

## **Comments on Collier County Health Report Regarding Pesticides and Birth Defects**

Pesticide Action Network North America reviewed a report issued October 12, 2005, by Florida's Collier County Health Department and a report issued October 2 by the Florida Department of Agriculture and Consumer Services regarding birth defects and possible links to pesticides. PAN believes that the reports' dismissal of a possible link between pesticide exposure and the occurrence of birth defects in babies born to agricultural workers exposed to pesticides is unfounded and irresponsible. Below is the letter we sent in response to their findings.

As to a recent report issued by the Occupational and Environmental Epidemiology Branch Division of Public Health, North Carolina Department of Health and Human Services, PANNA has not yet had the opportunity to review the report in its entirety, but our initial read is that officials in North Carolina appear to be taking not only the three cases of birth defects and the potential pesticide causality seriously in its evaluation, but also taking the more holistic view examining a system that is broken and prescribing remedies to fix it. This is an approach for a health department that we can embrace.

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Dear Ms. Millsap:

We are following up on our previous correspondence with you regarding the report prepared by the Collier County Health Department (CCHD), which documents the investigation into the relationship between the recent Immokalee birth defects cases and worker pesticide exposure. Since the release of the CCHD report and the subsequent Florida Department of Agricultural and Consumer Services (FDACS) report, we have had the opportunity to carefully review the methods and results presented by both. We acknowledge and appreciate the level of effort required to conduct the studies and to prepare these documents.

However, after careful analysis and consideration of the factual information, **we conclude that the CCHD report grossly overstates that "a teratogenic event [pesticide exposure] is quite unlikely to be the cause of the defects."** We feel that this position represents an inappropriate laissez-faire approach to health care and directly undermines Collier County's stated position of "promoting and protecting good health for all in Collier County." The lack of conclusive data together with ample information about

potential relevant health impacts should **at least** warrant more precautionary and health-protective conclusions. We arrive at this determination based on several factors:

1. The methods and data used to link statewide, county, and local birth defect rates with the three index cases are inadequate to identify a significant causal relationship or lack thereof between pesticide exposure in the pregnant workers and the resulting deformities.
2. Not all exposure sources, nor all of the pesticides that these women might have been exposed to, were considered in the analyses.
3. Two index cases were omitted due to unlikely worker exposures; however, other sources of pesticide exposure to these individuals were not considered. If these two cases were included in the analyses, the statistical correlation between pesticide exposure and the frequency of birth defects would have been strengthened.
4. Birth defects can be caused in humans by very small doses of a chemical (smaller than those estimated in the Florida report) that might not result in toxicity to the mother. Furthermore, any signs and symptoms of mild or even moderate pesticide poisoning in the exposed women would likely have gone unnoticed, unreported, or misdiagnosed.
5. Birth defect rates in Collier County have been elevated compared to statewide rates over the past six years. This is not only a methodological consideration; it is also important data that were dismissed by CCHD. These workers/residents are being exposed to pesticides from a variety of sources and there is clearly cause for concern that these exposures are at the root of the problem.
6. There are toxicology data gaps for several important pesticides. In addition, it is widely accepted in the scientific community that negative animal developmental toxicology studies are not necessarily predictive of the outcome in exposed humans.
7. There are few studies investigating the link between pesticide exposure and birth defects in human populations. Therefore, definitive data demonstrating causality are not available. This does not mean that pesticides do not cause birth defects.

Based on the available information contained in the two reports, CCHD should only have arrived at the conclusion that ***the available data neither support nor refute that pesticides might be the cause of the birth defects.*** However, as a health department with a mission to protect public health and “create and sustain a healthy environment and to promote physical, mental and socioeconomic well-being for all people” we are even more disturbed that the report’s recommendations are not more precautionary. In fact, statements made in both reports suggest that they were written with the goal to rule out pesticides as the cause of the birth defects. We do not understand why a health department would be interested in allowing continued unchecked exposures to agricultural workers and families living near fields where pesticides are applied, and where there is a steady, increased rate of birth defects in the same community.

We have attached a more detailed explanation of our concerns and hope that our comments will help inform a continued inquiry into the as-yet-unexplained origins of the

suspected elevated birth defect rate in Collier County and the cluster of birth defects in Immokalee. We strongly encourage Collier County and the state of Florida to reopen the investigation as to the causes of the three (five?) severe birth defects that were the subject of the evaluation, as well as the overall health status of these agricultural communities in an environmental justice context. We are ready to assist your department and other concerned organizations in Florida with any technical assistance we can in further understanding the role pesticides may play in the explanation.

Sincerely,

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## Evaluation of the Data and Arguments Presented by Collier County Health Department Regarding 2005 Birth Defect Cases

The Collier County Health Department (CCHD) utilized a common, but often inappropriate method for investigating a small cluster of health effects in a community, that is, comparing frequency rates of the health outcomes for the index cases with reported rates of the disease obtained at the state or local level. The report acknowledges “most clusters of birth defects or other maladies are not found to be causally associated with an environmental toxicant.” We agree that identifying a causal relationship between exposures to pesticides and birth defects in this situation is highly unlikely using this methodology. There are some fundamental flaws with this approach that shed significant doubt on the results of this study, and these flaws must be acknowledged.

- The small sample size precludes any possibility of finding a statistically significant increase in birth defects in this population; the power of the study is too small. This basic methodological problem was not addressed by CCHD.
- The general comparisons made in the CCHD report are irrelevant. With respect to using matched controls, if pesticides are the key variable being investigated, then birth defect rates in agricultural counties must be compared with non-agricultural counties, rates in agricultural communities compared to non-agricultural communities, parental agricultural occupations compared with non-agricultural occupations, etc.
- Not all birth defect types were counted and/or reported. According to the CCHD report, the specific severe malformations seen in the three index cases were not among the 42 birth defects reported by the Florida Health Department to the Centers for Disease Control. It is possible that there are no known cases of these severe malformations in the state, county, or even the community of Immokalee over the past six years. If this were true, then the frequency and severity of these cases over the same time period are particularly alarming.
- The conception dates for all three index cases evaluated by CCHD were estimated to have occurred within approximately 60 days of each other. Other health complaints in Immokalee and Collier County should be investigated during the same time period. The frequency of health complaints over this exact period would be a better indicator of some particular environmental or occupational episode (for example, a pesticide drift episode or an illegal application) that might have lead to the illness events.
- It is not clear whether it was appropriate to discount the two additional index cases born in Immokalee during the same time period. The rationale for discounting these two cases, as stated in the CCHD report, was due to the report that there was “no association with agricultural farming or pesticide exposure during pregnancy.” In fact, a thorough investigation into the potential exposures for these two individuals was *not* conducted by either CCHD or the Florida

Department of Agriculture and Consumer Services (FDACS). Rather, CCHD relied on information provide by the families and medical records. As we note elsewhere in these comments, these sources of information regarding pesticide exposure are unreliable.

Based on these methodological problems, we conclude that the results of this evaluation are irrelevant and should not have been used as a basis for any conclusion regarding the cause of the birth defects in Immokalee. In other words, a negative result from this study cannot be interpreted as evidence for the non-involvement of pesticide exposure. CCHD and the state of Florida should consider either conducting a retrospective, case-control study to examine the historical trends toward higher birth defect rates in Collier County, or follow a cohort prospectively over several years to investigate possible causal factors. Even if pesticides are not a major contributing factor to unhealthy living conditions in Collier County, CCHD and the state of Florida are obligated to protect the health of its residents and workers.

### **General Exposure**

Agricultural workers and residents in agricultural communities are exposed to many different chemicals both simultaneously and sequentially. Both the FDACS and the CCHD reports focused on exposure to individual chemicals and only on those pesticide exposures that would occur from working in agricultural fields. Although there is no doubt that the three index mothers were exposed to pesticides in their workplace, there are other important sources of pesticide exposure (and sources of this information) overlooked in both reports.

First, given Ag-Mart's record, it is unfortunate to have to rely on company records to identify the pesticides used during the period in question. As you are probably aware, on October 14, 2005, the Palm Beach Post reported that Ag-Mart had been found in violation of 88 Florida laws addressing pesticide use and worker safety (for example, applying pesticides more frequently than allowed by the label and having workers enter fields before the re-entry interval had expired). The same company is reportedly responsible for at least that many violations in North Carolina. It has already been reported that Ag-Mart had originally given false dates for the employment of one of the mothers whose child's birth defects were investigated. We would expect the conclusion that pesticide exposure is an "unlikely" cause of the birth defects to at least be qualified by the uncertainty due to the source of the exposure data.

Data collected in California clearly demonstrate that pesticides applied to agricultural fields are a major exposure source to residents living near the fields, as could have been the situation for the three cases who lived within 100 yards of each other, and potentially for the fourth and fifth cases discounted by CCHD in their evaluation.<sup>i</sup> Some pesticide residues may also persist longer indoors than outdoors since organisms, light, moisture, and heat influence how quickly they break down.<sup>ii</sup> The California Air Resources Board has collected and reported pesticide air monitoring data for the last 15 years under California's Toxic Air Contaminant Act. The reports from these monitoring studies are

available at the California Department of Pesticide Regulation's Web site: <http://www.cdpr.ca.gov/docs/empm/pubs/tac/tacstdys.htm>. CCHD in collaboration with Florida state agencies should re-evaluate ambient air as a significant exposure source for all five index cases identified in the Immokalee community. If no comparable data exist in Florida, we strongly recommend that ambient air monitoring efforts begin as soon as possible in and around the agricultural fields in Collier County.

We also recommend that CCHD and FDACS take a closer look at several other sources of exposure besides direct work in the fields such as residues in food and "take-home" exposure on clothing. Both CCDH and FDACS failed to consider in their analyses cross-contamination from another household members' employment in agriculture. Take-home exposures can be substantial.<sup>iii</sup> At home, women often have primary responsibility for house cleaning and as a result might be exposed to pesticide residues in household dust and when laundering pesticide-contaminated clothes.

As noted above, CCHD omitted two of five birth defect cases in the same community because the mothers did not work in the fields and therefore had "no association with agricultural farming or pesticide exposure during pregnancy." However, this conclusion was based on two sources of information, the families and their medical records. We have extensive experience working with agricultural communities. Although some farm workers tend to have basic knowledge about the names of the chemicals they work with, workers generally do not know the extent of their exposure. In comparison, residents have little or no knowledge of the several sources of exposures such as airborne pesticides, pesticide residues in food and water, "take-home" exposures, and home usage. Therefore, definitive conclusions regarding pesticide exposures should not be based on an interview with a family member.

Likewise, there is no reason to believe that medical records would yield any better information regarding pesticide exposures. Recognizing pesticide exposure and illness is not easy and is routinely neglected by a treating physician. Does the state of Florida have a program in place to train physicians on the recognition and treatment of pesticide poisoning cases? If yes, did the physicians treating the pregnant women have such training? If no, then CCHD should not conclude that the additional two index cases were not pesticide related.

With respect to multiple (simultaneous or sequential) exposures to pesticides or other chemicals in pesticide formulations, neither the FDACS nor the CCDH reports contain much discussion about this significant deficiency in the analyses. On page 73, FDACS summarizes its discussion with the statement "despite some exceptions, it has been demonstrated that interaction between components is not a common event at low levels of human exposure such as those that may occur through pesticides residues in food or drinking water. As a general rule, exposure to mixtures of pesticides at low doses of the individual constituents does not represent a potential source of concern to human health."

Pesticide products are usually a mixture of chemicals; an "active" ingredient and the so-called "inert" ingredients. In addition, some products contain more than one active

ingredient. For example, the short list of seven products considered the “chemicals of concern” by FDACS includes three products each containing two active ingredients. In product formulations, inert ingredients are added to improve the effectiveness of the active ingredient. For example, FDACS (page 54) presents an example of how one “non-active” compound increases “the dermal penetrability of the other potentially teratogenic chemicals” in a mixture. There is a plethora of information in the scientific literature regarding the biological activation or detoxification of chemicals, including pesticides, and chemical interactions that impact metabolism. Taken together, these data support the need for risk assessors to evaluate not only the individual chemical, but also the chemicals in formulation. Nevertheless, the exposure/risk assessment only evaluated exposure to a single active ingredient, not as a complex mixture. While we agree that synergistic or additive effects of chemical mixtures has been poorly studied, most of the chemical interactions reported demonstrate increased specific “potency” of a single chemical (by as much as a factor of 10), particularly if the modes of toxicity are related.

### **Fetal Exposure**

The FDACS report states “any potential effect on the developing fetus that might have occurred as a result of exposure to high levels of pesticide active ingredients would have been accompanied by symptoms in the mother.” This statement is misleading. In humans, very small doses of a chemical, far less than used in animal experiments, have been demonstrated to cause adverse effects on the fetus – with no resulting maternal toxicity. Acute effects (in the mother) are not necessary for the manifestation of developmental effects that can result from relatively small exposures at crucial periods of development. For example, thalidomide, methylmercury, and lead can cause severe developmental effects in offspring, with no overt clinical signs of toxicity in the mother. It should also be noted that current scientific evidence supports that there is no threshold for the developmental toxicity of lead, thereby refuting the claim that a certain dose level must be reached before toxicity is observable. In addition, maternal effects may be reversible while effects on the offspring may be permanent. There are examples of agents (FDACS lists cigarette smoke, alcohol, isotretinoin as examples) that are known to produce adverse developmental effects at minimally toxic doses in adult humans.

Even if we were to assume for the moment that health effects in the mother are required in order to achieve a pesticide dose high enough to cause toxicity to the fetus, the probability of recognizing such maternal toxicity in the general population is extremely low. What constitutes “maternal toxicity” is unknown and has not been clearly and objectively defined. Maternal toxicity is also difficult to track given the lack of surveillance tools and methods available, even in states with superior reporting requirements. Symptoms of low-grade pesticide poisoning mimic flu, other relatively common ailments, and pregnancy. Even in California where compliance with mandatory reporting of pesticide use, pesticide-related illness reporting, and physician training in the recognition and treatment of pesticide poisoning are among the best in the nation, we know that many (perhaps most) minor and even moderate acute effects of pesticide exposure never get reported.<sup>iv</sup> One would expect far worse in a state such as Florida where pesticide use and pesticide illness reporting are not as systematized as they are in

California, and where until this Ag-Mart case, fines for violations are rare.

The estimated gestational ages reported in the CCHD report were not consistent with the information available. In the report, the Critical Gestational Period (CGP) is given as 18 to 60 days after conception. For case number one, the probable date of conception is given as 4/3/04 to 4/17/04 and CGP as 4/21/04 to 6/02/04. If the full 60 days were projected from the last probable date of conception, it would extend the CGP to 6/16/04, not 6/02/04, a full two weeks more. The same is true for case numbers two and three. It is not clear how this discrepancy would change the statement made in the FDACS report “one or more pesticide products containing a chemical with potential developmental effects were not likely used in the fields during critical windows of exposure.” However, as we have discussed elsewhere in these comments, there are other potential sources of pesticide exposure in these cases besides occupational exposure in the fields. Without independent and confirmed pesticide use reporting, it is unlikely this issue will be adequately resolved.

In conclusion, it is not valid to dismiss possible developmental effects of pesticide exposure because of lack of maternal acute effects because: 1) pesticide toxicity is often misdiagnosed or not diagnosed at all, 2) most acute effects probably never get reported, 3) developmental effects can occur in the absence of maternal effects, 4) toxic effects on the mother might be reversible while effects on the fetus permanent, 5) dates of conception and gestational periods are subject to variability, and 6) for some developmental toxicants, a threshold for toxicity does not or might not exist. It should be noted that some of these concerns about the toxicology database are consistent with those stated on page 63 of the FDACS report.

## **Toxicology**

The causes of birth defects in the human population are generally unknown. The FDACS reports “most birth defects (about 60 percent or greater) have no identified cause,” while CCHD estimates that 65 percent of birth defect outcomes have no known etiology. Although it is estimated that about 25 percent are due to heritable conditions, there is no definitive evidence that supports or refutes the possibility that exposures to chemicals in the environment or diet represent a large proportion of the remaining causes. Of the approximately 35 to 40 percent of birth defects with known causes, the FDACS report states “most are due to chromosomal disorders and single-gene mutations, and are therefore more likely causes of birth defects than environmental teratogens.” However, many chemicals, including pesticides, have been shown to cause chromosomal disorders as well as single-gene mutations. Therefore, this conclusion does not seem to be supported by the scientific evidence. Pesticides should not be generally omitted from a list of potential teratogenic agents associated with congenital malformations, unless sufficient data are available to specifically refute that mechanism of toxicity.

We agree with FDACS that “causality in humans is only confirmed if a sufficient number of well-designed epidemiological studies show a clear and consistent pattern of association with a given health outcome,” and “most human teratogens in fact have not

been discovered by animal studies, but rather by epidemiology studies or by alert physicians.” However, carefully designed (with adequate statistical power) epidemiology studies investigating the causal relationship between specific pesticide exposure and birth defects have generally not been conducted. Of the scientific literature available, there is no consensus or even consistency in the scientific community as to what conclusions should be made. We agree with the statement in the FDACS report “convincing evidence for the developmental toxicity of occupational and environmental pesticide exposure in humans is lacking but the data are suggestive of increased risks of fetal deaths associated with pesticides in general and maternal employment in the agricultural industry” and that “there is inadequate evidence for either establishing or rejecting a relationship between pesticide exposure in humans and birth defects.” Some recent studies are available that indicate employment in agriculture increases the risk of a woman giving birth to an infant with congenital malformations, including orofacial cleft and musculoskeletal and nervous system defects. At this time, however, risk assessors and policy-makers must rely on results from toxicology tests in animals. Unfortunately, even here substantial data gaps exist and some studies, such as developmental neurotoxicity studies, are not generally conducted.

The following tables list the pesticides used in Collier County during the time period related to the index case pregnancies. Table 1 lists those considered of “potential concern” while those in Table 2 were not considered of “potential concern” by FDACS but are known to cause developmental effects. Both tables show a substantial number of data gaps.

**Table 1. Pesticides listed by FDACS as “Chemicals of Potential Concern”**

<b>Pesticide (active ingredient)</b>	<b>Endocrine Disruptor</b>	<b>Develop/ Reproductive Toxicant</b>	<b>Other Effects</b>	<b>Exposure Routes Considered *</b>	<b>Implications for Immokalee Cases</b>
Monitor (Methamidophos)	Unknown	Unknown	ChE inhibitor	Not clear, maybe only oral	The “unprotective” 2 day REI was breached for all 3 women on several occasions. OPs are volatile and inhalation exposure is probable.
Danitol (2-Ethylhexanol)	Not available	Prop 65	Teratogen	Oral, inhalation, dermal	“May cause birth defects.”
Danitol (Naphthalene)	Unknown	Unknown	Carcinogen	Not clear, apparently only oral and injection	FDACS argues there are many source of naphthalene exposure.
Agrimek 0.15EC (Abamectin)	Unknown	Yes	High acute toxicity	Not clear, maybe only oral	Persistence indoors might be substantial.
Agrimek 0.15EC (1-Methyl-2-pyrrolidone; N-methylpyrrolidone)	Not available	Prop 65	Teratogen	Oral, dermal and inhalation	
Penncozeb	Suspected	Yes, Prop 65	Carcinogen	Oral and	Metabolite of mancozeb

(Ethylene thiourea)				dermal	
Penncozeb (Mancozeb)	Suspected	Yes	Carcinogen	Oral and inhalation	
Courier (Buprofezin)	Unknown	Unknown	Possible carcinogen	Not clear, maybe only oral	
Kocide101 (Copper hydroxide)	Unknown	Unknown	Unknown	Not clear, apparently only oral and injection	
Thionex (Endosulfan)	Suspected	Unknown (PAN); FDACS lists a develop tox reference	High acute toxicity; teratogen	Oral and dermal	Persistence indoors might be substantial. This was the only example in the FDACS report of reverse dose-dependency.

Unless otherwise noted, the determinations of health effects are from the Pesticide Action Network's online pesticide database ([www.pesticideinfo.org](http://www.pesticideinfo.org)). The listing "unknown" indicates no available weight-of-the-evidence summary assessment.

\* In many cases (FDACS report, Table 7A) effects were listed only for oral exposure. It is not clear whether the oral route was the only route studied or whether other routes were studied but no adverse effects were reported.

**Table 2. Pesticides not listed as Chemicals of Potential Concern by FDACS but shown to cause developmental effects in at least one animal study**

Pesticide	Endocrine Disruptor	Develop/Repro Toxicant	Other effects	Notes
Butylated hydroxytoluene	Unknown	Unknown		
Esfenvalerate	Suspected	Unknown		
Azadirachtin	Unknown	Unknown	Unknown carcinogen	
Chlorothalonil	Unknown	Unknown	Carcinogen; high acute toxicity	
benzoic acid	Unknown	Unknown		
Fenpropathrin	Unknown	Unknown	High acute toxicity	This product is of potential concern because the REI was violated on two or more occasions while Case 3 worked in the field. Technical Danitol (in previous table) is 92% fenpropathrin with 2-ethyl-1-hexanol at <2%, and naphthalene at <6% listed as "inactive" ingredients.
1,2,4-trimethylbenzene	Not available	Not available		
Methomyl	Suspected	Unknown	High acute toxicity; ChE inhibitor	
Sulfuric acid	Unknown	Unknown	High acute toxicity	
Azoxystrobin	Unknown	Unknown		

The bottom line is that many pesticide active ingredients or formulations have not been thoroughly studied with respect to teratogenic effects and that almost no studies of teratogenic effects of pesticide mixtures have been conducted.

Most toxicology data available on pesticides are from experimental animal studies; animal studies are not 100 percent predictive of human teratogenic effects. As stated in the FDACS report “for many of the known human teratogens, experimental laboratory animals were less sensitive than humans to the teratogenic effects.” It further states “in some cases a teratogen may include certain abnormalities in one species that are entirely different than those induced in another species.” In addition, FDACS lists two recent studies that indicated “in some cases, adjuvants may contribute to a greater extent to fetal toxicity than the active ingredients.” U.S. EPA requires neither testing of pesticide-formulated products (containing one or more active ingredients together with one or more “inert” ingredients) nor of pesticide products in combination. These uncertainties in the database mean that we cannot confirm that the databases for each pesticide product of concern are complete and consistent, because teratogenic effects appear to be species-specific and not all of the ingredients are tested. Of course performing such tests in humans is unethical. However, these uncertainties did not stop FDACS from stating “a review of the scientific literature indicates that none of the pesticide active ingredients involved in this investigation are proven to be human teratogens.” Furthermore, FDACS dismissed a significant number of potential pesticides of concern even though the databases are incomplete and there is a high degree of uncertainty with the available data.

In the CCHD report, a consulting physician is quoted to say “while it is difficult to rule out that any particular exposure/s led to these birth defects, the fact that they are such different types of malformations does lead me to conclude that a teratogenic event is quite unlikely to be the cause of the defects.” We might agree with this statement, in part, if only a single chemical exposure were involved. However, this statement is unfounded on the basis that each case involves multiple exposures to multiple chemicals either in a mixture or sequentially and it is impossible to determine exactly which chemical might have caused the teratogenic event. Secondly, because it is agreed that over 60 percent of all birth defects have an unknown cause and only approximately 25 percent are caused by heritable conditions, there is about a three in four chance that an environmental exposure might have been the cause. In addition, evidence from controlled experiments on laboratory animals demonstrate that even exposure to a single chemical can increase the incidence of more than one kind of birth defect.<sup>v</sup>

### **Environmental Justice**

Farm workers (especially migrant workers) are a particularly difficult population to study. Although increased numbers of birth defects have been recorded among farm area residents studied,<sup>vi</sup> *few investigations have looked at farm workers*. Patterns among other pesticide-exposed groups in mid-western states strongly suggest exposure-related impacts on the health of fetuses and the newborns. In California, one older study showed that limb reduction defects among offspring of agricultural workers occurred 3 to 14

times more frequently than among the general U.S. population.<sup>vii</sup> A follow-up study showed 1.6 times greater risk for limb reduction defect when parents were involved in agriculture.<sup>viii</sup> The risk was greater when mothers lived in counties with high agricultural productivity (2.4 times) and high pesticide use (3.1 times). Neither the FDACS nor the CCHD reports adequately surveyed the literature for comparable studies linking exposure to agricultural chemicals with birth defects in workers or local residents.

Examining the table of rates of birth defects per live births in Florida (see Table 3, reproduced from page nine of CCHD's October 2005 report), we see a trend toward higher, sustained rates of birth defects in Collier County and the community of Immokalee (with the exception of 1997) over a six-year period. CCHD dismisses this trend as random fluctuations. No data or analysis were provided to support this position. The report states "based on this information ... the heavily agricultural county where thousands of migrant workers live and work does not have a higher rate of birth defects than the rest of Florida." We have already commented on the significant deficiencies associated with the methods utilized by the health department in evaluating these data. But it is our understanding that Collier County and specifically Immokalee are heavily populated by poor, Latino families. We cannot help but wonder how CCHD or the state of Florida might have interpreted these results had Collier County been predominantly a white, affluent, and politically influential jurisdiction. Placed in the context of environmental justice, we have to ask if this is the best a health department can do for these agricultural communities?

**Table 3. CCHD listing of relevant Florida birth defects records**

<b>Year</b>	<b>Statewide</b>	<b>Collier</b>	<b>Immokalee</b>
1997	221.2	279.3	219.6
1998	267.6	409.9	532.1
1999	279.3	355.9	331.5
2000	282.5	324.2	286.7
2001	288.0	308.4	337.4
2002	311.2	420.8	464.1

The basic belief of the environmental justice movement is that *all persons*, regardless of race or social status, have the right to a clean and healthy environment in which to live, work, and play. Five principles guide the environmental justice approach: 1) public participation is inviolate; 2) the public has the “right-to-know” about their exposure, intentional or accidental, to toxic substances and other hazards; 3) in making environmental decisions, subpopulations that bear disproportionate risks must be considered; 4) a complete assessment of risk to human health and quality of life includes the evaluation of cumulative impacts; and 5) achieving adequate protection of environmental and occupational health requires the adoption of preventive and precautionary approaches.

In the context of environmental justice, there are several factors that should be considered in evaluating the overall health status, and specifically the rate of birth defects in these communities; an approach that examines impacts holistically. Underserved communities often have limited access to health care, good education, and green spaces. When agricultural workers do have the opportunity to see a physician, it would be of little use if the physician has not been properly trained in the recognition, treatment, and reporting of pesticide poisoning. Furthermore, in most environmental justice communities studied, health risks are compounded by multiple sources of chemical discharge from both stationary and mobile sources. Poor nutrition (including childhood obesity due to generally poor eating habits) as well as diseases such as asthma and diabetes are often also elevated in these communities.

In addition to public health and societal infrastructure issues, the enforcement of environmental and worker protection laws is usually reduced or ineffective in environmental justice communities. In its report, FDACS makes the general assumption that safety measures are adequate and enforced (with a few exceptions) to protect agricultural workers and consumers from pesticides and other hazardous chemicals. While we cannot specifically comment on the enforcement activities in Florida, we know from analysis of data collected by California’s Environmental Protection Agency that neither can reasonably be assumed. We believe that the situation is likely to be even worse in Florida where there is substantially decreased ability to document acute pesticide poisonings among farm workers and hence very little ability to evaluate and enforce worker safety laws regarding pesticide use and exposure. Underreporting pesticide use poses a serious problem for investigations of pesticide-related illnesses

(both acute and chronic). We do recognize that in this case, Ag-Mart received fines for disregarding re-entry intervals. While this is a step in the right direction in an otherwise dismal response, for at least three babies, it was too little, too late.

- <sup>i</sup> a) Lee, S., R. McLaughlin, M. Harnly, R. Gunier, R. Kreutzer. 2002. Community Exposures to Airborne Agricultural Pesticides in California: Ranking of Inhalation Risks, *Env Hlth Persp.* vol. 110, pp. 1175-1184.
- b) Koch, D., C. Lu., J. Finker-Andersen, L. Jolley, R.A. Fenske. 2002. Temporal Association of Children's Pesticide Exposure and Agricultural Spraying: Report of a Longitudinal Biological Monitoring Study, *Env Hlth Persp.* vol. 110, pp. 829-833.
- c) Kegley, S.E., A. Katten, and M. Moses,) *Secondhand Pesticides: Airborne Pesticide Drift in California*, Pesticide Action Network, San Francisco, CA.
- <sup>ii</sup> Bradman, M.A., Harnly M.E., *et al.* 1997. In *J. Exposure Anal. and Env. Epidem.*, 7(2):217-234).
- <sup>iii</sup> Reeves, M. and L. Rosas. 2003. '*Nobody told me they were harmful*': pesticide exposure and the health of women farm workers. In M. Jacobs and B. Dinham (eds.), *Silent Invaders: Pesticides, livelihoods and women's health*. Zed Books, New York, pp. 16-31.
- <sup>iv</sup> a) Reeves, M., Katten, A. and M. Guzmán. 2002. *Fields of Poison 2002: California farmworkers and pesticides*. Pesticide Action Network, San Francisco, CA.
- b) Reeves, M., K. Schafer, K. Hallward and A. Katten. 1999. *Fields of Poison: California farmworkers and pesticides*. Pesticide Action Network, San Francisco, CA.
- <sup>v</sup> Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. 2000. Determination of Noncancer Chronic Reference Exposure Levels, Chronic Toxicity Summary: Methyl Bromide, [http://www.oehha.org/air/chronic\\_rels/pdf/74839.pdf](http://www.oehha.org/air/chronic_rels/pdf/74839.pdf).
- <sup>vi</sup> Garry, V.F., D. Schreinemachers, M.E. Harkins, *et al.* 1996. Pesticide applicers, biocides, and birth defects in rural Minnesota, *Env Hlth Persp.* 104(4): 394-99
- <sup>vii</sup> Schwartz, D.A., Newsum, L.A. Markowitz-Heifetz, R. In *Scandinavian Journal of Work, Environment and Health*, 12:51-54, 1986.
- <sup>viii</sup> Schwartz D.A. and J.P. LoGerfo. 1988. Congenital limb reduction defects in the agricultural setting, *Am J Pub Health*, 78: 654-57.