RESEARCH ARTICLE

Knowledge, Attitude, and Practices (KAPs) on COVID-19 of junior and senior high school students

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Abstract: During the COVID-19 pandemic, students faced increased risk of contracting the virus due to the relaxation of health protocols by the Philippine government and the authorization of face-to-face instruction in schools by the Department of Education. There is little data on basic education school students' awareness of COVID-19 in the Philippines, particularly in Cebu City. A cross-sectional descriptive-correlational research design was utilized to determine junior and senior high school students' knowledge, attitudes, and practices regarding COVID-19. In this study, a survey questionnaire was used to compare and attempt to identify relationships between the demographic profile of students and their KAPs regarding COVID-19. This study also investigated the relationships between students' KAPs. JHS and SHS students exhibited outstanding KAPs for COVID-19. Students' demographic characteristics, including grade level and family income, were significantly associated with their KAPs toward the disease. However, their gender was not significantly associated with their KAPs. There was a significant relationship between students' COVID-19 KAPs. It is imperative that the DepEd develop strategies and programs to combat the situation due to pandemic and prepare for similar situations in future. With the aid of curriculum designers, science educators must adapt the science education curriculum to address current and future health concerns.

Keywords: basic education students; COVID-19; KAPs

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Introduction

COVID-19, often called Coronavirus Disease 2019, is comparable to other diseases caused by coronaviruses like SARS and MERS. This COVID-19 adds to the evolution of ARDS (Getawa et al., 2022; Huang et al., 2020). At the beginning of the disease, the most prevalent symptoms were myalgia or exhaustion, cough, and fever. Other symptoms, such as headache, hemoptysis, sputum production, and diarrhea, were less common (Huang et al., 2020; WHO, 2020a; WHO, 2020b). Since most of the schools have re-opened, this pandemic greatly affects everyone, especially adults, children, people with comorbidities, and young students.

Studies mentioned that those young people are also affected by COVID-19 and believe they are at risk since most do not take necessary precautionary measures (Ningthoujam & Khomdram, 2020; Katz, 2021). Moreover, Muto et al. (2020) found that being younger was among the factors related to hesitance to follow preventive measures. Xue et al. (2021) stressed in their study that to improve health education about COVID-19 among students, it is necessary to understand students' awareness of COVID-19. Considering the social and behavioral norms of the students is one way in which public health officials and education officials can work together to reduce the severity of an outbreak (Wilkinson et al., 2017). Research on KAP can be utilized to glean information about public health that is specific to a certain situation (Rahman et al., 2021).

The KAP study is extremely important in public health management, particularly in health promotion and prevention. It is an appropriate strategy for evaluating ongoing activities and identifying strategies that have successfully brought about societal behavioral change. In many situations, there is a potential for a risk to one's health if there is a lack of understanding or if most health-related views are misconstrued

(Zhang et al., 2020). There are already local and international studies that assessed the KAPs toward COVID-19, which aimed to formulate initiatives to mitigate the current pandemic (Lau et al., 2020; Bautista et al., 2020; Lee et al., 2021; Pal et al., 2020; Feldman et al., 2021; Desalegn et al., 2021). A few studies assessing college students' KAPs on COVID-19 have already been conducted (Lau et al., 2020; Bautista et al., 2020). Research has been conducted internationally to understand the KAPs among basic education students on COVID-19 disease and the pandemic (Ferdous et al., 2020; Souli & Dilucca, 2020; Subedi et al., 2020; Wen et al., 2020; Xue et al., 2021), however no available information yet as to the KAPs on COVID-19 of JHS and SHS students who are also influenced by this pandemic in the Philippines.

Now that the Philippine government has loosened its policies on health protocols and the Department of Education allowed in-person classes in the schools and knowing that the virus is still present, the students are at danger of catching the virus. Due to the virus' high infectivity nature, managing the pandemic can become more difficult (Cao et al., 2020). Not much information is available regarding the basic education school students' awareness level in the Philippines, particularly in Cebu City. With this current situation, this study purposely focused on assessing the status of KAPs toward COVID-19 of JHS and SHS school students enrolled in Cebu City. This study used a survey questionnaire to compare and attempt to discover relationships between the students' demographic profile and their KAPs toward the disease. This study also described the correlation between the student's KAPs toward disease. This study falls within the realm of biology teaching and learning materials at all education levels, particularly focusing on understanding students' awareness and behaviors related to COVID-19. Additionally, it relates to the broader context of environmental education, as the COVID-19 pandemic has significant implications for public health and environmental interactions.

Materials and Methods

Research design

In the current investigation, a research strategy known as cross-sectional descriptive-correlational was utilized. In this cross-sectional research, the population or a subgroup is selected, and data are gathered from these individuals in the population to assist in answering the research objectives (Olsen & George, 2004). To help answer questions and establish the level of students' KAPs about COVID-19, this study selected junior and senior high schools that were enrolled in public schools in DepEd Cebu City. Instead of determining cause-and-effect associations, the descriptive correlational research approach focuses on describing the relationships between the variables (Luo et al., 2022). This study used a survey questionnaire to compare and attempt to discover relationships between the students' demographic profile and their knowledge, attitude, and practices toward disease. This study also described the correlation between the student's knowledge, attitude, and practices toward disease.

Research environment

The research was conducted in the Department of Education (DepEd) secondary schools in Cebu City. The respondents were from the public JHS and SHS schools in Cebu City. The city of Cebu is a highly urbanized city with an estimated population of 1 million population. Cebu City was one of the cities in the Philippines with the greatest number of COVID-19 cases recorded during the early stages of the epidemic. One of the reasons why this took place in Cebu City is because there are locations inside the relatively congested residential districts of Cebu City where "social distancing" is nearly impossible (Llaneta, 2020). There were around 80.000 JHS and SHS students enrolled in the public secondary schools in the city. Also, the researcher chose DepEd Cebu City because this is where the researcher works.

Research respondents

The DepEd Cebu City Division currently has 56.704 JHS students and 15.670 SHS students for the School Year 2021 – 2022. The formula developed by Cochran was utilized by the researcher so that the sample size could be calculated. According to the formula, the minimal sample sizes required for this study were 382 students for the JHS and 375 students for the SHS. To account for respondents who were unwilling to cooperate, Salkind (1997) suggested raising the sample size by 40–50%. As a result, the sample size for this study consisted of 536 students for the junior high school and 526 students for the senior high school. Table 1 shows the number of randomly picked students participating in the survey questionnaire.

Table 1. Actual number of JHS and SHS students participated for survey-questionnaire

School	Total number of students	Number of respondents in north district	Number of respondents in south district
Junior High School	620	306	314
Senior High School	660	348	312

The actual numbers of respondents who participated and answered the survey questionnaire were 620 JHS students and 660 SHS students. When selecting the participants for the study, the researcher made use of a method called stratified random sampling. A total of 620 JHS students and 660 SHS students enrolled in DepEd Cebu City Division were selected to answer the questionnaire on COVID-19. The researcher evenly divided the sample into north and south district public JHS and SHS in DepEd Cebu City Division. Three hundred six (306) junior high school students in the north district public junior high schools were randomly picked to answer the survey questionnaire. Three hundred fourteen (314) junior high school students in the south district public junior high schools were randomly selected. For senior high school, three hundred forty-eight (348) students in the north district public senior high schools were randomly picked to answer the survey questionnaire. Three hundred twelve (312) students were randomly selected to participate in the south district public senior high schools.

Research instrument

The survey questionnaire utilized in this investigation was developed based on a meta-analysis of KAP research on COVID-19 among basic education students worldwide (Origenes, 2023). This meta-analysis was used to prepare the survey questionnaire utilized in this inquiry. The JHS and SHS Students' KAP on COVID-19 Survey Questionnaire was the name given to this survey instrument. The survey items pertaining to knowledge, attitudes, and practices with validity and reliability testing results that be seen in Tables 2, Table 3, Table 4.

Table 2. Knowledge Items with Validity and Reliability Results

Items	Sub-categories	Validity	Reliability
- COVID-19 is a disease which can be spread to other people. - The COVID-19 infection was caused by a virus. - COVID-19 is an abbreviation for Coronas Virus Disease 2019, another name for the illness.	General knowledge of COVID-19	0.81, 0.79	0.76
- COVID-19 often manifests itself with a high temperature. - One of the symptoms of COVID-19 is a hacking cough. - One of the symptoms of COVID-19 is a painful throat.	Knowledge on signs and symptoms	0.83, 0.78	0.83
- If I have any reason to suspect that I am infected with COVID-19, I should see a doctor. - Since I have a presumptive infection with COVID-19, I shall refrain from participating in any pointless daily activities. - It is not possible to eliminate the cause of the disease by washing one's hands with water and soap.	Knowledge on prevention	0.86, 0.83	0.73
- It is not possible to pass on the disease by coughing or sneezing directly to another person. - The disease can be spread on from one person to another by coming into direct touch with infected surfaces. - The disease can be passed on from one person to another by unprotected direct contact with the infected persons (handshaking, hugging, kissing).	Knowledge on Transmission	0.83, 0.81	0.79
- The disease poses a greater threat to those individuals who have compromised immune systems. - Cancer patients, diabetics, and those who suffer from chronic respiratory disorders are at a greater risk of developing this disease. - COVID-19 does not appear to have any effect on youngsters in general.	Knowledge on Susceptible Population	0.85, 0.79	0.81
- A vaccine against COVID-19 is currently on the market. - Instead of obtaining COVID-19 from a sick person, getting vaccinated against it with COVID-19 is a less safe but more reliable strategy to establish protection against it. - My natural immunity to COVID-19, which I obtain as a side effect of having the virus, is superior to the vaccination-induced immunity to COVID-19 that I receive.	Knowledge on COVID-19 Vaccine	0.85, 0.83	0.71

Average	**0.83, 0.81**	**0.77**

Table 3. Practice items with validity and reliability results

Items	Sub-categories	Validity	Reliability
- I do not give much thought to the food that I put in my body. - I take vitamin pills. - Every day, I drink between one and two glasses of water	Health and diet	0.87, 0.83	0.85
- I do not use disinfectants and solutions. - It's been a while since I've washed my hands thoroughly with soap and water for at least 20 seconds each time. - Whenever possible, especially after not having cleansed my hands, I stay away from touching my eyes, nose, or mouth.	Personal hygiene	0.85, 0.82	0.90
- Whenever there is a COVID19 pandemic, I make it a habit to leave my house. - During this time of the COVID19 outbreak, I am not attending school. - When I go out in public, you won't find me with a face mask on.	Social distancing and wearing of facemask	0.82, 0.80	0.89
- I have been vaccinated against COVID-19, but I still choose to use a face mask whenever I am in public places. - Although having received the full vaccination, I am able to cough and sneeze normally. - In the event that the COVID-19 vaccination causes a negative reaction in me, I will not disclose this information to any health or medical authority.	COVID-19 vaccine and health protocol	0.86, 0.83	0.92
Average		**0.85, 0.82**	**0.89**

Five (5) respondents pretested this survey's questionnaire. Feedback was gathered regarding the language that was used in the items, how clear the instructions were, how accurate the format was, and how long it took to complete the questionnaire. Subject-matter experts were invited to evaluate the KAPs tool about COVID-19, including the school's master teacher, who teaches senior high school biology, a junior high school science teacher who is also a registered nurse, and the school nurse. Based on the appropriate scale, the subject experts were asked to offer scores for each instrument item independently. Once they had fully disclosed the scores on all issues, the experts were asked to submit their comments to the researcher. Then, using the advice of Ray et al. (2018), the item-level content validity index (I-CVI), scale-level content validity index based on the universal agreement (S-CVI/UA), and the scale-level content validity index based on the average (S-CVI/Ave) were calculated. All domains have reached a level of content validity that is considered adequate because the I-CVI scores for the KAP items are respectively 0.83, 0.84, and 0.85. In addition, the SCVI-UA knowledge, attitude, and practice all received scores of 0.81, 0.81, and 0.82, respectively; this indicated that they possessed an acceptable degree of content validity. The average I-CVI and the SCVI-UA, which came in at 0.84 and 0.81, respectively, both met the good standard, indicating that the questionnaire's content validity was satisfactory.

The instrument was handed over to the director of the academic institution along with a note alerting them that it was now ready to undergo pilot testing. Another round of feedback was provided, resulting in only a few minor changes to the format and instructions. The instrument underwent a pilot test at the school where the researcher teaches, which was approved by the head of the school or an administrator. The pilot test was conducted on 30 JHS and SHS students that were chosen at random. After that, a reliability test with Cronbach's alpha was carried out to establish the degree of internal consistency exhibited by each item. Modifications were made after the feedback and observations were considered and weighed against one another. The overall reliability of the questionnaire, Cronbach's alpha, was found to be 0.81, while the reliability of the questionnaire's KAP components was found to be 0.77, 0.78, and 0.89, respectively.

Table 4. Attitude items with validity and reliability results

Items	Sub-categories	Validity	Reliability
- It is fine for me to avoid eating nutritious meals and working to strengthen my immune system. - When I consume a lot of junk food and always smoke cigarettes, I get the feeling that I'm protecting myself and taking care of my health.	Health and diet	0.86, 0.83	0.75
- After having contact with animals and animal products, I should not engage in general hygiene practices such as washing my hands frequently with soaps and drinkable water. - Before I eat and prevent touching my nose, eyes, or mouth, I should clean my hands with soap or an antiseptic that contains alcohol.	Personal hygiene and handwashing	0.83, 0.81	0.81
- it is important for me to observe proper cough etiquette if I am showing signs of an acute respiratory infection (maintain distance, cover coughs and sneezes with disposable tissues or clothing, and wash hands). - If I have a cough, a runny nose, or any of the other symptoms that are similar to COVID-19, I should get medical attention as soon as possible.	Health protocol	0.83, 0.79	0.81
- It is vitally crucial for me to always maintain a distance of at least one meter (three feet) from a sick individual. - If I have a cough, a runny nose, and other symptoms that are similar to COVID-19, I should avoid going to school as well as any public locations that are crowded.	Social distancing	0.82, 0.83	0.83
- Because getting vaccinated against COVID-19 will create changes to my DNA, I should avoid getting it. - My opinion is that the immunization against COVID-19 should not be required.	COVID-19 vaccine (nature and perception)	0.84, 0.78	0.71
Average		**0.84, 0.81**	**0.78**

New validated questionnaire for evaluating the KAP of JHS and SHS students was designed in this study using samples from Mabolo National High School students. The reliability results for the knowledge, attitude, and practice portions are high. The completed and final questionnaire consisted of two parts: the first was a demographic profile of the students and included questions about the students' gender, school name, school district, grade level, and family monthly income. The second part of the study evaluated the students' knowledge of COVID-19 and their attitudes and practices regarding COVID-19. The assessment of students' knowledge of the disease comprised six constructs: general knowledge about the disease, signs and symptoms, prevention, transmission, susceptible population, and vaccine. Respondent's knowledge of COVID-19 was answered using dichotomous responses as True and False. The assessment of the students' attitudes included the classifications regarding COVID-19: health and diet, personal hygiene and handwashing, health protocol, social distancing, and the COVID-19 vaccine (nature and perception). For the attitude, a 4-point Likert scale was utilized with (4) as strongly agree, (3) agree, (2) disagree, and (1) strongly disagree. The assessment of the students' practices included the classifications regarding COVID-19: health and diet, personal and hygiene, social distancing and wearing of facemasks, and COVID-19 vaccine and health protocol. In assessing respondents' practices, a 5-point Likert scale was used with (5) as all the time, (4) most of the time, (3) sometimes, (2) occasionally, and (1) as not at all for the descriptive meaning.

The document requesting the participant's informed consent was in the foremost part of the survey questionnaire. Before any of the data was collected, it was made clear to each respondent that they had the right to refuse to respond to any question, that they could leave the survey at any time without incurring any penalty, and that their responses would be kept strictly confidential; the online survey form adhered in a stringent manner to the requirements outlined in the Data Privacy Act.

Data gathering procedures

The researcher first sought approval to administer the study from the Schools Division Superintendent of DepEd Cebu City, Philippines. The researcher explained and discussed how the study would be completed

and the possible risks and benefits by writing a letter to the Schools Division Superintendent. The gathering of information did take place during the School Year 2022–2023, and it took place in all of Cebu City's public senior high schools. The researcher collaborated with the junior and senior high school administrators and the teachers who advised the students. The members of this school's staff played an essential role in facilitating and managing the online survey questionnaire. The questionnaire for the online survey was administered by means of assisted questioning, and both the class advisers and the researcher controlled its distribution.

Data analysis

The researcher used percentages and frequencies. These were first calculated to explain the students' knowledge, attitudinal responses, and practices regarding COVID-19. For knowledge, scores above ≥ 70 % were considered good, 50% and 70% were considered fair, and less than 50% were considered poor. It is measured by 12 items 4-point Likert scale (Ganaprakasam et al., 2021). The mean scores of students' attitudes are divided into three levels: mean scores between 3.01 – 4.00 are considered good, 2.01 – 3.00 are considered fair, and 1.00 – 2.00 are considered poor. The mean scores of students' practice were categorized into 3 levels: mean scores between 3.68 – 5.00 were considered good, 2.34 – 3.67 were considered fair, and 1.00 – 2.33 were considered poor. The gathered data were examined using the SPSS statistical software. Percentages and frequencies were calculated, while Chi-square was utilized to identify the significant relationship between the demographic profile of JHS and SHS students and their KAPs on COVID-19. Pearson-r was used to determine the correlation between variables and KAP in this study. The statistical significance level was at $p < 0.05$.

Ethical considerations

During the research endeavor, the researcher considered all the relevant ethical considerations. These included the risk-benefit assessment, as well as its content, comprehension, and documentation; authorization to access private information; confidentiality procedures; and conflicts of interest. The Cebu Normal University Research Ethics Committee's ethical review board granted exemption from the ethical review board because this study presented minimal hazards or inconveniences to the study participants. Prior to the beginning of the collection of data, the respondents were briefed on the purpose of the study, briefed that their personal identities would be kept confidential, that their answers would not in any way affect or change their academic performance and standing, and that they had the option to withdraw and refuse from participating in the study at any time. All of this occurred before the data collection phase began. As evidence of the participant's agreement to participate in the research, the researcher collected either the participants' handwritten or digital signatures.

Results and Discussion

Demographic profile of the junior and senior high school students

It is vital to have access to the demographic information of the students in this study to assess whether or not the students constitute a sample of the focal population for generalization purposes. The demographic profile of JHS and SHS students is presented in Table 5.

There were 620 JHS and 660 SHS students who participated and answered the survey questionnaire on KAPs about COVID-19. Among junior high school students, 26.18% of grade 7 students participated, 34.97% of grade 9 students, 22.47% of grade 9 students, and 16.39% of grade 10 students. 46.96% of students were from north district schools and 53.04% from south district schools. More women participated in the study (50.84%) than men (41.22%). Some participants preferred not to say or reveal their gender, which was 5.74%. More junior high school students preferred not to say their family's income (46.96%) participated in the study than students who have a family's monthly income below Php5000 (17.06) and Php5001 – Php10000 (12.67%). Among the senior high school students, 40.00% of grade 11 students and 60.00% of grade 12 students participated and answered the survey questionnaire on KAPs about COVID-19. There were 52.63% of senior high school students from north district schools and 47.37% from south district schools. There were also more women (55.49%) who participated among senior high school students than men (38.35%). More students preferred not to say (29.62%) their family's income participated than students who belong to the below Php 5000 family income (25.86%) and Php5001 – Php10000 (16.86%).

The number of students who are women in this study is consistent with the participants in the studies conducted by Ayed et al. (2020), Souli and Dilucca (2020), El-Sayed and Hayam (2021), Hatami et al. (2021), and Feleke et al. (2022). In contrast to this, more men participated in the studies conducted by Subedi et al. (2020) and Dubik et al. (2021). The impact of the pandemic on adolescent girls may be largely disproportionate (Singh et al., 2021). In many contexts, women and girls are at a higher risk during an epidemic (or pandemic) because they are more likely to provide unpaid care for children and the elderly at home and frequently make up more than half of the workers in the healthcare industry (Wenham et al., 2020). They often have reduced access to education and increased dropout rates post such a crisis (Singh et al., 2021). The same in this

study, there were also more senior high school students who responded to the studies of Ayed et al. (2020), El-Sayed and Hayam (2021), and Feleke et al. (2022).

Table 5. JHS and SHS students' demographic profile

Demographic Variables JHS	Frequency n (620)	Percent %	Demographic Variables SHS	Frequency n (660)	Percent %
Grade level			**Grade level**		
Grade 7	162	26.18	Grade 11	264	40.00
Grade 8	214	34.97	Grade 12	396	60.00
Grade 9	140	22.47	----	----	----
Grade 10	104	16.39	----	----	----
School's district			**School's district**		
North	285	46.96	North	350	52.63
South	321	53.04	South	310	47.37
Gender			**Gender**		
Man	264	42.57	Man	261	39.55
Woman	314	51.68	Woman	373	56.54
Prefer not to say	42	5.74	Prefer not to say	26	3.91
Family's monthly income			**Family's monthly income**		
Below 5,000 Php	101	17.06	Below 5,000 Php	172	25.86
5,001 –10,000 Php	75	12.67	5,001 –10,000 Php	109	16.39
10,001–15,000 Php	41	6.93	10,001–15,000 Php	46	6.92
5,001 –20,000 Php	25	4.22	5,001 –20,000 Php	43	6.47
20,001–25,000 Php	20	3.38	20,001–25,000 Php	24	3.61
Over 25,001 Php	52	8.78	Over 25,001 Php	74	11.13
Prefer not to say	278	46.96	Prefer not to say	197	29.62

Knowledge of JHS and SHS students on COVID-19

The students' knowledge was evaluated to ascertain the extent to which they were aware of and acquainted with COVID-19. Students responded to the questions in this section of the survey questionnaire with dichotomous answers, either true or false. The results of a knowledge test administered to JHS and SHS students are presented in Table 6.

Table 6. Knowledge of Junior and Senior High School Students on COVID-19.

Knowledge Constructs	Correct Responses (Rate %) with Interpretation JHS		SHS	
General knowledge of COVID-19 and its Causes	93.09	Good	93.59	Good
Signs and Symptoms of COVID-19	91.85	Good	93.11	Good
COVID-19 Prevention	68.50	Fair	71.51	Good
COVID-19 Transmission	69.38	Fair	71.74	Good
Susceptible Population	89.53	Good	91.02	Good
COVID-19 Vaccine	52.94	Fair	56.41	Fair
Average	**77.55**	**Good**	**79.56**	**Good**
Overall: 78.55 (Good)				

For Interpretation : <50% (Poor)
50% – 70% (Fair)
≥ 70% (Good)

The students' overall knowledge of the disease is 78.55, which means they have good knowledge of it. The JHS students had good knowledge of the items under general knowledge on COVID-19 and its causes, signs and symptoms, and the susceptible population. They had a fair knowledge of the items under COVID-19 prevention, transmission, and vaccine. However, SHS students had five (5) good knowledge than the JHS students. These knowledge constructs were general knowledge on COVID-19 and its causes, signs and symptoms, susceptible population, prevention, and transmission. SHS students had only one (1) fair knowledge: the COVID-19 vaccine.

The good knowledge of the items of knowledge of causes of COVID-19 of both JHS and SHS students is consistent with the results of the studies conducted by Souli et al. (2020) and Hatami et al. (2021), but the findings in the studies of Subedi et al. (2020) and El-Sayed and Hayam (2021) got below 70% correct response rate. The good knowledge of signs and symptoms of COVID-19 among the JHS and SHS students

is also consistent with the results of Dubik et al. (2021) but contrary to the results of Subedi et al. (2020), El-Sayed and Hayam (2021), and Hatami et al. (2021). The good knowledge of the JHS and SHS students in the items of susceptible population is the same of El-Sayed and Hayam (2021) and Hatami et al. (2021). On the contrary, Subedi et al. (2020), Dubik et al. (2021), and El-Sayed and Hayam (2021) had different results in the students' knowledge of disease prevention compared to the current study. The same thing happened in the knowledge of disease transmission among the students in the studies of Subedi et al. (2020), Dubik et al. (2021), El-Sayed and Hayam (2021), Hatami et al. (2021), and Feleke et al. (2022). Their participants got a good knowledge of items under the disease transmission, which is totally different from the JHS students in the current study. The students' knowledge of the disease vaccine is parallel to the results in both studies were done by Subedi et al. (2020), and Hatami et al. (2021).

There were items in the knowledge of COVID-19 wherein they got below 70% and 50% response rate. Ideally, all items were expected to have a correct response rate of above 70%. The items with incorrect response rates could be the items that students have difficulty in understanding, or they have different interpretations of the concepts in the items. They may have misconceptions of those topics on COVID-19. Yet, not all misunderstandings are indeed misunderstandings, and not all instances of error may be classified as misconceptions. It is possible for students to give the wrong response if they do not comprehend or are familiar with the subject (Husnah et al., 2020). This could mean that educating the students about this disease is essential during the pandemic. The school and teachers, particularly the science teachers, could have provided the students with many opportunities to facilitate learning about the disease. However, this was also when schools were closed, and teacher-student interaction was limited.

It Is alarming that the students in the current study do not understand the disease vaccine. This is congruent with what was found in the current meta-analysis of the students' knowledge of the COVID-19 vaccine. Students could have the same manifestations of misconceptions about the vaccine just like other basic education students across the globe. These misconceptions, once again, could have resulted from the information they get from social media. It is important to note that the students could have had a more significant opportunity to utilize social media while they were at home during the lockdown (Carducci et al., 2019; Li et al., 2022). Although social media platforms have played a big part in the spread of knowledge, they have also contributed to the spread of false information (Brug et al., 2004). Because sorting fact from fiction on social media is an extremely difficult task, the emphasis should be placed on reputable sources that steer clear of offering their own points of view (Rochwerg et al., 2020). According to Li et al. (2022), the researchers thought that if the students had access to more different sources of information, then they would have a better in-depth understanding of the vaccination. The same information obtained from various sources can serve as supporting evidence and boost an individual's level of trust. The availability of numerous sources of information enables individuals to more accurately evaluate the material's credibility (Zou & Tang, 2021). With many sources of information about the disease, educators can help the students identify and examine the correct information and discriminate against fake news and misinformation. Educators can teach students how to examine research-based knowledge or facts. In addition, the vaccine is one of the science topics that teachers could have misinterpreted or mistaught. This lesson should have been well understood since this topic is a lesson package with the immune system and biotechnology. With this, revisiting the science curriculum in basic education could be appropriate.

Attitude of JHS and SHS towards COVID-19

The students' attitudes and any preconceived notions that they may have had about COVID-19 or the pandemic were evaluated during the survey. This allowed for the determination of the students' feelings regarding COVID-19. The responses in Table 7 indicate the perspectives of JHS and SHS students regarding COVID-19.

Table 7. Attitude of Junior and Senior High School Students towards COVID-19.

Attitude Constructs	Attitude towards COVID-19 (Weighted Mean) with Interpretation			
	JHS		SHS	
Health and diet	3.40	Good	3.46	Good
Personal hygiene and handwashing	3.48	Good	3.55	Good
Health protocol	3.59	Good	3.56	Good
Social distancing	3.63	Good	3.63	Good
COVID-19 vaccine (nature and perception)	3.01	Good	3.07	Good
Average	3.36	Good	3.39	Good
Overall: 3.38 (Good)				

For Interpretation: *3.01 – 4.00 (Good)*
2.01 – 3.00 (Fair)
1.00 – 2.00 (Poor)

The overall level of attitude of the students toward COVID-19 is 3.38, which means that they had a good attitude. Both JHS and SHS students had almost the same results in each construct regarding their attitude

toward COVID-19. The attitude constructs with the highest weighted mean were social distancing (3.63 for both JHS and SHS), followed by health protocol (3.59 for JHS and 3.56 for SHS). The students' attitude toward social distancing is consistent with those in El-Sayed and Hayam (2021) and Hatami et al. (2021) studies. It is possible that students think they need to keep a physical distance between themselves and other people. They believe everyone should separate themselves as soon as symptoms appear and avoid contact with ill people. This is congruent with what was found in the meta-analysis of attitudes on isolation, social distancing, and avoiding crowded places. It could mean that the students of Cebu City have similarities with the students across the globe regarding their attitude toward isolation, social distancing, avoiding crowded places, and hand hygiene. The JHS and SHS students' good attitude toward health protocol is also the same among the students in the studies of El-Sayed and Hayam (2021), Ali et al. (2021), and Getawa et al. (2022). They could have more information about how the disease is transmitted that they believed to follow health protocol. Important information can help students develop attitudes and foster values toward the disease. Although these students have already manifested good attitudes toward these items, educators must continue to educate the students about the disease.

The good attitude toward health and diet, personal hygiene, and handwashing of the JHS and SHS students are consistent with the students in the studies of Wen et al. (2020), Xue et al. (2021), Subedi et al. (2020), and El-Sayed and Hayam (2021). In the meta-analysis of attitudes on personal and hand hygiene above, 60% of basic education students across the globe had a good attitude toward handwashing. This could mean that the students identified personal hygiene and handwashing as the best way to prevent contracting the disease. This is the perspective of income-poor homes in the Philippines, where most survey participants identified hygiene and handwashing as preventive measures (Lau et al., 2020; Li et al., 2022). Moreover, most public schools were mandated to have a handwashing area and implement the DepEd WASH in Schools (WinS) Program before the COVID-19 pandemic. Through these, the students have already tested and had the hands-on experience that could lead them to have a good attitude towards handwashing. Health and balanced diet, and handwashing are part of the basic education curriculum and taught in school from preschool to high school. DepEd has implemented many programs regarding health education. Schools have already imposed healthy food, snacks, and beverages, especially in the canteen. This could be why students have a good attitude towards health and diet. These attitudes could have already been inculcated before the start of the pandemic. Students could have already experimented and discovered these attitudes when they were in school before the pandemic.

Although both JHS and SHS students got good attitudes toward the nature and perception of the vaccine (3.01 for JHS and 3.07 for SHS), this attitude construct got the lowest among the six constructs. Subedi et al. (2020) and Hatami et al. (2021) found the same about the students' attitudes toward vaccines. It is quite confusing that students do not manifest a good attitude toward vaccines knowing that the science and technology of vaccines started a long time ago. Every infant experienced being vaccinated, and every parent has, for sure, seen its good effect. However, there are still many people who do not believe in it. It could be the effect of the controversies of Dengvaxia. Fear of the adverse consequences of vaccines evolved, which was exacerbated by prior unfavorable experiences stemming from a dispute over a dengue vaccination in 2017 (Landicho-Guevarra et al., 2021) among the people in the Philippines, including parents and students. With this, educating the minds and fostering a good attitude among the students could be a good step to stop the vaccine conspiracy finally. Educators can help students by giving them activities to spark curiosity about the immune system and vaccines. That curiosity will surely assist them in exploring and experimenting until they inculcate a good attitude toward it.

Practice of junior and high school students toward the disease

The COVID-19 practice of the students was evaluated to identify whether they have any routine activities or behaviors that could protect them from getting the disease. Table 8 illustrates the behavior of JHS and SHS students regarding COVID-19.

Table 8. Practice of JHS and SHS Students towards COVID-19

Practice Constructs	Practice towards COVID-19 (Weighted Mean) with Interpretation			
	JHS		SHS	
Health and diet	3.97	Good	4.01	Good
Personal hygiene and handwashing	4.17	Good	4.14	Good
Social distancing and wearing of facemask	4.14	Good	4.15	Good
COVID-19 vaccine and health protocol	4.31	Good	4.24	Good
Average	**4.17**	**Good**	**4.15**	**Good**
Overall: 4.16 (Good)				

For Interpretation: *3.68 – 5.00 (Good)*
2.34 – 3.67 (Fair)
1.00 – 2.33 (Poor)

The overall level of practice of the students toward COVID-19 is 4.16, which means good practice toward COVID-19. Both JHS and SHS students had almost the same results in each item regarding their practice toward COVID-19. JHS and SHS students had good health and diet practices (3.97 for JHS and 4.01 for SHS). Similarly, students in the study by Wen et al. (2020) also had good practices towards health and diet. Although students had good practice toward health and diet, it still got the lowest weighted mean among the four constructs.

Students may know the value of healthy and balanced diet meals; however, their quality of living may affect their practice towards having healthy and balanced meals. It could start from their respective homes and family, where most Filipino families could not afford a complete and balanced meal. This situation has demonstrated a practice that the students have done. Students who come from low-income families are typically the ones who suffer the most from malnutrition. Still, they may not be able to afford to buy nutritious food at school (Angeles et al., 2014) and thus, resulting in doing a not healthy eating practice. This implies that educators must set themselves as an example of taking health and diet seriously. The students can see the teacher manifesting a certain practice, then they can eventually execute and demonstrate it on their own. Educators can also teach the students how to budget and manage their finances for a healthy lifestyle and good meals.

The recommendation that students in junior high and senior high schools should wear face masks is congruent with the findings of research carried out by Subedi et al. (2020), Wen et al. (2020), Dubik et al. (2021), and Hatami et al. (2021). On the contrary, these findings contradict what was discovered in the research carried out by Liu et al. (2020) and Ayed et al. (2020). According to their research findings, the students exhibited poor technique when it came to wearing masks as a form of protection. According to Ayed et al. (2020), this was connected to the fact that the students had less knowledge about the significance of wearing face masks. This is corroborated by the results of an earlier WHO (2020) study, which noted that only around one-third (1/3) of the study participants were using face masks. This data lends further credence to the argument. The WHO (2020) has suggested that anyone who is concerned about catching COVID-19 should start wearing facemasks. Most students engaged in social distance behavior when they were away from their families, which is congruent to the findings of the research conducted by El-Sayed and Hayam (2021). Students who went out of my home during the COVID-19 pandemic is consistent with the findings of Dubik et al. (2021), but this is different from the findings of Hatami et al. (2021), who found that 36 percent of students stated that they did not leave their homes during the previous week. This is a substantial number, particularly when considering that the early days of movement restrictions coincided with the vacations for the Persian new year.

Students have learned so much that they practice social distancing and wearing face masks. Much information circulating on social media reported the effects of social distancing and wearing facemasks. Even though the Philippine government announced the voluntary wearing of facemasks, many students still wear them. The importance of social distancing and wearing facemasks are crucial, especially when dealing with people with contagious diseases. This could mean that educators and science educators can provide learning opportunities for the students to know how to control and contain contagious diseases like COVID-19.

The students in the JHS and SHS washed their hands with soap and disinfectants. Most of them washed their hands with soap or detergents and water for at least twenty (20) seconds. That is why they had good practice in personal hygiene and handwashing. This is also similar to the results of the studies conducted by Wen et al. (2020), Subedi et al. (2020), El-Sayed and Hayam (2021), Dubik et al. (2021), and Getawa et al. (2022). This is evident during the first year of the pandemic. People brought sanitizers wherever they went. Establishments provided sanitizers and handwashing areas for their clients. Hygiene is a topic to stop the spread of contagious diseases. This is also a common lesson Integration In science subjects, especially biology. This surely implies that science curriculum that includes health education and educators should instill this hygiene in every student. When this is instilled, students can execute and apply hygiene where ever and whenever.

When the students sneezed or coughed, they avoided touching their mouths and eyes with unwashed hands. This got the highest weighted mean among the four practice constructs. This is opposite to what was found in the attitude of JHS and SHS students towards the vaccine. Students reported that even though they were vaccinated, they still practiced health protocols. In addition, this is contrary to the fact that these students had only fair knowledge about COVID-19 but had good practice. It could mean that their practice did not depend on what they knew about the vaccine. It could also mean that since the government offered the vaccine for free, students grabbed the chance to take it. While the government did not impose compulsory vaccination, students could still fear being singled out in school. DepEd listed students' status regarding COVID-19 vaccination because of the reopening of the schools. This could also be why students took the vaccine since they were motivated to return to school. Supposedly, knowledge and practice should be associated with one another. Educators have a crucial role here in making this association happen. Educators can do this by asking the students to translate and execute their knowledge into practice. When students are engaged in the application of their knowledge, students remember and achieve their academic goals (Eyler, 2009).

Relationship between the demographic profile and the KAP levels on COVID-19 among the junior and senior high school students

Students' demographic characteristics during their junior and senior years of high school may or may not influence their KAP levels on COVID-19. In addition to this, it is essential that the demographic profile be analyzed to establish the impact that it has had on the KAPs of the students. The correlation between the demographic profile and the level of KAPs about COVID-19 among JHS and SHS students is outlined in Table 9.

Table 9. Relationship between the demographic profile and the level of KAPs on COVID-19 among the JHS and SHS students

	Gender	Grade Level	Family's Income
Knowledge			
Pearson Chi-Square			
Value	17.843a	21.902a	71.178a
df	12	10	12
Asymptotic Significance (2-sided)	0.121	0.016*	<0.001*
Attitude			
Pearson Chi-Square			
Value	20.517a	39.015a	53.740a
df	18	15	18
Asymptotic Significance (2-sided)	0.304	<0.001*	<0.001*
Practice			
Pearson Chi-Square			
Value	25.379a	242.535a	38.641a
df	24	20	24
Asymptotic Significance (2-sided)	0.385	<0.001*	0.030*

**. Correlation is significant at the 0.05 level.*

Table 9 reveals the relationships between the students' gender and their knowledge (p-value = 0.121), attitude (p-value = 0.304), and practice (p-value = 0.385) about COVID-19. Based on the p-values, the null hypothesis was accepted. There was no significant relationship between the students' gender and their KAP about COVID-19. Regardless of their gender, they could have the same KAPs about COVID-19. This is in contrast to the findings of the previous studies that females or women demonstrated a higher level of knowledge on COVID-19 (Zhong et al., 2020; Lee et al., 2021) and better preventive practices toward COVID-19 (Ferdous et al., 2020). Al-Ahdab (2021) found that poor preventive practices were common among males. This is surprising because a woman or girl usually has good knowledge and better academic performance in school. But, in the case of this pandemic, most students, regardless of their gender, had the same KAPs during the pandemic. This could mean that everyone is affected by this disease and motivated to learn and prevent contracting the disease. This is when educators can assume that everyone in the classroom is equal and needs the same kind of education.

Table 9 also shows the relationship between the students' grade level and their knowledge (p-value = 0.016), attitude (p-value <0.001), and practice (p-value <0.001) about COVID-19. Based on the data, the null hypothesis was rejected. There was a significant relationship between the students' grade level and their KAP about COVID-19. It could mean that the higher the grade level of the students, the better their KAPs on COVID-19 they have. According to the findings of Feleke et al. (2022), the students in grades 11 and 12 possessed a greater level of understanding of COVID-19 compared to those in grades 9 and 10. This finding is congruent to the results of a study that was conducted on students attending four different private and public universities in the Amhara Region (Tadesse et al., 2021) as well as results from research done on general populations in China (Yue et al., 2021). The students' level of understanding and maturity depends on their growth and development. That is why as an educator, it is very important to remember to use appropriate strategies depending on the students' level of understanding and maturity.

Moreover, table 9 displays the relationship between the students' family income and their knowledge (p-value = 0.016), attitude (p-value <0.001), and practice (p-value =0.030) about COVID-19. The null hypothesis was rejected, and as a result, there was a significant association between the students' family income and their knowledge, attitude, and practice concerning COVID-19. Prior studies indicated that family income was one of the sociodemographic factors that were connected with having a strong knowledge of COVID-19 (Al-Hanawi et al., 2020; Alobuia et al., 2020; Zhong et al., 2020). Higher monthly family income was associated with more positive attitudes regarding COVID-19 (Ferdous et al., 2020), and suitable practices toward the disease (Zhong et al., 2020).

It is a reality that there is always a big gap in learning between poor and rich students. At the beginning of the epidemic, the vast majority of students attending high school in private schools switched to attending high school in public schools. Because they had access to more educational resources, students who hailed from homes with higher incomes were likely to have a deeper comprehension of the pandemic. It is imperative that the government make consistent investments in order to give all of the nation's students access to a good

education. Teachers play a very important role when it comes to assisting the government in providing great education.

Correlation between junior and senior high school students' KAPs on COVID-19

To determining the strength of the direct relationship between the KAPs of JHS and SHS students regarding COVID-19, the Pearson correlation was used and applied in this study. The correlation between JHS and SHS students' knowledge, attitudes, and behaviors (KAPs) concerning the disease is shown in Table 10.

Table 10. Correlation Between Junior and Senior High School students' KAPs on COVID-19

		Correlations		
		Knowledge	Attitude	Practice
Knowledge	Pearson Correlation	1	.131**	.127**
	Sig. (2-tailed)		.000	.000
	N	1280	1280	1280
Attitude	Pearson Correlation	.131**	1	.059*
	Sig. (2-tailed)	.000		.036
	N	1280	1280	1280
Practice	Pearson Correlation	.127**	.059*	1
	Sig. (2-tailed)	.000	.036	
	N	1280	1280	1280

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The students' knowledge and attitude regarding COVID-19 were both found to have a correlation of 0.131, according to Pearson, and the p-value was less than 0.000. The students' knowledge and their practice regarding COVID-19 were found to have a Pearson correlation of 0.127, and the p-value was less than 0.000. The p-value for the association between the students' practices and their attitude toward the disease was less than 0.036, meaning the Pearson correlation was 0.529. The null hypothesis was rejected after examining the p-values. As a result, there was a statistically significant correlation between the KAPs of the students.

There was a significant association between attitude, and knowledge scores (r = 0.131), which was similar to the results of a study done in Egypt (Abdel et al., 2020). There was also a significant correlation between practice and knowledge scores (r = 0.127), which was lower than what was discovered in studies carried out by Rahman and Sathi (2020), and Iradukunda et al. (2021). According to the results of a study done in Rwanda, there was a statistically significant association (r = 0.059) between the students' attitudes and their practice (Iradukunda et al., 2021). This current study found a statistically significant correlation between the students' KAP scores about COVID-19.

It has been discovered that high levels of knowledge and good attitudes are influential factors in establishing improved preventative practices. Wen et al. (2020), who reported the same results, believed that establishing good preventive behaviors requires information about infectious diseases and that having a positive and right attitude about the COVID-19 outbreak is helpful in establishing good preventive behaviors. The results of the current study supported these findings. However, Subedi et al. (2020) emphasized that the notion that an individual's level of knowledge determines the positive attitude and practices that they engage in is not always accurate. Because 45.5% of the students in the survey were already reluctant to walk into public spaces, fear may also play a significant role at times. This is evidenced by the fact that more than half of the students believe COVID-19 to be a fatal condition.

The correlations found in this study between attitude and knowledge, practice and knowledge, and practice and attitude were able to confirm a relationship between KAP. The primary assumption underlying KAP studies are that there is a direct relationship between attitude, knowledge, and behavioral change (Warwick, 1993; Muleme et al., 2017). Both Singh et al. (2010) and Hassali et al. (2012) believed having sufficient knowledge may result in a positive mindset, which in turn would lead to beneficial behaviors. Knowledge, as a positive influencing factor of attitudes, is proven to a considerable extent in the literature and is consistent with the KAP model (Ma et al., 2020).

It is thought that a lack of knowledge, which can be evaluated as a function of awareness and familiarity with health-related components, can impair a person's motivation for performing a self-audit on public health-related elements (Muleme et al., 2017). For this knowledge, attitude, and practice relationship to be fulfilled linearly, educators need to have plans and tactics to help students work on fulfilling this relationship. It is possible to facilitate learning in this situation by taking a student-centered strategy and approach, where students investigate the available information regarding the disease, investigate and carry out experiments to build their understanding, and put this understanding into practice to receive feedback on their progress as learners. Students are able to manifest and correlate their knowledge in this way with their attitude, and then their attitude can be associated with their practice.

Conclusion

Junior high and senior high school students exhibited positive KAP about COVID-19. The characteristics of their demographic profiles, such as their family income and grade level, were strongly associated with their KAPs in relation to the condition. On the other hand, there was no significant association between their gender and their KAPs. The students' knowledge, attitudes, and practices about COVID-19 were all found to have a substantial association with one another. Students in Cebu City's public secondary schools have acquired knowledge about the epidemic and developed strategies for coping with the socio-economic repercussions of the pandemic. Students have achieved a level of comprehension of the epidemic that enables them to proceed with their studies. It is possible that this is enough, but it will help the pupils get stronger and better prepared for any future health problems.

It is imperative that the Department of Education come up with strategies and create programs to combat this epidemic and get ready for future scenarios that are comparable to the current pandemic. With the assistance of curriculum planners, science educators must modify the science education curriculum so that it is better suited to meet the requirements of existing and upcoming health concerns. Lessons in science need to be contextualized and integrated into how they relate to the disease, in addition to continual and focused health and scientific education, to help dispel the widespread misunderstandings around COVID-19. Other methods, such as a subsidized school food program that the national and local government operates, will be required to ensure that students from families with low incomes can receive a wholesome meal while attending school. In addition, ongoing science educational activities should be implemented regularly to enhance the quality of life, promote a positive attitude, and encourage healthy practices regarding the prevention of COVID-19.

Limitations and future directions

the accuracy of the responses to an online survey cannot be guaranteed to be accurate. On the other hand, the direction supplied by the researcher and the students' advisers allowed the possibility to acquire the information accurately. Since the survey only covered students enrolled in the current school year, KAPs among teenagers who were not in school were not considered. These young people are also more likely to contract a disease, and the government should understand their KAPs and needs. The study was carried out in Cebu City, which is the location where COVID-19 instances became prominent during its first year of occurrence. The overall performance of the students on their KAPs may be impacted due to the city's high level of education and its information distribution network. Some kids answered "prefer not to say" when asked about their gender or family income. The researcher decided not to include this data in the Chi-square analysis because so many students responded to such an option in the survey.

Conflicts of Interest

The author has no conflicts of interest associated with the material presented in this paper.

Author Contributions

R. W. Origenes: methodology, validation, analysis, writing—original draft preparation, and review and editing.
B. A. Alejandro: analysis and validation

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