

## Knowledge of Production Processes and Utilization of Covid-19 Preventive Materials among Science Education Students of Enugu State University of Science and Technology (ESUT)

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### Abstract

The study examined the knowledge of production process and utilization of Covid-19 preventive materials among science education students of ESUT. Four research questions and two hypotheses informed the study. The population of the study comprise 490 students. All the students were used; hence, no sampling was employed. The instrument “Knowledge of Production Process and Utilization of Covid-19 Preventive Materials Questionnaire (KPPUCPMQ)” was used for data collection. The reliability indices of KPPUCPMQ were determined to be .84, .79 and .81 for Part 1, 2 and overall, respectively using Cronbach alpha. Mean, SD and t-test were adopted in the analyses. Result should that the there is a high extent of knowledge of production process and utilization of Covid-19 preventive materials among students. Female students were significantly more knowledgeable on production process and utilization of Covid-19 preventive materials. Based on these results, it was recommended among others that workshops and awareness should be organized especially for the male students on basic hygiene practices regarding Covid-19 and other related diseases.

**Keywords:** COVID-19 Preventive materials, production processes

### Introduction

In recent months, the corona virus, often known as the Covid-19 pandemic, has been a major source of worry. According to Mayo Clinic (2019), Covid-19 is a member of the virus family that can cause the common cold, Middle East respiratory syndrome (MERS), and severe acute respiratory syndrome (SARS). Similar to this, Masters (2019) described Covid-19 as a new respiratory disease brought on by the severe acute respiratory syndrome coronavirus-2, a single-strand, positive-sense, ribonucleic acid (RNA) virus (SARS-CoV-2-virus). Covid-19 has been described by the WHO (2020) as a unique infectious and respiratory disease that is thought to have originated in China. The symptoms of this newly discovered illness, known as Covid-19, typically include fever, cold, cough, shortness of breath, pneumonia, and breathing difficulties Eneogu, Ejimonye, Ezeocha, & Omaliko, (2021). Other symptoms noted by WHO include fatigue, breathing issues, chest pain, fever, headaches, sore throat, and others (WHO, 2020).

In addition to being extremely contagious, this new Covid-19 pandemic has also been linked to other metabolic and homeostatic issues, dry cough, septic shock, and other symptoms or characteristics (Enemuo & Ugbeleu, 2021). This Covid-19 is caused by a novel strain of the corona virus ('CO' for corona, 'VI' for virus, and 'D' for disease), which can spread through coughing, sneezing, sharing of contaminated materials, among other things (UNICEF in Eneogu et al, 2021).

Thousands of people were infected and killed by Covid-19 as it spread throughout nations, according to Okeke and Ocheni (2021). In March 2020, the WHO classified Covid-19 a dangerous disease.

It has been argued that the Covid-19 pandemic is to blame for the difficulties and issues that many industries have encountered throughout this crisis. Oguguo, Ocheni, & Oguguo, (2021) claim that the Covid-19 outbreak kept people apart and caused businesses, schools, markets, and places of worship to be closed. The outbreak, according to the authors, had an impact on many countries' economies, governments, and educational systems. This demonstrates how many activities were left in disarray by the pandemic. Perhaps because unemployment was at an all-time high and because parents and teachers found it difficult to find jobs due to the closure of all sectors, the impact of COVID-19 was greatest on young people. Students were obviously not exempted from this predicament since their education was suspended and society as a whole appeared to be in a state of standby. According to Eneogu et al. (2021), the crisis caused by Covid-19 resulted in a higher unemployment rate, long-term financial problems, school closures, and learning loss, among other things. This indicates that the danger imminent and the effects of Covid-19 could be worse across all industries if the issue is not addressed as quickly as possible.

As a way of curtailing the rampaging danger of Covid-19 pandemic, the governments of nations and related health agencies have intensified efforts to find ways to control the deadly disease. To this end, Okeke and Ocheni (2021) claimed that various countries around the world had embraced preventive measures such as social exclusion, mask usage, isolation, and routinely washing of hands and using hand sanitizer. UCI Health (2020) lists a number of further measures, including prohibiting public or social meetings, closing markets and places of worship, enforcing curfews, and putting schools under lockdown. The activities of so many sectors were stopped as a result of this enforced lockdown. Of course, the educational sector is included in this. All these were targeted towards containing the heinous threat of Covid-19 pandemic. Yet, the spread of Covid-19 and the number of death cases as a result of the pandemic continued to surge.

This situation is of course critical in developing countries like Nigeria where there is lack of vaccines and advanced medical resources/equipment to manage or contain the spread of the virus. As such, the best and recommended practices at a time like this would be to take advantage of basic covid-19 preventive materials. Preventive materials here may be regarded as basic medical and related equipment or tools that would aid in reducing the spread of Covid-19. These materials may include but not limited to face shields face masks (surgical and fabrics-made), alcohol-based detergent, postal/flyers on Covid-19 awareness, antiseptic and hand sanitizers, among others. Thus, increasing the production of these materials will ensure their adequate supply to all nooks and cranny of the federation, thereby increasing their usage and consequently, leading to a reduction in the spread of the virus. Most of these materials can be produced even at home with home-based materials and resources. Some of these resources include isopropyl ethanol, n-propanol, hydrogen peroxide, glycerol, all for sanitizers and disinfectants; as well fabrics which can be used by tailors for making face masks.

The production processes of most of these materials such as sanitizers and alcohol-based disinfectants and antiseptics for instance entail the mixing of substances such as water, ethanol, fragrance, etc. in various proportions Prajapati, Desai, & Chandarana, (2022), while to make a fabric-based face-mask, such sewing materials as scissors are used to cut the materials into pieces while threads and needles are then used to join the edges. Thus, when there is increase in production of these materials, there is a certainty of their

availability and possible usage. However, for the production of such preventive materials to be feasible and practicable, there must be adequate knowledge of processes required for producing them.

The knowledge of production processes of Covid-19 materials entails the understanding of resources needed for their production as well as the various stages involved in the production. It implies being aware of what is required and what must be put together in order to make or produce a Covid-19 preventive resources such as the hand sanitizer and other antiseptics which is often very common. According to Kebede, Yitayih, Birhanu, Mekonen, & Ambelu, A. (2020), there is a low level of knowledge on preventive practices toward Covid-19 by university medical visitors. More so, Bhagavathula, Aldhaleei, Rahmani, Mahabadi, & Bandari, (2021) equally reported a low level of knowledge on production of Covid-19 preventive material among students. However, Omotoso, Omotoso, Paimo, Teibo, & Olagunju, (2021) reported a contrary view stating that the level of knowledge of students is high. This is also supported by the findings of Olaimat, Aolymat, Shahbaz, & Holley, (2020) who also reported a high level of knowledge of students on preventive measures and processes. These reports could mean that there are disparities in the findings of researchers on the level of knowledge of production process of Covid-19 materials. This calls for further investigation. Notably, when there is lack of knowledge of production process, the level of utilization of these materials could also become an issue.

The level of utilization of covid-19 preventive materials basically addresses the extent or degree to which individuals are able to comply and put to use those resources or materials that have been recommended for the prevention of Covid-19 spread. Thus, the application of hand sanitizer, engaging in regular hand wash with running water, wearing face shield or masks and hand gloves and so on are means to ascertain if one is ensuring preventive measures or not. When these materials are frequently used in line with the recommendation of health agencies and professional, it could be said that there is high rate of utilization, but if otherwise, one could say that the level of utilization is low. According to Prajapati et al.(2022), such materials as hand sanitizers were highly utilized as measure to prevent the spread of Covid-19. Equally, Sikakulya, Ssebuufu, Mambo, Pius, Kabanyoro, Kamahoro, & Kyamanywa, (2021) reported that face masks were highly used by

individuals to prevent Covid-19 spread. The study of Li. Meng, Wang, Zhang, Zeng, Xiao, & Wang, (2021) also reported that the level of usage of mask and hand washing was high. Kebede, Yitayih, Birhanu, Mekonen, & Ambelu, (2020) however, found that the level of practice of preventive measures was not encouraging. These contrary views will be clarified once this study is completed. It is possible that the gender of students and individuals could equally influence the level of knowledge as well as utilization of Covid-19 preventive materials.

Gender entails a socially constructed variable which is capable of informing the role, behaviour, attitude and perceptions of males and females in the society. This means that the level of knowledge on production process as well as utilization of Covid-19 preventive materials of male and female students could be different since gender is likely to influence people's perception. Lee, Kang, & You, (2021) and Bronfman et al (2021) respectively reported that males show low level of knowledge and prevention hygiene with respect to Covid-19 than females. On the other hand, Pinchoff, Santhya, White, Rampal, Acharya, & Ngo, (2020). showed that males were more likely to show higher knowledge and practices on preventing Covid-19 than females. The differences in the above results necessitate this study.

The foregoing has shown that the outbreak of Covid-19 pandemic has been a very challenging factor to many nations, organization, institutions, and individuals. This is also particular to schools and students of Enugu State University of Technology. As a way of curtailing the continuous spread and danger posed by the virus, a lot of measures have been put in place. Consequently, developing countries where advanced resources are rarely available have resulted to the production of home-based preventive materials such as hand sanitizers, face shield, face mask, disinfectants, among others. However, the quantity and supply of these resources could be affected by the level of knowledge of production process and utilization among individuals and students' particularly. Similarly, while some studies have reported a high level of knowledge and utilization, others reported a contrary view. In the same way, some researchers found that males are more knowledgeable and utilize Covid-19 preventive materials than females, but other studies are in support of females over males. These are all indications of inconsistencies in the findings of scholars. Hence, the need for further investigation. Thus, this study sought

to investigate the level of knowledge of production process and utilization of Covid-19 preventive materials among science education students of Enugu State University of Technology. As a result, the following research questions guided the study:

1. What is the extent of knowledge on production processes of Covid-19 preventive materials among science education students of ESUT?
2. What is the extent of utilization of covid-19 preventive materials among science education students of ESUT?
3. What is the influence of gender on the level of knowledge on production processes of Covid-19 preventive materials among science education students of ESUT?
4. What is the influence of gender on the level of utilization of covid-19 preventive materials among science education students of ESUT?

### Hypotheses

These null hypotheses formulated below were tested at a level of significance of 0.05.

**H0<sub>1</sub>:** There is no influence of gender on the level of knowledge on production processes of Covid-19 preventive materials among science education students of ESUT

**H0<sub>2</sub>:** There is no significant influence of gender on the level of utilization of covid-19 preventive materials among science education students of ESUT

### Method

The procedures of descriptive research design guided this study. The study was carried out in Enugu State University of Technology (ESUT). The population of the study comprised of 490 science education students in ESUT. Since the population is of manageable size, no sampling will be done; hence, the entire population of 490 students (240 males and 250 females) from the Department of Science Education will be used for the study. The instrument, Knowledge of Production Process and Utilization of Covid-19 Preventive Materials Questionnaire (KPPUCPMQ) developed by the researcher was used for data collection. The KPPUCPMQ instrument has two sections, A and B. Section A elicited information on student's bio-data (gender) while section B with two parts-1 and 2, collected information on level knowledge and utilization of Covid-19 preventive materials. Part 1 has 10 items on knowledge while Part 2 has 10 items on utilization. Both Part 1 and 2 were structured on a 4-point Likert scale of strongly agree (4) to strongly

disagree (1). The KPPUCPMQ instrument was face validated by three experts, one in research measurement and evaluation, while the other two were in medical health unit. The instrument was subjected to reliability estimate using Cronbach alpha method and indices of 0.84 and 0.79 were obtained for Part 1 and 2 of KPPUCPMQ respectively with and overall index of 0.81. The data collected were subjected to

analysis using SPSS version 23. Means and standard deviation addressed the research questions while t-test was used at a level of significance of 0.05 to test the hypotheses. Mean values of 2.50 above were considered accepted and agreed while mean values below 2.50 were interpreted as disagreed. When the p-value obtain is less than 0.05 level of significance, the null hypothesis was rejected, otherwise, not rejected.

## Results

**Table 1: Mean and SD on extent of knowledge of production process of Covid-19 preventive materials**

S/N	Item statement	N	$\bar{X}$	SD	Dec.
	<b>During Covid-19</b>				
1	I am aware that alcohol is required to produce a hand sanitizer	490	3.34	.55	A
2	I know that making a sanitizer requires glycerol to increase sickness	490	3.37	.53	A
3	It is better to use distilled or boiled water in making formulation for sanitizer	490	3.27	.48	A
4	I understand that fabric materials can be used to make face mask to prevent Covid-19	490	3.28	.63	A
5	Excess of fragrances is not required when making sanitizer to prevent Covid-19 due to allergic reactions	490	3.28	.52	A
6	In making hand antiseptics to prevent Covid-19, hydrogen peroxide is necessary	490	3.21	.47	A
7	I know some of the materials used to make soap and antiseptics that helps prevents infectious bacteria and virus like Covid-19	490	3.17	.42	A
8	I have knowledge of the processes used for designing posters and flyers with messages on Covid-19 prevention	490	3.12	.54	A
9	I am aware that in washing hands regularly so as to prevent Covid-19, rushing tap water is advisable	490	3.11	.51	A
10	I Know that the substance used for making hand sanitizers are usually measured in relative proportions before mixing	490	3.21	.49	A
	<b>Total</b>	<b>490</b>	<b>3.23</b>	<b>.26</b>	<b>A</b>

**Key: A (Accepted), R (Rejected)**

The result of analysis presented in Table 1 on the level of knowledge on production process of Covid-19 preventive materials shows that the responses of students on items 1 to 10 all have mean values above 2.50 which indicates that students have high level of production processes listed on the items (1 to 10) on

Covid-19 preventive materials. The clusters mean of 3.23 shows that there is a high knowledge on production processes of Covid-19 preventive materials among science education students of ESUT. The cluster SD of 0.26 which is low implies that there is a low variation in the responses of the students.

**Table 2: Mean and SD on extent of utilization of Covid-19 preventive materials**

S/ N	Item statement;	N	$\bar{X}$	SD	Dec.
	<b>During Covid-19;</b>				
1	I always use substances/antiseptics with alcohol content to prevent Covid-19	490	3.28	.50	A
2	I ensure that I use hand sanitizer always	490	3.39	.53	A
3	I use distilled, boiled, running tap water while washing my hands,	490	3.29	.53	A



4	I make use of surgical face masks/face shield	490	3.18	.58	<b>A</b>
5	I am comfortable using face masks made of fabrics	490	3.33	.53	<b>A</b>
6	I used hand antiseptics that contain hydrogen peroxide	490	3.06	.60	<b>A</b>
7	I often wash my hands regularly with soap to help prevent	490	3.20	.60	<b>A</b>
8	I ensure I read and abide by safety protocols on postal and flyers	490	3.34	.54	<b>A</b>
9	I drink enough quantity of water to avoid being dehydrated	490	3.37	.53	<b>A</b>
10	I hand gloves when touch substances in public location	490	3.28	.48	<b>A</b>
<b>Total</b>		<b>490</b>	<b>3.27</b>	<b>.28</b>	<b>A</b>

**Key: A (Accepted), R (Rejected)**

The result in Table 2 shows the mean and standard deviation on the extent of utilization of Covid-19 preventive materials. The result shows that items 1 to 10 all have mean values between 3.18-3.37 which are above the criterion mean of 2.50. This implies that the extents of utilization of the preventive material on all

the items are high. Furthermore, the overall mean of 3.27 shows that there is a high extent of utilization of Covid-19 preventive materials among science education students of ESUT. The overall SD of 0.28 translates to a low level of differences in the responses of the students on the items.

**Table 3: Mean, SD and t-test result on the influence of gender on the extent of knowledge of production process of Covid-19 preventive materials**

Gender	N	$\bar{X}$	SD	df	t-value	Sig. (2-tailed)	Dec.
Male	240	3.20	.26	488	-2.732	0.007	Sig
Female	250	3.27	.25				

Table 3 shows the mean responses of male and female science education students on the extent of knowledge of production process of Covid-19 preventive materials. The result shows that the male students have a mean response of ( $M=3.20$ ,  $SD=0.26$ ) while the mean response of the female students is ( $M=3.27$ ,  $SD=0.25$ ). The result shows that the extent of knowledge of female students on production process of Covid-19 preventive materials is higher than that of their male counterpart.

Furthermore, Table 3 shows the t-test result on the level of significance of the influence of gender on the extent of knowledge of production process of Covid-19 materials. The result shows that  $t_{(df=488)} = -2.732$ ,  $p < 0.05$ . Since the p-value of 0.007 is less than the level of significance, the null hypothesis is rejected. Inference drawn is that there is a significant influence of gender on the extent of knowledge of production process of Covid-19 preventive materials in favour of the female students.

**Table 4: Mean, SD and t-test on the influence of gender on the extent of utilization of Covid-19 preventive materials**

Gender	N	Mean	SD	df	t-value	Sig. (2-tailed)	Dec.
Male	240	3.21	.26	488	-4.993	0.000	Sig
Female	250	3.33	.29				

Table 4 shows the mean and SD on the extent of utilization of Covid-19 preventive materials based on gender. From the result, the male students have a mean value of ( $M=3.21$ ,  $SD=0.26$ ) while the female students have a mean value of ( $M=3.33$ ,  $SD=0.29$ ). This result is an indication that the extent of utilization of Covid-19 preventive materials is higher for females than for male students.

On the other hand, Table 4 shows the t-test details on the influence of gender on the extent of utilization of Covid-19 preventive materials. From the result,  $t_{(df=488)} = -4.993$ ,  $p < 0.05$  was obtained. Based on this result, the null hypothesis was rejected since the exact probability value of 0.000 obtained is less than the level of significance of 0.05. Thus, conclusion drawn is, there is a significant influence of gender on the

extent of utilization of Covid-19 preventive materials in favour of the female students.

### Discussion

The result of this study showed that the extent of knowledge of science education students of ESUT on production process of Covid-19 preventive materials is high. This means that the science education students in ESUT are aware of the various processes employed in producing basic Covid-19 preventive materials. This result might have been like this because, as the Covid-19 pandemic became severe and people were compelled and sensitized on the use of sanitizers, masks, etc., the need to produce these materials at home increased as a result of continuous usage, this could have contributed to the increase in their knowledge on production processes of these material. This result agrees with the findings of Olaimat et al. (2020) and Omotosa et al. (2021) who respectively reported a high level of knowledge on Covid-19 preventive measures and processes among students. Contrary to this report, Kebede et al. (2020) and Bhagavathula et al. (2020) all reported a low level of knowledge among students. These differences in results may be blamed on location of the study.

The finding of this study showed that there is a high extent of utilization of Covid-19 preventive materials among science education students of ESUT. This result means that during the outbreak of Covid-19, the usage of preventive materials was high among the students. This result is plausible because, the knowledge of the danger posed by the virus and the collective effort to curtail the spread of the virus was possible by adhering to preventive measure which mostly were using of preventive materials such as sanitizer, disinfectants, gloves, masks, etc. this could have been the reason why this study is like this. The result of this study is consistent with the findings of Li et al. (2022), Sikakulya et al. (2021) and Prajapati et al. (2022) that most preventive materials such as masks, shield, and sanitizer, among others were in high usage during the outbreak of Covid-19 pandemic. However, the finding of Kebede (2020) disagreed, stating that there was a low level of utilization among individuals. These disparities may be blamed on the location of the study and the characteristics of the individuals investigated.

The result of this study showed that females' science education students of ESUT were more knowledgeable than their male counterpart on the production process of Covid-19 pandemic preventive materials. Further

analysis showed that this difference was significant. This means that the females' students understand and are more aware of how to produce Covid-19 preventive materials more than the male students. This result is not surprising because, females generally give more attention to production of such materials as detergents, sanitizers, masks among others than the males. This could have been the reason why the result of this study is like this. This finding is strengthened by the report of Lee et al. (2021) and Bronfman et al. (2021) who respectively reported a higher knowledge and prevention hygiene for females with respect Covid-19 than males. The study of Pinchoff et al. (2020) however disputed these findings. This may be as a result of the nature of individuals investigated.

The result of this study revealed that female students showed a high extent on utilization of Covid-19 preventive materials more than the males. The inference test conducted revealed a significant difference in support of the females. This means that female science education students in ESUT use more of the preventive materials for Covid-19 than the male students. This result is possible because females tend to pay attention to personal hygiene than males. This must have impacted on the result of this study. The report is in agreement with the findings of Lee et al. (2021). However, the result of Pinchoff et al. (2020) contradicted these findings, stating that males engage in more practices of preventing Covid-19 than females. These inconsistencies may be blamed on the location of the study.

### Conclusion

In accordance with the findings of this study, it is concluded that the extent of knowledge and utilization of Covid-19 preventive materials among science education students of ESUT is high. Consequently, the study concludes that female science education students of ESUT are more knowledgeable on the production process of Covid-19 preventive materials and as well utilize the materials more than the male students.

### Recommendations

The following recommendations guarded the study:

1. The government and relevant health agencies as well as university authorities should make effort towards organizing skill acquisition programmes that will enable students learn more on how to produce such Covid-19 preventive materials as sanitizer, masks, shields, etc.

2. Students should be informed on the need to prevent the spread of Covid-19 pandemic by encouraging the use of preventive materials such as masks, sanitizers, etc.
3. Workshops and awareness should be organized especially for the male students on basic hygiene practices regarding Covid-19 and other related diseases.

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### Conflict of Interest

There is no conflict of interest regarding this research work

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