (%)	Total N= 693 n (%)
Characteristics							
Age							
≤30 years	15 (6.3)	1 (1,0)	2 (1,9)	2 (2.2)	3(2.8)	3 (6.3)	26 (3.8)
31-40 years	7 (3.0)	7 (3.0)	5 (4.7)	1 (1.1)	1 (0.9)	1 (2.1)	22 (3.2)
41-50 years	53 (22.4)	12 (11.5)	6 (5.6)	24 (26.7)	22 (20.6)	12 (25.0)	129 (18.6)
51-60 years	74 (31.2)	39 (37.5)	28 (26.2)	25 (27.8)	28 (26.2)	11 (22.9)	205 (29.6)
>60 years	88 (37.1)	45 (43.3)	66 (61.7)	38 (42.2)	53 (49.5)	21 (43.8)	311 (44.9)
Gender							
Male	119 (50.2)	40 (38.4)	59 (55.1)	51 (56.7)	46 (43.0)	21 (43.75)	336 (48.5)
Female	118 (49.7)	64 (61.5)	48 (44.9)	39 (43.3)	61 (57.0)	27 (56.3)	357 (51.5)
Education							
<primary school	41 (17.3)	15 (14.4)	8 (7.5)	12 (13.3)	21 (19.6)	6 (12.5)	103 (14.9)
Primary school	83 (35.0)	26 (25.0)	42 (39.3)	29 (32.2)	44 (41.1)	26 (54.2)	250 (36.1)
Junior high school	33 (13.9)	11 (10.6)	9 (8.4)	7 (7.8)	10 (9.4)	5 (10.4)	75 (10.8)
Senior high school	44 (18.6)	24 (23.1)	26 (24.3)	19 (21.1)	15 (14.0)	4 (8.3)	132 (19.0)
Bachelor degree	36 (15.2)	28 (29.9)	22 (20.6)	23 (25.6)	17 (15.9)	7 (14.6)	133 (19.2)
Occupation							
Not working/retired	132 (55.7)	71 (68.3)	50 (47.7)	48 (53.3)	61 (57.0)	28 (58.3)	390 (56.3)
Farm worker	25 (10.5)	12 (11.5)	28 (26.2)	24 (26.7)	28 (26.2)	9 (18.8)	126 (18.2)
Civil servant	46 (19.4)	10 (9.6)	16 (15.0)	10 (11.1)	6 (5.6)	4 (8.3)	92 (13.3)
Private sector employee	34 (14.3.)	11 (12.9)	13 (12.1)	8 (8.9)	12 (8.9)	7 (14.6)	85 (12.3)
Income per month (in IDR)							
<1 million	147 (62.0)	53 (51.0)	54 (50.5)	38 (42.2)	59 (55.1)	28 (58.3)	379 (54.7)
1-2 million	27 (11.4)	10 (9.6)	9 (8.4)	16 (17.8)	17 (15.9)	9 (18.8)	88 (12.7)
2-3 million	15 (6.3)	9 (8.7)	11 (10.3)	8 (8.9)	5 (4.7)	3 (6.3)	51 (7.4)
>3 million	48 (20.3)	32 (30.8)	33 (30.8)	28 (31.1)	26 (24.3)	8(16.7)	175 (25.3)
Hypertensive agents							
Monotherapy	59 (24.9)	36 (34.6)	30 (28.0)	22 (24.4)	41 (38.3)	22 (45.8)	210 (30.3)
Combination therapy	178 (75.1)	68 (65.4)	77 (72.0)	68 (75.6)	66 (61.7)	26 (52.2)	483 (69.7)
Duration of hypertension[a]							
<1 year	31 (13.1)	22 (21.2)	13 (12.2)	13 (14.4)	25 (23.4)	3 (6.3)	107 (15.4)
1-5 years	110 (46.4)	46 (44.2)	53 (49.5)	48 (53.3)	55 (51.4)	24 (50.0)	336 (48.5)
5-10 years	26 (11.0)	12 (11.5)	11 (10.3)	3 (3.3)	9 (8.4)	5 (10.4)	66 (9.5)
>10 years	70 (29.5)	24 (23.1)	30 (28.0)	26 (28.9)	18 (16.8)	16 (33.3)	184 (26.6)
Number of comorbidities[b]							
0	27 (11.4)	9 (8.7)	14 (13.1)	12 (13.3)	21(19.6)	10 (20.8)	93 (13.4)
1	30 (12.7)	27 (26.0)	16 (15.0)	10 (11.1)	20 (18.7)	12 (25.0)	115 (16.6)
2	90 (38.0)	21 (20.2)	51 (47.7)	31 (34.3)	21 (19.6)	9 (18.8)	223 (32.2)
>2	90 (38.0)	47 (45.2)	26 (24.3)	37 (41.1)	45 (42.1)	17 (35.4)	262 (37.8)
Level of adherence							
High adherence	45 (19.0)	1 (1.0)	4 (3.7)	2 (2.2)	0 (0.0)	1 (2.1)	53 (7.6)
Intermediate adherence	63 (26.6)	10 (9.6)	15 (14.0)	7 (7.8)	12 (11.2)	5 (10.4)	112 (16.2)
Low adherence	129 (54.4)	93 (89.4)	88 (82.2)	81 (90.0)	95 (88.8)	42 (87.5)	528 (76.2)

[a]Defined as number of years from first diagnosed hypertension by health professional until present.
[b]Defined as CVD comorbidities other than hypertension, including diabetes mellitus, dyslipidaemia, stroke, coronary heart disease, congestive heart failure, and chronic renal diseases.

primary education, either completed or not. About half of the participants were unemployed or were seniors, and had a low income of less than 1 million IDR per month (or approximately USD $71). Of those who were employed, they mainly worked as civil servants or farm workers (13.3% versus 8.2%, respectively).

The score responses to the questions of the MGLS are presented in Table 1. In general, patients had low adherence to their hypertensive medications (76.2%). Hospital D (rural setting) had the highest number of patients wih low adherence (90%), while hospital A (urban setting) had the highest number of patients with high adherence (19.0% respectively).

Univariate analysis of individual socioeconomic factors – i.e. education, employment, income or setting – and levels of adherence showed statistically significant associations (all p-values <0.001). However, the binary logistic regression indicated only setting and education were independently associated with medication adherence. Patients in urban settings were 3.54 times more likely to have adequate adherence compared to those in rural settings (95% CI 2.30–5.45, Wald $\chi^2(1) = 33.03$, $p < 0.001$); while the odds of those with university-education level had adequate adherence was 5.39 times compared to those with primary-education level (95% CI 2.52 to 11.51, Wald $\chi^2(1) = 18.93$, $p < 0.001$). Detailed results

Table 2. Results of univariate analyses between socioeconomic factors and adherence.

Socioeconomic factors[c]	Adherence			*p*-value[a]
	high	intermediate	low	
Setting[b]				
Rural (n=352)	7 (2.0)	39 (11.1)	306 (86.9)	<0.001
Urban (n=341)	46 (13.5)	73 (21.4)	222 (65.1)	
Education				
≤Primary school (n=353)	12 (3.4)	37 (10.5)	304 (86.1)	<0.001
High school (n=207)	15 (7.2)	26 (12.6)	166 (80.2)	
Bachelor degree (n=133)	26 (19.5)	49 (36.8)	58 (43.6)	
Employment				
Not working/retired (n=390)	23 (5.9)	57 (14.6)	310 (79.5)	<0.001
Farm worker (n=126)	3 (2.4)	14 (11.1)	109 (86.5)	
Civil servant (n=92)	17 (18.5)	31 (33.7)	44 (47.8)	
Private sector employee (n=85)	10 (11.8)	10 (11.8)	65 (76.5)	
Income				
<1 million (n=379)	15 (4.0)	43 (11.3)	321 (84.7)	<0.001
1-3 million (n=139)	11 (7.9)	19 (13.7)	109 (78.4)	
>3 million (n-173)	27 (14.5)	50 (28.9)	98 (56.6)	

[a]p-value from chi-square tests.
[b]Urban setting included patients treated in hospitals A/B, while rural settings included those treated in hospitals C/D/E/F.
[c]Sample size varied due to missing data (n=691-693).

Table 3. Results of logistic regression between socioeconomic factors and adherence.

Socioeconomic factors	Adequate adherence[a]	
	OR (95% CI)	*p*-value
Setting[b]		
Rural	Reference	
Urban	3.54 (2.30–5.45)	<0.001[c]
Education		
≤Primary school	Reference	
High school	1.09 (0.63–1.88)	0.753
Bachelor degree	5.39 (2.52–11.5)	<0.001[c]
Employment		
Not working/retired (n=390)	Reference	
Farm worker (n=126)	0.75 (0.35–1.59)	0.453
Civil servant (n=92)	1.45 (0.70–3.01)	0.318
Private sector employee (n=85)	1.03 (0.51–2.07)	0.938
Income		
<1 million (n=379)	Reference	
1-3 million (n=139)	0.88 (0.45–1.73)	0.712
>3 million (n-173)	0.85 (0.42–1.88)	0.751

Abbreviations: OR, odds ratio; CI, confidence interval
[a]The binary dependent variable for adherence was created from grouping intermediate/high adherence into 'adequate adherence' and labelling low adherence into 'poor adherence'; poor adherence was used as the reference
[b]Urban setting included patients treated in hospitals A/B, while rural settings included those treated in hospitals C/D/E/F
[b]Significant association (adjusted for age, gender, and the clinical factors)

of the univariate analyses and the logistic regression can be seen in Tables 2, 3.

Discussion

This study has provided insight to the profiles of patients with hypertension in Lombok, West Nusa Tenggara, Indonesia. A majority of patients reported low adherence, and this was associated with socioeconomic status, particularly setting (rural *versus* urban) and education. This study included large convenience prospective sample that consisted of more females with hypertension; although not a random sample, this finding was comparable to the Indonesia Family Life Survey (IFLS) in 2016 where hypertension was significantly more prevalent in women than men (52.3% *versus* 43.1%) (Hussain et al. 2016). This survey also reported that regardless of gender, the prevalence of hypertension increased significantly with age (p-value for trend <0.001) (Hussain et al. 2016). This is in line with findings in this study where almost half of patients with hypertension were elderly. With regards to the patients' socioeconomic status, it was found that the majority had a low level of education, with a low level of income. This might reflect the Human Development Index (HDI) in West Nusa Tenggara which was reported to be lower than the national figure (67.3 *versus* 71.93, respectively) (MoH-RI 2019b).

The four items MGLS used to measure medication adherence among patients with hypertension in this study showed less than 25% of patients had moderate to high adherence. International studies have reported that adherence with antihypertensive medications is typically 50% and in developing countries is lower (Hill et al. 2011; Burnier and Egan 2019). Findings in Indonesia have shown different adherence levels among patients with hypertension across various areas, ranging from 20%–59% (Chusna et al. 2014; Liberty et al. 2017; Rahmadani and Sari 2018; Sinuraya et al. 2018). As the largest archipelagic country, Indonesia has a highly diverse environmental and socioeconomic status; while it has been suggested that that patients' socioeconomic status is frequently associated with medication adherence (Basu and Millet 2013; Sandoval et al. 2018; de Terteline et al. 2019).

Among sociodemographic factors, the logistic regression indicated that rural-urban setting and education were independently associated with medication adherence among patients with hypertension in Lombok. Patients in urban settings showed significantly higher adherence levels compared to those in rural areas. Many factors could influence increasing rates of non-adherence among those living in rural areas, such as increasing rates of poverty and lower income, reduced rates of insurance coverage, and increased distance to health care services among individuals living in rural communities (Anderson et al. 2015; Haveman et al. 2015).

In addition to rural-urban setting, education also had a positive association with adherence ($p < 0.001$). In parallel with this, studies in Bandung, which is located in the western part of Indonesia, have reported that more patients with higher education have better adherence levels (Sinuraya et al. 2018). Similar results have been reported in other developing countries, such as Nigeria and Ghana (Boima et al. 2015). It has been suggested that higher educational levels might relate to better health literacy (Mezuk et al. 2011; Olesen et al. 2011), thus improving adherence. Several studies have suggested that it is knowledge specific to hypertension that has a significant association with patient adherence to antihypertensive

therapy (Ghembaza et al. 2014; Algabbani 2020). Hence, strategies to improve adherence in Lombok should consider to initially target those living in rural areas with lower education levels. It must be noted patients in these samples have accessed health care and there maybe further unmet requirements.

With regards to occupation, although the univariate analysis reported significant associations with adherence, these were not independently associated in the logistic regression. Rather than the occupation itself, the educational levels might better explain differences in the adherence levels and has been reported as a significant predictor in this study. In addition to occupation, income was not significantly associated with medication adherence among patients with hypertension. The implementation of the National Health Insurance (*Jaminan Kesehatan Nasional, JKN*) starting in 2014 has enabled most Indonesians to have adequate access to more affordable and higher quality healthcare (Agustina et al. 2019). Hence, regardless of income, patients with hypertension in this study should be able to obtain medications they need; and thus non-adherence due to lack of medicine access should not be an issue.

This study has some limitations. This study specifically evaluated the profiles of patients with hypertension in Lombok which has a lower socioeconomic status; thus, some caution should be exercised in generalising these results. Although not a random sample, this study was a large convenience sample with a response rate of 84%. The characteristics of respondents in this sudy were comparable to the Lombok population with regard to the educational level; based on the data in 2018, 51.1% of the population had none or primary-level education (BPS NTB 2019). It should be noted that some self-reported data could be biased when patients could not accurately recall the information asked (recall bias). However, the questionnaire in this study was designed to include information regarding patients' behaviour in taking medication for a short period of time, i.e. in the last month, hence issues with recall bias might be minimal. Further research to explore external factors would be worthwhile to provide more comprehensive data to understand patient non-adherence in this disadvantaged area in Indonesia.

Conclusion

This initial study has shown poor medication adherence among patients with hypertension in Lombok, providing some insight into the health profile in a more disadvantaged area in Indonesia. The development of future interventions to improve adherence should consider patients' socioeconomics in this context, in particular those living in rural settings and having lower educational levels. These findings have important health and patient management issues as prescribers may not currently be aware of this low level of adherence.

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Conflict of Interests

The authors declare that there is no conflicts of interest.

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