

The North Borneo Iranun's community's ethnomedicine knowledge on marsh clam (*Geloina expansa*)

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Abstract. Hamdan DDM, Shah JMD, Gumpulan F, Foo J, Lukman KA. 2020. The North Borneo Iranun's community's ethnomedicine knowledge on marsh clam (*Geloina expansa*). *Asian J Ethnobiol* 21: 30-38. North Borneo is rich with natural resources that have boundless potentials for pharmaceutical product discovery that can lead to socio-economic development in rural areas as suppliers. Even though rich with cultural heritage and comprises of hundred sub-ethnic groups, detail documentation of ethnomedicinal knowledge in North Borneo from different ethnic groups is still limited and could disappear in no time. The ethnomedicinal knowledge of marsh clam (*Geloina expansa*) use in the Iranun community (respondents no.=28) living in Kampung Rampayan Ulu, Kota Belud in North Borneo were investigated and the concentration of iron, zinc and copper in different parts of marsh clam tissues were determined. In postnatal care of the Iranun community, many believe that marsh clam soup help boost nursing mother milk supply. Marsh clam is rich with micronutrients of iron followed by zinc and copper. The mantle organ has a higher iron concentration than other tissues. The traditional knowledge to heal blood clotting and bruises is topical application of marsh clam mantle organs onto the wound areas. Although participants have ethnomedicinal knowledge on marsh clam, they have poor knowledge of the nutritional benefits of this clam. Lifelong learning of the benefit of marsh clam is necessary from local health care.

Keywords: Galactagogue, indigenous knowledge, Iranun, maritime community, transdisciplinary

Abbreviations: ICP-OES: Inductively Coupled Plasma Optical Emission Spectroscopy; MFR 1985: Malaysia Food Regulation 1985

INTRODUCTION

In recent years, there is an increase of awareness on the importance of the preservation of indigenous knowledge especially for ethnic groups that did not have their own development of writing system until other societies who have writing system transfer this writing system to them (Kheng 1996; Embong et al. 2016; Mandal 2016). Some traditional oral stories have also been confirmed a narrative that help scientist understand past natural world catastrophic event and past history. The history of North Borneo is often records that come from outside people who has relationship with them as writing system is adopted late in this island and only aristocrats have early learning access. The old Malay World culture before Islam establishment in the Nusantara region was once heavily influenced by Indian cultures due to Nusantara region was once territories of Hindu empires such as the Srivijaya Empire and Majapahit Empire that had brought along the Sanskrit writings with them (Al Qurtuby 2013, Jalil et al. 2019). The Jawi literature development was modified from Arabic letters when some parts of the Malay World community had converted to Islam religion that was brought by Arab and India traders before Roman letters were used till today. There is also a suggestion that some

groups of people in tropical regions in the past might have written records but it was done on perishable items that got perish after hundreds of years (Keene 2019). This could be one of the factors why only a few well-preserved records from the old Malay world by locals are available. The political power and religion change throughout the Malay world timeline had caused record preservation to be neglected. However, apart from writing system, the diverse motif depiction by different ethnic groups in Borneo also has a tale in there to decipher. The flora and fauna motif that is used in the design are usually natural product resources which have the utmost importance in the life of its people and brings many benefits to its users. One of the importance of oral tradition preservations is the traditional ethnomedicine knowledge that can be used to cure illness in the synthesis of medical drug production (Poh et al. 2018).

The technology to extract substance from natural products is well-refined whereby specific substances from natural products can be extracted from a resource for clinical study to aid specific ailment (Peng et al. 2017; Hsieh et al. 2018). In contrast, the traditional medicine preparation of natural products will still retain all its natural substance composition when patient is treated. Nowadays, new innovation of pharmaceutical products had been

developed that can instantly be used during medical procedures by topical application rather than common traditional methods of ingestion such as consumption of snakehead and sea cucumber to enhance wound healing (Poh et al. 2018; Sahid et al. 2018). However it will take time to test all flora and fauna in the world to find the right cure for different types of disease symptoms. Thus many literature on pharmaceutical drug synthesis is based on natural products like common herbs in which the uses have been well-recorded from ancient times and are actually traditional medicine (Montaben 2017). In some societies, natural products that had been identified to have medicinal value is from the perception based on taste, smell, and visual (Narchi 2017). The documentation of traditional medicinal natural products is commonly are plant-based (Olawa and Demayo 2015; Rozaimie et al. 2019) whereas there is little documentation on animal use in traditional ethnomedicine knowledge especially in North Borneo. North Borneo is rich with terrestrial and marine animal diversity that even now there is often news of recently discovered species. Different ethnic groups in North Borneo could have different traditional ethnomedicine knowledge due to the local natural product resource availability (Rozaimie et al. 2019). In Borneo generally, ethnic groups are categorized as either inland people or maritime people.

A large population of North Borneo lives in the coastal areas. One of the ethnic group in North Borneo which is a part of maritime society is the Iranun ethnic group; who are a historical great enemy of the western countries that were trading in the sea trade route of Southeast Asia region and had branded them in their view as pirates (Warren 2002). There were no such local words for what the westerners define pirate during that century. The colonial power gave birth to the local word of piracy which is '*lanun*' in fear of Iranun great maneuvering skill in the sea. The Iranun ethnic group has a close political relationship with the Sultanate of Sulu before the colonial came to the Southeast Asia region. Most of what recorded in literature in relation to the Iranun ethnic group is about their history in the sea trade and political connections (Sajok 2018). Furthermore, there is a growing concern on the decline of Iranun native speakers and the possibility of losing some of their cultural heritage that is in dire need of preservation (Smith 2003; Pugh-Kitingan 2010; Amat and Abd Samad 2019). There are limited documentations of Iranun ethnic group ethnomedicine knowledge in North Borneo. Some of the Iranun ethnic group villages are near mangrove forests that have a wide distribution of natural products such as marsh clam (*Geloina expansa*). Marsh clam is a common food source of coastal people and we investigate if there are other uses of marsh clam in Iranun's ethnomedicine knowledge.

MATERIALS AND METHODS

Study area

Kota Belud district in Sabah state, Malaysia is a cultural hub (Amat and Abd Samad 2019) where there are many

different ethnic groups living harmoniously in this district such as the Dusun-Kadazan, Bajau-Sama, and Iranun ethnic groups. Iranun ethnic group is one of the minorities in Sabah that originated from the Southern island of the Philippines. Iranun communities are generally categorized as a maritime community because of their widespread reputation of a very skillful seafarer during their strong involvement in sea trade in the Southeast Asia region exceptionally (Warren 2002). The Iranun ethnic group settlement in the coastal areas of North Borneo is mainly located in Kota Belud district, Marudu Bay of Kudat district, and Darvel Bay in Lahad Datu district (Sajok 2018). One of the historical settlement of Iranun ethnic group is located in Kota Belud district, North Borneo. The Iranun ethnic group villages are usually nearby to coastal areas because they were very much involved in the maritime sea trade economically and politically (Sajok 2018). One of the Iranun villages in Kota Belud district is Kampung Rampayan Ulu, an area that is sheltered by mangrove forest (6°31'13" N, 116°31'00" E). It takes about an hour's drive to Kampung Rampayan Ulu from the capital city of Sabah state, Kota Kinabalu.

Perception and knowledge on marsh clam survey

Unstructured interviews were conducted during the first site visit to gather preliminary data for the construction of structured questionnaire. A questionnaire that was previously used in different locations and ethnic groups (Hamdan et al. 2019) was adapted according to the suitability of the study site with some addition and modification of multiple-choice questions based on preliminary data. The questionnaire language medium was the Sabah state Malay language dialect but some words were changed to follow the study site-local most common term used with the help of the locals. The questionnaire was divided into different parts. The first part was to record the socio-demographic and socio-economics of the survey participants that reside in Kampung Rampayan Ulu. Then respondents were given choice selection about their perception and knowledge on marsh clam (*Geloina expansa*) use as a food resource and natural pharmaceutical resource. The survey was distributed randomly to villagers each time when *G. expansa* was collected from Kampung Rampayan Ulu. A local villager had assisted researchers as a translator to avoid any miscommunication during interviews and survey distribution. The total number of survey participants was 28.

Marsh clam heavy metal analysis

A total of 20 individuals adult *G. expansa* in the same size shell range were collected once a month in November 2016, January 2017, and February 2017. *G. expansa* samples were obtained from the same *G. expansa* cage farmer in Kampung Rampayan Ulu. Samples were brought to the laboratory in a cool box (4° C) and washed clean. The abductor muscle, foot, gill, gonad, and mantle organs were dissected from *G. expansa* tissues and dried at 80° C in the oven. Dried samples were ground into a powder and homogenized with 5 mL 65% nitric acid (HNO₃) and left overnight. The next day 2 mL HNO₃ was added and heated

at 80°C for 4 hours until complete digestion. Cooled samples were filtered with 0.45 µm Whatman paper and diluted for heavy metal analysis by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) (Perkin Elmer Optima 5300DV). Blank solutions were also prepared with the same procedure for control.

RESULTS AND DISCUSSION

Socio-demographic profile

Iranun communities in Southeast Asia have been a devoted Muslim for centuries and some believe this is one of the reasons why they had strongly combat western enterprise during their prosperous sea trade era (Warren 2002). All the participants of the survey that was conducted in Kampung Rampayan Ulu, Kota Belud district belongs to the Iranun ethnic group who are Muslim in faith. The majority of the respondents were female (70.0%) and half of them were already married (Figure 1). Most of the women who had participated in this survey had at least completed secondary school and are working in the private sector. Only two women were homemakers with no income of their own and they had no formal education because they are already in the retirement age. There were four women who participated in this survey who work in the fisheries sectors and only one of them earn above the poverty line. On the other hand, we only managed to have one male participant who was working in the fisheries sector and who is above 60 years old during the survey was

conducted. The male fisherman's monthly income was below the poverty line (RM1215) for rural areas of Sabah. The self-employed three fishermen who are all above 40 years old did not receive any formal education and earn below RM500 monthly income. None of the respondents who participated in this survey were involved in the agriculture industry.

In this modern time, only a few people in Kampung Rampayan Ulu are working at sea as their main source of income. Moreover, fishermen who are below 40 years old prefer to buy marsh clam as middlemen rather than hunt these natural resources themselves due to the hard work and environmental conditions that had to be endured. In contrast, the older fishermen generation prefers to harvest the marsh clam themselves because they are more accustomed to the mangrove conditions. These similar situation has happened in communities living adjacent to mangrove areas in the Kudat district, North Borneo where many prefer to buy these natural resources rather than venture into the mangrove area (Hamdan et al. 2019). The perception of the Rungus community living in the Kudat area on which gender is generally associated with marsh clam foraging in a mangrove in Rungus culture is pointing out that it is a woman's work. Nevertheless in recent years, there is an increasing number of males who forage marsh clam in some Rungus communities due to the demand for marsh clam supply. However all survey participants from Kampung Rampayan Ulu are in agreement that marsh clam foraging does not focus on any gender.

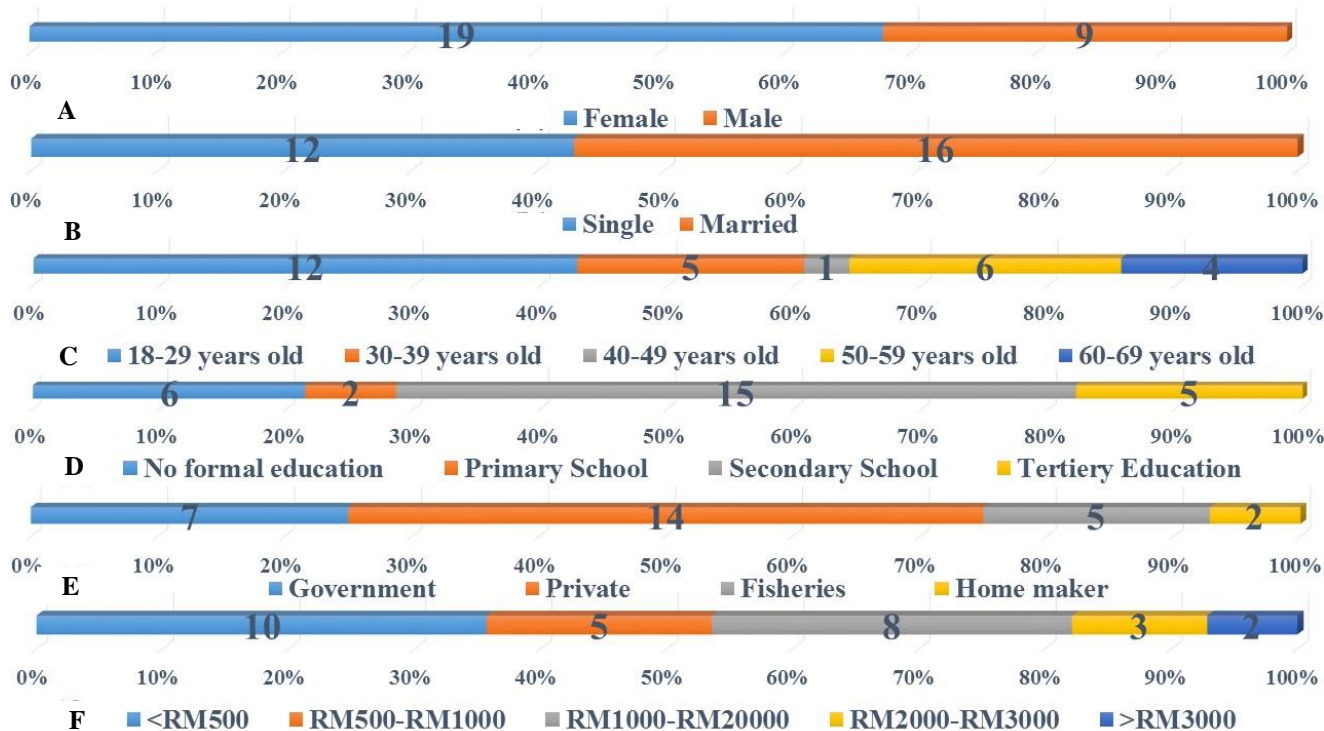


Figure 1. The sociodemographic and socio-economic profile of respondents (n=28) from Kampung Rampayan Ulu, Kota Belud district, North Borneo (n=28) who are Iranun Muslim in percentages of (A) gender, (B) marital status, (C) age, (D) education level (E) working sector, and (F) monthly income

Respondents who are employed in the government sector have more stability in their monthly earnings where all of them have more than RM1000 above of monthly income and all had at least completed secondary school education (Figure 1). Moreover there are only two representatives in this survey who had income more than RM3000 work in the government sector and are close to the retirement age. Like other parents in the world who want a better future for their child in life by getting a good education, Iranun parents begin to converse less with their children using their own native language at home to help their children to grasp the national language that is mainly being used in the basic education (Smith 2003). The younger generation finds it difficult to master their native language because at school they need to have a deeper comprehension of the national language of Malaysia and English language for better opportunities in furthering their study to tertiary education. This has raised concern in the decline of Iranun native speakers that can cause this language to lose as many languages had been lost these recent years. Initiatives had been taken to rectify this situation by providing Iranun language class to a primary school that have many Iranun students in the class. All the respondents living in Kampung Rampayan Ulu under the age of 40 years old had at least completed their secondary school education except for one participant (Figure 1). The decline of native Iranun speakers is a concern as it can disrupt the oral tradition of passing down indigenous knowledge to the younger generation. Thus, the documentation of traditional indigenous knowledge is important before it is lost forever.

Rural communities that solely rely on fishing as a source of livelihood face many insecurities and need to find different side income sources. The Sabah state government had developed rubber or oil palm plantation projects in collaboration with locals to alleviate poverty in rural coastal areas (Kodoh et al. 2016). This has shifted some of the main occupations of the locals who participated in this socio-economic development project from the sea to land because the main source of stable income comes from the rubber or oil plantations. In contrast, a small number of Rungus communities in Marudu Bay have also begun to work more in the sea than land. The Rungus ethnic group has always been associated with the agriculture sector and very little is known about their history connected to the sea. In recent years, an increasing number of Rungus communities participate in aquaculture projects (Hamdan et al. 2019). Socio-economic has been one of the key drivers that change the dynamics of community development in this modern world (Mansur and Idris 2016). There is a lack of socio-demographic and socio-economic data for the Iranun community in North Borneo. Most of the literature emphasis the cultural elements of this community (Amat and Abdul Samad 2019; Mulia 2010). Therefore it is difficult to gauge how long this marine community has gradually shifted to more land orientated in their current lifestyle and this study can provide data for future study on the Iranun community in North Borneo.

Mud clam locality as a food resource

Most of the survey participants are seafood lovers and no one has any allergies towards seafood consumption (Table 1). Only two respondents did not enjoy seafood and rather eat meat that is not from the sea. Marsh clam is not a staple food in this maritime society. However they do prepare marsh clam as the main dish and consume them once or twice per-month (Figure 2). Moderate clam consumption is recommended as bivalve are filter feeders which absorb nutrients from its habitats that can cause toxicity risk if the environment is contaminated with an excessive amount of minerals from the upstream activity caused by agriculture management and industrialization (Hamdan et al. 2016). Moreover, respondents do not have any tips to reduce toxicity risk from marsh clam consumption (Table 1). Marsh clam boil together with blood cockle perhaps can reduce contaminant risk were tips given by only two respondents.

The Iranun community in Kampung Rampayan Ulu is not a heavy marsh clam consumers. All respondents did not consume more than 10 clam per-meals which makes it at most 20 clams per-month per-person (Figure 2). On the other hand, the Rungus ethnic group who are not known as a maritime society in Kudat district, North Borneo eat marsh clam more frequently and consume more than the Iranun community in Kampung Rampayan Ulu (Hamdan et al. 2019). Marsh clam is becoming a popular cheap seafood snack by the roadside in North Borneo especially in a place called Salut which is outskirts from the capital city of Sabah state, Malaysia (Hamdan et al. 2016). These eateries offered grilled marsh clam where the entrepreneur grill the marsh clam with charcoal on top of straight zinc slate and sometimes add some herbs on top of the clam flesh. Thus, grilling has increasingly become a popular cooking method for marsh clam in the Iranun community in Kampung Rampayan Ulu compared to the traditional method of preparing marsh clam by marinating or the locals describe it as '*hempap*' (Figure 2). Marsh clam can also be eaten as raw meat (Table 1) and this is also had been observed in other cultures such as the Rungus people of Kudat district, Malaysia (Hamdan et al. 2019).

Table 1. Survey participant (n=28) perceptions on the marine resources as a food source and their life experience with marsh clam as a food source

	Yes	No
Seafood lover	26 (93%)	2 (7%)
Prefer to eat seafood rather than poultry meat	26 (93%)	2 (7%)
Allergic to seafood.	0 (0%)	28 (100%)
Like to eat marsh clam.	26 (93%)	2 (7%)
Eat more marsh clam than fish.	0 (0%)	28 (100%)
Enjoy marsh clam as main dish	20 (71%)	8 (8%)
Raw Marsh Clam ingest experience	16 (57%)	12 (43%)
Know any tips to reduce contaminant risk	2 (7%)	26 (93%)

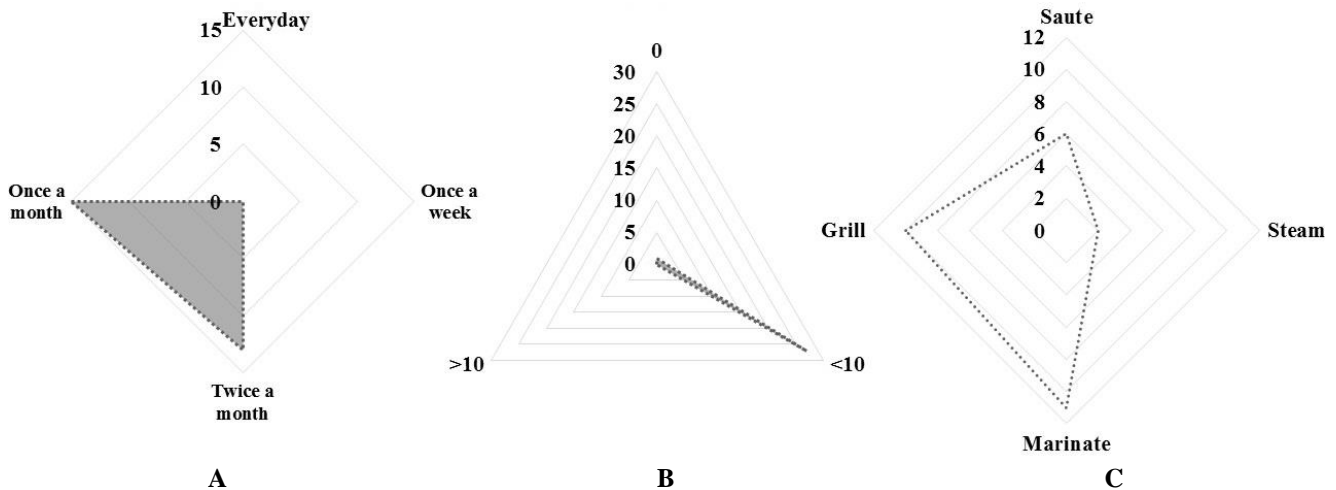


Figure 2. A. Frequency of how often do respondents have marsh clam for a meal. B. The no. of marsh clam that usually respondent eats per-meal. C. The common way to prepare marsh clam as a dish that was chosen by the respondents (n=28)

A galactagogue to aid nursing mother

Bivalve is a natural food product rich with micronutrients like iron and zinc which is important for the human body system to function properly. Iron is known to be important in the early development of a baby in a mother's womb. Thus, this increases expectant mothers' iron needs in their diet. Local food like marsh clam is not only a cheap protein source but contains many important minerals good for health (Hsieh et al. 2018). *G. expansa* that was harvested in Kampung Rampayan Ulu contains a high concentration of iron followed by zinc and copper (Figure 3). The iron, zinc, and copper concentration in total tissues studied did not exceed the permissible limit of Malaysia Food Regulation 1985 (MFR 1985). Thus marsh clam collected from Kampung Rampayan Ulu is safe to consume. Marsh clam is widely available for the locals to hunt in the mangrove forest anytime they want. All the respondents have informed that there is no specific season to harvest marsh clam in the mangrove forest and marsh clam is available all year round to catch.

Marsh clam can help supplement pregnant mothers and breastfeeding mothers diets who earn income below the poverty line than the over-reliance on conventional pharmaceutical supplements. Iron deficiency can cause anemia and local people can avoid anemia by occasional consumption of clams in their diet. However, all respondents have poor knowledge of the nutritional value of marsh clam that can benefit them (Figure 4.A). Local health care needs to promote indigenous functioning food like marsh clams to the locals as part of their diet as this natural food resource is more fresh, attainable, and cheaper. This also can help to promote the locals socio-economic

development by eating locally-produced. Furthermore, not many respondents thought that marsh clam was harvested near their village can pose any health risk (Figure 4.B). By making sure that marsh clams do not pose any health risk, the fisheries department can do regular monitoring on the seafood products and inform locals when there is red tide occurrence. Local Iranun community has knowledge of the impact of red tide on food safety.

Nowadays, all healthcare over the world strongly promotes mothers to breastfeed their babies as soon as birth because the early nutrient content in breastmilk is beneficial to newborn babies. Borneo people are very supportive towards nursing mothers and at an early stage, family members will give their support in finding ingredients of food resources that can boost milk supply especially during the post-partum period (Chang et al. 2015). The Rungus ethnic group people in North Borneo are very family orientated people and some still living in longhouses with extended families. The family elders of the Rungus for example help prepare a soup of marsh clam boil with papaya to help increase breastmilk supply for nursing mothers (Hamdan et al. 2019). Iranun community also uses marsh clam to increase breast milk supply but many are unsure of its effectiveness due to poor knowledge of the nutritional value of marsh clam (Figure 4). However this ethnomedicine knowledge is not widely known in North Borneo. For instance, a field study conducted at Kampung Sebayau, Marudu Bay in North Borneo found that the maritime community of Bajau-Sama ethnic group does not possess any traditional ethnomedicine knowledge on the use of marsh clam.

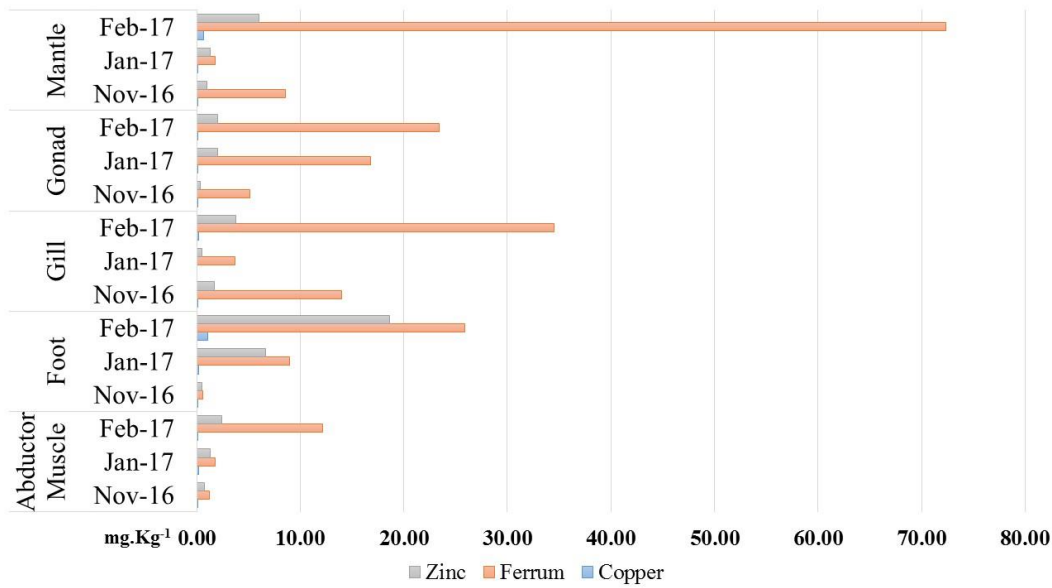


Figure 3 Distribution of zinc, ferrum, and copper mean concentration (mg.kg⁻¹) in different organs of an individual adult *G. expansa* that was collected from Kampung Ulu Rampayan in different months.

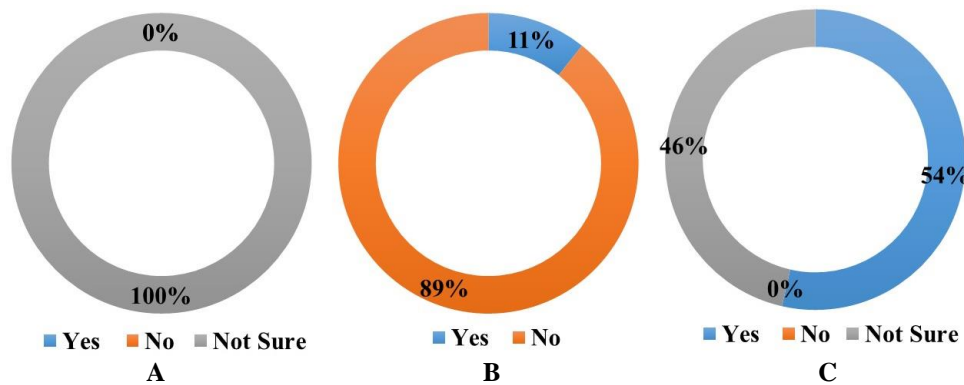


Figure 4. A. Percentages of respondents (n=28) know the benefit of the nutritional value of marsh clam (*Geloina expansa*). B. Respondent thinks that marsh clam can pose risk. C. Respondents who hold beliefs that marsh clam boost nursing mother breastmilk supply

The importance of postpartum care for mothers who had just given birth to a newborn is one common thing that people in the Southeast Asia region with different cultures and ethnic backgrounds hold the same belief. Traditional medicine during postpartum care is one of the indigenous knowledge that is best preserve among other traditional medicine (Olowa and Demayo 2015). Many different natural product sources are utilized for different needs in postpartum care (Rozaimie et al. 2019). Traditional knowledge of post-natal care is also important in making sure that nursing mothers have enough breast milk supply for newborn babies (Montaben 2017). Food resources that can increase breast milk supply for nursing mothers are also called galactagogue. Many traditional galactagogues that are used in the Asia region had been recorded but most

of them are from plant-based resources. There are limited documentations of animal-based galactagogue (Montaben 2017). Substance extract from animals is actually more easily absorbed for the human body as compared to plant-based. Similar to plants Zinc requirements for the early seedling growth development, Zinc is also essential in the early development and growth of a baby. Recently Zinc content in mother breastmilk is found not sufficient for the requirement of baby needs as mothers themselves need this mineral for their own body function (Aumeistere et al. 2018). Thus, this causes little allocation left of Zinc to breast milk. The type of food in mother diet is important to make sure that Zinc content in breast milk is sufficient especially for baby growth. Marsh clam is not only rich with iron but also one of the functioning food that is rich

with zinc micronutrients (Figure 2). A clinical study is recommended to further ascertain the merits of marsh clam as nutraceutical food.

Traditional medicinal knowledge of marsh clam topical application

Anticoagulants such as heparin and warfarin are medications that decrease the ability of the blood to clot. However, cautions must be taken to control the use of anticoagulants to minimize the risk of hemorrhagic complications. Heparin and other anti-coagulants substance compounds can also be extracted from natural products from marine animals like the bivalve (Ahmad et al. 2018). In these past decades, an increasing number of findings of different bivalve species have been identified as useful functional food for wound healing and anti-coagulation (Cesaretti et al. 2004; Mirshahi et al. 2009). Extract compound from bivalve tissues administrated in clinical studies as a supplement had shown quicker recovery of wound areas than the sole reliance on conventional modern medical practice (Peng et al. 2017). Many different substances can be extracted from clam tissues which provide many pharmaceutical properties in treating different kinds of ailments. The survival rate of specimens with Alzheimer's disease and cardiovascular disease had increased when *Geloina eros* was included in its diet regime (Hsieh et al. 2018). Organic practice in the poultry industry is without administrating livestock with antibiotics. Bacterial diseases can spread very fast between animals in dense conditions. This is one of the main challenges that organic farmers with limited rearing space is currently facing. Other alternatives than using antibiotics, animals can be given feed products based on supplemented organic materials such as the marsh clam that contain not only nutritional value but medicinal value content (Saili et al. 2019). Marsh clam can have a wider scope of function in the future not as food resource but as natural pharmaceutical products which is not only useful for human medicine but also livestock industry. The diversification of marsh clam functions can also help increase the livelihood of coastal people that hunt this wild food and also help sustain community based-management *Geloina* sp. aquaculture development (Hamdan et al. 2019).

The Iranun community in Sabah is related to the Maranao communities living in the Illana Bay off the southwestern coast of the Mindanao islands, Philippines where they were originally from (Amat and Abd Samad 2019). Ethnobotanical documentation on Maranao communities in Iranun people original homeland had been published. This publication had reported that one of the most common uses of this natural product is for the healing of cuts and wounds (Olawa and Demayo 2015). Many of the Maranao people's still rely on this pharmaceutical natural product than modern medicine due to their socioeconomic circumstances. This shows that indigenous knowledge provides the basis for grassroots decision-making (Senanayake 2006) for healthcare in their household. However, only plant-based natural products

were listed in the publication. In traditional medicine, not only plant-based products can be used for healing wounds but there are animals like molluscs which marsh clam belongs to is believed to have properties that can heal wounds that have been recorded in other cultures (Ahmad et al. 2018). Nevertheless, the ethnomedicine marsh clam usage for external application to heal blood clotting, and the wound had not been documented in literature. Iranun villagers that live in Kota Belud mangrove areas have shared one of the medicinal uses that some still practice today to get rid of blood clotting or bruise on the body are by topical application of raw marsh clam (figure 5.A). The part that is used for the traditional treatment to heal blood clotting and the wound is by using the mantle organ in marsh clam that looks like a layer usually covering other soft tissues in marsh clam. Mantle organ is usually closest to the clam inner hard shell side (Figure 5.B). Other organs are dissected and only the mantle organ that looks like a thin layer is applied onto the injured areas. Interestingly the mantle had a higher concentration of iron (Fe) in comparison with other organs except for the month of January 2017 (Figure 3). Iron is a mineral important for maintaining a normal process in the blood system. A clinical study will be needed to elucidate how effective this traditional medicine treatment for wound healing to bridge science and traditional knowledge together as an alternative for cheaper treatment for rural communities whose income is generally below the poverty line. Moreover, indigenous traditional knowledge and the basic science of it need to be promoted so that this valuable information from oral tradition won't be lost in the future.

Another aquatic living use for traditional medicine that has many believers in its effectiveness to heal wounds from surgery is the snakehead (*Channa striatus*) fish. The snakehead fish is locally known as *ikan haruan* and is especially sought out for mothers who had just delivered a newborn baby that had to undergo a cesarean section to assist in a fast recovery. Products from snakehead fish compounds have been innovated for external application and clinical use which have been proved to be effective rather than the traditional method by ingestion (Sahid et al. 2018). Sea cucumber (*Stichopus horrens*) a marine animal is sought after for traditional medicine use of people in the Southeast Asian region because it is widely known for its wound healing properties. Not just snakehead but sea cucumber products are also being rapidly developed for external application in clinical use (Poh et al. 2018). The prospect of pharmaceutical products innovation from marsh clam extracts for convenient topical application will increase the demand of this natural product and prompt the fisheries department to support the development of sustainable community-based marsh clam aquafarming that can help alleviate poverty in rural areas (Hamdan et al. 2019). In addition these pharmaceutical products are also a part of product that has similar concepts with cosmetic products objective which one of them is to diminish scar visibility.

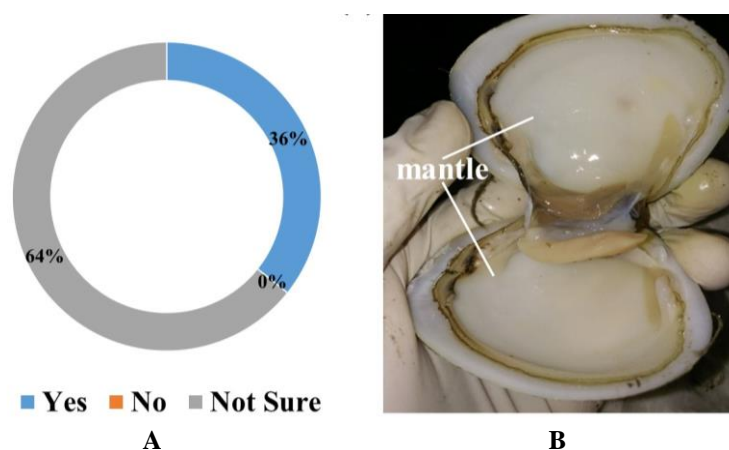


Figure 5. A. Percentages of respondents (n=28) who has heard about the traditional knowledge of *Geloina expansa* is able to heal blood clotting or bruises and hold this belief. B. The anatomy of *G. expansa* mantle tissues after other organ tissues had been dissected out from the shell

Historically Iranun ethnic groups are also land people as they also do subsistence farming and known as people of the lake where they originated from near Lake Lanao in the Philippine. But due to natural catastrophic disasters and different views in politics, a few seafarer Iranun ethnic groups open up settlements and government in some coastal areas in North Borneo to strengthen their political power in the profitable sea trade route of Southeast Asia region (Warren 2002). The Western countries were prompted to be involved in local politics in this region as Iranun marine military force is a force to be reckoned with and at sea sometimes war would ensue. Some casualties are common during war times. Therefore there will be a need for medicinal resources at hand to treat injuries. Unfortunately during that time there were very few records from the Southeast Asia region side apart from Western views. It is left to the imagination of how the Iranun army treats these casualties with and during that period of time the production of synthetic medicine of these days is not available yet. Hence, it will surely be from natural resources at hand. The uniqueness of marsh clam compared to other marine life is that marsh clam can live several days without water that makes it easy to transport anywhere because the clam itself keeps water in its shell. Moreover, marsh clam has its own antibacterial properties (Argent and Ilano 2015). The marsh clam is widely distributed in mangrove forests of North Borneo will, later on, be discovered by new settlers when they assimilate themselves with the new environment.

Marsh clam (*Geloina* sp.) in North Borneo is locally known as 'lokan'. The Rungus ethnic group have their own word for 'lokan' which is 'tagum' in native Rungus language. Interestingly, during the survey was conducted in Kampung Rampayan Ulu, inquiry of other local names for 'lokan' in the Iranun community resulted in all the respondents said they used the term 'lokan' to refer marsh clam. Nowadays, not only spoken language that was not successfully transferred to the younger generation orally (Smith 2003) but skill or knowledge of minority ethnic groups is also rapidly disappearing. One fine example is the

disappearance of gong making in the Iranun community in the Kota Belud district, Sabah, Malaysia (Pugh-Kitingan 2010). They are once acclaimed as the local gong maker that helps provide gong to this region. The gong is an important musical instrument use in many traditional ceremonies of many different ethnic groups such as Dusun-Kadazan and Bajau ethnic group. The skill of gong making ended in the Iranun community in the Kota Belud when the last gong making practitioners died of old age without any preservation of gong making production. Nowadays the popular locally made gong in North Borneo is only available in the Kampung Sumangkap in Kudat district which is also a part of the eco-tourism initiative. However, the material that is used for gong making these days are not the same as previous use in the older version due to the production cost.

Some civilizations have written records of the traditional medicinal value of their fauna and flora in the region they live that could be passed on to generations to come (Ahmad et al. 2018). However, many ethnics groups in Borneo islands do not have written records and this information are passed down orally to the younger generation that holds interest in the preservation of their cultural heritage. Preservation of oral tradition is important before the knowledge is lost as it gives the opportunity for future science research to integrate with indigenous knowledge for the benefit of all during this globalization. Marsh clam is one example of marine animal use in Iranun community traditional ethnomedicine knowledge at the moment that has high potential as pharmaceutical resources. North Borneo is one of the regions in the world that is renowned for its rich marine life diversity. More investigations are required to document in detail other marine animal use in traditional ethnomedicine of the Iranun community in North Borneo for the benefits of all especially the next generation. Understanding the worth of this marine animal to humans not just for food resources can facilitate socio-economic development and alleviate poverty in rural coastal areas when the demand for this natural product increases.

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