

**Health screening profile of a community (Clarinda Triangle) near the Escambia  
Wood Treatment Co. Superfund site in Pensacola, FL.**

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## INTRODUCTION

Between 2005 and 2006, the Florida Department of Health Escambia County Health Department (ECHD), in conjunction with the University of West Florida conducted a toxicologic health study of 31 persons who had been potentially exposed to chemical contaminants from the Escambia Wood Treatment Co. (ETC) Superfund site in Pensacola. Contamination at the ETC site arose primarily from the use of creosote and Pentachlorophenol PCPd as a wood preservative and the primary contaminants of concern at the site include dioxin (by-product associated with PCP), arsenic, lead, and benzo(a)pyrene. The focus was on a residential area (Clarinda Triangle) near the ETC. Contaminations at the ETC soils from the Clarinda Triangle area have been confirmed to contain elevated levels of dioxin and arsenic. This study group included current residents and previous residents.

A preliminary census and study, the Community Environmental Health Project (CEHP), a State of Florida funded collaboration between the ECHD and Citizens Against Toxic Exposure (CATE) identified eligible residents and previous residents of the focus area. These eligible citizens were invited to participate in a health screening, which included a health and exposure history/survey, routine blood and urine analysis, and a screening chest x-ray for clients >39 years of age. Thirty one (31) of these initial participants were subsequently invited to participate in an additional study (Partnership for Environmental Research and Community Health (PERCH) funded by the Centers for Disease control and Prevention (CDC), which included a physician review of toxicology reports, and blood sampling for analysis of contaminant profiles. In the present report, we describe the health screening profile of these 31 participants.

## METHODS

The initial screening and survey of the PERCH participants was conducted under the CEHP project, participants were queried about their medical history using a fixed panel of questions. These questions investigated demographics, exposure history, and health conditions such as cancer, hypertension diabetes, alcohol useage, and smoking history, among others. Blood and urine specimens were collected for routine tests (complete metabolic profile, lipid panel, thyroid panel, complete blood count with differential, urinalysis, hepatitis (5) panel, and prostate specific antigen) and analyzed by a commercial laboratory, Laboratory Corporation of America (Labcorp, Pensacola, FL). This data was provided to physicians affiliated with the PERCH study who reviewed this information and discussed the results with the PERCH participants.

## RESULTS

Demographics of the 31 PERCH participants are summarized in Table 1. The majority of the participants were African-American, closely reflecting national census data for the neighborhood surrounding the ETC site (ATSDR, 1995). Participant's age ranged from 13 to 77 and length of exposure ranged from 1 to 52 years.

The Clarinda PERCH project included 31 clients that had participated in the CATE/Community Environmental Health Project. The clients participating in the PERCH study were seen at the Escambia County Health Department beginning in 2004-2006.

Health and demographic information for these clients was gathered during the initial CATE/CEHP screening phase as well as during their further participation with PERCH. Demographics of the 31 participants are summarized in Table 1.

**Table 1. Demographic Profile of the 31 participants in the present study**

Characteristic	# of Participants	% of Participants
Race		
Caucasian	1	3.2
African American	30	96.8
Gender		
Female	19	61.3
Male	12	38.7
Length of Exposure (years)		
≤ 10	14	45.2
11-20	7	22.6
21-30	4	12.9
31-40	2	6.5
41-50	3	9.7
>50	1	3.2
Age (years)		
<20	1	3.2
20-40	8	25.8
41-60	17	54.8
>60	5	16.1
Client Qualification		
Current Resident	14	45.2
Previous Resident	17	54.8

*Cancer.* Cancer is the second leading cause of death in the United States. More than 500,000 Americans die of cancer each year, and twice that number are newly diagnosed with cancer annually. The most common cancers in the U.S. are lung, breast, colon, prostate, and skin. The National Cancer Institute, Cancer Control & Population Sciences, estimates that as of January 1, 2001 there are 9.8 million cancer survivors, which represents 3.5% of the population (NCI, 2004). In the ETC cohort, one participant reported a previous diagnosis of skin cancer (unknown type). Table 2 presents a demographic breakdown of the cancer cases in the ETC cohort, and Table 3 delineates the types of cancers that were reported.

**Table 2. Demographic profile of cancer cases in the cohort.**

Group	No. of Cases	% of group
All Clients	1	3.2
Caucasian	0	0.0
African American	1	3.3
Female	1	5.3
Male	0	0.0
Current Resident	1	
Previous Resident	0	
Self reported Cancer		
Skin (Unknown type)	1	100

**Table 3. Types of cancer reported in the cohort. U.S. data were obtained from the National Cancer Institute (NCI, 2004)**

Cancer type	PERCH Cohort No. of cases	PERCH Cohort % of cases	U.S. data % of cases
Uterine/Cervical	0	0	10% (gynecologic)
Soft Tissue	0	0	NA
Breast	0	0	22%
Skin	1	100	NA
Prostate	0	0	17%
Leukemia	0	0	7% (hematologic)
Lung	0	0	4%

*Diabetes.* Diabetes mellitus is a chronic metabolic disorder marked by hyperglycemia (Venes and Thomas, 1997). The National Center for Chronic Disease Prevention and Health Promotion at the CDC found that in 2003, 7.2% of adults nationwide and 8.5% of adult Floridians reported being diagnosed with diabetes. The National Diabetes Information Clearinghouse at the National Institutes of Health (NIH) reported that in

2002, the prevalence of diabetes among those aged 20-39 was 2.2%, among those aged 40-59 years the prevalence was 9.7%, and among those aged 60 years and older, 18.3% (NIDDKD 2003). In those age 20 and older, the prevalence among whites was 8.4% and among African-Americans 11.4%. In comparison, of the 31 participants in the PERCH study, n 8 (25.8%) reported a previous diagnosis of diabetes. Of the n 8 % affirmative reports of diabetes, n 3 (37.5%) were current residents and n 5 (62.5%) were previous residents.

**Table 4 Comparison of Diabetes Mellitus Prevalence in 2006**

Nationwide	Florida	PERCH
6.5 – 7.2 %	7.6 – 8.2%	25.8%

Commonly, members of the general population may be unaware of diseases they have and, thus, do not report their occurrence. The American Diabetes Association recommends the following screening levels for a fasting blood glucose test: 70 to 99 mg/dL (3.9 to 5.4 mmol/L) – normal glucose tolerance, 100 to 125 mg/dL (5.5 to 6.9 mmol/L) – impaired fasting glucose (pre-diabetes), 126 mg/dL (7.0mmol/L) and above – probable diabetes.

During the course of the PERCH study, participants received a fasting blood glucose test. Of the 31, 7 clients had an elevated blood glucose level (>100). Two (2) clients had a blood glucose level of >159, and 1 client had a fasting blood glucose level of >199. Information regarding blood glucose elevations in both the current and previous residents are shown in the table below. A demographic breakdown of these data is presented in Table 5.

**Table 5. Prevalence of elevated blood glucose in cohort (Fasting blood glucose levels)**

Group (Sample size)	>100	>159	>199
All clients (31)	4 (12.9%)	2 (6.5%)	1 (3.2%)
African American (30)	4 (12.9%)	1 (3.2%)	1 (3.2%)
Caucasian (1)	0 (0.0%)	1 (3.2%)	0 (0.0%)
Females (19)	4 (12.9%)	1 (3.2%)	1 (3.2%)
Males (12)	4 (12.9%)	2 (6.5%)	1 (3.2%)
Current Resident (14)	0 (0.0%)	2 (6.5%)	1 (3.2%)
Past Resident (17)	4 (12.9%)	0 (0.0%)	0 (0.0%)

*Hypertension.* Hypertension (HTN) is defined as a condition in which the blood pressure (BP) is higher than 140 mm Hg systolic or 90 mm Hg diastolic on three separate readings recorded several weeks apart, (Venues and Thomas, 1997). During the initial screening phase of the study, all PERCH participants were asked if they had been diagnosed with HTN or high blood pressure. Of the 31 total participants, 6 clients answered affirmatively (19.4%). Nationwide prevalence for a person being told that they have high blood pressure is 24.8% in 2003, with 25.8% of whites and 31.4% of African-Americans reporting a diagnosis of hypertension (CDC, 2003a). Table 6 summarizes the demographic profile of hypertension in the ETC cohort.

**Table 6. Demographic profile of participants with elevated BP**

Group	Sample size	# Reported	Percent
African Americans	30	6	20
Caucasian	1	0	0.0
Females	19	5	26.3
Males	12	1	8.3
Residents	14	1	7.1
Past Residents	17	5	29.4

*Hepatitis / Liver Disease.* According to data collected by the Florida Hepatitis and Liver Failure Prevention and Control Program and the Florida Department of Health, hepatitis A is the most common form of acute viral hepatitis in the United States, and it is one of the 10 most commonly reported infectious diseases in the U.S (Katz, 1999). The CDC states that 33%, 4.9, and 1.8% of the US population has been infected with hepatitis A, B and C, respectively (CDC, 2004b). During the initial health screening of the CATE/CEHP program, PERCH clients were screened with a hepatitis panel , including a hepatitis A antibody, a hepatitis B core antibody, and a hepatitis C antibody. The previous PERCH Health Screening results revealed that the prevalence of infection for all hepatitis strains was higher in the 2002 - 2004 ETC cohort than observed nationally (Davis, D.A., 2004). Tables 7, 8, and 9 summarizes hepatitis A, B, and C prevalence data collected during the current study.

**Table 7. Prevalence of Hepatitis A antibodies in the cohort.**

Group	Sample size	# Infected	% Percent
All clients	31	19	61.3
African American	30	19	63.3
Caucasian	1	0	0.0
Females	19	13	68.4
Males	12	6	50.0
Residents	14	5	35.7
Past Residents	17	14	82.4

*Hepatitis B* (formerly know as serum hepatitis) is a fairly common liver disease caused by a virus spread through contact with infected body fluids. A curative therapy for acute hepatitis B has not yet been identified, although several drugs have exhibited limited efficacy in treating chronic infection (Janowski, 2000). Management of chronic infection includes screening for development of liver disease and treatment of ensuing symptoms. Approximately 10 percent of infected people may become long-term carriers of the virus (Janowski, 2000).

**Table 8. Prevalence of Hepatitis B Core Antibodies in the cohort.**

Group	Sample size	# infected	% Percent
All clients	31	0	0.0
African American	30	0	0.0
Caucasian	1	0	0.0
Females	19	0	0.0
Males	12	0	0.0
Residents	14	0	0.0
Past Residents	17	0	0.0

*Hepatitis C.* The Hepatitis C virus (HCV) typically produces a liver infection that may eventually cause severe liver disease, including liver cancer and cirrhosis. Most people who become infected are unaware that they have the disease. The disease progress is slow; within 20 to 30 years after infection, up to 20% of those with chronic hepatitis C will develop cirrhosis, and up to 5% will develop liver cancer (Katz, 2000). Based on national estimates, approximately 220,000 Floridians are chronically infected with the hepatitis C virus, and approximately 2,000 new cases occur each year in Florida (Katz, 2000). HCV is the most common chronic blood-borne infection in the United States. The following table summarizes the hepatitis C data gathered during the PERCH study.

**Table 9. Prevalence of Hepatitis C Antibodies in the cohort.**

Group	Sample size	# infected	% percent
All clients	31	1	3.2
African American	30	1	3.4
Caucasian	1	0	0.0
Females	19	0	0.0
Males	12	1	8.3
Residents	14	1	7.1
Past Residents	17	0	0.0

In addition to the hepatitis blood tests, PERCH Clarinda participants also received a panel of tests to determine liver status. Clients received a laboratory test for AST (aspartate aminotransferase), ALT (alanine aminotransferase), and GGT (gamma glutamyl transferase). AST and ALT are intracellular enzymes that are involved in amino acid and carbohydrate metabolism (Venes and Thomas, 1997). These enzymes may be elevated in any condition that involves liver cell injury, such as cirrhosis, hepatitis, Reye

syndrome, and hemochromatosis (Vaughn, 1999.) Other factors, such as alcohol ingestions and medication use (acetaminophen, hypolipidemics, heparin) can also raise enzyme levels. GTT is also an enzyme that regulates amino acid transport, and this test is often used in conjunction with AST and ALT when evaluating hepatic status. GGT elevations can occur with cirrhosis, alcoholism, chronic hepatitis, cancer, lupus, and medication use (Vaughn, 1999). The analytical facility, Labcorp, considers AST and ALT to be elevated at >40 IU/L and GGT to be elevated at >65 IU/L. Elevated AST was observed in 3 PERCH clients 9.7% and elevated ALT was observed in 7 (22.6%) Likewise, 1 (3.2%) participant exhibited elevated GGT. Table 10 summarizes the demographic profile of participants with elevated liver function tests.

**Table 10. Demographic Profile of PERCH participants with elevated levels of AST, ALT, and GGT.**

Group	Sample Size	AST>40 (%)	ALT>40 (%)	GGT >60 (%)
All clients	31	3 (9.7)	7 (22.6)	1 (3.2)
African American	30	2 (6.7)	6 (20)	1 (3.3)
Caucasian	1	1 (100)	1 (100)	0 (0)
Females	19	2 (10.5)	2 (10.5)	0 (0)
Males	12	1 (8.3)	5 (41.7)	1 (8.3)
Residents	14	3 (21.4)	5 (35.7)	1 (7.1)
Past Residents	17	0 (0)	2 (11.8)	0 (0)

*Renal function.* Blood urea nitrogen (BUN) as nitrogen in the blood in the form of urea, the metabolic product of the breakdown of amino acids used for energy production (Venes and Thomas, 1997). The level of BUN provides a rough estimate of kidney function. BUN levels may be increased in response to dehydration, decreased renal functioning, upper gastrointestinal bleeding, or treatment with drugs such as steroids or

tetracyclines (Venes and Thomas, 1997). Creatinine is the decomposition product of the metabolism of phospho-creatine, a source of energy for muscle contraction (Venes and Thomas, 1997). Although it is normal, alkaline constituent of urine and blood, increased creatinine levels are observed in advanced stages of renal disease. Major causes of decreased renal functioning are hypertension, diabetes, and hyperlipidemia (Uphold and Graham, 1998).

Most clinicians prefer a single creatinine/BUN test to assess renal function and the combined usage of BUN and creatinine (BUN/creatinine ratio) may provide an understanding of the patient's prognosis (Vaughn, 1999). A consistent increase in the BUN/Creatinine ration suggests deteriorating renal function. Rapid changes suggest acute illness or exacerbation of a chronic disorder and reduction may indicate improvement. Therefore, the BUN/creatinine ratio is best used in comparison to previous BUN/creatinine ratio tests. Laboratory reference ranges, considered normal in the present study, were as follows: BUN 5-26 mg/dl, Creatinine 0.5-1.5 mg/dl, BUN/creatinine ratio 8-27 mg/dl

**Table 11. Profile of participants with elevated creatinine**

Group	Sample size	Clients with elevated creatinine	%
All clients	31	0	0.0
African American	30	0	0.0
Caucasian	1	0	0.0
Female	19	0	0.0
Male	12	0	0.0
Resident	14	0	0.0
Past Residents	17	0	0.0

*Anemia.* The term “anemia” generally refers to a reduction hemoglobin, hematocrit and the number of red cells (erythrocytes) to below normal levels (Vaughn, 1999). The presence of anemia usually suggests an underlying pathophysiologic process, although a definitive diagnosis can be difficult because of the numerous possible etiologies that result in anemia. A red blood cell (RBC) is a cell component of the blood that delivers oxygen to the body (Venes and Thomas, 1997). Hemoglobin (HGB) is the iron-containing pigment of the RBC that carries the oxygen and hematocrit (HCT) is a term used to describe the volume of RBC’s in a given volume of blood (Venes and Thomas, 1997). The actual levels of each component are important for diagnosing anemia. Low red blood cell counts, hematocrit, or hemoglobin tests indicate that the blood does not contain enough healthy red blood cells and this leads to an inability to supply the body with enough oxygen.

The 31 Clarinda PERCH participants were tested for RBCs, HGB and HCT. The following tables summarize the data gathered from the lab tests that would indicate anemia.

**Table 12. Demographic profile of participants with low RBC count (<3.8 in women and <4.1 in men)**

Group	Sample size	No. Low RBC	% Low RBC
All clients	31	1	3.2
African American	30	1	3.3
Caucasian	0	0.0	0.0
Females	19	1	5.3
Males	12	0	0.0
Resident	14	0	0.0
Past Residents	17	1	5.9

**Table 13. Demographics of participants with HGB. low HGB (<11.5 in women and <12.5 in men)**

Group	Sample size	No. Low HGB	% Low HGB
All clients	31	1	3.2
African American	30	1	3.3
Caucasian	1	0	0.0
Females	19	1	5.3
Males	12	0	0.0
Resident	14	1	7.1
Past Residents	17	0	0.0

**Table 14. Participants with low HCT (<34.0 in women and <36.0 in men)**

Group	Sample size	No. Low HCT	% Low HCT
All clients	31	1	3.2
African American	30	1	3.3
Caucasian	1	0	0.0
Females	19	1	5.3
Males	12	0	0.0
Resident	14	0	0.0
Past Residents	17	1	5.9

*Chest X-ray.* During the course of the CATE/CEHP and PERCH studies, some participants were offered a chest x-ray (CXR) for screening purposes, to obtain more information concerning the health status of an individual's heart and lungs. CXR's were ordered for every participant over forty years of age and for younger clients with a history of lung disease or lung disease risk factors (i.e. smoking history, asbestos exposure, etc). The CXR's were performed at the Imaging Center of Pensacola. Because the client was responsible for having the CXR done at a separate time and location from the health screening appointments at the health department, not every client that had a CXR

ordered actually followed through with having the test done.

***Out of 19 chest x-rays:***

- No active cardiopulmonary disease. Heart and vascularity are normal.
- Equivocal small nodule left mid lung. Recommend limited noncontrast CT for further assessment.
- No active disease notified
- No acute abnormalities
- Atherosclerotic disease. Cardiac enlargement. Obesity. Degenerative disease mid and lower dorsal spine. No definite acute or active process
- Obesity. Degenerative disease in the dorsal spine. No acute or active cardiopulmonary disease identified.
- No acute findings
- Negative obese chest
- Cardiac enlargement with evidence of left ventricular enlargement. Atherosclerotic disease, degenerative disease in the dorsal spine. No definite acute or chest pathology identified.
- Widened right peritracheal stripe which could be due to a distended SVC but cannot exclude adenopathy. Cardiomegaly.
- Obesity. Cardiac enlargement. No current congestive failure. Findings most compatible with chronic interstitial lung disease with mild pulmonary fibrosis, particularly both lower lobes, associated reduced lung volumes.
- Cardiomegaly

*Lifestyle.* Many lifestyle factors can affect the health of an individual and can impact existing diseases. During the CATE/CEHP health screening and the Clarinda PERCH study, clients were questioned about different lifestyle factors, and clients were weighed and measured to determine body mass index (BMI). Information was gathered regarding gender, race, height, weight, tobacco use, and alcohol consumption. According to the CDC, increases in BMI are often accompanied by increased risks for

several diseases related to obesity. These include premature death, cardiovascular disease, high blood pressure, osteoarthritis, some cancers, and diabetes. BMI does not indicate that a disease is present; rather it is useful as a predictive factor for disease risk.

According to prevalence data from the CDC, 16.2% of adult Floridians in 2002 were advised by their physician to lose weight. In 2002, 11.7% of adults nationwide were instructed to reduce their weight. In 2002, 14.1% of men, 18.1% of women, 15.1% of Caucasians, and 21.0% of African Americans in Florida were advised to reduce their weight (CDC, 2003a).

According to Clinical Guidelines in Family Practice Third Edition, Obesity is defined as excessive accumulation of body fat. In adults, a BMI between 18.5 and 24.9 (for all ages of both genders) is considered a healthy weight. Person's with a BMI  $\geq 25$  are classified as overweight, and those with a BMI  $\geq 30$  are classified as obese. Clarinda PERCH study, 1 (3.2%) out of the 31 participants had a BMI within the normal range, nine (29%) were classified as overweight, 17 (54.8%) were classified as obese. Nationally, 34% of adults are classified as over weight and 30% are classified as obese (CDC, 2003b). In Escambia County, 32.6 % and in the State of Florida 32.1% of the population was considered overweight. In Escambia County, 25% and in the State of Florida 35.1 % was classified as obese (FBRFD, 2002). The prevalence of these classifications generally increases with age. Table 15 summarizes BMI data gathered from the Clarinda PERCH participants who were considered either overweight or obese.

**Table 15. Demographic profile of Clarinda PERCH participants classified as overweight or obese.**

Group	Sample size	# Overweight	# obese	%
All clients	27	9 (29%)	17 (54.8%)	
Missing Values	4			
African American	26	9	16	
Caucasian	1		1	
Females	18	5	12	94.4
Males	9	4	5	100
Resident	11	4	6	90.9
Past-Residents	16	5	11	100
Age groups				
13-44	11	3	7	90.9
45-64	12	3	9	100%
65+	4	3	1	100%

According to the U.S. Surgeon General, smoking has negative health impacts on people at all stages of life (U.S. Surgeon General, 2004). Smoking is known to harm unborn babies, infants, children, adolescents, adults, and seniors.

During the Clarinda Perch study, information was gathered regarding active tobacco use among the participants (cigars, cigarettes, or smokeless tobacco).

Table 16 summarizes the data gathered regarding active tobacco use in the Clarinda PERCH study.

**Table 16. Demographic prevalence of active smokers in the Clarinda PERCH study**

Group	Sample size	Active Smokers	%
All clients	31	4	12.9
African American	30	4	13.3
Caucasian	1	0	0
Females	19	2	10.5
Males	12	2	16.7
Resident	14	2	14.3
Past Residents	17	2	11.8

The CDC's National Center for Chronic Disease Prevention and Health Promotion has reported that approximately 85,000 deaths in 2000 were attributed to either excessive or risky drinking in the U.S., making alcohol the third leading actual cause of death (CDC, 2004a). Heavy alcohol consumption is the cause of approximately 40% of the deaths from unspecified liver disease in the United States. Additionally, several cancers have been linked to excessive alcohol consumption including oral-pharyngeal, esophageal, prostate, liver, and breast. In general, the risk of cancer increases with increasing amounts of alcohol consumption. Compared to non-drinkers, women who consume an average of 1 alcoholic drink per day increase their risk of breast cancer by approximately 7% (CDC, 2004a). Women who consume an average of 2 to 5 drinks per day increase their risks of developing breast cancer by approximately 50% compared to that of non-drinkers (CDC, 2004a).

According to the CDC's prevalence data, 58.8% of adults nationwide in 2003 reported that they had at least one drink of alcohol in the previous 30 days (CDC, 2004a). In Florida, the 2003 prevalence was 57.5%. For adult Floridians, 65.0% of females, 61.4% of Caucasian adults, and 41.6% of African Americans reported drinking alcohol within the previous 30 days (CDC, 2003a). Table 17 summarizes the data

gathered from participants that drink at least one drink per week.

**Table 17. Profile of participants who consumed at least one drink per week.**

Group	Sample size	# of participants	%
All clients	31	2	6.5
African American	30	2	6.7
Caucasian	1	0	0
Females	19	1	5.3
Males	12	1	8.3
Resident	14	1	7.1
Past Residents	17	1	5.9

*Physician Lab Reviews and Conclusions.* After a PERCH participant completed the initial CATE/CEHP health screening and received the PERCH toxicological laboratory tests, the client was scheduled to return to the health department to meet with the physician. The purpose of this visit was for the physician to review the test results with the client, and to provide any necessary feedback or conclusions. The physician spent approximately 15-20 minutes with each client, discussing outcomes with each client. The physician answered questions that the client asked, as well as gave suggestions to the client regarding any current health problems or findings.

The physician not only discussed the toxicological test results with each client, but also reviewed the other screening laboratory tests with the participants as well. The physician discussed elevated liver function tests, elevated renal function tests, elevated glucose, and positive hepatitis panels. He also reviewed with the participant regarding hypertension and elevated BP.

The doctor discussed diagnosis of diabetes and obesity with the participants. Participants with diabetes were encouraged to follow a diabetic diet. The importance of

compliance with diabetic treatment, i.e. oral medications to lower glucose and/or insulin was stressed. Participants were made aware of the necessity of receiving regular check-ups with their primary care physicians for diabetes monitoring. They were encouraged and instructed to follow a healthy diet regime.

The physician encouraged the participants to follow up with their primary care physicians (PCP) for routine annual exams (prostate screenings, mammograms, and pap smears) as well as for diagnosis/problem oriented visits to monitor health status.

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