

The Enhanced Community Quarantine (ECQ) Problems of Cagraray Island Residents on Its Implementation During Covid-19 Pandemic

Christine C. Bechayda^{1*}, Michael B. Bibon²

¹Senior High School Student (GAS 12), Cawayan National High School (SDO-Albay), Philippines

²Research Teacher, Cawayan National High School (SDO-Albay), Philippines

*Corresponding Author: christinebechayda27@gmail.com, Tel.: +63961-589-0884

Available online at: www.isroset.org

Received: 01/Oct/2021, Accepted: 03/Dec/2021, Online: 31/Dec/2021

Abstract—The implementation of Enhanced Community Quarantine (ECQ) brought many shortcomings in the ways of living of Cagraray Island's residents. This island is located on the eastern coast of Philippines connected by a bridge via Sula channel. The aim of this qualitative study is to determine the problems encountered by its residents on the implementation of ECQ along basic necessities, source of income, and social life. Systematic random sampling identified the key informants of the study by interviewing the family heads. Interpretative analysis used thematic approach through coding of the responses. Findings revealed that ECQ brought socioeconomic problems in basic necessities, limited opportunities in the sustenance of income source, and impediments of social life. Codes also revealed the negative bearings of the problems particularly on the amplification of experienced poverty and depression via limited social contact. Nevertheless, accounts also showed positive effects of ECQ problems where residents learned to become more resourceful and value family ties. These findings validated the annals of the documented literature on the effects of ECQ in the lives of people. A problem-based scheme indicating the need to save resources and money, and supplement internet connectivity was proposed. In addition, accurate forecast analysis was also proposed for authorities to specify the timeline of ECQ for residents to monitor the quantity of resources to be saved. Despite some positive effects of ECQ, it was concluded that it brought many unconventional problems on the lives of Cagraray island residents.

Keywords—Enhanced Community Quarantine, ECQ, Covid-19 Pandemic, Encountered Problems during ECQ, Cagraray Island

I. INTRODUCTION

On March 2020, the Philippine government implemented the Enhanced Community Quarantine (ECQ) to prevent the spread of Covid-19 virus. During this period, Filipinos were obliged to follow strict regulations from Inter-Agency Task Force (IATF) like wearing face mask and maintaining social distancing. Though people are required to stay at home, one person per family is given a Home Quarantine Pass to buy goods and other essentials. Some provinces and cities of the country with high rate of infection were put into lockdown [1].

Coined as the 3rd pandemic of the world [2], Covid-19 is contagious by direct contact to the droplets of the infected individuals or their aerosols. The virus incubates in 5 to 14 days upon entrance in the body via the respiratory tract [3]. Due to its foreseen health threat, this prompted the Philippine government to implement a so-called ECQ to avoid further contamination and infection of the disease. Looking back at the history, the implementation of ECQ can be traced back during the flu pandemic in 1918 where imposition of an ECQ-like environment like social distancing, limited transportation, and public gatherings

were banned and restricted. Schools, church, and theater were shut down while quarantining people who were infected by the virus. Decades after the Spanish flu, the Covid-19 pandemic revived these ECQ measures which were later became MGCQ, while some LGUs still imposed lockdown measures. Countries all over the world followed these strict precautions in an attempt to control the spread of the virus [4].

The situation of ECQ in the Philippines has been considered as one of the longest running Covid-19 responses in the world [5] while South Korea and Sweden did not implement isolation of communities. In Sweden, the function of decision making was fully delegated to public health professionals. Its society was not locked unlike elsewhere in the world [6]. In South Korea, isolation is primarily implemented to infected individuals while conducting contact tracing. Traditional measures like border closures and lockdown were not implemented in the country [7]. In the advent of ECQ implementation in the Philippines, it brought many shortcomings on the lives of *Filipinos* who thrived to work hard in providing food on the table amidst community restrictions. In the Municipality of *Bacacay*, a lockdown was implemented

after its first case of Covid-positive individual was reported. This further exaggerated the living difficulties and problems within the area. The lockdown measures in *Bacacay* caused its people to face struggles in transportation, termination from work, working at home, and online communication. Shortage in food supply was also evident whilst movement outdoors to buy essentials is limited. *Cagraray* island is within the sovereignty of *Bacacay*. The imposition of lockdown and ECQ policies limited their access to many of life necessities in addition to the experienced isolation of the locale even before the pandemic. In this study, documentation of their experiences was a highlight to showcase the problems of its people during ECQ. Therefore, the current study is beneficial by providing assistance to many isolated areas on the pre-determined problems in case another ECQ will be implemented in the long run thus, limiting the disaster and risk of its implementation by augmenting intervention plans.

II. RELATED WORKS

Reference [8] signified the movement restrictions of workers, changes in demand of consumers, closure of food trade policies, and financial pressure in food supply chain as problems often cited during Covid-19 ECQ implementation. These findings were consistent with the accounts of reference [9] who noted that the imposition of social distancing and lockdown measures resulted to increased number of unemployment rate, and business closure.

One study documented the vivid problem caused by Covid-19 related protocols on the mental health of affected individuals [10]. There are also studies indicating that isolation may contribute to increased loneliness due to lack of immediate social interactions among peers and individuals [11]. Research also showed that Covid-19 pandemic affected personality, attitude and feelings of individuals resulting to “*anxiety, fear of contagion, depression and insomnia of the general population*” [12]. These findings were articulated with the studies of reference [13] who demonstrated that the pandemic affected the cognition and behaviors, mental health [14], and the psychosocial being of individuals [15]. Other effects include traumatic stress in the age of Covid-19 [16], gender-specific insight based on covid-19 epidemiological and socio-economic data [17], and defining a gender-responsive work-from-home scheme in a post ECQ scenario [18]. People will be benefited by this study through observing patterns of similarity in the experienced problems during ECQ and adapt the developed problem-preparation scheme in planning out solutions for the next possible pandemic.

This research covers only the problems of residents of *Cagraray* island, in the Municipality of *Bacacay*, during the implementation of ECQ and delimits on other factors irrelevant to ECQ-faced problems. The study specially aims to (1) identify the problems encountered by the

residents of *Cagraray* during ECQ across the following; (a) basic necessities, (b) source of income, and (c) social life; (2) determine how the identified problems affected the *Cagraray* residents’ living; and (3) develop a problem-preparation scheme to address early the problems in times of pandemic.

III. METHODOLOGY

Qualitative approach was the overall design of the study utilizing coding of gathered data through survey. Semi-structured interview was conducted with questions adapted from reference [19]. Narratives were recorded using phone after seeking approval from the interviewed respondents. Systematic random sampling through every fifth household was considered in determining the *Cagraray* families who participated in the study. Heads of the identified households were considered as the key informants. Oral narratives were deliberated as the primary source of data for interpretative analysis.

The Key Informants

Interview was conducted to the identified family providers. The key informants were fathers, mothers, and in some cases, the eldest among the siblings. Ages ranging from 29 to 51, a total of 49 key informants were interviewed in the research locale regardless of family structure, monthly income, and work engagement. It was assured, however, that the participants in the interview were natives and working in the *Cagraray* island.

Data Collection and Interpretative Analysis of the Codes

For interpretative analysis, thematic approach of the codes was used. This was done in 2 stages as to (1) organizing theme and (2) general theme. Translation of the codes into English was carried and ensured that it fits the context of the original text. A letter of approval from the *Punong Barangay* was secured to start the gathering of data within the community. Since data gathering method was through face-to-face interview, safety measures were observed like wearing of face mask, face shield, and maintaining physical distance. Nonetheless, willingness of family respondents to participate in the study was a crucial entry point in this research.

IV. RESULTS AND DISCUSSION

The following narratives were the significant findings of the study.

Problems Encountered by the residents of Cagraray Island during ECQ across the following; Basic Necessities, Source of Income, and Social Life.

The residents of *Cagraray* described the different problems they encountered during the implementation of ECQ across the following basic necessities. The codes shown in Table 1 were the oral narratives recorded by the researcher and were used to generate the general theme of problems encountered.

Table 1 showed that people of *Cagraray* island experienced key problems in the access to basic necessities particularly in food supply. This was shown from the majority of responses indicating inadequate supplies, proximity problems, and the fear of being infected by the virus during exposure to shops. These problems resulted to the strict implementations of ECQ where it limited people from going out of their *barangay* boundaries, or home. Socio-economic factors were the grounding causes of these identified problems. Nevertheless, these problems can be attributed to lack of preparatory measures or unforeseen duration of the ECQ which caused running out of basic commodities at home. This result can also be a calling to the authorities to intensify their basic commodity support and information dissemination system to the affected families of ECQ.

Table 2 consisted of the problems encountered by the residents during the implementation of ECQ in their source of income. The codes were used to create a general theme. The most observed problem in the source of income during ECQ was the unmodulated flow of money. Money is vital for the sustenance of living. This was shown in majority of the responses where key informants noted the incapability of businesses to thrive, no working opportunities, and closure of establishments that process money. These limited opportunities deprived the residents to sustain their ways of living since basic commodities at home require money. These data can also be a manifestation that business owners and companies in the locale shall learn to adjust in the new ways of marketing strategies and working

scheme to withstand the changing arena of working realm. This way, there will be a continuity in the source of income of the affected families during imposition of ECQ. Table 3 showed the oral narrative response of the residents on the problems encountered in their social life during ECQ.

The data implied that the absence of interactions and conveyance are the common problems experienced during ECQ by the residents of *Cagraray* island. They conceived these as problems since human interaction is vital for the mental health of individuals. The inability of the people to establish a social life impedes their overall health by forsaking the need for the release of internal tension and relieve of stress. Responses also showed that residents long for a different ambiance by the need to communicate and probe outside their homes. This was shown in the narratives indicating the problem for not meeting friends and going out to places. Therefore, the ECQ is not a healthy approach for the mental health of the residents. Authorities need to provide alternative measures where individuals can still engage in social life without compromising the safety standards of passing the infection.

Effects of the identified problems on Implementation of ECQ to the resident of Cagraray Island

Codes were used to determine the effects of the identified problems encountered by the residents of *Cagraray* island on the implementation of ECQ. Table 4 summarizes the codes of the consolidated responses.

Table 1: The common oral narratives (codes) of residents of *Cagraray* on their access in food, water, and all basic necessities during ECQ implementation.

Codes	Translation*	Organizing Themes	General Theme
<i>"Dae nakakasaud ta mahalang ang pamasaha pasiring sa banwa"</i>	"Can't buy groceries due to high rate of fare off the town"	Distance and isolation brought by ECQ limit the access to the basic needs	Problems encountered on basic necessities of <i>Cagraray</i> island residents during ECQ were grounded on socio-economic factors.
<i>"Harayoon sa tig-kukuwaan kang tubig"</i>	"Distant residential location from water source"		
<i>"Dae nakakaantos ang supply kan tubig sa bulod"</i>	"Water can't reach uphill residential areas"		
<i>"Warang deliver na suplay ki pagkaon sa banwa"</i>	"No food deliveries in the town"	No adequate supply of basic needs	
<i>"Nagkulang ang stock kan mga produkto"</i>	"Shortage in the stock of food products"		
<i>"Kulang ang suplay kang pagkaon para sa mga tawo kaya naghalangkaw ang mga presyo kan paninda"</i>	"Shortage in the food supply caused inflation of price"		
<i>"Dae basta-basta makabakal ki pagkaon ta saro sana ang tig-tawanan nin quarantine pass sa kada pamilya"</i>	"Can't buy food immediately since the quarantine pass is given to one member of the family only"	Meet-up with people hindered them from buying necessities due to fear	
<i>"Takot magbakal nin pagkaon sa banwa ta baka carrier sinda kang Covid-19 virus"</i>	"Frightened of buying food in the fear of being infected by Covi-19 virus"		

Table 2: The common oral narratives (codes) of the residents of *Cagraray island* on their problems regarding source of income on the implementation of ECQ.

Codes	Translation*	Organizing Themes	General Theme
“ <i>Nawaran ki trabaho</i> ” “ <i>Warang permanenting trabaho</i> ”	“Lost job” “No permanent job”	Jobless	
“ <i>Nagsara ang kompanyang tigtrabahan</i> ” “ <i>Dae na nakakalibot para mag-tinda</i> ” “ <i>Nagluya ang parabakal buda ang benta</i> ”	“Shutting down of the company” “Can no longer vend products” “Limited income and customers”	Inability of income source to operate properly	Limited opportunities to sustain the source of income
“ <i>Dae na minsan nakakapadara ki kwarta</i> ” “ <i>Nadedelay ang sahod</i> ”	“Can’t send money” “Delayed salary”	Impaired transactions to receive and send money	

Table 3: The common oral narratives (codes) of the residents of *Cagraray island* on their social life problems during the implementation of ECQ.

Codes	Translation	Organizing Themes	General Theme
“ <i>Wara na pagkakataon na magtambay kaiba ang amiga/amigo</i> ” “ <i>Daeng pagkakataon para makipaghuron sa mga bisto</i> ”	“No chance of loitering with friends” “No chance to communicate with friends”	Inhibited meet-up with friends	Social life is impeded
“ <i>Dae na nakakaduman sa mga rabasan</i> ” “ <i>Dae nabisita so kapamilya na nasa harayong lugar</i> ”	“Can’t visit places” “Can’t visit family members living in distant areas”	Restrained visitations	

Table 4: Effects of the identified problems during ECQ in basic necessities, source of income, and social life of *Cagraray island* residents.

Categories	General Themes (1)	Effects of the Problems Encountered (codes)	Translation* (English)	General Themes (2)
Basic Necessities	Problems encountered on basic necessities of <i>Cagraray island</i> residents during ECQ were grounded on socio-economic factors.	“ <i>Grabe pagtios</i> ”	“Extreme poverty”	Experienced shortcomings and trauma taught them to conserve resources
		“ <i>Makapunawon</i> ”	“Starvation”	
		“ <i>Makatakuton</i> ”	“Fearful”	
		“ <i>Nakaukod magsaray</i> ”	“Learned to save”	
Source of Income	Limited opportunities to sustain the source of income	“ <i>Problemado sa gastusan</i> ”	“Problems in expenses”	Financial crisis taught them to become practical
		“ <i>Dipisil magkakarta</i> ”	“Hard to earn money”	
		“ <i>Naging mapamaraan</i> ”	“Became resourceful”	
Social Life	Social life is impeded	“ <i>Makamunduon</i> ”	“Gloomy”	Social depression devoted their time to value family bond.
		“ <i>Nagkapanahon sa pamilya</i> ”	“Had time with family”	

The codes revealed that effects of the identified problems during ECQ were not solely negative. In fact, the residents were able to cope with the problems by establishing mechanisms that alleviated the experienced problems. Nevertheless, accounted to majority of the codes were the observation of experienced extreme poverty during the ECQ in the locale in addition to the psychosocial impacts of isolation. The ability of the residents to adapt in the changing environment can be attributed to their capability of being resourceful and optimistic that despite the hurdles in the community, life must find ways to continue at par with the changing ground. Meaning to say, the implementation of ECQ stretched out the aptitude and resilience of the residents to protract their means via the experienced problems, and generate meaningful life lessons that propelled their stamina to keep going. Notwithstanding the negative impacts of the aforesaid problems in lives of *Cagraray* people, positive accounts were also recorded which balances the impact of ECQ.

Consistent with the findings of the current study, reference [20] showed that the pandemic posited negative economic effects in the society, and changed behaviors of people while limiting a set of governed activities. Further studies need to be conducted to fully probed the effects of ECQ in other aspects of *Cagraray* residents' living.

Problem-preparation scheme to address early the problems in times of pandemic

The Enhance Community Quarantine (ECQ) was implemented to diminish the case of the Covid-19 infection in the Philippines. Residents of the *Cagraray* Island complied to the rules given by the government for their own safety, hence problems were projected during isolation. This problem-preparation scheme is hereby proposed to guide the residents in case another pandemic rises in the country.

Authorities need to conduct an accurate forecast analysis to predict the duration of ECQ. This has to be done with the help of health sectors and LGUs. Forecasting has to be grounded based on the existing records and data on the duration of earliest known pandemics. The forecast analysis can be used by the residents as springboard to assess the amount of goods they need to save to soften the negative impacts of ECQ.

In basic necessities, the residents of *Cagraray* island need to obtain resources inasmuch as good enough for the entire duration of ECQ. Community leaders need to establish granular markets to avoid distant travelling of their community households. Likewise, PPE must be secured when procuring for goods. Income sources can be sustained by, basically, saving money and allocating much of the expenses on the purchase of essential goods. Residents also need to venture on the virtual world for the furtherance of their income source hence, the need for internet connectivity is vital. As to social life, internet is needed to close coordinate with friends virtually. This lessens the experienced anxiety and detachment brought by

isolation. Other indoor interests must also be developed as an outlet of the residents to therapeutically heal their depression and anxiety.

The diagram below summarizes the proposed problem-preparation scheme which can be adapted from national to local level during the implementation of ECQ.

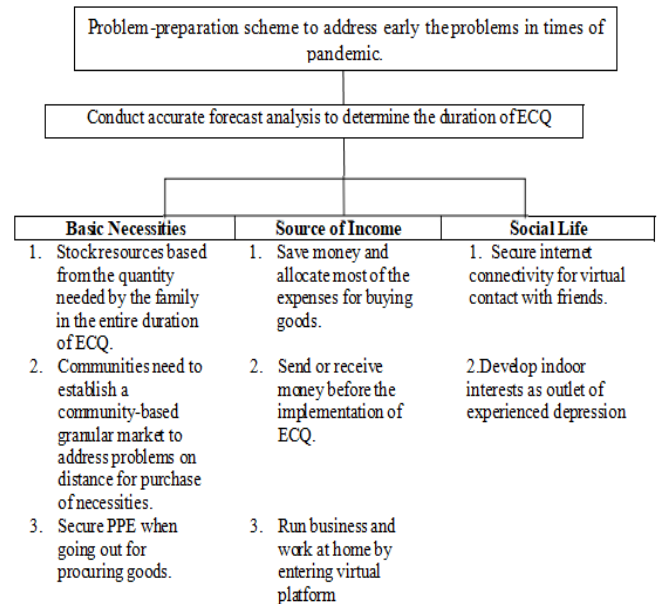


Figure 1. Problem-preparation scheme to lessen the negative impact of ECQ.

Discussion

Documented studies in the body of literature hold significant amount of findings indicating the negative impact of ECQ. So much concerns were not given enough consideration on the positive effects of the experienced problems which was uncovered by the present study. Meanwhile, related studies noted the impact of ECQ particularly on the feelings, cognition, behavior, mental health, and psychosocial well-being of affected individuals. The present study is consistent with these findings where the residents of *Cararay* island manifested thoughts and behavioral shift to adapt on the experienced problems brought by ECQ particularly on extreme poverty. Also, negative mental health was observed in addition to depression and anxiety due to isolation. This was shown by the virtue of their narrative responses reflected in codes. Summing it up, the findings of the current study brought significant measurements and validation on the existing accounts in literature. A significant discovery was also exposed on the resourcefulness and optimism of the residents of *Cagraray* island on the problems encountered during ECQ.

V. CONCLUSION

The dramatic effects of Covid-19 pandemic affected many sectors in the their supposedly normal ways of transaction. Lessening the viral transmission was accounted to the new health protocols and policies implemented by each country.

In Philippines, ECQ was enforced to address these problems on widespread infection and transmission of the virus.

ECQ brought many difficulties in the lives of *Cagraray* island residents. The study concluded that the implementation of ECQ in *Cagraray* island amplified the experienced poverty particularly on basic needs and income source. Psychosocial effects were also observed on the isolation of the residents delimiting their close contact with peers. These identified problems were attributed to the lack of preparatory measures and inconsistent protocols on the duration of ECQ. However, residents were able to cope with these problems by becoming resourceful and optimistic on these impediments. The development of the problem-preparation scheme can be conducted as an effective tool for the management of the pandemic in times of crises.

Further studies are recommended on the effects of ECQ on other aspects of *Cagraray* island residents. Mental health and psychosocial status of residents were recommended to be thoroughly investigated in addition to their resilience and perseverance to cope with problems. The developed problem-preparation scheme can be tested in a form of action research and enhance its contents based from the findings of future studies.

ACKNOWLEDGMENTS

The researchers would like to acknowledge the principal of Cawayan National High School, Mr. Roy L. Nipas, for allowing the researchers to conduct the study; To the new principal of the school, Mr. Nelson B. Bataller, for the support and acknowledgement of the work.

Also, to Mr. Pedro Bas Jr., the *punong barangay* of *Cagraray*, for the approval of the research to be conducted within his *barangay*; Expression of gratitude is also given to the participating key informants, whose names cannot be mentioned individually, for their active involvement during the entire duration of the study.

The corresponding author is also grateful to Mr. Jay Mar A. Barcenas, for the academic guidance all throughout the research endeavor, and to Mrs. Vilma Bechayda and Mr. Jose Bechayda, the parents of Christine, who showered her with love, moral, and financial support for the completion of the research report.

Above all, the researchers are grateful to Almighty God for showering them both with patience and courage to do the study amidst pandemic.

REFERENCES

[1] K. Hapal, "The Philippines Covid-19 Response: Securitising the Pandemic and Disciplining the Pasaway," *Journal of Current Southeast Asian Affairs*, Vol.40, Issue 2, pp.224-244,2021.

- [2] S. Perlman, "Another Decade, Another Coronavirus," *The New England Journal of Medicine*, Vol. 382, Issue 8, pp. 760-762, 2020.
- [3] L.K. Butola, R. Ambad & P.K. Kute, "The Pandemic of 21st Century-COVID-19," *J. Evolution Med. Dent. Sci.*, Vol.9, Issue 39, pp. 2913-2918,2020.
- [4] H. Yasmin, S. Khalil & R. Mazhar, "Covid 19 : Stress Management among student and its impact on their Effective Learning," *International Technology and Education Journal*, Vol.4, Issue 2, pp. 65-74, 2020.
- [5] Ibid. [1]
- [6] S. Anderson & N. Aylott, "Sweden and Coronavirus: Unexceptional Exceptionalism," *Social Science*, Vol. 9, Issue 12: 232, 2020.
- [7] E. Jeong, M. Ki and A. Flahault, "Understanding South Korea's Response to Covid-19 Outbreak: A Real-Time Analysis," *International Journal of Environmental Research and Public Health*, Vol. 17, Issue 24: 9571, 2021.
- [8] S. Aday and MS. Aday, "Impact of COVID-19 on the food supply chain," *Food Quality and Safety*, Vol. 4, Issue 4, pp. 167-180,2020.
- [9] A. Brodeur, D. Gray, A. Islam & S. Bhuiyan, "A Literature Review of the Economics of Covid-19," *IZA Institute of Economics*, Canada, pp. 1-63.
- [10] M. Tee, C. Tee, V. Kuruchitham and R. Hoo, "Psychological impact of Covid-19 pandemic in the Philippines," *Journal of Effective Disorder*, Vol. 277, pp. 379-391, 2020.
- [11] M. Luchetti, "The Trajectory of Loneliness in Response to Covid-19," *American Psychologist Association*, pp.1-12, 2020.
- [12] L. Sher, "The impact of Covid-19 pandemic on Suicide rates." *An International Journal of Medicine*, Vol.113, Issue 10, pp.707-712,2020.
- [13] F. Shen, C. Min, Y. Lu and Y. Chu, "The effect of cognition and affect on preventive behaviors during the COVID-19 pandemic: a cross-sectional study in China," *BMC Public Health*, Vol. 21:722, 2020.
- [14] J. Fegert, B. Vitiello, P. Plener and V. Clemens, "Challenges and burden of the Coronavirus 2019(Covid-19) pandemic for child and adolescent mental health : A narrative review to highlight clinical and research needs in the acute phase and the long return to normality," *Child and Adolescent Psychiatry and Mental Health*, Vol. 14, No. 20, pp. 2-11,2020.
- [15] S. Dubey, P. Biswas, R. Ghosh, S. Chatterjee, MJ. Dubey, S. Chatterjee, D. Luhiri and C. Lavie, "Psychosocial impact of COVID-19," *Diabetes and Metabolic Syndrome: Clinical Research & Reviews*, Vol. 14, No. 5. pp. 779-788, 2020.
- [16] D. Horehsh and A. Brown , "COVID-19 Response Traumatic Stress in the Age of COVID-19: A Call to Close Critical Gaps and Adopt to New Realities," *Psychological Trauma, Research, Practice and Policy*, Vol. 12, Issue 4, pp. 331-335, 2020.
- [17] R. Jantzen,N. Noisel, S Camilleri-Broet, C. Labbe, T. de Malliard, Y. Payette and P. Broet, Epidemiological characteristics of the Covid-19 spring outbreak in Quebec Canad: a population-based study," *BMC Infectious Diseases*, Vol. 21, No. 35, pp. 2-13,2021.
- [18] M. Reichelt, K. Makovi, and A. Sargsyan, "The impact of COVID-19 on gender inequality in the labor market and gender-role attitudes." *European Societies*, Vol. 23, pp. 228-245, 2021.
- [19] M. Barcelon, "The Problems Encountered on the Implementation of Coastal Road Extension on the Lives of Sto. Domingo, Albay Residents," *Unpublished Thesis*. Bachelor of Science in Environmental Studies, Republic University, Philippines.
- [20] L. Abdelouahed, "Investigating the Social and Economic Implications of Covid-19," *International Journal of Scientific Research in Multidisciplinary Studies*, Vol. 7, Issue 2, pp. 18-22, 2021.

AUTHORS' PROFILE

Christine C. Bechayda. Christine C. Bechayda is a Senior High School student of Cawayan National High School, Bacacay, Albay, Philippines. She is currently pursuing her studies in General Academic Strand (GAS), and a former student of Zamora Memorial College, High School Department.



Aside from serving the school as the SSG Vice President, her interest in research also lies in resilience, personality assessment, and phenomenological studies.

Michael B. Bibon. Michael B. Bibon is a science and research teacher at Cawayan National High School. He earned his Ph.D at Bicol University Graduate School, Legazpi City. His interest lies in culture-based studies, personality assessment, and phytopharmacology. He served as



LAS writer in science and currently working as publisher of M. BIBON Publication. He has authored books particularly in IMRAD research paper development and published research papers in soft and hard sciences.
