

DISEASE PATTERN IN HOT-SPOT OF DIOXIN POLLUTION

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Introduction

Study on disease pattern is important not only in assessment of health situation but also polluted environmental risk factors. The chemical war in the South of Vietnam has ended over 30 years but it has still left serious effect on people's health and environment, especially at around of air-base, that are called "hot-spot". The primary pollutants are called agent orange. Agent orange was 50:50 mixture of 2,4-D and 2,4,5-T. Agent orange was only one of several herbicide mixture during Operation Ranch Hand. Lesser amounts of agents Purple (2,4-D and 2,4,5-T), Pink (2,4,5-T), Green (2,4,5-T), White (2,4-D plus picloram) and Blue (cacodylic acid) were applied. Unfortunately, the 2,4,5-T in Agents Purple, Pink, Green and Orange was contaminated to varying degrees with dioxin (Jeanne et al., 2003). 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is widely perceived to be one of most hazardous of man-made chemicals. TCDD is actually only one of 75 dioxin congeners, that vary in the number and positions of chlorine atoms around the dioxin structure, but TCDD is the most toxic. Most, but perhaps not all, of the actions of TCDD appear to be mediated by binding to the aryl hydrocarbon (Ah) receptor. Other dioxin congeners, some polychlorinated or poly-brominated furan and biphenyl congeners and some poly-aromatic hydrocarbons also bind to this receptor, but with less high affinity. These have actions similar to those of TCDD. Since it is likely that most of the toxic effects of all of these substances are mediated by actions at the Ah receptor, throughout this application the generic term "dioxin" will be used to refer to TCDD and other substances which act at the Ah receptor. While there is potential toxicity from herbicides, concern regarding human health is primarily directed at dioxin because it is poorly metabolized by the human body. The lipophilic character of dioxin leads to deposition in body fat with a half-life of the order of 7-12 years (Kriebel et al., 1997). Dioxins are also persistent in the environment, and bioaccumulate in fish and animals that constitute human food. Thus, there is great potential for humans living in an area with high concentrations of dioxins in the environment to be continuously exposed for many years after the original application of dioxin, primarily through eating fish and meat from the contaminated area. To assess the impact of them on health of people, study on pattern of disease in hot-spot, Phu Cat district, Binh Dinh province, from 2002 to 2006 with objectives: (1) Evaluate relative causes of mortality by burden of mortality; and (2) determine incidence of birth defects in that time.

Material and methods

- **Material:** all death cases and birth defects from January 1, 2002 to December 31, 2006 in Phucat population .
- They are divided in to group by age and sex of Asia Developing Bank (ADB) for calculating years of lost life (YLL), and all of the cases birth defect in that time.
- **Methods:** Retrospective study on causes of all the cases dead and birth defect from 2002 to 2004 in Phu Cat by verbal autopsy of WHO are corrected to Vietnamese customer and habit [9]. Supervision all of the dead cases and birth defect from 2005 – 2006 in Phu Cat.
- All of dead cases are grouped in order to three major groups [5]:
 - + Group I. Non –communicable diseases;
 - + Group II. Communicable, maternal, perinatal and nutritional conditions;
 - + Group III. Injuries
- All the birth defects are grouped in order four groups:
 - + Neural systems defects; + Cardio- vascular systems defects; + Movement system defects;
 - + Other
- Burden of mortality was analyzed using Asia Developing Bank (ADB) standard method [5].

Result and discussion

I. General mortality: Interview by verbal autopsy all of families having deaths determines situation of dead causes from 2002 to 2004, and supervise on death from 2005 – 2006, it show on table 1 on mortality by major causes

Table 1: Rate mortality by major causes

No	Causes	Sex	2002	2003	2004	2005	2006
1	I	Men (%o)	2.17	2.41	2.90	2.08	2.53
		Female (%o)	2.16	2.28	2.80	2.26	2.26
		Sub total (%o)	2.16	2.35	2.85	2.17	2.40
2	II	Men (%o)	0.52	0.46	0.38	0.2	0.11
		Female (%o)	0.35	0.25	0.38	0.09	0.11
		Sub total (%o)	0.44	0.36	0.38	0.15	0.11
3	III	Men (%o)	0.70	0.83	1.20	0.52	0.54
		Female (%o)	0.30	0.37	0.50	0.16	0.14
		Sub total (%o)	0.5	0.59	0.84	0.35	0.34
Total			3.1	3.3	4.08	2.67	2.85

(*I: Non-communicable; II: Communicable; III: accidents and poison*)

By the cause groups, death incidence of men is higher than female and with trend is increasing from 2002 to 2006, except the cause of communicable, pregnancy, nutritional causes are reducing but it is not statistic mean ($P > 0.05$). The dead average datum from 2002 to 2006 is 3.2‰, maximum is 4.08‰ (2004), and lowest terms is 2.66‰ (2005). Detail of over all district from 2002 to 2006 shows that dead incidence is increasing from 3.1‰ (2002) to 3.3‰ (2003) and the most high is 4.09‰ (2004), and then reducing to 2.67‰ (2005), 2.85‰ (2006). Results of studies in the North of Vietnam show is lower as 2.14‰ (2001); 3.0 – 3.1‰ (1997 - 1999) [1: 3]; 3.2 – 3.9‰ (2000 - 2002) [2]. General trend of death for non-communicable diseases is increasing by time. Our results show that YLL of 0 – 4 aged and 5 – 14 aged groups is also increasing by time (53.02‰ – 62.99‰ and 12,21‰ – 19,42‰). Other results shows that it is reducing trend from 1997 to 1999 as 131,2‰ – 60,6‰ and 30,4‰ – 18,8‰) [1]. Maybe it is calculating ways and difference time carry out.

Table 2: Years lost life by major causes

Causes	Sex	2002	2003	2004	2005	2006	Mean	
1	I	Man (%o)	29.11	29.70	34.24	26.37	39.22	
		Female (%o)	29.26	26.09	40.24	32.30	20.91	
		Sub Total (%o)	29.18	27.96	37.15	29.24	30.35	
2	II	Man (%o)	10.15	12.40	8.85	6.23	3.89	
		Female (%o)	9.46	5.09	7.69	2.21	5.08	
		Sub Total (%o)	9.82	8.87	8.29	4.29	4.46	
3	III	Man (%o)	23.80	31.57	41.81	23.37	23.57	
		Female (%o)	9.46	10.04	14.05	6.52	4.24	
		Sub total (%o)	16.87	21.16	28.39	15.22	14.20	
4	Total (%o)	55.87	57.98	73.82	48.74	49.01	57.08	

(*I: Non-communicable; II: Communicable; III: accidents and poison*)

The result on table 2 shows that YLL by non-communicable diseases and injuries (group I and III) is increasing from 2002 to 2004, particular in men (YLL is 29.11 – 29.70 and to 34.24‰) and then lie reducing in 2005 and 2006. Communicable diseases, maternal, perinatal and nutritional conditions are trending reducing from 9.82‰ (2002) to 4.29‰ (2005), and 4.46‰ (2006). In this group, YLL of men is higher than female one, except in 2006. Group of injuries has higher in 2004 with YLL is 28.39‰ and lowest YLL is 14.2‰. Generally both 3 groups with average

YLL is 57.08% (48.72 – 73.82), communicable, maternal, perinatal and nutritional conditions group is 0.288%. In 2004, YLL of non-communicable, and injuries groups are higher than other years. Except communicable group in 2002 is highest incidence in 5 years.

More detail analysis non-communicable group, average ratio of die of cancer in 5 years is 0.464% (0.40 – 0.565). This result is higher than other studies in the North (Dong Anh, Soc Son – Hanoi, and Hai Phong). Particular, YLL in both men and female die for cancer of digestive system is higher lung cancer of men and breast cancer of human. The result is rather difference with other studies that die of lung cancer in men is common the most high and breast cancer in female is the most high [1;2;4;7].

1. Years life lost on aged group and causes

Table 3: YLL by reason and aged group

	Cause	0 - 4	5 - 14	15 - 44	45 - 59	≥ 60
2002	I (%)	59.05	6.51	15.59	64.26	77.30
	II (%)	46.61	0.00	4.18	15.12	16.54
	III (%)	20.62	16.71	17.77	15.97	10.81
Sub total		126.28	23.22	37.53	95.35	104.65
2003	I (%)	26.91	6.26	17.53	68.75	81.97
	II (%)	48.78	0.00	5.11	4.78	14.01
	III (%)	13.17	19.79	26.03	19.96	11.73
Sub total		88.85	26.05	48.67	93.48	107.71
2004	I (%)	103.23	9.11	17.96	71.30	94.21
	II (%)	28.91	3.11	7.33	6.63	9.03
	III (%)	18.62	24.67	38.54	16.72	12.44
Sub total		150.76	36.89	63.83	94.65	115.67
2005	I (%)	19.97	15.47	58.40	58.40	71.43
	II (%)	14.73	2.96	1.49	11.71	4.28
	III (%)	5.02	8.95	22.60	16.57	3.93
Sub total		39.72	27.39	45.00	86.69	79.64
2006	I (%)	59.56	5.92	21.20	66.07	64.97
	II (%)	38.02	0.00	1.71	5.89	1.82
	III (%)	5.23	10.25	19.91	13.95	5.35
Sub total		102.80	16.17	42.82	85.91	72.14
		101.68				

(I: Non-communicable; II: Communicable; III: accidents and poison)

On table 3, it shows that YLL of group 0 – 4 ages is high in 2002, 2004 and 2006 with average is 101.68% (39.72 – 150.76) and main causes are non – communicable diseases. With group over 60 years of old, YLL of non – communicable diseases is higher in almost years with average is 77.98% (64.97 – 94.21).

By disease groups, it is difference of YLL in years. The most high YLL is 73.82% (2004) and the most low YLL is 48.74% (2005).

- YLL of non – communicable diseases of group > 60 years old is high in almost years, but the most high is 94.21% in 2004, the most low is 64.97% in 2006. YLL by cause of Injuries are high on group 15 – 44 year old, except in 2002, it is high on group 0 – 4 year old (YLL is 20.62%).

- The result of investigation by ADB in 2000 show that YLL of non-communicable diseases is the most high, the second is communicable diseases and the most low is injuries [5]. Burden of YLL of Victoria people on main 20 reasons show that cardio – vascular in both sexes is the first on range [8].

YLL by cancer

Incidence of die of cancer is high in group non-communicable diseases and young, working age's group. Especially, death causes of digestive system cancers of both men and female is higher than lung cancer in men and breast, uterus cancer in female. They are not the same of rule on areas and other countries [5;6;7;8].

4.2. Incidence of birth defect:

4.2.1: General incidence of birth defect

Table 4. Incidence of birth defects (BD)

	2002	2003	2004	2005	2006	Total
No. births	3022	3047	3037	2823	2827	14 756
No of BD	31	36	24	33	13	137
%o	10.26	11.8	7.9	11.7	4.6	9.25

Incidences of birth defects are higher than indicator of other studies and figures of Binh Dinh. In general, it is difference incidence between years but it is still higher: In 2003 is max incidence: 11.8%0 and the lowest in 2006 with incidence is 4.6%0. Rate of birth defect of boy is higher than girl, with of boy is 58.39% and girl is 4161%. Birth defects of cardio – vascular defects of girl is higher boys (17/14 cases) .

4.2.2: Rate of birth defects on disease group: Nervous system is higher in birth defect groups (43.8%), cardio-system defects: 22.63%; and movement system: 16.05%, and others defects: 17.52%.

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