

HIA in the Orange Plantations and its contribution to Healthy Public Policy in the Agricultural Sector in Thailand¹

**Nuntana Sabrum², Bantoon Setthasiroj³
& Chomchuan Boonrahong⁴**

Abstract

The pesticide use in the orange plantations in the Fang Watershed area is an on-going controversial issue in Thai society. Since 1995, orange has become a new popular crop, as its price was higher than the other main crops. Consequently, the orange cultivating areas have rapidly expanded. At present, it is estimated that the orange plantation areas in the Fang Watershed are more than 16,000 ha.

The Fang Watershed area is one of the most important natural forest areas in Northern Thailand. Therefore, the plantations that have been using vast amount of pesticides, has caused many problems to local communities e.g. bad odours, polluted water, deforestation, and illegal migration of foreign labor. The local communities tried many times to complain with the local authorities. But their voices were vanishing.

By the end of 2002, the HIA study had been initiated by a local NGO. The project is a truly participatory research as the local villagers, who have been affected from the plantations, are the majority of the research team. The study aims to provide the evidence-based information to support their learning process in health impacts surveillance. It is found that there are two significant impacts namely, physical health impacts e.g. skin rash, dizzy, difficulty breathing, and social impacts such as community conflicts, quarrel and collapse of communities' relationship.

¹ Information and data used in this paper mainly base on the study of Framework and Approach for Health Impact Assessment (HIA) in the orange plantations in Fang Watershed conducted by Jutamart Taka, et al., 2004.

² Academic Coordinator of the Agricultural and Rural Development Policy Network, HPP-HIA Research and Development Program, Health Systems Research Institute (HSRI), the 5th Floor, AI-Nont Building, Tiwanon Road, Nonthaburi, Thailand. Email: nuntana@hpp-hia.or.th or nuntana@hsri.or.th. Correspondence should be addressed to this author.

³ Coordinator, Natural Resources Base Policy Network, National Human Rights Committee, Bangkok, Thailand. Email: kittiam@mozart.inet.co.th

⁴ Coordinator, Institute for Sustainable Agriculture Community (ISAC), Chiang Mai, Thailand, E-mail: boonrahong@hotmail.com

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Along the study process, the health impacts have been communicated with the public through various mass media. In September 2003, the Ministry of Natural Resources and Environment has been mandated by the Prime Minister to solve the problems of the orange plantations and a number of working groups have been appointed. The results and consequences of the working process as well as the public policy process are still to be followed.

Key words: Health Impact Assessment, Pesticide, Public Policy Process

Conference Topic: Health Impact Assessment

1. Introduction

The promotion of orange cultivating in three districts namely, Fang, Mae-Ai, and Chaiprakran in Chiang Mai province in the northern Thailand, has become a seriously controversial issue for local communities for more than ten years. Local people have been greatly suffered from the intensive enlargement of large-scale orange plantations in the Fang Watershed, one of the most important natural forest areas in the northern country, because an effective control measure has been regardless.

The villagers in the Fang Watershed area have encountered a number of extremely serious problems, which mainly are consequences of the orange plantations, for instances chemical odor, water contamination, public property invasions, deforestation, illegal migration of foreign labors, social conflicts etc. They tried many times to complain such problems, particularly about the terrible chemical odor, with local authorities as well as relevant provincial officers but their voices were vanishing. There had been no any meaningful resolutions from those authorities. Therefore, they had to cope with such serious problems themselves, while the problems were deeply severe.

By the end of 2002, a local grass root NGO initiated a project on Health Impact Assessment (HIA) in the orange plantations supported by Health Systems Research Institute (HSRI). The project aimed to support the local communities to learn about their health impacts related to the orange plantations. The project was a truly participatory research as the villagers, who have been affected from the plantations, were the majority of the research team. The study was expected to provide evidence-based information to support the communal learning process in health impact surveillance.

2. Development of the Orange Plantations in the Fang Watershed

Orange has become a new popular commercial fruit crop in the Fang Watershed since 1995 as its price was significantly higher than the prior commercial fruit crops in the area like lychee or longan. Moreover, the old famous orange cultivating areas in Rungsit⁵ including other areas in the central region were collapsed due to the problem of soil degradation as well as the sensitive of orange's pests and diseases (Manager Online, 2003a). One main reason for the Rungsit orange crisis was the constant usage of vast amount of agrochemical and pesticides.

Orange cultivating has been firstly moved into the Fang Watershed area since 1957 by an external investor, as the area was suitable in aspect of climate and landscape. In 1982 there had been a successful discovering in a new kind of orange variety, called "Sai Nam Phueng"⁶, which was more tasty as well as more costly (Manager Online, 2003b and Jutamart, 2004). Subsequently, there had been many farmers either large-scale (mostly from outside the areas) or small-scale farmers (mostly be local farmers) had shifted their investment towards orange cultivating considerably. The cultivating areas were significantly expanded since then. More

⁵ Rungsit is a Bangkok's suburb area. It was highly recognized as the most famous zone for orange cultivating in the country since more than 20 years ago.

⁶ "Sai Nam Phueng" means honey

importantly, orange has been promoted by different provincial agencies to be a product champion of the province.

It should be noted here that those all mentioned reasons have led to enormously fast extension of the orange cultivating areas in the Fang Watershed since 1997 (Manager Online, 2003a). At present, it is estimated that the orange cultivating areas in the Fang Watershed are more than 16,000 ha.



FIGURE 1: The Rapid Expansion of the Orange Plantations in the Fang Watershed

The Fang Watershed area comprises of three districts namely, Fang, Mae-Ai, and Chaiprakran, located in Chiang Mai province, the northern Thailand. The area has been highly recognized as one of the most important forest areas in the northern country. It should be noted that several main rivers of the country are originally generated from this area. Most of areas in the Fang Watershed have been reserved as 1A zone⁷ according to the land use classification identified by the Ministry of Natural Resources and Environment.

The orange plantations have been promptly expanded in the Fang Watershed area without a systematic control measure from any relevant authorities. Furthermore, as orange is a plant that basically has various kinds of pests and diseases, the plantation owners have to constantly use a lot of agrochemical and pesticides. With respect to this reality, it is found that there has been an intensive using number of various agrochemical and pesticides in the Fang Watershed area for several years. Unquestionably, this has caused many serious problems (for further details, please see 4) to the local communities who live nearby the plantation areas.

⁷ 1A zone refers to the area that is highly restricted for any land uses.



FIGURE 2: The Fang River, the Most Important River for Local People in Fang, Mae-Ai, and Chaiprakran Districts.

3. Health Impact Assessment (HIA) of the Orange Plantations: A Participatory Learning Process of Local People

The HIA study was conducted by the Institute for Sustainable Agriculture Community (ISAC), a local grass root NGO, by the end of 2002. This study was a participatory learning process for local people due to; some joined the project as the research team; some volunteered for data collection; and some participated in local health forums (for more details see 3.3). However, this study mainly focused on the scoping process of HIA only.

3.1 Objectives of the Study

- 1) To investigate socio-economic and population changes in the orange plantation areas in Fang, Mae-Ai, and Chaiprakran districts.
- 2) To explore local people's health problems related to the orange plantations in Fang, Mae-Ai, and Chaiprakarn districts.
- 3) To identify the scope of health impact assessment of the orange plantations in Fang, Mae-Ai, and Chaiprakarn districts.

3.2 The Study Areas

The study areas for this project comprises of 12 villagers which all located in the Fang Watershed area. The main stipulation for the study areas was each village had to occupy orange cultivating areas both in terms of plantations and small-scale crops⁸ in order to make a clear-cut conclusion about health impacts of the plantations.

⁸ It covers areas less than 1.6 ha

To make a clear comparison how the plantations had affected to those 12 villages, the research team had divided the villages into three groups regarding distances between the villages to the plantations.

- Group I:* The villages located far from the plantations less than 500 metres.
- Group II:* The villages located far from the plantations 500 – 3,000 metres.
- Group III:* The villages located far from the plantations more than 3,000 metres.

3.3 The Methods

In order to identify the scopes of health impact assessment on the villagers, who were affected from the plantations, a number of methods had been applied in this study as the following details:

- 1) *Literature reviews* – many related materials and documents concerning socio-economic and population changes in the Fang Watershed areas were reviewed. Furthermore, various sorts of documents related to communal state of health problems were gathered and collected from relevant agencies e.g. Public Health Volunteers at village level, community health care centers, hospitals, and provincial public health office.
- 2) *Local health forums* – three local health forums had been organized by the research team with the aim to bring together various groups of local people to discuss and share their experiences regarding their communities' socio-economic changes, as well as state of their health problems.
- 3) *Communal health monitoring* – one study was chosen to conduct community health monitoring. The chosen community had to continuously pursue and record status of their health changes for one month.
- 4) *Questionnaires* – approximately 3,300 questionnaires were conducted in the three village groups, by the research team and the local volunteers to learn about overall pictures of the communities e.g. status of the communal health, the changes in bio-physical environment and socio-economic environment of the communities.
- 5) *Blood testing* – the research team arranged the blood testing services along with the local health forums for those who were interested to check the pesticide residues in their blood stream.
- 6) *A public scoping seminar* – a seminar with stakeholders was held to present preliminary scoping results and to listen to the opinions of the stakeholders.



FIGURE 3: The Villagers Discussed and Shared Their Experiences about the Changes of the Communal Socio-economy and Their Health Problems in the Local Health Forum

4. The Result of HIA Study

From the literature reviews, the local health forums, and the questionnaires, it is clear that the intensive expansion of the orange plantations in the Fang Watershed causes problems in two main aspects, which are 1) problems related to the change in bio-physical environment and 2) problems related to the change in socio-economic environment.

4.1 The Changes in bio-physical environment

Chemical Odor

The most obviously serious problem for the local communities in the Fang Watershed area is concerning terrible chemical odor. The main cause of such terrible odor comes mainly from the pesticide uses in the orange plantations. Pesticides are enormously used in the orange plantations as orange is a sensitive plant. In addition, due to the plantations have rapidly extended more than 16,000 ha at the present, as a result there are several local communities that have been surrounded by huge plantation areas. Therefore, it is hard for those communities to avoid pesticide smells, which are sprayed almost every day from different plantation owners. Previously, the plantations were sprayed during daytime but since many affected local people had frequently complained about the chemical problem with several relevant authorities, later the plantation owners have changed to spray pesticide during nighttime, especially about 3 am. Thus, it is impossible for local people to escape to anywhere because it is sleeping time.

From the questionnaires, it is found that 26.4 per cent of the villagers in Group I replied that they smell the chemical odor, while the percentages of Group II and III are 11.4 and 3.6 per cent respectively. Therefore, the closer the community is surrounded by the orange plantations the stronger the chemical they expose.

The chemical odor does not cause only disturbance or annoyance but also other health impacts e.g. dizziness, difficult breathing, red eyes etc. Even local people tried several times to complain about the terrible chemical odor to the several relevant authorities, but it seemed that their requests were not sincerely addressed.



FIGURE 4: Pesticides are Heavily Sprayed in the Plantations almost Every Single Day

Pesticide Contamination in Water Resources

The contamination of pesticides in groundwater as well as in the communities' freshwater ponds is one of the most serious concerns among local people in the Fang Watershed area. Water qualities around the orange plantation areas have been significantly deteriorated due to over uses of pesticides in large plantation areas with little concerns about its impacts to local people's health or even the environment. Moreover, many pesticide containers are negligently dumped in water sources of the communities.

Consequently, people in many communities cannot drink or use their freshwater ponds as usual. Some people were used to regularly take a bath from their freshwater ponds for bath, after that they found that they encountered with skin rash problem. Furthermore, some also smelled chemical odor from their freshwater ponds. Therefore, some families have to pay much higher cost for buying drinking and using water. However, there are many local people who still use water from their freshwater ponds for household consumption.

From the questionnaires, it is found that approximately 53 per cent of the villagers replied that they still drink water from their freshwater ponds as it saves their expenditure costs. While around 20 percent buy drinking water due to they are not confident to drink water from their freshwater ponds. The rest seek for drinking water from other sources e.g. rainwater and the villagers' water pipe system.



FIGURE 5: Pesticide Containers are Negligently Dumped into the Communities' Water Sources.

Water Shortage

Basically, orange is a plant that needs water supply all year round, while other prior main commercial crops⁹ do not. Since the orange plantations are occupied more than 16,000 ha in the Fang Watershed, it certainly needs high volume of water supply, particularly in the dry season where local farmers face water shortage problem.

The plantations make the water shortage problem in the Fang Watershed more seriously due to the plantation owners have high potential to access to water sources than the local farmers as

⁹ Previously, the main commercial crops in the Fang Watershed area were garlic, onion, lychee and longan.

they have much money and more advanced technologies. In many cases, it is found that the plantation owners make large reservoirs close to the local canals¹⁰ and convey water to store in their reservoirs. As a result, it leads to the change of water drainage direction in the local canals. Consequently, many local farmers are seriously suffered from the water shortage mainly resulted from the mentioned behavior that strongly violate the local rule regarding water sharing. Recently, this problem has given risk to a disputed conflict among local people and the plantation owners.

It is clear from the questionnaires that the water shortage problem is one of the most concerns for local people. It is found that 59.7 per cent of the villagers replied that they have sufficient water supply for all year round, while 40.3 percent replied that they do not have water to use for all year round.



FIGURE 6: Water has been Highly Used in the Orange Plantations All Year Round. The Amount of Water Supply from Several Local Canals have been Diverted to Serve the Orange Plantations.

¹⁰ It refers to a community-based irrigation system that is mutually operated and maintained by a community aiming to provide water for agricultural purposes.

Deforestation

A huge number of bamboos from the communities' forests as well as from several national forest reserved zones have been immensely cut down to be used in the plantations as stakes for supporting small orange trees from wind. It is estimated that one orange tree needs bamboo stakes approximately ten stalks, therefore orange in one ha (there are about 375 orange trees in one ha.) needs to use bamboos around 3,750 stalks. Thus total bamboo used in the entire orange plantations of 16,000 ha are at least 60 millions stalks per year. Presently, bamboos in the Fang Watershed area have significantly decreased. Accordingly, many communities have been affected from this phenomenon since bamboo is recognized as a multi-benefit plant for local people, especially as an important source for food security. However, since bamboos in the local areas have been deteriorated leading to bamboo shortage, many plantation owners have to import bamboos from other areas.

Apart from the over uses of bamboo in the forest areas, the illegal invasions of the orange plantations into national forest reserved zones are also a serious problem in the Fang Watershed area, as shown in the contrast figures of the orange cultivating area. The official figure in 2002 was only 5,343.36 ha, while local people confirm that the actual areas should be at least 16,000 ha. It is estimated that the illegal invasion areas are certainly more than 1,600 ha at present.



FIGURE 7: A Vast Number of Bamboos are Used in the Orange Plantations as Stakes for Supporting Orange Trees

4.2 The Changes in Socio-economic Environment

The Conflict over Water Resources Management

Due to most of local people in the Fang Watershed area are small-scale farmers hence their concern about the water shortage problem has become the most critical issue for them. The conflict over water resources management between the villagers and the plantation owners has been seriously arisen all over the area as a number of plantation owners has violently diverted water from the local canals to use in their plantations. Importantly, several large plantations are located at upland areas that basically are upstream of the local canals. This advantage is benefit for them as it is easier to convey water from the local canals to store in their private

reservoirs. Accordingly, many local people who live at the downstream always face the water shortage problem.

One of the most respectful monks in the Fang area said that in the beginning, the plantation owners politely asked local people for the approval of water allocation from the local canals to store in their areas. They promised that they would distribute the reserved water to local people, but after that they never have followed their commitment. This has made the adverse impact to local people who have lost their water sources. Currently, the water conflict in the Fang Watershed area is more serious problem (Manager Online, 2002c).

The Change in Food Security

Before the intensive expansion of the orange plantations, local people in the Fang Watershed area had various kinds of natural food for their consumption e.g. bamboo shoot. However, in the present day the natural food varieties are significantly decreased since the large areas of the communities' forests, which are the major sources of the natural food, as well as other kinds of forest areas have been destroyed. The main cause of the forest area reduction comes from the invasions of the orange plantations into the forest areas. Furthermore, local people who live in the villages that are close to the plantations do not dare to eat the natural food as usual, as they are afraid it may have pesticide contamination.

Public Property Invasion

Apart from the communities' forests invasion, local people confirm that the plantation owners have also extended their incursions into other communities' public properties for instance, the deserted temple area of Nong Bua Ngam Village, the community street of Sansai Clongnoi Village, etc.

Concerning the case of community street, the plantation's owner (s) formerly bought many lands until that both sides of the community street are belong to them. After that, they illegally took over the street by expanding their plantation across the street. This is a serious problem for the villagers, as they have no other ways to access their own community. Thus, it has caused critical conflict between the villagers and the plantation's owner.

Illegal Migration of Foreign Labor

Many plantation owners prefer to engage foreign labors particularly the Burmese labors to work in their plantations, as their wages are considerably lower than the local labors. The plantation owners always hire these foreign labors to spray pesticides in their plantations. However, when these foreign labors spray the pesticides they hardly wear any protective gears as they have a little knowledge about the negative impacts of the pesticides, as well as they think it is not dangerous at all to their health.

The over uses of pesticides in the plantations with the careless concern, it makes the pesticide problems in the plantations are more seriously critical. Whenever these labors cannot work for the plantations because of their health are deteriorated resulting from the heavy pesticide application, the plantation owners will lay off them and then will hire another to work instead. There are surplus labor supplies as the province is close to the country borders, therefore it is not a big problem to hire other foreign labors.

However, most of these foreign labors are illegal migrations, thus it is difficult for the officers to regulate them. Moreover, some of them are disease carriers to local people, and some cause

the serious conflicts with the villagers, particularly related to the problems of the pesticide application in the plantations.

The Social Conflicts

The most seriously controversial problem resulted from the orange plantations is the social conflicts among local people themselves. At the beginning of the struggle, around 4-5 years ago, many local people who were affected from the plantations gathered together and tried to mutually cope with the plantations' problems themselves as their compliant to the authorities were not seriously responded. However, even they tried several ways to address the plantations' problems, but the problems seemed to be deeply severe. Several villagers were hopeless and dispirited, some felt stress, while some were very angry to the plantations' owners. The relationship in many communities declined since local people began to quarrel and disagree to each other. The social conflicts were intensified either between the villagers themselves or between the villagers and other groups such as the plantation owners, the foreign labors, and the authorities.

Currently, the conflicts among local people are deeply severe since the mass media, particularly the local and national newspapers, have continually reported the problems and impacts of the orange plantations in the Chiang Mai province until the government attended to seriously take action to address the plantations' problems. Unfortunately, the orange's price significantly fell down during that time. Local people who have invested in orange cultivating totally believe that the reduction of the orange's price because of the reports of the orange's impacts. Therefore, they have been very angry and unsatisfied at the villagers who were the HIA research team as they think that because of these people gave negative information about the orange to outsiders. Some villagers who were the struggle leaders cannot be able to live in the community no longer as they encounter with serious pressure from their neighborhoods as well as from their relatives. The kinship between these two groups in the communities is collapsed.

4.3 The Link to Overall Health Impacts

The previous topic illustrated how the orange plantations potentially affect to the changes of the communities' environments both the bio-physical and the socio-economic environments. The changes of these two environments closely link to health determinants, which ultimately reflect to human health. It can be concluded that any changes in health determinants correlatively relate to health impacts. Therefore, the overall health¹¹ impacts of local people in the Fang Watershed relating to the orange plantations are described as below.

Physical Health Impacts

From the questionnaires, it was found that the physical health impacts on local people, which closely relate to common symptoms of the pesticide exposure identified by Helen Murphy (FAO), were dizzy, burred vision, difficulty breathing, nose sore, itchy, skin rash, etc. These health impacts were probably consequences from the change in the bio-physical environment namely, the chemical odor and the pesticide contamination in their freshwater ponds. It should be noted that these symptoms were normally found in children more than adults. The summary

¹¹ Health in this content refers to holistic understand to 'health' which consists of four main aspects namely, physical health, mental health, social health and spiritual health.

of the physical health impacts of local people in the three village groups are illustrated in the following chart:

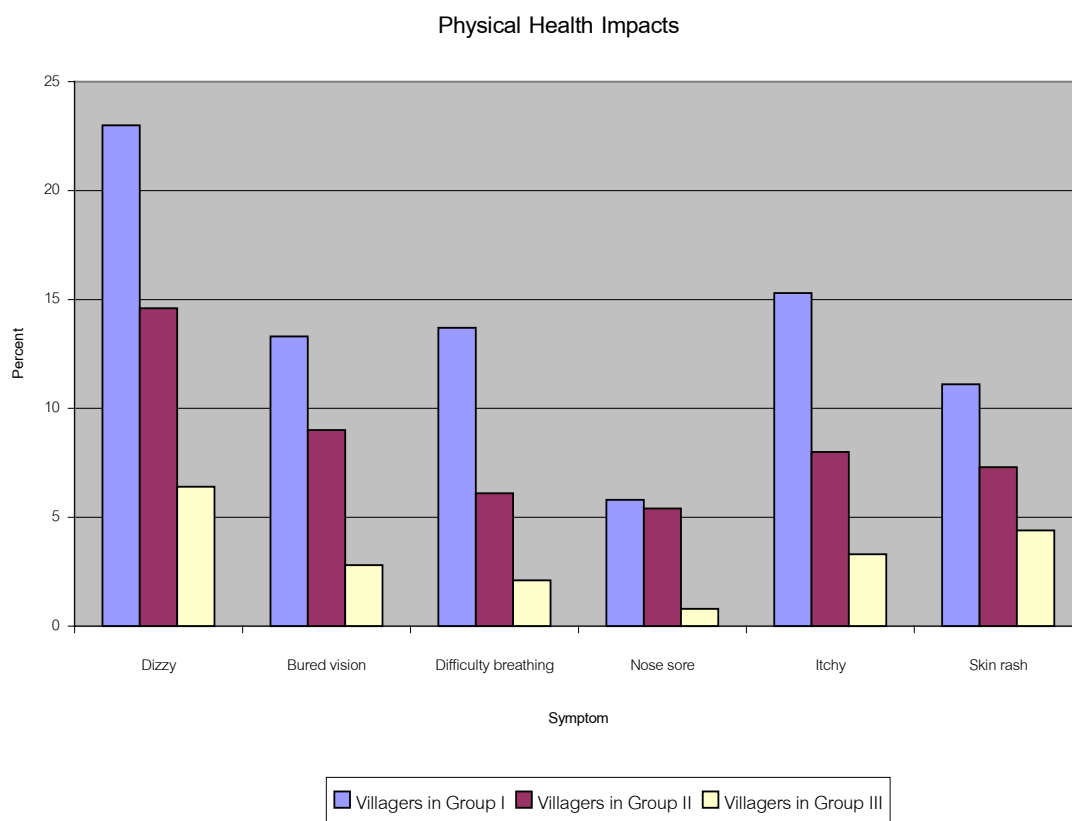


FIGURE 8: The Physical Health Impacts on the Three Village Groups.



FIGURE 9: The Physical Health Impacts on Local People in the Fang Watershed

Mental Health Impacts

The research team and the volunteer villagers mutually defined the meaning of ‘mental health’ as mental sickness that covers aggressive and furious, including having some stress behaviors e.g. shooting a gun to pesticide instruments and shooting a gun into sky. These mental health impacts were presumably resulted from the changes in the bio-physical and socio-economic environments such as chemical odor, pesticide contamination in water resources, water shortage, water conflicts and the change in food security. It should be noted here that these mental health impacts are the accumulated problems that are hard to exactly identify their certain causes as they can be potentially resulted from other factors besides the orange plantation problems. However, from the questionnaires it was found that local people, who live in the villages close to the plantations, trend to have mental sickness problems more than one who live far the orange plantations. The following chart illustrates the mental health impacts on local people in three village groups.

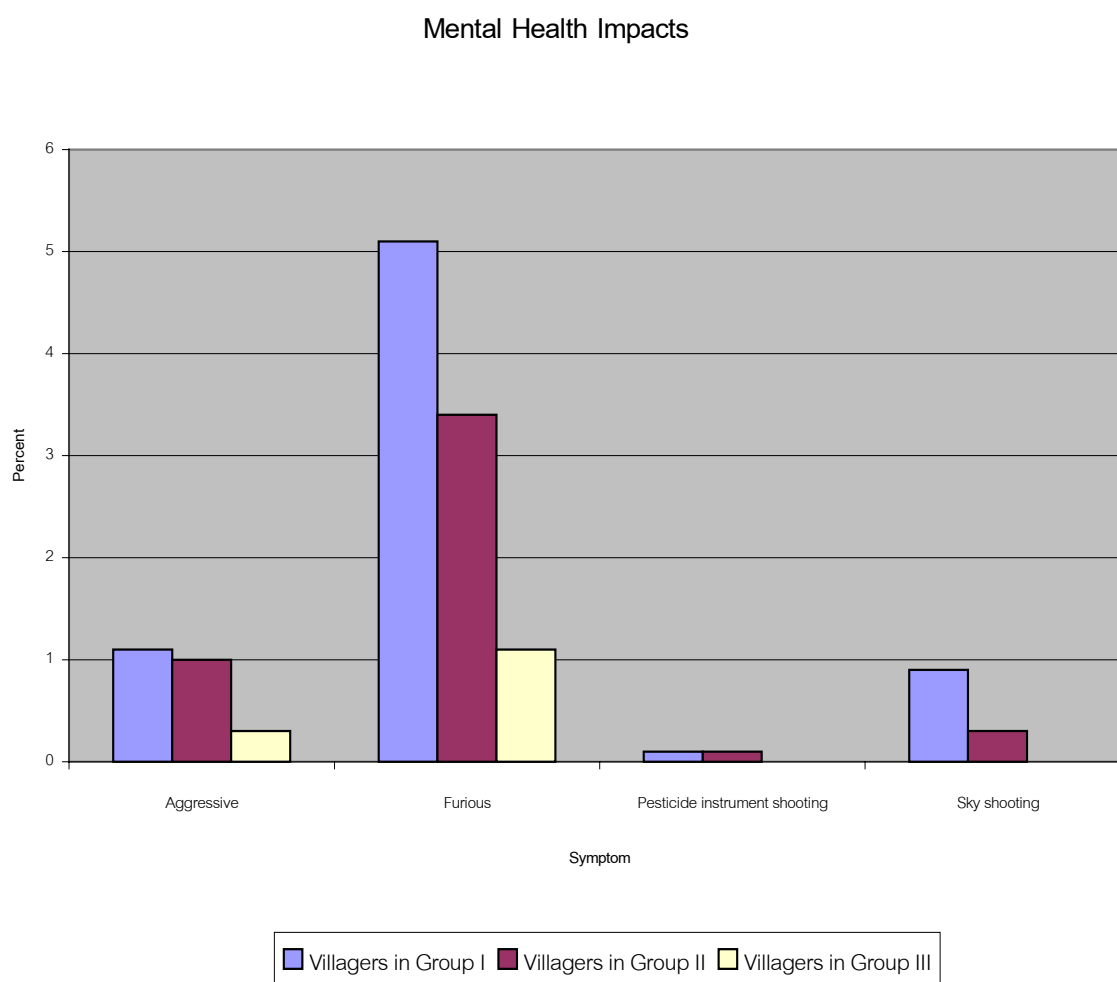


FIGURE 10: The Mental Health Impacts on the Three Village Groups.

Social Health Impacts

In this study, social health impact was defined as an ability of a person to properly live with other people in a society or community. From the questionnaires, it was found that the social health impacts as for examples dissents, quarrels and conflicts within the communities. These impacts mostly were consequences from the changes in the socio-economic environment e.g. the water conflicts, the communities' street invasion, the conflicts between the foreign labors and the social conflicts within the communities. The comparison of the social health impacts in the three villages groups is shown below.

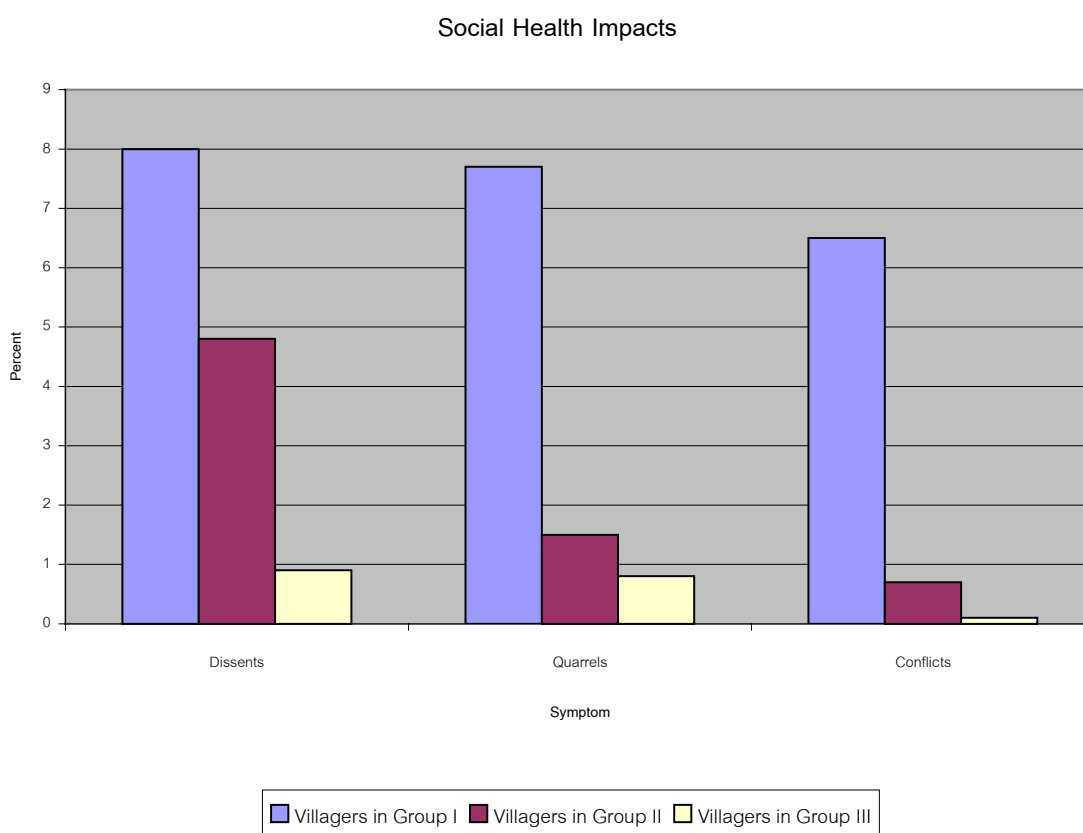


FIGURE 11: The Social Health Impacts on the Three Village Groups

Spiritual Health Impacts

The meaning of 'spiritual health impact' was mutually defined by the research team and the volunteer villagers as abandon of local people from their home communities, particularly one who live near the orange plantations. The key reason for the leaving was because of they would like go away from the plantation problems, especially concerning the terrible chemical odor and the pesticide contamination in their freshwater ponds. However, it should be noted that the problem about loss of the kinship within the communities is also one of the most serious spiritual health impacts at the present time.

The following figure is illustrated the summary the overall health impact of the orange plantations on the local communities in the Fang Watershed area.

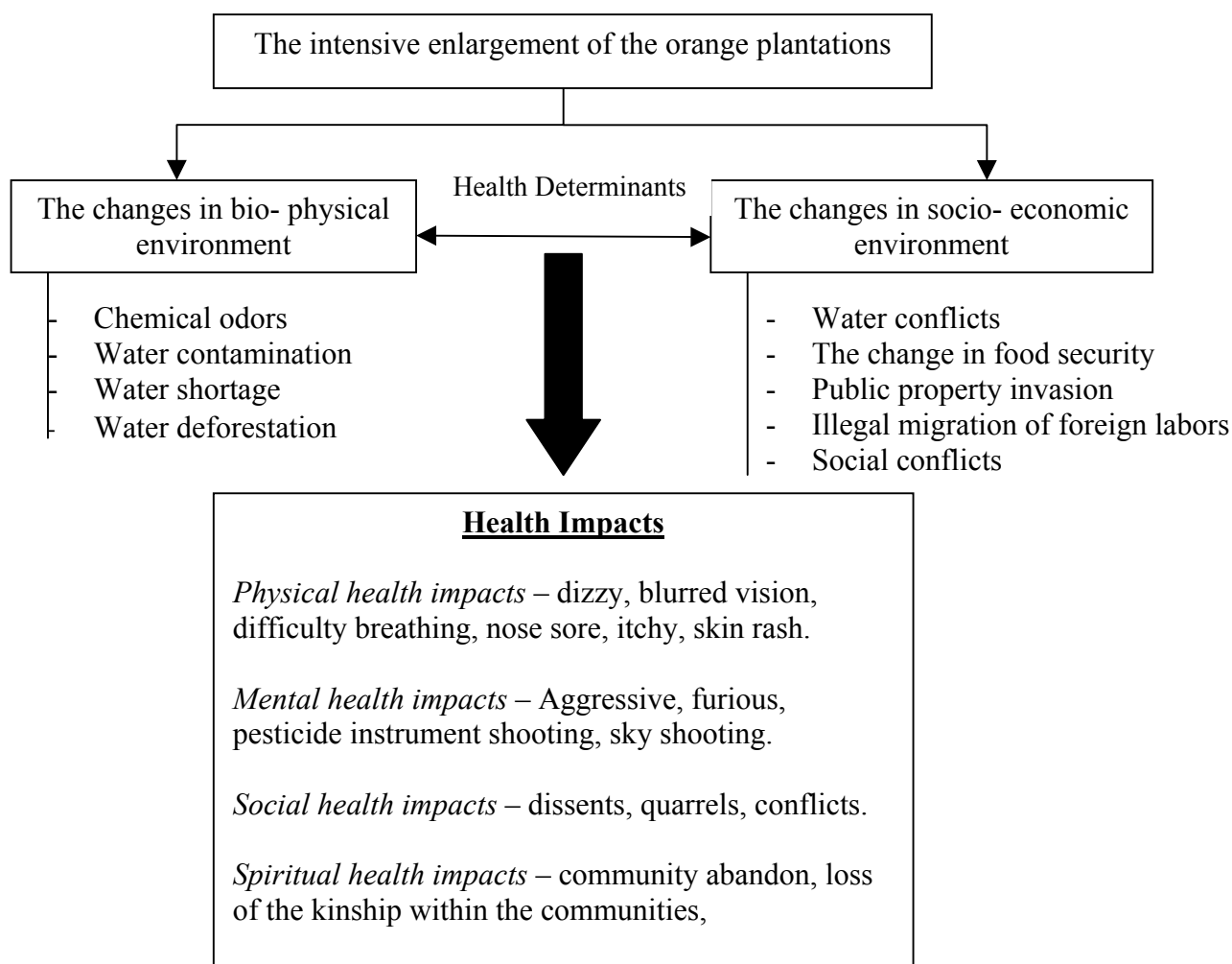


FIGURE 12: Summary the Overall Health Impacts of the Orange Plantations.

5. The HIA Study and the Move to Public Policy Process

5.1 The Struggle of Local People

From the result of the HIA study, it is clearly found that local communities in the Fang Watershed area have been seriously affected from the intensive expansion of the orange plantation areas for several years. Even local people tried many times to complain their sufferings for more than five years to local authorities, provincial officers as well as to the Prime Minister in the year 2001 (Manager Online, 2003b), but the problems were not seriously addressed.

Why their requests were not meaningfully responded from the authorities? Local people knew well that because each plantation owner is a powerful person in the local areas, some are the members of the provincial or sub-district administrative offices, and some is the mayor, etc. Importantly, most of them have close connections with politicians or the local bureaucrats. To cope with the plantation problems it was not easy for them. In order to strengthen their power themselves, therefore the villagers from many local communities gathered together and established the informal networking called the 'Fang Watershed Conservative Group' (Manager Online, 2003b). However, the plantation problems still could not be solved.

More recent, the plantation problems have become a hot public issue in the country as a number of mass media, particularly newspapers, have continually reported problems and impacts of the orange plantations in Fang Watershed. During that time, the preliminary result of the HIA study was referred in the article "Poisoned Orange in the Fang Watershed" that was unceasingly reported for three days in a national newspaper. Then later, this article got the praiseful award from the Thai Journalist Association in the field of 'Environment Conservation' news in the occasion of the Journalist Day for the year 2003 (Manager Online, 2004d).

5.2 The Move to Public Policy Process

Since the releases of the orange plantation problems in the Fang Watershed were continuously communicated to the public, many people began to debate about the Fang orange case, as well as other related issues such as impacts of pesticides on health. Eventually, in September 9, 2003 the issue of the orange plantations in Chiang Mai was raised to discuss in the Cabinet meeting. After that the Cabinet mandated the Ministry of Natural Resources and Environment (MoNRE) to take responsibility in solving the orange plantation problems in Chiang Mai province.

The MoNRE Minister appointed the provincial public health office to work as the focal point for the solving process. Six working groups were set to study on specific issues with the time limitation for six months. The working groups worked for solving problems in the following issues:

- 1) The health impacts
- 2) The environmental impacts
- 3) The illegal land use problems
- 4) The utility of high land or forest reserved areas management
- 5) The illegal foreign labors
- 6) The socio-economic, culture and livelihood impacts

To address the issue of health impacts of the orange plantations, the Public Health Act 1992 under the enforcement of the Ministry of Public Health, was seen as the key important legal enforcement mechanisms. The working group was assigned to work in order to force orange plantations as a 'risky activity to human health' according to the Public Health Act (Chomchaun, 2003). The affected local people hopefully expected that the law could be enforced to solve their health problems. The working group worked hard to investigate the impacts of the orange plantations on local people's health.

It should be noted that an obvious obstacle for the working group was the limitation of knowledge building as it mainly was based on scientific knowledge regardless communities' wisdom and their health concerns, as well as the limitation of working period, budget

including resources persons. During the end period of the working process the Minister of Public Health proposed in the Cabinet meeting that to solve health impacts related to the pesticide problems it was better to use the Hazardous Substances Act 1992 instead the Public Health Act. The working process of forcing orange plantations as a risky activity seemed to decline since then. Until now the problems of health impact on local people still cannot be definitely solved.

Unfortunately, in February 2004 the existing MoNRE Minister has been mandated to quit the position due to the political condition. The situation seems to be more adverse; the issue of the orange plantations has become out of concern for the new MoNRE Minister. Thus, the whole solving process seems to be ceased at the moment.

During the period of the solving process, another serious problem related to the Fang orange has been arisen (as mentioned to some extent in the topic 'social conflicts' in 4.2). The economic problem (the decline of the orange price) has become the most concerned for local people in the Fang Watershed; particularly for people who have invested in orange orchards, rather than the health impact problems. It seems that now most of local people are unhappy with the solving process as well as the negative public communication by several newspapers.

The most importantly, the villagers who joined the HIA research team, as well as the key leaders who support the solving process is seriously affected resulting from the decline of orange price. They are accused by most of local people to be evil for the communities as they induce the outsider researchers and gave the negative information to the journalists. As a result, some accused villagers have to permanently leave their communities as they are threatened by some powerful persons. Furthermore their neighborhoods as well as their cousins no longer want to talk with them. Now this problem has become the very serious conflict in the communities rather than the orange plantation problems.

6. Lessons Learnt

1) HIA Methodology and the Learning Process of Local Communities

The most significance of the HIA study, not the result of the study, but it was the collective learning process of local people, particularly in knowledge building. They learned what does it means by 'holistic health', as well as mutually defined the meaning of 'mental health', 'social health' and 'spiritual health' according to their understanding. They participated in designing of the study method, data investigation, data collection, including data processing. Moreover, they shared their experiences about the changes in bio-physical and socio-economic environments in their communities, as well as they learned how to use the body map to identify impacts of the orange plantations on their health. The HIA process facilitated them to learn about health impact surveillance.

It should be noted that before the HIA study started, there was no any significant data regarding the orange plantations and their impacts to human health and environment. The research team and local people tried to gather all relevant data themselves, several times they were denied from the authorities in data inquiring. Therefore, the HIA study was seen as the solely explicit effort of local people in knowledge building regarding the orange plantations and the link to their health impacts. It should be noted that there was no other key stakeholders e.g. plantation owners, local academics, health officers, etc participated in this

study even the study team tried to involve them at the beginning of the study but they denied to join the HIA process. It can be said that the HIA study was a truly communal participatory research. However, the result of the study was criticized by academics that it was only local concern, not based on scientific knowledge as well as it was not reliable and validity. This reflects the difference of 'health paradigm' among academics and local people. What really needs to address this problem is a collective learning process to mediate between them in order to work together for healthier community based on sound evidence.

2) Health Concern VS. Economic Concern

At the beginning period of the struggle, most of local people in the Fang Watershed much concerned about the impacts from the orange plantations on their health, particularly their children's health. However, when the situation is changed (the decline of orange price) most of them have turned to be interested in the economic issue solely. The health concern has been dropped from their minds. Consequently, it has given rise to the seriously adverse social impacts within the communities, the collapse of good relationship among themselves. Furthermore, other critical problems especially the deterioration of the ecosystem in the Fang Watershed are ignored by local people. The alike situation may happen in other intensive agricultural areas in other provinces if the related authorities do not closely pay attention to regulate at the beginning stage before any complicated problems arise.

3) Public Communication

From this case it is clearly found that the mass media have highly influence to urge the government to take action in solving the orange plantation problems, as well as to communicate with public. On the one hand, their role is significant for forcing the public policy process in the agricultural sector to achieve 'healthier agriculture practice' particularly regarding the pesticide application issue. On the other hand, their role can probably lead to negative impacts especially in the case that the written news is bias or vague. From the Fang orange case, it is found that the mass media particularly the newspapers have highly influence to the misunderstanding of local people in the Fang Watershed. Most of local people believe that because of the bad news about the 'poisoned orange' (consider the product as the problem) were continuously reported to consumer, the orange price is therefore declined. Inspire of the most serious concern for local people are the problem of 'the production processes' of the orange plantations. However, it is found that several reporters wrote the vague news about the Fang orange. This makes confusions to the public as well as to local people; consequently it leads to adverse impacts to the local communities. Under this circumstance, it really needs different groups of independent scholar or academic to pay roles for balancing the situation. This may be done in various ways e.g. making academic articles based on sound evidence to communicate with public; arranging academic forums or round table meetings to discuss and debate about the orange plantation issue. Therefore, academic supports from different groups of stakeholders are needed to forcing Healthy Public Policy (HPP) process in the agricultural sector.

4) The Uncertain of the Political Process

The uncertainty of the political process is also seen as one of the obstacles in solving the orange plantations in the Fang Watershed. Many efforts from the working groups have been paused since the new MoNRE Minister appointed. The solving process seems to be stop since then. The political process is significant for this case since they possess high power, authority, as well as all necessary resources e.g. human resources and budgets.

5) *The Contribution of HIA to Healthy Public Policy Process in the Agricultural Sector*

Even the result of the HIA study cannot directly be used to solve the orange plantation problems as well as to influence the policy makers. It does not mean the public policy process regarding this issue is totally ceased. In return, there are several key movements regarding pesticide issue are occurring in the society. The issues of pesticide impacts are frequently raised to debate and discuss in Health Assemblies¹² and the Fang case is always mentioned as an example. Furthermore, there is an attempt to push ‘plantations business’ to be considered in the EIA system reform because of the lessons learnt from the Fang Orange case, as one example. Even the HIA study was done but at the moment several efforts for forcing Healthy Public Policy (HPP) in the agricultural sector are going on in the Thai society.

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¹² The Health Assemblies have been recognised as one of the key mechanism for public policy process for the civil society to achieve their healthier society or community.