

Impact of Biomedical Waste on the Lao Community Environment: A Case Study of Vientiane Capital, Laos

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Abstract

This article analyzes and investigates “the Impact of Biomedical Waste on the Lao Community Environment, focusing on Vientiane Capital”, based on academic literature and regulations on hospitals and human rights in the community. In today's impact of biomedical waste management segregation and the factors influencing biomedical waste management, particularly segregation procedures. A high proportion of incorrectly segregated biomedical waste was found at each level of healthcare facility. Re-segregation revealed 39 percent at the central hospitals, 62 percent at the provincial hospitals, 57 percent at the district hospitals, and 37 percent at the health center in the community level, respectively, were poorly segregated. A higher proportion of biomedical waste from the inpatient department at the primary healthcare level was found. Thus, biomedical waste management at primary healthcare facilities needs more attention and should be better understood. Therefore, this article aims to study the legal framework implementation on impact of biomedical waste in community environment, and sets the basic concepts and definitions related to biomedical waste management, including definitions of waste, recycling and recovery, transportation, treatment and disposal, preventing medical waste is the preferred option, and sending waste to landfill for disposal should be the last resort. Many cities in Laos are facing the problem of biomedical waste management in the wake of urban development. The number of healthcare facilities is increasing day by day resulting in large-scale generation of biomedical waste. It has been observed that inadequate disposal of biomedical waste is creating a highly unhygienic environment and posing a serious health threat for inhabitants. This article discusses the issue of biomedical waste management in Laos from a wider perspective with special emphasis on the legal framework for biomedical waste management in the present context under domestic legislation and regulations, and international conventions related to environmental protection. Based on a study conducted in Vientiane Capital, which is the largest city in Laos. It is aimed to put forth the importance of adequate handling and treatment of biomedical waste with reference to healthy and hygienic living environment for inhabitants to live in.

Keywords: Biomedical Waste, the National; International Legislation, Regulations, Vientiane

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1. Introduction

Since Laos was liberated in 1975, the Lao People's Revolutionary Party has been attempting to implement various plans and policies from time to time to implement all forms of development for the country to prosper and escape from underdeveloped countries in 2024. Public health work is an important obligation of the Lao government, especially the Ministry of Health and related parties at the central and local levels, focus on developing all forms of biomedical waste management system to international standards. Nevertheless, Based on the report of the Lao Ministry of Public Health in 2022: Laos was affected by the spread of Covid-19 from March 2020-2021, and it is the main reason for increasing of the biomedical waste in Laos, especially in the large city as Vientiane and other cities, which will affect the health of people in the community in present and future, if the stakeholders do not have a standards system of control, treatment, and disposal according to the World health Organization Rules standards. And dealing with the massive amount of infectious healthcare waste became an enormous challenge to the Lao government¹. Biomedical waste implies waste is generated by human healthcare facilities, medical research and teaching establishments, clinical testing or research laboratories; and facilities involved in the production or testing of vaccines².

And in addition, it is caused by the spread of Covid-19, such as masks, infectious gloves, infectious needles, and other equipment. All of these may directly or indirectly affect the environmental conditions, health of people, animals, and living things in the community. In case the management is not systematic. Poor biomedical waste management-ranging from non-existing collection systems to ineffective disposal causes air pollution, water, and soil contamination and it is effective directly to people living in the community.

¹ Reported by the Lao Ministry of Public Health, May 2022, p 12, par 2.

² Laura Wakelam, “Negative Effects of Biomedical Waste on the Environment”, Published on 22 Oct 2021.

On the other hands, poor biomedical waste management ranging from non-existing collection systems to ineffective disposal is main causes air pollution, water, and soil contamination and it is effective directly to people living in the community because people and animals use drinking water, and the environment, it can cause infection and transmit diseases. Therefore, the relevant parties must pay more attention to treatment and dispose of those wastes in the right way and publicize their effects to the people in the community to prevent and not destroy them in a wrong way. In case there is a violation, legal measures must be taken against the violator seriously. Lastly, all biomedical waste has the potential to endanger human health as well as cause damage to the community environment. The most common types of potentially infectious biomedical waste include sharps waste, chemical waste, cytotoxic waste, and body part waste. This study investigates the management of biomedical management that is effective for the community environmental conditions in the Lao, especially in Urban Areas. To date, not much is known or understood about the situation since past studies have mainly focused on the issue of municipal biomedical waste creating a gap in the literature. The current study aims at bridging that gap by providing an empirical analysis of systemic and institutional approaches to the management of biomedical pollutants under the legal framework in the study area.

2. Impact of Biomedical Waste on the Community Environment

Biomedical waste management continues to dominate as a major societal and governance challenge, especially in urban areas of the least developed and developing countries overwhelmed by the high rate of population growth and garbage generation. As we know, biomedical waste is from hospitals' facilities, clinics, and other places and it has impacts on human health in society, nurses in hospitals, and clinics, and living animals. More important it affects us in the long term. One can develop diseases in people, especially women in the community from bad environmental conditions via uncontrolled dumping, open-air incinerators, and landfills, and others, such as asthma, cancer, cardiovascular disease, childhood cancer, infectious diseases, and preterm delivery. The negative impacts of such practices include air and water pollution, land degradation, emissions of methane and hazardous leachate, and climate change¹. In addition, there are many impacts of Biomedical Waste on the Lao Community Environment, such as its effects on our air and water, impacts our health, air pollution from burning biomedical waste mixed with general waste, hazardous waste, and others.

2.1 Biomedical Waste Impact in Urban Areas

The generation of biomedical waste in the hospitals of urban areas in Laos is on the rise every year, especially from 2019 - 2022 the Covid-19 pandemic is because of expanding urban population, poor collection, treatment transport, and disposal methods. Biomedical waste is on the rise in major cities, such as Vientiane Capital, Luang Prabang, Xaiyabouly, Thakhek, Savannakhet, and Champasak². However, this article focuses only Vientiane Capital because it is the largest city in Laos. Biomedical waste in Laos comprises mainly medical materials, chemical bottles, health care waste from hospitals, and clinics, masks, and Covid-19 test methods from communities. Laos responding to the problems and challenges associated with biomedical waste in urban areas, and managing biomedical waste generated from hospitals, clinics, and communities has become a major concern with the growing number of confirmed cases in Laos. Through the studies of many researchers, it is known that the rate of biomedical waste during the epidemic the covid-19 is increasing, but the system of protection, isolation, and disposal in Laos is still not strict and does not follow international standards as it should be even though the World Health Organization has sent experts to Laos to advise and help Laos. The major problems with urban biomedical waste disposal in Laos are releasing medical waste in hospitals, and the community, foul odor in the air, etc. Some of the most common concerns are that improperly disposed chemicals may leach into the soil and cause soil pollution because improper biomedical or general waste disposal affects the environment, and land pollution mainly. Land pollution happens whenever waste ends up on soil or another land that people should process instead and will be happened water pollution, air pollution, climate change, diseases, plant death, and loss of Habitats of humans and animals finally.

One of the major waste management problems is the lack of adequate collection and disposal infrastructure, and lack of proper collection, transportation, treatment, and disposal of biomedical waste by the related parties result in serious environmental issues, including littering and illegal dumping of peoples in society or communities. Therefore, the Lao government, and stakeholders have focused on solving those shortcomings as soon as possible to prevent the spread of chemical substances to the lives and health of people in the community and animals because of biomedical waste management is intended to reduce the adverse effects of waste on human health, the environment, planetary resources, and aesthetics. The aim of waste management is to reduce dangerous effects of such waste on the environment and human health in the community.

¹ Laos, the National Pollution Control Strategy and Action Plan 2018-2025 with Vision to 2030, Vientiane, Published in December 2017.

²Id, at p.15, par 1.

2.2 Consequences to Community and Environmental Conditions in Vientiane Capital

Vientiane Capital comprises 9 districts including Chanthabouly, Sikhottabong, Xaisethha, and Sisatthanak which could be considered as the metropolitans. Other 5 urbanized include Naxaythong, Xaithany, Hatxayfong, Pakngum, and Sengthong are small district¹. Vientiane capital currently (2023) has population, is 721,000, a 2.12% increase from 2022, and the metro area population of total in 2022 was 706,000, a 1.73% increase from 2021². Based on an analysis of the negative impacts of biomedical waste in Vientiane Capital by the Ministry of Natural Resources and Environment (MONRE) in 2022 and supported by the World Bank in actual practices including air and water pollution, land degradation, hazardous leachate, and climate change situation. The Minister of Public Health said: all biomedical waste must be disposed of responsibly, even if it is not considered particularly hazardous to people's health in the community in the present but it will be hazardous in the future direct and indirect absolutely. In order to reduce the risks of human infection, the spread of infections, and the emergence of epidemics, it is important to properly sort and dispose of medical waste based on the World Health Organization's recommendations³.

According to my point, biomedical waste has many effects on health and the well-being of people in crowded communities, for example in Vientiane Capital because the effects may be caused by the storage, separation, transportation and disposal of biomedical waste which is hazardous waste caused by improperly mixed chemicals according to the disposal mechanism system. In addition, the staff who are responsible for such work are not knowledgeable enough, competent and do not understand the processes of separation, treatment and disposal etc. It is one of main cause of the risk of biomedical waste to the community and the environment without avoiding such as the spread of various diseases to people and animals, making the water polluted with toxins and making the air unhealthy, which is caused by burning biomedical waste that mixed with solid waste improperly according to international medical methods standards and ultimately affecting the environment in the long term. And direct consequences from biomedical waste are associated risks groups, such as healthcare workers; waste handlers; scavengers retrieving items from dumpsites; children who may come into contact with contaminated waste; communities living near the landfill and waste sites or near treatment facilities; local populations affected by the utilization of products recycled from biomedical equipment.

2.2.1 Vientiane Capital: Biomedical Waste Challenges Situation Analysis

Areas of work to be carried out to overcome biomedical waste management in Laos, especially in Vientiane Capital challenges are legislation, capacity building, and awareness raising to people in the community, the nurses in hospitals and private clinics, and local health care facilities. Due to a lack of human resources and financial resources, rules, and management system standards, these government-run companies could not provide good solutions for sustainable biomedical waste. On the other hands, there are currently difficult challenges in biomedical waste management, such as (1) Inadequate legal framework and unclear institutional responsibilities; (2) Institutions envisaged to be established in accordance with the law, are sometimes not established, not given the proper mandate in accordance with the law, if established, neither given a budget to enable them to function in accordance to the law. New legislation is often drafted without proper reference to other legislations; (3) A considerable amount of waste, especially biomedical waste is illegally dumped into the drainage channels and rivers; (4) Collection vehicle fleet is old and subject to frequent break down; (5) The institutional and administrative structure is not well established; (6) Public education system and participation programs are not established; (7) The government bodies in local and central level and private entities do not strengthened cooperate and implement the administrative, civil and criminal measures based on legislation and regulations to violators it should be; and others⁴.

However, in today, with improvements in the solid waste management system, the urban households in large cities such as Vientiane Capital, Luang Prabang, and other cities are now served by biomedical waste collection services by private companies collected and disposed of at the sanitary landfill facilities located more than 10 kilometers from the city center. It accepts domestic, construction, industrial, and biomedical waste or hospital waste and provides separation for hospital waste within the fenced compound, the waste is collected by Vientiane Municipal Services. Since Vientiane is the capital of Laos, there are relatively many large-scale hospitals including public and private hospitals. The situation is by no means as in other areas in Laos. Most of these hospitals lacked biomedical waste control and management system standards, especially equipment for separation, storage, treatment, and disposal because the financial is not enough by support from the government. From 2020 - 2021, around 3,500 kg of biomedical waste is generated in the city, out of this; corporation- run hospitals generate almost 500 kg of biomedical waste every day. Biomedical wastes include human anatomical

¹ Solid Waste Management in Laos, Focusing on Vientiane Capital and Climate and Clean Air Coalition Municipal Solid Waste Initiative, More information sees at: <http://waste.ccac-knowledge.net/> (Last accessed on July 10, 2023).

² Vientiane Capital Department of Information, Culture and Tourism, Annual Report, June 2023, p 2, par 1.

³ Laos, Reported by the Ministry of Natural Resources and Environment (MONRE), 2022, p.12, par 3.

⁴ Laos, National Pollution Control Strategy and Action Plan with Vision 2020 – 2025, Published in June 2020, p. 19.

waste like tissues, organs, and body parts, as also animal waste, microbiological and biotechnological waste, hypodermic needles, syringes, scalpels, broken glass, discarded medicines, dressing bandages, catheters, incineration ash, etc. By the way, biomedical waste is collected, treated, transported and disposed in Vientiane Capital, the main government body responsible for biomedical waste and solid waste management is the Vientiane City Office for Management and Service¹. Based on an analysis of the current status of Vientiane's biomedical waste management challenges is presented by the government bodies related to responsibility directly in the sections that follow having as a basis a value chain analysis. These are some challenges that were singled out: (a) waste generation and handling; (b) waste collection, transfer, and transportation; (c) waste processing and treatment; (d) waste disposal; and (e) informal sectors, and community participation in biomedical waste management systems, including their role and obligations.

2.2.2 Biomedical Waste Management Sustainable Solution in Vientiane Capital

Biomedical waste management is important because improperly stored refuse can cause health, safety, and economic in the community of Laos problems. All living organisms create waste, but humans create far more waste than other species, to prevent damaging the environmental ecosystems and maintain a high quality of life for humanity's inhabitants, humans must manage and store their waste efficiently and safely. And biomedical waste management is an essential aspect of modern life, and finding the right information on how to manage waste can be difficult, but however, the government agencies must to find the good way of sustainable resolution mechanism for biomedical waste management and disposal.

1) Biomedical Waste Generation and Handling: Biomedical waste generation and handling will be safe handling and management of waste produced by the treatment of patients in hospitals and clinics is based on three essential principles. The following principles were used for managing virus-associated biomedical waste: (1) Safe handling and processing of the waste should be carried out as close to the point of generation based on legislation and regulations as possible; (2) Educates standards regulations and measures on handling biomedical waste generated to health care employees regularly; (3) Must use suitable biomedical waste equipment and waste management techniques for transportation away from hospital, treatment, and disposal of biomedical waste². According to data gathered by the Ministry of Public Health in 2021, the composition of biomedical waste in Vientiane is dominated by syringes, medicine bottles, Antigen testing equipment, and others. Biomedical waste generation per capita in Vientiane is estimated at 0.85 kg per person per day. However, segregation at source is not commonly practiced in Vientiane, and no bins for the collection of segregated or unsegregated waste have been observed in public spaces, health care facilities, and hospitals but waste that is collected by municipal services is temporarily stored in plastic bags or bamboo bins, which are typically placed on sidewalks or roadsides. Waste that is not collected is of disposed through open burning, burying, or littering on roadsides, drains, and vacant land³. And in 2022, Vientiane Capital collected the volume of biomedical waste from public facilities (hospitals, clinics) to be treated at the main waste treatment field 32 in total of 297,850.

2) Segregation, treatment, and Disposal: Its procedures should be done according to the recommendations of the World Health Organization and according to international law, and domestic legislation framework that related to standard implementation and the relevant parties must implement three methods to ensure that there are no risks to human health and the environment. Therefore, the following important steps must be followed:

(a) Segregation refers to the basic separation of different categories of waste generated at the source and thereby reducing the risks as well as the cost of handling and disposal. In addition, segregation is the most crucial step in biomedical waste management and effective segregation can ensure effective basis biomedical waste management. For the technical segregation of biomedical waste shall be segregated into containers or bags at the point of generation in accordance with regulations and measures prior to its storage, transportation, treatment, and disposal processes and based on the legal framework on biomedical waste management and segregation are the responsibility of both state and the people⁴. With the increasing population and human activity, biomedical waste management is becoming more important absolutely. And biomedical waste segregation facilitates the process of transportation, treatment, and disposal, however, biomedical waste segregation needs to ensure pure,

¹ Global Green Growth Institute, 19F Jeongdong Building, 21-15 Jeongdong-gil, Jung-gu, Seoul, 100-784, Korea (The Global Green Growth Institute does not make any warranty, either express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed of the information contained herein or represents that its use would not infringe privately owned rights. The text of this publication may be reproduced in whole or in part and in any form for educational or nonprofit uses, provided that acknowledgement of the source is made. Resale or commercial use is prohibited without special permission. The views and opinions of the authors expressed herein do not necessarily state or reflect those of the Global Green Growth Institute), Research on Solid Waste Management in Vientiane, Lao P.D.R: Situation assessment and opportunities for waste-to-resource, 2018, p.5.

² Id, at p.9.

³ Laos, the Ministry of Public Health, Annual Report in 2021, p.12, par 1.

⁴ National Pollution Control Board of Laos, Segregation of Biomedical Waste by Legislation and Measures, 2022.

quality material¹.

(b) Treatment and Disposal: Common methods of biomedical waste treatment and disposal are providing comprehensive, reliable, and environmentally friendly medical waste disposal sustainable solutions for centralized biomedical waste treatment plants as well as hospitals, and private companies². At present, the system of transportation, treatment and disposal of biomedical waste in Laos, especially in Vientiane, where is a capital of Laos and other urban areas, has not yet been developed according to the measures of the World Health Organization because of the need to spend a large amount of budget to purchase equipment, transport vehicles, treatment plants, etc. But in the past, especially during the spread of Covid-19 Pandemic, Laos received aid grants from friendly countries and the international organizations: China, Vietnam, Thailand and other countries and the World Health Organization, but it was not enough if compared to the actual situation. In addition, there is a lack of human resources with experience, knowledge and certain skills in the treatment and disposal of biomedical waste, lack of development and enforcement of the laws and regulations related to transportation, storage, treatment and disposal standards in a systematic manner, and lack of imposing civil and criminal law measures on violators of the disposal of chemical waste, and employees' bad performance on their role and obligations directly to biomedical waste management, etc.

Biomedical Waste Management Sustainable Solution in Laos is essential, necessary, and urgent work. Therefore, the government, especially the Ministry of Health, the Ministry of Resources and Environment, the Ministry of Finance, and the National Commission for the Prevention of Natural Disasters have discussed to improve the system and mechanism of sustainable solutions regarding the solid waste and biomedical waste that are harmful to the people's health in community, animals and environment because there has been a large increase in the amount of waste and the transportation, treatment and disposal are not as planned according to the law. The government will improve and resolve the main works as following: (1) allocate sufficient budget for waste treatment and disposal work; (2) Encouraging and promoting the investment of the private sector from domestic and abroad in the collection, treatment and disposal of solid waste and biomedical waste, now there are only eight companies in Vientiane Capital as a complete system; (3) Improve domestic laws and regulations along international conventions to which Laos is a party; and (4) Organize training or send related employees related to biomedical waste management to train or study for a long term or short term more in the country and abroad.

3. Legal Framework for Biomedical Waste Management in Laos: Vientiane Capital Issue

3.1 International Legal Framework

Laos has ratified several World Health Organization conventions that have been concluded which lay down fundamental principles concerning biomedical waste management, public health, environmental protection, and safe management of hazardous waste for the community environmental conditions. These conventions are set out below and must be taken into account in the planning of biomedical waste management. In addition, the international solid waste association is an international network of biomedical waste treatment and management experts under the principles of international agreement that Laos is a party. Its purpose is to exchange information with a view to promoting modern waste management strategies and environmentally sound disposal technologies between States throughout the world³.

In addition, Laos has ratified the Stockholm Convention and increased attention to one category of hazardous waste substance it is a significant international legislation to Laos for biomedical waste management. In November 2022, the National Committee with representatives from the Ministries: Department of Agriculture, Department of Food and Drugs, Department of Health, Environmental Research Institute; and other sectors discussed on implementation of international treaties and agreements for prevention of biomedical waste, focusing on Vientiane for testing. In addition, the Lao government has signed several international treaties, and protocols dealing with pollution control, such as United Nations convention on Climate Change; Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal; and others⁴.

The international conventions are important and necessary for the management of biomedical waste in Laos, it is also international legislation that the Lao government must implement and enforce consistently in conjunction with the internal laws and regulations or bring the important principles from conventions to update the content of internal laws and the specific regulations of the collection, transportation, treatment and disposal of biomedical waste and disseminate the content of the laws and the conventions to relevant healthcare employees and people in the communities. But in the event, if the Lao government does not pay attention or does not implement according to international standards, those conventions are considered to be of no value to the

¹ Laos, Vientiane Capital Annual Report 2022, p.9, par 2.

² Megan Chamberlain, "Treatment of Medical Waste", 26 March 2019.

³ Laos, the Ministry of Foreign Affairs, Department of International Conventions and Implementation, Annual Report 2021, p.15, par 4.

⁴ Laos, the Ministry of Natural Resources and Environment, National Pollution Control Strategy and Action Plan 2018-2025, published in December 2017 by ADB, p.19, par 6.

field of public health and biomedical waste management works. Therefore, the government, especially the relevant parties, must pay special attention to the implementation and enforcement consistently by the principles that have been ratified.

3.2 National Laws and Regulations

3.2.1 The Environmental Protection Law (2012)

The Environmental Protection Law was initially issued in 1999, and specifies necessary principles, rules, and measures for managing, monitoring, restoring, and protecting the environment in order to protect the public, natural resources, and biodiversity, and to ensure the sustainable socioeconomic development of the nation. In 2012, this law was amended by the National Assembly of Law, it consists of 13 parts, including General Provisions (Part I), Impact on Environment (Part II), Environmental Protection (Part III), Conservation and Utilization of Natural Resources (Part IV), Environmental Rehabilitation (Part V), Environmental Emergencies and Natural Disasters (Part VI), Environmental Protection Fund (Part VII), Prohibitions (Part VIII), Dispute Settlement (Part IX), Management and Inspection (Part X), National Environment Day, Symbols, Uniforms and Stamps (Part XI), Awards for Outstanding Persons and Sanctions against Offenders (Part XII), and Final Provisions (Part XIII)¹. Article 39 (New) stipulated the control of toxic and hazardous waste, the third paragraph defines that “For hospital waste, it must be properly managed and controlled according to the regulations, measures and standards set by the relevant sector and must be defined in the regulations of the specific hospital”². This law requires individuals or organizations that potentially emit pollutants to take measures to prevent environmental degradation caused by several materials, including water; segregation of waste including medical waste, must be careful segregation, transport, treatment and disposal.

3.2.2 Water and Water Resources Law (1996)

This law determines the necessary principles, regulations, and measures relating to the administration, exploitation, using and developing of water and water resources. Article 42 of this law stipulates that “Prevention of dirty water is the rights and obligation of every people. Individuals, legal entities, and organizations must strictly respect the laws and regulations regarding the prevention of environmental condition, pollution and do not throw general waste of every kind of waste into the water sources. In case of discovery, legal measures will be strictly followed against the violators”³. It shows that this article does not allow people, legal entities, and organizations to throw all kinds of waste including biomedical waste from hospitals, clinics, and healthcare facilities because it will directly affect to the lives of people in the community and the animals that live in the water sources. But in the past, the parties involved in the implementation and enforcement of this law, especially this article, have not been strictly implemented against the violators. But on the other hand, the solution to the problem of littering by individuals, legal entities and organizations has not been seriously resolved because the enforcement of this law is not regular due to the lack of inspection and monitoring of the collection, transportation, disposal and treatment of waste by the relevant parties. Currently, there is also the phenomenon of throwing, and burning of biomedical waste, and solid waste, which is widely seen in large urban communities and has direct and indirect effects on the health, living conditions of people in the community and animals in the water resources absolutely.

3.2.3 Regulations

1) Decree on Waste Management for Healthcare Facilities, No. 1706/MOH, 2 July 2004: This decree regulates several actions related to waste including biomedical waste from healthcare facilities, such as mechanism of waste segregation, collection and storage, management and internal relocation, and treatment and disposal. This decree is important for biomedical waste management in Laos, but there is not specific law on biomedical waste management. However, the hospitals, clinics, and healthcare facilities implement it to apply broadly to implement instead of specific law related to treatment and disposal of biomedical waste.

2) Action Plan and Roadmap: The Ministry of Natural Resources and Environment sets the National Environmental Strategy from 2020-2025 and is implemented by the Committee of National Pollution Control Strategy and Action Plan with Vision to 2030. This plan and roadmap is focusing on several programs on the healthcare waste, and environmental protection. However, none specifically target biomedical waste management, transportation, storage, treatment and disposal.

3) Vientiane Governor's Agreement on Waste Management in Vientiane Capital: This agreement has been drafted and appointed a responsible and obligations of the committee including specific regulations for the management of in Vientiane Capital and covered total 9 districts, through the agreement of the Vientiane Capital Waste Management and Services Office Board presenting for approval and signature from the Vientiane Capital

¹ The Environmental Protection Law, No. 29/NA, 18 December 2012, Article 1.

² Id, at Art. 39.

³ Water and Water Resources Law, No. 02-96, 11 October 1996, Art.41.

Governor. This agreement is legal under the law and can be properly enforced in accordance with the laws in the implementation of the work of the waste management office in Vientiane. Currently, there are total of 12 companies that provide waste collection and transportation services in Vientiane Capital. In this, the two state enterprise companies, namely: the Office of the Municipal Corporation of Laos and the Office of the Municipal Corporation of Chanthaburi District, and there are 10 are private companies.

3.2.4 Biomedical Waste Management Challenges

Through the implementation of storage, transport, treatment and disposal of biomedical waste in Laos, focusing on the Vientiane Capital situation, it is seen that there are conveniences and difficulties or challenges. That convenience is caused by the cooperation with many parties of government agencies, private companies, and local peoples in the community involved in transportation services and disposal of solid and biomedical waste. There are many laws and regulations that can be implemented and enforced¹. However, there are still many problems and challenges for biomedical waste management in Laos, especially in urban areas, for example in Vientiane Capital. Therefore, the government or related parties must pay attention to improve them. The causes of the problem and challenge consist of many factors, such as no specific law; an inadequate the legal framework on biomedical waste management; unclear institutional responsibilities and obligation under the laws; no specific institutional and administrative sectors that establish a legal framework for biomedical waste storage, transport, treatment, and disposal based on international standards, it is responsible and obligation of State enterprise and private companies but they collect, treat and dispose general waste; the public legal education system for communities and participation programs are not established strictly; lack of human resources, capacity building, awareness raising, and pilot projects of the government sectors; lack of financial resources for purchasing the equipment for collection, transport vehicles, segregation, treatment, and disposal of biomedical waste; lack of rules on management mechanisms and the government could not provide a good solution for a sustainable mechanism to the state enterprise and private companies for biomedical waste management establishment.

3.2.5 The Problems and Challenges Resolution Discussion

- 1) Technical Development: This is a significant way for resolution of the problems and challenges because the biomedical waste will be effective to human health and environment directly and indirectly. Therefore, this paragraph discuss on the technical resolution: (a) Law and decree on waste management should be developed and issuance of a law on biomedical waste management specifically; (b) Drafting of the regulation on municipal biomedical waste with solid waste management to be standards based on the international conventions and treaties that Laos is a party; (c) Development methods of data collection and analysis of Vientiane capital for being a model in the country; (d) Development of the National Action Plan and Roadmap on the Environmental Prevention, and put the regulations and mechanism of biomedical waste treatment and disposal; (e) the government may provide enough financial and human resources for the biomedical waste management; and (f) strengthening implementation and enforcement the national laws, regulations, and international conventions and treaties on environment and biomedical waste management, and enforce both administrative, civil and criminal measures by legal framework to violators.
- 2) Lesson Exchanges: The Lao government, especially the ministry of public health, the ministry of natural resources and environment must send relevant human resources to exchange lessons on biomedical waste management with other countries, including developed countries and developing countries, in order to bring such lessons to be applied in Laos.
- 3) Specific Plan of Vientiane Capital Office for Waste Management: based on Half Year 2023 Report, No. 212/VWO, June 2023: the Waste Management and Services will attempt focusing on (a) The promotion of the sorting of waste from the beginning, expand access to waste collection services in Vientiane capital to 400 villages, covering 83.16% of the total number of 481 villages in Vientiane capital, including biomedical waste and solid waste. (b) Coordinate with the district and village authorities to continue to expand the use of plastic containers for waste, starting with families, office buildings and shops located along the main road in the city. (c) Continue to manage, monitor, and supervise the implementation of the work of all the operators in order to develop the used vehicles to meet the standards, to upgrade the waste collection and transportation service system to become efficient and modernized. (d) Continue to develop and use a modern waste management system by using a program (Application) in the management of waste to be highly effective, especially the public sector can control, collect and manage the database in a centralized manner. And (e) Continue to coordinate with the Ministry of Natural Resources and Environment; the Ministry of Public Works and Transport; and the Ministry of Public Health to implement a project from the World Bank to build a new sorting plant and waste transfer station in Nashaithong district, improve the main 32 waste treatment landfill and the Nahai waste landfill.

¹ Laos, Vientiane Capital Office, Annual Report 2022, and Action Plan of Vientiane capital 2023.

4. Conclusion

This article explores and analyses the impact of biomedical waste on the Lao Community Environment, and focuses on the Vientiane Capital issue because it is the largest city in Laos within a crowded community. Biomedical waste collection, storage, transport, treatment, and disposal will be considered the problems and challenges in the management of the related parties because lack of specific laws and regulations, human resources, financial support, and implementation and enforcement of the laws. Steps in the management of biomedical waste include generation, accumulation, handling, storage, treatment, transport, and disposal but Laos, especially in Vientiane Capital could not establish strictly and regularly under the legal framework and the national strategy action plan.

The development and implementation of a national waste management policy can improve biomedical waste management in health facilities in a country if even the related parties can implement it strictly and regularly. Biomedical waste accumulation will harm the community environment's quality and ability to sustain life. One important cause of the current status is the cross-border movement management for hazardous waste. Laos ratified the Basel Convention on 20 December 2010 later than other ASEAN countries but the domestic laws and regulations related to the implementation of the Basel Convention have not yet been put in place, and however in 2021, the Lao government bodies discussed on the implementation of international conventions to make them effective in Lao society, especially in the healthcare sector and the environmental protection sector by including the content in the legal framework, but until now there is still not enough clarity.

Some laws currently (2023) are amending by the 5th session and 6th Series of the National Assembly because Laos lack of a domestic legal system if compare to expanding socio-economic system, there is no experience on implementing international conventions and treaties, especially the Basel Convention, and no legal action can be taken against illegal traffic under the Convention, and due to the lack of data on the amount of hazardous waste generated, imported and exported of hazardous waste, Laos has never submitted the annual National Report, which is the obligation of the parties to the Basel Convention.

The Lao government should pay attention in the improvement according to the severity of the waste problem by enact a basic law on biomedical waste management in the country and an ordinance of waste disposal in Vientiane Prefecture to clarify the roles and responsibilities of the parties concerned. Finally, the Ministry of Natural Resources and Environment, the Ministry of Public Health, and the Ministry of Public Works and Transports must strengthening cooperation and promotion State enterprise and private Companies for working on the Waste Management, especially working on storage, transport, treatment and disposal of biomedical waste to be standards and safety for human resources in hospitals, healthcare facilities, waste landfill area, and community environmental conditions.

5. References

1) Legislation and Regulations

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