



Health risk assessment of salt farmers in Pangasinan

Wilbert O. Rosario, Jumar B. Baratang*, Jomar R. Gonzales, Sherlyn C. Platon,
Queeny Anne Q. Apil, Naomi A. Rebong

Pangasinan State University Bayambang Campus Philippines

Article published on June 06, 2023

Key words: Health, Health risk assessment, Salt farmers

Abstract

The agricultural industry in the Philippines accounts for 20% of the national income found in salt farming. Salt-making has been one of the major sources of livelihood here in the Pangasinan. Farming is also widely recognized as a risky occupation, due to a high predominance of occupational injuries. This study aimed to determine the Health Risk Assessment of the Salt farmers in Pangasinan, Philippines. It sought to unfold the health risk factors of salt farmers in terms of demographic profile, health history, physical assessment, and medical-laboratory findings. In this study, the researchers utilized a descriptive quantitative research design. In selecting the participants, the researchers utilized stratified random sampling. It covers 3 Municipalities in Pangasinan including Alaminos, Dasol, and San Fabian, Pangasinan. The researchers administered survey questionnaires, conducted interviews, and performed a physical assessment, extracted blood samples for medical laboratory testing from the respondents in the stated locality. Salient findings that majority of the respondents have experienced hypertension, arthritis, chronic back pain, dehydration, and physical injury. There is a very alarming and risk-taking identified medical condition of salt farmers and requires lifetime medication. Moreover, there is poor medication management that may contribute to the increased morbidity and mortality rate of a patient. It is highly recommended that the government should also give necessary support in terms of financial, socioeconomic, and political benefits since salt farmers have a vital contribution to the agricultural industry in the Philippines.

*Corresponding Author: Jumar B. Baratang ✉ jumarbaratang@psu.edu.ph

Introduction

The agricultural industry in the Philippines is vital, it accounts for 20% of the national income found in salt farming and has been one of the major sources of livelihood here in the Pangasinan. Salt is the prime ingredient of cuisine. It adds flavor to dishes and provides trace amounts of minerals beneficial to maintaining the health of an individual. Also, health nowadays is considered a new investment that can improve new ways of living by an individual. However, a person's overall health and the possibility of developing a certain disorder or injury may depend on the health assessment done by the physician, and the capability of a person in identifying the health risk-related factors that drive a person in preventing a certain disease, illness, or an injury.

Agriculture is a sector of the economy with the peak risk of occupational skin disease. Allergic contact dermatitis is the most widespread occupational skin disease in farmers which was diagnosed in 86% of all cases. Given that primary-care physicians have a continuous partnership with patients, basic health risk assessment data includes demographics, lifestyle, personal and family health history, and physiological data (such as blood pressure, weight, cholesterol, etc.) might be very significant to the salt farmers (Bregendahl *et al.*, 2017). In a study of Lu, *et al.* (2021) found that farmers suffered from various symptoms concerning the general health, eye, ears, nose, and throat region, neurological system, gastrointestinal system, respiratory system, cardiovascular system, and integumentary system.

Also, farming is also widely recognized as a risky occupation, due to a high predominance of occupational injuries and fatalities and attention has been drawn to overweight/obesity as a contradictory risk factor for occupational injury, musculoskeletal disorders, and depression (Doorn, *et al.*, 2021). A specified health risk assessment tool for farmers is one of the basic components of personalized medicine that evaluated the possibility of developing a certain disease and a person's overall health. Collecting an accurate health risk assessment, focusing on the

general well-being of the patient and family history will likely improve risk stratification, and shared medical decisions with other health care providers will be the primary care role. As a result, improving the delivery of care throughout the healthcare system (Bregendahl *et al.*, 2017).

Furthermore, in accordance with Elwood (2016), a psychologist and behavioral scientist at the National Institutes of Health in a study entitled "Understanding health risks is key to making your own health care decisions," stated knowing health risk factors can give your perspective on potential harms and benefits, so you can make smart choices based on facts and not fears." As primary care's role is largely tackling the general welfare of the patient, collecting an accurate health risk assessment and family history will likely improve risk layering and shared medical decisions with medical providers. As a result, improving the delivery of care throughout the healthcare system (Bregendahl *et al.*, 2017).

In this study, the researchers want to identify the health risk assessment of Filipino Salt farmers. Since Pangasinan may still be the province's top salt producer nowadays. The study conducted by the Nutrition Center of the Philippines showed that salt from this province, totaled 74,765 MT, the highest salt production by a province in the country. However, the health risk of the salt farmers in the province must also be assessed because farmers must ensure their health and enable them to stay in the industry and boost agricultural activity, and productivity.

Materials and methods

The methodology and research design of this study specified the description of the subjects, data gathering instrument, data gathering procedure, and statistical treatment. This met and ensured the utmost validity of the study. The researcher utilized a quantitative research design, specifically a descriptive correlation method. Through this method sought to determine the health risk assessment of salt farmers in Pangasinan. Survey research was the instrument in gathering the data. This type of research used questionnaires in obtaining accurate data.

Finding reliable, valid, and information about the health risk assessment of Salt Farmers in Pangasinan. The initial step is to gain ideas about the health risk factors of salt farmers in Pangasinan. Second, reading old studies and journals that are compiled in libraries and on the internet is also helpful in gathering information. After gathering information about the topic, the researchers composed questionnaires. This questionnaire was undergone ethics review, and the content was validated by the expert administered to the respondents in strengthening the reliability of the information that was gathered. After that, the researchers administered survey questionnaires, conducted interviews, and performed the physical assessment, extracted blood samples for medical laboratory testing from the respondents in the stated locality. Then, the researcher thoroughly investigated and observed the environment in which the farmers are often exposed so that the researchers might see if the surroundings could also affect them.

The researchers asked permission from the respondents to perform a physical assessment, extraction of a blood sample for medical laboratory testing, and interview. Informed consent was obtained from the respondent. Privacy and confidentiality of the result were observed. Beneficence and Non-maleficence were properly discussed with the respondents. The right to withdraw or voluntary participation in this study was highly stipulated. In selecting the participants, the researcher utilized stratified random sampling. The population is first divided into two or more strata. As with quota sampling, the aim of stratified sampling is to enhance representatives. In this design, the population has subdivided into homogenous subsets from which an appropriate number of an element are selected randomly. The researcher might select subjects in proportion to the size of the stratum in the population. Stratified random sampling enables researchers to sharpen the precision and representativeness of the final sample.

The primary instrument that was used in this study was a structured survey questionnaire adapted from

CDC National Healthy Worksite Program (NHWP) Employee Health Assessment (CAPTURE™) and Behavioral Risk Factor Surveillance System which includes items on socio-demographic profiles, medical history, current health status, health behaviors, and readiness to change health behaviors and the needs and interests related to worksite health history, and safety questions were modified on how health may affect their daily work or activities. In addition, self-administered questionnaires, observation, and interviews were used in data collection and facilitated by formal written instruments.

A scale was provided in a numeric form to the questionnaires where the score was placed on the respondents on a continuum with respect to an attribute being measured. An ideal data collection procedure is one that captures a construct in a way that is relevant, accurate, truthful, and sensitive. The reliability of a quantitative instrument is a major criterion for assessing its quality and adequacy. Thus, reliability can be equated with measures of stability, consistency, or dependability. In this study assessment of an instrument's internal consistency scale and test that involve summing item scores, are almost always evaluated for their internal consistency.

In this study, the researchers utilized content validity wherein the concern is the degree to which an instrument has an appropriate sample item for the construct being measured and adequately covers the construct domain. Content validity is relevant for both affective and cognitive measure. All responses/data retrieved and consolidated. To be able to draw valid, reliable information, and good results appropriate statistical tools utilized. Using the data analysis tool pack Descriptive statistics employed such as frequency, percentage, in the analysis of data. Frequency distribution (Polit and Beck, 2006) is a method of imposing order on numeric data. It is a systematic arrangement of numeric values from the lowest to the highest together with counts or percentages of the number of times each value obtained. Pearson product correlation was used to determine the association between the profile and the

health risk assessment of the respondents. All statistical calculation was based on 95% confidence levels. Scoring and interpreting of answers by the respondents were illustrated using the score tables and graph presentations.

Results and discussion

Univariate data is presented in this section, contextualizing the study, and providing a detailed profile of the respondents. Majority or 50% of the respondents are classified under the category of 48 - 60 age group, 83.3% were male, 93.3% of the populations are married with 4-6 number of siblings, and 90% of them finished secondary education. Most of the salt producers assessed in the study are classified as old-aged adults and started salt-farming during the early stages of their lives. As pointed out by the World Health Organization (2021), older age is characterized by the emergence of several complex health states commonly called geriatric syndromes. As people age, they are more likely to experience several health conditions at the same time. And the nature of the work of salt farming which usually entails a heavy workload and a high amount of physicality put females at a disadvantage. In addition, majority of the salt farmers in Pangasinan did not manage to reach college level and started working in the salt farming industry as soon as they were in the elementary school. In line with this, as mentioned by V. Raghupathi *et al.* (2020), people who have low educational attainment are generally associated with self-reported poor health, shorter life expectancy, and shorter survival when sick. In relation, given that all the salt farmers who participated in the study earn below the minimum wage, it is not surprising that most if not all the respondents are having issues making both ends meet.

In line with this, based on the given health history of the respondents a specified health risk assessment tool for salt farmers evaluates the possibility of developing a certain disease and a person's overall health. Contemporary literature has simply suggested that occupational factors, especially working postures, are the main causes of low back pain

(Keawduangdee P, *et al.*, 2012). Since 40% of the respondents had experienced low back. Pain from hip, knee, ankle or foot 30% of salt farmers had experienced it also. Likewise, neck or shoulder pain got 18%, and for elbow, wrist, or hand pain 12% have encountered it for the past 3 months.

Further, 22% of the salt farmers were diagnosed with gout, and rheumatoid arthritis, 13% experienced chronic low back pain and dehydration. And some of them had been told by their doctors that they have respiratory and metabolic disorders such as chronic obstructive pulmonary diseases got 10%, asthma got 2%, and diabetes mellitus got 8%. Hypertension was prevailing on the health condition of the respondents where 32% of population diagnosed with high blood pressure. According to WHO (2021), hypertension is a serious medical condition that significantly increases the risks of heart, brain, kidney and other diseases. Consonantly, poor medication management on the stated diseases may contribute to the increased morbidity and mortality rate of a patient (Crouch *et.al*, 2016). This is very alarming and risk-taking for them since the identified medical condition of a salt farmer requires lifetime medication. In connection with this, the condition can damage a wide variety of body systems, including the skin, eyes, lungs, heart, and blood vessels (Mayo Clinic, 2021).

Health History

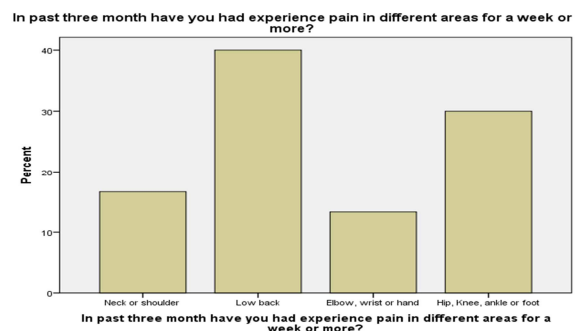


Fig. 1.

Fig. 1 illustrates that 40% of salt farmers had experienced low back pain for several weeks or months prior to data gathering. Pain from hip, knee, ankle, or foot 30% of salt farmers had experienced it also.

Likewise neck or shoulder pain got 18%, for elbow, wrist, or hand pain 12% have encountered it for the past 3 months. Contemporary literature has simply suggested that occupational factors, especially working postures, are the main causes of low back pain (Keawduangdee P, *et al.*, 2012).



Fig. 2.

Fig. 2 shows that 32% of the respondents/Salt farmers have been diagnosed with high blood pressure wherein, hypertension is a serious medical condition that significantly increases the risks of heart, brain, kidney, and other diseases (WHO, 2021). Further, 22% of the salt farmers were diagnosed with gout, and rheumatoid arthritis, 13% experiencing chronic low back pain, and dehydration. And some of them had been told by their doctors that they have respiratory and metabolic disorders such as chronic obstructive pulmonary diseases got 10%, asthma got 2%, and diabetes mellitus got 8%.

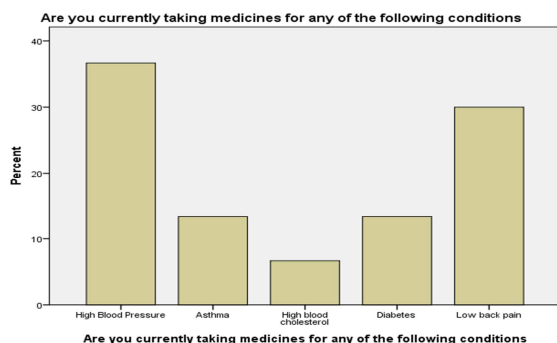


Fig. 3.

Fig. 3 illustrates that out of 30 respondents only 37% of the salt farmers diagnosed with high blood pressures are currently taking medications.

Next, for a condition of low back pain 30%, for Asthma only 13%, for High blood cholesterol only 7%, for Diabetes Mellitus only 13% are taking medication for their condition. This is very alarming and risk-taking for them since the identified medical condition of a salt farmer requires lifetime medication. In accordance, poor medication management may contribute to the increased morbidity and mortality rate of a patient (Crouch *et al.*, 2016).

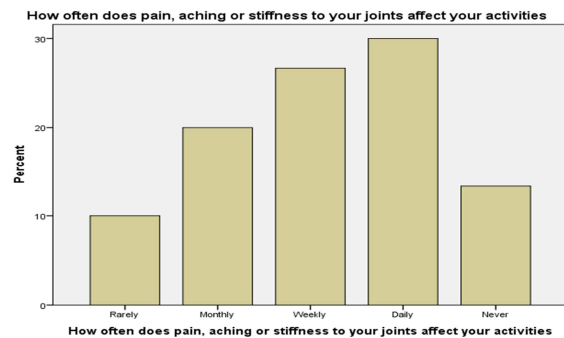


Fig. 4.

In connection to the results abovementioned, this Fig. 4, every day 30% of salt farmers experienced aching stiffness of their joints that affects their daily activities. Rheumatoid arthritis is a chronic inflammatory disorder that can affect more than just your joints. In some people, the condition can damage a wide variety of body systems, including the skin, eyes, lungs, heart, and blood vessels (Mayo Clinic, 2021).

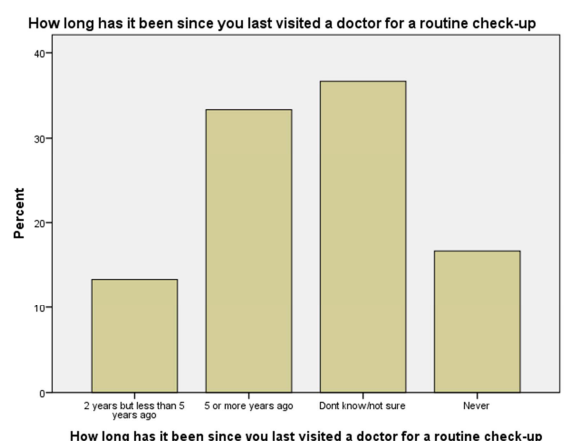


Fig. 5.

Fig. 5 shows that 37% of salt farmers do not visit a doctor for a routine check-up, and 33% usually take 5 or more years long to visit a doctor.

And there are 17% of our salt farmers have never been seen and examined by doctors for their underlying conditions and the remaining 13%, 2 years but less than 5 years salt farmers seek medical consultation from doctors. At present, the population living in rural areas is still struggling with no or limited access to quality inpatient and outpatient healthcare services (DOH, 2020). In addition, medical laboratory testing such as cholesterol testing, fasting blood sugar, urinalysis, complete blood count, and blood pressure check-up for the past 6 months. The majority of the responses on each testing “Don’t know” or Never been tested for medical laboratory check-ups.

Physical Assessment

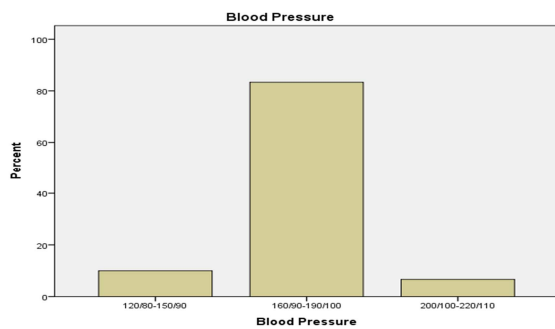


Fig. 6.

Fig. 6 shows that 80% of the population among salt farmers has an elevated blood pressure ranges from 160 over 90 mmHg to 190 over 100 mmHg, also 20% of which ranges from 120 over 80 mmHg to 150 over 90 mmHg, and about 15% has a blood pressure range of 200 over 100 mmHg to 220 over 110 mmHg. Elevated blood pressure or Hypertension is defined as systolic blood pressure more than 120 mmHg and/or diastolic blood pressure 90 mmHg or above.

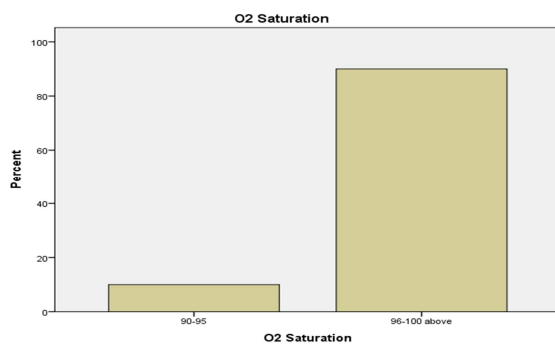


Fig. 7.

Oxygen saturation is the measure of how much oxygen is traveling through your body in your red blood cells. Normal oxygen saturation for healthy adults is usually between 95% and 100%. Fig. 7 illustrates that majority of the salt farm workers has a normal oxygen level with 90% having an outcome of 96% to 100% oxygen saturation while 10% has a product of 90% to 95% oxygen level in their body. If you have a chronic health condition that affects your lungs, blood, or circulation, regularly tracking your oxygen saturation is important. An O2 saturation level below 95% is not normal and requires medical attention.

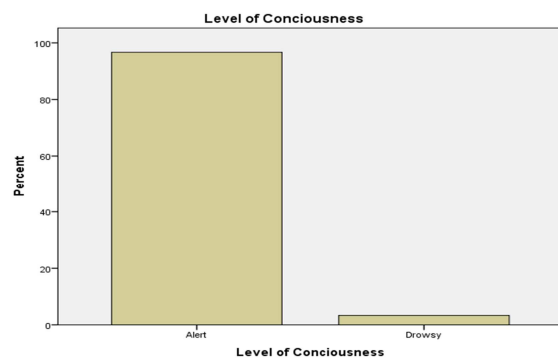


Fig. 8.

Checking level of consciousness is very important in assessing once physical health of an individual. Fig. 8 shows that predominantly among salt farm workers are 97% alert and about 3% were distinguished as drowsy during the time of assessment. Level of consciousness is a medical term for identifying how awake, alert, and aware of their surroundings someone is. It also describes the degree to which a person can respond to standard attempts to get his or her attention.

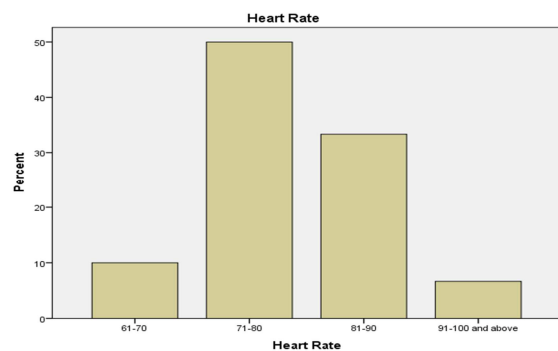


Fig. 9.

During physical assessment, this is one basic yet important measurement that needs to be taken and observed. Fig. 9 exemplifies a result taken during an assessment among salt farm workers with 50% having a Heart Rate ranging from 71 to 80bpm (beats per minute), 33% of them has 81 to 90bpm (beats per minute), while some has 10% range of 61 to 70bpm (beats per minute), and a least percentage of 7% has 91 to 100bpm (beats per minute) and above were enlisted. A normal resting heart rate for adults ranges from 60 to 100 beats per minute. Generally, a lower heart rate at rest implies more efficient heart function and better cardiovascular fitness.

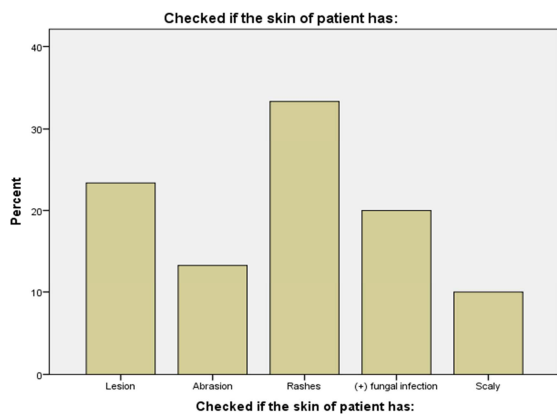


Fig. 10.

The various physical assessments of salt farm workers that cause the development of health risk with physiological signs and symptoms related to occupational disease is mostly skin problem. Salt farmers' face hot, bright sunlight conditions or heat exposure in their working conditions, combined with long working hours per week that produce cumulative adverse effects. They must perform heavy manual handling tasks of dragging and lifting a heavy sea salt basket. These factors affect their healthy skin, and health care protection exacerbate health as shown in Fig. 9. 33% Rashes, 23% Lesion, 20% (+) Fungal Infection, 14% Abrasion, and 10% scaly.

Medical Laboratory

The prevalence of Non-Communicable Disease (NCD) in the world is 73% (WHO, 2018). Diabetes Mellitus (DM) is a metabolic endocrine disease caused by increasing of blood sugar levels in the body (Sari,

Darlan and Prasetya, 2018). Fig. 11, fasting blood sugar result shows farmers with above normal 6 or 20%, normal blood sugar 19 or 63.3%, and below normal 5 or 16.7% respectively. This may be attributed to the nature of the work of salt farming which usually demands intense workload and physical movement. According to American Diabetes Association (2021) physical activity can lower your blood sugar up to 24 hours or more after your workout by making your body more sensitive to insulin.

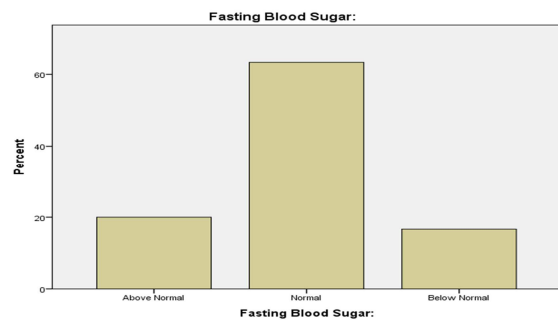


Fig. 11.

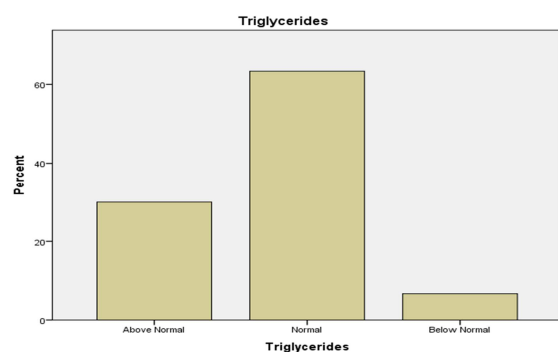


Fig. 12.

Furthermore, Fig. 12 total cholesterol result shows salt farmers with above normal 17 or 56.7%, normal 11 or 36.7%, below normal 2 or 6.7% which implies poor dietary habit and most of the farmers belongs to old-aged adults. According to the World Health Organization (2021), older age is characterized by the emergence of several complex health states commonly called geriatric syndrome. In addition, the study of D. Doorn *et al.* (2017) entitled "Farmers Have Hearts: The Prevalence of Risk Factors for Cardiovascular Disease Among a Subgroup of Irish Farmers", almost one in two farmers had hypertension, and 46% had elevated total cholesterol.

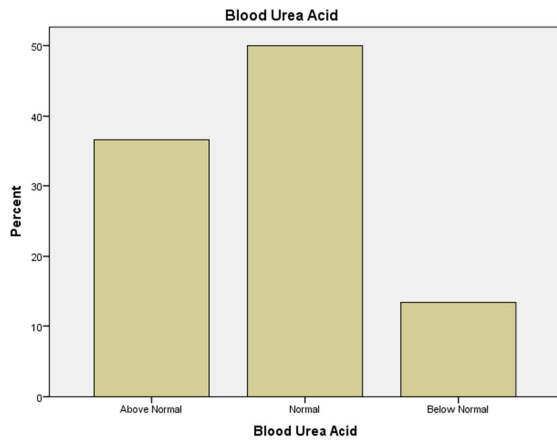


Fig. 13.

Uric acid is a waste product found in blood. It's created when the body breaks down chemicals called purines. Having some uric acid in the blood is normal. However, if uric acid levels go above or below a healthy range, this can result in health problems. High uric acid levels can increase the risk of gout. Fig. 12 shows blood urea acid of salt farmers with above normal 11 or 36.7%, normal 15 or 50%, and below normal 4 or 13.3% respectively. This could be attributed to available foods in their geographical location. Consistent with (Cleaveland Clinic, 2018), food and drinks high in purines also increase the level of uric acid. These include seafoods especially salmon, shrimp, lobster and sardines.

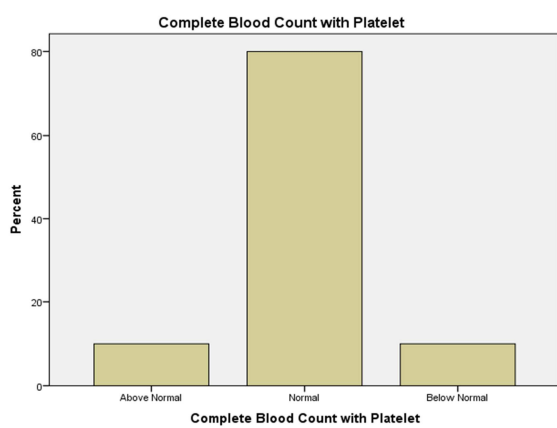


Fig. 14.

Fig. 14 reveals the complete blood count result of farmers with above normal 3 or 10%, normal 24 or 80%, and below normal 3 or 10% correspondingly. This entails that farmers are free from any blood

related disorders and current infections. A complete blood count (CBC) is a blood test used to evaluate your overall health and detect a wide range of disorders, including anemia, infection, and leukemia. (Mayo Clinic, 2021)

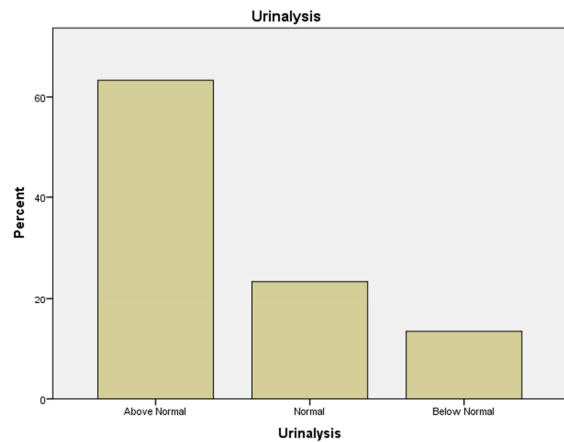


Fig. 15.

Hydration status was assessed using urine biomarkers included urine specific gravity which is the most popular biomarker. Fig. 15 discloses the urinalysis result of farmers with above normal 19 or 63.3%, normal 7 or 23.3%, and below normal 4 or 13.3% separately which indicates that they were dehydrated because they are working in the heat and intense workload. In a study of Luangwilai T. *et al.* (2021) findings showed that sea salt workers these workers have a heavy physical workload in a hot environment, and were found to be dehydrated after work, which could lead to a decrease in kidney function.

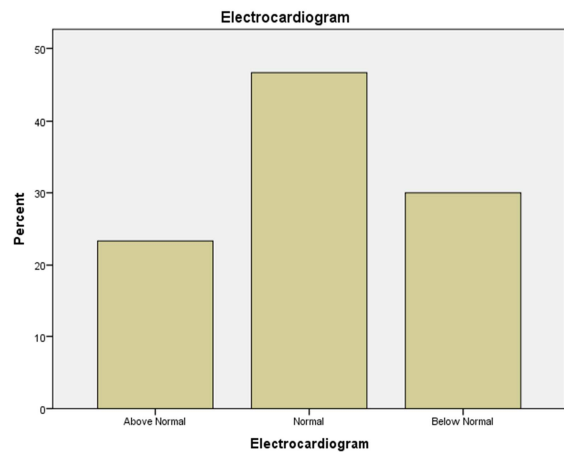


Fig. 16.

An electrocardiogram records the electrical signals in the heart. It's a common and painless test used to quickly detect heart problems and monitor the heart's health (Mayo Clinic, 2022). Fig. 16 reveals the electrocardiogram result of farmers with above normal 7 or 23.3%, normal 14 or 46.7%, and below normal 9 or 30% respectively. This implies that most of farmers were free from any heart disorders because of physical activity. Regular exercise Physical activity is important for all adults to keep their muscles strong and flexible and is key for a healthy heart. and exercise not only helps to prevent your risk of heart attack and heart disease but it can also help you improve and manage already developed heart conditions (Verywell, 2021).

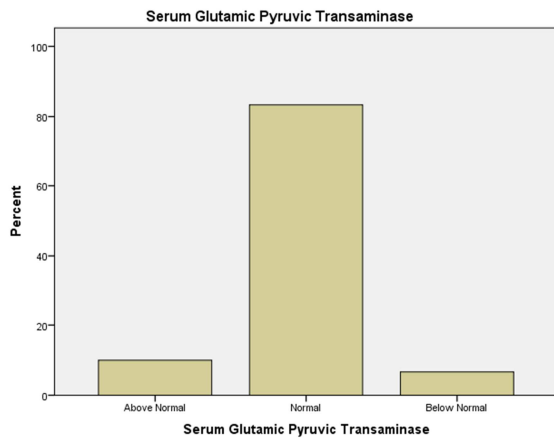


Fig. 17.

SGPT is highly sensitive marker of liver damage due to various diseases or injury. However, the fact is that higher than normal levels should not be automatically considered as indicative of liver damage which needs further evaluation. Fig. 17 reveals the SGPT result of farmers with above normal 3 or 10%, normal 25 or 83.3%, and below normal 2 or 6.7% in that order. This indicates that most of the farmers were not alcohol drinkers. Alcohol consumption is one of the leading causes of liver damage. When liver damage has happened due to alcohol, it's called alcohol-related liver disease (Healthline, 2020)

Chest X-rays produce images of your heart, lungs, blood vessels, airways, and the bones of your chest and spine. Chest X-rays can also reveal fluid in or

around your lungs or air surrounding a lung (Mayo Clinic, 2022). Fig. 18 reveals the Chest X-ray result of farmers with above normal 10 or 33.3%, normal 14 or 46.7%, and below normal 6 or 20.0% correspondingly. This suggests that farmers have healthy lungs from their physical activity. When you are physically active, your heart and lungs work harder to supply the additional oxygen your muscles demand. Just like regular exercise makes your muscles stronger, it also makes your lungs and heart stronger (American Lung Association, 2020)



Fig. 18.

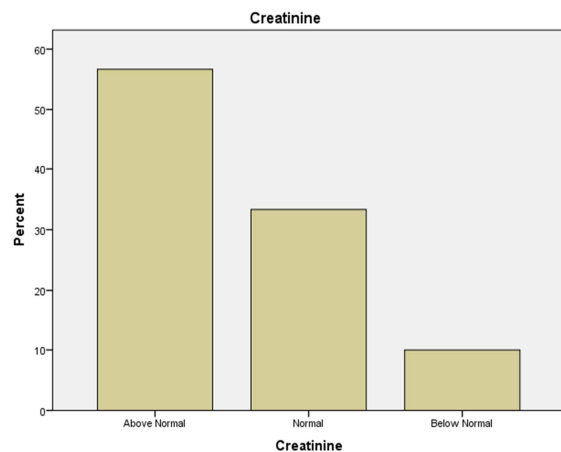


Fig. 19.

Creatinine is a waste product in your blood that comes from normal muscle wear and tear. The kidneys are responsible for the removal of creatinine from the blood, so if your kidney function declines, creatinine levels in the blood rise (emedicinehealth, 2022).

Fig. 19 reveals the creatinine result of farmers with above normal 17 or 56.7%, normal 10 or 33.3%, and below normal 3 or 10% respectively.

This implies dehydration of farmers during their heavy workload under the heat of sun. High creatinine levels can mean kidney damage or dehydration (emedicinehealth, 2022). Moreover, in a study of T. Luangwilai *et al.* (2021) entitled findings showed that sea salt farmers have a heavy physical workload in a hot environment, and were found to be dehydrated after work, which could lead to a decline in kidney function. The study gives new evidence that sea salt workers are at a reasonably higher risk of CKDu (chronic kidney disease of unknown etiology) in countries affected by climate change.

The various physical assessment and medical laboratory findings of the respondents significantly contributes to the total condition of the client. Almost one in two farmers had elevated blood pressure, and 46% had elevated total cholesterol, 36.7% of salt farmers with above normal result of blood uric acid which indicates for gouty arthritis. Overall results of medical and laboratory findings range above normal readings. This may be attributed to the nature of the work of salt farming which usually demands intense workload and lead to physical exhaustion.

Conclusion

Based on the salient findings there is a very alarming and risk-taking identified medical condition of salt farmers and requires lifetime medication. There is poor medication management that may contribute to increased morbidity and mortality rate of a patient. It is highly recommended that the government should also give necessary support in terms of financial, socioeconomic, and political benefits since salt farmers have a vital contribution to the agricultural industry in the Philippines.

Acknowledgment

We would like to express my heartfelt gratitude and appreciation to all those who have contributed to the successful completion of our research especially Pangasinan State University.

References

- American Diabetes Association.** 2002. Diabetes mellitus and exercise (Position Statement). Diabetes Care. Sanders Publication.
- American Diabetes Association.** 2021. Classification and diagnosis of diabetes: standards of medical care in diabetes-2021. Diabetes care, 44 (Supplement_1), S15-S33. Cauter, Kristine (2009). The Complete Canadian Health Guide. Canada Publishing Company.
- Anger WK.** 2015. Effectiveness of Total Worker Health interventions. *J. Occup. Health Psychol* **20**, 226-247.
- Bregendahl M.** 2017. Chapter 5 - Health Risk Assessments, Family Health History, and Predictive Genetic/Pharmacogenetic Testing, Editor(s): Sean P. David, Genomic and Precision Medicine (Third Edition), Academic Press.
- Brumby S.** 2013. Alcohol Consumption, Obesity, and Psychological Distress in Farming Communities- An Australian Study. *J. Rural Health* **29**, 311-319.
- Chen S, Mulgrew B, Granta PM.** 1993. "A clustering technique for digital communications channel equalization using radial basis function networks," *IEEE Trans. on Neural Networks* **4**, 570-578.
- Cordillera Administrative Region-Occupational Safety and Health Center.** 2006. (CAR-OSHC). Library of Congress. Country Profile Philippines.
- Cuevas, Princess Precilla L.** 2007. Public Health Nursing in the Philippines. (8th Edition) Publications Committee, National League of Philippine Government Nurses Incorporated.
- Deacon-Crouch M.** 2016. Chronic disease, medications and lifestyle: perceptions from a regional Victorian Aboriginal community. *Pharmacy Practice (Granada)* **14(3)**, 0-0.
- Gough B, Conner MT.** 2006. Barriers to healthy eating amongst men: A qualitative analysis. *Soc. Sci. Med* **62**, 387-395.

- Gust E.** 2006. National profile on occupational safety and health (Philippines). Occupational Safety and Health Center, Manila.
- Hernández AF, Parrón T, Alarcón R.** 2011. Pesticides and asthma. *Curr Opin Allergy Clin Immunol* **11**, 90-96.
DOI: 10.1097/ACI.0b013e32 83445939
- Keawduangdee.** 2012. Prevalence and associated risk factors of low-back pain in textile fishing net manufacturing. *Human Factors and Ergonomics in Manufacturing & Service Industries* **22(6)**, 562-570.
- Kiefer I, Rathmanner T, Kunze M.** 2005. Eating and dieting differences in men and women. *J. Men's Health Gend* **2**, 194-201.
- Luangwilai T, Robson MG, Siritwong W.** 2021. Effect of heat exposure on dehydration and kidney function among sea salt workers in Thailand. *Roczniki Państwowego Zakładu Higieny* **72(4)**.
- Mamane A, Baldi I, Tessier JF, Raheison C, Bouvier G.** 2015. Occupational exposure to pesticides and respiratory health. *Eur Respir* **24(136)**, 306-19.
- Mary Nies and Melanie McEwen.** 2018. *Community/Public Health Nursing (7th Edition)*. Elsevier Publication
- Nicolopoulou-Stamati PL.** 2016. Chemical Pesticides and Human Health: The Urgent Need for a New Concept in Agriculture. *Front Public Health* **4**, 148.
- Qixin Lü.** 2021. Risk assessment and hotspots identification of heavy metals in rice: A case study in Longyan of Fujian province, China, *Chemosphere* **270**, 2021, 128626, ISSN 0045-6535
<https://doi.org/10.1016/j.chemosphere.2020.128626>.
- Raghupathi V, Raghupathi W.** 2020. The influence of education on health: an empirical assessment of OECD countries for the period 1995-2015. *Archives of Public Health* **78(1)**, 1-18.
- Richardson N.** 2010. "The "buck" stops with me"—reconciling men's lay conceptualisations of responsibility for health with men's health policy. *Health Sociol* **19**, 419-436.
- Sy Henry.** 2008. *League of Philippine Diabetes Government Health Insight*. Nurses Incorporated. Publications Committee. National.
- van Doorn D.** 2021. Investigating the Dietary Habits of Male Irish Farmers to Prevent Mortality and Morbidity. *Safety* **7(3)**, 54.
<https://doi.org/10.3390/safety7030054>
- World Health Organization.** 2014. *Global Status Report on Noncommunicable Diseases*.
- World Health Organization.** 2021. *Obesity and Overweight*. World Health Organisation. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
- Ye M, Beach J, Martin JW, Senthilselvan A.** 2017. Pesticide exposures and respiratory health in general population. *J Environ Sci (China)* **51**, 361-370.