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Newsletter Topic: Midland County Health Department Studies : Cancer Death Rates - Birth Defects

In the debate on the health effects resulting from dioxin exposure, The Dow Chemical Company has stated,

"Numerous studies – including vital studies conducted by the ... Midland County Public Health Department ... – show that the health of Midland residents is better than both the state and national averages," [1]

Since these statements were made in the context of dioxin contamination, we can assume that the company meant to imply that dioxin exposure has not been harmful to Midland residents..

During 1999 to 2002, the Midland County Public Health Department ("Health Dept.") issued four Community Health Reports that addressed : "Leading Causes of Death", "Cancer Rates" (2 studies) and a "Birth Defects Study". The Health Dept. reports were more "letters to the community" than they were high quality epidemiology studies.

The Health Dept. studies were deficient in a number of areas and, as a result, the full impact of dioxin exposure on the health of city and country residents is still unknown.

1. Dilution with Non-exposed residents

Based on information provided by two Dow mortality studies[2,3] , and the July, 1967 issue of the ***Brinewell*** on the demographics of employees working in the Midland plant, it has been estimated that only approximately 20% of Midland county residents have been exposed to moderate to high levels of dioxins. The 20% estimate includes those Midland city residents that live within two miles of Dow's incinerator complex. Approximately 80% of the county residents have been exposed to primarily background levels of dioxins.

A more meaningful study would have focused on those residents with high levels of dioxin exposure – Midland plant employees residing in Midland county or those residents living within two miles of Dow's chemical waste incinerators.

The large number of low exposure residents would mask any higher mortality in high exposure residents.

2. Health Dept. Studies only Examined Death Rates in Midland County

The Health Dept studies found that death rates in Midland county were at or below the Michigan and national averages except for a higher rate of suicide.

However, the studies did not determine the death rates of prior county residents that may have been exposed to industrial or high levels of residential dioxins and left Midland county prior to death.

The Bond, 1987 study reported that, based on employment records for 1940 to 1982, approximately 66% of the Dow Midland-Bay City workforce left the company before being eligible for Dow retirement. It is assumed that some of the Midland county residents that may have been exposed to industrial levels of dioxins left the county to find employment elsewhere and did not return to Midland county prior to death.

In September, 2002, the Dow retiree's magazine, *Dow Friends,* reported that 65% of the 182 Dow Midland plant retirees that died during the reporting period died outside of Midland County.

Based on this information, it is probable that the majority of deaths that formed the basis for the Health Dept. studies did not include large numbers of ex-Dow employees (retired or otherwise) and may have consisted primarily of county residents with only exposure to background levels of dioxins.

3. Health Studies Included Deaths Not Related to Dioxin Exposure

The Health Dept studies included diseases and causes of deaths not shown to be associated with industrial dioxin exposure – suicide, influenza, chronic obstructive pulmonary disease, unintentional injuries, kidney disease.

1. http://www.dow.com – 9/24/2003
2. Bond GG, *et al*, Cause-Specific Mortality Among Male Chemical Workers, Am. Jour. Ind. Med. 12:353-383 (1987)
3. Burns, CJ, *et al.*, Cause-Specific Mortality Among Michigan Employees of a Chemical Company: 1940 to 1994, JOEM, Vol. 44, No.2 – Feb, 2002

The Health Dept studies, with the exception of all cancers, did not provide a great deal of information on the diseases that have been associated with high levels of dioxin exposure.

The All Cancer rate for Midland county residents (166.2 deaths/100,000 population – 1998) was approximately 83% of the US national average. This reduction in All Cancer mortality is typical of a population that has access to paid medical insurance. Based on the large number of county residents that work for Dow, Dow Corning, the Midland School System, Northwood Institute and both city and county government or are retirees of these organizations, it can be assumed that a large percentage of county residents have excellent health care which is a key factor in cancer detection and treatment resulting in a lower cancer mortality.

The Health Dept studies did not provide any information as to the demographics of age in Midland county and how the age distribution related to the US national average. Based on the large number of Midland county residents that take early retirement (to be replaced by younger workers), it is anticipated that the average age in Midland county is less than that of the US national average. The young have a much lower death rate than the elderly and this may have been an additional factor in the lower than expected cancer death rate found by the Health Dept.

4. Midland County Birth Defects Study

The Health Dept. analyzed information on birth defects in Midland county and Michigan from 1992 to 1996. For the eight categories reported, the birth defect rate in Midland county was slightly below (97.5%) that of the Michigan average.

Midland county residents have better access to paid pre-natal health care, take higher levels of pre-natal vitamins (especially folic acid) and have a higher socio-economic status than does the average Michigan resident. Based on these positive factors, it would be expected that the birth defect rate in Midland county would be much lower than it is.

There is another factor that should be addressed – therapeutic abortions based on pre-natal testing. With greater access to paid health care, identification of fetal birth defects should occur at a higher frequency in Midland county than in other Michigan counties. The Health Dept study did not provide any information as to the level of therapeutic abortions in Midland county versus levels in other parts of Michigan. Therapeutic abortions would reduce the number of birth defects in delivered infants that formed the basis for the Health Dept studies.

It should also be noted that air-borne dioxin levels in the county were dramatically reduced in the late 1960's and early 1970's with the startup of a greatly improved chemical waste tar burner and improvements to the air pollution control equipment on the company's chemical waste incinerator. The Health Dept studies provided no information as to whether the residents that delivered children during the 1992 to 1996 time period were long term residents of the city or county or if the delivering mothers moved into the county after air-borne dioxin levels were decreased.

5. Institute of Medicine Comparison

The Institute of the Medicine of the National Academy, Washington, D.C. has been evaluating the effects of TCDD and Agent Orange on Vietnam veterans and the children of veterans for a number of years. The IOM has issued a summary of the types of diseases strongly linked, moderately linked and weakly linked to TCDD exposure. The table on the following page shows the results of the Health Dept studies and the results of mortality studies of dioxin exposed Dow workers correlated with the IOM list of linked diseases.

As can be seen from the table, the Health Dept studies did not evaluate the incidence of a great many of the IOM diseases in Midland county residents, while the company examined a larger number of the IOM diseases.

The findings of multiple Dow studies are shown on the table. A large number of the Dow results were elevated indicating that employees had experienced a higher death rate than the US population. The total number of Dow employees exposed to pesticide plant dioxins is approximately 2,200 workers versus a Midland county population base of approximately 80,000 residents. The much large number of Midland county residents not exposed to dioxins would mask the impact of higher death rates from a small number of dioxin pesticide plant workers that might still reside in Midland county.

Table A
Institute of Medicine – Diseases Linked to TCDD Exposure
Midland County Department of Public Health – The Dow Chemical Company

HEALTH EFFECT - TCDD ASSOCIATION	Midland County Act./Exp. Death Ratio (1) (Normal = 1.0)	Dow Chemical Act./Exp. Death Ratio (2) (Normal = 1.0)
Sufficient Evidence of an Association		
Chronic lymphocytic leukemia (CCL)		
Soft-tissue sarcoma	NR	2.50
Non-Hodgkin's lymphoma	NR	2.38, 1.92, 5.92
Hodgkin's disease	NR	1.18, 1.32, 1.11
Chloroacne	NR	~16%
Limited-Suggestive Evidence of an Association		
Respiratory cancer		
Lung, brochus	0.81*	1.18
Larynx, trachea		
Prostatic cancer	0.79*	1.23, 1.88, 1.90. 1.88
Multiple myeloma	NR	2.00, 2.50
Acute/subacute transient peripheral neuropathy		
Prophyia cutanea tarda (PCT)		
Type 2 Diabetes	0.88	1.25, 1.11
Spina bifida in children of veterans	1.98	NR
Inadequate/Insufficient Evidence of an Association		
Hepatobiliary cancers	NR	1.38
Nasal or nasopharyngeal cancer		
Bone Cancer	NR	2.50
Breast Cancer	0.97*	1.08
Female reproductive cancer		
Urinary bladder cancer		
Renal cancer	NR	3.00
Testicular cancer	NR	1.88, 1.58, 1.67, 1.58
Leukemia (other than CLL)	NR	1.28, 1.08, 1.21, 171
Skin cancer		
Spontaneous abortion		
Birth defects (other than spina bifida)	0.97 - 1.21	NR
Neonatal or infant death and stillbirth		
Low birthweight		
Childhood cancer in offspring		
Abnormal sperm characterisitics and infertility		
Cognitive and neuropsychiatric disorders		
Motor or coordination dysfunction		
Metabolic and digestive disorders		
Immune system disorders		
Ciculatory disorders		
Respiratory disorders		
AL-type primary amyloidosis		
Endometriosis		
Effect of thyroid homeostasis		

* Cancer indicence rate, not mortality rate
(1) Expected deaths = Michigan, US actual (2) Expected deaths = US expected deaths