

ORIGINAL ARTICLE

The Decrease in the Quality Life of Fishermen Due to Covid-19 Widespread

Indriati Paskarini¹, Muhammad Najib Mohamad Alwi², Tri Martiana¹, Mahmudah¹, Shintia Yunita Arini¹, Endang Dwiyantri¹

¹ Department of Occupational Health and Safety, Public Health Faculty, Airlangga University, Campus C, Mulyorejo Street, 60111, Surabaya, East Java, Indonesia

² International Medical School, Management and Science University, 40100 Shah Alam, Selangor, Malaysia

ABSTRACT

Introduction: The COVID-19 pandemic has had a big impact on fishermen's lives. Fishermen, as informal workers, are vulnerable to a decline in the quality of life. By default, fishermen's quality of life is considered lower than other professions before the COVID-19 pandemic happened. Now, their quality of life had become even lower during the pandemic. In relations to this, the objective of this study was to compare fishermen's quality of life before and during the COVID-19 pandemic. **Methods:** The study was conducted among 70 fishermen in Kenjeran using a simple random sampling technique. The data was obtained using a questionnaire which comprised of sociodemographic characteristics and quality of life measurement using the Quality of Life BREF (WHOQOL-BREF). The fishermen's quality of life was measured based on physical, psychological, social, and environmental dimensions. The data was then analyzed using descriptive statistics and the Wilcoxon Signed Rank test. **Results:** The results showed significant decline in the mean scores of the quality of life in the total and all quality-of-life dimensions. **Conclusion:** The results of this study can be used to determine adaptation strategies for fishermen to improve their quality of life.

Keywords: Quality of Life, Fisherman, COVID-19

Corresponding Author:

Dr. Indriati Paskarini, S.H., M.Kes.

Email: indriati.paskarini@fkm.unair.ac.id

Tel: +6281234556464

INTRODUCTION

Kenjeran is situated at a coastal area that limits the city area of Surabaya and is one of the tourist attractions in the city (1). Most of the locals work in the informal sector make a living as fishermen, fish processors, marine handicraft makers, and labors employed by fish-based product manufacturers (2). The Surabaya City Health Office has put a special attention into the management of informal workers in Kenjeran especially in terms of developing relevant Occupational Health and Safety programs (3). The coastal border area of Kenjeran, which is in the Tambak Wedi area, Bulak District, Surabaya, is a unified area consisting of the Ria Kenjeran beach tourism area and a fishing village residential area (4).

As the COVID-19 pandemic is still progressing and while herd immunity is yet to be achieved with the

slow progress of vaccination in the country, the city of Surabaya has been put in the Moderate Risk Zone with an average of 38 additional COVID-19 cases daily. Hence, informal sector workers in Surabaya with uncertain work systems are very vulnerable to COVID-19 infection and its various consequences.

Aspirations to meet the WHO Sustainable Development Goals (SDGs) have been subscribed in many countries including Indonesia. Nevertheless, when the COVID-19 pandemic struck, all nations were affected financially and economically in their efforts to combat the virus while balancing between sustaining life and livelihood. According to the International Monetary Fund (IMF), the global economy would shrink by 3% in 2020, with advanced economies shrinking by twice as much. This puts SDG Goals 1 (zero poverty) and 3 (good health and well-being) in jeopardy, because despite some countries making headway in reducing pre-pandemic income disparity, a global recession may push an extra 71 million people into poverty (5).

The International Labor Organization (ILO) has recently

produced a decent plan to work with governments, as part of their long-term COVID-19 containment efforts, to legislate guaranteed workers’ right to paid sick leave, free access to health care and better living conditions for workers regardless of their employment or migratory status. The latter would enable social distancing measures in the short term and might improve the quality of life of these workers in the long term (6).

Since the pandemic started, the Huge Scale Social Restriction for COVID-19 (Pembatasan Sosial Bersekala Besar, abbreviated as PSBB) has been imposed by the local government in Kenjeran. As a result, the fishermen of Kenjeran Coast were greatly affected by the stay-at-home restrictions (7). It is known that the default pre-pandemic quality of life among these coastal fishermen was already quite low because of pre-existing socio-economic challenges (8). Therefore, loss of income due to their inability to work as usual was postulated to have a significant impact on the fishermen’s quality of life. Understanding to what extent and how the movement restrictions have impacted their lives and livelihood can help the government to implement corrective actions to help improve their quality of life.

Measurement of quality of life is a means to indicate how well people are coping with the pandemic. Quality of life is the impression of one’s situation in life with regards to the way of life and upsides of the local area one lives in and comparable to their own personal standards, objectives, concerns and assumptions (9). Quality of life can be assessed based not only on one’s overall life satisfaction but also on the dimensions of physical, psychological, social relationship, and environmental satisfaction (10,11). A study conducted among fishermen in Malaysia for instance showed that there are several factors that influence those dimensions, especially on work-related quality of life (12). These factors may include good job satisfaction, employer engagement, general well-being, home-work interface, and stress at work (12, 13, 14). As previous studies have indicated some differences in the quality of life among other populations during the pandemic from pre-pandemic era (15, 16), this study aimed to evaluate these changes among the Kenjeran fishermen.

MATERIALS AND METHODS

This study was a cross-sectional study conducted among a population of 83 fishermen in Kenjeran, Surabaya between August and November 2020. Based on sample size calculation using the Slovin Formula (Slovin, 1967), **n = N / (1 + Ne²) where:**

N = 83
e = 0.05

Hence, the required samples for the study were n=68.73.

life was measured based on total scores and physical, psychological, social, and environmental dimensions. During the interview, the respondents were questioned by using two questionnaires to assess their perception of quality of life before the beginning of the pandemic (March 2020) and after the pandemic (during the interview). In addition, their living conditions and other relevant information were obtained by visual observation and informal conversations during the visit.

Sociodemographic variables, WHOQOL-BREF dimension and total scores were analyzed using descriptive statistics. Wilcoxon Signed Rank test was used to compare the WHOQOL-BREF dimension scores between the pre-pandemic and during the pandemic era. Transformed values were totaled to make up for overall WHOQOL-BREF scores (10,18). The study received ethics approval from the Faculty of Dentistry, Airlangga University, Surabaya (certificate number 362/HRECC.FODM/VIII/2020).

RESULT

Sociodemographic Characteristics

All respondents were male. Majority of the respondents were adults in their prime age to work as fishermen aged 17 to 64 (n=67; 96%), received only primary education (n=53; 76%) and were married (n=65; 93%) (Table I).

Work Characteristics

All respondents were fishermen who left the jetty to fish at night and returned the next day. They fish every day in small groups using small fishing boats. The fish obtained would be sold on the same day, while the money earned would be deducted for operational costs and the rest would be divided among the fishermen in the group.

Table I. Sociodemographic characteristics of respondents from Kenjeran Village, Surabaya, East Java, Indonesia in 2020

Characteristic (n=70)	n (%)
<i>Age (Year)</i>	
17 – 40	25 (35.7)
41 – 64	42 (60)
65 – 89	3 (4.5)
<i>Education Level</i>	
Elementary School	53 (75.7)
Junior High School	9 (12.9)
Senior High School	8 (11.4)
<i>Marital Status</i>	
Married	65 (92.9)
Single	5 (7.1)

Consequently, 70 fishermen from the population were recruited using simple random sampling techniques. The survey was conducted via face-to-face interview. The data was obtained using a questionnaire which consisted of sociodemographic characteristics and the measurement of quality of life using the WHO Quality-of-Life BREF (WHOQOL-BREF) (17). Quality of

Quality of Life Before and During Pandemic

Physical Health Dimension

Physical health dimension of the WHOQOL-BREF includes activity of daily living, dependence on medicinal substances and medical aids, energy levels and fatigue, mobility, pain and discomfort, sleep and rest, and work capacity (17). Possible raw scores are from 7 to 35.

There is an 8-point decrease in the physical health dimension mean scores between before and during the COVID-19 pandemic – from 28 (range=19 to 30) to 20 (range=14 to 24) respectively ($p < 0.0001$) (Figure 1)

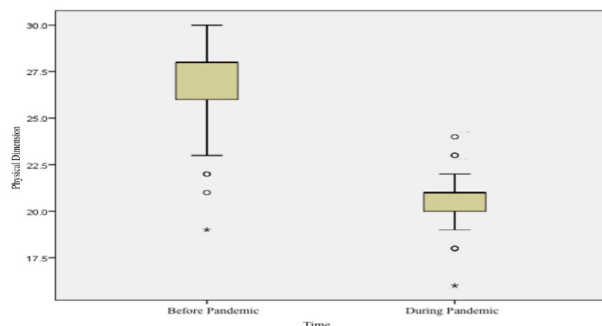


Figure 1: Physical Dimension Boxplot

Psychological Dimension

The psychological dimension of the WHOQOL-BREF consists of bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality / religion / personal beliefs, thinking, learning, memory, and concentration (17). Possible range of raw scores are from 6 to 30.

There is a 7-point decrease in the psychological dimension mean scores between before and during the COVID-19 pandemic – from 24 (range = 19 to 25) to 17 (range = 10 to 21) respectively ($p < 0.0001$) (Figure 2)

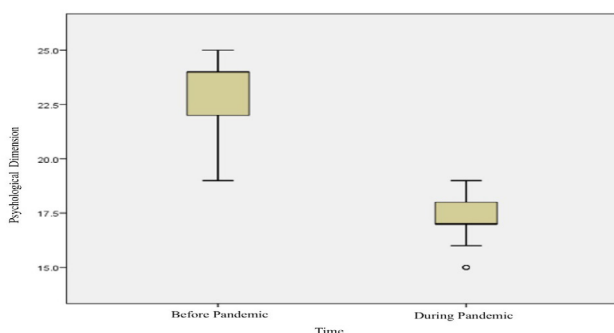


Figure 2: Psychological Dimension Boxplot

Social Relationship Dimension

The social relationship dimension of the WHOQOL-BREF consists of personal relationships, social support and sexual activity (17). Possible range of raw scores are from 3 to 15.

There is a 3-point decrease in the social relationship dimension mean scores between before and during the COVID-19 pandemic – from 12 (range = 7 to 14) to 9 (range = 6 to 12) respectively ($p < 0.0001$) (Figure 3).

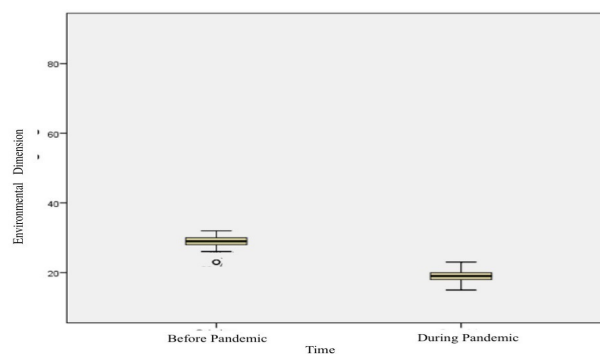


Figure 3: Social Relationship Dimension Boxplot

Environment Dimension

The environment dimension of the WHOQOL-BREF consists of financial resources, freedom, physical safety and security, health and social care that includes accessibility and quality, and home environment. Opportunities for acquiring new information and skills, participation in and opportunities for recreation or leisure activities, physical environment (pollution / noise / traffic / climate), and transport (17). Possible ranges of raw scores are between 8 to 40.

There is a 10-point decrease in the environment dimension mean scores between before and during the COVID-19 pandemic from 29 (range = 23 to 32) to 19 (range = 12 to 24) respectively ($p < 0.0001$) (Figure 4)

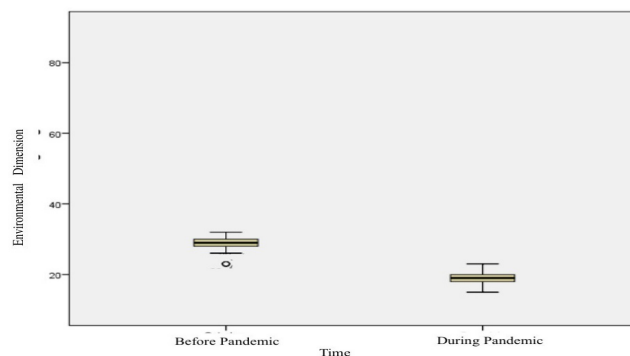


Figure 4: Environmental Dimension Boxplot

Overall Quality of Life

The overall quality of life scores was derived by transforming all domains scores to the range of 4 to 20 and totaling up the scores to make possible total scores range from 16 to 80 (17).

There was a 28.12 score decrease in the median total transformed WHOQOL-BREF scores between before and during the COVID-19 pandemic – from 70.83 (range = 47.92 to 76.04) to 42.71 (range = 22.92 to 54.17) respectively ($p < 0.0001$) (Figure 5).

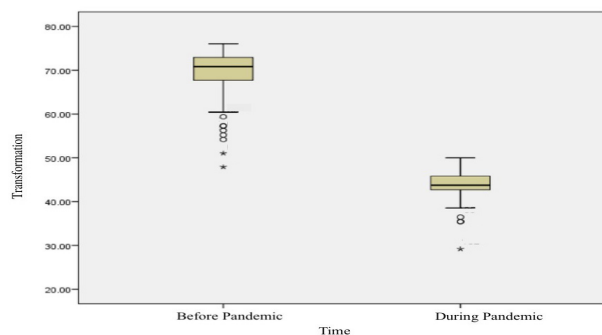


Figure 5: Transformation Boxplot

DISCUSSION

Fishermen’s Quality of Life Before and During Pandemic

In this study, the quality of life of fishermen in the Kenjeran Coast was compared between the pre-pandemic era (before March 2020) and during the COVID-19 pandemic (August to November 2020).

The COVID-19 pandemic has clearly transformed the lives of the fishermen and based on the findings of the study, it has also significantly affected their quality of life.

In the pre-pandemic era, the fishermen could easily get satisfaction and quality of life, both physically, psychologically, socially, and environmentally because they have been exposed to globalization, sophisticated technology advancements and modernization. This might influence how they work and face challenges of daily living including their ability to cope with nature when weather conditions change, the ability to predict the weather, the ability to make decisions, and to have high aspirations in the field of education (19). Furthermore, it might be possible that before the pandemic era, the fishermen had already developed stable social capital in their lives and work which ensured good quality of life (20, 21).

Although there was a 28 points reduction in the overall quality of life scores of fishermen from the pre-pandemic era when compared to the pandemic era, the default (pre-pandemic) scores were already low, in the range of 47.92 to 76.04 with a median of 70.83. This is in line with research conducted in Kuala Terengganu, Malaysia (22) which showed that even before the pandemic,

the quality of life of fishermen was already in the low category.

The change in the lifestyle of fishermen during the pandemic might be an important explanation for the reduced score in the overall perception of quality of life. In West India, fishing activities stopped completely from March to May 2020. This caused fishermen to lose their main source of income hence affecting their overall welfare (23, 24). Furthermore, implementation of policies to carry out social distancing and large-scale restrictions might have interfered with the fishermen’s ability in meeting their daily needs. In a similar study, more than 40% of fishermen on the Northeast Coast of America had to stop going to sea because of the social distancing policy that started in mid-March 2020. The policy had major disruption in their quality of life (25).

Physical Health Dimension

The physical health dimension shows an 8 points reduction in pre-to-during pandemic comparison scores among the Kenjeran Coastfishermen. The higher pre-pandemic physical health dimension scores is consistent with a similar study among fishermen in Gunungkidul Regency, Indonesia (26). A modest income of about Rp. 1,500,000 per month (about USD105) enabled them to have access to sufficient daily needs and physical health maintenance. They also had a lot of demand for fish from seafood restaurants and from marine product manufacturers.

The reduction in physical health dimension scores could be contributed by loss of assets including boats due to inability to pay rents and the sense of insecurity due to the pandemic restrictions (27). This may also be caused by a drastic loss of income. Many fishermen who were reliant on daily income based on the amount of catch of the day suffered the most, while others had their monthly income reduced to more than a half (28). In addition, for example in Bajo, there was also a drastic 50% decline in fish prices due to a 20% decrease in the demand of seafood products by seafood restaurants (28, 29, 30).

The fall of seafood products that impacted the local fishermen however is not unique to Indonesia. The decline of seafood product businesses is a global phenomenon which has impacted many countries including the U.S. and China. This was at least partly due to stringent health protective measures and quarantine procedures which caused a major decline in seafood export flow between the two countries (31 - 35).

Psychological Dimension

The psychological dimension of quality of life of the fishermen also showed a significant decline (7-points decline) from the pre-pandemic era. One possibility is that in the pre-pandemic era they had better peace of mind and stable mental state because they felt secure

in their life without threats and uncertainties and restrictions related to COVID-19 (18, 36). In India, for instance, many fishermen became stressed because they were stranded on boats or in ports unable to return home and had to live in cramped living conditions without sufficient water or food supply (23). Furthermore, fishermen might experience dissatisfaction, anxiety, and stress due to the above challenges and decline in income to provide for their families.

The decline in psychological dimension scores of qualities of life may be due to emotional changes because of the COVID-19 pandemic. In a similar study, 20.8% of fishermen reported difficulty in understanding themselves, 22.5% said that COVID-19 pandemic had prevented them from overcoming life problems or challenges, and 19.8% stated that the COVID-19 pandemic had disrupted their psychological/mental quality of life (26). The psychological impact of the COVID-19 pandemic on the fishermen should be quite similar based on all the disruptions that they are facing in the current pandemic era (28).

Social Relationship Dimension

Before the COVID-19 pandemic, the fishermen could easily interact with fellow fishermen, buyers and tourists without any barriers and obligations to do social distancing (24). They also had good quality social relationships between themselves and with their families, friends, and foreigners alike. For instance, a study among Sungai Apit District fishermen showed that they had good social relationship perception scores because it was still possible for them to carry out activities such as gathering and conducting marketing and trading activities (36).

The significant reduction in social relationship dimension for the Kenjeran Coast fishermen during the pandemic era is indicative of the lack of opportunity for them to interact and carry out their usual social activities in public spaces such as gathering, marketing, and trading. Furthermore, the fishermen might also find it harder to get social support from their relatives and friends, and to fulfill religious obligations during the pandemic (37). In addition, the COVID-19 pandemic restrictions might disrupt their sense of peace and harmony in life especially because of perceived discriminatory implementation of restrictions when compared to some other people in the community (24).

Environment Dimension

The fishermen's baseline perception of environmental dimension of quality of life was low even before the pandemic. Fishermen had a work environment with a high level of danger and risk. This is indicated by the physical dangers in the form of climate and weather that the fishermen must have faced when they went to sea. In the pre-pandemic era, fishermen had a burden only to deal with climate and weather uncertainties in

their work environment. In a previous study conducted in Jembrana, it was shown that the quality of life in the environmental dimension of fishermen was better because fishermen only faced variations in climate and weather (21). Fishermen could even guarantee and prioritize their own safety to carry out fishing activities such as to decide whether it was safe enough to go for deep-sea fishing in unfavorable weather conditions. Then, with the occurrence of a pandemic, the danger is increased by the threat of COVID-19 transmission in the fishermen's work environment.

The reduction in the environment dimension scores in this study is in line with another research which concluded that COVID-19 had exacerbated the perception of threats that occur in the fishermen's work environment, thereby reducing the quality of life of fishermen (38).

Furthermore, COVID-19 infection had also naturally occurred among fishermen, too, posing a significant threat to public health. Fifty million people work in marine fisheries—the vast majority in fishing communities. Conditions of fishing vessels that are narrow, crowded, and often unhygienic are among risk factors that might increase the risk of COVID-19 infection, and a reason for the decline in the quality of life of fishermen during the pandemic, especially in the environmental dimension (39).

Finally, the environmental impact of lifestyle changes on the fishermen due to the pandemic such as the necessity to wear disposable personal protective equipment and medical masks can also have an impact. Not only would such a requirement result in damage to the marine ecosystem if disposal were not done properly, it could also result in dissatisfaction about their work environment especially on concerns about the impact of indiscriminate disposals of those equipment on the marine ecosystem and their own health. This is also coupled with the cuts in allocation of funding for the marine conservation sector in response to national COVID-19 strategies which has resulted in the neglect of marine conservation (40).

CONCLUSION

In conclusion, there has been a marked decrease in the perception of quality of life in fishermen in the fishing village of Kenjeran coastal area, Surabaya since the COVID-19 pandemic started. There are 8 points, 7 points, and 3 points decrease in physical, psychological, and social relationship dimensions of quality of life respectively. Changes in the lifestyle that highly influenced the fisherman's quality of life were the most likely reason for the difference in the quality of life of fishermen between the pre-pandemic era and during the pandemic. The most important dimension that has been changed before and after quality of life is environmental

quality of life, which has decreased 10 points. Future studies should look at how they gradually coped with the unpredictable changes of regulations due to the impact of appearance of new variants of the COVID-19 virus and possible strategies that could be implemented to help them get by better to improve their livelihood as the pandemic evolves further.

ACKNOWLEDGEMENTS

We would like to show our gratitude to Dr. Santi Martini, dr., M.Kes as the Dean of Faculty of Public Health, 52nd APACPH Conference, also the fishermen community in Kenjeran Coast, Surabaya

REFERENCES

- Kementrian Kelautan dan Perikanan. Kementerian Kelautan dan Perikanan 2020. 2020;149.
- KKP (Kementerian Kelautan dan Perikanan). Laporan Tahunan Kementerian Kelautan dan Perikanan Republik Indonesia 2019. Kementerian Kelautan dan Perikanan Republik Indonesia [Internet]. 2019;(16):1–169. Available from: [https://kkp.go.id/an-component/media/upload-gambar-pendukung/kkp/LAPORAN/Laporan Tahunan/LAPORAN_TAHUNAN_KKP_TAHUN_2019_26_Maret_FINALE.pdf](https://kkp.go.id/an-component/media/upload-gambar-pendukung/kkp/LAPORAN/Laporan_Tahunan/LAPORAN_TAHUNAN_KKP_TAHUN_2019_26_Maret_FINALE.pdf)
- Pipit Festi, Aryunani ES. Aksiologi : Jurnal Pengabdian Kepada Masyarakat Pos UKK Cumi dan Pos UKK Kerapuh sebagai Upaya Meningkatkan Kesehatan Keluarga. 2018;2(1):88–95.
- Anisah Azzah Zhafirah Rukhus. Potensi Pengembangan Wilayah Pesisir Kenjeran Surabaya. 2020;(November):0–21.
- Shulla K, Voigt B-F, Cibian S, Scandone G, Martinez E, Nelkovski F, et al. Effects of COVID-19 on the Sustainable Development Goals (SDGs). *Discov Sustain* [Internet]. 2021;2(1). Available from: <https://doi.org/10.1007/s43621-021-00026-x>
- International Labour Organization (ILO). The likely impact of COVID-19 on the achievement of SDG 8. Italy: International Labour Organization; 2021.
- Peraturan Walikota Surabaya. Pedoman Pembatasan Sosial Berskala Besar Dalam Penanganan Corona Virus Disease 2019 (Covid-19) Di Kota Surabaya. 2020;19 (Nomor 19 tahun 2020):1–17.
- Hardianto AD. MEKANISME SURVIVAL KELUARGA NELAYAN. *Dep Sosiologi, FISIP, Univ Airlangga*. 2020;283.
- Mosteller F. Implications of measures of quality of life for policy development. *J Chronic Dis*. 1987;40(6):645–50.
- Valerie Müller DH. *Quality of Life and the Millennium Challenge: Advances in Quality-of-Life Studies, Theory and Research*. Springer Netherlands. 2010.
- Ghani NA, Raub MA, Adam F, Abdullah B, Afgani@Eusoff Y, Ali Puteh DAHM. Quality of Life (QoL) of Fishermen in the West Coast States of Peninsular Malaysia. *Int J Acad Res Bus Soc Sci*. 2017;7(4).
- McDowell I. *Measuring Health: A guide to rating scales and questionnaires*. Oxford Scholarship Online; 2006.
- Abd Gaffar N, Ismail Z, Abdul-Hamid H, Abdul-Razak S. Work-related quality of life and its associated factors among house officers working at two hospitals in Selangor. *Malaysian J Med Heal Sci*. 2021;17(2):137–45.
- Al Dhaheri AS, Bataineh MF, Mohamad MN, Ajab A, Al Marzouqi A, Jarrar AH, et al. Impact of COVID-19 on mental health and quality of life: Is there any effect? A cross-sectional study of the MENA region. *PLoS One* [Internet]. 2021;16(3 March):1–17. Available from: <http://dx.doi.org/10.1371/journal.pone.0249107>
- Fisheries N. *Alaska Fisheries Impacts from COVID-19*. NOAA. 2020;(April).
- World Health Organization. Division of Mental, H. (1996). WHOQOL-BREF : introduction, administration, scoring and generic version of the assessment : field trial version, December 1996. In. Geneva: World Health Organization.
- Ventegodt S, Merrick J, Andersen NJ. Quality of life theory I. The IQOL theory: an integrative theory of the global quality of life concept. *Scientific World Journal*. 2003;3(June):1030–40.
- Owczarek K. The concept of quality of life. 2016;(January).
- Apriyanti E. Perbandingan Kualitas Hidup Nelayan Berdasarkan Modernitas Individu. *MUKADIMAH J Pendidikan, Sejarah, dan Ilmu ...* [Internet]. 2020;4:78–85. Available from: <https://jurnal.uisu.ac.id/index.php/mkd/article/view/2618>
- Kusumayanti NMD, Setiawina IND, Utama IMS. Ni Made Dwi Kusumayanti, I Nyoman Djinar Setiawina, dan I Made Suyana Utama. Analisis Faktor-Faktor ... 251. *Bul Stud Ekon*. 2018
- ZAIN RM, KAMARUDIN MKA, SAAD MHM. Assessment of Quality of Life on Fishermen Community in Kuala Terengganu, Malaysia: A Review. *Int J Acad Res Bus Soc Sci*. 2018;8(10):640–50.
- Avtar R, Singh D, Umarhadi DA, Yunus AP, Misra P, Desai PN, et al. Impact of covid-19 lockdown on the fisheries sector: A case study from three harbours in Western India. *Remote Sens*. 2021;13(2):1–20.
- Bennett NJ, Finkbeiner EM, Ban NC, Belhabib D, Jupiter SD, Kittinger JN, et al. The COVID-19 Pandemic, Small-Scale Fisheries and Coastal Fishing Communities. *Coast Manag* [Internet]. 2020;48(4):336–47. Available from: <https://doi.org/10.1080/08920753.2020.1766937>
- Smith SL, Golden AS, Ramenzoni V, Zemeckis DR, Jensen OP. Adaptation and resilience of commercial fishers in the Northeast United States during the early stages of the COVID-19 pandemic [Internet]. Vol. 15, *PLoS ONE*. 2020. Available from: <http://>

- dx.doi.org/10.1371/journal.pone.0243886
26. Fay DL. KUALITAS HIDUP NELAYAN DESA KEMADANG, KECAMATAN TANJUNGSARI, KABUPATEN. *Angew Chemie Int Ed* 6(11), 951–952. 2017.
 27. Yapanto M Lis, Musa Th Dahniar, Tanipu F, Suherman SP. The Impact of Covid-19 on Supply Chain Fisheries and Challenges by Fisherman in Indonesia. *J Univ Shanghai Sci Technol*. 2020;22(10):1360–5.
 28. Nurhayati A. MANAJEMEN RISIKO PERIKANAN TANGKAP (STUDI KASUS DI TENGAH PANDEMI COVID-19). 2020.
 29. Kholis MN. PREDIKSI DAMPAK COVID-19 TERHADAP PENDAPATAN NELAYAN JARING INSANG DI KOTA BENGKULU Prediction. 2020;4(1):1–11.
 30. Ode L, Alidin A, Ode L, Adam B, Manajemen J, Halu U, et al. PELATIHAN PENJUALAN IKAN BERBASIS ONLINE UNTUK MASYARAKAT NELAYAN YANG TERDAMPAK COVID-19 DI. 2021;1:16–23.
 31. Asia Pacific Foundation of Canada. COVID-19 Pandemic Implications on Agriculture and Food Consumption, Production and Trade in ASEAN Member States. 2021;1–166. Available from: <https://asean.org/storage/COVID-19-Pandemic-Implications-on-Agriculture-and-Food-Consumption-Final.pdf>
 32. Fisheries N. NOAA Fisheries Initial Impacts Assessment of the COVID-19 Crisis on the U . S . Commercial Seafood and Recreational For-Hire / Charter Industries Agency Launches Rapid Assessment as Impacts Mount. 2020;(March).
 33. Fisheries N. Atlantic Highly Migratory Species Fisheries Impacts from COVID-19. 2020;(July):1–4.
 34. Fisheries N. Northeast Fisheries Impacts from. 2020;(April):1–6.
 35. World Bank Group. *Global Economic Prospects*. 2020. 238 p.
 36. Metalisa R, Septya F, Ramadona T, Darmis A. Social Condition of Fishermen Community in Sungai Apit Subdistrict Due to Social Manipulation for COVID 19 Pandemic Kondisi Sosial Masyarakat Nelayan Kecamatan Sungai Apit Akibat Rekayasa Sosial Pandemi COVID 19. *J Berk Perikan Terubuk*. 2021;49(1):727–32.
 37. Sujadi E, Kamil D, Ridha M, Yandri H, Juliawati D, Fadhli M, et al. Does covid-19 significantly affect the quality of life? The impact analysis of covid-19 on work, financial, quality of worship, emotional and social aspects. *Proc Int Conf Ind Eng Oper Manag*. 2020;(August):3071–82.
 38. Love DC, Allison EH, Asche F, Belton B, Cottrell RS, Froehlich HE, et al. Emerging COVID-19 impacts, responses, and lessons for building resilience in the seafood system. *Glob Food Sec* [Internet]. 2021;28:100494. Available from: <https://doi.org/10.1016/j.gfs.2021.100494>
 39. Saumweber W, Lehr AK. Covid-19 at Sea: Impacts on the Blue Economy, Ocean Health, and Ocean Security. *Horiz J*. 2020;1–6.
 40. Northrop E, Konar M, Frost N, Hollaway E. A Sustainable and Equitable Blue Recovery to the COVID-19 Crisis. 2020;108.