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EMPIRICAL RESEARCH QUANTITATIVE

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Long-term care facilities' response to the COVID-19 pandemic: An international, cross-sectional survey

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Abstract

Aims: To (i) assess the adherence of long-term care (LTC) facilities to the COVID-19 prevention and control recommendations, (ii) identify predictors of this adherence and (iii) examine the association between the adherence level and the impact of the pandemic on selected unfavourable conditions.

Design: Cross-sectional survey.

Methods: Managers ($n = 212$) and staff ($n = 2143$) of LTC facilities ($n = 223$) in 13 countries/regions (Brazil, Egypt, England, Hong Kong, Indonesia, Japan, Norway, Portugal, Saudi Arabia, South Korea, Spain, Thailand and Turkey) evaluated the adherence of LTC facilities to COVID-19 prevention and control recommendations and the impact of the pandemic on unfavourable conditions related to staff, residents and residents' families. The characteristics of participants and LTC facilities were also gathered. Data were collected from April to October 2021. The study was reported following the STROBE guidelines.

Results: The adherence was significantly higher among facilities with more pre-pandemic in-service education on infection control and easier access to information early in the pandemic. Residents' feelings of loneliness and feeling down were the most affected conditions by the pandemic. More psychological support to residents was associated with fewer residents' aggressive behaviours, and more psychological support to staff was associated with less work–life imbalance.

Conclusions: Pre-pandemic preparedness significantly shaped LTC facilities' response to the pandemic. Adequate psychological support to residents and staff might help mitigate the negative impacts of infection outbreaks.

Impact: This is the first study to comprehensively examine the adherence of LTC facilities to COVID-19 prevention and control recommendations. The results demonstrated that the adherence level was significantly related to pre-pandemic preparedness and

that adequate psychological support to staff and residents was significantly associated with less negative impacts of the pandemic on LTC facilities' staff and residents. The results would help LTC facilities prepare for and respond to future infection outbreaks.

Patient or public contribution: No Patient or Public Contribution.

KEYWORDS

adherence, aged, compliance, COVID-19, long-term care, multilevel analysis, older adults

1 | INTRODUCTION

Long-term care (LTC) residential facilities for older people have been identified as high-risk settings during the COVID-19 pandemic (Gardner et al., 2020; Thompson et al., 2020). About 40% of total COVID-19 deaths across the Organization for Economic Co-operation and Development (OECD) member countries came from the LTC sector (OECD, 2021). Some studies reported a prevalence rate of COVID-19 infection up to 85.4% and 62.6% among residents and staff, respectively (Frazer et al., 2021). Residents' social isolation, hopelessness and emotional exhaustion during the pandemic were frequently reported (Palacios-Ceña et al., 2021; Smith et al., 2023). Among staff, increased workload and shortage, high burnout and exhaustion, fears of infection, stress, anxiety, panic disorders, depression and moral distress were prevalent (Haslam-Larmer et al., 2022; Sarabia-Cobo et al., 2021; White et al., 2021). The pandemic also limited resident–family connectedness, which negatively affected residents' and families' psychosocial and emotional well-being (Palacios-Ceña et al., 2021; Pirhonen et al., 2022; Salcedo-Pérez-Juana et al., 2022). Several aspects of care (e.g., social support, information sharing and patient participation) were poorly achieved during the pandemic (Mota-Romero et al., 2022).

Several recommendations were published to help LTC facilities prepare for and respond to the COVID-19 pandemic (American Geriatrics Society, 2020; European Centre for Disease Prevention and Control, 2022; Kelly & Geffen, 2020; World Health Organization, 2021). These recommendations, hereafter referred to as COVID-19 prevention and control recommendations, focused on active screening for staff and residents, ensuring adequate supplies of personal protective equipment and mandating its use, employing social distancing and isolation measures, routine disinfection of surfaces, enforcing respiratory hygiene etiquette, visitor restrictions, and educating staff and residents on appropriate infection control measures (Frazer et al., 2021; Rios et al., 2020). Nevertheless, in most countries, there is a lack of data on the adherence of LTC facilities to these guidelines.

The adherence of LTC facilities to the COVID-19 prevention and control recommendations, as well as the impact of the pandemic on LTC facilities, is related to several factors. At the country level, levels of national preparedness (Chaudhry et al., 2020), economic status (e.g., gross domestic product) (Chaudhry et al., 2020; Leffler et al., 2020), healthcare system-related factors (e.g., health professionals-to-population ratio) (Chaudhry et al., 2020; Kumar et al., 2020), political factors (e.g., worldwide governance indicators) (Haider et al., 2020), population characteristics (e.g., population density) (Chaudhry et al., 2020; El Mouhayyar et al., 2022; Foo et al., 2021) and stringency of the response to the pandemic (e.g., restricting international travel) (El Mouhayyar et al., 2022; Leffler et al., 2020) were found to be significant predictors of COVID-19 related outcomes, such as transmissibility (Kumar et al., 2020), caseload (Chaudhry et al., 2020), death (El Mouhayyar et al., 2022; Foo et al., 2021; Leffler et al., 2020) and patient recovery rate (Chaudhry et al., 2020). At the facility level, some characteristics of the facility could be linked to the risk of COVID-19 cases, such as the facility size, staffing levels and availability of single rooms (Frazer et al., 2021; Wachholz et al., 2022).

Lessons learned from the response to infectious outbreaks can help preparedness and response to future outbreaks (ECRI, 2020). Examining the adherence of LTC facilities to the COVID-19 prevention and control recommendations would identify areas of strength and vulnerability of facilities' response and inform preparedness for future waves or the emergence of new pandemics or epidemics (Baum et al., 2021). Examining country, facility and individual factors associated with facilities' adherence would also provide real-world research-driven data for improving and prioritizing actions in future infection outbreaks. Therefore, the current study aimed to address the following three research questions:

- What was the level of LTC facilities' adherence to the COVID-19 prevention and control recommendations worldwide?
- Which country, facility and staff factors were associated with LTC facilities' adherence to the COVID-19 prevention and control recommendations?
- What was the association between LTC facilities' adherence to COVID-19 prevention and control recommendations and staff (e.g., staff turnover), residents (e.g., residents' cognitive status) and residents' families' (e.g., families' complaints) unfavourable conditions?

2 | METHODS

The methods and conducts of the current study were described in a published protocol (Eltaybani et al., 2022) and are summarized below. The study was reported following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (von Elm et al., 2007).

2.1 | Design

A cross-sectional, multi-site, international survey.

2.2 | Settings and participants

The survey was conducted in LTC facilities and targeted managers and direct care staff working at participating facilities. For the current study, LTC facilities were defined as designed institutions that provide formal (from paid staff) accommodation and health or social LTC services for older people. The inclusion criteria of LTC facilities were (i) operating since October 2019 or earlier; (ii) having at least one nurse, whether as a manager or a direct care staff member; and (iii) agreeing to participate in the study. Only healthcare professionals who provide daily direct care to residents in the facility (e.g., nurses) were invited to participate; categories of included professionals were decided based on the country and facility regulations. The inclusion criteria of staff were (i) working at the facility during the calendar year 2020, (ii) being available at the facility at the time of data collection and (iii) agreeing to participate in the study. The above inclusion criteria were set to allow comparing "during-the-pandemic" and "before-the-pandemic" statuses and to minimize the heterogeneity of the sample. The World Health Organization (2020) announced the COVID-19 pandemic to be a Public Health Emergency of International Concern on January 30, 2020; thereby, the current study used the term "before the pandemic" referring to the period before January 2020 and "during the pandemic" referring to the period between January 2020 and the date of data collection. These dates were fixed across data collection settings to prevent possible interpretation bias.

2.3 | Sampling

Researchers from 53 countries (Appendix 1) were contacted to participate in the study. To minimize selection bias, more than 500 researchers were contacted (at least 10 researchers from each country). Using a convenience sampling approach, participating researchers recruited LTC facilities, managers and staff from their countries with no restrictions on the number of recruited countries, facilities, or participants. The convenience sampling approach was adopted because of the lack of a sampling framework in many of the participating countries and the lack of resources (e.g., time and fund) to commute to LTC settings in distant areas (Eltaybani et al., 2022). No a priori sample size calculation was performed. Yet, after a thorough discussion among the research team members and considering the challenges of data collection during the pandemic, we strived to include at least ten LTC facilities and at least 100 staff members from each country. To minimize selection bias, the researchers strove to recruit LTC facilities of various types (e.g., governmental, private) from diverse geographic locations, and all direct care staff working at the included facilities were invited to participate if they met the eligibility criteria.

2.4 | Measurements

2.4.1 | Adherence to the COVID-19 prevention and control recommendations

After a literature review, COVID-19 prevention and control recommendations were categorized into 18 concepts across 12 dimensions. The level of LTC facilities' adherence to these recommendations was assessed using 18 multiple-choice questions (i.e., one question for each concept): seven questions were responded to by managers, and 11 were answered by staff. For example, the question "*How do you evaluate the psychological support provided to the residents during the COVID-19 pandemic?*" with three response options—*lots of support*, *minimal support* and *no support*—was used to assess the concept "*Psychological and mental support to residents*" of the dimension "*Psychological and mental support*." Responses to each question were scored 0, 1 or 2, where 0 indicates no response, 1 indicates minimal or insufficient response and 2 indicates ample or intense response. Items answered by the staff were aggregated at the facility level using the mean score. For easy interpretation, the total score of all items (range, 0—36; Cronbach's alpha = 0.697) was transformed to give a total score from 0 to 100; higher scores indicate higher adherence. The content validity of the adherence assessment items was assured by a panel of LTC researchers and practitioners. Due to time and resource limitations, the validation process took place through online discussions with experts and no pilot studies were conducted. The questions and their response options and scoring were described elsewhere (Eltaybani et al., 2022).

2.4.2 | Factors associated with LTC facilities' adherence to the COVID-19 prevention and control recommendations

Country-related variables were extracted from publicly available statistics (Appendix 2). They included the country's demographic characteristics (e.g., percentage of older people), economic status (e.g., country classification by income), healthcare status (e.g., medical doctors per 10,000 population), and country response to the COVID-19 pandemic (e.g., government response index). Facility-related variables were collected either from the facility's manager or staff and included the facility's type (e.g., public, private), size (number of beds), staffing (e.g., staff-to-resident ratio), pre-pandemic situation (e.g., provision of in-service education on infection control before the pandemic), residents' characteristics on the day of filling the questionnaire (e.g., percentage of residents with dementia) and manager's characteristics (e.g., professional background). Staff-related variables were collected from the staff and included demographic characteristics (e.g., age), work-related data (e.g., professional background) and easiness of getting information about the prevention and control of the novel coronavirus in the first few weeks of the pandemic. The latter was assessed on a 5-point Likert

scale ranging from 1 (very difficult) to 5 (very easy); higher scores indicate more easiness in getting information.

2.4.3 | Staff, residents' and residents' families' unfavourable conditions

Managers and staff stated their agreement on the perceived change in 15 unfavourable conditions comparing before-the-pandemic and during-the-pandemic statuses: seven residents' conditions (e.g., residents' overall cognitive status), six staff conditions (e.g., staff turnover) and two residents' families' conditions (e.g., family complaints). All conditions were stated in a negative format (e.g., *Compared to the situation before the pandemic, your work–life balance worsened*) and agreement ranged from totally disagree to totally agree (scored 1 to 5, respectively); higher scores indicate a higher negative impact of the pandemic.

2.5 | Data collection

Data were collected from April to October 2021 using an online survey created on SurveyMonkey®, and paper copies were made available on request. This mixed-mode approach in data collection aimed to minimize the coverage error of the survey and to enhance the response rate. Two questionnaires were used: the managers' questionnaire and the staff questionnaire. Questionnaires were developed in English, and their content validity was assured by a panel of researchers and practitioners from different countries. Due to the lack of time and resources, the validation process took place through online discussions with experts, and no pilot study was conducted. Questionnaires were then translated into each participating country's local language. To ensure equivalence of questionnaires in different languages and to prevent possible item or construct bias, the translation was made by a professional translation company, which adopts three stages of translation: translation by a target language native translator, proofreading by an original language native translator and a quality check by a translation manager. Furthermore, at least one researcher in each country confirmed the semantic, idiomatic, experiential and conceptual equivalence between the English and translated versions of the questionnaires and made modifications if needed. Researchers in each country recruited LTC facilities and distributed the questionnaires to managers and staff. The survey design and the translation process were described elsewhere (Eltaybani et al., 2022).

2.6 | Statistical analysis

Following the examination of descriptive statistics and bivariable analyses, a multivariable linear regression analysis was used to find out predictors of the adherence level. To account for the hierarchical nature of our data, where LTC facilities are nested within countries, the extent of the variability of the adherence level across countries was examined by estimating an unconditional generalized mixed model with random intercepts (Heck et al., 2010). The *Z*-test ($Z = 1.84$) suggested statistically insignificant variability ($p = .066$) across countries with an intraclass correlation of 0.225 (Appendix 3). This result suggests that a multilevel model may not be helpful, and a conventional single-level regression analysis would suffice (Heck et al., 2010). Nevertheless, we proceeded with performing a two-level regression analysis for two reasons. First, despite the considerable variability of the adherence level between countries (i.e., 22.5%), the absence of statistical significance may be merely due to the low number of countries in level 2 ($n = 13$ countries). Heck et al. (2010) suggested that the sufficiency of variation is relative and depends as much on theoretical concerns as it does on the structure and quality of data. Second, using a single-level analysis would neglect the clustering effect of LTC facilities in countries, leading to biased estimates of model parameters and, thus, erroneous conclusions about the effects of some predictors (Heck et al., 2010). Multilevel regression analysis was also used to examine the association between the adherence level and staff, residents' and residents' families' unfavourable conditions. Nineteen multilevel regression models were performed: a model for each unfavourable condition (i.e., 15 models for the 15 conditions), a model for each of the means of staff conditions, residents' conditions and residents' families' conditions (i.e., three models for the three mean scores), and a model for the mean of all conditions.

All bivariate and multivariable analyses were performed at the facility level. Therefore, data collected from the staff were aggregated at the facility level using the group mean score. To minimize bias in calculating the sum adherence score, facilities with missing data in >50% of manager's items or staff items were excluded. That is, the total facility's stringency score was computed for facilities that (i) provided answers from both managers and staff, (ii) had valid data in ≥50% of items responded to by the manager (i.e., ≥4 items of 7) and (iii) had valid data in ≥50% of items responded to by the staff (i.e., ≥6 of 11). Items with missing data in any of the facilities that fulfilled the above criteria were replaced by the mean score of items with valid data of the same facility. No other data replacement was done. That is, among variables aggregated at the facility level, only valid data were considered. Effect sizes were calculated using Cohen's d (for independent sample *t*-tests), Eta-squared (for one-way ANOVA) and *r* or rho (for correlations) (Wolverton et al., 2016).

In all multilevel regression models, level 1 involved facility-level variables that showed a statistically significant association in the bivariate analyses, and level 2 involved country-level variables. The absence of multicollinearity between potential explanatory variables was assured by examining the variance inflation factor and correlation coefficient. A priori protocol (Eltaybani et al., 2022) suggested that countries with <10 facilities or <100 staff members would be excluded from the analysis. Nevertheless, excluding

countries that did not fulfill these criteria did not affect the overall results. Therefore, all participating countries were included in the analysis. All analyses were conducted using SPSS version 28 for Windows. The alpha significance level was 0.05 (two tailed).

2.7 | Ethical considerations

This study was approved by the Research Ethics Committee of the Graduate School of Medicine, The University of Tokyo, Japan (number: 2020329NI), and other Research Ethics Committees of the individual participating countries (Appendix 4). The cover letter of the questionnaires explained the purpose of the study, provided assurance regarding the voluntary and confidential nature of responses, and stated that the completion and submission of the questionnaires would be regarded as consent to participate.

3 | RESULTS

3.1 | Participation and response rate

Researchers from 15 countries/regions participated in the study: Australia, Brazil, Egypt, Hong Kong, Indonesia, Japan, Norway, Portugal, Saudi Arabia, South Korea, Spain, Thailand, Turkey, the United Kingdom and the United States. Data collection in Australia and the United States was not completed due to feasibility issues; therefore, data from these two countries—less than ten responses from each—were not accounted for in the analysis. In the remaining 13 countries/regions, 212 managers and 2143 staff members working at 223 LTC facilities participated in the study (Figure 1).

3.2 | Descriptive characteristics of the study sample

The percentage of older people in the total population of the participating countries/regions ranged from 5.3% to 28.4% (Appendix 5). Table 1 shows that 36.3% of participating facilities were not-for-profit, 36.3% did not have a physician working full-time or part-time, and 20.2% did not have an infection census before the pandemic. About a third (33.5%) of participating managers were males, 27.8% were social workers and 25.9% were nurses, and their mean age was 48.9 ± 10.5 years. Most (80.7%) participating staff were female and 39.8% were nurse aids or residential care workers, and their mean age was 42.0 ± 11.8 years.

3.3 | Adherence of LTC facilities to the COVID-19 prevention and control recommendations

Figure 2 shows that restrictions on recreational activities (Item 16) and active screening of residents (Item 1) had the highest adherence rates; the highest possible score of these items was reported by 86.8% and 83.0% of participants, respectively. Contrarily, providing education to residents' families (Item 8) and the staff (Item 6) had the lowest adherence rates; the worst possible score of these items was reported by 39.3% and 27.9% of participants, respectively. The total adherence level was computed for 180 facilities (Appendix 6). The mean adherence level in the whole sample was 76.7 ± 10.5; Saudi Arabia and Brazil had the highest mean (85.9 ± 6.9 and 85.2 ± 6.0, respectively), whereas Norway and Indonesia had the lowest (67.1 ± 6.2 and 67.7 ± 18.4, respectively). Appendices 7 and 8 show the score of each response item across participating countries/regions.

3.4 | Factors associated with the adherence level

The bivariate analysis (Table 1) showed that the adherence level was significantly higher in facilities that regularly used infection censuses before the pandemic ($p = .001$; see Appendix 9) and facilities that had a policy for dealing with airborne infections before the pandemic ($p = .048$). The adherence level was also higher among facilities with more in-service education on infection control before the pandemic ($p = .003$) and that with higher staff-reported easiness of getting information on the prevention and control of the novel coronavirus early in the pandemic ($p = .006$). In the multivariable regression analysis (Table 2), in-service education on infection control before the pandemic and staff-reported easiness of getting information early in the pandemic were significant predictors of the adherence level (β [95% confidence interval]: 6.656 [1.314, 11.998] and 2.186 [0.172, 4.200], respectively). The full regression model accounted for more than half (58.4%) of the between-country variability in the facility's adherence level.

3.5 | Staff, residents' and residents' families' unfavourable conditions

As perceived by the study's participants, residents' feelings of loneliness and social isolation, residents' expression of feeling down and hopelessness, and staff work–life balance were the most affected unfavourable conditions by the pandemic; the percentages of participants who agreed (i.e., strongly agreed or somewhat agreed) on these conditions were 68.5%, 65.8% and 47.5%, respectively (Appendix 10). The mean score of all unfavourable conditions was positively associated with a larger facility size and a higher number of residents in the facility ($p = .028$ and .020, respectively), indicating a detrimental effect of these variables. Contrarily, the mean score of all unfavourable conditions was negatively associated with the mean age of staff in the facility and their years of experience ($p = <.001$ and .003, respectively), indicating a favourable effect of these variables (Appendix 11).

Of the 18 COVID-19 prevention and control recommendations, 15 had a statistically significant negative association—indicating a favourable effect—with at least one of the examined unfavourable

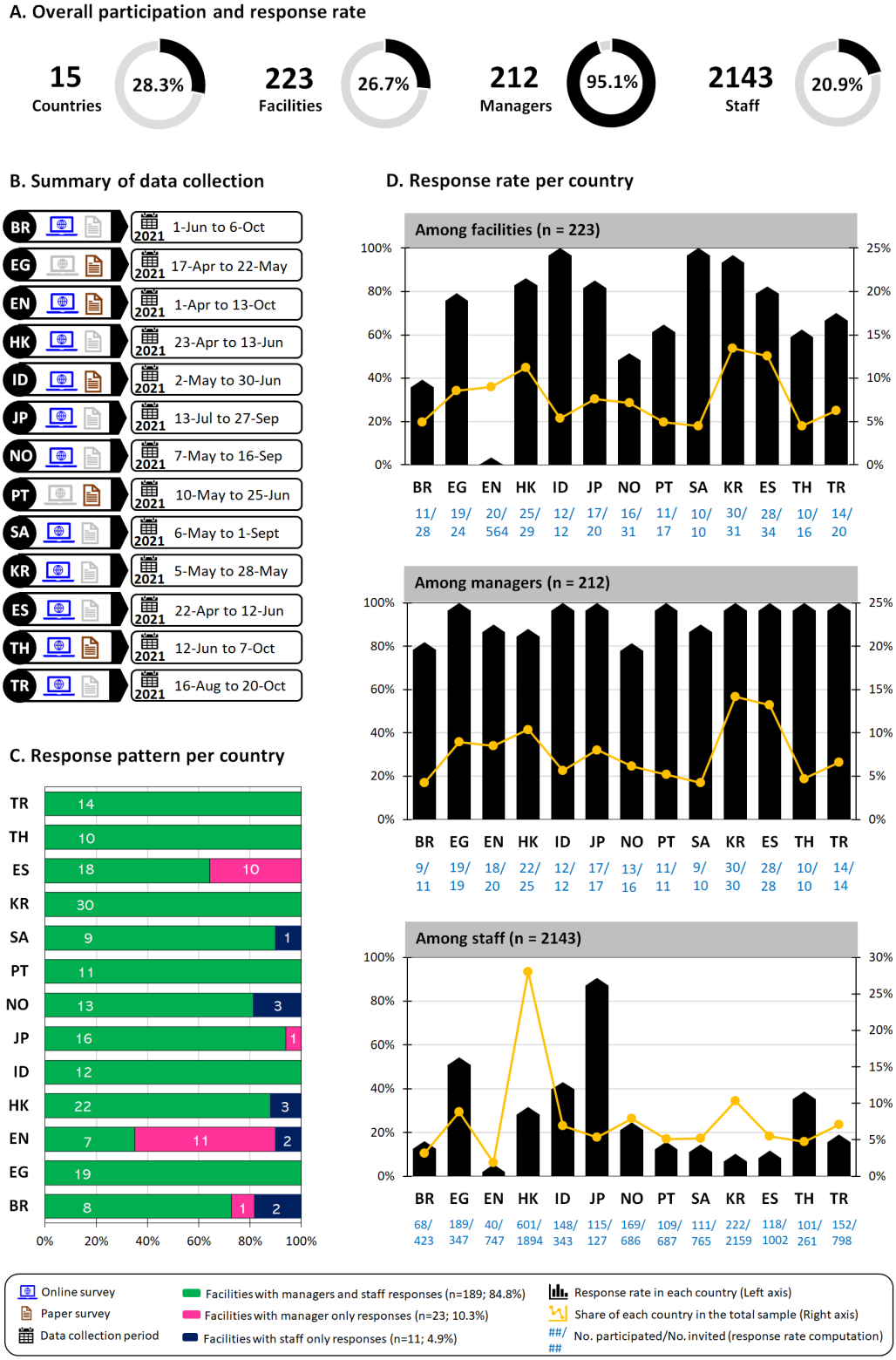

FIGURE 1 Summary of participation and data collection. BR, Brazil; EG, Egypt; EN, England; HK, Hong Kong; ID, Indonesia; JP, Japan; NO, Norway; PT, Portugal; SA, Saudi Arabia; KR, South Korea; ES, Spain; TH, Thailand; TR, Turkey.

conditions (Appendix 12). Items with the highest number of negative associations were the provision of psychological and mental support to residents (9 conditions [e.g., increasing residents' aggressive behaviours, rho = −0.141]) and provision of psychological and mental support to staff (8 conditions [e.g., worsening staff work–life balance, rho = −0.409]). The multivariable regression analysis (Table 3) showed that the total facility's adherence level was negatively associated with worsening staff work–life balance (β = −0.020 [−0.033, −0.007]),

TABLE 1 Descriptive statistics of study variables and bivariate analysis.

Independent variables	Total Mean ± SD, median [IQR], or *n* (%)[a]	Missing data *n* (%)	Bivariate analysis[b] Mean ± SD or correlation coefficient	*p*-value	Effect size[j]
1. Facility-related data (*n* = 223)[c]					
Facility type		11 (4.9%)			
Public/Governmental	68 (30.49%)		75.55 ± 11.47	0.390	0.010
Private for-profit	43 (19.28%)		79.38 ± 9.19		
Non-for-profit	81 (36.32%)		76.57 ± 10.13		
Other	20 (8.97%)		75.59 ± 10.76		
Facility size (number of beds in the facility)	60.00 [69.25]	11 (4.9%)	0.009	0.906	0.009
Having ≥1 physician in the facility (full- or part-time)		33 (14.8%)			
Yes	109 (48.88%)		75.94 ± 10.95	0.199	0.207
No	81 (36.32%)		78.06 ± 8.80		
Staff-to-resident ratio in the facility	0.76 [0.47]	13 (5.8%)	−0.043	0.535	0.043
Having an infection census before the pandemic		20 (0.9%)			
No	45 (20.18%)		76.32 ± 8.79	0.001	0.073
Yes, but it was not regularly used	37 (16.59%)		71.02 ± 13.39		
Yes, and it was regularly used	121 (54.26%)		78.56 ± 9.42		
Having policy for airborne infection before the pandemic[d]		26 (11.7%)			
Yes (≥ 1 staff member responded "Yes")	204 (91.48%)		77.19 ± 10.06	0.048	0.495
No (none of the staff responded "Yes")	19 (8.52%)		72.06 ± 13.02		
In-service education on infection control before the pandemic: Yes[d,e]	0.88 [0.50]	26 (11.7%)	0.220	0.003	0.220
Residents' characteristics					
Total number of residents	53.50 [65.00]	13 (5.8%)	−0.046	0.542	0.046
Percentage of residents aged ≥85 years[f]	53.57 [46.05]	24 (10.8%)	0.013	0.860	0.013
Percentage of residents with dementia[f]	46.44 [50.89]	25 (11.2%)	−0.149	0.050	0.149
Percentage of residents with cancer[f]	2.95 [6.45]	25 (11.2%)	−0.046	0.544	0.046
Percentage of residents with diabetes[f]	19.23 [20.27]	26 (11.7%)	0.166	0.029	0.166
Percentage of bedridden residents[f]	39.16 [46.71]	27 (12.1%)	0.005	0.952	0.005
Percentage of residents on oxygen therapy[f]	0.75 [4.30]	27 (12.1%)	0.144	0.060	0.144
Percentage of residents with gastric tube[f]	1.24 [5.88]	27 (12.1%)	0.010	0.894	0.010
Percentage of residents with urinary catheter[f]	2.67 [5.88]	28 (12.6%)	−0.050	0.512	0.050
2. Manager-related data (*n* = 212)[c]					
Age (in years)	48.85 ± 10.49	7 (3.3%)	0.028	0.712	0.028

TABLE 1 (Continued)

Independent variables	Total Mean ± SD, median [IQR], or *n* (%)[a]	Missing data *n* (%)	Bivariate analysis[b] Mean ± SD or correlation coefficient	*p*-value	Effect size[j]
Gender		1 (0.5%)			
Female	140 (66.0%)		76.49 ± 9.47	0.861	0.028
Male	71 (33.5%)		76.78 ± 12.22		
Professional background		1 (0.5%)			
Medical doctor	2 (0.9%)		85.35 ± 4.35	0.786	0.010
Nurse	55 (25.9%)		76.61 ± 8.49		
Nurse aid or resident care worker	9 (4.2%)		74.66 ± 8.00		
Social worker	59 (27.8%)		77.21 ± 9.72		
Others[g]	86 (40.6%)		76.29 ± 12.40		
3. Staff-related data (*n* = 2143)[d]					
Age (in years)	41.99 ± 11.75	153 (7.1%)	0.097	0.196	0.097
Gender[h]		22 (1.0%)			
Female	1730 (80.7%)		−0.052	0.490	0.052
Male	391 (18.2%)				
Professional background[i]		19 (0.9%)			
Nurse	457 (21.3%)		−0.120	0.200	0.120
Nurse aid or resident care worker	852 (39.8%)		0.105	0.260	0.105
Social worker	257 (12.0%)		−0.037	0.703	0.037
Others	558 (26.0%)		−0.032	0.756	0.032
Years of experience (in years)	10.97 ± 8.67	52 (2.4%)	0.027	0.817	0.027
Easiness of getting information	2.99 ± 0.72	13 (0.6%)	0.205	0.006	0.205

Abbreviations: IQR, Interquartile range; SD, Standard deviation.

[a]Percentages may not add to 100% due to missing data.

[b]Bivariate analysis was performed at the facility level (*n* = 180; mean [±SD] stringency score = 76.68 ± 10.46). Data collected from staff were aggregated at the facility level using group mean.

[c]Data were collected from the facility managers unless other otherwise indicated.

[d]Data were collected from staff.

[e]Proportion of staff who responded "Yes".

[f]Calculated out of the total number of residents in the facility on the day of filling out the questionnaire.

[g]Included support worker, assistant, auxiliary worker, physiotherapist, health worker, occupational therapist, service worker, caregiver, technician etc.

[h]In the bivariate analysis, results are reported for the proportion of female staff in the facility.

[i]In the bivariate analysis, results are reported for the proportion of each category out of the total number of staff in the facility.

[j]Eta-squared for one-way ANOVA (0.1: week, 0.3: moderate and 0.5: strong); *r* or rho for correlation (0.3: week, 0.5: moderate and 0.7: strong); Cohen's d for independent sample *t*-tests (0.2: small, 0.5: medium and 0.8: large).

worsening residents' overall physical condition (β = −0.015 [−0.028, −0.003) and increasing residents' skin problem (β = −0.010 [−0.020, 0.000]).

4 | DISCUSSION

To the best of our knowledge, the current study was the first to comprehensively examine the adherence of LTC facilities to COVID-19 prevention and control recommendations in multi-regional contexts. Appendix 13 summarizes the context of the LTC system and national efforts to mitigate the pandemic in participating countries/regions to provide better insights about the context of the data collection. The main findings of the current study were as follows. First, among all COVID-19 prevention and control recommendations, the provision of pandemic-related education to LTC facilities' staff and residents' families had the lowest adherence levels. Second, the overall adherence level was higher among facilities that (i) regularly used infection censuses before the pandemic, (ii) had policies for the management of airborne infection before the pandemic, (iii) provided in-service education on infection control before the pandemic and (iv) had more accessible pandemic-related information. Lastly, providing psychological support to residents and staff during the pandemic was significantly associated with a lower impact of the pandemic on staff, residents' and residents' families.

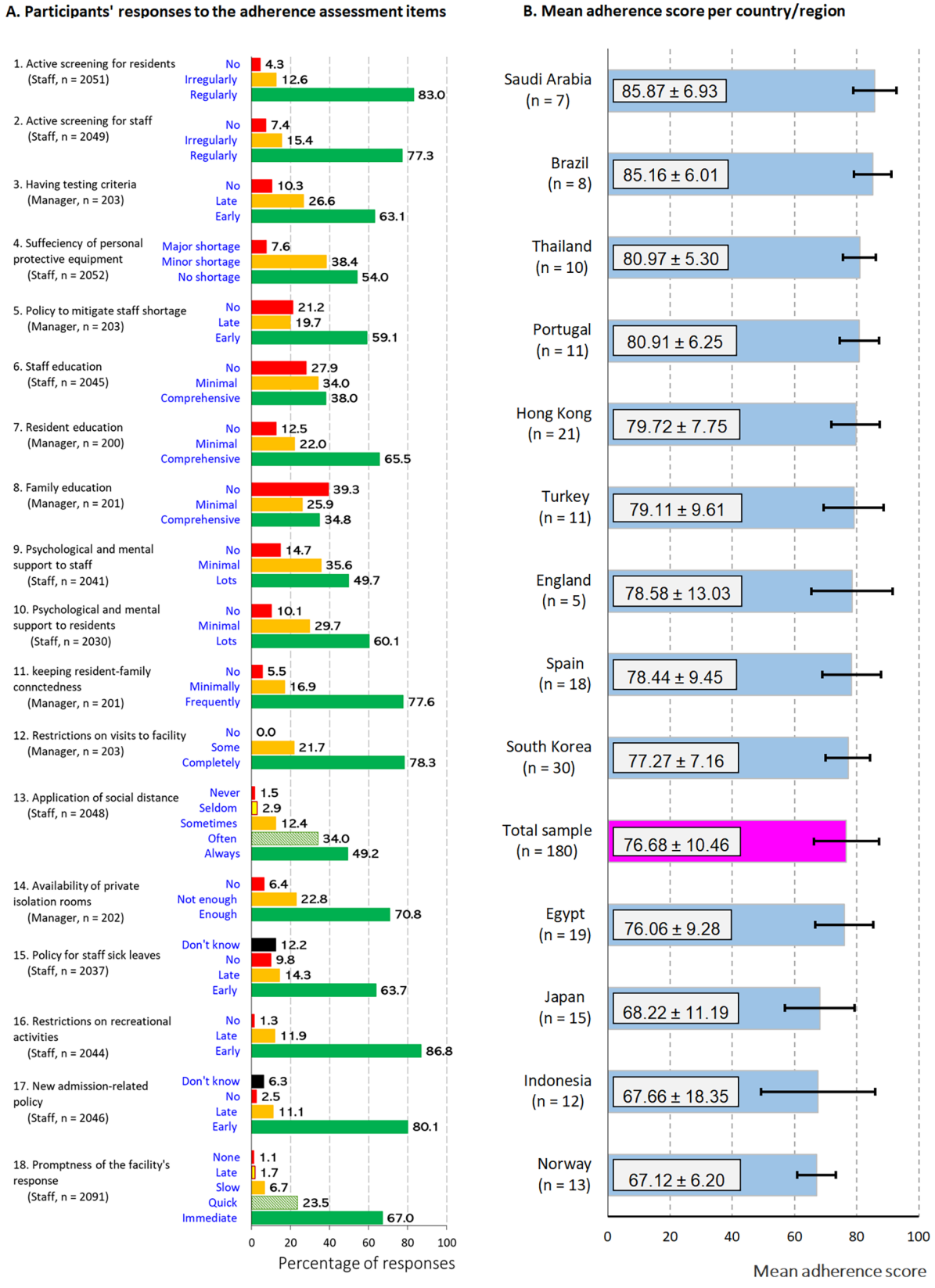

FIGURE 2 Adherence of long-term care facilities to the COVID-19 pandemic prevention and control recommendations.

One strength of the current study is the examination of a wide range of possible predictors of LTC facilities' adherence to the COVID-19 pandemic prevention and control recommendations at different levels. At the country level, none of the examined variables was found to be a statistically significant predictor of the adherence level. This might be due to the inability of country-level

TABLE 2 Multi-level regression model for the total facility's adherence score.

Parameters	Estimate	*Z*	*p*-value	95% confidence interval	
				Lower	Upper
1. Random effect parameters					
Residual	67.978	8.645	<0.001	54.188	85.276
Intercept	8.925	0.864	0.387	0.924	86.164
2. Fixed effect parameters					
Intercept	64.809		<0.001	47.820	81.798
2.1. Country-level variables					
Total population (in million)	−0.006		0.795	−0.059	0.047
Percentage of older people	−0.084		0.768	−0.780	0.612
High-income country[a]	−1.346		0.823	−16.583	13.891
Medical doctors per 10,000 population	0.199		0.123	−0.077	0.475
Nurses and Midwifery per 10,000 population	−0.100		0.056	−0.204	0.004
Average of the country's policy indexes[b]	−0.005		0.971	−0.333	0.324
2.2. Facility-level variables					
Regularly used infection census before the pandemic[c]	1.843		0.173	−0.814	4.500
Had a policy for airborne infection before the pandemic[d]	4.292		0.098	−0.807	9.392
In-service education on infection control before the pandemic	6.656		0.015	1.314	11.998
Percentage of residents with diabetes	0.043		0.257	−0.032	0.118
Staff-reported easiness of getting information	2.186		0.034	0.172	4.200
R^2					
Residual	0.082				
Intercept	0.584				
Proportion of variability	0.1161				
Intra-Class Correlation (ICC)	11.61%				

Note: Of the 180 facilities with total adherence score, 3 were excluded from the multivariate analysis to improve the regression model fit. The adherence scores of the excluded facilities were 36.74, 43.06 and 47.50. The total adherence score of the remaining facilities ($n = 177$) ranged from 51.62 to 99.54.

[a]: Reference category: Lower- or upper-medium-income country.

[b]: The averages of the four indexes (i.e., the average of the Government Response Index, the average of the Stringency Index, the average of the Containment Health Index and the average of the Economic Support Index) were aggregated due to multicollinearity (see Appendix 5).

[c]: Reference category: Not having or not regularly used census.

[d]: Reference category: Not having a policy.

TABLE 3 Multi-level regression models for the association between the total facility's adherence score and staff, residents' and residents' families' unfavourable conditions.

Unfavourable conditions	β[a]	*p*-value	95% confidence interval	
			Lower	Upper
Need to work longer shifts or overtime increased	−0.005	0.436	−0.018	0.008
Work–life balance worsened	−0.020	0.003	−0.033	−0.007
Frequency of medication errors increased	−0.003	0.551	−0.011	0.006
Having exceptional staff shortage	−0.006	0.599	−0.027	0.016
Staff absenteeism increased	0.011	0.333	−0.011	0.033
Staff turnover increased	0.002	0.881	−0.023	0.026
Mean of staff outcomes (6 outcomes; Chronbach's α = 0.678)	−0.004	0.435	−0.016	0.007
Residents' fall increased	−0.001	0.895	−0.011	0.010
Residents' aggressive behaviour increased	−0.004	0.470	−0.016	0.008
Residents' feeling of loneliness and social isolation increased	−0.002	0.744	−0.012	0.009
Residents' expression of feeling down and hopelessness increased	−0.007	0.197	−0.018	0.004
Residents' overall physical condition worsened	−0.015	0.019	−0.028	−0.003
Residents' skin problems increased	−0.010	0.049	−0.020	0.000
Residents' overall cognitive status worsened	−0.003	0.559	−0.015	0.008
Mean of residents' outcomes (7 outcomes; Chronbach's α = 0.890)	−0.006	0.176	−0.014	0.003
Family complaints increased	−0.009	0.190	−0.023	0.005
Family aggressive behaviours increased	−0.006	0.356	−0.018	0.006
Mean of residents' families' outcomes (2 outcomes; Chronbach's α = 0.900)	−0.008	0.221	−0.020	0.005
Mean of all outcomes (15 outcomes; Chronbach's α = 0.876)	−0.006	0.193	−0.014	0.003

Shown are the fixed effect parameters of the total facility's adherence score in the multi-level model for each listed unfavourable condition; a separate model was built for each condition. Controlling variables were consistent across all models: Level 1 included country-level variables (total population in millions, percentage of older people, country classification by income, medical doctors per 10,000 population, nurses and midwifery per 10,000 population, and the average of country's policy indexes); Level 2 included facility-level variables (facility size; percentage of residents with cancer, oxygen therapy and gastric tube in the facility; mean staff age in the facility; and mean years of staff experience in the facility [see Appendix 10 for the selection of facility-level variables]).

[a]: A negative estimate indicates that the total facility's adherence score had a favourable effect (i.e., decreased the unfavourable impact of the pandemic) and vice versa.

variables to consider within-country inequalities. For instance, the current health expenditure per capita and the health personnel-to-population ratio do not reflect the allocation of resources to high-risk groups (e.g., older people) or vulnerable settings (e.g., LTC facilities). Furthermore, the non-probability sample of the current study might have been affected by the within-country geographical disparity of healthcare resources. This finding is consistent with previous research that showed the inability of the Global Health Security Index (GHSI) (Nuclear Threat Initiative, 2019), the Epidemic Preparedness Index (EPI) (Oppenheim et al., 2019), and the Joint External Evaluation (JEE) (World Health Organization, 2022) to predict national COVID-19 preparedness (Baum et al., 2021; Haider et al., 2020). The GHSI, the EPT and the JEE are well-known indexes to describe countries' overall preparedness and capacities in the event of public health risks. The current study did not use the GHSI or the EPI because both lack data about Hong Kong. The JEE was also not used because it was not designed to make inter-country comparisons (Haider et al., 2020).

Regular use of infection censuses, having policies for managing airborne infection, and provision of in-service education on infection control before the pandemic might be a reflection of the level of preparedness of LTC facilities to combat infectious diseases. The current results demonstrated that these variables significantly shaped LTC facilities' adherence to the COVID-19 prevention and

control recommendations, implying that the more prepared a facility is, the better equipped it will respond to and combat the pandemic (ECRI, 2020). The current results also demonstrated the importance of accessible information as a significant predictor of LTC facilities' adherence to COVID-19 prevention and control recommendations. Poor access to information about COVID-19 prevention and control has been reported particularly in low- and middle-income countries, as well as the socially and geographically marginalized communities (Bonnet et al., 2022; McHunu et al., 2022; Wang et al., 2020). Poor access to information was also associated with experiencing more COVID-19 stigma (Adhikari et al., 2022) and a lack of adherence to measures to combat the pandemic (Lowe et al., 2022).

The current study provides evidence about the importance of psychological and mental support to residents and staff to mitigate the negative impact of the pandemic. Previous qualitative research showed that providing social support helped LTC residents alleviate loneliness (Smith et al., 2023). This is particularly important given that of all unfavourable conditions examined in the current study, participants' highest agreement on the pandemic's negative impact was for residents' feelings of loneliness and expressions of feeling down and hopelessness. This might be explained by our findings that restrictions on recreational activities and visits to the facility were among the recommendations with the highest adherence rate. These results are consistent with previous research that documented the negative impact of the lockdown and social isolation on older adults' psychological, emotional and cognitive well-being (Chu et al., 2021; Noguchi et al., 2021; Palacios-Ceña et al., 2021; Smith et al., 2023).

4.1 | Implications

Before the COVID-19 pandemic, most countries' pandemic preparedness plans did not focus on or prioritize the LTC sector and, in some instances, never mentioned LTC facilities (OECD, 2021). Results of the current study provide insights and ignite a sense of direction towards actionable steps to enhance LTC facilities' preparedness for and response to infection outbreaks. For instance, Norwegian LTC facilities participating in the current study performed better than LTC in other countries/regions in terms of having screening criteria, but worse in terms of the active screening for staff, education to residents and families, psychological support to staff and residents, and keeping resident–family connectedness (Appendix 7). Among Egyptian LTC facilities participating in the current study, the worst response scores were regarding providing pandemic-related education to staff and families (Appendix 8). These results help shed light on country-specific areas requiring remedial measures to optimize LTC facilities' capabilities to respond to infection outbreaks.

The current results provide evidence that regular use of infection censuses, developing and implementing policies that describe how to deal with infections, in-service education on infection control and availability of reliable sources of infection-related information would help LTC facilities prepare for and respond to infection outbreaks. Managers should provide adequate psychological and mental support to staff and residents during infection outbreaks. In terms of practice, social isolation and loneliness need to be adequately addressed during infection outbreaks. Information and communication technologies (e.g., social network services, phone calls, video chat and robotics) have been shown to help reduce social isolation problems, feeling of loneliness and cognitive decline among older adults during the pandemic (Latikka et al., 2021; Li et al., 2022; Thangavel et al., 2022) and thus can be applied to the LTC facilities during infection outbreaks. In terms of research, the psychometric properties of the adherence assessment tool need to be confirmed. Future research needs to examine the associations between the adherence level and the infection rates and infection-related hospitalization and mortality.

4.2 | Limitations

Certain limitations of the current study merit mention. First, statistically insignificant results should be interpreted cautiously because of the lack of an a priori formal sample size calculation. Second, the non-probability sampling and the low response rates limit the generalizability of the present results. Third, the data collection, which was planned to take up to one month, was extended to six months due to feasibility issues. This extension hindered comparing participating countries and facilities in several aspects, such as the number of staff and residents who tested positive for the novel coronavirus and COVID-19-related hospitalization and death. Fourth, the current study was commenced before initiating any COVID-19 vaccination; therefore, vaccination was not accounted for in the present study. Fifth, the criterion-related validity and the construct validity of the adherence assessment tool were not examined. Furthermore, resident- and family-related unfavourable conditions were proxy-rated, which may raise questions regarding their validity. Lastly, the current results are prone to recall bias and social desirability due to the use of self-reported data.

5 | CONCLUSIONS

This study demonstrated the importance of preparedness in shaping the adherence of LTC facilities to COVID-19 prevention and control recommendations. The pandemic highly impacted residents' psychosocial status and staff work–life balance. Providing psychological and mental support to residents and staff can minimize the negative impact of the pandemic on LTC facilities' staff, residents' and residents' families.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the acquisition and interpretation of data, drafting the article and revising it critically for important intellectual content. All authors have agreed on the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest has been declared by the authors.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

The datasets of the current study are not publicly available due to containing information that could compromise the privacy of research settings and participants. Anonymized data are available from the corresponding author upon reasonable request.

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REFERENCES

Adhikari, T., Aggarwal, S., Nair, S., Joshi, A., Diwan, V., Stephen, A., Devi, K. R., Kumar Mishra, B., Yadav, G. K., Bangar, S. D., Sahu, D., Yadav, J., Ovung, S., Gulati, B. K., Sharma, S., Singh, C., Duggal, C., Sharma, M., Ujagare, D., … Rao, M. V. V. (2022). Factors associated with COVID-19 stigma during the onset of the global pandemic in India: A cross-sectional study. *Frontiers in Public Health*, *10*, 992046. https://doi.org/10.3389/fpubh.2022.992046

American Geriatrics Society. (2020). American Geriatrics Society policy brief: COVID-19 and nursing homes. *Journal of the American Geriatrics Society*, *68*(5), 908–911. https://doi.org/10.1111/jgs.16477

Baum, F., Freeman, T., Musolino, C., Abramovitz, M., De Ceukelaire, W., Flavel, J., Friel, S., Giugliani, C., Howden-Chapman, P., Huong, N. T., London, L., McKee, M., Popay, J., Serag, H., & Villar, E. (2021). Explaining covid-19 performance: What factors might predict national responses? *BMJ (Clinical Research Ed.)*, *372*, n91. https://doi.org/10.1136/bmj.n91

Bonnet, E., Beaugé, Y., Ba, M. F., Sidibé, S., De Allegri, M., & Ridde, V. (2022). Knowledge of COVID-19 and the impact on indigents' access to healthcare in Burkina Faso. *International Journal for Equity in Health*, *21*(1), 150. https://doi.org/10.1186/s12939-022-01778-2

Chaudhry, R., Dranitsaris, G., Mubashir, T., Bartoszko, J., & Riazi, S. (2020). A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes. *eClinicalMedicine*, *25*, 100464. https://doi.org/10.1016/j.eclinm.2020.100464

Chu, C. H., Wang, J., Fukui, C., Staudacher, S., Wachholz, P. A., & Wu, B. (2021). The impact of COVID-19 on social isolation in long-term care homes: Perspectives of policies and strategies from six countries. *Journal of Aging & Social Policy*, *33*(4–5), 459–473. https://doi.org/10.1080/08959420.2021.1924346

ECRI. (2020). *Preparation is the best protection: Lessons from the 2003 SARS outbreak*. Health Devices. Retrieved October 25, 2022, from. https://www.ecri.org/components/HDJournal/Pages/Preparation-Is-the-Best-Protection-2003-SARS-Outbreak.aspx?tab=2

El Mouhayyar, C., Jaber, L. T., Bergmann, M., Tighiouart, H., & Jaber, B. L. (2022). Country-level determinants of COVID-19 case rates and death rates: An ecological study. *Transboundary and Emerging Diseases*, *69*(4), e906–e915. https://doi.org/10.1111/tbed.14360

Eltaybani, S., Suzuki, H., Igarashi, A., Sakka, M., Amamiya, Y., & Yamamoto-Mitani, N. (2022). Long-term care facilities' response to the COVID-19 pandemic: A protocol of a cross-sectional, multi-site, international survey. *Nursing Open*, *9*(5), 2506–2517. https://doi.org/10.1002/nop2.1264

European Centre for Disease Prevention and Control. (2022). Online resources for prevention and control of COVID-19 in long-term care facilities. Retrieved January 4, 2023, from https://www.ecdc.europa.eu/en/all-topics-z/coronavirus/threats-and-outbreaks/covid-19/prevention-and-control/LTCF-resources

Foo, O., Hiu, S., Teare, D., Syed, A. A., & Razvi, S. (2021). A global country-level analysis of the relationship between obesity and COVID-19 cases and mortality. *Diabetes, Obesity & Metabolism*, *23*(12), 2697–2706. https://doi.org/10.1111/dom.14523

Frazer, K., Mitchell, L., Stokes, D., Lacey, E., Crowley, E., & Kelleher, C. C. (2021). A rapid systematic review of measures to protect older people in long-term care facilities from COVID-19. *BMJ Open*, *11*(10), e047012. https://doi.org/10.1136/bmjopen-2020-047012

Gardner, W., States, D., & Bagley, N. (2020). The coronavirus and the risks to the elderly in long-term care. *Journal of Aging & Social Policy*, *32*(4–5), 310–315. https://doi.org/10.1080/08959420.2020.1750543

Haider, N., Yavlinsky, A., Chang, Y. M., Hasan, M. N., Benfield, C., Osman, A. Y., Uddin, M. J., Dar, O., Ntoumi, F., Zumla, A., & Kock, R. (2020). The Global Health security index and joint external evaluation score for health preparedness are not correlated with countries' COVID-19 detection response time and mortality outcome. *Epidemiology and Infection*, *148*, e210. https://doi.org/10.1017/s0950268820002046

Haslam-Larmer, L., Grigorovich, A., Quirt, H., Engel, K., Stewart, S., Rodrigues, K., Kontos, P., Astell, A., McMurray, J., Levy, A., Bingham, K. S., Flint, A. J., Maxwell, C., & Iaboni, A. (2022). Prevalence, causes, and consequences of moral distress in healthcare providers caring for people living with dementia in long-term care during a pandemic. *Dementia (London)*, *14713012221124995*, 5–27. https://doi.org/10.1177/14713012221124995

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2010). *Multilevel and longitudinal modeling with IBM SPSS (1st ed.)*. Routledge. https://doi.org/10.4324/9780203855263

Kelly, G., & Geffen, L. (2020). *Guidelines, standard operating procedures and clinical practice–preventing and managing COVID-19 infections in long-term care facilities*. Sifar Samson Institute for Ageing Research.

Kumar, A., Misra, S., Verma, V., Vishwakarma, R. K., Kamal, V. K., Nath, M., Prakash, K., Upadhyay, A. D., & Sahu, J. K. (2020). Global impact of environmental temperature and BCG vaccination coverage on the transmissibility and fatality rate of COVID-19. *PLoS One*, *15*(10), e0240710. https://doi.org/10.1371/journal.pone.0240710

Latikka, R., Rubio-Hernández, R., Lohan, E. S., Rantala, J., Nieto Fernández, F., Laitinen, A., & Oksanen, A. (2021). Older Adults' loneliness, social isolation, and physical information and communication Technology in the era of ambient assisted living: A systematic literature review. *Journal of Medical Internet Research*, *23*(12), e28022. https://doi.org/10.2196/28022

Leffler, C. T., Ing, E., Lykins, J. D., Hogan, M. C., McKeown, C. A., & Grzybowski, A. (2020). Association of Country-wide Coronavirus Mortality with demographics, testing, lockdowns, and public wearing of masks. *The American Journal of Tropical Medicine and Hygiene*, *103*(6), 2400–2411. https://doi.org/10.4269/ajtmh.20-1015

Li, Y., Godai, K., Kido, M., Komori, S., Shima, R., Kamide, K., & Kabayama, M. (2022). Cognitive decline and poor social relationship in older adults during COVID-19 pandemic: Can information and communications technology (ICT) use helps? *BMC Geriatrics*, *22*(1), 375. https://doi.org/10.1186/s12877-022-03061-z

Lowe, M., Harmon, S. H. E., Kholina, K., Parker, R., & Graham, J. E. (2022). Public health communication in Canada during the COVID-19 pandemic. *Canadian Journal of Public Health*, *113*, 1–12. https://doi.org/10.17269/s41997-022-00702-z

McHunu, G. G., Harris, O., & Nxumalo, C. T. (2022). Exploring primary healthcare practitioners' experiences regarding the coronavirus disease 2019 (COVID-19) pandemic in KwaZulu-Natal, South Africa. *Primary Health Care Research & Development*, *23*, e67. https://doi.org/10.1017/s1463423622000536

Mota-Romero, E., Campos-Calderon, C. P., Puente-Fernandez, D., Hueso-Montoro, C., Esteban-Burgos, A. A., & Montoya-Juarez, R. (2022). Impact of the COVID-19 pandemic on the perceived quality of palliative Care in Nursing Homes. *Journal of Clinical Medicine*, *11*(19), 5906. https://doi.org/10.3390/jcm11195906

Noguchi, T., Kubo, Y., Hayashi, T., Tomiyama, N., Ochi, A., & Hayashi, H. (2021). Social isolation and self-reported cognitive decline among older adults in Japan: A longitudinal study in the COVID-19 pandemic. *Journal of the American Medical Directors Association*, *22*(7), 1352–1356.e1352. https://doi.org/10.1016/j.jamda.2021.05.015

Nuclear Threat Initiative. (2019). Global Health Security Index website. *Johns Hopkins Center for Health Security and The Economist Intelligence Unit*. Retrieved October 17, 2022, from https://www.ghsindex.org/

Oppenheim, B., Gallivan, M., Madhav, N. K., Brown, N., Serhiyenko, V., Wolfe, N. D., & Ayscue, P. (2019). Assessing global preparedness for the next pandemic: Development and application of an epidemic preparedness index. *BMJ Global Health*, *4*(1), e001157. https://doi.org/10.1136/bmjgh-2018-001157

Organization for Economic Co-operation and Development (OECD). (2021). Rising from the COVID-19 crisis: Policy responses in the long-term care sector. Retrieved November 10, 2021, from https://read.oecd-ilibrary.org/view/?ref=1122_1122652-oyri4k81cp&title=Rising-from-the-COVID-19-crisis-policy-responses-in-the-long-term-care-sector

Palacios-Ceña, D., Fernández-Peña, R., Ortega-López, A., Fernández-Feito, A., Bautista-Villaécija, O., Rodrigo-Pedrosa, O., Arnau-Sánchez, J., & Lizcano-Álvarez, Á. (2021). Long-term care facilities and nursing homes during the first wave of the COVID-19 pandemic: A scoping review of the perspectives of professionals, families and residents. *International Journal of Environmental Research and Public Health*, *18*(19), 10099. https://doi.org/10.3390/ijerph181910099

Pirhonen, J., Forma, L., & Pietilä, I. (2022). COVID-19 related visiting ban in nursing homes as a source of concern for residents' family members: A cross sectional study. *BMC Nursing*, *21*(1), 255. https://doi.org/10.1186/s12912-022-01036-4

Rios, P., Radhakrishnan, A., Williams, C., Ramkissoon, N., Pham, B., Cormack, G. V., Grossman, M. R., Muller, M. P., Straus, S. E., & Tricco, A. C. (2020). Preventing the transmission of COVID-19 and other coronaviruses in older adults aged 60 years and above living in long-term care: A rapid review. *Systematic Reviews*, *9*(1), 218. https://doi.org/10.1186/s13643-020-01486-4

Salcedo-Pérez-Juana, M., García-Bravo, C., Jimenez-Antona, C., Martinez-Piédrola, R. M., Fernández-De-Las-Peñas, C., & Palacios-Ceña, D. (2022). Relatives experiences during the COVID-19 pandemic: A qualitative study set in Spanish locked-down nursing homes. *Jpn Journal of Nursing Science*, *e12510*. https://doi.org/10.1111/jjns.12510

Sarabia-Cobo, C., Pérez, V., de Lorena, P., Hermosilla-Grijalbo, C., Sáenz-Jalón, M., Fernández-Rodríguez, A., & Alconero-Camarero, A. R. (2021). Experiences of geriatric nurses in nursing home settings across four countries in the face of the COVID-19 pandemic. *Journal of Advanced Nursing*, *77*(2), 869–878. https://doi.org/10.1111/jan.14626

Smith, C. B., Wong, K. L. Y., To-Miles, F, Dunn, S., Gregorio, M., Wong, L., Tam, S., Huynh, P., & Hung, L. (2023). Exploring experiences of loneliness among Canadian long-term care residents during the COVID-19 pandemic: A qualitative study. *International Journal of Older People Nursing*, *18*(1), e12509. https://doi.org/10.1111/opn.12509

Thangavel, G., Memedi, M., & Hedström, K. (2022). Customized information and communication Technology for Reducing Social Isolation and Loneliness among Older Adults: Scoping review. *JMIR Ment Health*, *9*(3), e34221. https://doi.org/10.2196/34221

Thompson, D.-C., Barbu, M.-G., Beiu, C., Popa, L. G., Mihai, M. M., Berteanu, M., & Popescu, M. N. (2020). The impact of COVID-19 pandemic on long-term care facilities worldwide: An overview on international issues. *BioMed Research International*, *2020*, 8870249. https://doi.org/10.1155/2020/8870249

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. *Lancet*, *370*(9596), 1453–1457. https://doi.org/10.1016/s0140-6736(07)61602-x

Wachholz, P. A., Melo, R. C., Jacinto, A. F., & Villas Boas, P. J. F. (2022). Impact of long-term care facilities' size on adherence to COVID-19′ infection prevention guidance. *Revista Latino-Americana de Enfermagem*, *30*, e3557. https://doi.org/10.1590/1518-8345.5581.3557 (Impacto do tamanho das instituições de longa permanência na adesão às orientações de prevenção de infecções por COVID-19.)

Wang, W., He, Q., Liu, M., Wang, M., & Sun, X. (2020). Covid-19: Lack of knowledge is driving public panic. *BMJ Opinion*. Retrieved November 7, 2022, from. https://blogs.bmj.com/bmj/2020/02/28/communicating-research-evidence-about-covid-19-to-reduce-public-panic/

White, E. M., Wetle, T. F., Reddy, A., & Baier, R. R. (2021). Front-line nursing home staff experiences during the COVID-19 pandemic. *Journal of the American Medical Directors Association*, *22*(1), 199–203. https://doi.org/10.1016/j.jamda.2020.11.022

Wolverton, S., Dombrosky, J., & Lyman, R. L. (2016). Practical significance: Ordinal scale data and effect size in Zooarchaeology. *International Journal of Osteoarchaeology*, *26*(2), 255–265. https://doi.org/10.1002/oa.2416

World Health Organization. (2020). Novel Coronavirus(2019-nCoV): Situation Report - 11. Retrieved May 14, 2021, from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200131-sitrep-11-ncov.pdf?sfvrsn=de7c0f7_4

World Health Organization. (2021). Infection prevention and control guidance for long-term care facilities in the context of COVID-19: Interim guidance. Retrieved 21 October, 2022, from https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC_long_term_care-2021.1

World Health Organization. (2022). Joint external evaluation tool: International Health Regulations (2005) - third edition. Retrieved 7 November, 2022, from https://www.who.int/publications/i/item/9789240051980

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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