

KNOWLEDGE, ATTITUDE AND PRACTICE OF LOCAL RESIDENTS AT BIEN HOA CITY -VIETNAM ON PREVENTING DIOXIN EXPOSURE THROUGH FOODS

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Introduction

Literature has documented that between 1962 and 1971, U.S. military forces sprayed approximately 76.9 millions liter of herbicides over Central and South of Vietnam, in which Agent Orange (AO) accounted for much of the total chemical sprayed.^{1,2} Recent studies^{3,4} identified seven dioxin hot spots in Vietnam with the dioxin concentrations in soil and sediment were 2.5 to 80 times higher than environmental standards. Bien Hoa air base served as a bulk storage and supply facility for AO during the Operation Ranch Hand and was one of the three worst dioxin hotspots in Vietnam. Herbicides are known to have been spilled at this site for several times at large volumes. Consequently, samples of soil, sediment, blood and some types of local foods at Bien Hoa City (especially near Bien Hoa Air Base) had elevated levels of dioxin.^{5,6,7} Thus, local people at Bien Hoa City, especially those living at or nearby Bien Hoa Air Base have probably been facing with higher risks due to exposure to dioxin in the environment, especially through consuming local contaminated foods. This warranted special attention and intervention measures to reduce the risk of dioxin exposure were urgently needed.

Currently, the dioxin average daily intake from all sources for local people could not yet be quantified due to the lack of information on the frequency of food consumption and dioxin levels in all types of high-risk foods being consumed by local people. Nevertheless, there were substantial scientific evidences^{5,6,7} showing that local residents at Bien Hoa have been facing with higher health risks due to dioxin exposure. A KAP study would be needed to see the pattern of Knowledge-Attitude-Practice among those local people living in the highest polluted area with dioxin (Tan Phong and Trung Dung communes) and this was conducted by the VPHA. The results of this study were served as base-line evidence for developing an effective intervention program.

Material and methods

This was a cross sectional survey designed to assess knowledge, attitude and practice of the local residents toward dioxin and ways to prevent dioxin exposure through foods at Trung Dung and Tan Phong communes, Bien Hoa City, Vietnam. A sample of 400 households at these two communes was randomly selected from the list of local households using systematic random sampling scheme. 400 food handlers from selected households, aged 16-60 were interviewed. Data was analyzed using SPSS 13.0 and Stata 9.0.

Results and discussion

Knowledge and attitude on dioxin and dioxin exposure

The result of this KAP survey showed that although living at one of the worst dioxin hot spots, only few people have appropriate knowledge on the presence of dioxin in the environment, on routes of dioxin exposure, on high risk foods, and on health impacts of dioxin.

Most people thought that dioxin could be present in water 52.3%(CI 47.3%-57.2%) and soil 45.5% (CI 40.6%-50.4%) while only 13% (CI 9.7%-16.3%) were aware that dioxin could be present in food and 1.8% knew that dioxin could be present in all four environmental components namely soil, air, water, and food. Regarding knowledge on the routes of exposure, only 3.3% of the people in this survey were aware that dioxin in the environment could get into the body directly through skin, breathing contaminated air or through consuming contaminated foods.

Knowledge on high risk foods

People's knowledge about types of high risk foods were still very limited. The two types of foods that local residents at Bien Hoa City considered high risk were vegetables, and fruits and roots with 74.8% (CI 70.1% - 79.5%), and

41.6% (CI 36.2% - 46.9%) of total respondents agreed, respectively (see Figure 1.). In reality, these were low risk foods. Only small proportions of people in this survey were aware that people could be at risk of dioxin exposure through consuming local fish and aquatic products 37.1% (CI 31.8% - 42.2%), animal fat 25.6% (CI 20.9% - 30.3%), animal intestine 3.6% (CI 1.6% - 5.6%), and eggs, milk and dairy products 2.4%(CI 1.3%-3.5%).

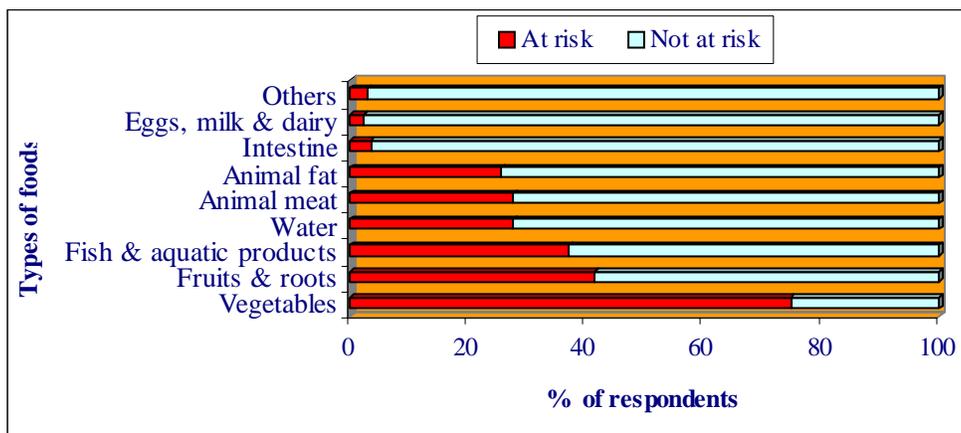


Figure 1. Knowledge of local residents on dioxin high risk foods, Bien Hoa 2007

Knowledge on preventive measures

Knowledge of local residents at Bien Hoa City on appropriate preventive measures was also low (see Figure 2).

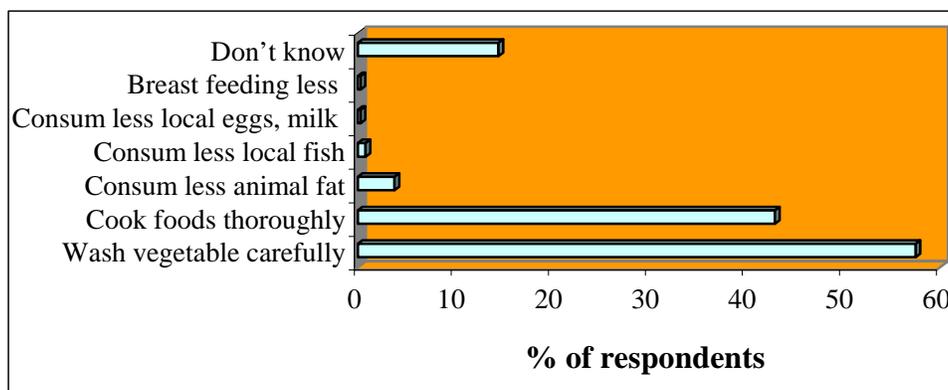


Figure 2. Knowledge of local residents on measures to prevent dioxin exposure through foods, Bien Hoa 2007

Most of the people in this survey reported that to reduce the risk of dioxin exposure through foods, they should wash vegetables carefully 57.5% (CI 52.6%-62.4%), or cook foods thoroughly 43% (CI 38.1%-47.9%). Small proportions of people were aware of effective preventive measures to reduce dioxin exposure through foods, such as cut off animal fat 3.8% (CI 1.9%-5.6%), consume less fish and shell fish caught at dioxin contaminated ponds 0.8% (CI 0.1%-1.6%), consume less local eggs, milk and dairy products 0.3% (CI 0% - 0.7%). In addition, 14.5% (CI 11%-18%) of respondents did not know any preventive measures.

Daily and weekly food consumption frequency

Results of survey on food consumption frequency (Figure 3) showed that high risk food such as fresh water fish, ducks, and chicken were usually presented in daily meals of local residents. 19% (CI 15,15% - 22.85%) and 16% (CI 12.4% - 19.6%) of respondents consumed fresh water fish, pork and beef daily. On a weekly basis, fresh water fish was consumed most frequently by 81% (CI 77.15% - 84.8%) of respondents, followed by chicken 52.3% (47.4% - 57.2%), lean pork meat and beef 51% (46.1% - 55.9%), and aquatic products 47% (CI 42.1% - 52%). Ducks were weekly consumed by 10.6% (CI 7.58% - 13.6%) households and animal viscera were consumed less frequent by 6.1% (CI 3.75% - 8.45%). Therefore, the risk of dioxin exposure through food consumption for local people at the two studied communes was probably high.

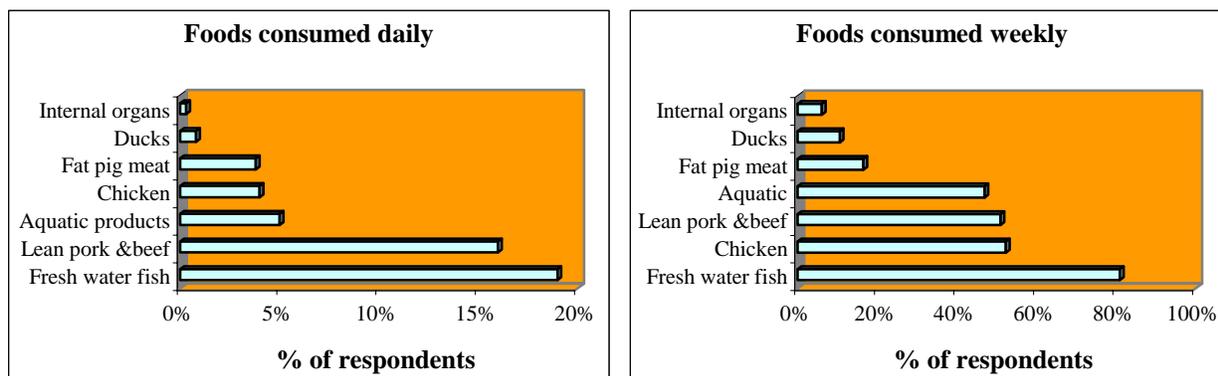


Figure 3. Foods consumed daily and weekly by local residents at Bien Hoa City, 2007

According to a study on levels of dioxin in foods at Bien Hoa City,⁷ marked elevation of TCDD (the most toxic member of dioxin) were reported in some of the food products, including ducks with 276 ppt and 331 ppt wet weight, chickens from 0.031–15 ppt wet weight, fish from 0.063–65 ppt wet weight, and a toad with 56 ppt wet weight. Usual TCDD levels in food were less than 0.1 ppt. The recommended tolerable daily intake (TDI) for a person weighting 70 kg ranged from 1pg to 4pg/1 kg body weight/day or (70 pg to 280 pg/day).⁸ If ducks with TCDD levels of 276 ppt and 331 ppt was the sole source of dioxin exposure for people living in Bien Hoa City, the TDI for an adult weighting 50 kg would be dioxin in approximately from 0.2g to 0.6g duck wet weight/day, equivalently 1.4g to 4.2g duck wet weight/week, which was a very small amount. Similar calculation could be made for chicken and fish. In reality, over 50% of local residents consumed these high risk foods weekly and with a larger amount. Thus, if calculated the average daily intake of dioxin from all sources, residents at two study communes at Bien Hoa City would have average daily intake levels far exceeding the TDI recommended by WHO⁸, which was 1 to 4 pg/ 1 kg bodyweight/day. As suggested by Schector et al.,⁶ food, including duck, chicken, some fish, and toad appeared responsible for elevated TCDD in residents of Bien Hoa City.

Current practices to prevent dioxin exposure through foods

Although facing a high risk of dioxin exposure through foods, only a small proportion of respondents 27.7% (CI 23.3% -32%) reported having preventive measures. The three preventive measures have been implemented by respondents were cooking food thoroughly 18.2% (CI 16.27%-20.1%), using clean water 5.5% (2.8% - 7.2%), and purchasing safe foods 4% (CI 2.1% - 5.9%), while 58.5% (CI 53.7% - 63.3%) of total respondents did not implement any preventive measures and 13.8% (CI 10.4% - 17.2%) did not know any thing about prevention. Since evidence showed that pure dioxin decompose almost completely at 800° C, and dioxins bound to particles remain intact even at 1,150°C.⁹ Therefore, the most common preventive measure currently adopted by local residents, i.e. cooking food

thoroughly, was thought to be ineffective. In addition, most people 65.5% (CI 60.8% - 70.2%) did not care or did not know the sources of foods that they consumed daily.

Although having limited knowledge on dioxin and risk of dioxin exposure through foods, the KAP results showed that most of local people have positive attitude toward adopting preventive measures to reduce dioxin exposure for themselves and their families, including pay on average 11,200 VND/household/day more for safer foods (equaled approximately 10% of households' income). An intervention program to raise local people's awareness on the availability of dioxin in some high risk foods, the effective preventive measures and to ban all agricultural activities at highly polluted areas at Bien Hoa City was urgently needed. Continue with this study, in October 2007, VPHA organized a public consultation meeting at Bien Hoa City to disseminate the results of this KAP survey and explored possibility of developing a comprehensive intervention using qualitative tools for getting more in-depth information. A multi-approach intervention program was developed and implemented since early 2008. This has been seen as a very first public health intervention program ever been implemented in Vietnam to reduce the risks of dioxin exposure through foods for local residents at dioxin hot spots.

Acknowledgments

The authors gratefully acknowledge the financial support from Ford Foundation in Vietnam, Dr. Charles Barley and sincerely thank staff of the Dong Nai Public Health Association for their supports throughout the data collection phase. The authors also would like to specially thank the 33 Office, the 10-80 Division, and Prof. Le Thi Hop for supporting and providing scientific references during proposal development and data analysis.

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