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AJR aims to become a platform for recommendations and development of frameworks, creations for programs and policies, and discourses about varied approaches in human resilience along the dimensions of individual, society, and human-environment interaction in the Asian context. As a multidisciplinary publication, AJR endorses human resilience as the focal point of intersections of the different fields of study. Note that albeit AJR's resilience is anchored on the concepts of preparedness, adaptation, flexibility, and recovery in times of changes and adversities, we are willing to transcend conceptually as long as human resilience remains the central point of discourse.

We welcome articles about resilience and social sciences; resilience and natural sciences; resilience and the humanities; resilience and education; resilience and health sciences; resilience and technology; and resilience, and commerce and industry.

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Editor's Note

Resilience is demonstrated in various ways and is manifested in different fields as reflected in the articles included in this inaugural issue of the Asian Journal of Resilience (AJR).

Mr. Jerone Avel S. Cansino kicks off this issue with an article on rice in Palaw'an labor culture in which he describes the evolving role of rice in the said indigenous people's group. This study elucidates further how the shift in the meaning ascribed to rice has influenced not only the lifestyle and livelihood patterns of the Palaw'an but also the children's attendance in school. In doing so, Cansino ushers us into the lives of the Palaw'an and allows us to see how rice is interwoven in their culture. More importantly, this study enables us to understand how the Palaw'an manifest resilience by adopting new ways of producing rice like irrigated rice farming, as well as finding alternative means through which they can earn money to buy rice. This study also bids us to ponder not only on the economic but also the educational implications of this changing significance of rice to Palaw'an.

In the second article, Ms. Alexes Mae C. Diaz describes the mercury level which still permeates in the abandoned mine site in Puerto Princesa City, despite its closure more than four decades ago. This study discusses further the probable health risks posed by mercury contamination. It also proposes possible programs to counter the debilitating effects of mercury contamination to safeguard the health of the residents in the area. It also recommends the use of mercury hyperaccumulating plants that may be helpful in rehabilitating the abandoned area.

The third article invites us to join the voyage of the fisherfolk in selected villages in San Vicente, Palawan, as they transition from fishing to tourism in an effort to adapt to the challenges brought about by several factors which have affected their livelihood. In this article, Mr. Mark Joseph J. Buncag documents how the fishers cope with the changing tides of livelihood. The study likewise offers recommendations to assist them to effectively shift from fishing to tourism-related activities taking into account sustainable development.

In the fourth article, resilience in the context of health is highlighted. Ms. Cathy Chu-Medina, Mr. Michael Angelo A. Legarde, and Mr. Jairus L. Katon do not only describe the health practices and lifestyle components of the university administrative personnel but also assess the risk factors contributory to non-communicable diseases (NCDs). This study strengthens the position that a healthy lifestyle fosters resilience against NCDs.

It is our aim that these articles find a niche in the growing body of knowledge in research, particularly on human resilience. Furthermore, it is hoped that these articles will inspire the readers to accommodate the different views interconnected by resilience in coping with the challenges brought about by the changes in the different aspects of life.

The publication of this issue has been possible through the concerted efforts of the reviewers, editors, and technical staff, to whom I am genuinely grateful. The support of the Palawan State University administration is likewise highly appreciated.

Jonalyn B. Villarosa
Editor-inChief

Rice in Palaw'an Labor Culture: Its Changing Significance to Consumption, Production, and School Attendance



Jerone Avel S. Cansino

Abstract

This study describes the role of rice as it causes the shifts that are happening in the Palaw'an labor culture as well as its effect to the students' attendance in school. Further, this study presents how the shifts affect the consumption and production patterns of the Palaw'an and identifies some opportunities that could be utilized to help them cope with the challenges they face. This study reveals that the place of rice in their culture has evolved from being a sacred and ceremonial crop to being a staple food source. This shift is connected to their new lifestyle and changes in their livelihood patterns. The shift contributed to the increase in the demand for rice and presumably added to their food insecurity which was seemingly not much of a problem before the shift occurred. Contributory to this problem are the challenges posed by the changing environmental conditions which resulted in the decrease in harvest of their crops. These consequences caused the shifting livelihood patterns of the present Palaw'an communities. The concept of income and the increase in demand for rice changed their labor culture. They adopted new labor activities to cope with the changing realities they now encounter.

Keywords

IP Education, Palaw'an, labor culture, *kaingin*, rice

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these areas which most of the Palaw'an used to occupy is now very limited.

1. Introduction

The Palaw'an, like the other ethnolinguistic groups in the country and South East Asia, have been practicing the remnants of the Neolithic practice of slash and burn agriculture. They refer to it locally as *kaingin*. This practice of swidden agriculture was observed by Macdonald (1992). According to Taha, Magbanua, and Apdon (2011), the Palaw'an believe that they must appease the spirits so that they could have a good yield in their crops especially their rice fields or their *kaingin*. They believe that these spirits and deities live in sacred places and are said to have influences on their daily lives.

At present, the Palaw'an employ different subsistence strategies to cope with the present challenges. Their lifestyle now is more sedentary as most of the communities who live near the lowland communities have learned lowland agriculture. Although they still practice swidden farming, they now do it differently. They no longer practice the shifting system of *kaingin*. Shifting is the process of leaving the parcel of land that was cleared and used for rice planting for it to regenerate; and then clearing another area for planting. Their *kaingin* now is using the cleared parcel of land repeatedly without the shifting. The swidden farming is now prohibited under the Republic Act 3701. Hunting and gathering are still practiced. However, hunting for wild boars has become difficult since they have retreated to the uplands and access to

The Palaw'an are identified to be festive individuals (Marquez, 2005; Taha, Magbanua, & Apdon, 2011). They have a number of festivals that they practice annually such as *mondeg*, *tabad*, and *lotlot*. *Mondeg* is a festivity that is practiced by the Pala'wan as a form of thanksgiving to the spirits. *Tabad* is a festivity that includes the drinking of rice wine. The term *tabad* refers to the wine itself and can also be used to refer to the Pala'wan celebration that includes the drinking of the *tabad* wine. *Lotlot* refers to the sticky rice variety that is cooked in bamboo. This food is a spiritual symbol for them because it is being offered to the spirits. Basically, these festivities are offerings to the spirits so that if they earn their favor, they would be granted a good harvest. If the spirits are not pleased, the opposite would happen. Their spirituality is heavily anchored on the beliefs of the spirits and the ultimate deity which they refer to as *Empu*.

Palaw'an is a geographically scattered indigenous people that is developing into subgroups but did not result in ethnogenesis or the creation of a new culture (Macdonald, 1992). According to the National Statistics Office as mentioned by Marquez (2005), their population had reached 39, 421 as of year 2000. The ethnolinguistic group speaks a variation of the Austronesian language. The Palaw'an came from a single protoculture like the Tagbanua, an indigenous group which occupies the uplands starting from the municipality of Narra up to the northernmost parts of Palawan (Fox, 1982 as cited in Villapa, 2017). The Palaw'an and the Tagbanua have similarities in their cultural practice and their language. However, there are also strong differences between them (Fox, 1982 as cited in Villapa, 2017; Ocampo,



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1985), which could be attributed to the long exposure of the Palaw'an to the Hindu-Indones and the Muslim culture.

When it comes to vulnerabilities, it is the Palaw'an of Bunog, Rizal that is highly vulnerable to the effects of climate change (Tanganon, Docto, Roa, Domingo, Fedillaga, Hechanova, & Natividad, 2015). They scored 4.6 in risk and only 0.06 in adaptation. This led to a vulnerability rate of 3.6. The Palaw'an observed that the weather became unpredictable which resulted in a 90% decrease in harvest, making the food supply of the Palawan challenging. Although the present study was conducted in a different locality, it reveals similarities in experiences of the possible effects of climate change to the Palaw'an labor culture.

For this study, the term "labor culture" is used as a reference on how the Palaw'an provide for their economic needs. This study did not use the term "livelihood" since the presentation touched cultural concepts such as how the acquisition of their needs is tied to their worldviews, beliefs, and spirituality. Their labor activities are largely influenced by their traditions and spiritual beliefs. The cultural significance of rice, which is central to their motivation to work and farm, is an example of this influence. The changing meaning of rice, as will be discussed, affected their labor activities. The term livelihood however, would only suggest a purely economic definition which would limit the context. Livelihood is taken only as a means of support for subsistence focusing only on production and consumption process and is considered a limited aspect under the umbrella of labor culture.

Rice has a significant role in the Palaw'an labor culture. Aguilar (2013) pointed out that rice was always associated with magic and the spirits in the precolonial Philippine culture. It was until the Spanish occupation that rice was adopted as a staple food. This transition from being sacred to being a staple food resulted in disenchantment and symbolic marginality. "Symbolic marginality" implies that in this context, rice lost its original meaning as its function changed. It was also mentioned that during the 1970s, the demand for rice increased and the supply fell short of it. This transition from magical and spiritual associations to being a practical staple food also happened to the Palaw'an context. Further, this transition is also associated with the existing food in/security issues among the Palaw'an.

Labor activities practiced by the Palaw'an were documented to draw associations with the labor culture and academic performance of the children who are enrolled in the mainstream program of the Department of Education. Describing how the changes in the labor culture and the environment and government policies affected the cultural patterns of the Palaw'an could contribute to the baseline knowledge about Palaw'an culture. This could also suggest implications on Indigenous People Education (IPED). The researcher focused on the labor culture in general and in the food production and consumption in particular and their implication to the school attendance of the children.

Abadiano (2011) stated that education is one of the crucial services that the indigenous people are deprived of. According to the June 2009 NCIP report as cited by Abadiano (2011), regions with considerable IP population have relatively low participation and survival rates in education. This crucial finding by the NCIP and Department of Education inspired this research. Indigenous people encounter challenges of formal education due to their living conditions (Abadiano, 2011). The concept that the indigenous people are being marginalized is also mentioned by Reyes,

Mina, and Asis (2017). According to them, aside from education, the ethnic groups subjected in the study have shown that they have fewer opportunities to access electricity, safe water, and sanitation (Reyes, Mina, & Asis, 2017). The idea of this research started on the concept that there is a need to identify the underlying reasons why the Palaw'an learners have difficulty coping with the demands of formal schooling particularly school attendance.

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This paper aims to describe the economic conditions of the Palaw'an, an indigenous people of Palawan. This gives a special focus on the meaning of rice and its relationship with the shifts that are happening in their labor culture. This study also relates the significance of rice to one basic aspect of the Palaw'an students' school condition which is their class attendance. Further, this study presents how the shifts affect the consumption and production patterns of the Palaw'an and identifies some opportunities that could be utilized to help them cope with the challenges they are facing.

2. Methods

Ten families from Barangay Malis and Barangay Salogon in Brooke's Point, Palawan participated in the study from April 2017 to January 2018. The researcher chose the families based on two criteria: (1) has a family member who performs poorly in his/her education and; (2) is a member of the Palaw'an ethnolinguistic group.

Realist ethnography is used as the method of the study. According to Creswell (2007), realist ethnography is a positivist kind of ethnography where the researcher keeps his distance from the subjects of his study to maximize the objectivity of data and keeps himself away from biases and subjectivity that could be possibly affected by being emotionally involved with the subjects of the study. Using realist ethnography, the researcher used the third person voice to establish objectivity.

Unstructured participant observations were employed on site. These observations were noted on observation notes and analytic memos. Thematic analysis was used to organize and analyze the data. Three themes about the rice and labor culture emerged i.e. the shift in meaning of rice from ceremonial to staple food, rice and school attendance, and rice and working children.

The observations became the basis for triangulation with unstructured and semi-structured face-to-face

interviews. The interviews were recorded and transcribed. The researcher conducted the interview twice with each of the participant. The researcher employed a research assistant who is also a Palaw'an to aid him in the linguistic aspects of the study. To address the ethical concerns of the study, informed consent was obtained from the participants, tribal gatekeepers, and barangay authorities. The researcher used aliases to conceal the actual names of the participants.

3. Discussion of Findings

3.1. The Description of the Locations

The study was conducted in four localities or sitio namely, Kilala, Tagpinasao, Babanga, and Rabok, within the two barangays in the Municipality of Brooke's Point. The two barangays (i.e. Malis and Salogon) are located in the south. These barangays especially barangay Malis is known to have a high Muslim population.

The Sitio Kilala got its name from the plant called kilala which has medicinal properties. The locality is mostly sloping as it is located on the foot of a hill. The residents there practice kaingin farming and also plant banana, root crops, and vegetables. There are also families who plant coconuts, although with a small yield. They also make charcoal that they sell to help them earn money. The population is mostly Palaw'an. The locality was introduced to Christianity by an American missionary and in the process, new forms of agriculture were introduced to them. Now, although a large majority are of the Palaw'an ethnicity, the religion that is practiced by the local settlers is a mix of the indigenous beliefs and the Christian (Protestant) religion. The sitio has an elementary school (Kilala Elementary School) of about 114 to 145 pupils. The school has six teachers who handle one multi-grade class and five mono-grade classes.

Sitio Rabok is located just below Sitio Kilala. It is mostly plain and the population is more heterogeneous. It is a

mix of lowland (non-indigenous culture) and the Palaw'an whose labor culture has deviated from those who live in the upland. They are mostly reliant on irrigated rice, on planting vegetables, and offering paid labor on farms. Some of them own land. Others are tenants who serve landowners by watching over their farms and getting a share from their harvest. The Palaw'an in this locality have also learned skilled labor such as carpentry and masonry by associating themselves with the lowlanders.

Tagpinasao is situated in Barangay Salogon in Brooke's Point, Palawan. The area is composed mostly of running hills. Banana and vegetables are planted along with root crops and few coconut trees. The residents in the area also plant vegetables which they sell for additional income. This sitio is separated from Kilala and Rabok by the Rabok River, which is one of the sources of irrigation water for the rice paddies in Barangay Salogon. Like Kilala, Tagpinasao was also reached by the Protestant missionaries. The locals actively participated with the Bible translation efforts that were done by the missionaries. The *sitio* has an elementary school that has seven teachers.

Babanga is around five to seven kilometers from Kilala. The area is also mostly sloping and residents there plant banana, tubers, and do swidden farming. They also rely on manual labor and charcoal making for alternative sources of income. The residents there send their children to either Malis Elementary School or Kilala Elementary School.

3.2. The Profile of the Participants

Table 1 presents some basic details about the participants. The names that are reflected in this paper are code names to hide the identities of the participants. Their age is only estimated as the older generations of Palaw'an are not aware of their real birthdates because they did not use calendar prior to contact with the non-indigenous culture. They originally did not practice recording of the dates of birth.

Table 1
Summary of Participant Profiles

Codename	Age(in year)	Sex	Religious Affiliation	Locality (Sitio)	Estimated Monthly Income (In php)
Freddie	(estimate)50-60	Male	Christian	Kilala	1,000
Tony	(Estimate)40-50	Male	Indigenous Religion	Kilala	2,000-3,000
Ansyong	(Estimate)60-70	Male	Indigenous Religion	Kilala	500
Leo(Lakot)	(Estimated) 60-70	Male	Indigenous Religion	Kilala	6,000
Nora	(Estimate)40-45	Female	Christian	Tipanon	500-10,000
Hilda	35-40	Female	Christian	Rabok	6,000
Ellen	35-40	Female	Indigenous Religion	Babanga	3,000
Mel	15	Male	Indigenous Religion	Kilala	
Wilson	17	Male	Indigenous Religion	Kilala	
Norma	30-35	Female	Indigenous Religion	Rabok	500-1,000



3.3. The Shift of Meaning: From a Sacred Crop to a Staple Food

Rice is long viewed as a sacred crop by the Palaw'an. When asked about it, Freddie one of the elders and at the same time a spiritual leader of the village in Kilala, told briefly a Palaw'an version of the 'Legend of Rice'.

It is a sacred food. It means... It is because of a story. It is said that rice is not just an ordinary food. In the history of our ancestors... I do not know if it is true... It is said that there was an infant or a kid that was chopped into small pieces. The bones were not taken out. They were included. Everything was included. Then they were sown into the fields. The parts of the bones became *pendinga*. It is the reason why when we plant rice, the grains that are not *pendinga* are not planted on the sides. For example, this is the whole field. We place it in the middle. In the middle of the swidden. That's why it is called *pendinga*. It is placed in the middle. The other grains are placed on the sides. There are foods or rice, however, that are black. Those are blood. It is just a story. (Freddie, a village elder)

Taha, Magbanua, and Apdon (2011) argued that rice that is harvested from the *kaingin* is the main crop of the Palaw'an today. However, this was not the case during earlier times. Rice, as suggested by Freddie, was a ceremonial crop. It was viewed to be a divine gift and eaten only on special occasions. It was not a staple food back then because root crops were primarily eaten by the Palaw'an.

The important element of the story is the infant or a child that was chopped into pieces and was sown into the field. Rice is regarded as a sacred crop because it came from the flesh and blood of the infant or the child that was chopped. Another important element is that the varieties of rice have their own varying statuses. The one they refer to as *pendinga* is the most highly regarded variety as it is planted in the middle of the field because of its fragrance and color. It is believed that this variety came from the bones of the child. These varieties are important to be noted because each variety has its own place in the ceremonies. The sticky variety called locally as *lotlot* is cooked in bamboo. Another variety is used as the main ingredient in the food they call *minelmel*. It is basically rice cooked on leaves of a certain plant. There is also a certain variety they use for making rice wine. However, the said beliefs about rice have changed.

Rice has become their staple food. However, this change of meaning for rice is not limited to the Palaw'an. This story of magical and spiritual associations of rice and its transformation into being a staple food is a phenomenon that has happened to the Philippines (Aguilar, 2013). Before the Spanish came to the Philippine shores, even a *datu* with many slaves would eat root crops and tubers at certain seasons (Scott, 1994 and Junker, 2000 as cited in Aguilar 2008). This suggests that rice was not really the staple food during the precolonial times. Similarly, the Palaw'an originally regarded rice as a ceremonial crop; but eventually transformed into being a staple food. The result of this transformation is the increase in demand and the struggle of filling in the deficiency of rice supply. Considerably, the shift of meaning of rice is an important variable in consideration for the issue of Palaw'an food in/security.

The demand for rice is not as much as what it is today. The abundance of rice during the old times was also significant due to the fact that forest clearing by *kaingin* was not prohibited then. Now, the Palaw'an are aware of the

government policies about clearing forest lands to be used for *kaingin*. When asked about the land they use for planting rice, Tony explained that they no longer clear virgin forests. They use the same parcel of land over and over again.

Yes. One cropping per year..... We cannot clear more land anymore. (Tony, a village elder)

This legislation is known as the Republic Act 3701. The effect of this law is seen by the Palaw'an to be a challenge to their food security. The yield of rice has supposedly decreased because the Palaw'an have already stopped deforesting new lands. *Kaingin* does not undergo shifting now. As a result, the nutrients in the soil are exhausted due to repeated use. The village elder named Ansyong confirmed this.

That. Yes. We were not used to buying rice from irrigated rice fields because it is better with how it used to be. It is hot nowadays. That is the reason why we do not eat rice from the irrigated fields before because we had it (*kaingin*) back then. But we do now. Luck is not good for *kaingin*. It may be because the soil is always used. It is being cleared over and over again and all the nutrients went down. That's the reason why our land is weak now. (Ansyong, a village elder)

The statement above reflects Palaw'an worldview and the current realities about how they view rice not only as a food but as part of their culture. The first part of the statement illustrates the current reality that rice is now bought and that the proceeds from irrigated rice supplements the demand of the Palaw'an for rice. Another thing that could be seen in the above statement is that the Palaw'an did not resort to this practice (irrigated rice planting) in the past because the swiddens could provide enough rice. The concept of good fortune that was mentioned by Ansyong also referred to their spirituality. In the worldview of the Palaw'an, the spirits play a central role and the appeasement of these spirits has everything to do with the fortune of their crops.

The statement above is also consistent with the findings of Tangonan et al. (2015). Even to the elders, it is evident that the weather pattern at present is different from what it used to be. This along with pests is seen as the reason for their poor yield. This poor yield is one thing. Another thing is the increased demand for rice due to the shift in the role of rice in the food preference of the Palaw'an. To understand the magnitude of the effect of this phenomenon to the Palaw'an, it is important to take careful note of the role of rice in today's Palaw'an culture.

Rice is an important crop for the Palaw'an. This theme is consistent with the rest of Southeast Asia. It is either viewed to be sacred or a status symbol. As directly stated by Freddie below, the Palaw'an presently view rice in a wholly new context.

As you have said, aside from rice, we have a variety of food. We have bananas, cassava, sweet potato, and yam. We have yam. One of its varieties is *talas*. We have lots of food. I cannot mention it all, but rice is the most important. (Freddie, a village elder)

The statement above shows an important concept on how Palaw'an view rice as a staple food at present. However, it should be borne in mind that the status of rice as a staple food is only a product of modernization. It is said that in the

past, rice was only eaten during special occasions. However, today this has already changed.

It has already changed. It changed a lot. I asked my older brother while we were talking: 'How different is our way of life today?' He said: 'It changed a lot.' What is it? 'Like our food. In the old days, our parents fed us with crops (cassava, banana, yam). Now we eat rice more often. It just changed. Isn't it?' (Freddie, a village elder)

Palaw'an nowadays treat rice not as a ceremonial food but food that is expected to be eaten on a daily basis. Using food and rice interchangeably points out to this fact. For example, Leo used the term *pagkain*(food) to refer to rice.

We wait for the bananas to become ripe. That's what we eat. If you do not have food (rice) and you have cassava, you eat it instead. (Leo, a village elder)

The nuances of the Palaw'an language could be seen in the statement above. It could be reflected on how the term "food" was used. In the original translation they refer to rice as *pagkain*(food) and they refer to bananas and tubers as alternative foods. This detail needs to be understood because it could serve as an evidence on the role of rice in the consciousness of the Palaw'an. This phenomenon was also observed by Aguilar (2008; 2013). Rice is considered as the most important part of every meal of a Filipino family. In the ethnographic analysis conducted by Aguilar (2008), the interviews reveal that rice is a defining element of a Filipino meal. This is also now evident among the Palaw'an. The linguistic nuances of the Palaw'an with reference to food (*pagkain*) is more associated to rice compared to other foods.

The shifting role of rice has its effects on the *Palaw'an*. As mentioned by Freddie, the role of rice has changed. From being a sacred and ceremonial crop, it evolved into being the food eaten on daily meals. The statement of Leo below shows that other foods are less preferred.

Eating only banana and cassava is unappetizing. (Leo, a village elder)

Historically, rice is produced from swidden fields or *kaingin*. However, because of the increased demand brought about by the new preference of the Palaw'an with regard to their staple food, *kaingin* became insufficient to support the daily rice demands. Nora's statement below reflects this concern.

It (food) is not enough... Actually, we don't have rice fields (irrigated)... *Kaingin*? It's not enough. (Nora, a mother)

This was supported by the statement of Leo below. Because *kaingin* is a matter of luck... unlike irrigated rice. (Leo, a village elder)

Providing food for the family is the objective of every economic activity of the Palaw'an. Income, a new concept introduced to the labor culture, is now visible. The sources of income come from selling products such as banana, root crops, charcoal, Agathis, and wood carvings. Another source of income that is emerging comes from working on rice paddies, coconut plantations, rice mills, carpentry, and construction jobs, and employment on

stores in the town. Their labor culture was traditionally dominated by swidden farming, hunting, and gathering for subsistence. The increase in demand for rice and the changing economic situations within and outside the community affected the traditional labor activities of the Palaw'an. Thus, the concept of income-generation through other activities.

We really look for a source of income. We look for income so that we can improve our living conditions... Like sending our children to school... That is what we are now. We have changed a lot... We were civilized by folks from the plains. (Freddie, a village elder)

The concept of spending is introduced to the Palaw'an. According to Freddie, much of their income is allocated to food. He said that it is even possible that they spend everything on food.

These days, even if you divide (the income), majority goes to food. We would even spend it all on food as much as possible because it is the primary problem of humans. If there is no food, you cannot do anything. (Freddie, a village elder)

Food expenditures are associated with rice and on several occasions, with viand. They need to buy rice because the swidden could not provide enough of it for the whole year. In just a few months after the harvest, they need to rely on the commercial rice that is sold by commercial dealers. It has come to a point that children are picky about what they eat because they are ashamed of eating food other than rice in school. This is exemplified in the statement of Freddie below.

We eat it in the presence of other people when our prepared meal is *kulando*(an alternative to rice). The reason that food or rice is needed to be brought is we need to eat rice. That is the reason why some Palaw'an stopped going to school. I was laughed at in school because I do not have rice for food. (Freddie, a village elder)

One of the challenges of the Palaw'an is related to their food production. Primarily, it is because of the effects of the unpredictable weather patterns that cause the low yield of rice. Further, new demand for rice as it is now treated as a staple food is another challenge. The effects of these shifts are best manifested in the new features of the labor culture of the Palaw'an. These exemplify how the Palaw'an adapt to the challenges they face. Their adaptation is shown in their being able to accept the concept of income. Consistent with the observations of Tangonan et al. (2015), these are the ways in which food (in)security affects their lives.

3.4. Rice and School Attendance

One important concept that needs to be understood is that the effect the changing meaning of rice for the Palaw'an has reverberated to the pupils' performance in school. The schools are usually far from their homes; hence, they need to bring their lunch with them. Although the demand for rice has increased due to its shift from being ceremonial to being a staple food, the supply has steadily diminished due to environmental reasons. This is also presumably



a consequence of prohibiting the practice of *kaingin*. One consistent theme from the responses of the participants is that their supply of food is not enough for their needs. Although they have alternative food sources such as bananas and tubers, their children would think twice about bringing them as their lunch because they are embarrassed. The behavior of the pupils towards the alternative foods could be reflected in the statement of the participants below. The following are responses to the questions regarding the willingness of the children to go to school.

That, Sir (referring to school absences), in cases we have no rice; but if we have, they do not skip school. My son. He wants to go to school. I told him: 'You might get sick. You will be hungry there'. If someone gives you food... Although during our time, someone would always give us food. If we do not have meal, someone would give us. (Nora, a mother)

Nora's statement is another manifestation of the language nuances of the Palaw'an in reference to food. Nora tells about her children's willingness to go to school even though they do not have food (*pagkain* the original translation which she refers to rice). This is also true for Hilda. Just like Nora's, Hilda's children skip school because of having no rice to bring for lunch.

It is because we have no rice (a response to the question on why her child skips school often). It is already late in the morning and we have not bought a thing. I also told Ma'am yesterday that maybe tomorrow they could go to school. (Hilda, a mother)

It is also true to Ellen's case. She said that her children are ashamed to eat boiled bananas for lunch.

I tell them that: 'You should pursue your education. You should strive.' They do not like to eat banana. I told them if we have banana, it is fine with us to go to school. They say they are ashamed of it. (Ellen, a mother)

When asked about why the Palaw'an pupils skip school when they have no rice when banana and root crops are still available, Freddie directly answered that they are ashamed to bring lunch that is not rice. "The reason is that we are embarrassed", he said.

Apart from this feeling of embarrassment, school attendance may also be affected by illness due to malnutrition. According to Albert (2016), one out of three primary school-age children fails to attend school because of illness. Among the indigenous people, food insufficiency could lead to malnutrition and other health problems. It was also found out in the same study that 3% of children under five years old are stunted and 5% of them are underweight. This issue is also related to one of the perennial problems of Philippine education namely the problem of non-participation and dropout (David & Albert, 2012). Dropping out is seen as a major concern for Philippine education. Abadiano (2011) claimed that there is a correlation between the indigenous people's population and the high dropout rate. This finding of Abadiano (2011) and the result of this present study, although still inconclusive, could shed light on the concern of improving the quality of the public school education of the country.

3.5. Rice and Working Children

When pupils think that their parents are having a hard time providing for the family, their motivation to attend school could be affected. This is seen in the statement of Norma below.

Yes, at least I want them to finish (school), the two of them. Now she (referring to her daughter) is married. She does not want to study. She said: 'I will drop school. I will help you instead. I will rather work in the town'. (Norma, a mother)

As stated above, the parent is willing to send her child to school. The child however, has a different thing in mind. She wants to help her parents. Implicitly, the child thinks that education is more of a burden for the parents. It is also true to Wilson in his statement below.

Of course, it could not just be a burden of my parents. It could not happen. It is no longer possible. (Wilson, a student)

It is also confirmed by Mel on the next statement. When he was asked why he skipped school for a long time last school year, he said:

I went there on the plains... Nothing. I worked on the rice fields... I dug a canal there... They paid me for it. (Mel, a student)

When he was asked what he did with the money, he said:

To be able to buy rice. So that mother can buy rice. (Mel, a student)

It could be seen that the availability and shortage of rice in a Palaw'an household is connected to the children's school attendance. The problem is not only about the embarrassment the pupils feel when bringing a packed lunch that is not rice. It is also somewhat related to dropping out and absenteeism because pupils choose to engage in paid labor rather than attend school to help their parents supply the needs of the family.

The Palaw'an pupils drop out of school to help their parents provide for the need of the family. The willingness of the parents for their children to continue their study are apparent because of the expectations of economic returns. Whenever a child decides to stop his or her education, it does not necessarily reflect the decision of the parents. Based on the participants' responses, the children give up school because they do not want to add any more burden to their parents.

Tindown (2016) showed that the Aetas also do not give much primary consideration on formal education because they are mainly concerned about providing food, which is a basic need. This finding also confirms that the poor school attendance of the Palaw'an in terms of formal education is related to the challenges they have regarding their economic status.

3.6. Manifestation of Resilience in Palaw'an People

Just like any other vulnerable groups, the Palaw'an are affected by the changing conditions of the sociopolitical landscape, the environment, and cultural changes. They view themselves as marginalized and they constantly see themselves as facing the challenges of surviving every day. The shift in their labor culture and the changes in the meaning of rice have posed negative effects on their food security and their children's school attendance. However, the Palaw'an by interacting with what they refer to as the lowlanders, have adopted new ways of producing rice. Aside from the new kaingin practice, they now practice irrigated rice farming. They learned it from working as farmhands with the lowlanders. In one of the locales of the study, the Palaw'an have managed to channel spring water towards this field. As a result, they were able to plant irrigated rice which could help them supply the necessary means to sustain the needs of the family.

Aside from planting banana, the Palaw'an are now capable of doing skilled labor, of selling their products and seeking alternative employment. They also plant new plants such as coconut and fruit trees. However, this appears to be inadequate. The interview data suggest that the farther an indigenous community is from mainstream urban culture, the more limited their adaptation practices are. This could be due to the problem of distance in transporting their goods to the market with terrain being a crucial factor. However limited their adaptive capacities are, the Palaw'an manifest a considerable level of resilience needed to survive the cultural, environmental, and economic changes they encounter.

4. Conclusion and Recommendations

The shift of Palaw'an labor culture is a product of the shift on how the Palaw'an ascribe meaning to rice. Consistent with Aguilar (2008; 2013) the change of meaning of rice affects its demand. This shift or the change of meaning caused the increase of demand leaving the supply lagging behind and affecting the food security of the Palaw'an. However, their traditional mode of acquiring it could not cope with this trend. This effect on demand then caused the Palaw'an to adjust their subsistence strategies to cope with the increasing demand for rice. The ethnographic data show that the change in subsistence strategies paved way for the entry of the concept of income among the Palaw'an. This has something to do with the availability of their funds since they are now able to sell their products and they are developing their version of spending as they try to adapt to a more modern lifestyle.

Other negative effects of the changing rice consumption and production patterns of the Palaw'an are presented. Its impact is not to be denied especially in the areas of attendance and survival of IPED students. The children are ashamed of being seen in public eating tubers, root crops, and bananas instead of rice during lunchtime which affected the attendance of the Palaw'an learners. Further, the importance they now give to rice as main staple food has become a contributing factor to school

absenteeism due to doing paid labor instead of attending school. This advancement of rice from a sacred and ceremonial good/crop to a staple food eaten on every meal on a daily basis challenges the DepEd IPED program e.g. improving the school attendance of the Palaw'an pupils despite the effects of the shifts in labor culture and significance of rice.

This study has the following implications for the implementation of the IPED program of the Department of Education. Promoting a positive environment to rectify the stigma on foods that are not rice such as bananas and root crops may be a potential step that will help in improving the Palaw'an pupil's school attendance. Topics related to cultural differences, geography, history, and health and character education may be utilized for this purpose.

The Department of Education may find ways in expanding the scope of the School-Based Feeding Program (SBFP) to pupils who are affected by the problems related to rice consumption of the Palaw'an (or other IP groups) by formulating new criteria on choosing the beneficiaries of the same program.

A study on a bigger scale may be conducted so that policymakers and implementers can take a complete view of the magnitude and the intensity of the problem and respond accordingly. They may conceptualize a strategic direction to alleviating the problem. Strengthening the alternative delivery modes of instruction may also be beneficial such as making self-learning modules for students that are affected by the problem related to the rice consumption of the Palaw'an. Perhaps, a kind of an Open School Program (that is now implemented throughout the country) can be implemented to accommodate indigenous students according to their needs.

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Declaration of Conflict of Interest

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References

- Abadiano, B.D. (2011, July). *Proposed strategic directions on indigenous peoples' education for the Department of Education: Roundtable discussion on indigenous people's education*. Philippines: Department of Education.
- Aguilar, F.V. (2008). *Rice in the Filipino diet and culture* (Philippine Institute for Development Studies Research Paper Series No. 2001-03). Retrieved from <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsrp0803.pdf>.
- Aguilar, F. V. (2013). Rice and magic: Acultural history from the precolonial world to the present. *Philippine Studies: Historical and Ethnographic Viewpoints*, 61(3), 297–330. <https://doi.org/10.1353/phs.2013.0015>.
- Albert, J. R. G. (2016). *What do statistics say about basic education in the Philippines?* (Philippine Institute for Development Studies Policy Note 2016-19). Retrieved from <https://dirp4.pids.gov.ph/websitecms/CDN/PUBLICATIONS/pidspn1619.pdf>.
- Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications. London.
- David, C. C., & Albert, J. R. G. (2012). *Primary education : Barriers to entry and bottlenecks to completion* (Philippine Institute for Development Studies Policy Note 2018-17). Retrieved from <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspn1817.pdf>.
- Macdonald, C. (1992). Protestant missionaries and Palawan natives: Dialogue, conflict or misunderstanding? *Journal of Anthropological Society of Oxford*, 23(2), 127-137.
- Marquez, A.B. (2005). *Reviving cultural heritage: A socio-cultural criticism on Kudaman, a Palaw'an ethnoepic*. (Unpublished Master's Thesis). Palawan State University.
- Ocampo, N. (1985). *Katutubo, muslim, kristyano: Palawan, 1621-1901*. Alemana: Bahay-Saliksikan ng Kasaysayan.
- Reyes C.M, Mina, C.D., & Asis, R.D. (2017). *Inequality of opportunities among ethnic groups in the Philippines* (Philippine Institute for Development Studies Discussion Paper Series No. 2017-42). Retrieved from <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1742.pdf>.
- Taha, H.A., Magbanua, V.C., & Apdon, J.V. (2011). The art of Palaw'an's rituals and their world view. *Palawan State University Journal*, 4(2), 11-23.
- Tanganon, L.F., Docto, R.M., Roa, S.A., Domingo, K.G., Fedillaga, K.M., Hechanova, I.P., & Natividad, J.B. (2015). Vulnerability of Pala'wans due to climate change. *Palawan State University Journal*, 8(2), 112-118.
- Tindown, D.C. (2016). The economic life of the Aetas of northern Philippines. *Khazar Journal of Humanities and Social Sciences*, 19(4), 97-109.
- Villapa, J.A. (2017). Katutubong pangagamot ng pangkat-etnikong Pala'wan sa Brooke's Point at Bataraza, Palawan. *Saliksik E-Journal*, 6(1), 57–84.

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Mercury Contamination and Community Awareness on the Abandoned Palawan Quicksilver Mine in Puerto Princesa City, Philippines

Alexes Mae C. Diaz

Abstract

The Palawan Quicksilver Mine Inc. was a former mercury mining company in Barangay Santa Lourdes, Puerto Princesa City which operated from 1954 to 1976. The generated mining waste that had been discarded into Purok Honda Bay, Barangay Santa Lourdes, was used to construct a mining port. This study aimed to determine the mercury level in the soil (the land surrounding the pit lagoon) of the abandoned mine site and the awareness of the nearby community about its state. The mercury concentration of the soil in the said site has an average value of 40.26mg/kg which is 805.2-fold of the Department of Environment and Natural Resources' standard mercury level in the soil, which is 0.05mg/kg. Majority (69%) of the 32 households who participated in this research reported that the mercury waste at the abandoned mine site is already non-persistent due to the long-time non-existence of the mining operations. Even if they experienced illnesses such as fever and flu, they did not attribute them to mercury exposure. However, based on the soil analysis conducted, mercury still persists in the abandoned mine site and continues to pose potential health risks. Information education campaign about mercury contamination and soil toxicity, including mercury testing, is recommended.

Keywords

mercury contamination, heavy metal, community-awareness, metallophyte, pit lagoon

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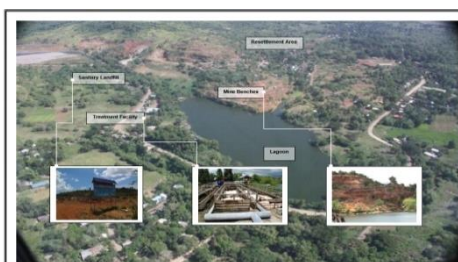
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1. Introduction

Mining activities produce abundant waste products containing high concentrations of toxic heavy metals which cannot be degraded into harmless forms (Dixit et al., 2015). Mercury (Hg) naturally occurs as a trace metal; however, when absorbed beyond minute concentrations due to human intervention, it is detrimental to plants, animals, and humans due to its high toxicity that greatly affects biological metabolism (R. Azevedo & Rodriguez, 2012).

The Palawan Quicksilver Mine Inc. (PQMI) in Barangay Santa Lourdes, Puerto Princesa City, Palawan, under the Marsman and Company organization, was a product of the pioneering efforts of Mary A. Marsman, the wife of Jan Hendrik "Hank" Marsman. The mining industry regarded her as the First Lady of Mining (Lichel Technologies, Inc., 2015). Aside from gold and copper mining organizations, the Marsmans established PQMI which produced its first mercury liquid metal from its mines in Tagburos, Puerto Princesa City, Palawan, in 1954 (The American Chamber of Commerce of the Philippines, 1963). After closing its mining operations, the PQMI left behind the following structures: 1) a 5-hectare pit lagoon (previously the open pit); 2) exposed pit benches; and 3) a port jetty. A portion of the mine area is now utilized as a

resettlement site and the remainder of the explored area is converted into a sanitary landfill and a treatment plant (Lichel Technologies, Inc., 2015).



Source: Lichel Technologies, Inc. (2015)

Figure 1. The current site conditions of the abandoned PQMI site

According to the study of Gray, Greaves, Bustos, and Krabbenhoft (2003), PQMI produced about 2,900 tons (t) of Hg, a moderate-sized Hg mine on an international scale. Gray et al. (2003) added that more than 2,000,000 t of mine-waste calcines (roasted ore) were generated during mining. They reported that the mine calcines had high concentrations of dissolved Hg. About half of this waste was dumped into Honda Bay to construct a jetty, which was used as a mining port (Gray et al., 2003). Mercury from the mines was shipped to Japan until 1975 when the company ceased mining operations. During PQMI's operation in the 60s and 70s, there were no stringent measures or guidelines by which mines operated and there was no rehabilitation plan after site closure. PQMI protected and maintained its rights and



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possession of the subject claim area after the suspension of operations (Lichel Technologies, Inc., 2015).

Adjacent to the PQMI flows the Tagburos Creek, which is used by some of the locals for domestic purposes. The flow from the creek then continues into Honda Bay, a few kilometers downstream from the mine site. The study of Gray et al. (2003) also revealed high concentrations of total Hg (43–660 $\mu\text{g/g}$) in the calcines while lower results were found in the sediments from the pit lake and Tagburos creek (3.7–400 $\mu\text{g/g}$). Methylmercury, which is the most dangerous form of Hg (Hong, Kim, & Lee, 2012), ranged from 0.13–21 ng/g in the calcines and sediments. The highest methylmercury content was found to be in the pit lake sediments, varying results from 2.0–21 ng/g. The high result was linked to the pit lake sediments containing more organic matter which will induce anaerobic process.

According to the residents, after decades of the mining company's abandonment, the land in the abandoned mine area was used for crop production. The crops were then sold to the market. The living tilapia fishes (*Oreochromis niloticus*) in the pit lake within the abandoned site used to be a source of livelihood of the community in Barangay Sta. Lourdes and even sold in the market until fishing from the pit lake was ceased. The mining's excavation activities created the pit, which as time passed by, became filled with rainwater and eventually became a lake. The DENR-MGB project manager of the abandoned mine site had the tilapia fish tested with its mercury content and it turned out to be positive with mercury contamination. A piggery also existed in the site as shown by the pig pens left behind.

DENR- Mines and Geosciences Bureau-IVB (MGB-IVB) launched a rehabilitation project in the study area entitled "Rehabilitation of the Abandoned Mine Site of Palawan Quicksilver Mines, Inc". This was in partnership with the City Government of Puerto Princesa according to the Memorandum of Agreement (MOA) dated October 29, 2014. The project area covers around eight hectares, including the pit lake/lagoon. There are three phases in the project activities: 1) pit lake outer perimeter fencing; 2) pit lake inner perimeter fencing; and 3) pit benches engineering and landscaping, slope protection and vegetation, and construction of three-meter "hike-jog-bike" pathway with park lighting.

As pointed out earlier, there were no stringent mining regulations at the time of the operations of PQMI. Further, heavy metals do not break down into simple forms (Dixit et al., 2015). In addition, Gray et al. (2003) found that the PQMI mine site contained sediments with Hg concentrations. Considering these premises, it is assumed that mercury still persists in the soil of the mine site. In view of the foregoing, this study which is anchored on the premise that metal contamination is a serious environmental problem that must receive proper attention and remediation, aimed to determine the persistence of mercury in the abandoned site. However, this covered only the surrounding pit lake, as this study focused only on the abandoned mine site. Awareness of the community about the state of the abandoned mine site and its effects on human health were also taken into account. It is hoped that this study will provide useful information about mercury contamination and community's perceptions about its effects to human health.

2. Methods

2.1. Soil Sampling Method

The soil sampling method used in this study followed the agricultural method from the United States Department of Agriculture (USDA). Fifteen spots for digging in a Z-pattern were made. The sampling pattern used the Z-pattern for more reliable results. The concept of the said pattern is to pass all the points in the land to maintain homogeneity and avoid bias. A thick wooden stick, and a plastic shovel were used for soil digging to avoid metal contact because mercury is a metallic element and the sampled soils would be analyzed for their mercury concentration. Each point has a slanting depth of 36 cm. The collected soils from the 15 different spots were weighed 1kg each before mixing all thoroughly as shown in Figure 3. Afterward, four samples which weighed one kilogram each were taken from the mixed soil. When transporting the samples from the study area to the laboratory, the researcher ensured that the plastic bags containing the samples were not closed to avoid trapping moisture as presented in Figure 2. The Atomic Absorption Spectroscopy (AAS) method used for mercury analysis was Environmental Protection Agency (EPA) 1996, 3050B method: Acid Digestion of Sediments, Sludges, and Soils, Revision 2.



Figure 2. The 15 collected soils from the abandoned mine site



Figure 3. Mixing of the 15 collected soils to homogenize the soil sample

2.2. Data Gathering Procedure

To gather the needed data on community awareness, the researcher surveyed three purok (small village) namely: Purok Matahimik (Eugelio Compound); Purok Centro-1; and

Purok Honda Bay. These communities were selected because of their immediate proximity to the abandoned mine site. A total of 32 households (one participant per household) participated in a semi-structured interview. The participants were household representatives. A guide questionnaire was used to identify the level of their awareness of the existence of the mine, its mining interest, their perception of the mercury level at the site, and awareness of mercury's effects on human health. The participants, particularly those who had witnessed the changes in their environment after mining, were also asked to describe their observations and experiences.

Convenience sampling technique was applied for the selection of the participants because of the lack of available community members to be interviewed, as well as the difficulty of access to other households. Only few participants were available during the interview. This situation could be linked to the crucial issue of demolition in Barangay Santa Lourdes, particularly the selected purok which would be directly affected by the said demolition. This demolition issue was due to the DENR-MGB's plan of rehabilitating the abandoned mine site by converting it into an ecological park. In order for the ecological park to materialize, the houses must be extended away from the abandoned mine site by creating a 20 to 40-meter buffer.

Purok Matahimik had a total of 173 households. Eugelio Compound, which was a part of this purok, had 20 households. However, only six households were interviewed because most of the houses were empty at the time of the interview. Purok Centro-1 had a total of 128 households; however, only 12 households were interviewed due to the absence of adults in the area. Most of the houses were also empty at the time of the interview.

Purok Honda Bay had a total of 417 households, but the survey covered only 14 households because most of the residents in Purok Honda Bay were in the innermost part of the area which was difficult to access. It was only in this purok that the fifth question regarding the port jetty was asked. The port jetty (a structure that projects from the land out into the water and is used as a place to get on, get off, or tie up a boat) is one of the structures still found in Honda Bay.

Aside from the 32 household representatives, two barangay officials were also interviewed through key informant interview (KII). Prior to the survey, the researcher paid a courtesy call to the barangay officials. The researcher also explained the objectives of the present study to the household representatives and concerned barangay officials who agreed to participate in the study. The data were analyzed through descriptive statistics.

3. Results

The soil sampled was from the soil surrounding the pit lake which is presently a part of the DENR-MGB project as the project's first phase. The samples were analyzed for their total Hg content. Total Hg pertains to all forms of Hg present in the sample.

3.1. Mercury Level of the Soil Surrounding the Pit Lake

Table 1. Soil Mercury Concentration in the PQMI Abandoned Mine Site

Sample of Soil	Mercury Concentration	pH
Soil 1	32.75 mg/kg	7.38 at 23.6°C
Soil 2	51.60 mg/kg	7.43 at 23.4°C
Soil 3	40.71 mg/kg	7.21 at 23.6°C
Soil 4	35.98 mg/kg	7.24 at 28.3°C
Average result	40.26 mg/kg at 7.315Ph	
Standard Level of Hg in Soil(DENR)	0.05mg/kg	
40.26mg/kg / 0.05mg/kg = 805. 2fold		

Table 1 shows the level of mercury in each soil sample, having 51.60 mg/kg as the highest while 32.75 mg/kg as the lowest. The result of all the soil samples exceeded the DENR standard level of mercury level in soil, which is 0.05mg/kg indicating contamination in the soil of the study area. The resulting value of 805.2 indicates 805.2-fold toxicity of mercury in the soil. As the soils tested here were topsoil (36 cm from the surface), this high result can be supported by the studies of Sterckeman, Douay, Proix, and Fourrier (2000), Feng, Li, and Qiu (2006), and Ettler, Rohovec, Navrátil, and Mihaljevic (2007) showing that mercury does not move downward through soil profile but primarily remains in the topsoil.

Aside from the mercury (Hg) concentration, pH was added to the parameter because based on McCauley, Jones, and Rutz (2017), the pH level has a relation to the metal availability in soil. At lower pH, the metal has less retention in the organic matter in the soil resulting in higher bioavailability for an organism; while at higher pH, the metal has higher binding with organic matter, creating less bioavailability for plants (McCauley, Jones, & Rutz, 2017). All of the samples were neutral indicating mercury's moderate bioavailability.

3.2. Community's Awareness of the Mercury Contamination

Barangay Santa Lourdes, one of the 66 barangays in Puerto Princesa City, has a population of 5,171 based on the 2015 Census. It represents 2.03% of the total population of the City.

The interviewed officials, who were the barangay secretary and barangay councilor, were both men, aged 23 and 38, respectively. These officials have been residing in Barangay Santa Lourdes for over 10 years at the time of the interview. They acquired knowledge about the contamination of mercury through the DENR-MGB whose project is the rehabilitation of the PQMI abandoned mine site. They were



aware of the problem in the abandoned mine site due to the past mining operations. They were not just aware of the mercury contamination but also understood the impact of mercury on the environment and human health. Thus, they have more capability in disseminating further awareness to the community. In addition, they may participate well in the future rehabilitation process.

Regarding the community members, among the 32 household representatives who participated in this study, 30 have been residing in the barangay for three to four years, while two have been residing for 10 to 30 years. There were three male participants while the rest were females. As for the age, the new residents (those residing for about three to five years in the community) were within the range of 32 to 35 years old, while the two old community members were 68 years old.

In terms of illnesses the community members had experienced, the participants identified cough, fever, and flu. Only one mentioned kidney problem and another one reported a respiratory problem. They did not consider the illnesses they experienced to be attributed to mercury poisoning. They have a perception that the manifestation of mercury exposure is through an occurrence of an epidemic disease, in which none occurred.

However, even common or usual health illness, despite not being high in degree may still manifest the risk of mercury on human health. Headaches, hearing loss, irritability, fatigue, and insomnia are also included in the symptoms of exposure to mercury according to B. Azevedo et al. (2012) and World Health Organization (2017). Further, mercury inhalation can also harm the kidneys. One participant reported that she experienced a kidney problem.

Table 2. *Illnesses Experienced by the Participants*

Illness	Frequency n=32
Cough, Fever, and Flu	30
Kidney Problem	1
Respiratory Problem	1

Although the illnesses mentioned by the residents were also included in the symptoms of mercury contamination in human, a proper blood testing or medical examination is needed to confirm mercury contamination of the residents. The health condition of the community should not be overlooked. Testing of Hg levels in the community members is important because of the high degree of contamination in the area, as presented in Table 1, as well as the possibility that these people have consumed fish from the pit lake or crops from the contaminated land.

Table 3. *Community Awareness on the Existence of the Mining Site and Mercury Contamination*

Questions on Awareness	Frequency n = 32		Percentage (%)	
	Yes	No	Yes	No
1. Are you aware that a mine site (PQMI) was situated before in Barangay Santa Lourdes?	24	8	75	25
2. Are you aware that mercury was the mining interest of the said mine site?	23	9	72	28
3. Are you aware of the adverse health impact of mercury?	15	17	47	53
4. Even if the mine site has been non-existent for many decades, do you believe that the mercury waste still persists up to present?	10	22	31	69
5. Are you aware that the port jetty here in Honda Bay was from the mine waste of PQMI?*	10	4	71	29

Note. *The fifth question is only for the 14 participants of Purok Honda Bay, Barangay Santa Lourdes.

Table 3 presents the knowledge of the community members near the abandoned mine site about the existence of the former mining company and mercury contamination.

Majority (75%) of the total interviewed households were knowledgeable about the existence of PQMI and most of them(72%) alsoknew that mercury was PQMI’s mining interest.

With respect to the negative impact of mercury to human health, more than half of the participants(53%) were not aware of its negative impact. Majority (69%)did not believe that mercury wastes in the abandoned mine site still persist.

As for the port jetty in Honda Bay, most (71%) of the interviewed households knew that the port jetty was from the mine waste.

Most of the residents interviewed from the threecommunities situated near the abandoned site are new residents (living in the area for three to four years) and were not present during the mine’s operation. On the other hand, tworesidents have been residing for 10 to 30 years.

During the interview, the researcher obtained new information from Purok Matahimik (Eugelio Compound) and Purok Honda Bay. At Purok Matahimik, during the early years after the abandonment of the mining site, one participant witnessed the collection of mercury from the abandoned mine site. It was done by scooping liquid mercury from the soil. Purok Honda Bay, according

to the residents, was a mangrove area before. The residents of Purok Honda Bay reported that when the mining operation stopped, mine waste was released to Honda Bay for the construction of the port jetty. They said that the construction of the port jetty was for tourism which was promoted by the former Mayor of Puerto Princesa City. The residents reported further that due to the construction of the port jetty, a number of marine species died. In addition, two residents noted that during the early years when the soil was still heavily contaminated by mercury, they saw shiny particles in the soil and observed that plants could not thrive in the area.

Most of the participants were aware that mercury has negative impacts on human health; however, no one was knowledgeable about the specific symptoms of mercury exposure to humans. The majority believed that the condition of the mercury at the abandoned mine site was already non-persistent because of the long-time non-existence of the mining operations.

4. Discussion

Human activities such as mining adversely affect the ecosystem resilience. Resilience in the context of environment is the ecosystem's capacity of tolerating disturbance and restoring itself within the threshold of the environment, which is called assimilative capacity. However, in the case of PQMI, this went beyond the threshold of the environment causing this extreme Hg pollution.

The results of the present study show the status of mercury contamination as well as the community's awareness of the situation. The 800-fold mercury level in the abandoned site exhibits the persistence of mercury especially when present in organic matter. Gray et al. (2003) revealed that the total Hg content in the mine calcines are soluble; thus, the mercury content at the site is still available for leaching into the surrounding environment, emphasizing its elevated concentration. The widespread leachate reaching the bodies of water poses risks to human health, not only to the residents who live near the abandoned mine site but even to those who live in neighboring villages. Although leaching from mine tailings is slow, according to Odumo et al. (2014), the migration of tailings themselves over the years may be the most important mechanism of Hg dispersal. The company's last operation was over 40 years ago. With this dispersal mechanism of Hg, the leaching possibly had spread widely. The possible widespread leaching of Hg to the neighboring villages could gradually exacerbate the contamination. Moreover, leaching can be enhanced as rainwater passes through highly permeable piles, thereby accelerating the spread of mercury in both the dissolved and particulate phase (Li, 2013).

Aside from mercury contamination through soil, leaching is also possible through crop consumption since grown vegetables in the abandoned mine site and tilapia fishes from the pit lake which are sold in the market.

The level of mercury in Barangay Santa Lourdes is extremely beyond the standard level; however, the residents living near the contaminated area lack awareness of the said contamination. They believe that

contamination results in the occurrence of an epidemic disease. They are not aware that the symptoms of mercury may be exhibited gradually or may even be unnoticed or taken for granted, such as headache and fatigue.

Another concern is that some of the community members still go fishing from the pit lake and plant crops, which makes the potential intake of mercury a cycle. Moreover, some of the residents continue selling these gathered resources (fish and crops) in the market thereby increasing the extent of the risk of contamination to the consumers. If information and education campaigns are not conducted immediately, the chain of contamination will continue, increasing the potential risks to other people.

Consideration of system resilience of human-environment relationship can play an important role in maintaining conditions that will sustain the provision of ecosystem services that contribute to human well-being (National Research Council, 2013). There is a need to rehabilitate the site to capacitate the ecology's natural ability to recover to make it resilient again. Based on the results presented, the Hg contamination of the land went beyond its ability to restore itself within the necessary time frame for the community to be able to utilize it again safely. Human intervention is needed for this rehabilitation to materialize.

5. Conclusions and Recommendations

This study emphasizes the persistence of Hg in the environment resulting in extremely high levels of mercury and highlights the wide dispersal of the Hg contamination not only through leaching but also through the food chain by the Hg-contaminated fish ingestions, covering not only Barangay Santa Lourdes but extending even to the adjacent communities. High levels of total mercury from the soil analysis show that even if a mining activity has already ended, heavy metals from mine wastes do not degrade in the environment. This study points to the risk of methylmercury, as the Hg from mine wastes is released to the organic matter of the environment.

Despite the high level of mercury in the soil from the abandoned mine site, the survival of some vegetation is still evident in the area. Most of the thriving plants are weeds since the area where the plants are situated was a disturbed environment. In the western part of the study area is an abundance of *Ipilipil* (*Leucaena leucocephala*) which belongs to the family of Fabaceae. Fabaceae belongs to the list of families dominating the plants that hyperaccumulate metals from the soil. However, this plant is not endemic in Palawan. Thus, this study recommends the analysis of certain surviving plants in the abandoned mine site for their mercury concentration which can be used to remediate the contaminated land. Further, existing mercury hyperaccumulating plants can also be used in the rehabilitation process of the area. These plants are *Castor Oil* (*Ricinus communis*) from the Euphorbiaceae family, and plants from the family of Brassicaceae. Fabaceae, Euphorbiaceae, and Brassicaceae are among the families where hyperaccumulator plants are found. These plants have the capability to grow in metal contaminated soils and



accumulate very high concentrations of metal in their systems. Although not as strong compared to other conventional hyperaccumulators, Vetiver Cogon (*Chrysopogon zizanioides*) can help in trapping mercury from the soil to their tissues.

With respect to the communities near the remains of the past mine, appropriate information education campaign (IEC) about the soil contamination and mercury toxicity is recommended. The community members will be the ones to be directly affected by the impact of the environmental problem. Dealing with environmental concerns such as this will require not only the local government's efforts, but the concerted efforts of the community as well. This study also recommends that mercury testing be conducted among the residents of Barangay Santa Lourdes and the adjacent communities to assess the community's health.

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Declaration of Conflict of Interest

The researcher declares that there is no conflict of interest involved whatsoever in this study.

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References

Azevedo, B., Furieri, L., Peçanha, F., Wiggers, G., Vassallo, P., Simões, M., Fiorim, J., Batista, P., Fiorelli, M., Rossoni, L., Stefanon, I., Alonso, M., Salas, M., and Vassallo, D. (2012). Toxic effects of mercury on the cardiovascular and central nervous systems. *Biomed Research International*, 2012 (949048), 1-11. doi:10.1155/2012/949048.

Azevedo, R., & Rodríguez, E. (2012). Phytotoxicity of mercury in plants: A review. *Journal of Botany*, 2012 (848614), 1-6. doi: 10.1155/2012/848614.

Dixit, R. Wasiullah, M., Malaviva, D., Pandivan, K., Sahu, A., Shukla, R., Singh, B., Rai, J., Sharmaw, P., Lade, H., & Paul, D. (2015). Bioremediation of heavy metals from soil and aquatic environment: An overview of principles and criteria of fundamental processes. *Sustainability*, 7(2), 2189-2212.

Ettler, V., Rohovec, J., Navrátil, T., & Mihaljević, M. (2007). Mercury distribution in soil profiles polluted by lead smelting. *Bulletin of Environmental Contamination and Toxicology*, 78, 12-16.

Feng, X., Li, G., & Qiu, G. (2006). A preliminary study on mercury contamination to the environment from artisanal zinc smelting using indigenous methods in Hezhang County, Guizhou, China: Part 2. Mercury contaminations to soil and crop. *Science of the Total Environment*, 368, 47-55.

Gray, J. Greaves I.A., Bustos, D.M., & Krabbenhoft, D.P. (2003). Mercury and methylmercury contents in mine-waste calcine, water, and sediment collected from the Palawan Quicksilver Mine, Philippines. *Environmental Geology*, 43 (3), 298-307.

Hong, Y.S., Kim, Y.M., & Lee, K.E. (2012). Methylmercury exposure and health effects. *Journal of Preventive Medicine and Public Health*, 45(6), 353-363.

Lichel Technologies, Inc. (2015). *Risk assessment and preparation of environmental management plan - Palawan Quicksilver Mines Inc.* Final Report for Department of Environment and Natural Resources - Mines and Geosciences Bureau. Philippines: Author.

Li, Y. (2013). Environmental contamination and risk assessment of mercury from a historic mercury mine located in southwestern China. *Environment Geochemical Health*, 35, 27-36.

McCauley, A., Jones, C., & Rutz, K. (2017). *Soil pH and organic matter*. (Nutrient Management Module No. 8). Bozeman, Montana: Montana State University Extension Publications.

National Research Council. (2013). *An ecosystem services approach to assessing the impact of the deep-water horizon oil spill in the Gulf of Mexico*. Washington, DC: The National Academies Press. doi: 10.17226/18387.

Odumo, B., Carbonell, G., Angoyo, H., Patel, J., Torrijos, M., Rodriguez, M. (2014). Impact of gold mining associated with mercury contamination in soil, biota sediments and tailings in Kenya. *Environmental Science Pollution Research International*, 21(21), 12426-35.

Sterckeman, T., Douay, F., Proix, N., & Fourrier, H. (2000). Vertical distribution of Cd, Pb and Zn in soils near smelters in the north of France. *Environmental Pollution*, 107, 377-389.

The American Chamber of Commerce of the Philippines. (1963). *Journal*. Manila: The American Chamber of Commerce of the Philippines.

World Health Organization. (2017). *Mercury and health*. Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/mercury-and-health>.

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From Fishing to Tourism: A Livelihood Transition in San Vicente, Palawan, Philippines



Mark Joseph J. Buncag

Abstract

The decline of fish production is one of the economic and environmental issues in Palawan where many households are highly dependent on fishing. This condition resulted in a decline in household income which prompted the fishers to shift to other forms of livelihood. This study documented the shifting of the fishers' livelihood from fishing to tourism-related activities, the reasons for the shift, the tourism-related activities that they engaged in, and the average household monthly income from fishing and tourism-related activities. Data were gathered from 291 fishers in Poblacion and Port Barton, San Vicente, Palawan, Philippines. Data gathering was conducted using household and key informant interviews. The participants who were owners or employees of fishing operations experienced a decline in fish production and income due to unfavorable weather. Fishing also consumed much of their time and money. These situations impelled them to shift to tourism-related activities. Results indicated that 139 (44.77%) participants shifted to tourism-related activities and earned a higher average monthly income compared to what they earned from fishing. These findings may provide information for concerned agencies in designing appropriate programs that may assist the fishers in coping with the challenges caused by a decline in fish production, thereby developing resilience and promoting sustainable development.

Keywords

shifting of livelihood, seasonal shifting, fishing, tourism-related activities

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1. Introduction

In the Philippines, fishing is one of the most common sources of livelihood. This is usually the source of income of the people that have access to the coastal area or aquatic environment. The fishers use different gears like traps, fishing nets, and hook and line. Some utilize trawl or poisonous substances and many others. The fish catch in the Philippines reached 26,510 million tons in 2015 (Barut & Garvilles, 2016). In terms of fish catch by sector, 66% came from large scale fisheries, 23% from small-scale fisheries and 1% from recreational fishing (Palomares & Pauly, 2014). According to Fabinyi (2007), there is an increase in the market value of live fish exports in the Philippines since 2000, with a yearly average of around US\$ 11 million compared to US\$7.2 million per year during the 1990s. The said increase was attributed to the increasing international demand from the industrialized areas of Asia.

The increasing demand for marine products in the global market resulted in the increasing rate of export in the Philippines, one of the leading countries in exporting high valued marine products. Presently, trading of live fishes is concentrated in Palawan which produced

55% of the live fish production in the country in 2002 (Padilla et al., 2003). Specifically, the focal area for trading in the province of Palawan is the municipality of Coron in the Calamianes Islands. In 2002, the estimated market value in the Calamianes was Php 265.1 million or approximately US\$5.3 million at an exchange rate of Php 51.5 per 1 US\$ (Fabinyi, 2007; Pomeroy et al., 2005).

In the country, especially in Palawan province, many households are highly dependent on fishing as a source of livelihood. The benefits of fishing are evident among the small-scale fishers. An individual grouper of a suitable size (9 cm to 12 cm length) can be sold for more than Php 2,000. This is a significant value in an area where fishers have an average income that is usually less than Php 5,000 each month (Fabinyi, 2007). Furthermore, the local market price ranges from Php 300 to Php 600 per kg of fresh groupers. In view of this, fishing might help boost the economy of Palawan. However, according to the small-scale fishers of San Vicente, Palawan, they do not have a stable income in fishing.

Based on the Community-Based Monitoring System (CBMS) survey in 2008, as indicated in the annual report of World Fish (2011), the number of fishers in the municipality of San Vicente was about 2,659. Of the said number of fishers, 23.88% lived in Barangay Poblacion, 19.14% in Barangay Caruray, 18.92% in Barangay Port Barton, 15.04% in Barangay Alimanguan, and 11.21% in Barangay Binga. The Municipal Agriculture Office



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(2016) reported that approximately 65% of the households were engaged in fishing in San Vicente, particularly in Barangay Port Barton and Barangay Poblacion. The said communities experienced a decline in fish production due to overfishing, too many fishers, use of illegal and highly destructive fishing gears, and mangrove cutting. The decline in fish production caused a decline in income and an increase in time spent in fishing, which prompted the fishers to shift from fishing to other sources of livelihood like tourism-related activities. Factors such as scarcity of fish, bad weather, and opportunities in other areas of agriculture are also stated in related studies (Brugère, Holvoet, & Allison, 2008). Further, Salagrama (2006) and Ray and Kumar (2015) found that fishers had been affected by monsoon and unstable source of income, which compelled them to find other modes of subsistence.

Similarly, in a community in Plateau State in Nigeria, people shifted to tourism activities from agricultural activities like farming and fishing because of a decline in income (Ijeomah, Korstanje, & George, 2012). This was also the case in Honda Bay, Puerto Princesa City, where tourism was the most preferred alternative livelihood by the community (De Boer, 2012).

The Philippines is an archipelago composed of 7,107 islands which offer many attractions for local and foreign tourists alike. Many tourism activities such as kayaking, scuba diving, hiking, sight-seeing, surfing can be experienced in tourist spots in the Philippines (Levine, 2015). The Philippines attracted 3,267,542 visitors from January 2014 until August 2014 (www.tourism.gov.ph) and reached 7.1 million tourists in 2018 (DTI, 2019). The tourism industry has a significant contribution to the economy of the Philippines, contributing up to 6% to the gross domestic product (GDP) as of 2012 based on the collected data of the National Statistical Coordination Board (NSCB) (PSA, 2012). The NSCB was able to obtain the GDP of the Philippines from 2000 until 2012 and reported that in 2018, the contribution of the tourism industry to GDP reached 12.7%, equivalent to Php 2.2 trillion (PSA, 2019). The NSCB measured accommodations, food and beverage serving services, transportation services (land, air, and water transportation services), travel agencies and other hotel and tour reservation services, entertainment and recreation, shopping, miscellaneous, and other products. The tourism industry also provided more jobs in the Philippines. As of 2009, the statistics from the travel and tour agencies show that 67,974 employees were hired and worked under the tourism industry (PSA, 2012). In 2018, the tourism industry contributed to the employment of about 5.4 million people which was higher by 1.8% than the number of those employed in the tourism industry in 2017 (PSA, 2019).

Tourist arrivals in Palawan recorded 1,809,880 tourists in 2018 which was 21% higher compared to 2017 with 1.4 million tourists (Ibañez, 2019; Reduble, 2019). There were 35,050 tourists in San Vicente in 2018, which was 35% higher compared to the tourist arrivals in 2017 (Reduble, 2019). The influx of tourists to San Vicente has a significant contribution to its economy. The setting up of the San Vicente Airport contributed to the employment opportunities where it absorbed more than 200 employees from the local community and it also sped up the increase of the number of business establishments (Municipal Tourism Office, 2019).

Several studies (e.g. Truong, Hall, & Garry, 2014) report that people regard tourism as a means of poverty alleviation and an alternative livelihood for fishers (Carter & Garaway, 2014; Porter & Orams, 2014). However, to the best of the author's knowledge, there is scant literature on livelihood transition from fishing to tourism-related activities particularly in the municipality of San Vicente. The present study strives to describe the economic impacts of fish decline in the said locality. Specifically, this study determines if there is a shift of livelihood from fishing to tourism-related activities for the last five years, the reasons for the shift of livelihood, the type of shift, the tourism-related activities that the participants engaged in, and the average monthly household income from fishing and tourism-related activities.

The data gathered can be used in determining how the fisherfolks cope with the current realities specifically the decline in income caused by the decline in fish catch, and in identifying appropriate actions to be undertaken.

2. Methods

The present study mainly used descriptive research design with mean and percentage as statistical tools.

This study was conducted in the municipality of San Vicente, Palawan, Philippines, particularly Barangay Poblacion and Barangay Port Barton. The municipality of San Vicente is located in the northern part of the province of Palawan. With a total area of about 4,361 hectares, Barangay Poblacion (10°31'01"N 119°16'09" E) is approximately 186 km away from the capital of the province, Puerto Princesa City. Out of five puroks of Barangay Poblacion, only the following were included in this study: Panindigan, Rosal, and Sampaguita. Purokis a division or zone in a barangay in the Philippines especially in rural areas. These puroks comprised 473.4 hectares equivalent to 10.8% of the total land area of the said barangay. Barangay Port Barton (10°26'31"N 119°06'56" E) is 25 km southwest of the Poblacion of San Vicente and is more or less 120 km from Puerto Princesa City. Out of seven puroks of Barangay Port Barton, only the following were included: Mangingisda, Pagkakaisa, Masigla, Maunlad, and Pag-asa. The households in these puroks located in coastal areas engaged in fishing.

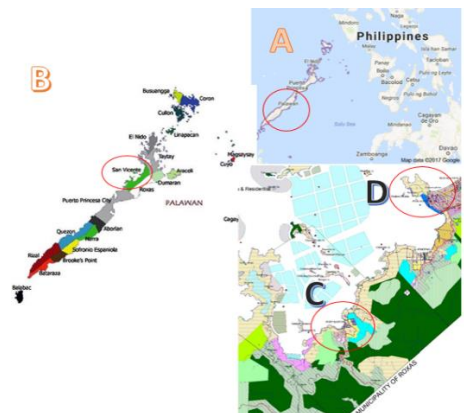


Figure 1. Philippine map showing the province of Palawan (A), Map of Palawan showing municipality of San Vicente (B), Map of San Vicente showing Barangay Port Barton (C) and Map of San Vicente

showing Barangay Poblacion (D) (Source: *Municipal Planning and Development Office*)

The total household population of fishers in the said barangays was 970. Of the said number, 520 households were from Barangay Poblacion and 450 households were from Barangay Port Barton. The sample size of 291 or 30% of the population was selected for this study through random sampling. There were 156 participants from Barangay Poblacion and 135 from Barangay Port Barton.

The participants were 18 years old and above. Table 1 shows the summary of the participants' profile.

Table 1. Summary of Participants' Profile (n=291)

Participant's Profile	Frequency	Percentage
Sex		
Male	198	68.1
Female	93	31.9
Age		
18-25	18	6.19
26-30	27	9.28
31-35	15	5.15
36-40	52	17.87
41-45	54	18.56
46-50	40	13.75
51-55	36	12.37
56-60	15	5.15
61 and above	34	11.68
Place of Residence		
Poblacion	156	54
Port Barton	135	46

Prior to the conduct of the interviews, the author secured permits from the Municipal Mayor of San Vicente and Barangay Captain of Barangay Poblacion, San Vicente, Palawan. The author also paid a courtesy call to the officers of the organizations of fishers and tour operators, and coordinated with the residents of the said areas. The Barangay Captain was also requested to provide a *barangaytanod*/ police to serve as a guide.

The author utilized a semi-structured survey questionnaire through household interview (HHI) to document the shifting of livelihood from fishing to tourism-related activities. The questionnaire consisted of four parts: 1) profile; 2) fishing; 3) shifting of livelihood from fishing to tourism-related activities; and 4) tourism-related activities. With regard to the second part, the participants were asked about the fishing gears they used in fishing and their monthly household income in fishing. They were also asked if they worked full time in fishing for the last five years. In connection with the third part of the questionnaire, the participants were asked to answer nine questions (e.g. *Did you shift from fishing to tourism-related activities? What type of shift of livelihood did you engage in?*) Out of the nine questions, five questions allowed the participants to select one or more than one response (e.g. *If your answer is Yes in C.1, what is/ are the reasons for the shift? If your answer is No, what is/ are the reasons?*) The last section includes questions on tourism-related activities (e.g. *Are you engaged full time in tourism-related activities for the last five years? What is your average household monthly income from tourism-related activities?*)

This study mainly focuses on the shifting of livelihood from fishing to tourism-related activities and does not cover the factors that affect the fish catch decline in the area, the status of fish stocks, and the actual status of marine habitats.

3. Results and Discussion

In this section, the following are discussed: the shift of livelihood from fishing to tourism-related activities; reasons for staying in fishing; reasons for the shift of livelihood from fishing to tourism; types of shift; and tourism-related activities that the participants engaged in. This section also discusses the data on fishers who are interested to shift to tourism-related jobs and average monthly income from fishing and tourism-related activities.

3.1. The Shift of Livelihood From Fishing to Tourism-Related Activities

The number of fishers in San Vicente for the year 2012 to 2016 declined compared to that of 2007 to 2011 (Municipal Tourism Office, 2016). Based on the data gathered in the present study, a reason for the decrease in the number of fishers is the shifting of livelihood from fishing to tourism-related activities.

Out of 291 participants that were randomly selected, there were 258 (88.66%) full-time fishers and 33 (11.34%) part-time fishers in 2007 to 2011. They were engaged in fishing as owners or employees of fishing operations. However, the number of fishers decreased in 2012 to 2016 because 139 (47.77%) participants shifted to tourism-related activities.

This transition in livelihood was parallel to what occurred in Honda Bay, Sta. Lourdes, Puerto Princesa City, based on the report of ABS-CBN Foundation Incorporated and Palawan State University Center for Strategic Policy and Governance (2014). It was reported that the fishers shifted to tourism activities such as boat operations for island hopping in Pambato Reef. Similarly, a number of fishers in San Vicente shifted to tourism-related activities. The reasons for the shift and the tourism-related activities that they engaged in will be discussed in detail in the succeeding sections.

3.2. Reasons for Shifting From Fishing to Tourism-Related Activities

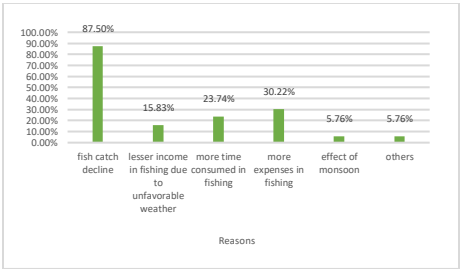


Figure 2. Reasons (by percentage) for shifting from fishing to tourism-related activities



Figure 2 shows the reasons of the participants for changing livelihood. Out of 139 participants who shifted livelihood, most (121 or 87.50%) stated that there had been a decline in fish catch because their fishing method were highly affected by fish catch decline. There was also a decrease of target fishery species like reef fishes. Based on the result, the primary reason of shifting livelihood was the decline of fish catch. This is followed by more expenditures in fishing activity. The reasons considered least were the effect of monsoon to fishing and others which included prohibition of the use of some fishing gears, lack of good health, and loss of interest in fishing. These findings are supported by some studies which indicate the following as reasons for the shift of livelihood from fishing to tourism: scarcity of fish or fish catch decline; bad weather; and opportunities in other areas of agriculture (Brugère, Holvoet, & Allison, 2008), and unstable source of income (Ray and Kumar, 2015; Salagrama, 2006).

3.3. Reasons for Not Shifting From Fishing to Tourism

Among the participants, majority (152 or 52. 23 %) opted to stay in fishing as a source of livelihood. Figure 3 shows their reasons for not shifting to tourism-related jobs.

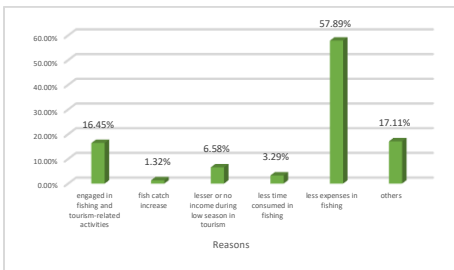


Figure 3. Reasons for not shifting (by percentage) from fishing to tourism-related activities

Figure 3 shows the participants' reasons for remaining in fishing as a source of livelihood. Out of 152 participants that did not shift, majority (57.89%) stated that fishing required lesser expenses compared to tourism-related work. They also claimed that they had lesser or no income in tourism-related activities during low season. Low season in this context refers to the period when there are few tourists who visit their place. This usually occurs during the months of June, July, August, September, and October. They also reported that there had been fish catch increase. This fish catch increase was attributed by them to the fact that their fishing method which was usually undertaken in the deeper and farther part of sea was not affected by fish catch decline. The other reasons included lack of knowledge in tourism as a source of livelihood and lack of permits and other needed documents for the operation. Hence, there are still some participants who preferred to remain in fishing.

These findings are similar to the study of Carter and Garaway (2014), which found that in the local community in Mida creek in Kenyan coasts, fishing is their main livelihood due to lack of skills and assets needed in tourism livelihood.

3.4. Types of Shift From Fishing to Tourism-Related Activities

The shift of livelihood from fishing to tourism-related activities is classified as seasonal or total shift. Seasonal shift in this study pertains to engaging in tourism-related jobs on a seasonal basis while total shift refers to leaving fishing completely as a source of livelihood to focus on tourism-related activities. Out of 139 participants that shifted to tourism, majority (79 or 56.83%) totally or completely shifted. However, some (60 or 43.17%) of them opted to shift to tourism-related work on a seasonal basis only because the chosen tourism activity like boat operation for island hopping was affected by high and low season in tourism. For instance, there are fewer tourists during the months of June, July, August, September, and October which are considered as low season for tourism compared to the number of tourists during the months of November, December, and January. Based on the Department of Tourism (2019), the lowest tourist arrivals in the Philippines in 2018 were recorded during the months of June (530,267 tourists), September (518, 041 tourists), and October (523, 703 tourists). On the other hand, the highest tourist arrivals were recorded in December (693,137 tourists), January (732,506 tourists) and February (674,541 tourists). During the low season in tourism, the participants engaged in business (buy and sell, store, etc.) or private employment. Based on their estimate, 20% of their total annual income came from non-tourism related activities. They stated that they saved money from their income so that they could have a capital or available money during low season in tourism. This reflects the participants' adaptive ability in terms of finding other sources of income.

These findings are similar to the finding from the study of Fabinyi (2019), which indicated that the residents in Coron, Palawan switched their livelihood into tourism-related activities. Similarly, the study of Carter and Garaway (2014) pointed out that the local community was engaged in fishing during the low season in tourism activities. In addition, Brugère, Holvoet, and Allison (2008) reported that the members of the local community shifted to other sources of income like small-scale businesses and private employment.

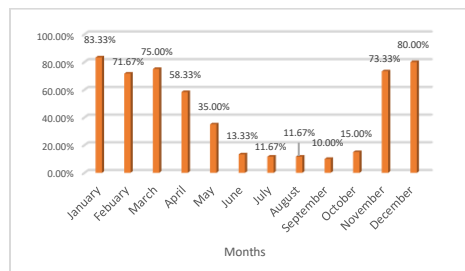


Figure 4. Seasonal shifting to tourism-related activities (by percentage)

Among the 139 participants that shifted from fishing to tourism-related activities, 60 or 43.17% engaged in seasonal shifting. Figure 4 shows the months during which they engaged in tourism as a source of livelihood. The months of

November, December, and January are the leading months considered as peak seasons for tourism. It is during these months that there are more tourists who visit different tourist destinations in San Vicente. Most of the participants that shifted from fishing on a seasonal basis concentrated in tourism during the aforementioned months.

On the other hand, few participants engaged in tourism-related work during June, July, August, September, and October which are considered as low seasons. These are considered as low seasons because fewer tourists visit San Vicente resulting in low income also for the participants. The participants also reported that the weather is unfavorable during these months due to southwest monsoon (*habagat*). Based on these findings, the type of season in the context of tourism influenced the participants' decision to shift from fishing on a partial or seasonal basis. These findings support the result of the study conducted by Alizee and Marie (2013), which stated that tourism livelihood is highly seasonal due to climatic factors in which tourism activities are directly affected by extreme weather conditions. In addition, Carter and Garaway (2014) reported the case of Watamu in Kenyan coast where the residents engaged in fishing during the low season in tourism.

3.5. Tourism-Related Activities That the Participants Engaged in Upon Shifting From Fishing

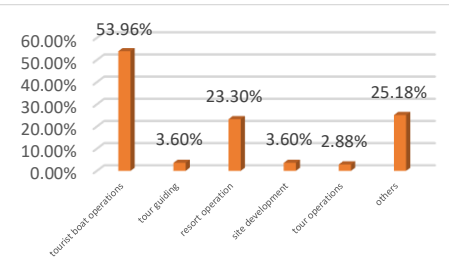


Figure 5. Tourism-related activities (by percentage) that participants engaged in upon shifting from fishing

Figure 5 shows the tourism-related activities that the participants engaged in upon shifting from fishing. Out of 139 participants that shifted, majority (75 or 53.96%) engaged in boat operations for tourism use whereas few (2.88 %) engaged in tour operations. Other tourism activities included working in massage spa, minibar, and souvenir store. The estimated average monthly income of these participants was Php 10,000 to Php 15,000. Most of their income was from boat operation for tourists. The participants also reported that among the tourism-related activities, boat operations for tourism were the easiest for them to do because they were already knowledgeable about the said job unlike in inland tour operations that required high capital. They also converted their boats from fishing to tourism use. These findings are similar to the study of Fabinyi (2010) and Fabinyi (2019) which reported that local communities in Coron, Palawan engaged in the construction of tourist boats, engaged in tourist boat operations, worked as tour guides, and provided tourist accommodations.

At present, the Municipal Tourism Office of San Vicente provides training to the local residents before they actively engage in any tourism-related activity to avoid future problems and ensure an efficient tourism industry.

3.6. Interest to Shift from Fishing to Tourism-Related Activities

This section presents the data on the number of fishers that are interested to shift to tourism-related activities, target year for the shift, and the tourism-related activities they plan to engage in.

3.6.1. Number of Fishers That Are Interested to Shift to Tourism-Related Activities

Out of 152 participants that remained in fishing, most (124 or 81.58%) were interested in shifting to tourism-related activities. They expressed interest to shift in the next five years. The leading reason for not changing their livelihood yet was having insufficient money to serve as their capital for tourism livelihood such as the conversion of their boats for tourism use. In relation to this, the study of Porter and Orams (2014) pointed out the willingness of the local community in Victoria, Bolinao, Philippines, to explore tourism livelihood. Furthermore, Fabinyi (2019) reported on the interest of the local community in Coron, Palawan to engage in tourism livelihood that provides higher income compared to fishing. However, Porter and Orams (2014) stated that the willingness of the residents to involve in tourism livelihood is not sufficient. Kennell (2014) emphasized that the tourism industry has its carrying capacity that can be affected by the rapid growth of the residents that are involved in tourism livelihood and may exceed tourism's carrying capacity.

3.6.2. Target Year to Shift From Fishing to Tourism-Related Activities

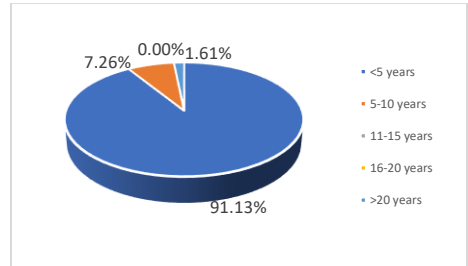


Figure 6. Target year to shift from fishing to tourism-related activities

Figure 6 shows that out of 124 participants who were interested to shift, most (113 or 91.13%) intended to shift in less than five years (2017 to 2021), nine (7.26%) after five to 10 years (2022-2027), and two (1.61%) after 20 years. No participants planned to shift after 11 to 20 years. Based on this result, there is a likelihood that more fishers will shift livelihood because of a higher income in tourism compared to fishing. This will be discussed in the last section of this study which provides comparison of the average monthly income from fishing and from tourism-related activities.



3.6.3. Tourism-Related Activities That Participants Are Interested to Engage in When They Shift From Fishing

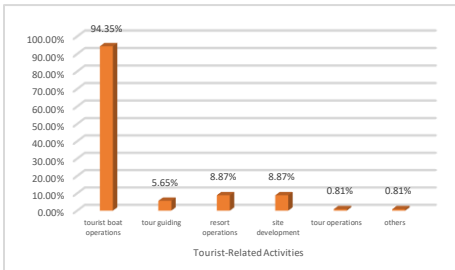


Figure 7. Tourism-related activities (by percentage) that participants are interested to undergo

Figure 7 shows the tourism-related activities that the participants were interested to undertake. Out of 124 participants who were interested to shift, most (117 or 94.35%) expressed interest to engage in boat operations for tourism use whereas few (0.81 %) were interested to engage in tour operations and other activities, particularly massage spa. According to the participants, boat operation for tourism use is the easiest and least expensive among tourism-related activities. They claimed that they could convert their boats from fishing to tourism use. This reflects that the participants considered their current resources and economic condition in their choice of tourism-related activities which they were interested to undergo.

3.7. Average Monthly Income From Fishing and Tourism-Related Activities

3.7.1. Average Monthly Income From Fishing

Figure 8 shows the participants' average monthly income from fishing. Based on the result, majority (123 or 42.27 %) of the households had an average monthly income of Php 5,000 below while only few (2 or 0.69%) earned Php 30,000 above. As reported by the participants, the income from fishing was quite small and could not support all their basic needs; however, some of them were still engaged in fishing because the expenses were lesser compared to tourism-related activities.

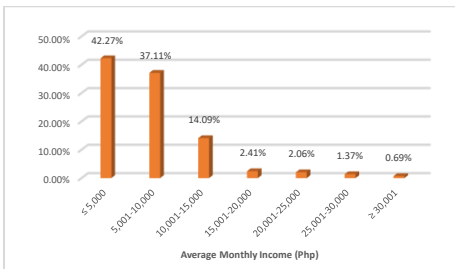


Figure 8. Average monthly income from fishing

3.7.2. Household Average Monthly Income From Tourism-Related Activities



Figure 9. Average monthly income from tourism-related activities

Figure 9 shows the participants' average monthly income from tourism activities. Majority (40 or 24.54%) of the households had an average monthly income of Php 10,001 to Php 15,000. Based on the results, tourism activities provided a higher monthly income to the majority compared to fishing activities. According to the participants, they shifted to tourism-related activities because of higher income, although the needed capital was higher than that which was needed in fishing. However, some were still engaged in fishing because they could not afford the expenses that could be incurred in tourism as a source of livelihood.

Most of the participants that remained in fishing had an average monthly income of less than Php 5,000 while those who shifted to tourism-related activities had an average monthly income of Php 10,001 to 15,000. This implies that those who shifted to tourism-related activities have higher income compared to those who stayed in fishing.

In the case of Calatagan, Batangas, the average annual income from tourism activities reached to Php 141,708 (Buncag, Esguerra, & Asnawi, 2019). Similarly, Fabinyi (2019) reported that tourism provides higher income compared to fishing.

4. Limitations of the Study

The present study is the first study which documented the shifting of livelihood from fishing to tourism-related activities in San Vicente, Palawan; however, it has limitations. First, this study does not cover the factors that affect fish catch decline in the area, the status of fish stocks, and the actual status of marine habitats. Future researches may consider including these to provide additional pertinent information that can be used by concerned individuals and agencies for relevant programs, projects, and activities. Second, this study focuses only on the fishers in the two barangays of San Vicente. Future studies may consider extending the study by involving participants from other municipalities in the province.

5. Conclusions

There is a shift of source of livelihood from fishing to tourism-related activities although majority (52.23%) remained in fishing. The shift in livelihood was brought about

by fish catch decline, lesser or no income in fishing because of bad weather, more time consumed in fishing, more expenses in fishing, prohibition of the utilization of some fishing gears, lack of good health, and loss of interest in fishing. The type of shift of livelihood is either seasonal or total shift. Among the participants who shifted to fishing, majority (53.96%) engaged in boat operations for tourism use. Of those who had not shifted to tourism-related activities, majority (81.58%) expressed interest to shift in the next five years and were interested to engage in boat operations for tourism. Majority (42.27 %) of the households engaged in fishing had an average monthly income which was lower than the average monthly income of those who shifted to tourism-related activities. These findings indicate that livelihood transition is influenced by several factors. The fishers cope with the challenges they meet by finding alternative means through which they will be able to provide for their families. Income and subsistence are the driving forces for the shift from fishing to tourism-related activities. If this shift in livelihood will continue to happen, there will be an increase in the number of locals who will engage in tourism as a source of livelihood. As a result, the economy, in terms of the production of marine products, will be affected. This possible result implies that there is a need for concerned agencies to undertake appropriate measures not only to address the impact of the said livelihood transition to economy but also to ensure promotion of sustainable development.

6. Recommendations

Mass shifting of livelihood from fishing to tourism-related activities can directly affect the economy in terms of the production of marine products. In this case, the local government can provide a management plan and regulate the shifting by providing opportunities and benefits in both fishing and tourism-related activities (e.g., proper delineation of areas in the sea that can be used for fishing and tourism activities as well as equitable livelihood support). In addition, the national or local government units as well as the non-government organizations may conduct awareness programs as well as monitoring and evaluation programs about sustainable fishing and ecotourism. The fishers' capabilities and interests must be considered in shifting livelihood. Furthermore, the national or local government may provide mechanisms to monitor and evaluate the implementation of policies particularly about fishing gears, fishing area, time frame of fishing, and tourism activities. Appropriate mechanisms will greatly help in the management of the natural resources, particularly the mangrove, seagrass, and coral reefs. Moreover, the national or local government must delineate specific areas for fishing and tourism activities with the involvement of all stakeholders in decision-making. This necessitates the constant monitoring of the status of fishing areas and tourism areas by the concerned agencies. Conduct of intensive research regarding fishing and tourism-related activities and shifting of livelihood is also recommended.

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Declaration of Conflict of Interest

The researcher declares that there is no conflict of interest involved whatsoever in this study.

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References

- ABS-CBN Foundation Incorporated & PSU Center for Strategic Policy and Governance (2014). *Environmental and socioeconomic impacts of Honda Bay island hopping, Sta. Lourdes, Puerto Princesa City*. Puerto Princesa, Philippines: Author.
- Alizee, A. & Marie, L. (2013). Interactions between fishing and tourism: Case study of the Saint-Brieuc Country. *Study Report. GIFS Project*.
- Barut, N. C. & Garvilles, E. G. (2016). Annual report to the Western and Central Pacific Fisheries Commission: Part 1 Information on fisheries, research, and statistics, *Philippine annual fishery report 2016*. (WCPFC-SC12-AR/CCM-20). Retrieved from <https://www.wcpfc.int/system/files/AR-CCM-20%20PHILIPPINES%20PART%201.pdf>.
- Brugère, C., Holvoet, K., & Allison, E. H. (2008). *Livelihood diversification in coastal and inland fishing communities: Misconceptions, evidence, and implications for fisheries management*. (Working paper on Sustainable Fisheries Livelihoods Programme). Rome: Department for International Development of the United Kingdom (DFID)/Food and Agriculture of the United Nations (FAO).
- Buncag, M.J., Esguerra, W., & Asnawi, L. (2019). Community-based mangrove rehabilitation: The case of Calatagan Mangrove Park-Marine Protected Area, Batangas, Philippines. *International Journal of Science and Management Studies*, 2(6), 95-102.
- Carter, C. & Garaway, C. (2014). Shifting tides, complex lives: The dynamics of fishing and tourism livelihoods on the Kenyan Coast. *Society & Natural Resources*, 27(6), 573-587.
- De Boer, I. (2012). *Tourism as alternative livelihood: Grassroots perspectives and experiences on the livelihood impacts on local community members around Honda Bay (Puerto Princesa) Palawan, Philippines*. (Unpublished Thesis Report). Wageningen University and Center for Sustainability. Retrieved from <http://edepot.wur.nl/222213>.
- Department of Tourism. (2019). *Visitor arrivals to the Philippines by country of residence January-December 2018*. Retrieved from http://www.tourism.gov.ph/Tourism_demand/Arrivals2018.pdf
- Department of Trade and Industry. (2019). *Tourists arrival in the Philippines*. Retrieved from <https://www.dti.gov.ph/resources/statistics/tourist-arrivals>.
- Fabinyi, M. (2007). Illegal fishing and masculinity in the Philippines: A Look at the Calamianes Island in Palawan. *Philippine Studies*, 55(4), 509-529.



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- Fabinyi, M. (2010). The intensification of fishing and the rise of tourism: Competing coastal livelihoods in the Calamianes Islands, Philippines. *Springer Science+Business Media, Human Ecology Journal*, 38, 415-427.
- Fabinyi, M. (2019). The role of land tenure in livelihood transitions from fishing to tourism. *Springer Maritime Studies*, 19, 29-39. doi: 10.1007/s40152-019-00145-2.
- Ijeomah, H.M., Korstanje, M. & George, B. (2012). Impact of tourism on livelihood of communities adjoining ecodestinations in Plateau State, Nigeria. *Special Issue on Sustainability, Tourism and Environment*, 6 (3), 55-71.
- Kennell, J. (2014). Carrying capacity, tourism. In J. Jafari and H. Xiao (Eds.). *Encyclopedia of tourism*. doi: 10.1007/978-3-319-01669-6.
- Levine, T. (2015). *Philippine Department of Tourism: Destination branding through "It's more fun in the Philippines"*. (Thesis Report). The Fletcher School Tufts University.
- Municipal Agriculture Office of San Vicente (2016). *Percentage of households engaged in fishing livelihood in the municipality of San Vicente*. Palawan, Philippines: Author.
- Padilla, J.E., Mamauag, S., Braganza, G., Brucal, N., Yu, D., & Morales, A. (2003). *Sustainability assessment of the live reef-fish for food industry in Palawan, Philippines*. Quezon City: WWF-Philippines. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.514.7131&rep=rep1&type=pdf>.
- Palomares, M.L., & Pauly, D. (2014). Reconstructed Philippine marine fisheries catches in the Philippines, 1950-2010. In M.L. D. Palomares and D. Pauly (Eds.), *Philippine marine fisheries catches: A bottom-up reconstruction, 1950 to 2010* (pp.129-138). B.C., Canada: Fisheries Centre, University of British Columbia.
- Philippine Statistics Authority. (2012). *Share of tourism industry to GDP is 6.0 percent in 2012*. Philippines: Author. Retrieved from <https://psa.gov.ph/content/share-tourism-industry-gdp-60-percent-2012>.
- Pomeroy, R.S., Pido, M.D., Pontillas, J., Francisco, B.S., White, A.T. & Silvestre, G.T. (2005). Evaluation of policy options for the live reef food fish trade: Focus on Calamianes Islands and Palawan Province, Philippines, with implications for national policy. *Palawan Council for Sustainable Development, Fishereis Improved for Sustainable Harvest Project, and Provincial Government of Palawan*. Retrieved from http://oneocean.org/download/db_files/live_reef_fish_food_trade_policy_study.pdf on 22 October 2016.
- Porter, B. & Orams, M. (2014). Exploring tourism as a potential development strategy for an artisanal fishing community in the Philippines: The case of Barangay Victory in Bolinao. *Tourism in Marine Environments*, 10 (2), 49-70.
- Ray, S. & Kumar, U. (2015). Livelihood assessment of the fishermen community in the southwest region of Bangladesh. *Journal of Experimental Biology and Agricultural Sciences*, 3(4), 353-361. doi:10.18006/2015.
- Reduble, R. (2019). Palawan's tourist arrival reaches 1.8 million in 2018. *Palawan Daily News*. Retrieved from <https://www.pressreader.com/>.
- Salagrama, V. (2006). Trends in poverty and livelihoods in coastal fishing communities of Orissa State, India. FAO Fisheries Technical Paper. No. 490.
- Truong, D., Hall, C., & Garry, T. (2014). Tourism and poverty alleviation: Perceptions and experiences of poor people in Sapa, Vietnam. *Journal of Sustainable Tourism*, 22 (7), 1079-1089. doi: 10.1080/09669582.2013.871019.
- World Fish Center (2011). *World fish status report*. Retrieved from <https://www.worldfishcenter.org/publications-resources>.

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Health Practices and Lifestyle Components of University Administrative Personnel: Risk Factor Assessment of Non-Communicable Diseases



Cathy A. Chu-Medina
Michael Angelo A. Legarde
Jairus L. Katon

Abstract

This study describes the health practices and lifestyle components of the university administrative personnel and evaluates their potential risks in developing non-communicable diseases (NCDs). Using the WHO-STEPI instrument developed by the World Health Organization (WHO), this study found that majority of the 108 randomly selected participants were non-smokers and moderate alcoholic beverage drinkers. They also performed moderate-intensity activities, did not meet the recommended servings of fruits and vegetables per day, and consumed salt and processed foods which are within the recommended servings per day. Majority of the participants had normal body mass indices (BMI) and blood pressures (BP); however, most of them had above normal waist circumferences. The health practices and lifestyle components that situate the participants at most risk in developing NCDs are inadequate physical activity and dietary behavior particularly low consumption of fruits and vegetables. Their anthropometric measurements likewise pose potential risks for NCDs. These findings strongly suggest that maintaining a normal BMI, BP, and waist circumference by having adequate physical activities and by following a healthy diet can prevent lifestyle-related diseases. It is proposed that an evidence-based, comprehensive, and inclusive employee wellness program be designed and implemented because a healthy lifestyle promotes resilience against NCDs.

Keywords

health practices, lifestyle practices, lifestyle components, hypertension, non-communicable disease

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1. Introduction

A healthy lifestyle is a way of living that lowers the risk of being seriously ill or dying early. Not all diseases are preventable; but a large proportion of deaths, particularly those from coronary heart disease and lung cancer, can be avoided. Healthy lifestyle to most people means both physical and mental health are in balance or functioning well together in a person. In many instances, physical and mental health are closely linked, so that a change (good or bad) in one directly affects the other (Reeves & Rafferty, 2005).

Non-communicable disease (NCD) is a lifestyle-related disease that is non-infectious or non-transmissible. It means that NCDs are not passed from person to person. They are of long duration and of generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (e.g. heart attacks and stroke), cancers, chronic respiratory diseases (e.g. chronic obstructed pulmonary disease and asthma), and diabetes (World Health Organization [WHO], 2011). These diseases are attributed largely to unhealthy lifestyle according to WHO.

The World Health Organization (WHO, 2011) stresses that timely, appropriate, and valid surveillance of NCDs and their risk factors are needed by countries to support the planning, implementation, and evaluation of public health prevention initiatives. This is imperative to address the growing burden of NCDs in low- and middle-income countries like the Philippines (WHO, 2011).

Pinlac et al. (2015) and Villaverde, Vergeire, and Santos (2012) reported that deaths caused by NCDs steadily increase in the Philippines. This is supported by Ulep et al. (2012) who stated that majority of deaths in the country in 2007 were linked to NCDs. In this regard, Pinlac et al. (2015) emphasized an increasing need to intensify health system interventions and uphold responsibility of the different sectors pertaining to the reduction of NCDs and the risk factors. They added that it is necessary to design a multi-sectoral action plan on the prevention and control of NCDs to end the upsurge of NCDs in the country.

Villaverde, Vergerie, and Santos (2012) stated further that the Department of Health (DOH), pursuant to the guidelines from the WHO, introduced programs to reduce NCD-related fatalities in the Philippines. They also conveyed that other agencies and sectors had launched different health programs. They expounded that health promotion, which requires a comprehensive approach, is a concrete solution to control the burden of NCDs. They argued that considering that NCDs are linked to lifestyle, "these are



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best addressed by reducing the prevalence of common behavioral risk factors which are tobacco use, alcohol abuse, unhealthy diet and obesity, and physical inactivity” (p. 85).

Furthermore, based on the study of Villaverde, Vergerie, and Santos (2012), the responsibility of surveillance of NCDs and their risk factors does not only lie with the national government but also with the other sectors and agencies. Hence, institutions like universities should be involved in this fight against NCDs.

In this connection, Schuwirth et al. (2019) claimed that a community will be healthy as long as there are many connections between the individuals and sub-groups that form it. Working on health promotion and talking about participation and participatory models imply that people and communities have the right to self-manage. They stated that universities are ideal places to implement strategies to improve the lifestyles of their members who also go beyond the university spaces and positively affect the lives of people inside and outside the campus.

The present study aimed to collect baseline data regarding the health practices and lifestyle components of the administrative personnel of a state university. With the growing number of stakeholders in the university, employees' health becomes an important concern. According to WHO (2011), sedentary lifestyles, physical inactivity, and office work increase risks of developing NCDs. This study focused on understanding the participants' health practices and lifestyle components which place them at risk for developing specific lifestyle-related diseases such as hypertension, diabetes, asthma, and some kidney diseases.

The present study is rooted on the premise that employees' health affects their work performance as expounded by Mitchell and Bates (2011) in their study which determined the correlation between health status and productivity loss and provided calculations of the repercussions of lost work performance. They found that health conditions and lifestyle risk factors are concomitant with workplace productivity loss and emphasized the significance of maintaining a healthy population.

Similarly, Boles, Pelletier, and Lynch (2004) reported that health risks are associated with productivity loss. They argued that there is a greater likelihood that absenteeism and presenteeism will be incurred by personnel with more health risks than those with fewer risks. Therefore, the workplace is a significant milieu for health promotion (Mikkelsen et al., 2019). A preliminary approach to an effective health promotion program is an evaluation of the employees' health practices and lifestyle components. Identification and analysis of varied risk factors will pave the way for the identification of diverse intervention strategies (Ulep et al., 2012). In this context, the present study responds to the call for a concerted effort (Pinlac et al., 2015) of different sectors to engage in the battle against NCDs. This assessment can lead towards the formulation of appropriate policies and measures as interventions to promote a healthy lifestyle in the workplace to prevent and control chronic life-style related diseases.

2. Methods

The participants of this study were employed as members of the administrative personnel of a state university in Palawan, Philippines. There were 145 staff members assigned at the administration building at the time of the conduct of this research. Out of the said number, 108 participants were identified through random sampling.

To assess the risk factors of health practices and lifestyle components of the participants and the prevalence of the risk factors for NCDs, the researchers utilized a written questionnaire developed by the World Health Organization (WHO). Minor modifications to the generic instrument were made but the core questions were retained, pursuant to the requirements of the survey. For example, for demographic information, the following which are part of the WHO-STEPPS were not included in the modified instrument: total years spent in school, highest level of education, ethnic/cultural background, number of people over 18 years old living in the household, and average annual household income.

The research instrument included demographic information, behavioral measurements (Step 1) and physical measurements (Step 2). Demographic information refers to the participants' identification and demography, which included information on age, sex, occupation, education, marital status, and employment status. Behavioral measurements included questions on key behavioral risk factors for NCDs such as cigarette use, alcohol consumption, dietary behavior, physical activity, and health history. There are seven questions for cigarette use, six of which are answerable by Yes or No (e.g. *Do you currently smoke any tobacco products such as cigarettes, cigars, or pipes? Do you currently smoke tobacco products daily?*). For alcohol consumption, there are six questions (e.g. *Have you consumed any alcohol such as beer, wine, or spirit? Have you consumed alcohol within the past 12 months?*). Similarly, there are six questions for dietary behavior (e.g. *In a typical week, on how many days do you eat fruit? How many servings of fruit do you eat on one of those days?*). There are 11 questions for physical activity (e.g. *Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, digging or construction work for at least 10 minutes continuously?*) and 14 for health history (*Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension? Have you ever had your blood sugar measured by a doctor or other health worker?*)

Physical measurements included blood pressure, height and weight, and waist circumference. To obtain the said physical measurements, the researchers used the following instruments: tape measure, bath scale, sphygmomanometer, and stethoscope. To get the body mass index (BMI) of the participants, the researchers utilized tape measure and bath scale for height and weight, respectively. Then the formula of BMI where weight in kilogram over height in meters squared (kg/m^2) was applied. To record blood pressure, the researchers used an analog sphygmomanometer and stethoscope. Blood pressure was checked thrice to ascertain accurate readings. To measure the waist circumference, the researchers placed the tape measure just above the umbilicus or the belly button of the participant.

Prior to the collection of data, the researchers informed the participants about the purpose of the study and assured them of the confidentiality of data. Having secured the participants’ informed consent, the researchers proceeded with the data gathering. Data gathering took place in November 2015 until February 10, 2016.

To answer the queries raised in this study, descriptive and inferential measures were used. To describe the participants’ demographic profile, anthropometric measurements, and their health and lifestyle practices, descriptive statistics such as frequency count, percentage, and frequency distribution were utilized. In addition, inferential statistics such as chi-square test of independence and Pearson Product Moment Correlation were used to test the significant relationships between the following variables: (a) participants’ demographic profile and their health and lifestyle practices; (b) participants’ health and lifestyle practices and their anthropometric measurements; and (c) participants’ anthropometric measurements and their potential risks in developing NCDs. All statistical computations were analyzed with the aid of Statistical Package for Social Sciences Version 23, tested at 0.05 level of significance.

3. Results and Discussions

This section discusses the participants’ demographic profile, health and lifestyle practices, and their anthropometric measurements. The demographic profile of the participants includes variables such as age, sex, civil status, and employment status. Further, health and lifestyle practices were divided into four components namely: (a) cigarette behavior; (b) alcohol behavior; (c) dietary behavior; and (d) physical activity. With regard to their anthropometric measurements, body mass index, blood pressure, and waist circumference were included. For a visual presentation of data, frequency distribution, pie graph , and bar graph were utilized.

3.1. Participants’ Demographic Profile

Table 1: Frequency Distribution of the Participants’ Demographic Profile (n = 108)

Participants’ Demographic Profile		Frequency (f)	Percentage(%)
Age	21 – 29	34	
	30 – 38	33	
	39 – 47	10	
	48 – 56	22	
	57 – 65	9	
Sex	Male	24	
	Female	84	
Civil Status	Single	50	
	Married	53	
	Widow/er	5	
Employment Status	Permanent	43	
	Non-Permanent	65	

Table 1 shows the distribution of the participants when they are grouped according to their demographic profiles. In terms of age, majority or 32 % of the participants were 21 to 29 years old whereas only few or 8% were 57 to 65 years old. With respect to sex, female participants, comprised 78% of

the sample. In terms of civil status, majority (49%) of the participants were married, 46% were single, and 5% were widowed. As pertains to their employment status, 60% of the participants held a non-permanent position whereas the remaining 40% held a permanent position.

3.2. Participants’ Health and Lifestyle Practices

This section presents the participants’ health and lifestyle practices which include their cigarette consumption, alcohol consumption, dietary behavior, and physical activity. In this study, cigarette consumption refers to the use of any tobacco product while alcohol consumption denotes drinking of alcoholic beverages. Dietary behavior includes daily intake of fruits and vegetables and consumption of salt and processed food. Physical activity refers to involvement in vigorous-intensity activity or moderate-intensity activity and the time spent in doing these activities.

3.2.1. Participants’ Health and Lifestyle Practices in Terms of Cigarette Consumption

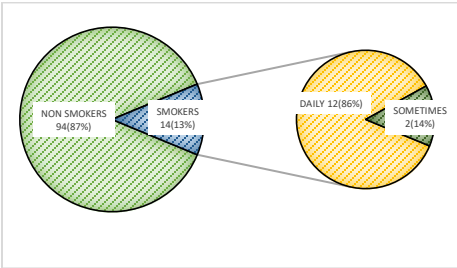


Figure 1. Distribution of the participants’ cigarette consumption (n = 108)

Figure 1 shows the distribution of the participants’ health and lifestyle practices in terms of cigarette consumption. Out of 108 participants, majority (87%) of them were non-smokers whereas the remaining 13% were smokers. Those who were identified as smokers reported that they smoked tobacco products such as cigarettes, cigars or pipes. Futher analysis indicates that out of 14 employees identified as smokers, majority (86%) smoked tobacco products daily while the remaining 14% used tobacco products sometimes.

The result which reveals that majority were non-smokers could be attributed to the fact that majority of the participants were women. According to WHO (2005), women are less likely to smoke tobacco than men. However, the epidemic of tobacco use among women is on the rise in some countries. Generally, men tend to use all tobacco products at higher rates than women. Such differences may relate to a combination of physiological, cultural, and behavioral factors (National Center for Chronic Disease Prevention and Health Promotion Office on Smoking and Health [NCCDPHPOSH], 2014). In addition, another factor which could have influenced the minimal number of smokers is the policy on the prohibition of smoking inside the university premises. This is also consistent with the finding of Pinlac et al. (2015) that smoking, as well as drinking, had decreased which could be linked to the continued tobacco control measures being employed in the Philippines.



3.2.2. Participant's Health and Lifestyle Practices in Terms of Alcohol Consumption

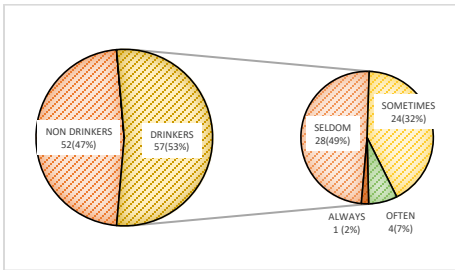


Figure 2. Distribution of the participants' alcohol consumption (n = 108)

Figure 2 shows that majority (53%) of the participants drank alcohol beverages whereas the remaining 47% had never drunk alcoholic drinks. Moreover, out of 57 participants who consumed alcoholic drinks such as beer, wine, and spirit for the past 12 months at the time of the survey, majority drank alcohol occasionally. The results indicate that majority of the personnel are at risk of developing NCDs due to consumption of alcoholic beverages.

According to WHO (2018), increasing consumption of alcohol has emerged as a major public health problem. Alcoholic disorder or risky alcohol consumption is one of the common major risk factors known to predispose individuals to the development of chronic non-communicable diseases such as Type 2 diabetes, hypertension, and chronic liver and pancreatic cancers.

3.2.3. Participants' Dietary Behavior

This section illustrates the employees' dietary behavior. In this study, dietary behavior refers to the intake of fruit and vegetable measured in servings per day. In addition, this includes the daily consumption of salt and processed food.

3.2.3.1. Participants' Intake of Fruits and Vegetables per Day

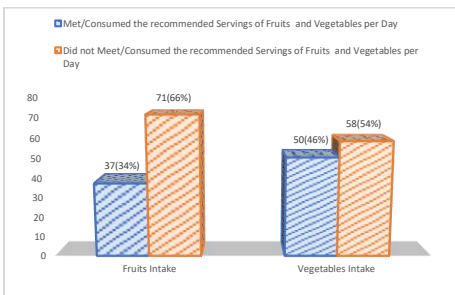


Figure 3: Distribution of the participants' intake of fruits and vegetables per day (n = 108)

As mentioned in the previous parts of this study, in order to meet the recommended servings of fruits and vegetables per day, an individual should consume at least five servings (400 mg) of fruits and vegetables per day. This is anchored on the study conducted by Reeves and Rafferty (2005) and

the standards set by WHO. Their study reveals that consuming five or more fruits and vegetable per day is one of the four healthy lifestyle characteristics.

Based on the analysis, the figure indicates that majority (66%) of the participants were not able to meet the recommended servings of fruits per day whereas the remaining 34% were able to consume sufficient amount of fruit servings in their diet. It can be also noted that majority (54%) of the participants did not consume the recommended servings of vegetables per day. This is similar to the finding of Olatona, Onabanjo, Ugbaja, Nnoaham, and Adekan (2018) that the participants in their study consumed inadequate amount of fruits and vegetables. Moreover, poor dietary fiber and fruit and vegetable intakes among the adult participants from an Indian community was observed as documented in the study of Naicher, Venter, Macintyre, and Ellis (2015).

In view of the finding that majority of the participants of the present study did not meet the recommended servings of fruits and vegetables per day, they are at risk of developing NCDs. According to the FAO/WHO (2004) joint report on fruit and vegetables for health, low fruit and vegetables consumption is associated with NCDs.

3.2.3.2. Participants' Intake of Salt and Processed Food per Day

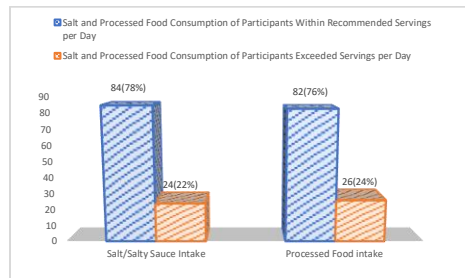


Figure 4 shows the distribution of the participants as to salt and processed food consumption. Salt consumption refers to adding of salt or salty sauce and the typical days in which processed food high in salt is taken. With regard to the allowable servings of salt and processed food intake of the participants, majority were within the acceptable range of salt and processed food intake per day having a percentage of 78% and 76%, respectively. However, it can be observed that there were some participants who exceeded the recommended servings of salt and processed food per day. Hence, this is another factor that needs to be observed and monitored by the employees because high salt and processed food intake puts them at risk of developing NCD.

As sodium accumulates, the body holds onto water to dilute the sodium. This increases both the amount of fluid surrounding cells and the volume of the blood in the bloodstream. Increased blood volume means more work for the heart and more pressure on blood vessels leading to high blood pressure, heart attack, and stroke. High blood pressure is a leading cause of cardiovascular disease accounting for two-thirds of all strokes and half of heart disease (Harvard T.H. Chan, n.d.). Furthermore, unhealthy diets may result in overweight and obesity that may trigger non-communicable diseases (GBD 2013 Mortality and Causes of Death Collaborator, 2014).

3.2.4. Participants' Physical Activity

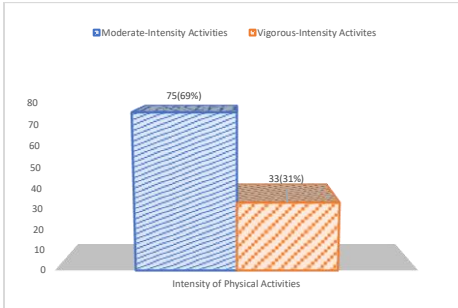


Figure 5. Distribution of the participants' nature/intensity of physical activities (n = 108)

Figure 5 shows that majority (69%) of the participants did moderate-intensity activities such as sports, fitness, or recreational activities while the remaining 31% engaged in some vigorous-intensity activities. This implies that considering the nature or intensity of physical activities being done by the participants, most of them did not meet the recommended levels of exercise or physical activities. This is consistent with the report of Pinlac et al. (2015) that only 23.7 % of the Filipinos had sufficient physical activity.

It has been shown that participation in regular physical activity reduces the risk of coronary heart disease and stroke, diabetes, hypertension, colon cancer, breast cancer, and depression. In addition, physical activity is a key determinant of energy expenditure, and thus is fundamental to energy balance and weight control (WHO, 2011). Furthermore, physical inactivity was also considered as the fourth leading risk factor for global mortality. Hence, a limited physical activity is considered as a major contributor to the rising prevalence of obesity worldwide (WHO, 2007).

In addition, Lear et al. (2017) reported that sedentary lifestyles raise the risk of NCDs like cardiovascular disease, hypertension, and obesity. On the other hand, physical activity protects individuals from NCDs.

Among the participants of the present study that fell short of the recommended physical activities, the nature of their work could have attributed to their sedentary behavior. Most of them perform typical office work, which does not necessitate frequent movement or carrying or lifting of heavy loads.

3.3. Participants' Anthropometric Measurements

This section discusses the participants' anthropometric measurements which include their body mass indices, waist circumference, and blood pressure levels.

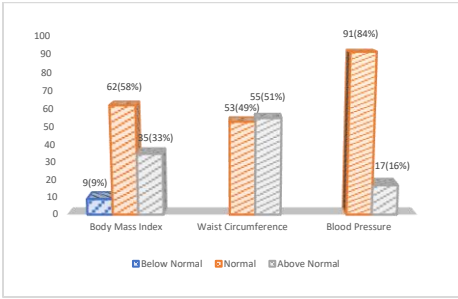


Figure 6. Distribution of the participants' anthropometric measurements (n=108)

Figure 6 shows the distribution of the participants' anthropometric measurements. In terms of body mass index (BMI), majority (58%) of the participants had normal BMIs. However, it can be observed that 33% of the participants had BMIs which were above the normal standard whereas 9% had BMIs that were below the standard. The present study adopted the categories of BMI for adults aged 20 or above set by WHO. The participants whose BMI was below 18.5 were described as underweight while those whose BMI fell within 18.5 and 24.9 had normal weight status. Further, those who had BMI that fell within 25.0 and 29.9 were considered as overweight whereas those who had BMI that was 30.0 and above were classified as obese.

Even if majority of the participants had normal BMI, it should be noted that a significant number had above normal or increased BMI. According to Kudel, Huang, and Ganguly (2018), increased BMI was positively connected to reduced work productivity and indirect costs. They further added that obesity imposes significant health and economic burden. These findings reinforce the need for employers and employees to evaluate and address the burden of obesity on work productivity.

With respect to their waist measurements, majority (51%) of the participants had above normal waist circumference whereas the remaining 49% had normal waist circumference. Increased waist circumference can also be a marker for increased risk, even in persons of normal weight. Waist circumference is related both to body mass index and to waist hip ratio. It refers to the measurement of the distance between the bellybutton and the center of the rib cage and recorded in centimeter. Two action levels of waist circumference are determined to identify people whose health risks are increasing (action level 1-94 cm for male and 80 cm for female and action level 2-102 cm for male and 88 cm for female). Those on action level 1 should avoid weight gain and those on action level 2 are more likely to have one or more cardiovascular risk factors (Han, van Leer, Seidell, & Lean, 1995).

Moreover, with regard to blood pressure, majority (84%) of the participants had normal blood pressure. However, it can also be observed that there were 17 (16%) participants whose blood pressure levels were above normal during the conduct of this study. Blood pressure level refers to the pressure of the blood in the circulatory system. The normal blood pressure for men and women is 139/89 and below and high blood pressure for men and women is 140/90 and above. Based on the analysis, most of the participants had no risk in developing a non-communicable disease related to hypertension although there were some whose blood pressures were beyond the normal level.

3.4. Relationship Between Participants’ Demographic Profile and Their Health and Lifestyle Practices

This section illustrates the relationship between the demographic profile of the participants and their health and lifestyle practices. Participants’ demographic profile includes variables such as age, sex, civil status, and employment status while health and lifestyle practices include their alcohol and cigarette consumption, physical activity, and dietary behavior.

3.4.1. Relationship Between Participants’ Demographic Profile and Their Health and Lifestyle Practices in Terms of Cigarette and Alcohol Consumption

Table 2. Relationship Between Participants’ Demographic Profile and Cigarette and Alcohol Behavior

Participants’ Demographic Profile	Cigarette Consumption		Alcohol Consumption	
	p – value	Interpretation	p – value	Interpretation
Age	0.096	Not Significant	0.0016**	Significant
Sex	0.108	Not Significant	0.2784	Not Significant
Civil Status	0.861	Not Significant	0.0081**	Significant
Employment Status	0.739	Not Significant	0.0932	Not Significant

Legend: ** Significant at 0.05 level of significance

Table 2 shows the relationship between the participants’ demographic profile and their health and lifestyle practices in terms of cigarette and alcohol consumption. Using chi-square test of independence with the aid of Statistical Package for Social Sciences, the data reveal that there is no significant relationship between the demographic profile of the participants and their cigarette consumption. Th p-values clearly indicate that the identified demographic profile has no bearing with the behavior of the participants in terms of cigarette consumption.

Moreover, the analysis reveals that the participants’ age and civil status were found to be significantly related to their health and lifestyle practices with regard to alcohol consumption. The p-values of 0.0016 and 0.0932 indicate that the participants’ age and civil status are significantly related to their behavior as regards alcohol consumption. Further analysis also reveals that those participants who were young and single had a tendency to engage in drinking alcoholic beverages. This finding is in agreement with the study conducted by Prescott and Kendler (2001), which stated that there is a decrease in drinking accompanying the transition from being single to first marriage. They further added that marriage causes decrease in alcohol drinking. Similarly, the present finding supports the study of Leonard, Miller-Tutzauer, and Windle (1991), which suggested that with regard to civil status, being single places the unmarried ones at risk because they may engage in such risky behaviors

such as alcohol drinking. In addition, Ulep et al. (2012) reported that among young and middle age adults, the pervasiveness of harmful drinking is relatively high.

3.4.2. Relationship Between Participants’ Demographic Profile and Their Health and Lifestyle Practices in Terms of Dietary Behavior

Table 3. Relationship Between Participants’ Demographic Profile and Fruits and Vegetables Intake

Participants’ Demographic Profile	Physical Activity	
	p – value	Interpretation
Age	0.0013**	Significant
Sex	0.0206**	Significant
Civil Status	0.1783	Not Significant
Employment Status	0.0809	Not Significant

Legend: ** Significant at 0.05 level of significance

Table 5 above shows the relationship between the participants’ demographic profile and their health and lifestyle practices with regard to the nature or intensity of their physical activities. Based on the analysis, the p-value of 0.0013 indicates that there is a significant relationship between the participants’ age and sex and the nature or intensity of the physical activities being done by them. This implies that age and sex have something to do with their engagement in doing physical activities. It can be noted that the young male participants spent more time in doing vigorous-intensity activities such as sports and fitness activities.

This finding is in agreement with the study of Hickey and Mason (2017), which cited that, in comparison with females, males spent more hours in doing or completing exercises every week and took part in more varied activities. Furthermore, El Ansari, Kahlil, Crone, and Stork (2014) noted that the female participants in their study manifested low level of physical activity.

3.5. Relationship Between Participants’ Health Lifestyle and Practices and Their Anthropometric Measurements

Table 6.1. Relationship Between Participants’ Health and Lifestyle Practices and Their Waist Circumference

Participants’ Health Lifestyle and Practices	Anthropometric Measurement (Waist Circumference)			
	Correlation Coefficient (r)	Qualitative Description	p-value	Interpretation
Cigarette Consumption	0.115	Negligible Correlation	0.4602	Not Significant
Alcohol Consumption	0.362	Low Correlation	0.0031**	Significant
Physical Activity	- 0.604*	High Correlation	0.0002**	Significant
Dietary behavior				
Fruit Intake	- 0.582*	High Correlation	0.0001**	Significant
Vegetable Intake	- 0.509*	High Correlation	0.0072**	Significant
Salt Intake	0.387	High Correlation	0.0294**	Significant
Processed Food Intake	0.372	High Correlation	0.0017**	Significant

Legend: ** Significant at 0.05 level of significance

Note for Pearson r value: 0.01 – 0.19 – Negligible Correlation; 0.20 – 0.39 – Low Correlation; 0.40 – 0.69 – High Correlation; and 0.70 – 0.99 – Very High Correlation (Superscript indicates the ranking of the identified health lifestyle and practices)

Table 6.1 shows the relationship between the participants' health and lifestyle practices and their anthropometric measurements in terms of waist circumference. Based on the analysis, it can be gleaned from the table above that there is a high negative correlation between physical activity and waist circumference having a correlation coefficient of -0.604. In addition, the correlation coefficients of -0.582 and -0.509 indicate that the participants' fruits and vegetables intake were highly correlated with their waist circumference. It can be observed that negative correlation coefficient implies inverse relationship, that is, a high physical activity and more intake of fruits and vegetables indicate a smaller waist circumference.

Further analysis also reveals that there is a significant relationship between the participants' health and lifestyle practices in terms of alcohol consumption, physical activity, and dietary behavior and waist circumference. This implies that consuming alcoholic beverages, engaging in physical activities, and observing proper diet by eating more fruits and vegetables and less salt and processed foods have something to do with their waist circumference. This means that if an employee drinks alcoholic beverages, there is a greater likelihood for a bigger waist circumference. In contrast, if an employee engages in more vigorous physical activities, eats fruits and vegetables, and consumes less salty and processed foods, the result is a decrease in waist circumference.

The finding on alcohol consumption is in coherence with the finding of Schröder et al. (2007) that there was an association between risks of abdominal obesity in men and increased level of alcohol. This finding is also consistent with the study of Peltzer and Pengpid (2017), which reported that there were specific dietary behaviors associated with obesity. However, the finding of the present study is in contrast with that of Peltzer and Pengpid (2017), which pointed out that there was no significant relationship between physical activity and obesity.

Among the identified health and lifestyle practices, only cigarette behavior was not significantly associated with waist circumference. Hence, smoking could not be a contributory factor in the measurements of the waist circumference of the participants. This result could be attributed to the unequal representation or proportion of smokers and non-smokers. It may be noted that 87% of the participants were identified as non-smokers.

Table 6.2. Relationship Between Participants' Health Lifestyle and Practices and Their Body Mass Index

Participants' Health Lifestyle and Practices	Anthropometric Measurement (Body Mass Index)		
	Correlation Coefficient (r)	Qualitative Description	Interpretation
Cigarette Consumption	0.186	Negligible Correlation	Not
Alcohol Consumption	0.302	Low Correlation	Significant
Physical Activity	- 0.482 ⁵	High Correlation	Significant
Dietary behavior			
Fruit Intake	- 0.414 ⁴	High Correlation	Significant
Vegetable Intake	- 0.528 ³	High Correlation	Significant
Salt Intake	0.296	Low Correlation	Significant
Processed Food Intake	0.335	Low Correlation	Significant

Legend: ** Significant at 0.05 level of significance

Note for Pearson r value: 0.01 – 0.19 – Negligible Correlation; 0.20 – 0.39 – Low Correlation; 0.40 – 0.69 – High Correlation; and 0.70 – 0.99 – Very High Correlation (*Superscript indicates the ranking of the identified health lifestyle and practices*)

Table 6.2 shows the relationship between the participants' health and lifestyle practices and BMI. Based on the analysis, the top three among the identified health and lifestyle practices are vegetable intake, physical activity, and fruit intake with correlation coefficient of -0.528, -0.482, and - 0.414, respectively. The negative correlation coefficients imply inverse relationship. Hence, high vegetable intake, physical activity, and fruit consumption, were highly associated with a normal BMI.

Further analysis also reveals that the participants' alcohol consumption, physical activity, and dietary behavior were found to be significantly related with their BMIs. Therefore, less consumption of alcoholic beverages, observing proper diet by eating more fruits and vegetables and less salt and processed foods, and engaging in physical activities were statistically associated with normal BMIs. This finding is in coherence with the results of the studies of Lukasiewicz et al. (2005) and Albani et al. (2018), which claimed that alcohol consumption was significantly correlated with BMI, and concluded that drinking alcoholic beverages could cause obesity. In addition, the finding of the current study is likewise related to the study of Pati, Sinha, and Mahapatra (2019), which noted that growing obesity is attributed to inadequate physical activity. Furthermore, the finding of the present study with regard to dietary behavior supports the report that there is an inverse relationship between dietary behavior, particularly vegetable intake, and weight-related outcomes among adult individuals (Nour, Lutze, Grech, & Allman-Farinelli, 2018).

Among the identified health and lifestyle practices, only cigarette consumption was found to be statistically insignificant. This implies that smoking cigarette does not relate to the BMIs of the participants. This finding does not corroborate the study conducted by Taylor et al. (2018), which stated that cigarette smoking had been found to be significantly associated with higher BMIs. One possible reason for this is the unequal representation or proportion of smokers and non-smokers in the current study. It may be recalled that 87 % of the participants were non-smokers.

Table 6.3. Relationship Between Participants' Health and Lifestyle Practices and Their Blood Pressure

Participants' Health and Lifestyle Practices	Anthropometric Measurements (Blood Pressure)			
	Correlation Coefficient (r)	Qualitative Description	p-value	Interpretation
Cigarette Consumption	0.384	Low Correlation	0.0021**	Significant
Alcoholic Consumption	0.412	High Correlation	0.0074**	Significant
Physical Activity	- 0.709 ⁷	Very High Correlation	0.0003	Significant
Dietary behavior				
Fruit Intake	- 0.673 ⁶	High Correlation	0.0092**	Significant
Vegetable Intake	- 0.588 ⁵	High Correlation	0.0037**	Significant
Salt Intake	0.308	Low Correlation	0.0258**	Significant
Processed Food Intake	0.384	Low Correlation	0.0183**	Significant

Legend: ** Significant at 0.05 level of significance

Note for Pearson r value: 0.01 – 0.19 – Negligible Correlation; 0.20 – 0.39 – Low Correlation; 0.40 – 0.69 – High Correlation; and 0.70 – 0.99 – Very High Correlation (*Superscript indicates the ranking of the identified health lifestyle and practices*)

Table 6.3 shows that there is a very high correlation between physical activity and blood pressure. The correlation coefficient of -0.709 indicates that there is an inverse association between the participants’ physical activity and their blood pressure. This finding supports the study of Pati, Sinha, and Marapatra (2019), which claimed that inadequate physical activity is a factor for raised blood pressure.

It is also revealed that fruits and vegetable intake were found to be highly correlated with blood pressure having a correlation coefficient of -0.673 and -0.588, respectively. This implies that having a diet rich in fruit and vegetables is highly associated with normal blood pressure. This finding is in congruence with the study of Alonso et al. (2004), which showed that there is a strong association between a diet rich in fruits and vegetables and lower blood pressure level.

Further, all the participants’ health and lifestyle practices in terms of cigarette consumption, alcohol consumption, physical activity, and dietary behavior were identified as significant factors in the status of their blood pressure. Therefore, it can be concluded that avoiding cigarette smoking, lessening consumption of alcoholic beverages, engaging in physical activities, and observing proper diet by eating more fruits and vegetables and less salt and processed foods are statistically associated with normal blood pressures.

These findings support the previous studies which reported that smoking could upturn blood pressure that might result in a number of cardiovascular diseases (Jena and Purohit, 2017), drinking alcoholic beverages increases the risk of raised blood pressure (Santana et al., 2018), physical inactivity predicts occurrence of hypertension (Aljadhey, 2012), and dietary intake affects blood pressure (Alonso et al., 2004; Borgi et al., 2016; Du et al., 2016; John, Ziebland, Yudkin, Roe, & Neil, 2002; Lelong et al., 2017).

3.6. Relationship Between the Participants’ Anthropometric Measurements and Their Potential Risk in Developing Non-Communicable Diseases

Table 7. Relationship Between the Participants’ Anthropometric Measurements and Their Potential Risk in Developing Non-Communicable Diseases

Participants’ Anthropometric Measurements	Participants’ Risk in Developing Non-Communicable Diseases			
	Correlation Coefficient (r)	Qualitative Description	p-value	Interpretation
Body Mass Index	0.825	Very High Correlation	0.0001	Significant
Waist Circumference	0.808	Very High Correlation	0.0017	Significant
Blood Pressure	0.739	Very High Correlation	0.0084	Significant

Legend: ** Significant at 0.05 level of significance
Note for Pearson r value: 0.01 – 0.19 – Negligible Correlation; 0.20 – 0.39 – Low Correlation; 0.40 – 0.69 – High Correlation; and 0.70 – 0.99 – Very High Correlation

Table 7 shows that there is a very high positive correlation between the participants’ anthropometric measurements and risk in developing NCDs. This means that a high BMI, large waist circumference, and a high blood pressure imply a more potential risk in developing NCDs such as hypertension and cardiovascular diseases. This finding supports the claim of

Kruger, Venter, and Vorster (2001) that anthropometric measurements, particularly increased BMI or obesity which was significantly associated with blood pressure, are linked with an increased risk of NCDs. In addition, the finding of the current study is in agreement with the study of You, Wang, Teng, Ma, and Liu (2018), which revealed that the occurrence of NCDs is significantly associated with blood pressure level.

Further, there is a significant relationship between the participants’ BMI, waist circumference, and blood pressure and their potential risk in having NCDs. Thus, it is imperative for employees and administrators to take into consideration the said potential risk factors that may trigger the development of NCDs. These factors need to be addressed because the health of the employees significantly affects work performance (Boles, Pelletier, & Lynch, 2004; Mikkelsen et al., 2019).

Limitations of the Study

This study has two main limitations which warrant attention. First, since the participants came from one university only, this study may not merit generalizability of findings. A comprehensive study involving employees from other universities may be conducted. Second, it only used a portion of the STEP instrument. Future researches may consider using the instrument in its entirety so that all the factors are included. Additional tests like cholesterol checkup and glucose test with fasting may also be conducted to ensure more accurate determination of people who are at risk of developing NCDs. Notwithstanding these limitations, this study provides substantial information that can be used in formulating programs as interventions to thwart non-communicable diseases.

4. Conclusions

This study illustrates that the health practices and lifestyle components of university administrative personnel influenced the risk factors of non-communicable diseases. Among the lifestyle practices, lack of physical activity and dietary behavior in terms of low consumption of fruits and vegetables place the employees at most risk in developing NCDs. In terms of anthropometric measurements, there is a significant relationship between the employees’ BMI, waist circumference, and blood pressure and their potential risk in having non-communicable diseases. This means that a high BMI, large waist circumference, and a high blood pressure point toward a more potential risk in developing non-communicable diseases.

Considering these findings, the assessment of risk factors to NCDs can be used towards the formulation of appropriate policies to promote a healthy lifestyle in the workplace. A healthy lifestyle promotes resilience against non-communicable diseases. As Elhadj As Sy, the Secretary General of International Federation of Red Cross and Red Crescent Societies (2014) aptly emphasized, “NCDs are a leading threat to health and development. Yet, these diseases are preventable. Changing behaviors by eliminating shared risk factors can save lives.”

To reach this goal, it is recommended that an evidence-based, comprehensive, and inclusive employee wellness program be designed and implemented. The wellness program which must include components such as physical fitness, health promotion, and information dissemination, will focus on improving physical activity, improving dietary behavior, and limiting or cessation of tobacco smoking and

alcoholic drinking, among others. These may be deemed as small steps but are significant contributions geared towards the realization of the vision of the Department of Health (DOH) for “A Philippines free from the avoidable burden of NCDs”.

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Declaration of Conflict of Interest

The researchers declare that there is no conflict of interest involved whatsoever in this study.

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References

- Albani, V., Bradley, J., Wrieden, W. L., Scott, S., Muir, C., Power, C., Fitzgerald, N., Stead, M., Kaner, E., & Adamson, A. J. (2018). Examining associations between body mass index in 18-25 year-olds and energy intake from alcohol: Findings from the Health Survey for England and the Scottish Health Survey. *Nutrients*, 10(10), 1477. doi:10.3390/nu10101477.
- Aljadhay, H. (2012). Physical inactivity as a predictor of high prevalence of hypertension and health expenditures in the United States: A cross-sectional study. *Tropical Journal of Pharmaceutical Research*, 11(6), 983-990. doi: 10.4314/tjpr.v11i6.16.
- Alonso, A., De la Fuente, C., Martín-Arnau, A., De Irala, J., Alfredo Martínez, J., & Martínez-González, M. (2004). Fruit and vegetable consumption is inversely associated with blood pressure in a Mediterranean population with a high vegetable-fat intake: The Seguimiento Universidad de Navarra (SUN) Study. *British Journal of Nutrition*, 92(2), 311-319. doi:10.1079/BJN20041196.
- Boles, M., Pelletier, B., & Lynch, W. (2004). The relationship between health risks and work productivity. *Journal of Occupational and Environmental Medicine*, 46(7), 737-745. doi: 10.1097/01.jom.0000131830.45744.97.
- Borgi, L., Muraki, I., Satija, A., Willett, W. C., Rimm, E. B., & Forman, J. P. (2016). Fruit and vegetable consumption and the incidence of hypertension in three prospective cohort studies. *Hypertension*, 67(2), 288-293. doi:10.1161/hypertensionaha.115.06497.
- Du, H., Li, L., Bennett, D., Guo, Y., Key, T. J., Bian, Z., Sherliker, P., Gao, H., Chen, Y., Yang, L., Chen, J., Wang, S., Du, R., Su, H., Collins, R., Peto, R., & Chen, Z. (2016). Fresh fruit consumption and major cardiovascular disease in China. *New England Journal of Medicine*, 374(14), 1332-1343. doi: 10.1056/nejmoa1501451.
- El Ansari, W., Khali, K., Crone, D., & Stock, C. (2014). Physical activity and gender differences: Correlates of compliance with recommended levels of five forms of physical activity among students at nine universities in Libya. *Central European Journal of Public Health*, 22(2), 98-105. doi: 10.21101/cejph.a4011.
- GBD 2013 Mortality and Causes of Death Collaborators. (2014). Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, 385 (9963), 117-171. doi: 10.1016/S0140-6736(14)61682-2.
- Han, T.S., van Leer, E.M., Seidell, J.C., & Lean, M.E.J. (1995). Prevalence study in a random sample: Waist circumference action levels in the identification of cardiovascular risk factors. *The BMJ*, 311(7017), 1401-1405. doi: 10.1136/bmj.311.7017.1401.
- Harvard T.H. Chan (n.d.). *The nutrition source: Salt and sodium*. Retrieved from <https://www.hsph.harvard.edu/nutritionsource/salt-and-sodium/>.
- Hickey, M.E. & Mason, S.E. (2017). Age and gender differences in participation rates, motivators for, and barriers to exercise. *Modern Psychological Studies*, 22(2), 10-19. <https://scholar.utc.edu/mps/vol22/iss2/3>.
- Isfiedvajani, M. S., Zarchi, A. A. K., & Tavana, A. M. (2016). diet behavior of employees at a medical sciences university in Tehran, Iran: Iran Health Day 2015. *International Journal of Travel Medicine and Global Health*, 4(3), 92-95. doi: 10.21859/ijtmgh-040305.
- Jaime, P. C. & Monteiro, C. A. (2005). Fruit and vegetable intake by Brazilian adults, 2003. *Cadernos de Saúde Pública*, 21(1), 19-24. doi: 10.1590/S0102-311X2005000700003.
- Jena, S.K. & Purohit, K.C. (2017). Smoking status and its effect on blood pressure: A study on medical students. *CHRISMED Journal of Health and Research*, 4(1), 14-8. doi: 10.4103/2348-3334.196034.
- John, J., Ziehlend, S., Yudkin, P., Roe, L., & Neil, H. (2002). Effects of fruit and vegetable consumption on plasma antioxidant concentrations and blood pressure: A randomised controlled trial. *The Lancet*, 359(9322), 1969-1974. doi:10.1016/s0140-6736(02)98858-6.
- Kruger, H., Venter, C., & Vorster, H. (2001). Obesity in African women in the North West Province, South Africa is associated with an increased risk of non-communicable diseases: The THUSA study. *British Journal of Nutrition*, 86(6), 733-740. doi:10.1079/BJN2001469.
- Kudel, I., Huang, J. C., & Ganguly, R. (2018). Impact of obesity on work productivity in different US occupations: Analysis of the National Health and Wellness Survey 2014 to 2015. *Journal of Occupational and Environmental Medicine*, 60(1), 6-11. doi:10.1097/JOM.0000000000001144.
- Lear, S. A., Hu, W., Rangarajan, S., Gasevic, D., Leong, D., Iqbal, R., Casanova, A., Swaminathan, S., Anjana, R.M., Kumar, R., Rosengren, A., Wei, L., Yang, W., Chuangshi, W., Huaxing, L., Nair, S., Diaz, R., Swidon, H., Gupta, R., Mohammediard, N., Lopez-Jaramillo, P., Oguz, A., Zatonska, K., Seron, P., Avezum, A., Poirier, P., Teo, K., & Yusuf, S. (2017). The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: The PURE study. *The Lancet*, 390(10113), 2643-2654. doi: 10.1016/s0140-6736(17)31634-3.



- Lelong, H., Blacher, J., Baudry, J., Adriouch, S., Galan, P., Fezeu, L., Hercberg, S., & Kesse-Guyot, E. (2017). Individual and combined effects of dietary factors on risk of incident hypertension. *Hypertension*, 70(4), 712-720. doi:10.1161/hypertensionaha.117.09622.
- Leonard, K.E., Miller-Tutzauer, C., & Windle, M. (1991). Marriage and alcohol use: A longitudinal study of "maturing out". *Journal of Studies on Alcohol*, 52(5), 434-440. doi: 10.15288/jsa.1991.52.434.
- Lukasiewicz, E., Mennen, L., Bertrais, S., Arnault, N., Preziosi, P., Galan, P., & Hercberg, S. (2005). Alcohol intake in relation to body mass index and waist-to-hip ratio: The importance of type of alcoholic beverage. *Public Health Nutrition*, 8(3), 315-320. doi:10.1079/PHN2004680.
- Mikkelsen, B., Williams, J., Rakovac, I., Wickramasinghe, K., Hennis, A., Shin, H.R., Farmer, M., Weber, M., Berdzuli, N., Borges, C., Huber, M., & Breda, J. (2019). Life course approach to prevention and control of non-communicable diseases. *BMJ*, 364, (I257). doi: 10.1136/bmj.I257.
- Mitchell, R. & Bates, P. (2010). Measuring health-related productivity loss. *Population Health Management*, 14, 93-8. doi:10.1089/pop.2010.0014.
- Naicher, A., Venter, C.S., Macintyre, U.E., & Ellis, S. (2015). Dietary quality and patterns and non-communicable disease risk of an Indian community in KwaZulu-Natal, South Africa. *Journal of Health, Population and Nutrition*, 33, 12. doi: 10.1186/s41043-015-0013-1.
- National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health (2014). *The health consequences of smoking—50 years of progress: A report of the surgeon general*. Atlanta (GA): Centers for Disease Control and Prevention (US).
- Nour, M., Lutze, S. A., Grech, A., & Allman-Farinelli, M. (2018). The relationship between vegetable intake and weight outcomes: A systematic review of cohort studies. *Nutrients*, 10(11), 1626. doi:10.3390/nu10111626.
- Olatona, F.A., Onabanjo, O.O., Ugbaja, R.N., Nnoahamm, K.E., & Adelekan, D.A. (2018). Dietary habits and metabolic risk factors for non-communicable diseases in a university undergraduate population *Journal of Health, Population and Nutrition*, 37(1), 21. doi:10.1186/s41043-018-0152-2.
- Pati, S., Sinha, R., & Mahapatra, P. (2019). Non-communicable disease risk reduction teaching in India: A curricular landscape. *Public Health*, 7, 133. doi:10.3389/fpubh.2019.00133.
- Peltzer, K. & Pengpid, S. (2017). The association of dietary behaviors and physical activity levels with general and central obesity among ASEAN university students. *AIMS Public Health*, 4(3), 301-313. doi: 10.3934/publichealth.2017.3.301.
- Pinlac, P.A.V., Castillo, E.C., Guevarra, J.P., Escartin, I.C., Caluag, M.E.I., Granada, C.N., Tagunigar, L.B., & Gloriani, N.G. (2015). The status of non-communicable disease prevention and control in the Philippines: A systematic review. *Acta Medica Philippina*, 49(3), 19-26.
- Prescott, C.A. & Kendler, K.S. (2001) Associations between marital status and alcohol consumption in a longitudinal study of female twins. *Journal of Studies on Alcohol and Drugs*, 62(5), 589-604. doi: 10.15288/jsa.2001.62.589.
- Reeves, M.J. & Raftery, A.P. (2005). *Healthy lifestyle characteristics among adults in the United States, 2000. Archives of Internal Medicine*, 165(8), 854-857. doi: 10.1001/archinte.165.8.854.
- Santana, N., Mill, J. G., Velasquez-Melendez, G., Moreira, A. D., Barreto, S. M., Viana, M. C., & Molina, M. (2018). Consumption of alcohol and blood pressure: Results of the ELSA-Brasil study. *PLoS One*, 13(1), e0190239. doi:10.1371/journal.pone.0190239.
- Schröder, H., Morales-Molina, J. A., Bermejo, S., Barral, D., Mándoli, E. S., Grau, M., Guxens, M., de Jaime Gil, E., Alvarez, M.D., & Marrugat, J. (2007). Relationship of abdominal obesity with alcohol consumption at population scale. *European Journal of Nutrition*, 46(7), 369-376. doi: 10.1007/s00394-007-0674-7.
- Schuwirth, N., Borgwardt, F., Domisch, S., Friedrichs, M., Kattwinkel, M., Kneis, D., Kummerlen, M., Langhans, S.D., Martínez-López, J., & Vermeiren, P. (2019). How to make ecological models useful for environmental management. *Ecological Modelling* 411(108784). doi:10.1016/j.ecolmodel.2019.108784.
- Taylor, A., Richmond, R., Palviainen, T., Loukola, A., Wootton, R., Kaprio, J., Relton, C.L., Davey Smith, G., & Munafò, M. (2018). The effect of body mass index on smoking behaviour and nicotine metabolism: A Mendelian randomization study. *Human Molecular Genetics*, 28(8), 1322-1330. doi:10.1093/hmg/ddy434.
- Ulep, V.G.T., Go, J.J., Aldeon, M., Duante, C., Ortiz, D.A.P., Gonzales, R.C., Mendoza, L.R., Reyes, C., & Elgo, F.R. (2012). Inequities in non-communicable diseases (Philippine Institute for Development Studies Discussion Paper Series No. 2012-04). Retrieved from <https://dirp3.pids.gov.ph/ris/dps/pidsdps1204.pdf>.
- Villaverde, M., Vergere, M., & Santos, M. (2012). *Health promotion and non-communicable diseases in the Philippines: Current status and priority policy interventions and actions*. (Technical Report). Q.C., Philippines: Ateneo de Manila University School of Government and Health Justice Philippines. doi:10.13140/RG.2.1.4008.3282.
- World Health Organization. (2005). *The Bangkok charter for health promotion in a globalized world*. Retrieved from http://www.who.int/mediacentre/news/releases/2005/p_r34/en/.
- World Health Organization. (2007). *Cancer control: Knowledge into action. WHO guide for effective programmers*. Retrieved from <http://www.who.int/cancer/FINAL-Advocacy-Module%206.pdf>.
- World Health Organization. (2011). *From burden to "best buys": Reducing the economic impact of non-communicable diseases in low and middle-income countries*. Retrieved from https://www.who.int/nmh/publications/best_buys_summary/en/.
- World Health Organization. (2018). Alcohol. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/alcohol>.
- You, Y., Wang, J., Teng, W., Ma, G., & Liu, P. (2018). Blood pressure and noncommunicable diseases in middle-aged and older adults in China. *PLoS One*, 13(11), e0206635. doi: 10.1371/journal.pone.0206635.

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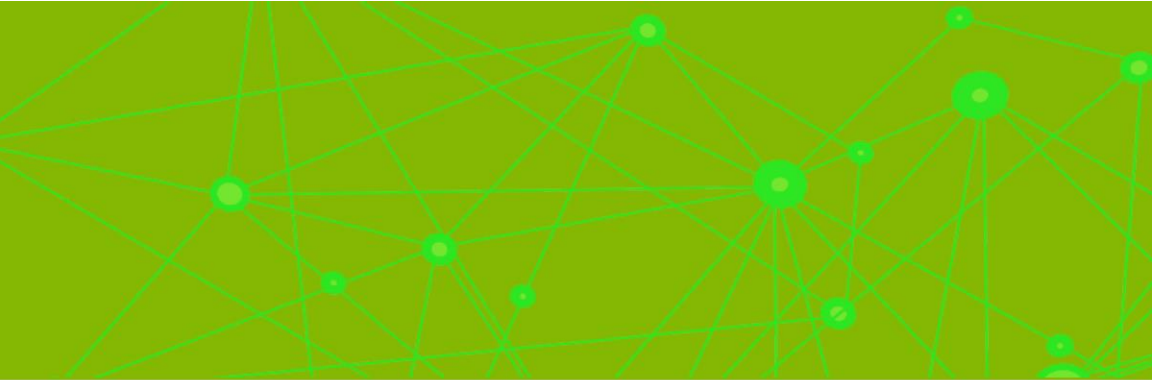
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