DOI: 10.1111/1475-6773.13872

RESEARCH ARTICLE

HSR Health Services Research

Differences in trends of perceived inpatient care quality based on regional socioeconomic level in the United States and Taiwan

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Funding information
Ministry of Science and Technology, Taiwan. MOST, Grant/Award Number: 109-2410-H-002-050-SS3

Abstract

Objective: To examine perceived inpatient care quality according to regional socioeconomic status (SES), measured by regional household income, across the United States and Taiwan.

Data sources: Patient Experience in Hospital Care (PEHC) survey 2018–2019 data from National Taiwan University; US Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) 2018–2019 data from CMS.gov; and household income and facility data from publicly accessible databases.

Study design: This retrospective study used multivariate logistic regression to estimate the effect of household income on the rate of positive inpatient experiences in Taiwan and the United States, adjusting for hospitals' teaching status and ownership, and physician density.

Data collection: Hospital administrators for HCAHPS and PEHC's research teams invited patients who received inpatient care during the data collection period in the United States and Taiwan, respectively. The analysis included 1024 facilities from nine US states and 350 facilities from twenty major cities/counties in Taiwan.

Principal findings: Perceived inpatient care quality was higher in the United States than in Taiwan for the three experience measures. In Taiwan, hospitals with higher regional SES were less likely to receive a highly positive response for perceived respect, accommodation quality, and understanding upon discharge, with odds ratios (ORs) ranging from 0.83 to 0.88. In contrast, in the United States, higher regional SES was associated with a higher likelihood of a positive response for accommodation quality and understanding upon discharge (ORs = 2.51 and 1.48). Regional physician density and individual hospital characteristics show varying effects on perceived quality between Taiwan and the United States.

Conclusions: Higher overall experience scores in the United States are consistent with higher spending on health care compared with Taiwan. Varying associations between regional SES and perceived inpatient care quality highlight how systemic and cultural differences between the two countries affect scoring patterns.

KEYWORDS
inpatient care, international comparison, patient satisfaction, quality of care, socioeconomic status

What is known on this topic

- Inpatient care is costly compared with outpatient and post-acute care.
- More spending on health care is known to result in higher overall perceived care quality worldwide.
- Internationally, US health care spending is far greater than that of Taiwan, but the United States reports lower overall satisfaction at the system level.

What this study adds

- Using identical questions for the discharged patient survey, this study examined the effect of regional household income on the likelihood that hospital experiences would be rated positively in the United States and Taiwan.
- Higher regional household income was associated with positive effects on patient experiences for the United States, but negative effects for Taiwanese hospitals, when controlling for facility type and regional characteristics.
- Explanation of how income-related patient experiences differ in the United States and Taiwan may facilitate an understanding of the systemic and cultural expectations of health care across countries.

1 | INTRODUCTION

Inpatient care is costly compared with outpatient care.[1] In 2016, each inpatient stay in the United States cost an average of USD 11,700 with a utilization rate of approximately 104 hospitalizations per 100,000 population per year. The cost of hospital admission for comparable care varies among geographical settings.[2–4] The literature indicates that more spending on individual health care results in higher overall perceived care quality.[5,6] The Centers for Medicare and Medicaid Services (CMS) have used the Hospital Consumer Assessment of Healthcare Providers and Systems Survey (HCAHPS) to measure inpatient hospital quality since 2006 in the United States, and this is also used in other countries.[7] Taiwan, in collaboration with National Taiwan University, recently piloted a similar questionnaire called Patient Experience of Hospital Care (PEHC) in hospitals with inpatient capacity.

1.1 | Spending differences across two systems

While US health spending has been rising for many years—currently, at almost 18% of the GDP—Taiwan has kept its total health expenditure low, at approximately 6% of its GDP.[8,9] Although significant reforms have occurred in the past few decades in the United States, health-related bankruptcies, access barriers, and unaccounted-for, wasteful administrative spending, still exist in new iterations of health care reform.[10] Although Obamacare's mandated coverage program slowed the percentage of the GDP spent on health care for the past decade,[11] uninsured populations have increased over the last 3 years.[12]

Despite 99.9% coverage of care in Taiwan, the GDP share of health care spending has remained stable since the National Health Insurance (NHI) program was adopted in 1995,[13] which is comparable to that of Western nations such as Australia and Denmark. Residents' satisfaction with this system is at over 89% as of November 2019.[14] Without the gatekeeper system, patients are free to consult a provider of their choice. The vast gap in spending rates in proportion to GDP and comparable satisfaction with health systems begs the question of the utility of the high health spending in the United States.[9] This study addresses an aspect of this question by comparing the level of positive inpatient experiences in the two health systems.

1.2 | Socioeconomic status and inpatient care

With evidence suggesting the association between lower patient satisfaction and lower socioeconomic status (SES), we focus on the disparity in perceived care quality, based on metrics including a region's average household income.[15–17] Individuals from a lower-income background tend to report lower perceived trust toward providers and lower perceived respect from providers.[18] In a recent study with a representative US sample, lower-income respondents scored lower in all aspects of a patient satisfaction survey than higher-income patients.[19]

Regional SES may also hint at the health care resources available in the local area, with the potential to indirectly impact inpatient experience. A study including 31 countries associated patient satisfaction with regional environmental factors such as clinicians per 100,000 population and public spending on health care.[20] Following this precedence, we examine regional average annual household income as an indicator of environmental SES and its association with different dimensions of inpatient experience.

1.3 | Objectives

Regional SES and its relationship to inpatient experience ratings across different health systems in multiple nations have not yet been

explored. This study examines differences in perceived inpatient care quality according to regional average household income in the United States and Taiwan. We hypothesize that hospitals in regions with higher household income may produce higher inpatient experience ratings.[6]

2 | METHODS

2.1 | Study design

This was a retrospective secondary analysis of two cross-sectional patient experience surveys, HCAHPS and PEHC, from the United States and Taiwan, respectively. We approached the research question by considering the average annual household income in each region as an indicator of regional SES (in US states and Taiwanese cities/counties).

2.2 | Conceptual framework

There is a longstanding understanding in the field of health services research of disparities in health care quality based on SES. Sutton and Lock (2000)[21] proposed a conceptual framework that stratifies populations that utilize health care in two ways: (1) health care administrative areas and (2) population-level variables known to differentiate health care needs within a large region. This study stratifies the population based on the latter concept, using regional household income to differentiate the sample population. Using this framework requires two assumptions about the health systems: they strive for (1) geographically equitable distribution of resources and (2) equitable allocation of resources across populations with different levels of health care need.

Under these assumptions, this study examined differences in perceived inpatient care quality between different regions in the United States and Taiwan. The results enhance the understanding of whether equitable inpatient experience is achieved in two health systems with significantly different resources allocated to health care. Second, viewing within-region differences in perceived inpatient care quality may provide further indication points for trends of perceived care in the context of different facility-level and regional settings.

2.3 | Data sources

The HCAHPS was developed by the CMS and Agency for Healthcare Research and Quality and serves as a standardized measure of patient hospital experience. The facility-level HCAHPS dataset was publicly available and was obtained from a CMS data repository.[22] For the teaching status and ownership information for US hospitals, we referred to the American Heart Association's Data Hub.[23]

The PEHC individual-level dataset was obtained from the Graduate Institute of Health Policy and Management at the National Taiwan University. We chose items with identical meaning in both HCAHPS and PEHC. Other items on the PEHC survey share items with Britain's inpatient quality survey. They also include unique, detailed questions about patients' demographic status and entry points. The selected survey questions from HCAHPS and PEHC (Table 1) were validated as equal by the second author who speaks Mandarin and English and is the principal investigator of the survey development and implementation project, supported by the NHI Administration, Ministry of Health and Welfare.

2.4 | Setting

Nine states in the United States were included in the HCAHPS dataset (Alabama, Arizona, Arkansas, California, Illinois, Massachusetts, New York, Washington, and Wyoming). The major metropolitan areas of Taiwan (Taipei, New Taipei, Taoyuan, Taichung, Tainan, and Kaohsiung), cities (Keelung and Hsinchu), and counties (Hsinchu, Miaoli, Changhua, Nantou, Yunlin, Chiayi, Pingtung, Yilan, Hualien, Taitung, and Penghu) were included in the PEHC dataset.[24] In this study, HCAHPS data were collected between October 2018 and September 2019, and the PEHC survey was conducted between October 2018 and July 2019.

2.5 | Participants

The PEHC and HCAHPS questionnaires were sent to all facilities with inpatient care capacity. Responsive facilities distributed the survey to patients who had used their inpatient facilities during the data collection period. For HCAHPS, respondents included individuals older than 18 years at the time of hospital admission. Data were collected via physical written mail or guided phone surveys by hospital administration staff or by hospital-approved survey vendors.[25] The survey was administered to a random sample of adult patients across payment types and medical conditions between 48 h and 6 weeks after discharge.

PEHC data were collected using multiple survey methods: (1) direct in-person recruitment at hospital discharge counters, (2) surveys sent by mail without incentives for completion, (3) surveys sent by mail with monetary incentives, (4) computer-assisted telephone interviews, and (5) online questionnaires. A separate manuscript will further discuss the different response rates produced by these methods. In total, 11,202 questionnaires were completed. Among qualified respondents, the response rate ranged from less than 10% by mail to 64% for telephone interviews.

2.6 | Measurement of variables

2.6.1 | Independent variable

The independent variable is the average annual household income in each region (state-level for the United States and city/county-level

TABLE 1 Outcome variables and their original questions on HCAHPS/PEHC

Variable	PEHC questions (translated from Mandarin)	Possible responses for PEHC (translated from Mandarin)	HCAHPS questions	Possible responses for HCAHPS
Perceived respect	Does your doctor treat you politely and respectfully?	1. Always 2. Often 3. Sometimes 4. Never	During this hospital stay, how often did doctors treat you with courtesy and respect?	1. Never 2. Sometimes 3. Usually 4. Always
	Does your nurse treat you politely and respectfully?	1. Always 2. Often 3. Sometimes 4. Never	During this hospital stay, how often did nurses treat you with courtesy and respect?	1. Never 2. Sometimes 3. Usually 4. Always
Understanding of responsibilities at discharge	When you were discharged from the hospital, did you know what you should pay attention to in managing your health in the future?	1. Understood well 2. Understood 3. Understood some 4. Did not understand	When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.	1. Strongly disagree 2. Disagree 3. Agree 4. Strongly agree
Accommodation quality	During this hospital stay, were your ward and bathroom equipment always kept clean?	1. Very clean 2. Clean 3. Normal 4. Not clean	During this hospital stay, how often were your room and bathroom kept clean?	1. Never 2. Sometimes 3. Usually 4. Always
	During this hospital stay, was there any noise in your ward at night that prevented you from sleeping well?	1. Always 2. Often 3. Sometimes 4. Never	During this hospital stay, how often was the area around your room quiet at night?	1. Never 2. Sometimes 3. Usually 4. Always

for Taiwan), according to 2018 data from the Kaiser Family Foundation public database for the United States and the Ministry of Health and Welfare for Taiwan. This number was adjusted to 10,000 USD for analysis purposes.

2.6.2 | Dependent variables

The dependent variables in the analysis include: (1) perceived respect, (2) understanding of responsibilities at discharge, and (3) accommodation quality. "Perceived respect" is a combined average score of two questions—perceived respect from doctors and perceived respect from nurses. "Accommodation quality" is a combined average score of noise level and cleanliness (Table 1). To facilitate the comparison between the United States and Taiwan, we calculated the percentage of positive responses for the three dependent variables such as *always* and *often* or *strongly agree* and *agree*. Because of the nonlinear distribution of proportions, the variables were dichotomized as *high* and *low* levels of positive responses, according to the weighted median of each dataset. The cutoff for each variable was the weighted median of the country's dataset for each of the three criteria.

Potential reporting bias between the two measurement tools should be noted. The respondent items in PEHC are ranked 1–4, with the most positive response being the first choice. The HCAHPS lists the most negative responses as the first choice (Table 1). This may have led to a response bias toward higher reported scores in the PEHC survey.

2.6.3 | Covariates

We obtained physicians per 100,000 rates for each region in the AAMC 2019 Physician Report and Taiwan's Ministry of Health's workforce statistics for 2020.[26,27] We also adjusted for ownership (private vs. public) and teaching status (teaching vs. non-teaching) of the hospital. Ownership was considered *public* if the facility belonged to a federal or local government body. All others, including those with nonprofit status, were considered *private*.

2.7 | Statistical analysis

In PEHC's original individual-level dataset, 287 records had unidentifiable/missing hospital names, mismatching or missing location data, and hospital IDs. These records were deleted from the analysis and represented less than 3% of the total original completed questionnaires. In the PEHC and HCAHPS datasets, 178 and 103 hospitals, respectively, were excluded because they had fewer than three individual survey responses. More Taiwanese hospitals were excluded because of the low number of individual respondents. While hospitals in the United States are expected (by CMS) to collect a larger number of survey respondents, there is no such expectation for the PEHC survey in Taiwan.

To obtain regression estimates, odds ratios, 95% confidence intervals, and their significance level, logistic regression models were employed and weighted on the number of surveys received per facility. Statistical significance was set at an alpha level of 0.05. Statistical analyses were done using *SAS* 9.4 (SAS Institute Inc., Cary, NC).

2.8 | Ethical review

The PEHC survey process was reviewed and approved by the Research Ethics Committee of the National Taiwan University Hospital. HCAHPS is adopted and used by the Center for Medicaid and Medicare Services and is publicly available as a quality measure resource.

3 | RESULTS

3.1 | Descriptive data

In total, 1042 facilities across nine states in the United States and 350 facilities across Taiwan were included in the final analyses (Table 2). The most and least represented states were California (30.52%) and Wyoming (2.40%). For Taiwan's PEHC, most facilities were from Kaohsiung (16.29%), Taichung (14.27%), and New Taipei City (12.29%). Household income was the lowest in Arkansas ($48,952) and highest in Massachusetts ($85,843) for the US dataset, while Chiayi ($30,324) was the lowest and Taipei ($61,427) was the highest for Taiwan's dataset. Among US facilities, 58.83% were teaching facilities and 22.26% were publicly owned. Among Taiwanese facilities, 50.86% were teaching facilities and 24.57% were publicly owned. Among the US regions, Massachusetts had the highest physician density per 100,000 population (449.5), and Arkansas had the lowest (207.6). Among the Taiwanese regions, Taipei had the highest physician density per 100,000 population (404.9), and Miaoli had the lowest (104.9).

Overall, perceived respect from clinicians scored higher than the other measures (Table 3). For all three indicators, the US facilities received higher rates of positive responses than those in Taiwan. The difference in the proportion of positive responses between the two countries ranged from 1.83% in perceived respect to 6.25% in

TABLE 2 Distribution and characteristics of hospitals by regions in the United States and Taiwan

Region	Facilities (N, %)	Average annual household income (USD)	Physician density (per 100,000 population)
United States	**1042, 100.0**		
Alabama	83, 8.0	$51,734	217.1
Arizona	71, 6.8	$62,055	242.0
Arkansas	70, 6.7	$48,952	207.6
California	318, 30.5	$80,440	279.6
Illinois	175, 16.8	$69,187	284.4
Massachusetts	58, 5.6	$85,843	449.5
New York	161, 15.5	$72,108	375.1
Washington	81, 7.8	$78,587	278.8
Wyoming	25, 2.4	$65,003	207.9
Taiwan[a]	**350, 100.0**		
Tainan	22, 6.3	$38,473	205.4
New Taipei	43, 12.3	$47,053	148.3
Yilan	9, 2.6	$38,983	153.7
Kaohsiung	57, 16.3	$43,660	241.7
Taoyuan	20, 5.7	$49,633	189.0
Pingtung	18, 5.1	$34,387	144.7
Taipei	28, 8.0	$61,427	404.9
Keelung	12, 3.4	$40,659	206.0
Penghu	3, 0.9	$36,989	128.3
Miaoli	12, 3.4	$38,254	104.9
Taichung	50, 14.3	$46,292	231.1
Chiayi	11, 3.1	$30,324	138.3
Changhua	23, 6.6	$36,606	167.0
Nantou	9, 2.6	$33,543	130.5
Hualien	5, 1.4	$34,117	267.9
Taidong	4, 1.1	$31,172	138.4
Hsinchu	12, 3.4	$54,886	167.0
Yunlin	12, 3.4	$33,294	153.7

[a]Density of Western physicians (excluding Chinese medicine physicians) as collected by the Taiwan Ministry of Health and Welfare.

understanding upon discharge. Taiwan's larger standard deviation is explained by lower individual survey respondents per facility because PEHC is a pilot study, while HCAHPS is mandated by CMS and has a sample size requirement (300 per facility). This discrepancy is mitigated in the regression analysis by weighting the number of surveys received for each facility.

3.2 | Main results

Table 4 presents the results of the logistic regression model. First, we examined the differences between the United States and Taiwan for the three outcome variables. Second, we examined regional variations.

3.2.1 | Perceived respect from clinicians

This outcome variable represents the high vs. low level of positive responses (ref = low) received by the facility for questions asking about the perceived respect received from doctors and nurses.

In the United States, for every 10,000 USD increase in regional household income, the odds of high positive responses to questions related to perceived respect did not change (OR = 1.00, 95% CI = 1.00, 1.01). Being a teaching facility (OR = 0.96, 95% CI = 0.95, 0.97) and publicly owned hospital (OR = 0.83, 95% CI = 0.82, 0.84) were associated with a 4% and 17% decrease in the odds of positive responses for perceived respect. Facilities in regions with higher physician density were associated with an 18% decrease in the odds of positive responses (OR = 0.82, 95% CI = 0.80, 0.83).

In Taiwan, for every 10,000 USD increase in regional household income, the odds of receiving a high level of positive responses were 12% lower for questions related to perceived respect (OR = 0.88, 95% CI = 0.83, 0.92). Being a teaching facility (OR = 2.02, 95% CI = 1.85, 2.21) and publicly owned (OR = 1.90, 95% CI = 1.73, 2.08) were 2.02 times and 1.90 times more likely to have a high level of positive response for perceived respect. Facilities in regions with high physician density were 19% less likely to receive a high level of positive responses.

3.2.2 | Perceived accommodation quality

This outcome variable represents the level of positive responses to survey questions about perceived accommodation quality—specifically cleanliness and noise—during respondents' inpatient stays.

TABLE 3 Descriptive comparison of the rate of positive responses in the United States and Taiwan weighted by the number of surveys

	Perceived respect		Accommodation quality		Understanding upon discharge	
	Mean (SD)	(min, max)	Mean (SD)	(min, max)	Mean (SD)	(min, max)
United States	96.6 (46.7)	80.5, 100.0	88.7 (100.7)	68.5, 100	95.0 (49.2)	82.0, 100.0
Taiwan	95.2 (25.5)	59.4, 100.0	82.5 (48.1)	41.7, 100	89.8 (39.9)	33.3, 100.0

TABLE 4 Adjusted odds ratios of the effects of household income and facility characteristics on perceived inpatient care

	United States			Taiwan		
	OR	95% CI		OR	95% CI	
Perceived respect						
Household income	1.00	1.00	1.01	0.88***	0.83	0.92
Teaching status (ref = non-teaching facility)	0.96***	0.95	0.97	2.02***	1.85	2.21
Ownership (ref = private)	0.83***	0.82	0.84	1.90***	1.73	2.08
Physician density (ref = low)	0.82***	0.80	0.83	0.81***	0.72	0.90
Perceived accommodation quality						
Household income	2.51***	2.48	2.53	0.83***	0.79	0.88
Teaching status (ref = non-teaching facility)	1.46***	1.45	1.48	1.94***	1.77	2.11
Ownership (ref = private)	0.86***	0.85	0.87	1.57***	1.43	1.73
Physician density (ref = low)	0.36***	0.35	0.36	0.96	0.87	1.07
Understanding upon discharge						
Household income	1.48***	1.47	1.49	0.88***	0.84	0.93
Teaching status (ref = non-teaching facility)	1.17***	1.15	1.18	2.19***	2.01	2.40
Ownership (ref = private)	0.89***	0.88	0.90	2.24***	2.04	2.47
Physician density (ref = low)	0.45***	0.44	0.46	1.97***	1.76	2.20

Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

In the United States, for every 10,000 USD increase in regional household income, the odds of receiving a high level of positive responses for perceived accommodation quality were 2.51 times greater (OR = 2.51, 95% CI = 2.48, 2.53). Teaching facilities had 46% increased odds of receiving a high level of positive responses (OR = 1.46, 95% CI = 1.45, 1.48). Those in regions with high

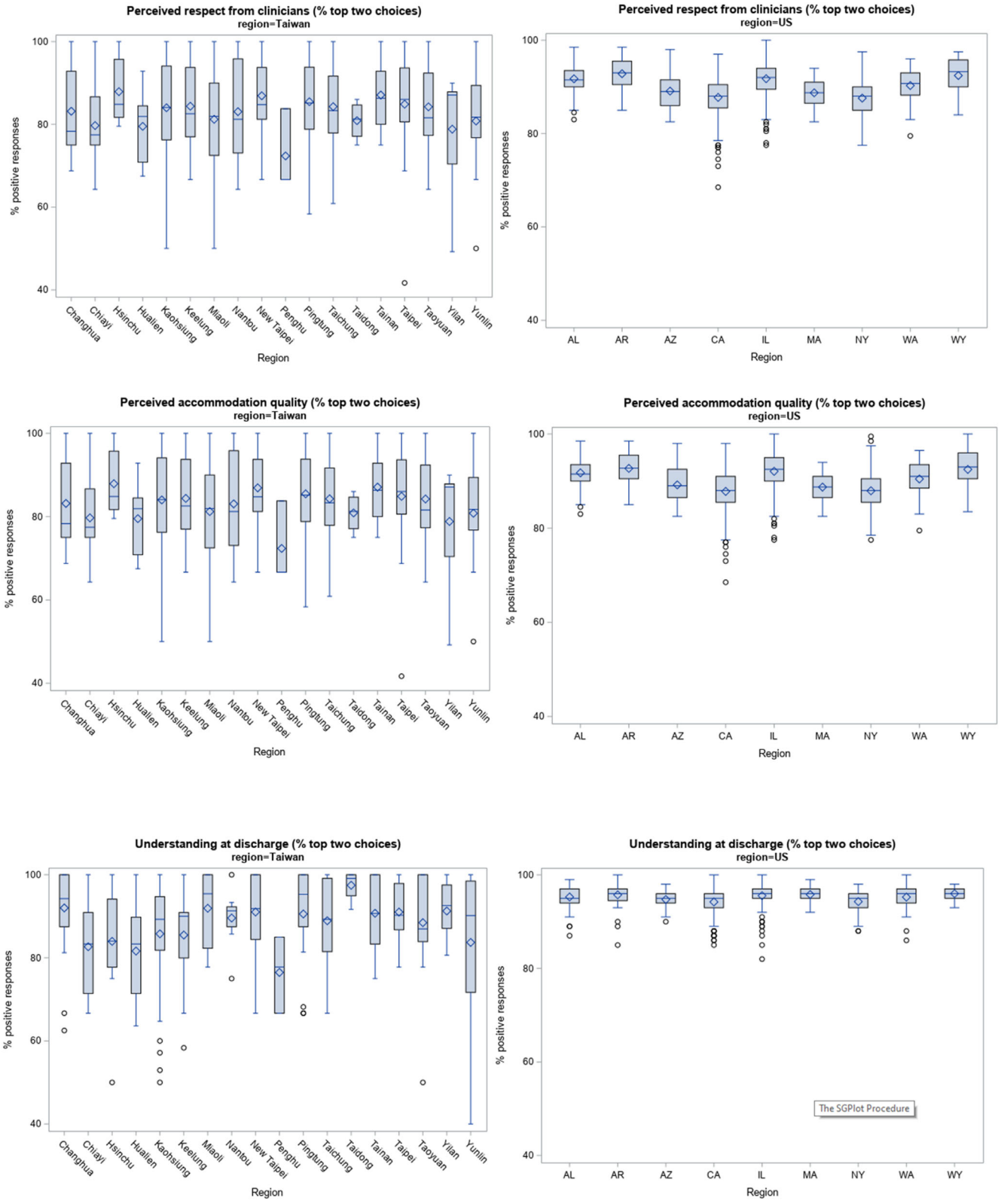

FIGURE 1 Distribution of the percentage of positive responses for the three patient experience indicators by regions in the United States and Taiwan [Color figure can be viewed at wileyonlinelibrary.com]

physician density had 64% lower odds of receiving high positive responses (OR = 0.36, 95% CI = 0.35, 0.96).

For every 10,000 USD increase in regional household income in Taiwan, the odds were 17% lower of having a high level of positive responses for perceived accommodation quality (OR = 0.83, 95% CI = 0.79, 0.88). Teaching facilities and publicly owned facilities were associated with 94% and 57% increased odds, respectively (OR = 1.94, 95% CI = 1.77, 2.11; OR = 1.57, 95% CI = 1.43, 1.73). Physician density was not significantly associated.

3.2.3 | Understanding upon discharge

This outcome variable represents the level of positive responses to the survey questions about the perceived level of understanding upon discharge. This may include understanding of responsibilities once patients return home, how to access and administer medications, and disease status at the time of discharge.

For every 10,000 USD increase in regional household income in the United States, the odds of facilities receiving higher positive responses for perceived understanding upon discharge were 48% greater (OR = 1.48, 95% CI = 1.02, 1.03). The odds of teaching facilities receiving a high level of positive responses increased by 17% (OR = 1.17, 95% CI = 1.16, 1.18). Facilities in regions with high physician density and publicly owned facilities had 55% and 11% lower odds (OR = 0.45, 95% CI = 0.44, 0.46; OR = 0.89, 95% CI = 0.88, 0.90), respectively.

For every 10,000 USD increase in regional household income in Taiwan, the odds of a high positive response for perceived understanding upon discharge were 12% lower (OR = 0.88, 95% CI = 0.84, 0.93). Teaching and publicly owned facilities were 2.19 times and 2.24 times more likely to produce a high level of positive responses, respectively (OR = 2.19, 95% CI = 2.01, 2.40; OR = 2.24, 95% CI = 2.04, 2.47).

3.2.4 | Within-region variations

Our results showed a low level of regional variation, as shown in Figure 1. Lower rates of positive scores are seen in the lower SES regions in Taiwan, such as Yunlin, Penghu, and Miaoli. The range of positive response rates also varies much more than in the United States. Detailed within-variation results for each country are provided in Data S1.

To address the influence of population diversity in the United States, we examined the proportion of non-White and Asian populations in the nine states in Data S2. California and New York, two states with the largest Asian population, had the lowest positive response of inpatient care quality among all three experience dimensions. Adjusted regression results show that, for patients' understanding upon discharge, the odds of a high positive response rate are consistently lower for states with more non-White and Asian populations. Perceived accommodation quality is also consistently lower for states with a bigger Asian population.

4 | DISCUSSION

4.1 | Key results

This study compared inpatient experiences in the United States and Taiwan and examined the effect of regional household income on the likelihood of hospitals receiving a high proportion of positive responses for inpatient experience relative to their peers. In general, facilities received more positive experiences for inpatient stays in the United States than in Taiwan. Hospitals in regions with higher household income were less likely to receive a higher rate of positive responses in Taiwan, but this did not have any effect on the same criteria in the United States. For perceived accommodation and level of understanding at discharge, higher regional household income was associated with a higher proportion of positive responses in US facilities, but both were lower for Taiwanese facilities.

In this study, we selected three dimensions of patients' experience regarding the services they received during a hospital stay, which were measured in the HCAHPS and PEHC. We noticed that the rates of positive responses to the three dimensions were all higher in the United States than in Taiwan. This finding supports previous evidence, which states that patients' satisfaction rates are associated with overall spending in the health care system.[6] We also noticed that the variation in the rates tended to be larger in Taiwan than in the United States due to the sample size of the respondents in each hospital (Figure 1).

4.2 | Comparing responses from the United States and Taiwan

We might ask if it is valid to compare positive response rates in two countries with significantly different health systems? The key difference between the United States and Taiwan is Taiwan's universal coverage through the NHI scheme. The NHI program has been active since 1995 and ensures health care access for all eligible residents in Taiwan[13] who can select a contracted provider of their choice without a gatekeeping mechanism. The premium rate under NHI is considerably lower (~5.17% of the salary) than that of the United States. Furthermore, cost-sharing for health care utilization is also relatively low (~10%) under the NHI, while in the United States, households spend approximately 16%–34% of their household income on out-of-pocket health care costs. The higher-end of the US cost-sharing range represents the burden on low-income households.

In addition, there is a critical difference between the countries in the availability of hospital beds. As of 2017, the United States had 28.7 beds per 10,000 inhabitants[26] and Taiwan had 69.83 beds.[27] Combined with the lack of a gatekeeper system and universal health care, in addition to a higher density of hospital beds in a small region, Taiwanese patients may have relatively easier access to inpatient services compared with patients in the United States.

The differences in health delivery systems between the United States and Taiwan may exacerbate differences in expectations

regarding inpatient care quality. There is a general impression that the overall patient satisfaction rate might be higher in Taiwan than in the United States, owing to greater accessibility and the lower cost of care.[10,13,28] However, findings from the almost-identical survey questions answered by discharged patients in the United States and Taiwan—and potential response tendency (items presented from most positive to most negative) that favored Taiwanese responses—we conclude that US respondents reported higher satisfaction overall.

4.3 | Regional household income and positive inpatient experience

The main objective of this study was to examine the association between regional SES and perceived inpatient care quality in the United States and Taiwan. The results suggest that regional SES, as measured by average annual household income, is significantly associated with the likelihood of facilities receiving a high rate of positive responses. First, facilities in higher-SES regions were neutral or less likely to receive a high rate of positive responses for perceived respect in both the United States and Taiwan (OR = 1.00 and 0.88, respectively). One explanation is that patients living in high-SES regions have higher expectations for respect from clinicians during their hospital stay.[29] There is limited evidence on how cost-sharing may impact patient experience levels. Cost-sharing is usually higher in the United States than in Taiwan,[30] which may have different effects on the perceived care rating compared with Taiwan.

Second, hospitals in high-SES regions were more likely to have better accommodation quality ratings in the United States (OR = 2.51) than those in Taiwan (OR = 0.83). We attribute this difference to access to various types of hospital rooms in the two countries. Inpatient beds are already a scarcer item in the United States compared with Taiwan. However, the US inpatient care system allows for extra payment for a patient to stay in a better room based on the patients' ability to pay and the available coverage of private insurance. This comes as no surprise, due to changing standards and increased demand for private rooms while receiving inpatient care in the United States.[31,32] Therein lies a potential explanation—facilities in more affluent regions can afford to build more private rooms, leading to a higher share of positive responses for perceived accommodation.

Taiwan showed negative associations between high regional household income and perceived accommodation quality. For PEHC only, we were able to examine individual-level data on the type of inpatient room respondents stayed in during their hospitalization. The descriptive data show that 68% of patients in single rooms responded positively, whereas 85% of patients in triple or larger rooms responded negatively, which is expected given the prior literature on HCAHPS.[28] The discrepancy between raw percentages and the regression results allude to a lack of correlation between regional household income and individual patients' room assignment in Taiwan.

Third, this study found a positive effect in the United States and a negative effect in Taiwan for regional SES and a high level of understanding upon discharge. The ability of individuals to understand the responsibility and contents provided by clinicians upon discharge is largely influenced by the patient's health literacy. Higher literacy is required for a layperson to comprehensively understand inpatient or specialty care.[29] The oppositive effect between the two countries highlights the differential impacts of higher regional income on the patient's perception of their understanding. Like perceived accommodation quality, the United States may have more positive associations between regional affluence and patients' understanding level, where Taiwanese facilities do not experience a heavy impact from relative regional affluence on patients' understanding levels.

4.4 | Hospital characteristics and positive inpatient experience

The relationship between facility-level characteristics and patient experience must be considered, given that the unit of analysis in this study is at the facility level. Taiwan's NHI scheme is linked to the hospital accreditation level, which is based on the scale of the hospital and the qualification of its professionals.

We found that patients discharged from teaching or public hospitals in Taiwan consistently reported a higher rate of positive experiences in all the experience criteria measured in this study. This may be because public hospitals in Taiwan are usually large scale, have better medical equipment and well-trained professionals, and are more likely to possess teaching status. Therefore, these hospitals are more likely to receive a high rate of positive responses under the NHI scheme.

In the United States, findings related to hospital characteristics were less consistent. Teaching status contributes to a high rate of positive responses, but public ownership status is consistently negatively associated with patient experience scores. This alludes to how public ownership does not necessarily indicate better care in the United States. Unlike US public facilities, Taiwan's public facilities are less burdened by competitive pressure from private facilities. A more detailed context is needed, for further discussion concerning the differences in the effects of hospital teaching status and ownership, between the United States and Taiwan.

4.5 | Diverse populations and their trust in health system in the United States

In the United States, it is well known that belonging to an ethnic minority may impact one's trust in the health system because of systemic racism and a history of unethical medical practices.[33] Current statistics show disproportionately worse health outcomes for ethnic minorities, further exacerbating minority groups' negative perceptions of the health system.[30] Evidence shows that the Asian population in the United States provides lower patient satisfaction scores than their counterparts, which could be attributed to response tendencies rather than differences in care quality. Although this presents a bias in the

US population, this phenomenon cannot be assumed for Taiwanese respondents in their own country, and there are no existing weights suggested to adjust for different racial groups' response tendencies for patient satisfaction.

Although we could not obtain individual-level race/ethnicity data from the database, it was possible to compare states based on the percentages of non-White and Asian populations in the US data. In the HCAHPS data in this study, there were significant differences in facilities less likely to receive higher positive responses for "understanding at discharge" for states with more non-White and Asian populations. Higher Asian populations were consistently negatively associated with higher positive responses. These factors were tested using an adjusted regression model (see Data S2). Our results match prior literature on racial/ethnic minorities' lower satisfaction in health care settings in the United States.[31]

4.6 | Unique exogenous factors to consider for Taiwan

In the United States, people living in higher-SES regions may possess better health coverage from private health plans, and hospitals in these regions may invest more to cater to patients with comprehensive coverage. On the other hand, people in Taiwan share the same benefits under the universal NHI scheme. From the system's perspective, hospitals do not have incentives to cater to certain population groups.

Despite this, NHI premium collection is mainly based on salary level. People in higher salary categories must pay higher premiums (approximately 7.6 times of that in the lowest category), yet they receive the same benefits under the NHI scheme. It is reasonable to assume that people living in areas with higher SES may have paid higher premiums and have higher expectations of care quality. Thus, it is not surprising that we found that regional SES was negatively associated with the odds of returning positive responses for all three measured quality criteria.

4.7 | Limitations

This study has some limitations. First, based on the limited availability of data sources from the HCAHPS, this study conducted a hospital-level analysis with a regional-level household income measure, which may lead to an ecological fallacy. Second, we did not test the validity of the PEHC questions for those adapted from the US HCAHPS. The issue of cross-cultural adaptation of HCAHPS has been tested in recent literature in several regions and has been validated in many languages.[34–36] Third, the lack of information concerning the respondents' health literature and room type may confound the results obtained from the analyses.

4.8 | Policy implications

Although judging overall health care quality from perceived satisfaction should be done with caution,[37] lessons from our results can be applied broadly in assessing whether costs are reflected in how patients experience high-cost care, such as inpatient services across different systemic and cultural contexts. Our findings span two different health systems: a mixed privatized health system in the United States and a universal health care system in Taiwan. Inpatient care is generally more costly than outpatient care worldwide; thus, there may be heightened significance for potential relationships between household income and perceived care quality in different health care systems.

The strength of this study is its examination of the impact of regional SES on the likelihood of perceived positive experiences in inpatient care in the context of health systems in Taiwan and the United States. Within-region variations indicated that physician density might be a useful tool to parse out differences in patient experience ratings. In allocating costly health resources across large regions, policy makers would be prudent to note how their decisions may impact potential geographic disparities in perceived health care quality, based on population-level SES and their systemic and cultural expectations of health care.

ACKNOWLEDGMENTS

The data for Taiwan came from a survey project supported by the Ministry of Health and Welfare (MOHW 107-NHI-S-114-00008) in Taiwan. The first author (GHY) was supported by the U.S.–Taiwan Fulbright scholarship and a grant from the Ministry of Science and Technology (MOST 109-2410-H-002-050-SS3). The funding agencies have no role in this work. The views expressed in this article are those of the authors and do not reflect the position of the National Health Insurance Administration, Ministry of Health and Welfare in Taiwan.

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How to cite this article: Yoon GH, Cheng S-H. Differences in trends of perceived inpatient care quality based on regional socioeconomic level in the United States and Taiwan. *Health Serv Res*. 2021;56(Suppl. 3):1418-1428. doi: 10.1111/1475-6773.13872