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Resilient health systems for already resilient countries? Pandemic discourses in the post-COVID-19 era

Juan Arroyo-Laguna (https://orcid.org/0000-0002-3183-4046) [1]

Abstract *This study aimed to reconstruct and analyze the discourses of the pandemic in the post-COVID-19 era. The methodology was based on a critical review of the scientific literature on the pandemic, selecting 80 non-biomedical, clinical, or pharmacological articles published in journals indexed in Scopus or Web of Science from a sample of the 500 most cited scientific articles on the pandemic in Google Scholar. The theoretical approach was based on the debates on predictability, unpredictability, determination, and indeterminacy in the health and social sciences. As a result, six theses on the pandemic were identified and analyzed: a) the thesis of the unpredictability of pandemics; b) the thesis of pandemic denial; c) the thesis of the pandemic as a failure in predictability systems; d) the thesis of the prevention of catastrophic events with timely interventions; e) the thesis of the structural postponement of predictive care by non-developed countries; and f) the environmentalist-health thesis, of foreseeing a critical phase for the planet and humanity. We concluded on the limits of resilience as the center in preparing Latin American health systems in the post-pandemic.*

Key words *Health surveillance, Disaster management, Pandemic, COVID-19, Health discourses*

[1] Facultad de Ciencias Empresariales, Universidad San Ignacio de Loyola. Lima Peru. juan.arroyol@usil.pe

Introduction

COVID-19 caused irreparable damage to various sectors of society and is considered the greatest health challenge of the past 100 years[1]. Furthermore, the high capacity for adaptive mutations of the etiologic agent, the Sars-CoV-2 virus, and the emergence of new variants heighten the uncertainties regarding vaccine coverage and the end stage of the pandemic[2].

In 2020, the first year of the pandemic, guidelines issued by Brazil's national health surveillance agency (*Agência Nacional de Vigilância Sanitária*, ANVISA)[3] recommended that the main measures to be taken in dental services include suspending elective care, placing restrictions on emergency care, applying new biosecurity protocols and acquiring personal protective equipment (PPE), such as face shields and N95 or similar masks, as well as encouraging teleworking, distancing in waiting rooms and others[3].

In private dental practice, it is up to the dental employer or employee to make organisational decisions and changes, and to purchase the necessary PPE for safe care. These professionals were directly affected by the suspension of elective treatment: their earnings depend daily on their performance in carrying out procedures to maintain the profitability of their establishments[4]. The biosafety measures to be taken[5] entailed higher expenses and economic consequences of major concern to the profession[6-8].

COVID-19 brought diverse changes to the global scenario and had strong impact on dental practice, especially during the first year of the pandemic[9]. Also, private sector dentists[10] have shown greater emotional impairment than those in the public sector[9-11], possibly due to the numerous uncertainties and insecurity of employment in the private sector.

In view of the atypical problems experienced by these professionals and the concept of occupational stress (which can be defined as a physiological and psychological response to pressures and demands unrelated to workers' knowledge and skills[12]), it became important to identify possible factors causing job stress in the private sector during the pandemic period. Accordingly, this study examined for individual and organisational factors associated with occupational stress among dentists working in the private sector in the first year of the COVID-19 pandemic in Brazil.

Methods

This cross-sectional study used data from a multicentre, observational, cross-sectional study to evaluate the COVID-19 prevention and control measures adopted by dental surgeons, technicians and oral health assistants in Brazil's southern states (Paraná, Santa Catarina and Rio Grande do Sul) in response to the ANVISA recommendations for health services. Data for Paraná were obtained under the responsibility of the Universidade Estadual de Ponta Grossa and the Universidade Federal do Paraná. The study was approved by the research ethics committees of the Universidade Estadual de Ponta Grossa (CAAE certificate: 31720920.5.1001.0105, opinion 4,024,593) and the Universidade Federal do Paraná (CAAE certificate: 31720920.5.3001.0102, opinion 4,312,933).

The design followed a methodological framework for online studies (websurveys), within the limitations of a non-probabilistic, convenience sample. The research and reporting of results were guided by the Checklist for Reporting Results of Internet E-Surveys (CHERRIES)[13].

A research form of open and closed questions was drawn up, subjected to face and content validation, assessment by eight experts in the field and a pilot study with oral health professionals from states not participating in the research. The construction and validation of the data collection instrument used for this research are described in detail in another publication[14].

The questionnaire was organised on the Google Forms platform and the link to participate was sent out by email by the regional boards of dentistry (*Conselhos Regionais de Odontologia*, CROs). The CROs resent the email 14 and 45 days after the first sending, totalling three attempts. In the same period, a wide-ranging dissemination strategy was pursued through social media. Responses to the form were monitored at all times and further dissemination strategies were implemented as needed[15].

The population of the multicentre study comprised 81,531 oral health professionals working in the three southern states in May 2020. With the study population size given by the number registered with the CROs, a non-probabilistic, convenience sample of 2,560 participants was obtained, representing a 3.1% response rate.

Participants from Paraná comprised 1,127 oral health professionals, of whom 435 worked in private dental clinics and surgeries. The sample selected for this study comprised the 384 dental

Table 1. Selected Latin American countries: tests, cases, and deaths from COVID-19, March 2020 – August 2022.

Country/ Indicator	Total tests	Total cases	Total deaths	Total cases per 1M people	Total deaths per 1M people	Population
OECD	2,396,487,922	366,059,039	2,975,676	262,844	2,137	1,392,684,554
Latin America	255,623,597	75,154,524	1,711,694	116,769	2,659	643,619,068
Peru	28,971,116	3,966,898	214,637	117,658	6,366	33,715,472
Brazil	69,951,873	34,018,371	679,996	158,722	3,173	214,326,223
Chile	39,773,213	4,306,955	59,800	220,947	3,068	19,493,184
Paraguay	2,609,819	710,890	19,289	106,043	2,877	6,703,799
Argentina	36,663,990	9,602,534	129,440	212,085	2,859	45,276,780
Colombia	35,241,195	6,278,998	141,075	121,883	2,738	51,516,562
Mexico	15,569,464	6,857,470	328,320	54,121	2,591	126,705,138
Uruguay	6,086,835	971,728	7,415	283,612	2,164	3,426,260
Ecuador	2,870,685	975,234	35,811	54,795	2,012	17,797,737
Bolivia	4,440,371	1,064,405	22,095	88,117	1,829	12,079,472
Costa Rica	3,677,525	1,044,385	8,754	202,638	1,699	5,153,957
Guatemala	4,067,775	802,744	17,139	45,588	973	17,608,483
Cuba	5,296,762	1,108 827	8,529	98,507	758	11,256,372
Venezuela	-	538,435	5,768	19,094	205	28,199,866
Haiti	206,594	32,464	838	2,836	73	11,447,569
Nicaragua	196,380	14,447	236	2,109	34	6,850,540

Source: Authors, based on data obtained from Our World in Data (August 8, 2022)[3].

surgeons in Paraná who responded with regard to their work process in these establishments.

The survey form addressed: sociodemographic characteristics; academic background and work; biosafety and COVID-19-related work process; access to information; and perceptions regarding anxiety, worry and emotional aspects of work. Response options for questions on biosafety and work process were organised on a five-point Likert frequency scale: (1) never, (2) almost never, (3) sometimes, (4) almost always and (5) always. There was also an 'I don't know' option.

In this study, the two outcome items selected as proxy for occupational stress related to perceived anxiety and emotional aspects of work during the pandemic: (1) I feel informed and secure enough to practice dentistry properly during the COVID-19 pandemic and (2) I feel anxious and worried about working properly in my dental practice during the COVID-19 pandemic. Both offered response options on a five-point Likert scale of agreement: (1) strongly disagree, (2) partly disagree, (3) neither agree nor disagree, (4) partly agree and (5) strongly agree. They also offered the 'I don't know' response option.

For purposes of analysis, in addition to the ordinal measure, responses to the two items were dichotomised and categorised as: a) 'No' – negative and neutral responses (completely disagree, partly disagree, neither agree nor disagree); and b) 'Yes' – positive responses (partly agree and totally agree). 'I don't know' responses were considered missing (lost data). The outcomes of interest were the 'No' responses to feeling prepared and safe, and 'Yes' to feeling anxious and worried about working during the COVID-19 pandemic. These were considered proxy variables for stress symptoms.

This study is based on self-perceived stress assessment[16], and the choice of dependent and independent variables followed the explanatory theoretical model of occupational stress proposed by the World Health Organization (WHO)[17] and adapted to dental surgeons working during the pandemic (Figure 1). The proxy variables for stress symptoms include psychological and emotional factors (anxiety and worry) and cognitive and behavioural factors (secure and knowledge). The independent variables identified from the answers were listed as individual factors and extra-organisational and organisational sources of stress con-

nected with the work process, biosafety and access to personal protective equipment (PPE).

The theoretical model described here rests on three explanatory pillars:

1) Individual characteristics: intrinsically individual possible sources of stress represented by the variables: age (dichotomised at the median into less than 39 years old and 39 years old or more), gender (male/female), time since professional qualification (10 years or less/11 to 20 years/more than 20 years), existence of a risk condition for severe COVID-19 (No/Yes) and whether COVID-19 tested (No/Yes);

2) Extra-organisational sources of stress indirectly related to the service as such and represented here by: withdrawal from practice in the pandemic (No/Yes) and access to information guidelines on dental care in health services (No/Yes); and

3) Organisational sources of stress, that is, directly work-related possible causes of stress, such as: type of work relationship (dichotomised into self-employed and other relationships), having received workplace guidance on measures to be taken during the COVID-19 pandemic (No/Yes) and a set of questions about work process organisation (suspension of elective care, participation in decision-making, reduction of workload, investigation for symptoms of respiratory infection when scheduling appointments, specification of urgency following prior clinical protocols, COVID-19 guidance from dentist to patients, use of digital tele-guidance and tele-monitoring tools), which were categorised into 'always/almost always', 'sometimes ' and 'almost never/never'. The same went for dental clinic biosafety factors (cleaning and disinfection of the environment and suction hoses at each appointment, use of sterile handpieces at each appointment, four-handed dentistry, use of the rubber dam in high-speed procedures, avoidance of aerosol-generating procedures, doffing in correct sequence at each appointment) and access to, and use of, PPE (N95/PFF2 masks and waterproof aprons in sufficient quantity, use of face shield during patient care and N95/PFF2 mask reuse in accordance with safety criteria) (Figure 1).

Lastly, the responses identified as proxy for occupational stress constituted the study outcome were the resultant of, on the one hand, sources of stress which can foster anxiety and concern and, on the other, information and conditions for safe clinical care during the pandemic (Figure 1).

The data were organised in a Microsoft Excel spreadsheet and analysed using the SPSS for Windows (version 16.0) Package for the Social Sciences statistics programme. The sample's sociodemographic, education, work and health characteristics were analysed using descriptive statistics. Absolute and percentage frequencies were measured for categorical variables, and medians (± interquartile intervals), for numeric variables.

Associations between outcome variables were quantified using Spearman's correlation test. Bivariate associations between outcomes (proxy for occupational stress) and explanatory variables (individual, extra-organisational and organisational factors) were measured using Pearson's chi-square test, to a 5% level of statistical significance. Variables associated with each outcome with p-value ≤ 0.20 were eligible for multivariate analysis, which was performed by binary logistic regression. Results for the variables included in the multivariate explanatory model are displayed by crude and adjusted odds ratio with respective 95% confidence intervals. Years since completion of undergraduate course showed multicollinearity with age and was excluded from the analysis. Variables were included in the regression analysis by the enter method. Goodness of fit of the final model was assessed using the Hosmer and Lemershow test, with $p \geq 0.05$ indicating fit.

Results

The sample characterisation (Table 1) revealed that participants were predominantly female (74.7%) and 39 years old or less (51.0%). Most reported no risk factors for the development of severe forms of COVID-19 (90.9%) and had not yet been tested for COVID-19 (71.6%). On the other hand, most participants declared having left off working in a dental clinic during the pandemic (84.4%), having had access to official COVID-19 prevention and control guidelines (84.4%) and having received workplace guidance on measures to be taken during the COVID-19 pandemic (77.5%). Table 1 also shows that, despite the high frequency of reports of feeling prepared and safe to work properly in dentistry during the COVID-19 pandemic (78.1%), most participants reported feeling anxious and worried (64.8%).

The measure most often adopted to prevent and control the spread of COVID-19, as reflected in the response 'always/almost always', was to investigate for symptoms of respiratory infection when scheduling appointments (83.4%) and the measure least applied was to suspend elec-

tive procedures and restrict care to emergencies (29.7%) (Table 2).

The biosafety measure most often taken in dental clinics, as given by 'always/almost always' responses, was for a trained professional, with appropriate PPE, to clean and disinfect the environment (80.5%), while the least applied was to avoid aerosol-generating procedures (26.6%), to use a rubber dam in high-speed treatments (32.0%), four-hand dentistry (40.1%) and to use sterile handpieces at each appointment (42.7%) (Table 2).

The PPE most commonly available and used was the face shield (85.4%) and N95/PFF2 masks were available in sufficient quantity for most participants (76.6%) (Table 2).

Table 3 shows the bivariate associations between explanatory factors of the theoretical model and the dichotomised outcome variables. As regards the individual factors, participants who felt prepared and confident were mostly male ($p = 0.018$), over 39 years old ($p < 0.001$), trained more than 20 years ago ($p < 0.001$) and had some risk factor for severe forms of COVID-19 ($p = 0.044$). Women ($p = 0.015$), younger participants (up to 39 years old) ($p < 0.001$) and more recent graduates (qualified up to 10 years previously) ($p = 0.055$) reported greater anxiety and concern (Table 3).

In the block of extra-organisational work-related factors, professionals who stopped working during the pandemic were more anxious and concerned ($p = 0.020$), while those who had access to official COVID-19 prevention and control guidelines were more prepared and confident ($p = 0.050$) (Table 3).

With regard to organisational factors, participants who declared they were more prepared and confident reported receiving workplace guidance on measures to be taken during the pandemic ($p < 0.001$), always or almost always suspending elective care ($p = 0.035$) and participating in decision-making ($p < 0.001$), as well as those who reported 'always/almost always' investigating for respiratory infection symptoms when scheduling appointments ($p < 0.001$), specifying emergencies on the basis of established protocols ($p < 0.001$) and using digital tele-guidance and tele-monitoring tools ($p < 0.001$). As regards workplace biosafety measures, participants who reported feeling better prepared and safer responded that 'always/almost always': a) the environment was cleaned and disinfected by a trained professional with appropriate PPE ($p < 0.001$); b) suction hoses were cleaned at each appointment ($p < 0.001$); c) sterile pens and handpieces were used at each appointment ($p < 0.001$); d) four-hand dentistry was performed ($p = 0.002$); e) aerosol-generating procedures were avoided ($p = 0.005$); f) doffing followed the recommended sequence ($p < 0.001$); g) enough N95/PFF2 masks were available ($p = 0.018$); and h) enough waterproof aprons were available ($p = 0.046$) (Table 3).

The most anxious and concerned were women ($p = 0.015$), young people (up to 39 years old) ($p < 0.001$), participants who had completed their professional training within 10 years earlier ($p = 0.055$), who withdrew from clinical work during the pandemic ($p = 0.020$) and who "always/almost always" suspended elective care ($p = 0.037$) and used a face shield ($p = 0.001$). The most anxious and concerned declared that they "never/almost never" took part in decision making ($p = 0.010$). Also more anxious and worried were those who answered "sometimes" with regard to a trained professional's cleaning and disinfecting the environment ($p = 0.009$) and four-hand dental care ($p < 0.001$) (Table 3).

Table 4 shows the results of multivariate analysis for feeling individually prepared and safe with regard to, and anxious and concerned about, working in a clinic during the pandemic. The final model revealed that the preparedness and safety outcome was associated with individual and organisational biosafety-related factors. Participants were less likely to feel prepared and safe regarding clinical care because of individual factors (being female and younger) and organisational factors (not receiving workplace guidance on measures to be taken during the pandemic and "almost never/never" doffing in the recommended sequence). COVID-19-related factors, such as risk factors for severe forms of the disease and laboratory testing to detect COVID-19, were of borderline statistical significance and adjusted the explanatory model.

In the multivariate model, feelings of anxiety and concern about working were found to be associated with only one individual factor – age – and with factors relating to work process organisation and biosafety in the clinic. Younger dentists, those who "almost never/never" participated in decision-making and who "sometimes" performed four-handed dental procedures were more likely to feel anxious and worried. Less likely to be anxious and worried were those who "almost never/never" suspended elective care and who "sometimes" used a face shield (Table 4).

Table 2. Social variables of selected Latin American countries in pre-pandemic and pandemic.

Country/ Indicator	Population in situations of extreme poverty and poverty (%)		Informal employment (%)		Total income of the 20% of the population with the lowest income (%)		Total income of the 20% of the population with the highest income (%)		Population using safely managed drinking water services (%)	
	(2018)	(2020-2021)	(2018)	(2020-2021)	(2018)	(2020)	(2018)	(2020)	(2018)	(2020)
Venezuela	90.2	94.5	48.5	84.5	-	-	-	-		
Cuba	-	72.5	-	-	-	-	-	-		
Haiti	-	60.0	-	-	-	-	-	-		
Honduras	50.4	59.2	70.0	80.0	3.4	-	53.1	-	18.4*	18.7*
Mexico	49.9	52.8	57.6	57.1	4.9	5.0	52.6	51.2	42.8	43.0
Colombia	34.7	39.3	62.4	63.2	4.0	2.8	55.4	58.3	72.9	73.0
Argentina	24.4	39.2	48.5	48.9	5.0	4.8	46.5	47.3		
Bolivia	39.9	39.0	80.7	84.9	4.5	4.7	47.5	49.0		
Ecuador	23.2	27.7	62.6	68.6	4.6	4.1	51.0	52.3	66.4	66.8
Paraguay	24.2	26.9	70.3	69.3	4.8	5.3	51.5	49.3	63.9	64.1
Peru	20.5	25.9	68.5	70.1	5.0	4.8	47.9	49.1	50.7	51.3
Brazil	25.3	24.1	39.8	39.4	3.1	4.5	58.3	54.7	84.3	85.8
Costa Rica	21.1	23.0	40.3	40.8	4.3	4.0	53.3	54.4	80.5	80.5
Chile	8.6	10.8	29.3	27.1	-	5.5	-	51.6	98.8	98.8
Uruguay	8.1	10.6	24.0	21.9	5.9	5.7	45.9	46.2	94.6*	94.6*
Panama	21.4	-	51.4	55.7	3.6	-	53.6	-		

Source: Authors – population in poverty and extreme poverty based on data from CEPALSTAT; informal employment based on data obtained by ILOSTAT; drinking water data based on WHO/UNICEF Joint Monitoring Program (JMP) for Water Supply and Sanitation; quintile income data from the World Bank. * In the cases of Honduras and Uruguay, the indicator was only found at the rural and urban levels, respectively.

Table 3. Resources of the health systems of selected Latin American countries before and during the pandemic.

Country/ Indicator	Per capita public spending on health (dollars)	Public spending on health (% of GDP)		Doctors per 10,000 inhabitants	Nurses per 10,000 inhabitants	Hospital beds per 1,000 inhabitants	ICU beds per 100,000 inhabitants		Average fixed broadband internet speed in Mbps*	
	(2017)	(2018)	(2021)	More recent data	More recent data	More recent data	(2018)	(April 2020)	(April 2018)	(August 2022)
Uruguay	1,165	6.2	7.5	49.4	72.2	2.4	19.9	20.2	35.9	187.8
Cuba	877	9.9	12.6	84.2	75.6	5.3			3.9	6.9
Panama	729	4.7	4.9	16.3	32.1	2.3			34.5	152.3
Costa Rica	659	5.4	6.7	33.0	38.0	1.1			11.4	76.1
Chile	739	5.5	5.7	28.4	43.5	2.1	7.0	10.6	47.4	285.9
Argentina	692	6.0	6.8	40.6	26.0	5.0	19.0	25.8	19.7	75.6
Colombia	367	5.9	6.0	23.3	14.6	1.7	-	6.8	13.8	113.2
Brazil	355	3.9	4.6	23.1	74.0	2.1	8.0		23.6	151.6
El Salvador	184	4.5	6.4	28.7	18.3	1.2	1.2	1.6	8.4	35.5
Mexico	259	2.7	3.3	24.3	28.5	1.0	2.0	6.6	22.4	71.9
Peru	255	3.2	4.1	13.7	29.8	1.6	0.9	4.1	22.4	74.6
Ecuador	310	4.9	4.4	22.2	28.3	1.4	1.5	2.7	13.1	57.4
Bolivia	171	4.8	4.5	10.3	15.6	1.3			6.9	31.5
Paraguay	175	3.0	3.9	10.5	16.6	0.8			27.8	88.7
Guatemala	93	2.2	3.0	12.4	22.4	0.4			7.9	33.8
Nicaragua	104	5.1	5.8	16.7	15.5	0.9			6.6	54.4
Haiti	8	0.9	0.8	2.3	3.9	0.7			8.3	24.1

Source: Authors, based on World Bank and World Health Organization data.

Discussion

This study showed that most dentists reported feeling anxiety and concern about working during the COVID-19 pandemic, and that individual and organisational factors were associated with occupational stress among dentists in the private sector in the state of Paraná during the COVID-19 pandemic. Studies have shown that the pandemic affected mental health adversely in the population at large[18], and especially among health personnel[19], including private-sector dentists[10], who were more affected as compared with the emotional state of public-sector dentists[10,11], possibly because of the unpredictability inherent to economic and work conditions in the former sector.

Women are a majority among dental professionals in southern Brazil and the mostly-female sample was similar to those of most studies of dentists there, corroborating the feminisation of the profession[20,21]. Although studies have shown women to be more perceptive of mental health, the only outcomes with which gender was found to associate in this study were preparedness for, and safety at, work: more women reported feeling less prepared and safe. Although, in this study, gender was not retained in the multivariate analysis as a factor associated with anxiety, in the literature, women have been found at greater risk of anxiety during the COVID-19 pandemic[19,22]. That age showed greater impact than gender may be explained by the professional experience gained with age's fostering feelings of being informed and safe in clinical practice and, consequently, resulting in less anxiety and concern at work and mitigating the influence of gender.

In this study, most participants were in the younger age groups (median age, 39; 75% percentile, 47 years). Younger people tend to use social networks more and are more likely to respond to online surveys. With social isolation, however, the population as a whole began to make more use of these tools[23], which may justify the similar participation by different age groups. Age was the only individual factor retained in the theoretical model in both outcomes, in which younger professionals felt less prepared and safe, and more anxious and concerned about working during the pandemic. In Turkey, recent dentistry graduates seemed to be the most affected during the pandemic[24] and a study in Paraíba State in Brazil showed greater confidence in working during the pandemic among older dentists, which can be explained by their being longer in practice and more stably established in the profession[25].

As regards the organisational factors, participants who received workplace guidance on COVID-19 reported greater confidence and preparedness for work, highlighting the importance of continuing health education for practitioners. A study in São Paulo state showed that more than 80% of dentists received no specific training to control COVID-19 transmission in the healthcare environment, although several courses were available and widely publicised[11].

Participants who did not follow the recommended sequence for doffing PPE felt unprepared and more insecure in providing care during the pandemic. Given that doffing is one of the main routes for contamination of health personnel, this procedure is as important as donning[3]. Adequate access to, and proper use of, PPE have been associated with not only physical health protection, but greater job satisfaction and lesser emotional distress[26].

Organisational factors relating to adherence to COVID-19 protocols were associated with anxiety and concern about working. Lack of participation in decision-making was associated with a greater likelihood of participants' being anxious and worried, suggesting that those employed in clinics, with fragile employment relationships, were adversely affected. This underlines the importance of team dialogue, as well as managers' role in guiding targeted measures.

Professionals who understood the importance of the adjustments were more affected emotionally, as they were more aware of the risk of infection and possibly more concerned about the consequences of contamination, as evidenced in the association between use of face shield and anxiety and concern. Lax adherence to protective measures, reflected in the "sometimes" responses with regard to four-hand care, showed that uncertainty regarding the workplace support structure can generate anxiety and concern among health personnel. Private sector care teams do not always include oral health assistants and technicians, although this can optimise the work, possibly because they represent an additional financial burden for the clinics. Nonetheless, four-hand dentistry is highly recommended and stressed during pandemics because it helps reduce the generation of aerosols, speeds up care and, consequently, reduces the risk of contamination[27].

On the other hand, participants who did not suspend elective care were less anxious and worried. With time, they had possibly grown used to the inappropriate conditions or this may even suggest carelessness and denial of the severity of

the pandemic, both of which are associated with a lesser likelihood of occupational stress. A study in Poland showed that dentists who suspended their clinical work reported greater anxiety than those who continued their practice without interruption[22]. In general, however, dentists seem to have a good command of knowledge of COVID-19 and the adjustments necessary in services to minimise the risk of contamination[28].

Patient flow, in both urgent and elective care[29], has been seen to decrease in private dental services worldwide, entailing financial losses for practitioners. Also, the impact of COVID-19 on dentists' financial situation is determined by factors beyond those inherent to suspending care during a critical period of the pandemic, because the economic situation of patients who attend private dental clinics is intrinsically bound up with the country's economic situation. Accordingly, the current economic crisis in Brazil, which involves reduced purchasing power, high rates of unemployment and food insecurity, has heightened the impacts of the pandemic and aggravated this problem[30].

The findings of this study, in which participants under most occupational stress were younger, women and more recent graduates, demonstrate the existence of precarious work relations in the private dental sector. In practice, it is increasingly common for employment situations not to assure favourable conditions of care and adequate PPE, but subject dental workers' wage gains to their quantitative performance of procedures, which diminished or were abruptly stopped during the pandemic period. This thus resulted in substantial financial losses and, consequently, affected these workers' emotional health. Also, informal employment lacking guarantees has devalued and impaired working conditions. That dental practice in the supplementary health market is precarious is recognised in the literature[31], and in Brazil, it has to be acknowledged that the labour market is over-supplied with dental surgeons, as a result of the excessive number of schools of dentistry across the country, plus a lack of market regulation and State control[31].

The findings of this study may thus be reflecting the effects of problems existing in the dental sector labour market prior to the pandemic, especially in southern Brazil, where this study took place and where, after the southeast, most of Brazil's dentists are concentrated[32]. The findings, which are grounded in the concepts of the theoretical models applied[33,34], help to explain, in part, socioeconomic points of view on occupational stress among dentists, which was aggravated during COVID-19.

Having been tested for COVID-19, although not associated at the 5% level, was an important variable in fitting the final explanatory model. This finding may be connected with uncertainty about possible infection by the disease, which would affect dentists emotionally, especially at a time when there were no proven effective drugs nor vaccines available for the disease. The sample comprised liberal professionals from the private sector, most of whom had only one job and were thus not only concerned over their own health with regard to this newly-arrived installed infectious disease, but were suffering direct impact on their financial situation from the necessary period of isolation, quarantine and resulting absence from work, which left them apprehensive and worried about the future of the profession[35,36].

Vaccination has been highly effective in controlling COVID-19[37] and may impact the responses of participants who answered the questionnaire early in the pandemic. Accordingly, the multicentre research team plans to conduct a further wave of data collection. Although the instrument used to measure occupational stress was a proxy for occupational stress and the validation of the research instrument has yet to be published, the data obtained here are consistent with findings in the literature on the subject[19,24]. Note that the data were collected between August 10 and October 7, 2020 and, given the spread of the pandemic into new phases, accentuated by the emergence of new variants of the virus, the findings should be interpreted with caution, as they may not be representative of the whole pandemic period. One limitation of this study is the bias inherent to participation in an online questionnaire by a convenience sample. However, sample calculation found that the study sample was of sufficient sise to represent the state of Paraná.

The findings of this study underline the need to build strategies to minimise the emotional impacts suffered by private sector dentists during the COVID-19 pandemic. It is the job of Brazil's federal and regional boards of dentistry to enable and encourage dental caregivers to qualify through permanent health education to afford them effective preparation and safety for working in clinical practice. It is the function of the regulatory bodies to supervise and seek to improve labour relations and working conditions in the private dental sector, so as to guarantee dentists' rights, given that these conditions are intrinsical-

ly related to the occupational stress suffered by workers, which may potentially affect their mental health.

Collaborations

EC Pacheco and LS Avais: study design, data collection and interpretation, drafting of the article. RG Ditterich, MF Silva-Junior e MH Baldani: study design, data collection and interpretation, final review of the article.

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ERRATUM

p. 2993-3001

reads up:

Introduction

Latin America has 8.4% of the world's population but has had 24% of COVID-19 infections and 28% of deaths for that cause until August 2022. Other more populated regions had proportionally fewer infections and deaths: Asia, with 59.5% of the world's population, had 27.9% of infections and 22.6% of deaths; Europe, with 9.6% of the population, had 36.8% infections and 29.3% of deaths; North America, with 4.7% of the population had 16.2% infections and 16.7% of deaths.

The first case confirmed in Latin America was registered in Brazil on February 26, 2020, and the first deceased in Argentina on March 7. Since then, until August 2022, the region has paid the cost of 1.711 million lives due to the pandemic[1]. Obviously, the cost has been different throughout Latin American countries. Table 1 shows that Peru stands out in terms of deaths by COVID-19 per million inhabitants, with a rate of 6,366, followed by Brazil and Chile, above 3,000 deaths. A second group comprises Paraguay, Argentina, Colombia, Mexico, Uruguay, and Ecuador, with mortality rates between 2,012 and 2,877. A third group with minor rates includes Bolivia, Costa Rica, and Cuba, below 1,800 killed per million. Whatever the variation between countries, the regional mean is high (2,659), above that of the OECD (2,137) and other world regions.

Why this disproportion in Latin America? What did we do wrong? Do we not have health management capabilities in the face of epidemics and pandemics? Is it centrally a problem of our health systems? Was another result possible with our types of societies?

Now, looking at the future, will we have learned the lesson? What are the big lessons? The central discourse that stems from the North about converting our health systems to resiliency, in adapting what we have before eventual new pandemics, must it be the axis of our solutions for them? Will we not need to enter a new battle for health ideas in the Post COVID-19 era, which allows another perspective of what lies ahead?

Methods

The present paper reviews and discusses the literature that attempts to answer these questions, under the hypothesis that the use of the window of opportunity that means the socio-health crisis experienced depends on evaluating how much these crises are predictable and confrontable, which requires evidence and adequate approaches to assess them. The central narrative on the type of post-pandemic normality throughout Latin America is at stake, which includes its health systems.

The study is based on a review of the non-medical, clinical, or pharmacological scientific literature on the pandemic. General search descriptors such as <pandemic COVID-19>, <SARS-CoV-2>, <coronavirus> were adopted and returned 437,000 results in Google Scholar, 150,804 in PubMed, and 28,428 in Science Direct from 2020 to August 2022. The analysis of a sample of the 500 most cited scientific articles on Google Scholar revealed that most of the global production on the pandemic (84%) is biomedical. The remaining 16% seeks a global interpretation of what happened and forward public policies. The critical review of these 80 scientific articles, editorials, and comments in indexed journals in Scopus or Web of Science has been the base material for the present reflection on the state of the matter.

Results

Literature on the pandemic and spectrum of the predictable and unpredictable

There has been much scientific production about COVID-19 since the first cases in Wuhan, most from virology, molecular biology, genetic engineering, clinical medicine, and veterinary medicine. However, there have also been more panoramic readings of the pandemic from epidemiology, public health, social sciences, and humanities, and they can be classified into a continuum between two extremes: from the Black Swan theory or Taleb's Impact of the Highly Improbable[2] to environmental-public health the-

ories, proposing a Single Health or articulation between human medicine, veterinary medicine, and ecology[3,4]. These general writings about the pandemic could be classified into six theses of what happened: a) the unpredictability of pandemics; b) the denial of the pandemic; c) the pandemic as a failure in predictability systems; d) the possible prevention of catastrophic events with interventions focused on critical variables; e) the structural postponement of care from predictions by underdeveloped countries; and f) the environmentalist-health-related, forecasting a critical phase for the planet and humanity.

It is evident that there are no precise borders between these approaches to the pandemic, and there are many mixtures. However, the location in some of these postures has apparent implications on what is proposed forward.

Unpredictability or the fortuitous case

The thesis of unpredictability is that of chance in history, understood as a succession of black swans or high-impact and unpredictable rare events. It is true that we are returning from the deterministic rationalist understandings that dominated most of the nineteenth and twentieth centuries. Since Khaneman[5], Thaler et al.[6] and Akerlof et al.[7], behaviorism has been giving an account of the last remnants of the *Homo Economicus*, raised as predictable according to the calculation of their interests. However, this new focus between the rational and the intuitive, between the structured and semi-structured or unstructured, does not imply indeterminacy.

The studies self-limited to the "zero cases" in the Huanan market are approaching the unpredictability or random contagion thesis under the assumption of infectious events without underlying determinants. The exaltation by some followers of a traditional tropicalism these last two years has attempted to focus the issue on the details of the first cases on the southwest side of the Huanan market and, thus, lost sight of the set[8,9]. According to this line of thought, a hypothetically fortuitous act where a virus that coexisted thousands of years with bats was transmitted to humans. However, this transmission would have occurred anywhere else on the planet had it not been in Wuhan because the multiplication of zoonoses is a symptom of our time. The issue is "why".

The denial of the pandemic

It was relatively easy to shift from the SARS-CoV-2 thesis as a rare and unpredictable event to the denial of its actual existence, or its severity, or even the thesis of facilitating the "flock immunity"[10,11].

Thus, three years of public intervention denialism were inaugurated under the alleged claim of defending individuals. Initially, conservative governments allowed the unrestricted spread of the virus, postponing social distancing or immobilization measures[12]. This rhetoric raised a moral claim of freedom without responsibility[13]. Once again, we stood before the dilemma of collective action or tragedy of the commons in societies with the primacy of individual interests. There is no public good nor public/collective health.

Either with the thesis that COVID-19 was the result of some conspiracy, that the scientific community was wrong, that the coronavirus did not have the severity it was assigned, or that masks or quarantines or vaccines were unnecessary, countries like The United States, England, Brazil, Argentina, Mexico, were for some time defenseless against the pandemic[14-16]. As Paviotti[17] says, another battle was established in this context of fake news, fears, speculations, and misinformation: the political struggle for narrative control.

The failure of the predictability systems

Most of the literature has focused on pragmatically examining failures in the early detection of the pandemic. From this viewpoint of the pandemic, it is a management failure of many governments, of which there have certainly been many before. And they have cost many lives lost: in a crisis, all delay, omission, and erroneous decision translates into massive avoidable morbimortality.

The WHO emergency committee's 71-day delay in declaring the pandemic has remained in the memory of global public health and health authorities as one of the things that cannot be repeated. International health regulations that define the steps to report pandemics and have control measures have begun to be rediscussed. There has been a feeling that a new "treatise on pandemics"[18] is necessary, whose draft has been announced for 2024, which is too far.

The COVID-19 pandemic exposed decades of State weakening and its inability to manage risks given the practical non-existence of anticipation and planning. The incorporation of Latin America

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into the global era of pandemics was not noticed, and this is not the first pandemic. Regarding the coronavirus, global society remembered the pandemics of the 20th and 21st centuries, although only a few lessons were learned from the previous ones.

Precursors always foretell significant historical events without anyone paying attention to them. Laurie Garrett's early warnings still ring in our ears: *While the human race battles itself, fighting over ever more crowded turf and scarcer resources, the advantage moves to the microbes' court. They are our predators, and they will be victorious if we, Homo sapiens, do not learn how to live in a rational global village that affords the microbes few opportunities. It is either that or we brace ourselves for the coming plague*[19].

Osterholm[20] warned that time was running out to prepare for a pandemic. Webster[21] predicted two years earlier that it was only a matter of time before we witnessed another deadly and disturbing pandemic. Almost all those responsible for studying global disasters and emergencies knew and announced that a pandemic was in the offing[22]. The first were the ecologists, and today it is clear their precursor message was correct. For most of the specialized literature, the zoonosis from which SARS-CoV-2 derives is a reaction to an exacerbated cornering of the planet[23].

As far as Latin America is concerned, the delay in entirely acting was two months since the first COVID-19 cases were reported at the end of February, especially in March 2020, when the region woke up. All of the above was a rhythm of waiting and a very weak preparedness, with some exceptions. However, between the first and second half of March, when the infections and deaths had a domino-like effect, all the countries closed their borders and took emergency measures and mandatory immobilization or quarantines. Argentina entered a state of emergency or exception on March 11, Colombia and Bolivia on March 12, Peru on March 15, Costa Rica on March 16, Brazil on March 20, and Mexico on March 30[24]. The countries' borders were closed, and the Latin American governments and health systems took a sharp turn in that fortnight. Moreover, many previous warning signs of those two months are now known to have been minimized or ignored. Many unreported or not studied cases presented in February have been discovered recently.

There is a vast written production on the weakness of the ministries' and governments' early warning systems, as we will see[25]. Indeed, there has been neglect. However, is it only that of those two months and nothing more?

The problem with this type of literature is that it addresses health emergencies as the periodic hiccups of normal society. It is not necessary to correct society but hiccups. It does not ask why the recurrence of these same emergencies and whether the surveillance systems are there to support the resolution of the issues or instead to relieve and postpone them for the next occasion. That is why they act proactively for emergencies that they consider naturally repeatable. The problem is, given the current global context and the poor conditions of most Latin American societies and health systems, are we still living in a continuous health emergency that has become our normality?

The possibility of preventing catastrophic events with specific interventions

Another type of literature seeks to generate evidence to prevent future eventualities by reinforcing health systems and societal environments. To this end, studies on the combinations of variables, indicators, and explanatory categories of the two great pandemic results, infections, and COVID-19 deaths, have multiplied. Among them are the studies by Acosta[26], García, Alarcón et al.[27], Schwalb et al.[28], and Cid et al.[29]. The value of this latest literature is that, besides capturing critical variables backward, it allows prioritizing forward where to emphasize interventions so that what happened is not repeated. The question is whether a range of specific interventions guarantees the non-repetition of systemic events.

The structural postponement of forecasting attention by developing countries

This thesis transcends the previous ones as far as the decision-makers no longer intend to attend to the forecasts when there are any. These are authorities and managers of unprotected societies with deficient health systems, that is, most Latin American countries.

People know what is coming, but they need to act accordingly. Thus, health exclusion situations are rhetorically addressed, and the intentional and revocable non-application of the law is normal. Holland's[30] concept of forbearance explains this "normally tolerated default". In Latin America, forbearance is related to omission as a policy. According to McConnell et al.[31], the study of public policies has been characterized by a bias toward the study of State activity. However, it has yet to focus on analyzing its inactivity. In many southern countries, the State is aware of the gaps

that do not allow it to guarantee the rights of its population. It, therefore, allows a political culture of "consensual non-compliance". For this reason, the resilience of health systems will be insufficient for the next crisis.

In Latin America, the pandemic defeated not only the health systems but also the historical model of Iberian American societies without universal social protection regimens[32,33]. Health systems in the region need to be organized practically under the principle of Health for All, but rather Health for Some[34]. There is a permanent deficit of supply accessible to the entire population, which expresses a level of exclusion allowed and is part of the reproduction mechanism of the old normality. This undercoverage is expressed in the over-exhaustion of the working or informal population and, therefore, in a morbimortality and loss of years of healthy life avoidable since before the pandemic.

These health systems were asked during the pandemic to solve the problem that States and governments had been unable or wanted to solve for decades. Most countries had substandard societies and health systems. Given that the Latin American countries have different reproduction models, they are organized around points of balance or imbalance, with variable levels of centripetal and centrifugal forces and mean exhaustion or over-exhaustion, thus with protected, semi-protected, and unprotected countries with high, medium, and low resilience, more or less lethal and contagious countries, since before the pandemic.

All of this was expressed in the pandemic. The "society-health system binomial" largely determined the infection volume and excess mortality. We can observe from the figures in Table 2 that countries with higher levels of poverty, with high informality levels, with high percentages of their wealth concentrated in their upper quintiles, without safe quality water, among other societal variables, were predestined to failure, and vice versa.

As of March 2020, governments charged their health systems with saving their societies. However, as seen in Table 3, most of these arrived at the pandemic with few resources, with low public spending and high out-of-pocket spending. The latter was, on average, 32% of total health spending in 2019, while it was 21% in the OECD. Public spending per capita exceeded 700 dollars per annum only in Costa Rica, Panama, Cuba, and Uruguay, and many countries ranged from 100 and 300 dollars per annum.

In most cases, public health spending against GDP ranged from 3% to 6%. The doctors, nurses, and beds rates did not exceed WHO standards either. It is unsurprising that the region, with 8.4% of the world population, has produced 15.3% of global excess mortality. Furthermore, in 2020, the pandemic increased the number of poor to 204 million and of extreme poor to 81 million and elevated the GINI Index by 0.7 as a regional mean from 2019 to 2020[35]. It was a vicious circle: inequality aggravated the pandemic, and this, in turn, generated even greater inequality.

Governments were so aware of the supply deficit that, in March 2020, they hurriedly tried to cover the resource gap to reinforce their services, although it was too late. There was a massive shift in trying to do in months what had been neglected for decades.

Everything was needed in everyone. They were all resilient since before the pandemic because part of their job was to manage scarcity to the extent possible. Now, thinkers from the North, from countries with welfare states or better health systems, are asking Latin American health systems for even more resilience[36,37].

The health management of the pandemic was an exceptional moment in the life of health systems, with some of the following characteristics:

The State, long criticized, came to the fore and showed that it had to lead the response to the pandemic.

It woke up from the lethargy of the New Public Management, its fragmented State with the division of functions, the long blockade of coordination, and its cultivation of the private as naturally the best.

The old public equipment was pushed to the maximum and gave rise to a period of great productivity.

The health workforce grew, with the massive integration of new human resources, including students in their final years.

Despite damaged primary care levels in most cases, the base staff took over the early screening and vaccinations, and the intra-muralism and attention to demand were broken for a period.

In countries with certain levels of digitization, teleworking, and hybrid, face-to-face and virtual work have expanded; where there was none, the national learning of the digital began at a forced march. The pandemic enormously expanded digitization and the width of the Internet (Table 3).

The situation forced the repair of chronically weak or broken supply chains, with periods of shortages of supplies and medicines, overcoming the efficient just-in-time logic to shift to a supply with higher margins.

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The services assumed a policy of massive over-exploitation of face-to-face work. However, in many cases, the health personnel also plunged into a massive voluntary self-exploitation, resulting in burnout and mental health problems.

Although some countries legally extended the working hours of health personnel, most health professionals and workers understood that it was an emergency and did what they had to do.

It was a particular stage of relative lack of protection of human resources in health to protect their societies in an emergency.

Domestic health care and palliative society reappeared with more force, still under the female role and the family format as a central resilience unit.

It was an act of massive generosity that millions of health professionals and workers in Latin America shouldered the social and health debt generated and engaged in the line of duty to the front line of battle, giving their share of sacrifices to offset the "structural or historical neglect". The WHO estimated that 80,000 to 180,000 workers had died from COVID-19 from January 2020 to May 2021, converging on an average figure of 115,000 deaths[38]; a good part of them consisted of Latin Americans.

The environmentalist-health prediction

Fortunately, these have not been the only global messages that have emerged in this momentum of creating the post-pandemic future. Much more promise for Latin America and humanity contains the possibility of an environmentalist-health perspective of what happened. Animals and humans share nearly 300 diseases, and 60% of known human infectious diseases are of (domestic or wild) animal origin[39]. That is why today, the conviction making its way into world public health is that, from now on, human health, animal health, and ecosystems will have to be studied together under the new concept of "One Health". Steele[40] and Schwabe[41] previously said this. Since then, global warming has further modified the epidemiology of zoonotic diseases and altered the interactions between hosts, vectors, and pathogens[42]. Human health and veterinary medicine are already and will be closely linked.

However, the environmentalist-health approach transcends zoonoses due to the multidimensional planetary crisis we are experiencing. It places the criticism of the production and society model in the center based on the intensive use of resources, consumerism, and the privilege of efficiency as a life metric. Many of the previous constructions in the health field, such as health promotion, social determinants, prevention, primary care, care theories, and healthy lifestyles, partially match ecologic theories. However, health systems health can only overcome their assigned role of repairing damage, which is increasingly impossible to fulfill in these new times if they merge their heritage into this broader framework of life in harmony between humanity and the planet[43]. Health philosophies have yet to enter the debate in this preliminary link between ecologism and public or collective health, with few exceptions[44].

We must look at the post-pandemic not as a simple restoration of the previous dilemmas between neoliberalism and collective health because it has further opened up the future health agenda: a) The colossal health crisis was also a great moment for a revival of nature's free expression in all the cities of the world in quarantine, almost as a preview of what the planet would be like without all the "noise" of our presence: "The fauna recolonizes the city in the face of confinement by the coronavirus", exclaimed the world press in March 2020[45]. b) It was also a great occasion for demonstrations of *new social interaction*, forced by the need for survival but equally disinterested. And c) a stage of global learning of a *neo-hygienist culture*, forced by contagion but projectable now as a post-pandemic proposal in terms of public policies for territorial planning, pro-green urban zoning, ventilated homes, decent transportation, expanded spaces for leisure time and other daily sociability[46].

Discussion

The critical review of the literature that we have conducted on the different perspectives on the pandemic has prospective implications for the health systems of the future. The theses a) of the black swan and b) denialist, are the most harmful to health; the theses c) on health surveillance systems' failure and d) on focused interventions, seem to enclose, with their limits, part of the solutions; but the theses e) on the structural postponement to meet announced predictions, and f) on the environmentalist-health forecast of the onset of a critical phase for the planet, seem to enclose the problem's core and its solutions.

In pre-pandemic times, the aggressive economic model had repositioned health systems as primarily curative, albeit with different levels of preventive-promotional work depending on the

country. However, when public health spending is minimal, it even stops paying for the redress of the whole and skims off the strip that is useful to it, the scenario in which we were in. This was the natural course of things, the actual public health policy in many countries, but not all. In contrast, formal public policy was filled with rhetoric based on principles, while the multiplication of overlapping innovations disorganized the practice of Latin American systems and services. Thus, confused hybrid systems, infinite reforms, and superficial modernizations were established.

The new problem is that climate change has been added to the balance, against it, and in this context of economies that produce disasters and pandemics, the effective counterweight of the old restorative health systems may be even less. This implies that this stage must be completed and return to clear organization and financing models towards universalism. In this context, the preparation for the next pandemic cannot be only a problem of resilience.

Finally, Latin America had many mistakes, but in the end, it was mostly positioned in the global concert of approaches to ethics and social justice that were put into play in the face of the pandemic. To defend itself against the pandemic, it had to reject the anarcho-liberal solution of extreme individualism, which was no longer that of the classical liberals, friends of *checks and balances*, but that of Ayn Rand, who condemns altruism as irrational and encourages the individual's morality as the absolute value.

We can imagine the neo-Malthusian implications of this approach amid the pandemic. Unfortunately, Latin America had not built the European solution of a great provider and guarantor of health, like the welfare regimens founded decades ago by Marshall, Titmuss, and Beveridge, despite being the path closest to our universalism in health. For this reason, during the crisis, the governments assumed the humanitarian and social defense of the populations, relying pragmatically on the Benthamian crisis management solution and ex-post solutions, the only possible ones already during the struggle, although they have less ceiling for the systemic crises to come. This, while other peoples appealed centrally to Hobbes and Leviathan, such as Asian countries.

Above all, however, the global mobilization to get out of the pandemic was built on the Kantian foundation of the unrestricted defense of human dignity regardless of age or ethnic, gender, or social origin, a principle that has been the organizer of the global response to the pandemic. It was the first time a global action of this size occurred.

Latin America, the region that suffered and struggled the most because it did not have as many previous experiences as Asia or other regions, has to organize its message to contemporary global public health, which must stem from an environmentalist-health, multicultural, feminist, and decolonizing perspective, because the single-voice world has come to an end, and that is the importance of the moment for the region.

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