HOSPITAL UTILIZATION IN KALIMANTAN ISLAND-INDONESIA IN 2018: DOES BORDERLINE STATUS MATTER?

UTILISASI RUMAH SAKIT DI PULAU KALIMANTAN-INDONESIA TAHUN 2018: APAKAH STATUS PERBATASAN PENTING?

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Abstract
Background: The border area in Indonesia is often neglected, apart from remote locations and islands.
Aims: The study aims to analyze the role of borderlands status on hospital utilization on Kalimantan Island, Indonesia.
Methods: The study was a cross-sectional study. The research obtained 61,598 respondents through stratification and multistage random sampling—the study employed hospital utilization as an outcome variable; meanwhile, borderlands status as an exposure variable. Moreover, the study used nine control variables: residence type, age group, gender, marital status, education level, occupation type, wealth status, health insurance ownership, and travel time to the hospital. The study employed binary logistic regression to analyze the data in the last stage.
Results: The results show that the average hospital utilization in Kalimantan Island in 2018 in this study was 4.953%. Meanwhile, those who live in the border area have 1.406 times the probability of utilizing the hospital than those in the nor-border area (95% CI 1.392-1.419). On the other hand, the study analysis also found all control variables were significantly related to hospital utilization: residence type, age group, gender, marital status, education level, occupation type, wealth status, health insurance ownership, and travel time to the hospital.
Conclusion: The study concludes that borderlands status is related to hospital utilization on Kalimantan Island. Those who live in border areas have a better possibility of hospital utilization than those in non-border areas.

Keywords: borderlands, health disparity, hospital utilization, healthcare access, public health.

Abstrak
Latar Belakang: Wilayah perbatasan di Indonesia merupakan salah satu yang seringkali terabaikan, selain area remote dan kepulauan.
Tujuan: Penelitian ini bertujuan untuk menganalisis hubungan status perbatasan dengan pemanfaatan rumah sakit di Pulau Kalimantan, Indonesia.
Metode: Penelitian ini merupakan penelitian potong lintang. Penelitian ini memperoleh 61.598 responden melalui stratifikasi dan multistage random sampling—penelitian ini menggunakan pemanfaatan rumah sakit sebagai variabel hasil; sedangkan status perbatasan sebagai variabel eksposur. Selain itu, penelitian ini menggunakan sembilan variabel kontrol: jenis tempat tinggal,

kelompok umur, jenis kelamin, status perkawinan, tingkat pendidikan, jenis pekerjaan, status kekayaan, kepemilikan asuransi kesehatan, dan waktu perjalanan ke rumah sakit. Penelitian ini menggunakan regresi logistik biner untuk menganalisis data pada tahap terakhir.
Hasil: Hasil penelitian menunjukkan rata-rata utilisasi rumah sakit di Pulau Kalimantan tahun 2018 pada penelitian ini sebesar 4,953%. Sementara itu, mereka yang tinggal di daerah perbatasan memiliki peluang 1,406 kali untuk memanfaatkan rumah sakit dibandingkan mereka yang tinggal di daerah perbatasan (95% CI 1,392-1,419). Di sisi lain, analisis penelitian juga menemukan semua variabel kontrol secara signifikan berhubungan dengan pemanfaatan rumah sakit: jenis tempat tinggal, kelompok umur, jenis kelamin, status perkawinan, tingkat pendidikan, jenis pekerjaan, status kekayaan, kepemilikan asuransi kesehatan, dan waktu perjalanan ke rumah sakit. **.**
Kesimpulan: Studi menyimpulkan bahwa status perbatasan berhubungan dengan pemanfaatan rumah sakit di Pulau Kalimantan. Mereka yang tinggal di daerah perbatasan memiliki kemungkinan pemanfaatan rumah sakit yang lebih baik daripada mereka yang tinggal di daerah non perbatasan.

Kata kunci: perbatasan, disparitas kesehatan, pemanfaatan rumah sakit, akses kesehatan, kesehatan masyarakat.

Introduction

Hospital Utilization has recently become an essential factor in a country's health system since it directly relates to society. In Indonesia, this system is built in stages regionally, resulting in a referral facility service (Republik Indonesia, 2012; Wulandari, Laksono, Nantabah, *et al.*, 2022). This service can optimally help the hospital utilize the complete health service for every citizen and is oriented to equitable access to hospital use. The comprehensive health service is a health system including a promotive, preventive, curative, and rehabilitative sector. Equitable access should be felt by all groups and individuals in a population regardless of the social, demographic, economic, or geographic diversity. These differences, in some cases, can cause a health service disparity, influencing hospital utilization (Faka, 2020).

The hospital utilization of all is affected by the convenient accessibility; an urban area with a proper supporting infrastructure to access the hospital makes it better than the countryside (Seran *et al.*, 2020). As the supreme authority in health services, the government must provide facilities and access to equal health services for every citizen. On the other hand, in some cases, complete health services can not be done equitably due to some obstacles. Indonesia has implemented national health insurance since 2014, which is held to decrease the gap between citizens in achieving equitable health services (Agustina *et al.*, 2019; Denny *et al.*, 2022).

Some service problems can be found in border areas that eventually affect hospital utilization. Specifically, the factors influencing hospital service quality are the limited infrastructure, location, and staged referral support system (Xiao *et al.*, 2021). The difference in accessibility among regions sometimes is linked to the government's priority program in development. Government prioritizes an area with easy transportation access in building health services, such as hospitals in certain regions (Song *et al.*, 2018), considering that the convenient accessibility will help to level up the performance of the health service system in that area. The regulation of increasing the health service performance level in remote areas, borders, and islands has not entirely succeeded. There are a lot of obstacles, such as limited human resources and

organizational governance among stakeholders (Winarsa, Suryoputro and Warella, 2020).

Some researchers explain that some health service gaps in rural areas (Gómez *et al.*, 2021). This condition is similar to Indonesia, where there is a disparity in hospital utilization in border areas on Kalimantan Island (Laksono and Wulandari, 2021). Kalimantan Island is one of the Indonesian islands with the most border areas, and the broad place and complex accessibility challenge increase hospitals in borderlands (Laksono and Wulandari, 2021; Mahmudiono and Laksono, 2021). Examining the disparity in hospital utilization in Kalimantan Island is becoming more attractive. This situation is because the Indonesian government wants to move the country's capital city from Jakarta on the island of Java to the province of South Kalimantan on the Kalimantan Island.

The geographic condition of this island shows that forests and villages dominated, which became the next obstacle. Some studies in Indonesia stated that citizens living in the city have better hospital utilization than those in the countryside (Wulandari and Laksono, 2019). With all obstacles and challenges, it does not reduce any obligation owed by stakeholders and policymakers to grant equitable health access, including the hospital's convenience and utilization for every citizen. Based on the background narration, the study aims to analyze the role of borderlands status on hospital utilization on Kalimantan Island in Indonesia.

Materials and Methods

Data Source

The study employed secondary data from the 2018 Indonesian Basic Health Survey. Meanwhile, the survey was a national-scale cross-sectional poll conducted by the Ministry of Health. In May-July 2018, the 2018 Indonesian Basic Health Survey gathered data through interviews with Household Instruments and Individual Instruments. The population of this study was adults (≥ 15 years) on Kalimantan Island in Indonesia. The study analyzed 61,598 respondents using the sampling methods as a weighted sample.

Outcome Variable

The study used hospital utilization as an outcome variable. The study defined hospital utilization as an adult's access to hospitals, whether outpatient or inpatient. Hospital utilization consists of unutilized and utilized. The analysis using outpatient hospitalizations was restricted to the previous month, whereas the survey determined inpatient hospitalizations to the past year. The survey requested this limit so respondents to recollect outpatient and inpatient incidents correctly (National Institute of Health Research and Development of the Ministry of Health of the Republic of Indonesia, 2018).

Exposure Variable

The study employed the borderlands status as an exposure variable. The study determined borderlands status based on direct borders to neighboring countries in Kalimantan Island (Malaysia and Brunei Darussalam). Meanwhile, there were seven border regencies out of 56 regencies/cities, namely Sambas, Bengkayang, Sanggau,

Sintang, Kapuas Hulu, Malinau, and Nunukan (Laksono and Wulandari, 2021). Moreover, the borderlands' status consists of the border and non-border areas.

Control Variables

The study used nine control variables as part of those variables. The nine variables were the type of residence, age group, gender, marital status, education level, occupation type, wealth status, health insurance ownership, and travel time to the hospital.

The study defined the residence type as an urban and rural area and used the Indonesian Central Statistics Agency's provisions for urban-rural categorization. The study divided age into three groups: ≤ 17, 18-64, and ≥ 65. Meanwhile, gender consists of males and females. Moreover, marital status consists of never being in a union, married/living with a partner, and divorced/widowed.

Education is their acknowledgment of their most recent diploma. Education consists of no education, primary, secondary, or higher education. Moreover, the study divided the occupation types into no work, civil servant/army/police, private sector, entrepreneur, farmer/fisherman/labor, and others.

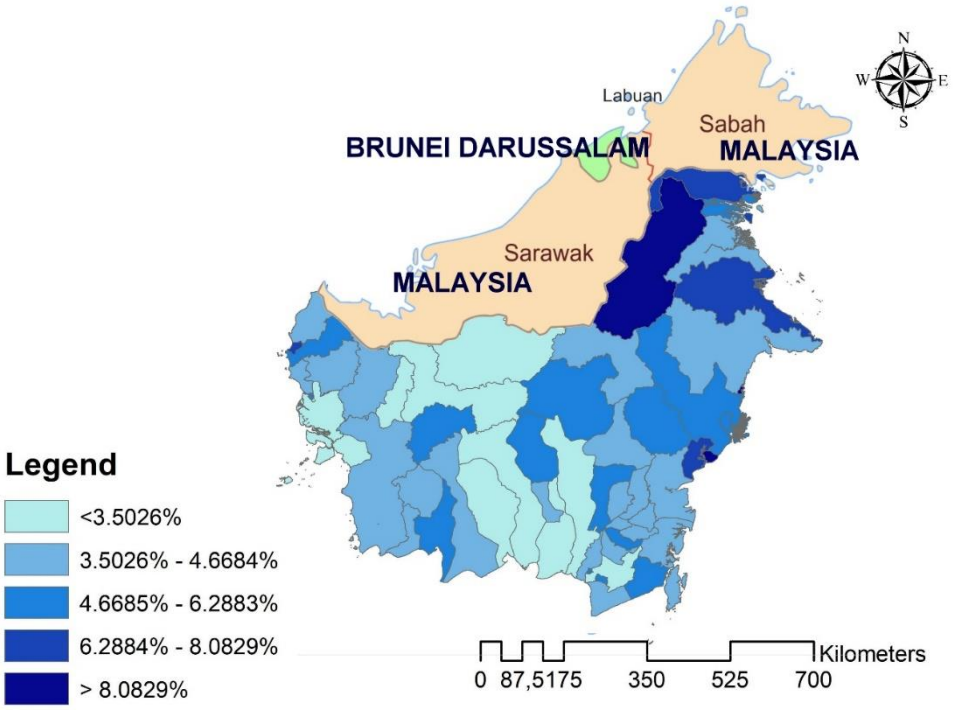
The 2018 Indonesian Basic Health Survey used the wealth index formula to determine wealth status. The poll defined the wealth index employing a weighted average of a family's total spending. On the other hand, the survey calculated the index using primary family expenditures such as health insurance, food, and lodging, among other things. Furthermore, the 2018 Indonesian Basic Health Survey defined the wealth index into five classes: the poorest, poorer, middle, richer, and the richest (Wulandari *et al.*, 2019). Furthermore, the study classified health insurance ownership into four groups: uninsured, government-run insurance, private-run insurance, and government-run and private-run insurance. Moreover, travel time to the hospital consists of ≤ 1 hour and > 1 hour.

Data Analysis

The Chi-Square test was performed in the first phase to assess a bivariate comparison. Furthermore, the investigation used a binary logistic regression. The study examined the multivariate connection between all independent variables and hospital utilization in the last test. Throughout the statistical analysis portion of the project, the study employed the IBM SPSS 26. On the other hand, the study employed ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to map hospital utilization in Indonesia's Kalimantan Island in 2018.

Results

The analysis found that the average hospital utilization in Kalimantan Island in 2018 in this study was 4.953%. Moreover, Figure 1 shows diverse variations among areas in the hospital utilization coverage in every regency directly adjacent to Malaysia. This variation of hospital utilization coverage covers the lowest to the highest percentage. There was no particular trend found spatially.



Source: researcher visualization

Figure 1. Hospital utilization by the regency/city in Kalimantan Island in Indonesia in 2018

Table 1 shows descriptive statistics of borderlands status and the respondents' characteristics. The result shows the proportion of those who utilized the hospital is higher in non-border areas than in border areas. Those who lived in the rural area ruled the border area based on residence type, and on the contrary, those living in urban areas led in non-border areas.

Table 1. Descriptive statistics of the borderlands status and the respondents' characteristics (n=61,598)

Characteristics	**Borderlands Status**		**p-value**
	Border (n=8,415)	**Non-Border (n=53,183)**	
Hospital utilization			< 0.001
Unutilized	95.7%	94.9%	
Utilized	4.3%	5.1%	
Residence type			
Urban	21.8%	50.8%	
Rural	78.2%	49.2%	
Age (mean)			< 0.001
≤ 17 years	7.8%	7.5%	
18-64 years	86.0%	87.1%	
≥ 65 years	6.2%	5.4%	
Gender			

Characteristics	Borderlands Status		p-value
	Border (n=8,415)	Non-Border (n=53,183)	
Male	50.9%	51.5%	
Female	49.1%	48.5%	
Marital status			< 0.001
Never in union	21.2%	23.7%	
Married/Living with a partner	71.7%	69.0%	
Divorced/Widowed	7.1%	7.3%	
Education level			< 0.001
No education	8.2%	4.8%	
Primary	66.4%	58.1%	
Secondary	19.5%	28.2%	
Higher	5.8%	8.9%	
Occupation			< 0.001
No work	28.2%	36.7%	
Civil servant/army/police	3.3%	4.5%	
Private sector	5.6%	12.9%	
Entrepreneur	11.9%	14.1%	
Farmer/fisherman/labor	46.5%	24.6%	
Others	4.5%	7.3%	
Wealth status			< 0.001
Poorest	13.3%	6.1%	
Poorer	21.3%	15.1%	
Middle	24.3%	22.1%	
Richer	24.3%	24.9%	
Richest	16.8%	31.8%	
Health Insurance			< 0.001
Uninsured	53.0%	35.2%	
Government-run insurance	45.4%	59.3%	
Private-run insurance	1.5%	4.2%	
Government-run and Private-run insurance	0.1%	1.3%	
Travel time			< 0.001
≤ 1 hour	46.4%	71.5%	
> 1 hour	53.6%	28.5%	

According to the age group, the 18-64 dominated all borderlands statuses. Meanwhile, the study also found males led in border and non-border areas. Moreover, married/living with a partner dominated in all borderlands statuses. Based on education level, those with primary education ruled in all borderlands status in Kalimantan Island. According to wealth status, those with poorer and middle groups ruled in the border area; on the other hand, the richest led in the non-border area. The uninsured led in the border area regarding health insurance ownership, while government-run insurance led in non-border areas. Based on travel time to the hospital, > 1-hour rule in the border area; on the contrary ≤ 1-hour guided in non-border area.

Table 2 informs the binary logistic regression result. Based on borderlands status, those who live in the border area have 1.406 times the probability than those who live in the nor-border area to utilize the hospital (95%CI 1.392-1.419). The analysis results show that those who live in border areas have a better probability of hospital utilization.

Table 2. The result of binary logistic regression of hospital utilization in Kalimantan Island - Indonesia, in 2018 (n=61,598)

Predictor	**Hospital Utilization**			
			95% CI	
	p-value	**AOR**	**Lower Bound**	**Upper Bound**
Borderlands: Border	< 0.001	1.406	1.394	1.419
Borderlands: Non-border	-	-	-	-
Residence: Urban	< 0.001	1.268	1.260	1.277
Residence: Rural	-	-	-	-
Age: ≤ 17 years	-	-	-	-
Age: 18-64 years	< 0.001	1.627	1.596	1.659
Age: ≥ 65 years	< 0.001	3.477	3.404	3.552
Gender: Male	< 0.001	0.856	0.850	0.861
Gender: Female	-	-	-	-
Marital: Never in union	-	-	-	-
Marital: Married/Living with partner	< 0.001	2.886	2.855	2.917
Marital: Divorced/Widowed	< 0.001	2.452	2.416	2.488
Education: No Education	-	-	-	-
Education: Primary	< 0.001	1.047	1.034	1.061
Education: Secondary	< 0.001	0.958	0.944	0.971
Education: Higher	< 0.001	1.070	1.053	1.088
Occupation: no work	-	-	-	-
Occupation: civil servant/army/police	< 0.001	0.659	0.651	0.668
Occupation: private sector	< 0.001	0.536	0.530	0.542
Occupation: entrepreneur	< 0.001	0.585	0.579	0.590
Occupation: farmer/fisherman/labor	< 0.001	0.606	0.601	0.612
Occupation: others	< 0.001	0.880	0.871	0.889
Wealth: Poorest	-	-	-	-
Wealth: Poorer	< 0.001	1.247	1.225	1.270
Wealth: Middle	< 0.001	1.642	1.614	1.670
Wealth: Richer	< 0.001	2.177	2.141	2.213
Wealth: Richest	< 0.001	3.034	2.985	3.085
Insurance: Uninsured	-	-	-	-
Insurance: Government-run	< 0.001	3.437	3.409	3.464
Insurance: Private-run	< 0.001	4.130	4.075	4.185
Insurance: Government-run & Private-run	< 0.001	5.585	5.481	5.691
Travel time: ≤ 1 hour	< 0.001	1.454	1.442	1.465

Predictor	Hospital Utilization			
	p-value	AOR	95% CI	
			Lower Bound	Upper Bound
Travel time: > 1 hour	-	-	-	-

Note: AOR: Adjusted Odds Ratio; CI: confidence interval.

On the other hand, the study analysis also found all control variables were significantly related to hospital utilization. Those who live in urban areas are 1.268 times more likely to use the hospital than those in rural areas (95%CI 1.260-1.277). Based on age group, the older you are, the higher the possibility of utilizing the hospital. Regarding marital status, all marital classes have more chances to use the hospital. According to education, primary and higher education have more possibility to use the hospital than no education; hence, secondary education has less chance to utilize the hospital.

Based on occupation type, all types have less likely to utilize the hospital than no work. Moreover, based on wealth status, the better a person's wealth status on Kalimantan Island, the higher the possibility of taking advantage of the hospital. Table 2 shows that, based on health insurance ownership, all kinds of health insurance have a higher possibility for the uninsured to utilize the hospital. Moreover, according to travel time, those who have a travel time of 1 hour have 1.454 times the probability compared to those who have a travel time of > 1 hour to utilize the hospital (95%CI 1.442-1.465). These results inform that shorter travel time is better for hospital utilization.

Discussion

The results inform that those who live in border areas have a better probability of hospital utilization. Country Territory Boundaries are on land like the island of Borneo; border areas are in sub-districts. Communities in the border areas of Kalimantan Island use the hospital more than non-border communities. The results differ from studies on communities in the border areas of Thailand, which state that border communities have several challenges in utilizing health facilities. These challenges can be in the form of uncompensated care instead of financial management in serving the global population and the difficulties of maintaining transnational mobility in border areas (Meemon *et al.*, 2021). Studies of cross-border public services in the Czech part suggest that health care is very remote, as the nearest hospital on its side of the border is about a 50-minute drive away, while the hospital in Austria's Gmünd is a few minutes away (Böhm and Kurowska-Pysz, 2019). In addition, previous studies reported that those who live in border areas have a lower likelihood of hospitalization utilization than those who live in non-border areas. Meanwhile, simultaneously, outpatient or inpatient utilization did not show a statistically significant difference between the two regions (Laksono and Wulandari, 2021).

The study results prove an effective hospital policy in the borderlands area. One of the policies in Indonesia related to border areas is the Border Disadvantaged Regions and Islands policy. However, there are still many obstacles to its implementation. Studies on the Riau Islands Provincial Government also report that implementing sectoral coordination and ego is still an obstacle, including the fragmentation of the

bureaucracy with scattered subjects, making policy implementation less focused and integrated (Mirza and Aisyah, 2020).

People in urban areas on Kalimantan Island who use hospital services are higher than those who live in compared to those who live in rural areas. This study supports a study in Florida that found that patients in more affluent and rural areas tend to travel longer for inpatient hospital care. Longer travel distances may be necessary for rural patients to overcome the lack of accessibility to local hospital care. Still, it may indicate better mobility and more health care options for other population groups (Jia, Wang and Xierali, 2019).

The study informs that the older you are, the higher the possibility of utilizing the hospital. Hospital utilization increases with increasing age. A systematic scoping review also supports that older age is positively correlated with increased health service utilization (Soleimanvandiazar *et al.*, 2020). Moreover, a study in New South Wales, Australia, in people who died aged 70 years revealed a high use of hospital care among the elderly during their last year of life, although this decreased with advancing age (Ní Chróinín *et al.*, 2018).

Meanwhile, all marital classes have more chances to use the hospital, and Kalimantan married people use the hospital more than single people. These results support previous research that marital status is a predictor of hospital utilization in adults in Kalimantan, Indonesia (Laksono and Wulandari, 2021). Similarly, a study on health services in China reported that a predisposing factor for marital status was a consistent and robust predictor of health services utilization at the individual level (Zhang, Chen and Zhang, 2019). In addition, middle-aged people who do not live with their partners tend to have worse health behaviors than those without partners (Megatsari *et al.*, 2021).

According to education, primary and higher education have more possibility to use the hospital than no education; hence, secondary education has less chance to utilize the hospital. A systematic scoping review also supports higher education levels associated with increased health service utilization (Soleimanvandiazar *et al.*, 2020). Studies on health care utilization in China report that education is a solid and consistent predictor of individual-level health care utilization (Zhang, Chen and Zhang, 2019).

Based on occupation type, all types have less likely to utilize the hospital than no work on Kalimantan Island. In line with the results of this study, a systematic scoping review also supports that unemployment is positively correlated with increased health service utilization (Soleimanvandiazar *et al.*, 2020). Studies on Sickle cell disease patients who are unemployed also have a significantly higher hospitalization rate than those employed (Idowu, Chung and Yu, 2018).

The study shows that the better a person's wealth status on Kalimantan Island, the higher the possibility of taking advantage of the hospital. The richer a person is, the better at using the hospital than those who are poor (Wulandari, Laksono, Prasetyo, *et al.*, 2022). The result is similar to a study in Timor-Leste that found that the poorest quintiles tend not to use hospital services compared to other quintile groups (Guinness *et al.*, 2018). The study results support a systematic scoping review that finds that higher-income has positively correlated with increased health service utilization (Soleimanvandiazar *et al.*, 2020).

The result indicates that all kinds of health insurance are more likely than the uninsured to utilize the hospital on Kalimantan Island. The result shows that the ownership of various types of health insurance can increase hospital utilization. This

study's results align with the results of a systematic scoping review, which also found that insurance ownership has correlated with an increase in health service utilization (Soleimanvandiazar *et al.*, 2020). Higher rates of utilizing health services were also higher among South Africa's Gauteng province residents with health insurance (Abaerei, Ncayiyana and Levin, 2017).

The results inform that shorter travel time is better for hospital utilization. The results of this study support that access to hospitals that require shorter travel times can increase hospital utilization. This result is similar to a previous study which also found predictors that affect hospital utilization in adults on the island of Borneo, Indonesia, are travel time and transportation costs (Laksono and Wulandari, 2021). A systematic review identified 77% of the included studies demonstrating that patients living farther from the health facility needed to attend poorer health outcomes than those living closer (Kelly *et al.*, 2016).

Strength and limitation

The authors carried out the study by utilizing big data so that the analysis results could represent Kalimantan Island. On the other hand, the authors analyzed secondary data, limiting the analysis to the accepted variables. Several previous studies that found other variables related to hospital utilization could not investigate, including travel costs, types of disease, and health status (Wei *et al.*, 2018; Laksono and Wulandari, 2020; Antol *et al.*, 2022).

Conclusion

Based on the results, the study concludes that borderlands status is related to hospital utilization on Kalimantan Island. Those who live in border areas have a better possibility of hospital utilization than those in non-border areas.

Ethical Approval

The National Ethics Committee approved the 2018 Indonesian Basic Health Survey (LB.02.01/2/KE.024/2018). Furthermore, the survey removed all respondents' personal information from the database. Respondents have given their written consent to participate in the study. Through the website http://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/, the author has secured permission to utilize data for this study.

Competing interests

The authors declare that they have no competing interests

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