

The Bicol University COVID-19 Study on the Clinicodemographic Profile, Extent of Exposures, Vaccination, and Predictors of Outcomes Among its Employees: A Retrospective Cohort Study

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Abstract

The COVID-19 pandemic caused global disruptions in educational operations and serious health implications among employees. A retrospective cohort study was conducted to explore the health impacts of the pandemic on the employees of Bicol University (BU). Using data collected from the Human Resource Department and available survey instruments on COVID-19 and its vaccination, the clinicodemographic profile, extent of exposure, vaccination, and predictors of outcomes were determined. The study identified that most of the COVID-19-afflicted subjects were the non-teaching personnel aged 42 and above who are not on a work-from-home scheme. Clinically, more than 80 percent of the affected employees had symptoms. The most common symptoms were fever (17.6%), cough (16.3%), colds (10.5%), malaise (7.8%), and difficulty of breathing or shortness of breathing (7.2%). Out of the 1,267 Bicol University employees, 51 became COVID-19 positive. Most were mild cases who recovered by home treatment, isolation, and quarantine, except for four who were moderate to severe and died. Age, sex, and the vaccination status were significant risk factors on the effects and outcomes of COVID-19. Age, vices, comorbidities, clinical presentation, and need for hospitalization were significant predictors of COVID-19 outcome of death. This study confirms the paramount need for the school administration to contain transmission of the infection in a pandemic through prompt implementation of infection control protocols, work-from-home schemes, vaccination, recording and monitoring of cases during and after recovery, information dissemination campaign, focus on older age group, control of comorbidities, and avoidance of vices.

Keywords: *Bicol University, cohort analysis, mortality rate, pandemic, personnel, predictors, risk factors*

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic has adversely affected all countries globally and has also aggressively spread throughout the Philippines with 2.84 million cases and 51,373 deaths reported as of December 30, 2021 (Macaraeg, 2021). COVID-19 is now the number one cause of death worldwide (Woolf, Chapman, & Lee, 2021). The recurrence of the pandemic as a result of the emergence of several variants leading to its increasing morbidity and mortality, despite existing mitigation and health preventive protocols, underlines the need for assessing the clinical profiles of affected patients, impacts of the effects and outcomes on functional status and performances, employment and the effectiveness of

various available COVID-19 interventions, treatment, and vaccines. COVID-19 vaccines have been developed and tested quickly and successfully achieve immediate herd immunity (Helle et al., 2021).

The COVID-19 pandemic has caused disruptions in all operations and activities of the educational system and detrimental effects include acquiring the infection and death, financial hardships faced by individuals, stress related to known and particularly unknown information, and uncertainty regarding the continued impact. There are also health concerns about Covid symptoms and complications that last for a long time, which may also lead to less productivity at work (Zhang et al., 2020).

To thwart the further transmission of the novel coronavirus, the closure of schools and colleges was initially implemented across the country and later transformed into a flexible learning modality using online and distance learning schemes to ensure the continuity of higher education learning. Hence, the operations of higher education institutions were later resumed, with non-teaching employees continuing to report and faculty members given work-from-home options. The impact on the employees who continued working may include health issues after being exposed and getting infected by the COVID-19 virus.

The World Health Organization (WHO) and several health institutions have underscored that vaccines are essential in the fight against COVID-19, and are one of the best ways to protect against the onslaught of the disease. On March 12, 2021, the Department of Labor and Employment released guidelines for the vaccination of employees at work. Employees were required to adopt needed vaccination policies as part of their occupational safety and health program in line with guidelines from the Department of Health and the Inter-Agency Task Force for the Management of Emerging Infectious Diseases (CHED, 2021).

However, despite strong evidence of the importance of vaccines in improving population health outcomes, the WHO in 2019 identified “reluctance to be vaccinated” as one of the top 10 barriers to overall global health. The Octa Research group undertook a survey on February 24, 2021, which found that only 19% of the respondents agreed to be vaccinated due to safety concerns and low confidence in the vaccines that were produced in China with only 1 in 10 or 15% trusting its efficacy. Meanwhile, those made in the United States got a significantly higher trust rating of 41%; trust for United Kingdom vaccines, 25%; Russian-made vaccines, 20%; and Indian vaccines, 17% (Tomacruz, 2021).

The Bicol University administration has shown significant concern over the impact of the COVID-19 pandemic and, to address this, had put out a total of 29 issuances relevant to COVID-19. Before the opening of the school year 2021-2022, it embarked on a university-wide, on-campus vaccination campaign and implementation for all its employees, administrative staff, faculty, and, eventually, students. The rolling out of vaccines was preceded by a large-scale survey that served as the database for employees to be vaccinated and to determine their priority classification. During the implementation, the vaccination data were

encoded digitally through a digital platform provided by the Department of Health.

On December 30, 2021, after the government’s aggressive national vaccination program, the chairman of the Commission on Higher Education (CHED), Prospero de Vera, announced on the commission’s website that the “vaccination rate among higher education institution (HEI) personnel and tertiary students continue to scale up” (CHED, 2021, para. 1). According to him, as of December 29, 2021, reports from HEIs all over the country showed that 87.1% of HEI faculty and employees have been vaccinated. He reiterated that this was a significant increase from the 72% vaccination rate at the start of the vaccination campaign in October 2021.

There is, therefore, a need to evaluate the effects of the COVID-19 pandemic on academic institutions’ employees. This evaluation needs to include the assessment of the health status of those affected, specifically their clinical profiles, risk factors, and outcomes of the disease, and the effects of the COVID-19 vaccination.

Such a study may help in the crafting of policies in providing the needed support and benefits for affected individuals, as well as adjusting the COVID-19 vaccination program in the university and other similar institutions. It can also add insights on the appropriate choice of COVID-19 vaccines and the respective effects of the number of doses, including booster doses, in the light of changing threats of varying variants. It may also give insights into a better COVID-19 vaccine policy, vaccine distribution, and future development of vaccine technologies.

To evaluate the health impacts of the COVID-19 outbreak and the extent of vaccination on Bicol University employees, in view of the continuing surge of COVID-19 cases in the Bicol region and the plan of the Bicol University to implement limited face-to-face classes, the Bicol University COVID-19 Study was conceptualized. It also aimed to identify predictors of outcomes among its employees affected by COVID-19.

The specific objectives of this research are as follows: (1) To determine the clinicodemographic profile and outcomes of the COVID-19 outbreak on Bicol University employees in terms of age, sex, employment category, college/department, and symptoms; (2) To determine the extent of exposure to COVID-19 of selected Bicol University employees in terms of the number of positive cases, number

exposed to COVID-19-positive individuals, their socio-demographic profile, and outcomes of management; (3) To assess the number of COVID-19 cases per month among the Bicol University employees who have filed their leave of absence; (4) To determine and compare the relationship of age, sex, and outcome of COVID-19 among Bicol University employees; (5) To determine the predictors of mortality outcome among the Bicol University employees; and (6) To identify correlated problems and issues as factors that affect the treatment, management, control of COVID-19 infection and the implementation of COVID-19 vaccination programs.

Materials and Methods

The study was done from January 25, 2022 until March 30, 2022, when the researcher was tasked to do a quick-response type of research. In view of the urgency of the need for the study, and the life-threatening and high infectivity nature of the COVID-19 virus infection, a retrospective study that reviewed available records was done. This study lasted for two months using available data of BU employees affected by the COVID-19 virus throughout the duration of the pandemic from March 2020 to February 2022. The data were gathered from the Human Resource Department of Bicol University (BU) and available BU survey instruments on COVID-19 and its vaccination, which were then correlated with results. All employees of BU with relevant data were included in the study.

These data included parameters that evaluated the health impacts of the COVID-19 outbreak and the extent of vaccination on Bicol University employees, both the teaching and the non-teaching staff. The research method used in this study is the quantitative descriptive type.

After approval from the University, eligible employees were identified. No personally identifiable information was collected. Data were then encoded and managed in a password-protected Microsoft Excel spreadsheet. Data quality and completeness checks were done after encoding. No paper copies of the data collection forms were used. All electronic data collection forms and Excel spreadsheets were saved on a password-protected laptop of the primary investigator. Encrypted back-up copies of the files were saved in a hard drive kept by the investigator. The passwords were accessible only to the investigator of this study. Each patient was assigned an alphanumeric code upon encoding in the Excel spreadsheet and the

database was secured with password encryption. No patient names or identifiers were included in the study reports.

For objectives 1-4, data were analyzed to determine the frequency and percentage values of the clinical profile, characteristics, extent of exposure, number of cases per month, and outcome of Bicol University employees who have been infected with COVID-19 using the Statistical Package for Social Science (SPSS) version 25.

For objectives 5-6, to determine the predictors of mortality outcome, logistic regression analysis was used by obtaining the odds ratio in the presence of several risk factors and variables to determine the association between characteristics of exposure to the COVID-19 virus, its manifestations, and other associated variables vis-a-vis mortality outcome among the Bicol University employees in relation to COVID-19. Pearson Product Moment Correlation was utilized to determine the relationship between problems and issues that affect the management and control of COVID-19. Significance was computed using Multivariate Analysis of Variance at p -value < 0.05 to determine the risk factors of COVID-19 among Bicol University employees. Pearson correlation coefficient was used to determine correlated factors relative to the management and control of COVID-19 that affect the outcome of COVID-19 vaccination.

Ethical Considerations

This is a retrospective study done using available data from the Bicol University Human Resource Department. The anonymity of the respondents and confidentiality of the secondary data have been ensured. In addition, in this study, no individual data are presented. The research willfully ensured that all secondary data collected from the files were solely utilized for academic purposes. The data collected were those available only in the University records.

Training of Personnel

Only a data collection tool was used, so there was no training of personnel needed. Only the investigator had a hand in the collation and analysis of the data.

Privacy and Confidentiality

Data gathered from the study have been kept in full confidentiality. Only the investigator had a direct access to the accomplished data collection forms.

Risks and Benefits

There were no expected risks associated with the study. There was no direct and intentional harm intended in this study.

Informed Consent Form Process and Recruitment

Informed consent was waived since this study only entailed records review.

Limitations of the Study

The study, being retrospective, has several limitations owing to the nature of its design. Since the study depended on a review of charts or records that were not originally designed to collect data for research, some information is bound to be missing. The convenience sampling may also not be representative of the general population. Some affected employees may have hidden their illness for fear of social stigma or some may not have been tested because they were asymptomatic or had only mild symptoms. Regarding vaccination, not all employees were vaccinated in the University-sponsored vaccination facility and the DOH data was not 100% accurate.

Results and Discussions

The Human Resource Management Office record reveals a total of 1,267 Bicol University employees comprising of 613 teaching, 318 non-teaching, 266 job order, 54 contract of service, and 16 casual personnel. These were distributed among the auxiliary services, Daraga Campus, East Campus, Main Campus, and outside campuses. Of these employees, 97 were reported to have been exposed and 51 were confirmed COVID-19 positive by Reverse Transcription Polymerase Chain Reaction (RT-PCR) and/or Rapid Antigen test. Three of these employees developed COVID-19 infection twice and 87 filed leaves of absence. There were four employees who died, and two of them failed to file leaves of absence as their course was extremely fast. Death benefits with the Government Services Insurance System (GSIS) were filed instead. During the pandemic, the teaching staff was on a work-from-home (WFH) scheme, while the non-teaching staff reported physically to their offices.

As shown in Table 1, a total of 97 employees were affected by COVID-19, both exposed and positive cases. The majority (72%) were 42 years old and above, with

a mean age of 47. While persons of all ages are at risk of getting COVID-19, older adults are at a higher risk of developing serious illness as a result of physiological changes associated with aging and other underlying health issues. Patients over the age of 50 years who were proven to have SARS-CoV-2 infection had a 15.4-fold increased risk of getting COVID-19 compared to those under the age of 40 (Biswas et al., 2021).

Table 1 Clinicodemographic Profile of Bicol University Employees Affected by COVID-19

Characteristics		
Age (in years)	N	%
47 – 51	19	19.6
42 – 46	18	18.6
57 – 61	12	12.4
62 and above	11	11.3
37 – 41	10	10.3
52 – 56	10	10.3
27 – 31	8	8.2
32 – 36	6	6.2
22 – 26	3	3.1
TOTAL	97	100.0

MEAN AGE = 46.9 years old

As shown in Table 2, in terms of employment category, the majority were from the non-teaching personnel, followed by the teaching personnel, and the rest were job order employees. Non-teaching staff members, particularly in the various offices and departments of Bicol University, were required to report for work personally while the teaching workforce had been shifted to a work-from-home setup. This is a plausible explanation for the predominance of cases in the non-teaching staff. On the other hand, the teaching staff members were also less affected because they were on a work-from-home scheme and were less exposed. Likewise, since they were already at home, they might have felt no need to file for leave and some might have chosen to remain silent about their cases to avoid disclosure and humiliation.

Table 3 shows that the department with the highest number of COVID-affected employees was the General Administrative Support Services (GASS), which is expected as its employees have been regularly reporting for work to man the frontline administrative functions of the university. The next most affected was

the Polangui Campus (BUPC) probably because all its services are on one contiguous campus. The College of Medicine (BUCM) was third in the highest number of cases, which is also expected, as the employees are doctors and served as direct frontliners in battling the COVID-19 virus in various hospitals in the community.

Table 2 Employment Category of Bicol University Employees Affected by COVID-19

Frequency of Covid-19-Related Illnesses by Employment Category		
Employment Category		
Non-Teaching Personnel	54	55.7
Teaching Personnel	37	38.1
Job Order Personnel	6	6.2
TOTAL	97	100.0

Figure 1 shows the clinical presentation of affected employees at Bicol University. Clinically, more than 80% of the COVID-affected Bicol University employees were symptomatic while the remaining percentages were asymptomatic and some did not disclose their symptoms. This is expected as having symptoms heralds the application for leave in a working institution. The asymptomatic ones are the offshoot of contact tracing when someone turns positive in a workplace.

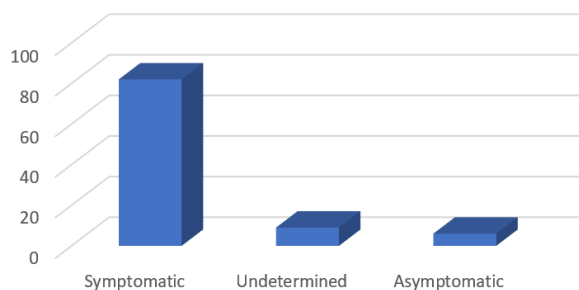


Fig 1 Clinical Presentation of COVID-19-Affected Employees in Bicol University

The COVID-19 pandemic has created widespread disruptions in all sectors of society's operations and activities. Since the outbreak of the epidemic two years ago, the educational system has come to a halt, and practically all educational institutions have shifted to online and flexible learning modalities. To halt the spread of the novel coronavirus, schools and colleges were initially closed across the country, but later adopted a flexible learning mode utilizing online and distance learning schemes to ensure the continuity of

Table 3 COVID-Affected Employees in different Departments/Colleges of BU

Frequency of COVID-Affected Employees in different Departments/Colleges of BU		
College/Department	N	%
General Administrative Support Services (GASS)	27	27.83505
Polangui Campus (BUPC)	12	12.37113
College of Medicine (BUCM)	9	9.278351
College of Agriculture and Forestry (BUCAF)	6	6.185567
University Library Service (LS)	6	6.185567
College of Science (BUCS)	5	5.154639
College of Arts and Letters (BUCAL)	4	4.123711
College of Engineering (BUCENG)	4	4.123711
College of Education (BUCE)	3	3.092784
College of Industrial Technology (BUCIT)	3	3.092784
Extension Management Division (EMD)	3	3.092784
R&D Management Division (RDMD)	3	3.092784
College of Nursing (BUCN)	2	2.061856
Tabaco Campus (BUTC)	2	2.061856
Health Services	2	2.061856
College of Social Science and Philosophy (BUCSSP)	1	1.030928
Jesse M. Robredo Institute of Governance and Development (BUJMRIGD)	1	1.030928
College of Business, Economics and Management (CBEM)	1	1.030928
Office of the Vice President for Planning and Development - Business Affairs Office (OVPPD - BAO)	1	1.030928
Supply and Property Management Office (PMO)	1	1.030928
TOTAL	97	100

higher education learning. As a result, higher education institutions' operations were eventually restored, with non-teaching workers reporting as usual and teaching personnel granted work-from-home choices. While higher education is critical for a country's economy to remain stable, it has also been significantly impacted as a sector. The effect on individuals who continued to work could include health problems as a result of being exposed to and infected with the COVID-19 virus (Albitar et al., 2020).

The symptoms presented by COVID-19-positive patients are shown in Table 4. Around 17.6% experienced fever, 16.3% had cough, 10.5% had colds, 7.8% had malaise, 7.2% had difficulty breathing or shortness of breath, 6.5% had loss of either smell or taste, 5.2% had sore or itchy throat, 4.6% had loss of both smell and taste, 3.9% had headache, 3.9% had diarrhea, and 2.6% had body pains. Other symptoms reported by one patient each were fatigue, loss of appetite, loss of weight, rashes, and stomach ache. Specific diseases were reported as presenting manifestations with 2% reported to have hypertension, 1.3% chest pain, 1.3% nausea, and 1.3% pneumonia. Around 4.6 % of the subjects were asymptomatic.

Table 4 Clinical Presentation of Bicol University COVID -19 positive Employees

Clinical Presentation (Symptoms)	N	%
Fever /Fever with chills/ high grade fever/ recurrent fever	27	17.6
Cough (dry cough n=23; productive cough n=2)	25	16.3
Colds/ nasal congestion/ runny nose/ clogged nose	16	10.5
Body malaise/ general malaise	12	7.8
Difficulty breathing/ Shortness of breath/ asthma-like	11	7.2
Itchy throat/ sore throat	8	5.2
Loss of smell	10	6.5
Asymptomatic	7	4.6
Loss of smell and taste	7	4.6
Diarrhea	6	3.9
Headache	6	3.9
Body pain	4	2.6
High BP/ hypertension	3	2
Chest pain	2	1.3
Nausea	2	1.3
Pneumonia	2	1.3
Fatigue	1	0.7
Loss of appetite	1	0.7
Loss of weight	1	0.7
Rashes	1	0.7
Stomach ache	1	0.7
TOTAL	153	100

The above data presented in Table 4 are compatible with available data showing COVID-19 presenting more commonly with mild general and respiratory symptoms and, occasionally, gastrointestinal symptoms while some would come without any symptom and will just be found incidentally or when presenting with other illnesses.

The COVID-19 pandemic has imposed considerable health burdens on teaching and non-

teaching staff in educational institutions, as well as on students. The adverse effects include infection and death, financial hardships experienced by individuals, the stress associated with known and particularly unknown information, and fear of continued impact. Additionally, there are health concerns regarding the development of long-lasting COVID effects and problems, which may result in decreased occupational productivity (Tadesse & Muluye, 2020).

The pandemic's recurrence as a result of the emergence of several variants, despite existing mitigation and health preventive protocols, highlights the importance of assessing affected patients' clinical profiles, the effects and outcomes on functional status and performance, employment, and the effectiveness of various COVID-19 interventions, treatment, and vaccines. COVID-19 vaccine development and testing have been successfully launched at a rapid pace with the use of novel vaccination technologies, excellent country-to-country collaboration, and public-private partnerships. Vaccination is without a doubt a critical method for controlling the COVID-19 pandemic. Although vaccination programs were well underway globally, in the Philippines, vaccination could only slow or stop ongoing transmission of the SARS-CoV-2 virus and reduce the overall severity of this viral infection if widespread uptake occurs and a specific population develops immunity to the SARS-CoV-2 virus (Tarkar, 2020).

Table 5 shows the outcome of COVID-19 among the employees of Bicol University. Almost 90 percent of the employees who have filed leaves of absence in relation to COVID-19 illnesses have recovered and improved through home treatment, isolation, and quarantine. There were five employees who needed hospitalization but recovered, while there were two patients who died due to COVID-19-related illnesses despite being in the medical facility. During the pandemic, hospitalization was indicated only for those with moderate to severe infections. Naturally, these patients were the more serious ones. There were three employees who have not filed leaves of absence and two of them died. Patients in the government service who died after a very acute and fast course would usually not be able to file leaves of absence and, subsequently, would just claim death benefits from the Government Service Insurance System (GSIS).

The results in Table 5 are compatible with the expected course of illness of COVID-19. Patients with mild symptoms are usually managed by supportive measures or by being isolated at home or in a facility and

Table 5 Bicol University Employees Who Filed Leave of Absence due to COVID-Related Illnesses According to Number of Cases per Month, Age, and Outcome

Number of Cases Per Month	N	%	Age	Sex	Outcome	
					Survived	Died
March 2020	3	3.45	47 - 57	All females	Survived	
April 2020	0	0.0				
May 2020	2	2.3	47 & 56	1 Male & 1 Female	Survived	
June 2020	4	4.6	47 & above	3 Females and 1 Male	Survived	
July 2020	4	4.6	42 - 56	All Females	Survived	
August 2020	0	0.0	45	Male	Survived	
September 2020	5	5.75	41 - 57	3 Males & 2 Females	Survived	
October 2020	3	3.45	27, 29, & 64	1 Male & 2 Females	Survived	
November 2020	2	2.3	58 & 64	1 Male & 1 Female	Survived	
December 2020	0	0.0				
January 2021	3	3.45	55 & Above	All Female	Survived	
February 2021	4	4.6	41 - 57	1 Male & 3 Females	Survived	
March 2021	5	5.75	40 & Above	2 Males and 3 Females	Survived	
April 2021	4	4.6	36, 43, & 44	2 Males and 2 Females	Survived	
May 2021	10	11.49	46 & Above	3 Males & 6 Females	Expired	1 Female Died
June 2021	11	12.64	29 - 59	3 Males & 8 Females	Expired	1 Male Died
July 2021	8	9.2	47 - 59	4 Males and 4 Females	Survived	
August 2021	6	6.9	40 & Above	3 Males and 3 Females	Expired	1 Male Died
September 2021	7	8.05	36 - 64	6 Males & 1 Male	Survived	
October 2021	5	5.75	33 - 63	3 Males & 2 Females	Expired	1 Male Died
November 2021						
December 2021	1	1.15	42	Female	Survived	
TOTAL	87	100.0				

are expected to have a good prognosis. The moderate to severe cases are the ones who need hospitalization and by virtue of the severity of the illness would also have a poorer prognosis and despite hospitalization may eventually succumb to death.

Table 5 also shows the association of age, gender, outcome, and the number of cases per month of COVID-19-related illnesses among the employees of Bicol University who filed leaves of absence both for those in the teaching and non-teaching workforce. Out of the 87 employees who filed leaves of absence, more than 90 percent have survived. These were mild cases and the patients were just isolated and quarantined at their respective homes or facilities, while others were hospitalized and also recovered except for the four who died.

The surge of the cases occurred during the emergence of the Delta variant from April to October 2021. However, Bicol University managed to contain

the COVID-19 virus through immediate action from the university administration in terms of requiring employees to undergo vaccination to combat and prevent COVID-19 on top of the suspension of classes and the work-from-home scheme of the teaching staff.

COVID-19 is both a global health concern and an economic menace to the international community. The global lockdown of businesses and industries enacted and enforced to contain the virus created a slew of unique and fundamental issues for both employees and employers globally. The requirement for millions of workers to WFH as a result of COVID-19 has accelerated recent remote work trends, which have been supported by the increase in connection and communication technologies. This situation has been worsened further by the forced confinement of workers during the COVID 19 pandemic. Even though WFH may sound appealing, if it means a safe harbor, the fact that there is no difference between work and

Table 6 Risk Factor Analysis of Bicol University Employees on the COVID-19 Outcomes as to Age, Sex, and Vaccination Status

Age (in years)	Sex		Outcome			Vaccination Status	p-value
	Male	Female	Home Isolation%	Hospitalized (Alive) %	Hospitalized (Died) %		
27 – 31	0	3	3.4	0.0	0.0	95%	0.001
32 – 36	1	4	5.7	0.0	0.0	96%	0.001
37 – 41	7	1	9.2	0.0	0.0	97%	0.001
42 – 46	8	6	16.1	0.0	0.0	92%	0.001
47 – 51	6	10	5.7	0.6	0.6	99%	0.003
52 – 56	7	9	17.2	0.6	0.0	99.9%	0.001
57 and above	8	17	25.3	3.4	0.6	99.9%	0.001
TOTAL	37	50	82.6	4.6	1.2		

home and that there are no commutes between the two can be hard (Amin & Palter, 2021).

Table 6 shows the risk factor analysis using a statistical tool to determine the significance of each variable according to its impact. All of the variables such as age, sex, clinical outcome, and vaccination status were shown to be significant in the effects and outcomes of COVID-19 among the employees of Bicol University, both teaching and non-teaching, and the job order personnel.

As shown in Table 6 above, the risk factor analysis was derived. This was done using Multivariate Analysis of Variance in order to determine the statistically significant clinicodemographic profile of selected Bicol University employees relative to the corresponding health outcome after getting COVID-19 infection. All the variables such as age, sex, clinical outcomes and vaccination status were shown to be statistically significant in the effects and outcomes of COVID 19 among the employees of Bicol University, both teaching and non-teaching, and the job order personnel.

Governments across the world over are becoming increasingly reliant on disease modeling outputs to assess the risk of pandemic and the cost-benefit analysis of action (or inaction) to mitigate novel health threats through vaccination to be able to contain the COVID-19, as well as the strict implementation of the minimum health standards as prescribed by the World Health Organization (Azorín, 2020).

Table 7 shows the total number of cases for each month from March 2020 to December 2021. The most number of the cases per month have been recorded in June 2021 with a total of 11 employees or 11.7 percent of the total population. This was followed by

the month of May 2021 comprising 10.6 percent of the total population. The majority of all cases happened in 2021 compared to the year 2020 as shown in Figure 2. It is noteworthy that the surge of the COVID-19 cases

Table 7 Bicol University Employees Who Filed Leave of Absence due to COVID-19-related illness according to Number of Cases per Month

Number of Cases Per Month	N	%
March 2020	3	3.2
April 2020	0	0
May 2020	2	2.1
June 2020	3	3.2
July 2020	4	4.2
August 2020	0	0
September 2020	4	4.2
October 2020	4	4.2
November 2020	1	1.1
December 2020	0	0
January 2021	3	3.2
February 2021	4	4.2
March 2021	7	7.4
April 2021	5	5.3
May 2021	10	10.6
June 2021	11	11.7
July 2021	9	9.6
August 2021	6	6.4
September 2021	8	8.5
October 2021	7	7.4
November 2021	2	2.1
December 2021	1	1.1
TOTAL	94	100.0

at Bicol University happened during the proliferation of the Delta variant, which affected the whole country and the rest of the world. However, compared to the data for the whole of Bicol region as shown in Figure 2, the cases in Bicol University did not surge as much.

It can also be gleaned from Figure 2 that the vaccination, which started on July 14, 2021 in Bicol University, was followed by a drop in cases during the nationwide Delta variant surge and followed by a sustained plateau in cases. This shows the favorable effect of the vaccination among the Bicol University employees, which abated the surge noted in the general population in the whole Bicol Region.

Table 8 shows the rate of vaccination among Bicol University personnel for both the teaching and the non-teaching staff. There was a total of 310 part-time teaching personnel in Bicol University. Around 70.6% were fully vaccinated, 25% were unvaccinated or partially vaccinated, while only 4.2% have been inoculated with a COVID-19 booster shot. On the other hand, there were a total of 526 full-time teaching personnel. More than 70% have been fully immunized, 7% were unvaccinated or partially vaccinated, and around 21% have taken the booster shot. The non-teaching staff has been categorized as permanent or casual, as well as job orders, utility staff, and security guards. More than 80% of the permanent and casual non-teaching employees have been fully vaccinated and only a small percentage were unvaccinated or partially vaccinated. The remaining 14% were inoculated with a booster shot. The large percentage of vaccinated

Table 8 Bicol University Employees relative to COVID-19 vaccination as of October 2021

Bicol University Personnel	N	%
Part-Time Teaching Staff		
Fully Vaccinated	219	70.6
Unvaccinated	44	14.2
Partially Vaccinated	34	11.0
With Booster Shot	13	4.2
TOTAL	310	100.0
Full-Time Teaching Staff		
Fully Vaccinated	373	70.9
With Booster Shot	114	21.7
Unvaccinated	23	4.4
Partially Vaccinated	16	3.0
TOTAL	526	100.0
Permanent/Casual Non-Teaching Staff		
Fully Vaccinated	214	82.0
With Booster Shot	36	13.8
Unvaccinated	9	3.4
Partially Vaccinated	2	0.8
TOTAL	261	100.0
JO/CO Utility and Security Guards		
Fully Vaccinated	259	84.4
With Booster Shot	33	10.7
Unvaccinated	8	2.6
Partially Vaccinated	7	2.3
TOTAL	307	100.0

employees indicates that the vaccine is highly accepted by the permanent and casual non-teaching personnel. It can also be seen in the table that a large number of JOs, utility staff, and security guards have been vaccinated.

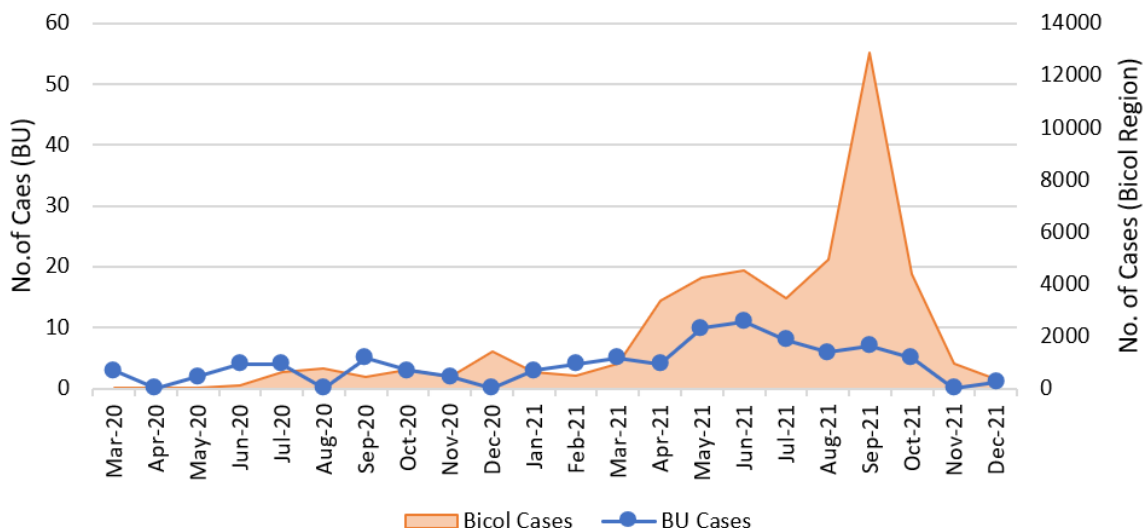


Fig 2 Number of Cases of COVID-19-Related Illnesses Per Month during the Surge of the Delta Variant

These data show that the non-teaching staff has a higher vaccination rate than the teaching staff. This is due to the fact that they were required to be vaccinated as they were working in-person, compared to the teaching staff that was on work-from-home schemes. Likewise, some teaching personnel have already been vaccinated in their respective localities.

Before the opening of the school year 2021-2022, the Bicol University administration embarked on a university-wide, on-campus vaccination campaign and implementation for all its employees, administrative staff, faculty, and, eventually, students. The rolling out of vaccines was preceded by a large-scale survey that served as the database for employees to be vaccinated to determine their priority classification. During the implementation, the vaccination data were also encoded digitally through a digital platform provided by the Department of Health.

Vaccination in Bicol University started on July 14, 2021. On October 8, 2021, Bicol University had already vaccinated 51% of the teaching personnel and 78% of the non-teaching personnel, excluding those who had been vaccinated by their respective Local Government Units (LGUs), Local Health Units, or any COVID-19 vaccination program outside the university (Noda, 2021).

Acceptance of anti-COVID-19 immunization by the general public has been found to be less than desirable throughout the world, particularly in the Philippines. Numerous surveys indicated that the percentage of the public agreeing to get a COVID-19 vaccine varied between 35 and 75%, with no discernible trend. Acceptance rates varied by ethnicity and color, with Blacks experiencing lower acceptance than Whites (Cardenas, 2021).

In the Philippines, a priority group list for the national vaccination program was introduced in February 2021, following approval by the Interim National Immunization Technical Advisory Group. The list is divided into three major categories, with populations classified as “A” receiving the highest priority. As of October 2021, immunization was permitted for people in priority groups A1 through A5, the whole adult population, and select adolescents (ages 12 to 17 years old) (Corpuz, 2021).

Table 9 shows the summary of statistical calculation relative to the relationship between the identified variables. For both genders, more than 50 percent of the population were aged 42 years old and

above.

Table 9 Comparison of the relationship of age, sex, and outcome of COVID-19 among Bicol University employees

Age Cohort	MALE		FEMALE		TOTAL	%
	N	%	N	%		
22 – 26	2	5	1	1.8519	3	3.1915
27 – 31	3	7.5	4	7.4074	7	7.4468
32 – 36	2	5	4	7.4074	6	6.383
37 – 41	6	15	4	7.4074	10	10.6383
42 – 46	8	20	9	16.6667	17	18.0851
47 – 51	7	17.5	10	18.5185	17	18.0851
52 – 56	4	10	6	11.1111	10	10.6383
57 and above	8	10	16	29.6296	24	25.5319
TOTAL	40	100	54	100	94	100.0
MEAN AGE = 47.20 years old						

Table 10 depicts the result of the logistic regression analysis used to obtain the odds ratio in the presence of several risk factors and variables to determine the association between characteristics of exposure to the COVID-19 virus, its manifestations, and other associated variables vis-à-vis mortality outcome among the Bicol University employees in relation to COVID-19. The statistical analysis reveals that the major reason for the mortality is the vaccination status wherein the employees who died were mostly unvaccinated and partially vaccinated with a corresponding p-value of <0.0001. All of the above variables have been proven to be statistically significant based on the result of the computation, which is less than the threshold of 0.05. The regression analysis on the different variables relative to the mortality among the Bicol University employees in relation to COVID-19 also showed that all variables (being symptomatic, unvaccinated or partially vaccinated, with comorbidities, history of vices, and need for hospitalization) have been proven to be statistically significant predictors and the strongest one is the absence of or partial vaccination status.

The result of the current study corroborates the findings of Albitar et al. (2020) on the risk factors for COVID-19 mortality among a large sample of patients worldwide. Male gender, advanced age, patients with hypertension, diabetes mellitus patients with other pre-existing medical conditions, and patients working in firms in America were all independent risk factors for death among COVID-19 patients. Extra attention should be paid to these things, and more evaluations should be done to find out how these effects happen.

Table 10 Predictors of Mortality in COVID-19 among Bicol University Employees

Variables/Risk Factors	OR	CI	P
Symptoms	0.049	0.050 – 0.069	0.0018
Vaccination Status (Partially Vaccinated & Unvaccinated)	0.230	0.245 – 0.641	< 0.0001
With comorbidities	0.040	0.047 – 0.098	0.003
History of Vices	0.029	0.038 – 0.093	0.0002
Hospitalization	0.090	0.097 – 0.339	0.004

OR: Odds Ratio, CI: Confidence Interval

Table 11 shows the rate of COVID-19 vaccination among BU personnel by vaccine type. The majority have been inoculated with Sinovac Coronavac (38.30%), followed by undetermined (34%) as they were vaccinated outside of Bicol University, Oxford Astra Zeneca (11.7%), Janssen (9.6%), Pfizer (5%), and Moderna (1.06%). At the start of COVID-19 vaccination at Bicol University among its employees, most of the available vaccines in the country were Sinovac Coronavac imported from China, so the majority of the healthcare workers and other frontliners have been inoculated with this type of COVID-19 vaccine.

Table 11 Rate of COVID-19 vaccination among BU personnel by Vaccine Type

Type of Vaccine	N	%
Sinovac Coronavac	36	38.2979
Undetermined	32	34.0426
Oxford AstraZeneca	11	11.7021
Janssen	9	9.5745
Pfizer BioNTech	5	5.3191
Moderna	1	1.0638
TOTAL	94	100

The Bicol University Vaccination Team, in collaboration with the University Health Services, College of Medicine, College of Science, and General Services Office initiated the COVID-19 jabs on June 18, 2021, prioritizing the first one hundred personnel under the A1 group (Noda, 2021). On November 2, 2021, CHED reported that 91% of Bicol University’s faculty members and 96% of the non-teaching personnel were already vaccinated as of October 30, 2021. Vaccination is a paramount basis for conducting face-to-face classes in the new normal.

The development of an effective COVID-19 vaccine has been the world’s top scientific priority to combat the pandemic. Vaccines are at the heart of modern public health (Tadesse & Muluye, 2020).

Table 12 shows the risk factor analysis in terms of age, sex, management, and clinical outcome on vaccination status wherein all of the identified factors proved to be statistically significant in the mortality rate of COVID-19 among the Bicol University teaching and non-teaching personnel. Interestingly, it can be gleaned here that 92-99.9% of cases were significantly prevented from dying and hospitalization due to COVID in all age groups. This corroborates the available data on the value of vaccination against COVID worldwide. As shown in the table, aging (particularly >60 years age) may be the primary risk factor for severe outcomes. Primary research of the highest quality that accounts for many confounders is required to have a better understanding of the degree of relationships between COVID-19 severity and a variety of other parameters (Mohan et al., 2020). The risk variables for COVID-19 death were studied in a large sample of patients from around the world. Male, advanced age, hypertension, diabetes mellitus and other pre-existing medical disorders, and patients living in America who work in firms were all independent risk factors for death in COVID-19 patients. Hao et al. (2020) says that these factors should get more attention, and more research should be done to figure out the basic mechanisms that cause these effects.

Table 13 shows the result of Pearson correlation coefficient, which revealed that the correlated factors relative to the management and control of COVID-19 that affect the outcome of COVID-19 vaccination were significant. These include vices, comorbidities, and clinical presentation, which are all shown to be statistically significant correlates.

Based on these findings, it is crucial to enhance information dissemination in the workplace with regard to the importance of avoidance of vices particularly smoking and alcohol intake, ensure full vaccination to include booster doses especially for those employees with co-morbidities, and prompt diagnosis and hospitalization of those with poor clinical presentation.

The COVID-19 pandemic has created a crisis unprecedented in terms of scale and social, economic, and environmental implications. The effects of this crisis are numerous and unprecedented in their severity

Table 12 Risk Factor Analysis of Bicol University Employees on the COVID-19 outcome as to Age, Sex, and Vaccination Status

Age (in years)	Sex		Management & Outcome			Vaccination Status	p-value
	Male	Female	Home Isolation %	Hospitalized (Alive) %	Hospitalized (Died) %		
22 – 26	2	1					
27 – 31	3	4	3.4	0.0	0.0	95%	0.001
32 – 36	2	4	5.7	0.0	0.0	96%	0.001
37 – 41	6	4	9.2	0.0	0.0	97%	0.001
42 – 46	8	9	16.1	0.0	0.0	92%	0.001
47 – 51	7	10	5.7	0.6	0.6	99%	0.003
52 – 56	4	6	17.2	0.6	0.0	99.9%	0.001
57 and above	8	16	25.3	3.4	0.6	99.9%	0.001
TOTAL	40	54	94	4.6	1.2		

Table 13 Correlation of problems and issues that affect the management and control of COVID-19

Correlated Factors	r	α	p
Vices	0.719	0.05	0.0002
Vaccination	0.882	0.05	< 0.0001
Comorbidities	0.640	0.05	0.0003
Clinical Presentation	0.559	0.05	0.0002

for the majority of organizations in the most impacted countries. Along with its human consequences, particularly for sufferers with severe symptoms and overcrowded health systems, economic restrictions and the cessation of economic activity in the majority of industrialized countries have resulted in an economic catastrophe. Also, the COVID-19 pandemic is a complex crisis that affects the main aspects of corporate sustainability, which can be defined as the balanced consideration of social, economic, and environmental issues through the strengthening of organizations' social responsibility in order to better meet current and future stakeholder expectations (Ranjbari et al., 2021).

Given the disease's origin, much remains unknown; however, we do know that clinical presentations range from a normal cold to more serious conditions such as bronchitis, pneumonia, severe acute respiratory distress syndrome (ARDS), multi-organ failure, and even death. COVID-19 is believed to progress more rapidly and severely in people with underlying health issues or comorbidities, frequently resulting in death. According to current knowledge, people with COVID-19 disease who also have concomitant conditions such as hypertension or diabetes mellitus are more prone to acquire a more severe course and progression of the disease (Baradaran et al., 2020).

According to the World Health Organization Interim Guidelines, smoking, being older than 60,

and having non-communicable diseases (NCDs) like hypertension, cardiac diseases, diabetes, chronic kidney disease, chronic lung disease, cerebrovascular disease, cancer, and immunosuppression lead to a higher risk of death (WHO, 2019b).

Vices such as smoking and excessive alcohol drinking are major causes of sickness and have resulted in eight million fatalities worldwide. Both vices and COVID-19 infection have a strong respiratory component. Alcohol is the most widely abused substance in the world. It has an effect on nearly every organ in our body. At this period, patients with a history of alcohol consumption have more severe outcomes than patients without a history of alcohol consumption (Ramalho, 2020). COVID-19 individuals with a history of cigarette smoking have a higher risk of developing serious complications than non-smoking patients (Reddy et al., 2021).

Table 14 COVID-19 Mortality, Morbidity, and Attack among Bicol University Employees

Indicators	Percentage Values (%)
Morbidity Rate = COVID-affected employees/ total number of employees x 100% = (51/1267)100%	4.03%
Attack Rate = COVID-19 positive / total number of employees at risk x 100% = (51/1267)100%	4.03%
Mortality Rate = Died/ the total sample population x 100% = (4/1267)100%	0.32%
Case Fatality rate = Died/ COVID-19 positive x 100% = (4/51)100%	7.84%

Table 14 shows that the two-year mortality rate of Bicol University employees affected by COVID-19 is 0.32% of the total sample population of 1,267 employees. It also shows the computation of the various indicators of severity and outcomes of COVID-19 among BU employees. The Case Fatality rate is 7.84% for the 51 COVID-19-positive employees. This is reflected by the virulence of the Delta variant prevalent during the times when the four deaths occurred from May to October 2021 and most employees have just started vaccinating during this period for categories A1-A3.

Conclusions and Recommendations

The COVID-19 pandemic disrupted the continuance of education globally and harmed employees' health. There were 51 Bicol University personnel who tested positive for the COVID-19 virus; the majority of the employees have recovered with home treatment, isolation, and quarantine. Most COVID-19 patients were non-teaching personnel who were required to report physically to their offices, unlike the teaching staff who were allowed to work from home. Over 80% of affected employees had symptoms. Fever (17.6%), cough (16.3%), colds (10.5%), malaise (7.8%), and difficulty breathing (7.2%) were most common.

The significant risk factors for the effects and outcomes of COVID-19 were age, sex, and vaccination status. For the COVID-19 outcome of death, the significant predictors were age, vices, comorbidities, clinical presentation, and need for hospitalization.

This study recommends the paramount need for school administrations to contain the transmission of the infection in a pandemic through prompt implementation of infection control protocols, work-from home schemes for all employees, vaccination, full recording and monitoring of cases during and after recovery with an information dissemination campaign that focuses on the elderly, control of comorbidities, and avoidance of vices such as smoking and alcoholism. Based on these findings, it is crucial that full vaccination including booster doses be promptly given especially for those employees with co-morbidities coupled with prompt diagnosis and hospitalization of those with poor clinical presentation.

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References

- Albitar, O., Ballouze, R., Ooi, J. P., & Ghadzi, S. M. S. (2020). Risk factors for mortality among COVID-19 patients. *Diabetes Research and Clinical Practice*, 108293. <https://doi.org/10.1016/j.diabres.2020.108293>
- Amin, D. P., & Palter, J. S. (2021). COVID-19 vaccination hesitancy among healthcare personnel in the emergency department deserves continued attention. *The American Journal of Emergency Medicine*, 48, 372-373. <https://doi.org/10.1016/j.ajem.2021.01.089>
- Azorín, C. (2020). Beyond COVID-19 supernova. Is another education coming? *Journal of Professional Capital and Community*, 5(3/4), 381-390. <https://doi.org/10.1108/jpcc-05-2020-0019>
- Baradaran, A., Ebrahimzadeh, M. H., Baradaran, A., & Kachooei, A. R. (2020). Prevalence of comorbidities in COVID-19 patients: A systematic review and meta-analysis. *Archives of Bone and Joint Surgery*, 8(Suppl 1), 247-255. <https://doi.org/10.22038/abjs.2020.47754.2346>

- Biswas, M., Rahaman, S., Biswas, T. K., Haque, Z., & Ibrahim, B. (2020). Association of sex, age, and comorbidities with mortality in COVID-19 patients: A systematic review and meta-analysis. *Intervirology*, *64*, 36–47. <https://doi.org/10.1159/000512592>
- Cardenas, N. C. (2021). Harnessing strategic policy on COVID-19 vaccination rollout in the Philippines. *Journal of Public Health*, fdab181. <https://doi.org/10.1093/pubmed/fdab181>
- Corpuz, J. C. G. (2021). Multisectoral Approach on COVID-19 vaccination: A proposed solution on vaccine hesitancy. *Journal of Public Health*, *43*(2), e370–e371. <https://doi.org/10.1093/pubmed/fdab085>
- Hao, X., Zhou, D., Li, Z., Zeng, G., Hao, N., Li, E., Li, W., Deng, A., Lin, M., & Yan, B. (2020). Severe psychological distress among patients with epilepsy during the COVID-19 outbreak in southwest China. *Epilepsia*, *61*(6), 1166–1173. <https://doi.org/10.1111/epi.16544>
- Helle, K. B., Sadiku, A., Zelleke, G. M., Ibrahim, T. B., Bouba, A., Tsoungui Obama, H. C., Appiah, V., Ngwa, G. A., Teboh-Ewungkem, M. I., & Schneider, K. A. (2021). Is increased mortality by multiple exposures to COVID-19 an overseen factor when aiming for herd immunity? *PLOS ONE*, *16*(7), e0253758. <https://doi.org/10.1371/journal.pone.0253758>
- Macaraeg, P. (2021, December 30). Philippines logs 1,623 COVID-19 cases, highest since November 21. *Rappler*. <https://www.rappler.com/nation/coronavirus-cases-philippines-december-30-2021/>
- Mohan, A., Tiwari, P., Bhatnagar, S., Patel, A., Maurya, A., Dar, L., Pahuja, S., Garg, R., Gupta, N., Sahoo, B., Gupta, R., Meena, V. P., Vig, S., Pandit, A., Mittal, S., Madan, K., Hadda, V., Dwivedi, T., Choudhary, A., & Brijwal, M. (2020). Clinico-demographic profile & hospital outcomes of COVID-19 patients admitted at a tertiary care centre in north India. *The Indian Journal of Medical Research*, *152*(1 & 2), 61–69. https://doi.org/10.4103/ijmr.IJMR_1788_20
- Noda, A. (2021). 65% of BU personnel population gets COVID-19 jab; 4th year BUños set for vax. *The BUzette News*. <https://bicol-u.edu.ph/thebuzzette/news/bubDD1w1DropM>
- Ramalho, R. (2020). Alcohol consumption and alcohol-related problems during the COVID-19 pandemic: A narrative review. *Australasian Psychiatry*, *28*(5), 524–526. <https://doi.org/10.1177/1039856220943024>
- Ranjbari, M., Shams Esfandabadi, Z., Zanetti, M. C., Scagnelli, S. D., Siebers, P.-O., Aghbashlo, M., Peng, W., Quatraro, F., & Tabatabaei, M. (2021). Three pillars of sustainability in the wake of COVID-19: A systematic review and future research agenda for sustainable development. *Journal of Cleaner Production*, *297*, 126660. <https://doi.org/10.1016/j.jclepro.2021.126660>
- Reddy, R. K., Charles, W. N., Sklavounos, A., Dutt, A., Seed, P. T., & Khajuria, A. (2020). The effect of smoking on COVID-19 severity: A systematic review and meta-analysis. *Journal of Medical Virology*, *93*(2), 1045–1056. <https://doi.org/10.1002/jmv.26389>
- Tadesse, S., & Muluye, W. (2020). The impact of COVID-19 pandemic on education system in developing countries: A review. *Open Journal of Social Sciences*, *8*(10), 159–170. <https://doi.org/10.4236/jss.2020.810011>
- Tarkar, P. (2020). Impact of COVID-19 pandemic on education system. *International Journal of Advanced Science and Technology*, *29*(9s), 3812–3814. <http://sersc.org/journals/index.php/IJAST/article/view/16620>
- Tomacruz, S. (2021, February 25). 46% of adult Filipinos still unwilling to get vaccinated vs COVID-19. *Rappler*. <https://www.rappler.com/nation/octa-research-filipinos-covid-19-vaccine-willingness-february-2021/>
- Vaccination rate among faculty and tertiary students get a boost ahead of 2022 – CHED. (2021, December 30). CHED. <https://ched.gov.ph/vaccination-rate-among-faculty-and-tertiary-students/>
- Woolf, S. H., Chapman, D. A., & Lee, J. H. (2020). COVID-19 as the leading cause of death in the United States. *JAMA*, *352*(2), 123–124. <https://doi.org/10.1001/jama.2020.24865>
- World Health Organization. (2019). *Ten health issues WHO will tackle this year*. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
- World Health Organization. (2020, May 27). Clinical management of COVID-19: Interim guidance. *WHO Institutional Repository for Information Sharing*. <https://apps.who.int/iris/handle/10665/332196>
- Zhang, J., Liu, P., Wang, M., Wang, J., Chen, J., Yuan, W., Li, M., Xie, Z., Dong, W., Li, H., Zhao, Y., Wan, L., Chu, T., Wang, L., Zhang, H., Tao, T., & Ma, J. (2020). The clinical data from 19 critically ill patients with coronavirus disease 2019: A single-centered, retrospective, observational study. *Journal of Public Health*, *30*, 361–364. <https://doi.org/10.1007/s10389-020-01291-2>

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