



# Local Knowledge and Habits of Julung-julung Fishermen (*Hemiramphus lutkei* Valenciennes, 1847) in Buru Regency, Maluku

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Received: July 04, 2025  
Revised: April 22, 2026  
Accepted: May 25, 2026  
Published: May 31, 2026

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DOI: [10.29303/jppipa.v12i5.12011](https://doi.org/10.29303/jppipa.v12i5.12011)

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**Abstract:** Julung-julung fishermen along the coast of Buru Regency, Maluku, have a structured organization and division of labor within their groups. The objective of this study is to describe the structure, functions, knowledge, and local customs of julung-julung fishing groups in Buru Regency. Data collection was conducted through observation and interviews with the fishermen (N=46). The results of the study indicate that julung-julung fishermen belong to the category of small-scale and traditional fishermen. Membership in the fishing groups is not restricted by age or educational level. The majority of group members work primarily as fishermen. Each julung-julung fishing group consists of a fishing boat owner (juragan) and crew members (masnait). There are no social status distinctions within the julung-julung fishing groups. The fishing boat owners and crew members work together in the julung-julung fishing operations according to their respective skills. Fishing is conducted based on knowledge passed down from their ancestors and has become a tradition practiced from generation to generation. They possess knowledge of water conditions, signs of the presence of julung-julung fish, fishing gear, fishing techniques, and the timing of fishing and landing the catch. The local knowledge and customs of these fishermen can be utilized to formulate policies for the sustainable management of julung-julung fisheries in Buru Regency.

**Keywords:** Buru regency; Fishermen; Habits; *Hemiramphus lutkei* Valenciennes; Local knowledge

## Introduction

Small pelagic fishers constitute a key component of coastal communities and are generally characterized by small-scale, labor-intensive operations with limited technological capacity (Akyol & Tosunoglu, 2020; Emperua et al., 2018). This profile is consistent with definitions provided by the Food and Agriculture Organization (FAO) and Indonesian fisheries regulations, which emphasize restricted fishing range, low capital investment, and reliance on traditional practices. In this context, fishing activities are typically conducted in nearshore waters based on local ecological

knowledge and customary norms, with catches landed directly along the coastal settlements where fishers reside.

(FAO, 2012) defines small-scale and artisanal fisheries with the following characteristics: household scale of fishermen (different from commercial companies), using relatively small capital and labor, using relatively small fishing vessels (if any), close fishing range, fishing areas near the coast, catches are mainly for local consumption. Kolding et al. (2014) also explained that the characteristics of small-scale fisheries are household fishermen, limited fishing operations,

## How to Cite:

Tuhumuri, E., Talakua, M., & Umasugi, S. (2026). Local Knowledge and Habits of Julung-julung Fishermen (*Hemiramphus lutkei* Valenciennes, 1847) in Buru Regency, Maluku. *Jurnal Penelitian Pendidikan IPA*, 12(5), 712-720. <https://doi.org/10.29303/jppipa.v12i5.12011>

dependence on local fish resources and low capital investment (Kara et al., 2012)k.

Halim et al. (2020) wrote that in Indonesia there is no term for small-scale fisheries. The terms used are small-scale fishermen and traditional fishermen. The definitions of small-scale fishermen and traditional fishermen have different meanings. Law of the Republic of Indonesia Number 7 of 2016 concerning the Protection and Empowerment of Fishermen, Fish Farmers, and Salt Farmers defines small-scale fishermen and traditional fishermen in Chapter I Article 1 Points 4 and 5 as follows: "*Small Fishermen are fishermen who catch fish to meet their daily needs, whether they do not use fishing vessels or use fishing vessels with a maximum size of 10 (ten) gross tons (GT). Traditional Fishermen are fishermen who catch fish in waters that are traditional fishing rights that have been used for generations in accordance with local culture and wisdom..*"

In the coastal areas of Buru Regency, Maluku, there is a group of fishermen who target julung-julung fish as one of their main catches. Julung-julung fish belong to the family Hemiramphidae (order Beloniformes), with *Hemiramphus lutkei* Valenciennes, 1847 identified as the dominant species in these waters (Talakua et al., 2022). This species is generally categorized as a small pelagic fish inhabiting surface waters and commonly associated with coastal environments such as seagrass beds and coral reef areas. Its distribution extends across tropical marine waters, including several regions in eastern Indonesia such as Rote Island and Nain Island (Balukh et al., 2020; Umasangadji et al., 2023). Julung-julung fish are known to spawn multiple times a year, with local observations in Buru waters indicating seasonal spawning peaks (Talakua et al., 2023). These ecological characteristics influence their availability and accessibility to local fishing communities.

Fishermen of Ubung Village and Waelapia Village, Buru Regency are generally fishermen who catch julung-julung fish. The activity of catching julung-julung fish has been carried out since the time of their ancestors. The fish caught can be used in fresh or dried form. Waelapia Village is the center of dried julung fish production in Buru Regency. Dried julung fish is produced by traditional smoking methods. This processed fish is used as food stock, especially side dishes, which are used as a substitute for fresh fish during a fish shortage, which is a condition when fishermen cannot go to sea due to strong winds and large waves.

Although the julung-julung fish (*Hemiramphus lutkei*) is of significant ecological and biological importance, research to date has largely focused on its taxonomy, distribution, and reproductive biology, with limited attention paid to the socio-ecological aspects of this fishery. In particular, there is a clear lack of research examining the structure and function of fishing communities, as well as the local knowledge systems

and fishing practices associated with the julung-julung fishery. This gap highlights the need for research that integrates socio-ecological perspectives to better understand how coastal communities in Buru Regency interact with and manage this resource.

## Method

This study was carried out in Ubung and Waelapia Villages, Buru Regency, Maluku (Figure 1) between February and April 2022. Data were collected through direct field observations and interviews. Observations focused on documenting fishing activities, how fishermen organized themselves, and the roles of each group member. The study involved all active julung-julung fishermen in both villages, totaling 46 individuals. These participants were identified through information provided by the local community and confirmed with village leaders to ensure that they were actively engaged in julung-julung fishing. Interviews were conducted face-to-face using a flexible approach, allowing respondents to share their experiences while still covering key topics such as fishery characteristics, fishermen's profiles, group structure, division of tasks, as well as local knowledge and fishing practices.



Figure 1. Map of sample collection sites on Buru Island

The data were analyzed using a descriptive qualitative approach. Interview results were reviewed and organized to identify recurring patterns, particularly those related to fishing practices, local knowledge, and group dynamics. Basic descriptive summaries were also used to present fishermen's characteristics, such as age, education level, and main occupation, based on commonly used classifications. Information on the characteristics of the fishery was then interpreted within the context of small-scale and traditional fisheries. Overall, this approach was intended to provide a clearer picture of how ecological

aspects of julung-julung fishing are closely linked with the social dynamics of the fishermen in the study area. The overall research process is illustrated in the flowchart (Figure 2).

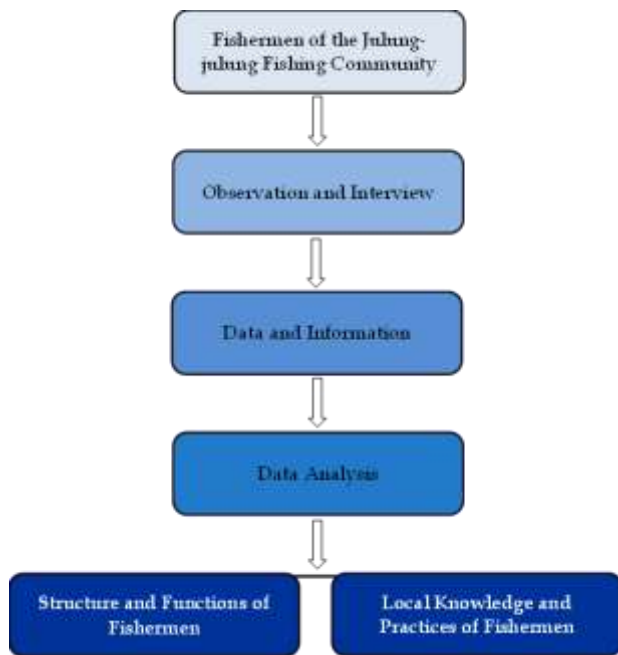


Figure 2. Research flowchart

## Results and Discussion

### Characteristics of major fisheries

Julung-julung fishing activities in Ubung and Waelapia Villages are carried out by local fishermen in groups. Preparation and fishing operations use the power of the ship's crew (ABK) or locally known as masnait, ranging from 4-8 people. The fishermen use fiber boats, generally ± 6 m long and ± 2 m wide. The fiber boat uses a 15 HP outboard engine, fueled by 10 L of gasoline for one fishing operation. This capture fleetnot yet equipped with navigation and safety equipment. The type of fishing gear used is a small circle net (mini purse seine), which local fishermen call giop or julung net.

Fishing areas near the coast and inside Kaiely Bay. Fishing areas are determined based on local knowledge and customs. Fishing is always done in the afternoon, very rarely in the morning or evening. The duration of fishing is generally around 2-3 hours. Fish landing is done on the shore of the local village. The fishermen do not yet have the knowledge to invest in fisheries business capital. Based on the data above, it can be said that the characteristics of the julung-julung fishery in Ubung and Waelapia Villages are classified as small and traditional fishermen.

### Age profile, education and occupation of senior fish fishermen

The results of the study show that the Julung-Julung fishing group consists of fishermen with groups varying ages from young to old. The largest number are fishermen aged 20-29 years (28.26%) and the fewest are fishermen aged 60-69 years (6.52%) (Table 1). Based on the age profile of the fishermen, it can be seen that membership of the julung-julung fisheries group is not limited by age factors.

The education level of the fishermen in the julung-julung fisheries also varies. The research data shows that the education level of the fishermen ranges from elementary school (SD) to college (PT) (Table 2). Fishermen with elementary school and high school (SMA) education levels have the same percentage, namely 41.30%. The education level of fishermen who have basic education including elementary school (SD) and junior high school (SMP) is more dominant (54.34%) compared to fishermen who have high school and higher education (45.65%). This education profile shows a social picture of the lack of human resources in the small and traditional fisheries sector. This social condition can be an obstacle to the development of fishermen's fisheries businesses. Zuraidah & Saunabella (2018) wrote that the low level of education of fishermen illustrates the weakness of human resources in the fisheries sector and the low level of education tends to hinder the process of technology and skills transfer, impacting management capabilities and business scale.

Table 1. Age profile of junior fisheries fishermen (N=46)

Age category (year)	Amount (person)	Percentage (%)
<19	7	15.22
20 - 29	13	28.26
30 - 39	12	26.08
40 - 49	7	15.22
50 - 59	4	8.69
60 - 69	3	6.52

Source: Primary data 2022

Table 2. Educational level of primary fisheries fishermen-eldest (N=46)

Level of education	Amount (person)	Percentage (%)
Elementary school/equivalent	19	41.30
Junior high school/equivalent	6	13.04
High school/equivalent	19	41.30
College	2	4.35

Source: Primary data 2022

The julung-julung fishing group mostly consists of local residents whose main occupation is fishing and

only a small number whose main occupation is not fishing. The results of the study showed that 84.78% of respondents have a main occupation as fishermen. There are 6 school-age children (13.04%) who work as fishermen to help their parents who are the owners of the julung-julung fishing fleet and one person (2.17%) works as an honorary teacher (Table 3). None have a main occupation as a farmer, livestock breeder or civil servant (PNS). Working as a julung-julung fishing fisherman is the main job done by men and the main source of income to meet the family's economic needs.

Some of the julung-julung fisherman have side jobs and some do not have side jobs. As many as 23.91% of respondents have side jobs as employees in a traditional eucalyptus oil processing factory, 19.6% work as employees in a people's gold mine, 13.04% work as builders and 17.4% of respondents do not have side jobs (Table 3). Side jobs are carried out when the fishermen are not at sea due to natural factors. Income from side jobs is relatively small, conditional at certain times only.

**Table 3.** Main and secondary jobs of senior fish fishermen

Type of work	Main Job		Side job	
	Number of people	Percentage (%)	Amount (person)	Percentage (%)
Fisherman	39	84.78	1	2.17
Imam/Caretaker of the Mosque	-	-	2	4.34
Farmer/planter	-	-	4	8.69
Cattle/goat breeder	-	-	3	6.52
Civil Servant (PNS)	-	-	-	-
Elementary school teacher (honorary)	1	2.17	-	-
Student	6	13.04	-	-
Trader (kiosk)	-	-	1	2.17
Village Secretary	-	-	1	2.17
Builder	-	-	6	13.04
Eucalyptus oil factory employees	-	-	11	23.91
People's gold mine employees	-	-	9	19.6
There isn't any	-	-	8	17.4

Source: Primary data 2022

The productivity of small and traditional fishermen is influenced by local weather and sea conditions. Vibriyanti (2019) stated that small-scale fishermen have a high dependence on natural conditions, weather factors are a determining factor in fishing. Thoya & Daw (2019) emphasized that weather conditions greatly affect navigation, fishing activities, have costs and risks for fishermen to access fishing areas. The success of fishing is highly dependent on the efforts of fishermen and the abundance of target fish so that the decision to go to sea by coastal fishermen is always related to local space and time conditions. When the weather is not conducive, strong winds and large waves, fishermen cannot go to sea to fish. These conditions encourage fishermen to switch to doing part-time side jobs to earn income. When the weather and sea conditions are calm again, the fishermen return to their activities of catching julung-julung fish. The description of the main and side jobs of these julung-julung fishermen shows their dependence on julung-julung fish resources (*Hemiramphus lutkei*). Kusnadi (2020) wrote that the potential of fish resources and fisheries economic activities are the mainstay of coastal community life.

*Structure and division of tasks of fishermen in the julung-julung fisheries*

The structure of the top fisheries fishermen in each fishing fleet consists of Fishing Skippers and Masnait. Fishing skippers are fishermen who own fleets (fiber boats) and julung-julung fishing gear, while masnait are boat crew members (ABK) or auxiliary fishermen who help in operational operations. first-ever fish catch. There is no difference in social status within the julung-julung fishing group. The social relations between the fishing ravine and the masnait are based on family and kinship relationships. The masnait are not bound to the ravine by having to work on the day of fishing. If a masnait does not work, he does not get a share of the catch that day. There are no social sanctions given by the ravine to a masnait if he is not involved in fishing. Masnait who do not participate in fishing today can be involved again the next day. The social unity of the julung-julung fishermen is seen in the pattern of division of tasks and functions of each.

Law Number 7 of 2016 concerning the Protection and Empowerment of Fishermen, Fish Farmers and Salt Farmers explains the definition of owner fishermen and labor fishermen as follows, "owner fishermen are

fishermen who own fishing vessels used in fishing efforts and actively catch fish" and "labor fishermen are fishermen who provide their labor who participate in fishing efforts". This definition implies a very strict social separation in the working relationship between owner fishermen (jurangan) and labor fishermen. This is different from the social relations of the julung-julung fisheries fishermen in Ubung and Waelapia Villages. The social ties of the julung-julung fisheries fishermen do not describe a relationship between employer and labor, but as a complementary relationship in a community of julung-julung fisheries families for common economic goals between them.

The wages of the fishermen and masnait are obtained from the sale of julung-julung fish. The distribution of the proceeds from the sale of julung-julung fish is carried out with the principle of equality

and justice between the fishermen and masnait. There is a general agreement in the julung-julung fishing group regarding the distribution of results. A fishing boss gets two parts, namely as the owner of the fleet and fishing gear and as the driver of the fiber boat, while each masnait gets one part. Another agreement is that part of the proceeds from the sale of fish are also used for operational costs of fishing such as purchasing gasoline. The income earned by the fishermen in their position as fleet owners is always used for the maintenance and care costs of the fleet and fishing gear.

The Abyss fisherman And *mass* work together in the operation of fishing for julung-julung. There is a division of tasks between the boss and the masnait based on their experience and local knowledge. The division of tasks for fishermen in the julung-julung fishery is shown in full in Table 4.

**Table 4.** Division of tasks and functions of fishermen in the julung-julung fisheries

Position	Duties and functions
1. Fisherman's ravine	Driving a fiber boat
2. <i>Masnait</i> (ABK):	
a. Fish school monitor	Determining the location of the net deployment or fishing area
b. Net ring spreader	Untying the net rope
c. Net ring puller	Pulling the net rope onto the fiber boat
d. Net buoy puller	Pulling the net buoy onto the fiber boat
e. Net puller	Pulling the net body onto the fiber boat
f. Stone thrower	Throwing stones at a school of fish so they don't escape from the net cage
g. Fish catcher	Scooping, releasing and/or taking fish from the bag and/or those stuck in the body of the net
h. Swimmer/diver	Releasing a net that is caught on an object in the water column or on the seabed

Source: Primary data 2022

The fishermen always do their job as fiber boat drivers, controlling and directing the fiber boat from departure, during the fishing process until landing on the shore. The monitoring masnait is a person who has special skills in observing the presence of schools of julung-julung fish, ensuring the location of the net casting. The monitoring masnait always stands at the front of the fiber boat. The spreading and pulling masnait usually consists of several people, with the task of simultaneously spreading and pulling the net and/or scooping or taking fish from the net bag. The stone throwing masnait, whose job is to throw stones at schools of fish, aims to prevent the fish from escaping from the net cages. Masnait swimmers or divers are people who have diving skills, do not use diving equipment, are tasked with diving into the water column or seabed to remove nets that are caught on certain objects such as coral rocks. The activities of the julung-julung fisheries fishermen are shown in Figure 3.

*Local Knowledge and Habits of First-Time Fishermen*

The julung-julung fishery in Buru Regency has been going on for a long time and has been carried out for generations by coastal communities in the area. The first fish fishermen had local knowledge and customs acquired from their parents. Respondents stated that in ancient times their ancestors had unwritten rules which became a habit for catching julung-julung fish.

Julung-julung fishing practices in the study area are guided by a set of local rules and customary norms. When shoals of julung-julung fish begin to appear, the decision to initiate fishing is made by a designated village elder, who gives a single command to start the activity. The fishing process itself is carried out using a specific type of gear locally known as a julung net, which is traditionally recognized as the appropriate method for this fishery. Fishing activities are generally limited to the late afternoon, typically conducted before the evening call to prayer. In addition, access to fishing grounds is regulated through customary marine boundaries

(petuanan), where fishermen from neighboring villages are not permitted to enter or cross into these areas, including the defined coastal and sea cliff boundaries of the village territory.

At present, some ancestral customs related to julung-julung fishing are no longer fully practiced. However, a number of local knowledge systems and traditional understandings are still maintained and applied by fishermen. One important aspect relates to environmental cues that signal the presence or absence

of julung-julung fish. Fishermen recognize that when seawater becomes highly turbid and brownish in color – typically due to sediment carried by runoff from rivers after rainfall – schools of julung-julung fish tend not to appear. Under such conditions, fishermen usually refrain from going out to fish. In addition, natural indicators such as the loud calls of fish-eating birds at night are interpreted as signs of the presence of fish schools, often associated with abundant catches.



**Figure 3.** Activities of senior fish fishermen in the fishing area Caption: (a) Fishermen monitor schools of fish; (b-c) fishermen throw stones towards the shoal of fish; (d-f) fishermen pulling the net onto the boat fiber; (g) fish caught in net bags; (h. Fishermen releasing fish caught in the net; i. fishermen fish from inside the net bag using a scoop. Source: Team documentation, 2022amG

Fishermen also rely on their understanding of fish behavior and oceanographic conditions. Julung-julung fish are believed to move against the direction of sea currents, so fishermen adjust the direction of their boats accordingly when tracking fish schools. Silvano & Valbo-Jørgensen (2008), stated that water temperature is another important factor, as these fish are thought to prefer warmer waters. In the northern waters of Buru Island and Kaiely Bay, for instance, fishermen note that

sea temperatures tend to be warmer at night and cooler during the day. Julung-julung fish are also known to swim near the surface, although they may remain below the surface when water temperatures are relatively cold. This combination of ecological knowledge continues to guide fishing decisions and practices in the study area.

Fishermen in Buru Regency can fish for julung-julung every day, though this depends heavily on the presence of schools of fish. These activities may be

disrupted if environmental conditions become unfavorable due to seasonal changes or high waves. Julung-julung fish have the biological behavior of swimming in groups to look for spawning areas (spawning migration). The presence of these shoals of julung-julung fish is used by fishermen to catch them by casting nets in their route. The number of julung-julung fish caught was relatively higher during the peak spawning period, which was marked by almost all fish in biological conditions containing many eggs. Fishermen understand that julung-julung fish containing many eggs are a food ingredient with high nutritional value and a savory taste. This fishing effort is no different from the research results of Linggi et al. (2021) who wrote that julung-julung fish were caught by fishermen in the waters of East Nusa Tenggara when the fish were spawning. P2LD-LIPI (2018) also reported that schools of julung-julung fish in the waters of East Seram Island, Maluku were caught by local fishermen when the fish were spawning.

In the fishing process, the masnait who is tasked with monitoring the schools of julung-julung fish plays a role in ensuring the presence of fish and determining the right location to cast the net. A fish monitor has the ability to detect the presence of schools of fish through observation from a relatively long distance, without using tools such as binoculars. Signs of the presence of fish can be identified by the glow of light reflected from the fish's body when exposed to sunlight. The presence of a school of julung-julung fish can also be indicated by masnait by the fishy smell of julung-julung fish eggs which is different from other types of fish. Monitoring masnait can estimate the number of large or small fish based on the size of the school of fish. If the school of fish looks thick, moves slowly, and does not widen, this indicates that there are a lot of first-jung fish. On the other hand, if the school of fish is thin, the movement is fast, and wide indicates the number of first-fish is small (Oliveira & Chellappa, 2014).

Julung-julung fishing is always done in the afternoon. Fishermen have an understanding that julung-julung fish need relatively warm water temperature conditions to lay eggs and release their eggs at sunset until early morning. In general, the time used for the fishing process is approximately 2-3 hours from the start of departure until returning to the shore. After the fishing process, the fishermen must return to land before the Maghrib prayer time and the sound of the call to prayer is heard from the mosque in their village.

The habits of the julung-julung fishermen are local knowledge that is practiced daily. This local knowledge is empirical in nature which enriches the knowledge of the julung-julung fishermen, and can be the basis for sustainable management of the julung-julung fishery.

Sustainable management of julung-julung fish resources requires collaboration between local knowledge and scientific knowledge (FAO, 2021). Liliweri (2023), wrote that local knowledge is a skill possessed by a group of people from a certain geography, which is practiced and developed based on historical experiences that are cultural with their natural environment. Therefore, local knowledge and local habits possessed by julung-julung fishermen can be utilized to formulate policies for managing julung-julung fisheries.

Napitupulu & Sitanggang (2023) stated that small and traditional fishermen in Indonesia receive less attention from the government, are marginalized, and are not involved in fisheries resource management policies. Hibata & Amahorseja (2021) explained that fish resource management is all efforts aimed at ensuring that fish resources can be utilized optimally and sustainably for the welfare of the community. Effective fisheries management requires comprehensive data to support fish sustainability and conservation Stat et al. (2017). Purwanto et al. (2022) wrote that in the context of managing small pelagic fisheries, an appropriate and effective strategy is needed to maintain fish population stocks and optimize economic benefits. In relation to the julung-julung fish in Buru Regency, an optimal and sustainable management strategy for the julung-julung fish resources is needed for the welfare of the local community. The strategy and effectiveness of the management of the julung-julung fisheries can take place if national fisheries managers can directly involve fishermen and/or coastal communities because their existence is legally recognized as the main stakeholders who use and utilize the julung-julung fish resources (referring to Law of the Republic of Indonesia Number 1 of 2014 concerning the Management of Coastal Areas and Small Islands in Article 1 Point 30).

## Conclusion

The julung-julung fishery in Buru Regency is classified as a small and traditional fishing group, which membership is not limited by factors age and level of education. The structure of the julung-julung fisheries fishermen consists of the fishing boss and the fisherman, whose relationship between the two is based on family and kinship relationships. Masnait serves according to his knowledge and expertise. The local knowledge and habits of julung-julung fishing fishermen were obtained from their ancestors and have been passed down from generation to generation in julung-julung fishing. Local knowledge and local habits of fishermen can be utilized to formulate sustainable management policies for the julung-julung fishery in Buru Regency.

### Acknowledgements

We would like to thank the people of Ubung Village and Waelapia Village, Buru Regency, Maluku for their support and active participation in this research.

### Author Contributions

Conceptualization, ET and MT; investigation, MT and SU; formal analysis, ET; data curation, ET; writing- original draft preparation, ET, MT and SU; writing-review and editing, ET; visualization, ET; project administration, ET; funding acquisition, ET, MT and SU. All authors have read and agreed to the published version of the manuscript.

### Funding

This research did not receive funding from internal or external parties.

### Conflict of Interest

The authors declare no conflict of interest in the writing of this article.

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