

Enhancing Maritime Safety Awareness Through Simulation-Based Training for Fishermen in Raam Island

Fajar Gumelar¹, Ryan Puby Sumarta^{2*}, Fadel Muhammad³, Filemon⁴, Iqdam Mukaddim Ikbāl⁵

¹²³⁴⁵*Sorong Merchant Marine Polytechnic*

*e-mail: rps55982@gmail.com

Artikel submit	060125
Artikel review	081125
Artikel accepted	073025

Abstract

Maritime accidents in small coastal communities often stem from poor safety awareness and a lack of knowledge about standard procedures among traditional fishermen. Pulau Raam, a community in Southwest Papua, where most fishermen lack formal maritime safety education, is a prime example. This initiative aims to boost fishermen's safety knowledge and preparedness through a structured educational program. The approach included theory, practical simulations, and the distribution of essential safety gear. Thirty traditional fishermen, who use small long boats for their livelihood, participated. The training started with sessions on the importance of life-saving equipment and safe sea practices. This was followed by hands-on simulations covering the proper use of life jackets, recognizing dangerous weather, and basic emergency responses. To gauge the program's success, participants took pre- and post-tests. Results indicated a significant knowledge improvement, with average scores rising from 48.5 in the pre-test to 83.7 in the post-test. The distributed life jackets also facilitated the immediate application of learned safety measures. This program proves that combining local education, practical skills, and access to equipment can greatly improve fishermen's safety awareness and conduct. It provides a model that can be replicated in other Indonesian coastal communities facing similar issues. Future efforts should focus on community mentoring and institutional partnerships to ensure long-term safety practice sustainability.

Keywords: Maritime Safety; Fishermen Training; Sorong

Abstract

Kecelakaan laut di komunitas pesisir berskala kecil sering kali disebabkan oleh rendahnya kesadaran dan pengetahuan tentang keselamatan pelayaran di kalangan nelayan tradisional. Pulau Raam di Papua Barat Daya merupakan salah satu wilayah di mana sebagian besar nelayan belum pernah mendapatkan pelatihan keselamatan laut secara formal. Program pengabdian masyarakat ini bertujuan untuk meningkatkan pengetahuan dan kesiapsiagaan keselamatan nelayan melalui intervensi edukatif yang terstruktur. Metode yang digunakan menggabungkan pembelajaran teori, simulasi praktik, dan pemberian alat keselamatan. Peserta kegiatan terdiri dari 30 nelayan tradisional yang menggunakan perahu kecil dalam aktivitas sehari-hari. Kegiatan dimulai dengan sesi teori yang membahas pentingnya alat penyelamat jiwa dan perilaku aman di laut. Selanjutnya dilakukan simulasi langsung mengenai cara memakai jaket pelampung, mengenali cuaca berbahaya, dan melakukan respon darurat dasar. Untuk mengevaluasi efektivitas program, seluruh peserta mengikuti pre-test dan post-test. Hasil menunjukkan

peningkatan pengetahuan yang signifikan secara statistik, dengan skor rata-rata meningkat dari 48,5 menjadi 83,7 ($p < 0,05$). Selain itu, pemberian jaket pelampung memungkinkan peserta untuk langsung menerapkan praktik keselamatan yang telah dipelajari. Program ini membuktikan bahwa kombinasi edukasi lokal, pelatihan keterampilan praktis, dan akses alat keselamatan dapat secara nyata meningkatkan kesadaran dan perilaku keselamatan nelayan. Model ini dapat direplikasi di komunitas pesisir lain di Indonesia yang menghadapi tantangan serupa. Upaya lanjutan perlu melibatkan pendampingan komunitas dan kolaborasi kelembagaan untuk menjaga keberlanjutan praktik keselamatan.

Kata kunci: Keselematan Pelayaran; Pelatihan Nelayan; Sorong

INTRODUCTION

Maritime safety is a significant concern in archipelagic areas such as Pulau Raam, Southwest Papua, given the high dependence on maritime transport and fishing activities. Despite its advantageous geographical position and abundant marine resources, Pulau Raam grapples with substantial obstacles stemming from the limited safety awareness and proficiency of its inhabitants. Contributing factors to an increased susceptibility to maritime incidents include the infrequent use of life-saving apparatus, deficient understanding of emergency protocols, and insufficient comprehension of meteorological influences.

One of the most significant maritime accidents recorded in the waters around Pulau Raam occurred on April 8, 2023, when *Kapal Anugerah 13* sank with four crew members on board. Fortunately, all individuals were rescued by the joint Search and Rescue (SAR) team, yet the incident gained national media attention and highlighted the vulnerability of local maritime safety practices (Antaranews, 2023; Santoso, 2023; Tim Redaksi VOI, 2023). This accident illustrates the fragility of safety preparedness in coastal communities, particularly concerning the limited understanding of emergency procedures, inadequate use of safety equipment, and insufficient awareness of weather-related risks.

Various studies underscore the multitude of risks that maritime operations encounter, including adverse weather conditions, human error, equipment malfunction, and regulatory compliance issues (Hermann, 2024; Utama et al., 2024). International conventions, particularly the International Convention for the Safety of Life at Sea (SOLAS), aim to mitigate risks by implementing stringent regulations (Joseph & Dalaklis, 2021). Nonetheless, compliance with these regulations is often inconsistent among maritime operators, which increases the vulnerability of maritime activities in these regions (Wahyudi & Mochtar, 2022).

This community service initiative aims to increase maritime safety awareness and skills through participatory socialization programs. These programs are designed to transfer knowledge and enhance the practical competencies of local residents in using life jackets, understanding weather indicators, and implementing emergency evacuation protocols. The approach combines lectures, simulations, and direct practice to ensure material relevance and skill retention.

Theoretically, this program is grounded in participatory education models and behavioral change theories, which emphasize the active involvement of community members in learning. Past research has demonstrated that human error—often stemming from poor training and knowledge—accounts for 80% of marine accidents (Bowo & Furusho, 2018; Hasanspahić et al., 2021). Further support comes from studies that validate the effectiveness of simulation-based safety training in increasing comprehension and preparedness (Cheung et al., 2019; Fibriansari et al., 2022).

This initiative is expected to generate measurable improvements in knowledge, skills, and behavioral changes regarding safety practices. Beyond that, it aims to foster a culture of safety in coastal communities, contributing to the broader goals of the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being) and Goal 14 (Life Below Water).

GENERAL DESCRIPTION OF THE COMMUNITY, PROBLEMS AND TARGET SOLUTIONS

General description

Pulau Raam is located approximately 15–30 minutes by boat from Sorong City, serving as a key maritime access point to the Southwest Papua region. The community primarily consists of traditional fishermen who rely on small-scale boats (long boats) and simple fishing gear to support their livelihoods. Observations in the field indicate that many of these vessels are still operating without standardized safety equipment such as life jackets or communication tools. This condition reflects a broader issue of limited access to safety resources and low awareness regarding maritime emergency procedures.

The residents of Pulau Raam, particularly fishermen and their families, face elevated risks when navigating sea routes due to insufficient safety knowledge and preparedness. These challenges are further compounded by unpredictable weather conditions and a general lack of training in emergency response protocols.

The target audience for this community service activity consists solely of fishermen who are directly involved in maritime activities and are at a higher risk of maritime accidents due to the lack of safety measures and emergency preparedness.

Tabel 1 Target description

No	Name of Target	Characteristics of Target	Amount	General Problem or Targets
1	Economic Target	Fishermen and boat operators	30	Maritime Safety, Economy Sector

Problem

Based on preliminary observations and limited interviews with several fishermen in Pulau Raam, three major safety challenges were identified. These findings were also reinforced by previous studies, highlighting the common patterns of maritime safety issues in small-scale coastal communities:

1. Low Level of Safety Knowledge and Awareness: Most fishermen are not familiar with basic maritime safety standards, including the importance of using life-saving equipment like life jackets and emergency procedures. This reflects the broader issue of limited access to safety information and training opportunities in the region (Imron et al., 2018).
2. Limited Emergency Response Skills: Fishermen lack hands-on training in how to respond to emergencies at sea. Many do not know how to properly wear life jackets, interpret dangerous weather conditions, or execute basic evacuation procedures when faced with maritime hazards (Browne et al., 2021; Tjarles et al., 2021).
3. Behavioral and Perception Barriers: A number of fishermen believe that safety equipment is unnecessary or too costly, leading to low motivation to adopt safe practices. This perception, combined with a general sense of complacency, continues to hinder the establishment of a proactive safety culture among local fishermen (Frestiquauli et al., 2024; Sidharta et al., 2021).

Tabel 2 Problem and solution

No	Problem	Solution	Indicators of Goal
1	Low knowledge of maritime safety	Knowledge transfer, 587 <i>Enhancing Maritime Safety Awareness Through Simulation-Based Training for Fishermen in Raam Island</i> Gumelar F, Sumarta RP, Muhammad F, et al.	Improved safety knowledge scores

No	Problem	Solution	Indicators of Goal
	procedures among fishermen	mentoring sessions	(pre-post comparison)
2	Inadequate emergency response skills at sea	Simulation training and practical drills	Greater skill accuracy during evacuation simulations
3	Negative perception and low motivation to use safety tools	Awareness campaigns and safety outreach	Increased adoption of life jackets and safe behaviors

Target solution

To improve maritime safety awareness and preparedness among fishermen in Pulau Raam, the community service program was designed with a structured sequence of interventions, integrating theoretical instruction, practical simulation, and direct equipment support. The first stage consists of introductory theoretical sessions that aim to build foundational knowledge on the importance of safety at sea, particularly the proper use of life-saving equipment such as life jackets, lifeboats, and buoys. These tools are critical in emergency situations for preventing drowning and saving lives (Książkiewicz & Szwoch, 2018; N. O. & O. S., 2023). The consistent use of such safety equipment has been shown to reduce the risk of fatal maritime accidents (Ada et al., 2024; N. O. & O. S., 2023).

These sessions are delivered using simple, localized language and visual materials to ensure accessibility and relevance to fishermen's daily experiences. Theoretical education provides the essential cognitive foundation for risk awareness, decision-making, and emergency protocol comprehension. Health education programs have been proven to significantly increase safety-related knowledge among fishermen, which is crucial for effective emergency response (Novendy et al., 2017). This foundation is essential for building confidence and initiating behavior change prior to engaging in practical activities.

The second phase of the intervention consists of practical training through direct demonstrations and hands-on simulations. Fishermen are guided through exercises such as properly wearing life jackets, recognizing dangerous weather conditions, and responding to emergencies, including evacuation procedures. These simulations are intended to develop muscle memory and improve real-life readiness during maritime crises (Laksham, 2024; Spitzer et al., 2018). Simulation-based training also improves response speed and decision-making in emergencies, contributing to more efficient lifesaving actions (Quistberg et al., 2014; Spitzer et al., 2018).

Correct use of life jackets is particularly emphasized, as their effectiveness depends heavily on proper usage (Laksham, 2024; Quistberg et al., 2014; Spitzer et al., 2018). Practical drills are also used to help fishermen recognize signs of hazardous weather—such as changing cloud patterns, wave behavior, and wind intensity—enhancing their ability to make timely decisions before going to sea (Quistberg et al., 2014; Spitzer et al., 2018). In addition to physical skills, simulation-based training significantly improves self-efficacy. Studies have shown that trainees who participate in simulations report reduced anxiety and higher confidence in emergency skills (Al-Sebaei, 2023; La Monte et al., 2023). In medical training contexts, simulation has been found to improve real-life performance, including in emergency responses (Nater et al., 2023).

The use of simulators in maritime education and training (MET) has long been recognized as effective in replicating real on-board conditions. Simulation-based learning enables participants to rehearse emergency responses in a controlled but realistic environment, enhancing their preparedness and minimizing human error (Baldauf et al., 2016; Cwilewicz & Tomczak, 2004; Kristensen et al., 2022). Hands-on practice with marine survival tools—such as life rafts, signaling

devices, and emergency-locating beacons—has also been shown to increase survival rates in actual emergencies (Dzugan, 2010).

The third component of the intervention is the distribution of life-saving equipment, particularly life jackets. Providing direct access to this equipment ensures that the skills taught during training can be applied immediately and sustainably. Studies have shown that equipping small fishing vessels with adequate safety gear substantially reduces the risk of accidents and improves survival outcomes (Dewi, 2023; Dzugan, 2010; Pati et al., 2023). Furthermore, the integration of education and equipment support has been shown to increase knowledge, attitude, and correct usage behavior among fishermen (Dewi, 2023; Yusriani et al., 2021).

Finally, the program also incorporates community engagement and localized facilitation strategies. Involving local fishermen in the learning process and encouraging peer-based learning groups supports long-term impact. Research has shown that involving communities in preparedness programs and building collaborative trainer networks significantly enhances effectiveness, cultural relevance, and sustainability (Joseph & Dalaklis, 2021; Palinkas et al., 2025).

By combining these three pillars—theoretical education, practical simulation, and equipment provision—the program aims to foster a culture of safety, reduce human error, and strengthen emergency preparedness among traditional fishermen in Pulau Raam.

METHOD

This community service activity was carried out to improve the awareness and skills of traditional fishermen in Pulau Raam regarding maritime safety. The approach used in this program combined educational, persuasive, participatory, and empowerment-based methods to ensure the materials and training were relevant, engaging, and applicable to the daily needs of the participants. The activity began with a brief theoretical session, where fishermen were introduced to key concepts of maritime safety, including the importance of using life jackets, recognizing signs of bad weather, and responding to emergency situations. This was followed by practical training through direct simulations, where participants practiced how to wear life jackets properly, carry out basic evacuation procedures, and identify environmental hazards such as strong winds or high waves. To measure the effectiveness of the intervention, a pre-test and post-test design was used. Participants were asked to complete a basic multiple-choice questionnaire before and after the activity to assess the change in their knowledge and understanding. Additionally, observations were conducted during the practical sessions to evaluate their skills and participation. As part of the empowerment strategy, the program also provided personal safety equipment, such as life jackets, to selected participants to support the application of safety practices in real-life settings. The target group of this activity consisted of 30 traditional fishermen in Pulau Raam, selected based on their daily use of long boats for fishing and marine transport. Pulau Raam is located approximately 15 to 30 minutes by boat from Sorong City, where the service team is based at Politeknik Pelayaran Sorong. Access to the location was arranged through coordination with local authorities using sea transport. The activity was implemented on May 21st 2024, and was facilitated by lecturers and practitioners with academic expertise in maritime safety and community-based education. The combination of knowledge transfer, skills training, equipment provision, and pre-post evaluation ensured that the program was both impactful and measurable.

Table 3 : Activity Schedule

Time	Activity
------	----------

Time	Activity
08:00 – 08:30	Registration and participant briefing
08:30 – 09:00	Pre-test to assess baseline knowledge
09:00 – 10:30	Theoretical session: Maritime safety concepts
10:30 – 12:00	Simulation I: Proper use of life jackets and evacuation procedures
12:00 – 13:00	Lunch break
13:00 – 14:30	Simulation II: Identifying weather indicators and environmental hazards
14:30 – 15:00	Post-test to measure improvement in knowledge and skills
15:00 – 15:30	Distribution of safety equipment (life jackets)
15:30 – 16:00	Closing session and feedback

RESULTS AND DISCUSSION

This community service program aimed to improve the maritime safety knowledge of traditional fishermen in Pulau Raam. The evaluation was conducted using a pre-test and post-test design to measure knowledge improvement on essential safety topics, including the correct use of life jackets, weather awareness, and emergency procedures at sea.

Table 4 : Knowledge Level of Participants Before and After the Program

Knowledge Level	n (Pre-test)	% (Pre-test)	n (Post-test)	% (Post-test)
Low	18	60.0%	2	6.7%
Moderate	10	33.3%	8	26.7%
High	2	6.7%	20	66.6%
Total	30	100%	30	100%

The data in Table 1 show a substantial shift in participants' knowledge categories following the training. Prior to the program, 60% of the fishermen were categorized as having low knowledge. After the intervention, this number dropped to 6.7%, while those in the high knowledge category rose from 6.7% to 66.6%.

To determine the statistical significance of this increase, a paired sample t-test was conducted.

Table 5 : Paired Sample t-Test of Knowledge Scores

Variable	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
Pre-test Score	30	48.5	10.2			
Post-test Score	30	83.7	8.6	16.12	29	0.000

The result indicates a statistically significant increase in knowledge ($t = 16.12$, $p < 0.05$). This confirms the effectiveness of the program's method, which combined theoretical instruction with practical demonstration using a participatory and contextualized approach.

These findings are supported by earlier studies. Limited safety knowledge among fishermen is a major contributing factor to maritime accidents, particularly in remote communities with minimal access to formal training (Imron et al., 2018). Additionally, human error accounts for approximately 80% of maritime incidents in Indonesia, often due to poor safety education and lack of preparedness (Bowo & Furusho, 2018).

Barriers to maritime safety are not only technical but also behavioral. Many fishermen perceive safety equipment as expensive or unnecessary, a view that discourages its use (Frestiquauli et al., 2024; Sidharta et al., 2021). This initiative bolstered maritime safety awareness among Raam Island fishermen by delivering safety education and distributing life jackets, thereby bridging

knowledge deficits and improving access to essential safety gear. The training's participatory and community-specific approach resonates with successful models in other maritime programs, while the incorporation of simulation-based learning and actual equipment has demonstrated a substantial improvement in comprehension and the sustained application of safety protocols. Simulation-based training significantly bolstered maritime safety awareness among Raam Island fishermen through comprehensive safety education and the distribution of life jackets, effectively bridging knowledge gaps and enhancing access to critical safety equipment. This training's participatory, community-tailored methodology aligns with successful strategies observed in analogous maritime programs. The integration of both simulation-based learning and hands-on experience with actual equipment has yielded a marked improvement in participants' comprehension and their consistent adherence to safety protocols. (Sumarta et al., 2024). Overall, the significant change in test scores demonstrates that the approach used—combining education, empowerment, and equipment provision—was both effective and relevant. The results affirm the value of community-based safety training in reducing vulnerability among fishermen in isolated maritime regions. This model holds strong potential for replication in similar coastal communities across Indonesia.

CONCLUSIONS AND SUGGESTIONS

The results of this community service program demonstrate that targeted safety education—delivered through a structured combination of theoretical instruction and practical simulation—can significantly improve the maritime safety knowledge of traditional fishermen. The pre-test and post-test analysis confirmed a statistically significant increase in participants' knowledge scores, indicating that the approach was both effective and contextually relevant. In addition to improving awareness, the provision of life-saving equipment such as life jackets empowered fishermen to immediately apply what they learned. The participatory nature of the program strengthened engagement and fostered positive behavioral change, highlighting the importance of a localized, empowerment-based model in enhancing safety within small-scale maritime communities. To ensure programs have a lasting effect, similar initiatives should be started in other coastal areas with similar maritime safety issues. These efforts should include ongoing support after training, the creation of safety groups led by peers, and working with local governments to build a lasting safety culture. Using tests before and after the program is advised as a way to measure how well the program works and encourage responsibility in future outreach. By combining what is taught, skills learned, and access to needed equipment, this program offers a flexible and repeatable plan for creating safer and stronger fishing communities across Indonesia's islands.

REFERENCE

- Ada, W., Zulaikah, S., Yusyarif, I. S., Muh, A., Saputra, A., & Taufik, A. (2024). Development of Life-Saving Buoy Ring With Remote Control System. *Majority Science Journal*, 2(4), 64–72. <https://doi.org/https://doi.org/10.61942/msj.v2i4.247>
- Al-Sebaei, M. O. (2023). Evaluating the use of role-play simulations in teaching management of medical emergencies in the dental clinic. *BMC Medical Education*, 23(1), 1–10. <https://doi.org/10.1186/s12909-023-04818-9>
- Antaranews. (2023, April 9). Tim SAR berhasil selamatkan 4 awak kapal di perairan Raja Ampat.

- Antaranews*. <https://tribratanews.polri.go.id/blog/nasional-3/tim-sar-berhasil-selamatkan-4-awak-kapal-di-perairan-raja-ampat-56534>
- Baldauf, M., Schröder-Hinrichs, J.-U., Kataria, A., Benedict, K., & Tuschling, G. (2016). Multidimensional simulation in team training for safety and security in maritime transportation. *Journal of Transportation Safety and Security*, 8(3), 197–213. <https://doi.org/10.1080/19439962.2014.996932>
- Bowo, L. P., & Furusho, M. (2018). Human Error Assessment and Reduction Technique for Reducing the Number of Marine Accidents in Indonesia. *Applied Mechanics and Materials*, 874, 199–206. <https://doi.org/10.4028/www.scientific.net/amm.874.199>
- Browne, T., Veitch, B., Taylor, R., Smith, J., Smith, D., & Khan, F. (2021). Consequence modelling for Arctic ship evacuations using expert knowledge. *Marine Policy*, 130(February), 104582. <https://doi.org/10.1016/j.marpol.2021.104582>
- Cheung, J. J. H., Kulasegaram, K. M., Woods, N. N., & Brydges, R. (2019). Why Content and Cognition Matter: Integrating Conceptual Knowledge to Support Simulation-Based Procedural Skills Transfer. *Journal of General Internal Medicine*, 34(6), 969–977. <https://doi.org/10.1007/s11606-019-04959-y>
- Cwilewicz, R., & Tomczak, L. (2004). The role of computer simulation programs for marine engineers in hazard prevention by reducing the risk of human error in the operation of marine machinery. *Management Information Systems*, 9, 791–798. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-11844276067&partnerID=40&md5=042509cdc24c03c2dd7c563fd96d32da>
- Dewi, F. S. (2023). Edukasi Peningkatan Pengetahuan Dan Perilaku Keselamatan Kesehatan Kerja Nelayan Terhadap Alat Pelindung Diri. *Ekalaya: Jurnal Pengabdian Kepada Masyarakat Indonesia*, 2(1), 78–86. <https://doi.org/10.57254/eka.v2i1.19>
- Dzugan, J. (2010). The development and efficacy of safety training for commercial fishermen. *Journal of Agromedicine*, 15(4), 351–356. <https://doi.org/10.1080/1059924X.2010.509226>
- Fibriansari, R. D., Maisyaroh, A., & Widiyanto, E. (2022). Pelatihan Pertolongan Pertama Korban Tenggelam Pada Nelayan Dengan Metode Simulasi. *Media Karya Kesehatan*, 5(1). <https://doi.org/10.24198/mkk.v5i1.35905>
- Frestiqauli, S., Sujantoko, S., Murdjito, M., Wardhana, W., Mustain, M., Silvianita, S., & Dhanistha, W. L. (2024). Penyuluhan Keselamatan Dan Kesehatan Kerja Pada Nelayan Surabaya Timur. *Sewagati*, 8(2), 1303–1308. <https://doi.org/10.12962/j26139960.v8i2.808>
- Hasanspahić, N., Vujičić, S., Frančić, V., & Čampara, L. (2021). The role of the human factor in marine accidents. *Journal of Marine Science and Engineering*, 9(3), 1–16. <https://doi.org/10.3390/jmse9030261>
- Hermann, W. (2024). Impact of Bulk Carrier Disasters on the Amendments to the SOLAS Convention. *Transnav the International Journal on Marine Navigation and Safety of Sea Transportation*, 18(2), 287–294. <https://doi.org/10.12716/1001.18.02.03>
- Imron, M., Nurkayah, R., & Purwangka, F. (2018). Pengetahuan Dan Keterampilan Nelayan Tentang Keselamatan Kerja Di PPP Muncar, Banyuwangi. *Albacore Jurnal Penelitian Perikanan Laut*, 1(1), 99–109. <https://doi.org/10.29244/core.1.1.99-109>

- Joseph, A., & Dalaklis, D. (2021). The International Convention for the Safety of Life at Sea: Highlighting Interrelations of Measures Towards Effective Risk Mitigation. *Journal of International Maritime Safety Environmental Affairs and Shipping*, 5(1), 1–11. <https://doi.org/10.1080/25725084.2021.1880766>
- Kristensen, C., Holen, S. M., Lamvik, G., Okstad, E. H., & Tinmannsvik, R. K. (2022). Design of, and learning from simulator-based contingency training in aquaculture. *Proceedings of the 32nd European Safety and Reliability Conference, ESREL 2022 - Understanding and Managing Risk and Reliability for a Sustainable Future*, 473–479. https://doi.org/10.3850/978-981-18-5183-4_R12-06-087-cd
- Książkiewicz, E., & Szwoch, I. (2018). International standards of life? saving appliances for inflatable liferafts. *AUTOBUSY – Technika, Eksploatacja, Systemy Transportowe*, 19(12), 110–114. <https://doi.org/https://doi.org/10.24136/atest.2018.365>
- La Monte, O. A., Lee, J. H., Soliman, S. I., Saddawi-Konefka, R., Harris, J. P., Coffey, C. S., Orosco, R. K., Watson, D., Holliday, M. A., Faraji, F., & Hom, D. B. (2023). Simulation-based workshop for emergency preparedness in otolaryngology. *Laryngoscope Investigative Otolaryngology*, 8(5), 1159–1168. <https://doi.org/10.1002/lio2.1139>
- Laksham, K. B. (2024). Life Jacket Usage and Effectiveness in Drowning Prevention. *Preventive Medicine Research & Reviews*, 1(1), 10–15. <https://doi.org/10.4103/PMRR.PMRR>
- N. O., W., & O. S., A. (2023). Usage of Life-saving Equipment by Commercial Boat Users and Operators in Southern Nigeria. *South Asian Journal of Social Studies and Economics*, 20(3), 30–36. <https://doi.org/10.9734/sajsse/2023/v20i3710>
- Nater, M., Nelson-McMillan, K., Elzein, C., Boone, A., & Urbas, C. (2023). Development of pediatric multidisciplinary extracorporeal membrane oxygenation simulations: A novel educational program to enhance team communication and emergency preparedness. *Perfusion (United Kingdom)*, 38(6), 1142–1152. <https://doi.org/10.1177/02676591221105408>
- Novendy, K., Soesilo, J. A., Indahsari, S., Fikri, M. F., & Drew, C. (2017). Knowledge improvement for wound management on fishermen at Pagedangan ilir village, Tangerang regency. *Advanced Science Letters*, 23(4), 3358–3360. <https://doi.org/10.1166/asl.2017.9105>
- Palinkas, A., Vaughan, A. M., Eldredge, S., Cyr, L., & Gladics, A. (2025). Nationally Connected Network of Trainers Empowers Fishers as Medical First Responders: A Case Study in Collaboration and Capacity Building. *Journal of Agromedicine*, 30(2), 221–226. <https://doi.org/10.1080/1059924X.2024.2434075>
- Pati, D. D., Asmin, E., Awan, R., Titaley, C. R., Tobing, R. T. A., Bugis, R., Oei, M., Hetharie, Y., Amanupunjjo, G., & Gofu, N. (2023). Edukasi Kesehatan Dan Keselamatan Kerja Pada Nelayan. *Jurnal Abdimas Sangkabira*, 4(1), 43–47. <https://doi.org/10.29303/abdimaassangkabira.v4i1.796>
- Quistberg, D. A., Bennett, E., Quan, L., & Ebel, B. E. (2014). Low life jacket use among adult recreational boaters: A qualitative study of risk perception and behavior factors. *Accident Analysis & Prevention*, 62, 276–284. <https://doi.org/https://doi.org/10.1016/j.aap.2013.10.015>
- Santoso, B. (2023, April 9). Kapal Tenggelam Di Perairan Raja Ampat, Empat Orang Selamat. *Suara.Com*. <https://www.suara.com/news/2023/04/09/065042/kapal-tenggelam-di->

perairan-raja-ampat-empat-orang-selamat?page=all

- Sidharta, D. B., Kelana, S., & Sutrisno, S. P. (2021). Peningkatan Kesadaran Penggunaan Alat Keselamatan Pelayaran Bagi Nelayan Di Kabupaten Musi Banyuasin. *KACANEGARA Jurnal Pengabdian Pada Masyarakat*, 4(1), 75. <https://doi.org/10.28989/kacanegara.v4i1.812>
- Spitzer, N., Phillips, M. T., Chow, W., & Mangione, T. W. (2018). Factors associated with life jacket use among cabin sailboat and day sailor boaters in the United States. *Journal of Safety Research*, 65, 101–114. <https://doi.org/https://doi.org/10.1016/j.jsr.2018.02.002>
- Sumarta, R. P., Widarbowo, D., Haryanto, D., Kendek, M., & Adiputra, I. K. H. P. (2024). Safety Improvement for Sea Taxi Association in Doom Island, Sorong City, Southwest Papua Port and Shipping Management Study Program, Sorong Merchant Marine Polytechnic, Indonesia 2 Nautical Studies Study Program, Sorong Merchant Marine Polytechnic, Indone. *ABDIMAS: Jurnal Pengabdian Masyarakat LPPM-Universitas Muhammadiyah Tasikmalaya*, 7(1), 239–250. <https://doi.org/https://doi.org/10.35568/abdimas.v7i1.4458>
- Tim Redaksi VOI. (2023, April 9). Kapal Anugerah 13 tenggelam di perairan Raja Ampat, 4 orang berhasil diselamatkan. *Voi.id*. <https://voi.id/berita/271019/kapal-anugerah-13-tenggelam-di-perairan-raja-ampat-4-orang-berhasil-diselamatkan>
- Tjarles, L., Gunaisah, E., Komboe, A. A. S., Muhfizar, & Poltak, H. (2021). Peningkatan Pengetahuan Alat Keselamatan Dasar di Atas Kapal Kepada Guru-Guru SMA Muhammadiyah Al-Amin Sorong Increasing Knowledge of Basic Safety Tools on Boats to Teachers of Muhammadiyah Al-Amin High School in Sorong. *Buletin SWIMP*, 1(1), 020–026.
- Utama, W. T., Sari, R. D. P., & Sutarto, S. (2024). Occupational Health and Safety Behavior in the Fisherman Group of Muara Tembulih Village, Ngambur District, Pesisir Barat. *International Journal of Innovative Research in Multidisciplinary Education*, 03(02). <https://doi.org/10.58806/ijirme.2024.v3i2n15>
- Wahyudi, R., & Mochtar, D. A. (2022). Legal Protection for Sea Transport Passengers. *Jurnal Cakrawala Hukum*, 13(3), 316–324. <https://doi.org/10.26905/idjch.v13i3.7490>
- Yusriani, Ernaningsih, & Alwi, M. K. (2021). Edukasi Dan Pelatihan Dalam Meningkatkan Pengetahuan, Sikap dan Praktik Penggunaan Alat Pelindung Diri Pada Kelompok Wanita Nelayan. *MATAPPA: Jurnal Pengabdian Kepada Masyarakat*, 4(4), 584–591.