HEALTHY VINTON/VINTON SALUDABLE
HIA DEMONSTRATION PROJECT FINAL REPORT
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Disclaimer. The views expressed are those of the authors and do not necessarily reflect the views of the Robert Wood Johnson Foundation or The Pew Charitable Trusts.

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EPWU cover for water meter box

SECTION I. EXECUTIVE SUMMARY
HEALTHY VINTON/VINTON SALUDABLE: HIA DEMONSTRATION PROJECT

Our Goal: Examine the current status of public health in Vinton and evaluate the potential impacts related to changes in water and sanitation infrastructure.

What We Did

- Collected tap water samples of households representing each major water source.
- Surveyed residents in Vinton about health and their views and practices about water and sanitation and in Westway, a neighboring community already connected to El Paso Water Utilities (EPWU), as a reference population.
- Interviewed key individuals, and organized focus groups with citizens, business people, and local leaders.

Results and Conclusions

Water Quality, Quantity, and Trust**.** The water quality concerns are arsenic (As), total dissolved salts (TDS), and bacteria, including *E.coli.* Twenty residences had water above the drinking water standard of 10 ppb As, ranging from 10.2 to 15.8 ppb. These were from domestic wells, Hillside Water Works and Vinton Village Estates. For TDS, there is no primary drinking water standard only a secondary standard. In Texas, the secondary standard for TDS is 1000 ppm. The national standard set by EPA is 500 ppm. These standards are designed to reduce hardness, salty taste, and damages to pipes. Four residences had water above the Texas standard, from 1010 to 1480 mg/L. These are from domestic wells and Villa Alegre Estates. Sixty-four residences had TDS concentrations above the EPA secondary standard. These were from all public and domestic sources, except from the EPWU. Drinking water should have zero presence of *E. coli* and other bacteria to prevent diseases. Eleven residences were positive for either *E.coli* and/or other type of bacteria. These were from domestic wells, Vinton Hills Subdivision, Hillside Water Works, and Villa Alegre Estates. The presence of bacteria indicates water can be contaminated with fecal material. Many residents distrust their piped water, prefer drinking bottled water, complain about low water pressure and pipe damages, and express fear of water shortages because of the prolonged drought in the region.

We conclude that current water sources do not meet drinking water standards in some cases and there is a risk of water scarcity in the short-term due to prolonged drought in the region. EPWU draws water from multiple sources, including deeper and reliable aquifers, keeps adequate water pressure, and complies with drinking water standards. This supplier is more reliable and dependable for the future and will likely increase trust in piped water that could result in less bottled water expenses.

Ailments Related to Water**.** A third of survey respondents from Vinton reported numbness and/or cramping in legs and arms, 28% report frequent stomach and abdominal problems, and 26% report skin problems. The rate of prevalence of skin disorders and gastrointestinal ailments is greater in Vinton compared to the neighboring community of Westway which is similar demographically but is already connected to EPWU for water. **We conclude that current tap water quality may pose a moderate risk to public health because these ailments can be related to arsenic, salts, and fecal contamination of drinking water.**

Septic Tanks**.** Septic tanks are not properly managed. Half of residences do not have a Certificate of Compliance, never pumped-out their septic tank, and never received information about proper maintenance. **We conclude that poorly managed septic tanks pose a moderate risk to public health. During the rainy season, they can produce odors, contaminate the aquifer, and are at risk of overflow.**

Fire Safety**.** Fire control is a concern due to either lack of piped water or low water pressure. A third of the streets lack fire hydrants, including the industrial street. Of the streets with fire hydrants, half are not functional due to low water pressure. **We conclude that the lack of piped water and low water pressure pose a risk to control fires in homes and businesses and can result in high costs for fire insurance.**

Economic and Community Development**.** With improved water and sanitation, there are ample opportunities for: 1) expansion of manufacturing and retail businesses, 2) expansion of health services, and 3) improved recreational spaces. **We conclude that Vinton is missing opportunities for economic growth, community development, and improvements in overall quality of life by not having a dependable, high quality water supply and sanitation system.**

Predictions

The neighboring community of Westway, which is already connected to EPWU for water and sanitation, has better water quality, improved reliability in terms of water quantity and pressure, fewer sanitation issues, and consequently fewer health issues that can be attributed to water or sanitation, as evidenced by our survey results. **We predict that improved infrastructure in Vinton will result in several positive long-term benefits: 1) improved public health; 2) reliable water quality, quantity, and pressure; 3) reduced risks from wastewater overflow, odors, and aquifer contamination; 4) higher property values; 5) potential growth in retail and manufacturing businesses. A potentially negative impact is the high cost of the improved infrastructure and the cost at the household level of: 1) metering, 2) connection to the main lines for both water and sanitation, 3) possible replacement of piping or new piping from the main to the house, and 4) decommissioning of septic tanks.** These costs could reduce the financial resources available at the household level for other health promoting activities or expenditures.

Recommendations

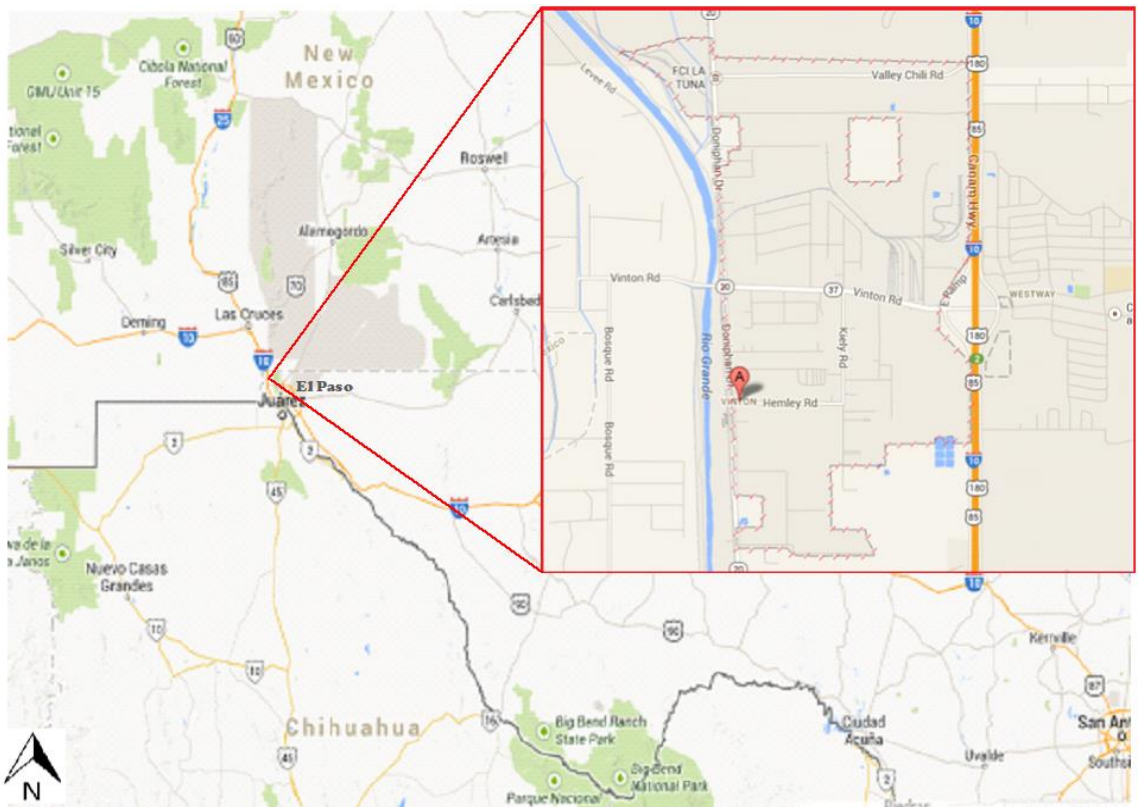
- Connect to PWU for water and sanitation.
- Pursue every available opportunity for financial assistance in order to minimize the cost to residents.
- Develop a Strategic Plan aimed at economic and community development, including improving fire safety, economic growth, expansion of health services, and improvement of recreational spaces.
- Conduct an educational campaign for residents, decision makers, and youth focused on: 1) impacts of water and sanitation on public health and 2) water conservation practices.
- Promote conservation measures, which could lessen the negative impact of higher costs for EPWU water and sanitation as households transition to the new system.

SECTION II. INTRODUCTION

The Context

The Village of Vinton, TX, a small peri-urban community of about 2000 residents, is considering water and sanitation development/improvement projects. The village lacks a suitable water supply system and depends on septic tanks for wastewater collection and treatment. Vinton is a U.S./Mexico border town in far west Texas, bounded on the north by the city of Anthony, Texas, on the south by the city of El Paso, on the west by the Rio Grande river, and on the east by Interstate 10 (Fig.1). It has a predominantly Hispanic population, a high incidence of unemployment and poverty, and limited infrastructure. The majority of residents rely on private water suppliers and domestic wells for potable water and other household needs. Some of the current water supplies were suspected to be contaminated with arsenic and industrial pollutants, sporadically exceeding drinking water standards and exposing the population to chronic levels of arsenic and other contaminants. Failing septic systems and open cesspools can expose residents to a number of pathogens that cause diseases such as dysentery, hepatitis, typhoid fever, and gastrointestinal illness. No specific data on incidence of these diseases are available for Vinton. Other potential health impacts from failing septic systems or cesspools that result in open standing water include vector-borne diseases like dengue fever and West Nile virus.

Figure 1. Map showing location and limits of Village of Vinton.



The Decision: Proposed Infrastructure Projects

Water System Improvement Project. There are seven different major sources of water in Vinton, including: 1) five different private suppliers who provide water from local wells, 2) a number of households have their own domestic well; and 3) a portion of the community is connected to EPWU for water. An engineering feasibility study was completed by Parkhill, Smith, & Cooper (PSC) in July, 2012, that describes a new water system that would connect the entire village to the EPWU system. The estimated costs for the project total about $15 million. PSC is currently updating the feasibility study and plans to complete the update by June, 2014. The Village of Vinton City Council and the residents will consider a decision whether or not to move forward with the project based on the most current feasibility report. Other agencies like the Border Environment Cooperation Commission (BECC), the North American Development Bank (NADB), Texas Water Development Board, and the U.S. Department of Agriculture Rural Development Agency (USDA/RDA) are or will be considering technical and financial assistance for the project.

Wastewater Collection System. The proposed sanitation project will provide first time wastewater service to the entire Village of Vinton. The wastewater will be discharged to the EPWU system and conveyed to their Northwest Wastewater Treatment Plant. Currently residents of Vinton utilize individual septic tanks. An engineering feasibility study was completed in November, 2011 and revised in January, 2012, that describes installation of the wastewater collection system. The estimated costs for the project total about $20 million. The wastewater study also is being updated by PSC. The Village of Vinton City Council has voted to delay the project based on high costs, but will possibly reconsider a decision to move forward with the project in 2014 after completion of the update report. Potential funders of the project also include BECC/NADB, USDA, and others.

The Affected Population

The Village of Vinton, TX is located in El Paso County about 15 miles north of downtown El Paso, adjacent to I-10. It is incorporated within the State of Texas as a Type A General Law Municipality. The population according to the 2010 census is 1,971. The population is 94% Hispanic. The median household income in 2009 was $32,206, well below the statewide average of $48,259; 18% of the population is living in poverty (U.S. Census-American Community survey 2008-2012). Thirty-seven percent of the residents are foreign born (Latin America), and only 48 % of residents have completed high school. The median age is 27 years, significantly below the state average of 41 years (U.S. Census, 2010).

The Stakeholders

The key stakeholders are the community members and their local elected leaders. Children in the community are an especially vulnerable population. Thus, parents and expectant parents are key stakeholders, as well as the local schools. Included in the community are a number of small business owners, three steel-related industries, and near the Rio Grande River, some agricultural producers. The long-term sustainability of these businesses will certainly be impacted by these projects. In addition to the community itself, agencies who are potential funders of this project or technical assistance providers are also stakeholders, including BECC, NADB, USDA/RDA, and EPA. A wider group of interested agencies in the El Paso/Ciudad Juarez area include

universities, state and federal agencies, and NGOs, who have interest in public health, environmental issues, and economic development in the region.

The Health Impact Assessment

Health Impact Assessment (HIA) is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population (National Research Council, 2011). In addition, HIA provides recommendations on monitoring and managing those effects. Our HIA followed the six recommended steps of:

- Screening
- Scoping
- Assessment
- Recommendations
- Reporting
- Monitoring

The goals of our HIA were to: 1) assess water quality of current water supplies and the current health status of residents; 2) identify the potential health impacts of improved water and sanitation infrastructure in the Village of Vinton; 3) inform the decision of the community and local government in Vinton to implement the proposed infrastructure projects; and 4) inform the decision of potential donors to provide funding for the projects. Our assessment is focused on **direct and indirect determinants** of health in relation to the proposed projects. These are summarized below in Table 1.

Table 1. Direct and Indirect Determinants of Health Addressed in our HIA

Direct Determinants	**Contaminants of Concern**	**Health Impacts**
Poor water quality	Arsenic, organic compounds, salt	Cancer, skin rashes, neuropathy, gastrointestinal illness
Poor sanitation	Fecal matter, E. coli	Gastrointestinal disease, hepatitis
Indirect Determinants		
Inadequate water pressure	--	Fire hazard
Lack of retail sources of fresh fruits and vegetables	--	Poor nutrition, obesity
Lack of public parks	--	Obesity
Lack of community health center	--	Reduced access to health care

Some of the other issues that we addressed include environmental and socioeconomic factors. Environmental indicators of interest include those related to substandard sanitation systems, like the impact of free-standing water/wastewater. Socioeconomic issues of interest included individual household costs associated with the improvements, neighborhood improvement and property values, impact on retail and manufacturing businesses, and perceived quality of life.

We conducted the HIA over a period of 12 months, April, 2013 – March, 2014, with most of the new data collection and survey work being conducted over the summer months (June-August).

We had a Leadership Team comprised of representatives of the lead organizations: UTEP, the Pan American Health Organization (PAHO), BECC, and the Village of Vinton. We also had an Advisory Committee comprised of key stakeholder groups and agencies, including: County Judge's Office, EPA Border Office, Paso del Norte Health Foundation, TX Department of State/Colonias Program, El Paso Health Department, the Village of Vinton Mayor's Office, and citizens of Vinton. The individuals for both groups are listed below.

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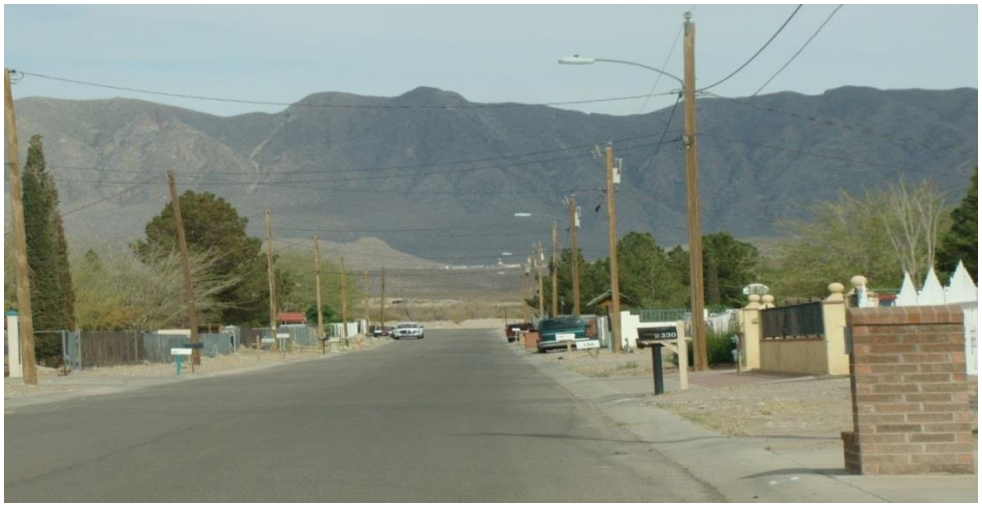
Kathryn Hairston, TX Dept of State
Bruce Parsons, El Paso Health Dept
Madeleine Praino, Mayor of Vinton
Sal Payan, Citizen of Vinton

The HIA Report

This report summarizes our HIA process and methods, all of the information that we collected, and our analysis, conclusions, and recommendations. The report was drafted and finalized over the period of March-May, 2014. The report includes sections that describe each of the six basic steps of HIA. The Appendix includes our survey instruments, lists of key informants, public meetings and focus groups, and ancillary data not included in the body of the report.

Acknowledgement

We gratefully acknowledge the advice, support and constructive criticism of the Health Impact Project Officers, Katie Hirono and Arielle Simoncelli, and the Technical Consultant, Jonathan Heller, from Human Impact Partners. We also acknowledge the hard work, commitment, and dedication of the UTEP students who worked on the project, including Barbara Aguilera, Aaron Arce, Mariela Bustillos, Tali Castillon, Sergio Del Campo, Jesus Placencia, Anna Ramos, and Jorge Velarde.



Street in Vinton

SECTION III. SCREENING

Background

The objective of the screening step is to decide whether an HIA is feasible, timely, and would add value to the decision-making process. It involves:

- Defining the decision and its alternatives
- Identifying potential partners and deciding who will be involved in screening
- Evaluating the project, plan, or policy based on screening criteria
- Making a decision about whether to conduct an HIA and notifying stakeholders of your decision
- Documenting the screening process and outcomes

In our case, we did decide to conduct an HIA. We describe in this section the decision and the timeline for the decision, and we document the screening criteria, our response to each criterion, and the rationale for our response.

Decisions Informed by the HIA and Timeline for the Decisions

Our HIA will inform the decision whether or not to move forward with projects to connect Vinton residents to EPWU for both their public water supply and wastewater management. The key local decision makers include the Mayor and Village Council. In addition, BECC, who certifies border infrastructure projects for funding by NADB and other funding agencies, will not only use our HIA in consideration of certification of this project, but this demonstration project will help BECC to establish a framework for conducting HIA for their projects. Our HIA will also inform decisions by potential funders of the project.

The Village Council voted the projects down a number of times. After the fall 2013 elections, a new City Council was formed and will likely be reconsidering a decision on these projects in 2014. Decisions by funders will be made later, after the projects are approved by the Council. We made our results available to these potential funders in late 2013/early 2014.

Screening Criteria and Rationale for the HIA

Table 2 below identifies the screening criteria and describes the response and rationale to each of the screening criteria. Responses reflect the rationale at the start of the project.

Table 2. Screening criteria.

Screening Criteria	Response and Supporting Information	Rationale
1. The project, plan, or policy has been proposed, a final decision about whether to adopt the proposal has not been made, and there is sufficient time to conduct an analysis before the decision is made.	Yes, the Water System Improvement Project and Wastewater Collection System Project have been proposed, a final decision has not yet been made, and there is sufficient time to conduct the analysis prior to the decision.	Engineering feasibility studies have been completed for the two projects. EPWU and the design engineers recommend that the projects be implemented concurrently to optimize efficiency. The Village Council has voted the projects down twice due to high costs, but no analysis

Screening Criteria	Response and Supporting Information	Rationale
		has been done of impacts related to public health, environment, and economic development. Three of the six Council seats are up for re-election in November, 2013. After the election the Council will reconsider the projects. Our HIA will be completed by that time and can inform the decision.
2. The decision has the potential to affect, positively or negatively, environmental or social determinants of health that impact health outcomes of a population – and those health impacts are not being or not likely to be considered without the HIA.	Yes, the proposed projects have the potential to affect health, and those impacts are not likely to be considered without the HIA. In fact, two votes on the proposed projects have already been held. The projects failed both times; the discussion focused mostly on cost without regard to health and other impacts.	The current water sources are believed to be contaminated with arsenic, salt, and organic compounds, exposing users to chronic levels of contaminants with direct health impacts. Residents rely on septic tanks or sanitation. Untreated waste on the soil surface can expose residents to organisms associated with fecal matter, raising the risk of hepatitis, dysentery, and other gastrointestinal disease. Standing wastewater also increases vector borne diseases like West Nile virus and others. Other indirect determinants include: 1) inadequate water pressure to meet firefighting demands, posing a public safety threat; 2) lack of retail sources of fresh fruits and vegetables that could lead to improved nutrition and overall quality of life for residents; 3) lack of public parks and recreational opportunities that could promote physical activity for residents; and 4) lack of a health clinic in the

Screening Criteria	Response and Supporting Information	Rationale
		community that could improve health care access.
3. Evidence, expertise, and/or research methods exist to analyze health impacts associated with the decision being considered.	Yes, methods exist to analyze the health impacts associated with the proposed projects. We plan to use a combination of quantitative and qualitative methods, drawing on published information and new information that we will collect. .	We are planning a community based participatory approach that will draw heavily on the information and perceptions of community members and other key stakeholders. A community participatory approach will not only result in identifying the key health and environmental issues and indicators, but will ensure a rich contextual understanding and attention to important cultural issues.
4. The proposal being considered could potentially impact health inequities	Yes, the proposed projects could impact health inequities.	We anticipate health inequities in the community resulting from the various sources of water and effectiveness of septic systems. Connecting residents to a single public water supply and sanitation system should remove these inequities.
5. The proposal's impact on health outcomes is potentially significant. This can be measured in terms of the number of people impacted, the magnitude of impacts, and the breadth of the impacts.	Yes, the proposed projects could have potentially significant impacts on health, in number of people impacted, the magnitude of impacts, as well as the breadth of the impacts.	There are approximately 2000 people in Vinton who could be impacted. The proposed project could remove the exposure to poor water quality. The sanitation system will remove exposure to untreated sewage.
6. The connections between the proposal and health outcomes are neither too obvious nor too indirect.	Yes, the connections between the proposed projects and health outcomes are neither too obvious nor too indirect.	Improved water and sanitation will have direct impacts on health and these should be obvious but are poorly documented. Some impacts are indirect and relate to economic development and improved community infrastructure that

Screening Criteria	Response and Supporting Information	Rationale
		will in turn have health impacts. Thus impacts are a mixture of direct and indirect, but none are well documented.
7. Decision-makers and/or stakeholders who have the capacity to influence decision-makers are likely to use HIA findings and recommendations to inform or influence the decision –making process, whether through regulatory requirements or voluntarily.	Yes, decision-makers and stakeholders influencing decision-makers are likely to use the HIA findings and recommendations.	The community and their leaders have not had access to information such as we will provide through the HIA. They have focused on costs only until now. The projects will likely come up for a vote again after the November elections. Our HIA results will inform the community and leaders by that time.
8. The HIA could help lead to institutional and/or systemic changes that promote better health outcomes for all.	Yes, this HIA could help lead to institutional and/or systemic changes that promote better health outcomes for all.	The improved water and sanitation will allow for many community improvements that will lead to a systemic improvement in quality of life for the residents. In addition, this HIA will demonstrate the process and utility of HIA for BECC and others who are interested in using HIA in the border region.
9. Partners are available to participate in the HIA process and use HIA findings and recommendations.	Yes, partners are available to participate in the process and use HIA findings and recommendations.	We have engaged a number of federal, state, and local government partners as well as NGOs, the university community, and community organizations, including residents themselves.
10. Resources (including funding, personnel, technical capacity, and leadership) are available to conduct the HIA.	*Response:* Yes, resources are available to conduct this HIA.	We have assembled an excellent leadership team, technical expertise, and knowledge sources to conduct the HIA. The Health Impact Project has provided funds matched by some of our own resources to conduct the HIA.

SECTION IV. HIA SCOPE

Goals

Our goals were to: 1) assess water quality of current water supplies and the current health status of residents; 2) identify the potential health impacts of improved water and sanitation infrastructure in the Village of Vinton; 3) inform the decision of the community and local government in Vinton to implement the proposed infrastructure projects; and 4) inform the decision of potential donors to provide funding for the projects. We collected a mixture of quantitative and qualitative information through the assessment process that was used to formulate our appraisal and recommendations. The chief indicator of success will be utilization of our results by the Village Council and community.

Health Determinants and Potential Outcomes

Our assessment focused on direct and indirect determinants of health in relation to the proposed projects. The geographic focus was on the Village of Vinton itself, including all the residents and businesses located within the village limits. Direct health impacts include the main diseases associated with poor water and sanitation, such as gastrointestinal diseases and ailments, including stomach aches, diarrhea, hepatitis A, Giardia, E. coli, and dehydration. Children are especially vulnerable and susceptible to significant health problems from inadequate water and sanitation. We suspected that current water supplies in Vinton are contaminated with arsenic and industrial pollutants. We conducted a literature review of the impacts of these contaminants on health and assessed the incidence of these impacts in the residents of Vinton. The new water system is expected to meet U.S. drinking water standards.

Some of the indirect determinants include: 1) inadequate water pressure in the current water supply systems to meet firefighting demands; this poses a public safety threat; 2) lack of retail sources of fresh fruits and vegetables that could lead to improved nutrition and overall quality of life for residents; 3) lack of public parks and recreational opportunities that could promote physical activity for residents; and 4) lack of a health clinic in the community that could improve health care access and reduce costs. We anticipated that we would identify other direct and indirect determinants in the course of our HIA.

Some of the other issues that we addressed include environmental and socioeconomic factors. Environmental indicators of interest include those related to substandard sanitation systems, like the impact of standing water/wastewater on the soil surface. Socioeconomic issues of interest include individual household costs for one-time hook-up plus ongoing costs for water and sewage, neighborhood improvement and potential increased housing values resulting from the environmental infrastructure projects, and perceived quality of life improvements.

Vulnerable Populations

Vinton has a relatively young population; 34% of the population is under 18 years of age (U.S. Census, 2010). Children and childbearing or pregnant women are among the population groups most adversely affected by poor drinking water quality and sanitation infrastructure. Also, people with health conditions such as HIV/AIDS or tuberculosis can suffer disproportionate effects from poor water and sanitation. We attempted to examine changes in health and quality of life indicators with special emphasis on these vulnerable population groups.

Pathway Diagrams

We have identified water quality and sanitation as direct health determinants, and economy and community development as indirect determinants. We developed pathway diagrams illustrating how the proposed projects would impact the determinants, the conditions in the community, and the impacts on health. The draft pathway diagrams are presented in the Appendix (Fig. X.1.). These diagrams were developed by the core leadership of our project, utilizing input from the stakeholders who participated in our HIA Training Workshop on April 16-17, 2013. These pathway diagrams were used to generate key research questions regarding current conditions and the potential changes and their health impacts that would result from implementation of the proposed projects.

Research Questions

We identifed research questions and key indicators for each health determinant category (water, sanitation, economy, and community development) in Tables 3-6 below. These questions guided our assessment activities.

Table 3. Health Determinant: WATER QUALITY

Research Questions: Existing Conditions	**Research Questions: Impacts**	**Indicators**
How prevalent are small public water supplies operated by private owners and/or domestic wells to supply water?	How would the proposed water project impact the reliance on wells as water supplies?	# homes that rely on local wells, excluding EPWU
What is the quality of water provided by small public water supplies and domestic wells?	How will connection to EPWU water supply impact the quality of water?	Water quality of all sources of water
What is the prevalence of diseases that can possibly be attributed to exposure or ingestion of contaminated water?	How would the proposed project impact the prevalence of diseases attributable to ingestion of contaminated water?	Prevalence of gastrointestinal disease, neurological disorders, cancer, methemoglobinemia, and/or skin irritation/rashes

Table 4. Health Determinant: SANITATION

Research Questions: Existing Conditions	**Research Questions: Impacts**	**Indicators**
How many households rely on septic tanks or cesspools for waste management?	How would the proposed project impact the prevalence of septic tanks or cesspools?	# households that use septic tanks or cesspools?
How many septic tanks are not functioning properly and result in standing pools of water on the soil surface?	How would the proposed project impact the prevalence of open pools of water on the soil surface?	#households with non-functional septic tanks or cesspools
What is the prevalence of vector borne disease that can	How would the proposed project impact the prevalence of disease	# cases of West Nile virus

possibly be attributed to open pools of water?	attributable to vector borne diseases such as West Nile virus?	
What is the prevalence of disease that can possibly be attributed to exposure to untreated waste or contaminated soil?	How would the proposed project impact the prevalence of disease attributable to exposure to untreated waste or contaminated soil?	# cases of gastrointestinal disease, hepatitis, dysentery; # cases of skin irritation or rashes
What is the prevalence of contamination of domestic wells by fecal coliform bacteria and/or nitrate, stemming from on-site septic tanks?	How would the proposed project impact the contamination of domestic wells and related exposure or ingestion of water contaminated with fecal coliform bacteria and/or nitrate?	# contaminated domestic wells with nitrate and/or fecal coliform
What is the prevalence of methemoglobinemia or gastrointestinal disease stemming from contaminated wells?	How would the proposed project impact the prevalence of methemoglobinemia and/or gastrointestinal disease?	# cases of methemoglobinemia and gastrointestinal disease

Table 5. Health Determinant: ECONOMY

Research Questions: Existing Conditions	**Research Questions: Impacts**	**Indicators**
What are the current average costs for water and waste management?	How would the proposed project impact the costs for water and sanitation?	Monthly costs of water; # households that rely on bottled water; cost to establish and maintain septic tanks
How do water and sanitation related illnesses (gastrointestinal, dysentery, West Nile virus, etc.) impact job absenteeism and productivity?	How would the proposed project impact job absenteeism and productivity?	# cases of disease related to contaminated water; job absenteeism
How do water and sanitation related illnesses (gastrointestinal, dysentery, West Nile virus, etc.) impact school absenteeism and educational performance for school children?	How would the proposed project impact school absenteeism and educational performance for school children?	# cases of disease among children related to contaminated water or exposure to waste; school absenteeism
	How would the proposed project impact the ability of households to pay for basic needs?	Change in cost of water and sanitation per household
	How would the proposed project impact the ability of community members to access services locally?	# of new service industries in Vinton
What are the existing access and costs of health services in the community	How would the proposed project impact the ability to	# of households with health insurance and

	afford health insurance and/or preventative health care?	access to preventative care

Table 6. Health Determinant: COMMUNITY DEVELOPMENT

Research Questions: Existing Conditions	**Research Questions: Impacts**	**Indicators**
How many health service providers are located in the community (clinics, pharmacies)?	How would the proposed project impact the number of health service providers in the community?	#health service providers
How many schools are located in the community?	How would the proposed project impact the number of schools in the community?	# schools
How many retail businesses and service industries (banks, etc.) are located in the community?	How would the proposed project impact the number of retail businesses and service industries in the community?	# retail businesses and service industries
How many parks, green spaces, and recreational facilities are located in the community?	How would the proposed project impact the number of parks and recreational facilities in the community?	# parks and recreational facilities
How many functional fire hydrants are located in the community?	How would the proposed project impact the number of functional fire hydrants in the community?	# functional fire hydrants
How many community centers, churches, or other public gathering places are located in the community?	How would the proposed project impact the number of community center, churches, and other public gathering places in the community?	# community centers, churches, or other public gathering places
How many sources of fresh fruits and vegetables are located in the community?	How would the proposed project impact the number of retail sources of fresh fruits and vegetables in the community?	# retail sources of fresh fruits and vegetables
How many households practice home or community gardening?	How would the proposed project impact the number of households practicing home or community gardening?	# households practicing home gardening
Is current water pressure adequate and consistent for households in Vinton?	How would the proposed project impact water pressure at the household level?	# households with adequate water pressure (as defined by the residents)

Assessment Methodologies

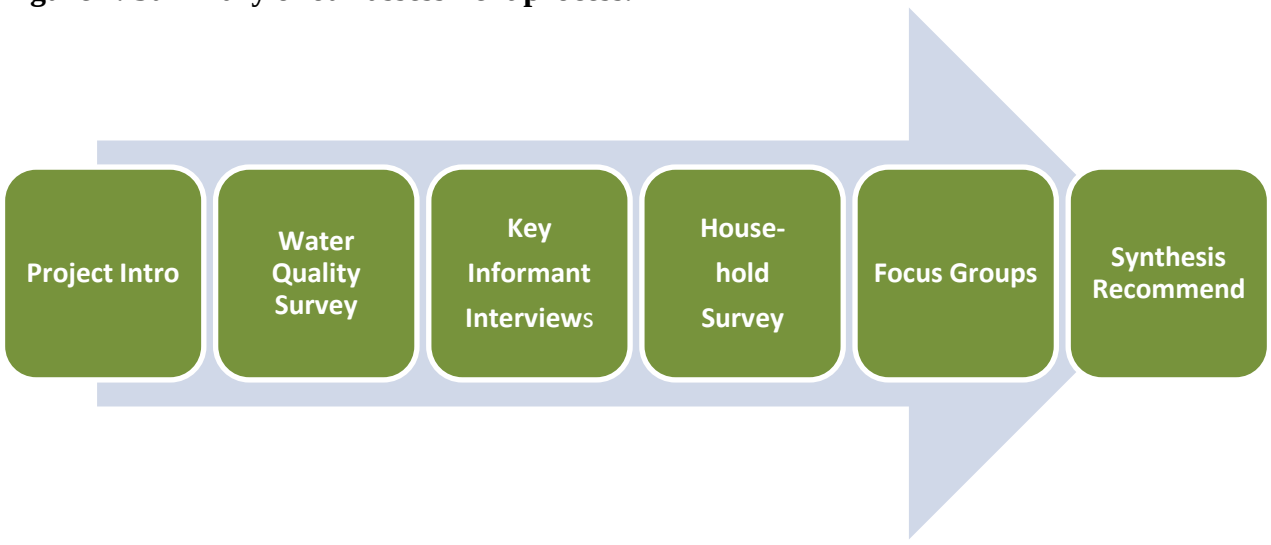
There are not hard data available for most of the indicators listed above. We collected a mixture of quantitative and qualitative information in our assessment, mostly through interviews, surveys, and focus groups. We used a community based participatory approach that drew

heavily on the information and perceptions of community members and other key stakeholders. A community participatory approach not only resulted in identifying the key health and environmental issues and indicators, but ensured a rich contextual understanding and attention to important cultural issues.

Our community participatory "toolbox" included the following:
Public meetings – We used public meetings to introduce the project, share information of broad interests, and share results. A list of the public meetings that we hosted is provided in the Appendix in Table X.2.
One on one interviews – We conducted in depth interviews with key informants such as community leaders, members of the community wastewater steering committee, business leaders, agency representatives who are stakeholders in Vinton, and professionals with particular knowledge or interest, like physicians who practice near Vinton. A list of the key informant interviews is provided in the Appendix in Table X.3.
Household surveys – We conducted two household surveys, one in Vinton and one in Westway, a neighboring community with similar demographics but which has been connected to EPWU for water and sanitation for 12-14 years. The Westway sample provides a reference population to which the Vinton results can be compared. In Vinton, we surveyed approximately 20% of the total number of households (121 out of 550) through a systematic sampling method to answer a structured questionnaire regarding health status, occurrence of gastrointestinal disease and other relevant socioeconomic characteristics. One adult in each household was interviewed. In Westway, we surveyed 50 households. The survey instrument for Vinton is provided in the Appendix in Table X.4. and for Westway in Table X.5.
Focus groups – We organized focus groups for key stakeholder groups to collect information on perceived risks, barriers and benefits of the proposed projects. Focus groups included key leaders from businesses, local community leaders, and local residents. A list of the focus group sessions that we hosted is presented in the Appendix in Table X.2.

A flow diagram showing the assessment process is provided below, followed by a brief description of each step.

Figure 2. Summary of our assessment process.



Project Introduction. We introduced our project to the community through a public meeting on May 16, 2013 at the local elementary school and a presentation to the City Council on June 4.

Water Quality Survey. We conducted a water quality survey by sampling tap water from 55 households in late May-early June and 50 households in early August. The reason for the two dates is that groundwater in the area is impacted by the flow in the Rio Grande. Water releases from Elephant Butte Reservoir, which controls the flow in the Vinton area, commenced in late June and continued until late July. In May the flow in the river had been very low to none for about nine months, thus ground water levels were at their lowest and quality was likely at its worst. After flow resumed in the river, we hypothesized that the water from the river would dilute the groundwater. Thus the two sampling dates should provide water quality at its best and at its worst. The major water sources, the number of connections for each, the number of water samples that we collected from each, and the number of households surveyed from each water source is provided below in Table 7. A map of Vinton showing the location of the wells of four of the five private providers is shown in Figure 3. Vinton Mobile Home Park is not included as the owner did not agree to let us survey any households in this mobile home park. The number of domestic wells are not registered or reported and are also not shown in Fig. 3. We estimated the number of domestic wells by subtracting the total number of connections to public supplies from the total number of households. We sampled at least eight households from each of the six major water sources at each of the two times for a total of 96 samples, from 69 households. EPWU Certified Lab analyzed the samples for arsenic, total dissolved solids, chloride, nitrate and sodium. These results provided us with data on the current quality of water in Vinton. We also delivered the results, either my mail or in person, to each household that we sampled.

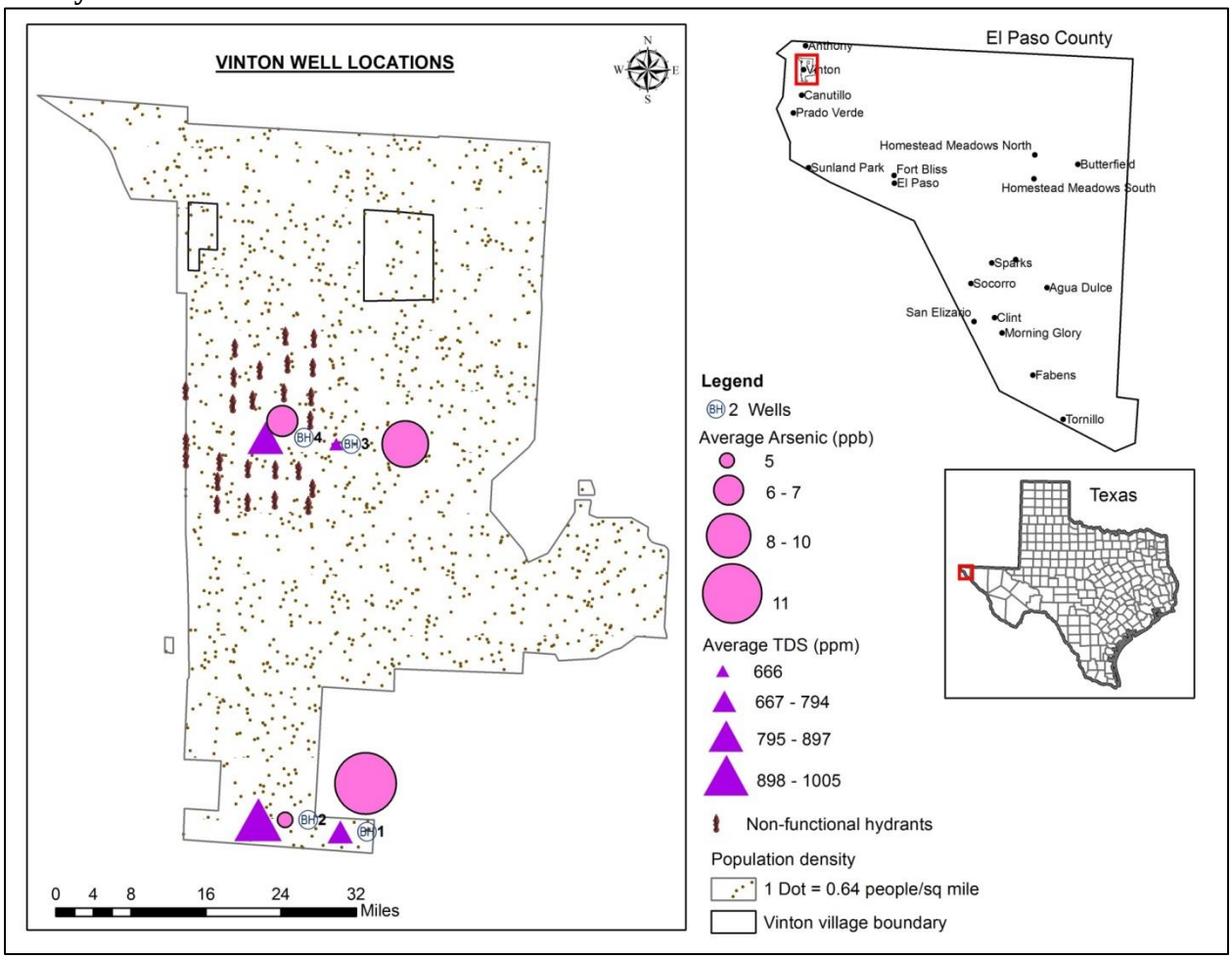
Table 7. Water sources, number of connections, and number of samples

Water System	Number of connections	Number of households with one or two water samples	Number of surveys (% of total connections)	Households with water samples
Vinton Hills Subdivision	158	17	40 (25%)	15
Vinton Village Estates	82	9	24 (29%)	6
Hillside Water Works	52	13	12 (23%)	10
Vinton Mobile Home Park	36	N/A	N/A	N/A
El Paso Water Utilities	92	12	22 (24%)	6
Villa Alegre Estates	22	3	5 (23%)	2
Private wells	113*	15	18 (16%)	10
Total	**555**	**69 (12%)**	**121 (22%)**	**49**

***** Estimated number of households with private wells based on the 555 total households reported by the U.S. Census 2010 .

Key informant Interviews. We conducted eleven key informant interviews of agency stakeholders, like EPA, TCEQ, county government, Health Department, etc.; professionals in the health, education, and religious sectors; business leaders; and community leaders. These individuals have key information and perceptions about public health and the potential impacts of the proposed projects on health by virtue of their professional position. We used the pathway diagrams and research questions to develop appropriate questions for these interviews. In turn, these interviews informed the household survey that we developed. A list of those we interviewed is provided in the Appendix (Table X.3).

Figure 3. Map showing location of: 1) wells of private providers, and 2) non-functioning fire hydrants in Vinton.



Household Survey.

We conducted two household surveys, one in Vinton and one in Westway, a neighboring community with similar demographics but which has been connected to EPWU for water and sanitation for 12-14 years (see map in Fig. 1). The Westway sample provides a reference population to which the Vinton results can be compared. In Vinton, we conducted a household survey of 121 homes. The households were selected to represent the six major sources of water in the community. One adult in each household was interviewed. The survey instrument is presented in the Appendix (Table X.4.) In Vinton, the interviews lasted 29 minutes on average (15 and 60 minutes minimum and maximum respectively) and 51% of the participants preferred Spanish as the language to conduct the interview. The survey focused on current conditions with respect to water and sanitation, perceptions about the proposed projects, and potential health impacts. In Westway, we surveyed 50 households, all of them relying on EPWU for water and sanitation for a period of at least 10 years. The survey instrument was modified from the Vinton survey to focus more on the public health conditions. The survey instrument is presented in the Appendix in Table X.5.

Focus Groups. After we collected water quality data, key informant interviews and household surveys, we conducted four focus groups to share results, ask further questions, and collect perceptions about the results that have been collected to date. The focus groups were used to validate results and begin to discuss conclusions and recommendations. We conducted focus groups with a number of different sectors including professionals, business leaders, agency stakeholders and community members themselves. The list of focus groups is presented in the Appendix in Table X.2.

Synthesis/Recommendations. After the field work was completed, we synthesized our results and formulated recommendations. We recognize that our assessment process did not result in definitive cause and effect data. We tried to quantify the prevalence of certain diseases and health issues commonly associated with poor water and sanitation and make extrapolations, based on best available though incomplete evidence, to the potential impact of the proposed projects on health outcomes. More definitive associations between poor water and sanitation with public health outcomes demand rigorous epidemiological studies beyond the scope of this assessment.

Café in Vinton

Vinton Mobile Home Park

SECTION V. ASSESSMENT FINDINGS

General Socio-Economic and Demographic Characteristics of Vinton

We present below in Table 8 general demographics from the 2010 U.S. census for both Vinton and Westway. Sources of these data include the 2010 U.S. Census and the American Community Survey for 2006-2010 and 2008-2012 (U.S. Census, 2014a,b).

Table 8. Demographics in Vinton and Westway from U.S. Census

Characteristics	Vinton		Westway	
	Value	%	Value	%
POPULATION				
Total population[3]	1,971		4,188	
Median age[3]	27.4		28.0	
Population per age groups[3]				
Under 5 years of age	149	7.6	368	8.8
5 to 19 years of age	601	30.4	1,173	28.0
20 to 44 years of age	677	34.4	1,389	33.2
45 to 64 years of age	424	21.5	932	22.3
65 and more years of age	120	6.1	326	7.8
Hispanic or Latino[3]	1,861	94.4	4,077	97.3
High school graduate or higher[1]		53.7		40.4
Bachelor degree or higher[1]		6.5		1.2
Native of the United States		63.4[2]		49.7[1]
Foreign born		36.6[2]		50.3[1]
Spanish spoken at home		90.5[2]		90.6[1]
HOUSING				
Total housing units[3]	555		1,265	
Average household size[3]	3.68		3.59	
Median household value[1]	$63,400		$52,300	
INCOME				
Median household income[1]	$32,206		$20,438	
Household income by range				
>10,000 to $24,999		36.9[2]		62.3[1]
$25,000 to $49,999		30.2		23.1
$50,000 to $74,999		15.8		12.7
$75,000 and more		17.1		1.8
Families living below the poverty level		18.4[2]		49.5[1]

[1] U.S. Census Bureau-American Community Survey 2008-2012

[2] U.S. Census- American Community Survey 2006-2010

[3] U.S. Census 2010 Demographic Profile Data

We focus our discussion mainly on the characteristics of Vinton, the target community for our HIA. The population of Vinton is 1,971, 94% of whom are Hispanic (90% of Mexican origin), 5% white, and 1% other. Thirty-seven percent of the residents are foreign born (Latin America), and only 54 % of residents have completed high school. The median household income is $32,206, well below the statewide average of $48,259; 36.9% households manage to live with less than $25,000 per year and 18% of the population is living in poverty.

Additional data from the 2010 Census (not presented in Table V.1.) show that some families rely on additional support such as food stamps (15.5%) to fulfill the needs of their families. Of the total residents, 4.1% survive with retirement income and 6.4% with supplemental security income. A great proportion of residents (87%) commute to work daily to nearby cities and towns (U.S. Census, 2010).

The median age is 27 years which is significantly below the state average of 41 years and over a quarter of the population is under 18 years of age. Typically, Hispanic grandparents may take care of their grandchildren while parents commute to work every day. This practice can be observed in the Village of Vinton, where16% of households report having at least one person 65 years and 15.9% are female householder (no husband present).

The total number of housing units is 555; of which 96.6% is occupied (536) and 82.1% are owner-occupied housing units (440). The average family size is 4 members per house. 63% of the households are connected to a community public water system, 17% of the households are connected to the public water system, and 20% of the households are estimated to depend on private wells, either in their property or connected to an adjacent property. All households depend on septic tanks to manage their wastewater. The Village of Vinton does not have rain runoff or storm water public system. Additionally, the village lacks some basic public services such as transportation, health services or community centers within the village limits. The Village has two public parks, and one fire and police station.

To address their health care issues, residents utilize private or community providers from nearby towns, including centers from the Health Department of the city of El Paso. According to the monthly reports from the Health Department from October 2012 to August 2013, the type of service and number of encounters with residents of Vinton include: 9 disease reports, 48 persons screened and 5 active cases of TB, and an average of 76 WIC clients receiving food benefits per month.

Westway though about two times larger than Vinton in population, is similar demographically with a few notable exceptions:

- Vinton's population is more educated with a larger percentage of high school and college graduates.
- A greater percentage of Vinton residents are native to the U.S. and not foreign born.
- Vinton has a larger percentage of the population in higher income brackets and is overall somewhat more affluent compared to Westway. Related to this, home values are on the average greater in Vinton compared to Westway.

Demographics of Participants in Household Survey

The methodology for the household survey is described in Section IV, pages 17,19. The demographics of the participants in the survey are presented in Table 9. Of the 121 households in Vinton, 49 households had at least one tap water sample tested (41%). The participants in the survey span a range of age, family size, and income level. The demographic characteristics of the households surveyed in Westway were similar to Vinton with the exception that Vinton households were somewhat more affluent and more of them preferred English over Spanish.

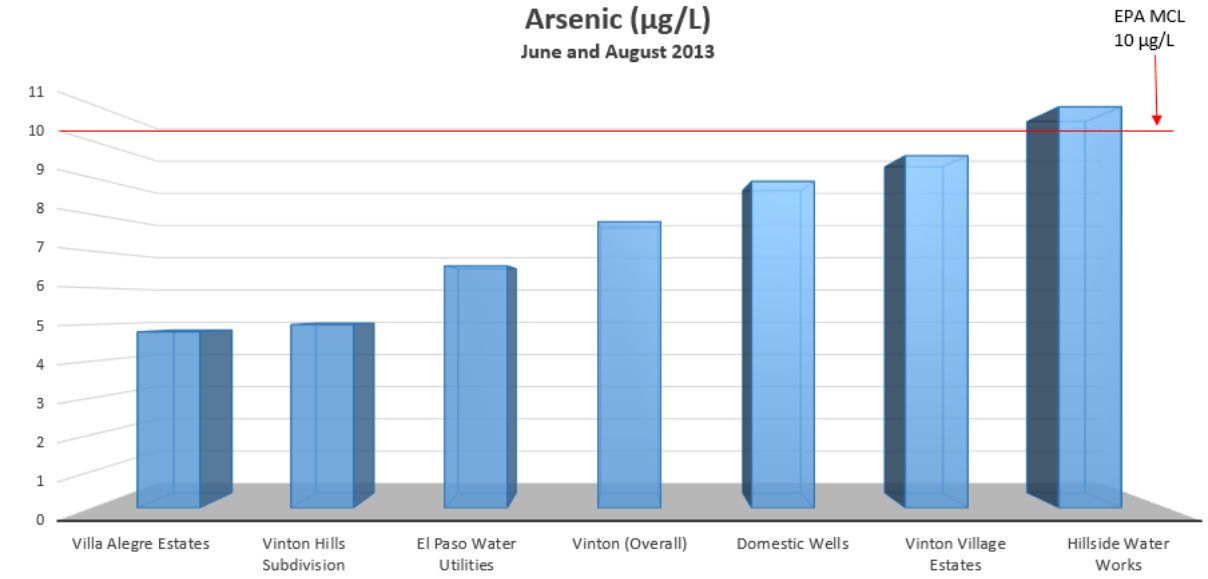
Table 9. Demographics of participants in our surveys in Vinton and Westway

Characteristics	Vinton		Westway	
	Value	%	Value	%
POPULATION				
Total households surveyed	121		50	
Median age (respondent)	48		50	
Total population of participating households	485		170	
Population of participating households by age range				
5 years of age or less	53	11	19	11
6 to 17 years of age	98	20	30	18
18 to 64 years of age	300	62	106	62
65 and more years of age	34	7	15	9
Mean school years of education (respondent)	11		9.6	
HOUSING				
Average household size	4.0		3.4	
Average years living in this town	15.6		16.7	
INCOME				
Median household income estimation	$25,500		$18,000	
Household income by range				
<$10,000-20,000		36	59	
$21,000-40,000		41	21	
$41,000-60,000		9	14	
$61,000-80,000		7	5	
>$80,000		7	0	
SURVEY				
Preferred Language by Participants				
English	59	49	12	24
Spanish	62	51	38	76
Households agreeing to participate		58		57

Results from Water Quality Survey

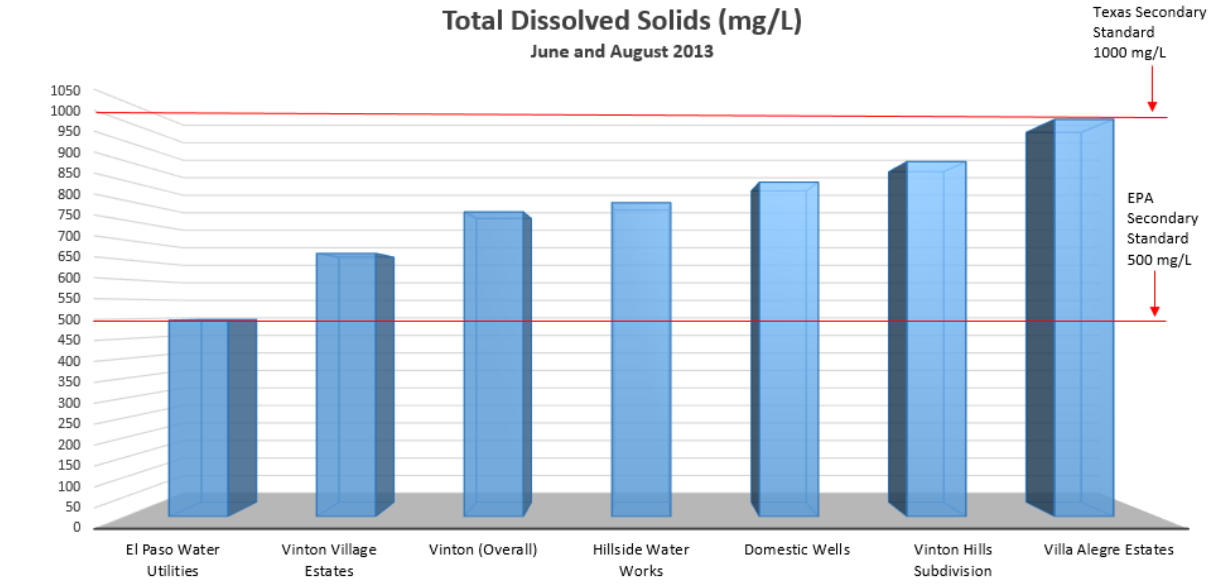
A total of 113 water samples were collected at two sampling times: 1) 59 water samples from May 30 to June 10, including 55 households and 4 businesses/parks; and 2) 54 water samples from August 4 to 8, including 51 households and 3 businesses. For these two sampling times, 44 samples were collected from the same household/business and 25 samples were collected once per household/site. Overall, 69 households had at least one water sampled and tested. The main water quality concerns were arsenic, total dissolved solids (TDS), and E.coli. A summary of results for As is provided in Figure 4 and for TDS in Table 5. The overall level of As in the Village of Vinton is 7.8 ppb. Moderately higher levels of As were found in the PSW-Hillside Water Works (10.9 ppb). The EPA drinking water standard for As is 10 ppb. The maximum concentration of As was found in a domestic well (15.8 ppb). The overall level in Vinton for TDS is 771 mg/L. The highest level for a given water source was found in the PWS-Villa Alegre Estates (1,005 mg/L). The secondary standard for TDS in Texas is 1000 mg/L. Similar to As, the highest level of TDS in an individual sample was found in a private well (1,480 mg/L). There is a significant difference ($p<0.001$) between and within wells for the arsenic and TDS levels. No organic industrial pollutants were found. A few households resulted in a positive detection for total coliforms (9% of samples) and one household was positive for E. coli (1% of samples). No viruses or other pathogenic organisms were found (Giardia, Cryptospiridium, or

Figure 4. Levels of arsenic in different water sources



	Villa Alegre Estates	Vinton Hills Subdivision	El Paso Water Utilities	Vinton (Overall)	Domestic Wells	Vinton Village Estates	Hillside Water Works
Average	4.8	5	6.6	7.8	8.9	9.6	10.93
Samples	3	17	12	69	15	9	13
Range	4 – 7.5	4.4 – 5.3	5.8 – 9.6	2.7 – 15.3	2.7 – 15.3	8.9 – 10.2	8.9 – 11.9

Figure 5. Concentration of total dissolved solids in different water sources.



	El Paso Water Utilities	Vinton Village Estates	Vinton (Overall)	Hillside Water Works	Domestic Wells	Vinton Hills Subdivision	Villa Alegre Estates
Average	497	666	771	794	846	898	1005
Samples	12	9	69	13	15	17	3
Range	230 - 657	655 - 672	230 - 1480	659 - 822	482 - 1480	850 - 930	992 – 1020

other oocysts). Compared to recent history in Vinton, 100% of all community wells have experienced at least one violation of drinking water standards according to TCEQ during the period of 2005-2010. In Texas in 2009, 9% of community water supplies reported health-based violations (USEPA, 2009). In a national level survey domestic wells conducted by the USGS, 23% of wells had at least one chemical contaminant above the drinking water standard, 34% were positive for total coliform bacteria, and 8% were positive for E.coli (Van DerSlice, 2011).

The results for the two sampling dates are shown in Table 10. We hypothesized that arsenic concentrations would be less on the second sampling date due to dilution, but this was not the case. Arsenic concentrations were significantly greater on the second sampling date for most of the local wells and even EPWU. That was not the case for domestic wells. Possible explanations for this significant increase on the second sampling date could be leaching of arsenic from the soil between the river bed and the water table into groundwater (not very likely since arsenic is not very mobile in soil, though this soil material is sandy and not very high in clay content) and/or chemical reduction of arsenic under flooding from As^{+5} to As^{+3} (increasing the amount of arsenic in solution and making it more mobile). Although the differences are statistically significant, the magnitude of increase is still small (on the average, 7.5 ppb on the first date vs. 8.1 ppb on the second date).

Table 10. Arsenic concentrations in tapwater for two sampling dates, one before water release in the Rio Grande and the other after water release in 2013.

Water Source	As Concentration in June, ppb			As Concentration in August, ppb			As in Paired Water Samples, ppb	
	n	Avg.	Range	n	Avg.	Range	n	Avg.
Vinton Village Estates	8	9.08	8.94 - 9.34	8	10.0	8.92 – 11.10	7	9.53
Vinton Hills Subdivision	10	4.85	4.61 - 5.03	15	5.16	4.64 – 5.62	8	5.11
Hillside Water Works	12	10.75	10.10 - 11.40	11	11.08	7.36 – 12.30	10	10.90
Villa Alegre Estates	3	4.65	4.57 - 4.71	2	5.20	5.0 – 5.39	2	4.91
Domestic wells	15	8.81	2.75 - 15.80	7	7.62	2.58 – 14.20	7	7.33
Local Wells	**48**	**8.25***	**2.75 - 15.80**	**43**	**7.98***	**2.58 – 14.20**	**34**	**8.17**
EPWU	11	6.19	5.81 – 6.68	11	7.15	5.77 – 13.00	10	6.72
All Water Sources	**59**	**7.87***	**2.75 – 15.80**	**54**	**7.81***	**2.58 – 14.20**	**44**	**7.84**
Paired water samples	**44**	**7.52****		**44**	**8.12****			

* Difference between and within wells is significant (p<.001)

** As levels are significantly different between May and June for paired water samples (n=44) (p=.001)

Results from Household Survey

The methodologies for the household survey are presented in Section IV, pages 17, 19. The recruitment rate (# of household agreeing to do the survey vs. the number contacted or attempted to contact) is presented in the Appendix (Table X.6). One adult in each household was interviewed.

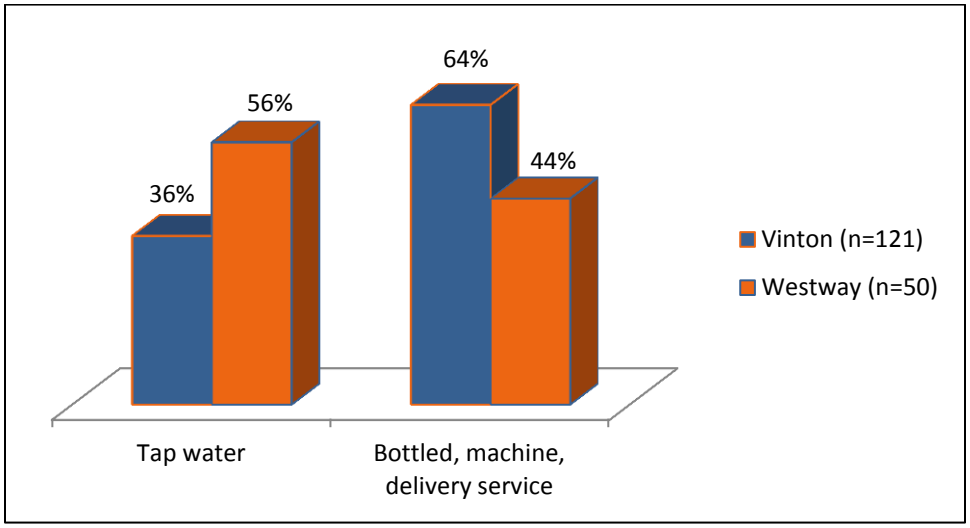
Practices and Perceptions with Respect to Water and Sanitation

Water. Figure 11 shows a comparison of the proportion of households drinking tap water vs. bottled water for Vinton and Westway. We found that the majority of households in Vinton

bought bottled water to drink, and used their tap water for all other household purposes (64% of households). Much fewer households in Westway purchased bottled water to drink (44%); the majority drank their tap water (56%), which is provided by EPWU.

Residents of Vinton drink more bottled water because generally the water from local wells tastes worse and they have less trust in the water compared to EPWU or bottled water (Fig. 12). We asked survey participants to rate their water supplies based on taste and their level of trust in the quality of the water. Vinton residents generally rated local well water poor compared to EPWU or bottled water. Bottled water was rated slightly above EPWU in terms of trust.

Figure 11. Proportion of households in Vinton and Westway drinking tap water or bottled water.

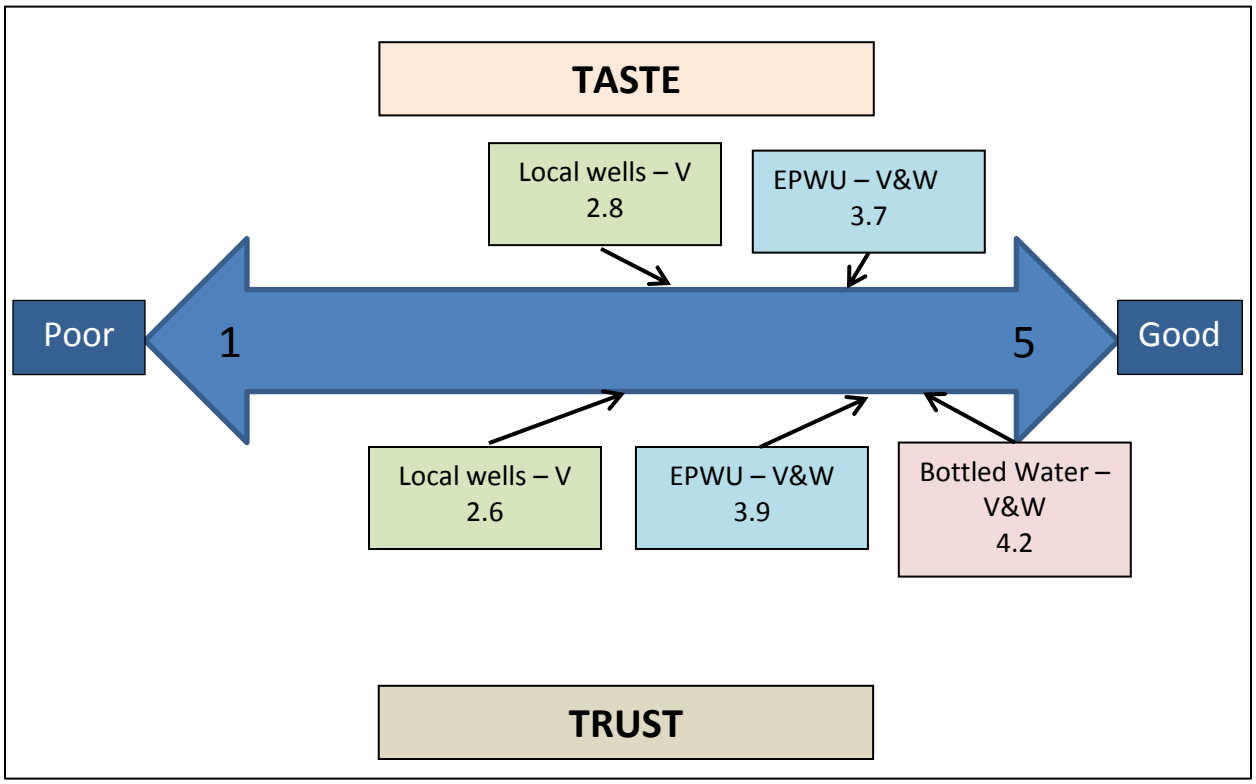


*Significant difference between communities at p=0.1

Sanitation. All residents and businesses of Vinton rely on septic tanks for sanitation. Westway is already connected to EPWU for sanitation. Our survey of households in Vinton demonstrates a poor level of understanding of septic tanks and how they should be maintained. Figure 13 shows the current condition of septic tanks as observed by our survey teams. Each team inspected the site of the septic tank, if known, to observe any foul odors or standing water. If odors or standing water were detected, they considered the condition as "at risk", and "no risk" if no odors or standing water were observed. Forty percent of households were deemed "at risk". The average age of septic tanks is 20 years. Thirty-one percent of residents knew nothing about their septic tank and 67% claimed that they have never received any information on how to maintain their septic tank. Forty-one % never had an inspection and another 32% did not know.

Figure 14 shows results for how many households have a certificate of compliance for their septic tank and Figure 15 shows how frequently septic tanks are pumped out. Most residents were unaware of the need for a certificate of compliance or how to obtain one. About half of households have never had their septic tank pumped out or do not know when it was pumped out. The other half have had their tanks pumped in the last 1-5 years.

Figure 12. Perceptions regarding taste and level of trust in water sources.



"Local wells" include community and domestic wells in Vinton.
EPWU= El Paso Water Utilities; V= Vinton; W= Westway

Figure 13. Observed conditions of septic tanks from the household survey in Vinton.

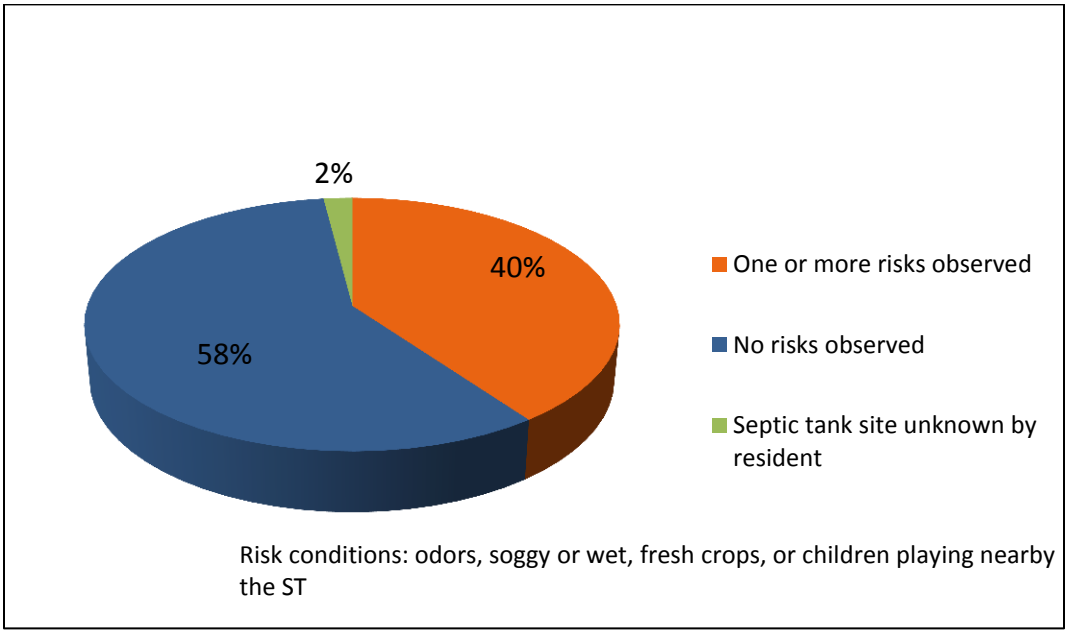


Figure 14. Percentage of households in Vinton that maintained a Certificate of Compliance for septic tanks from county or state.

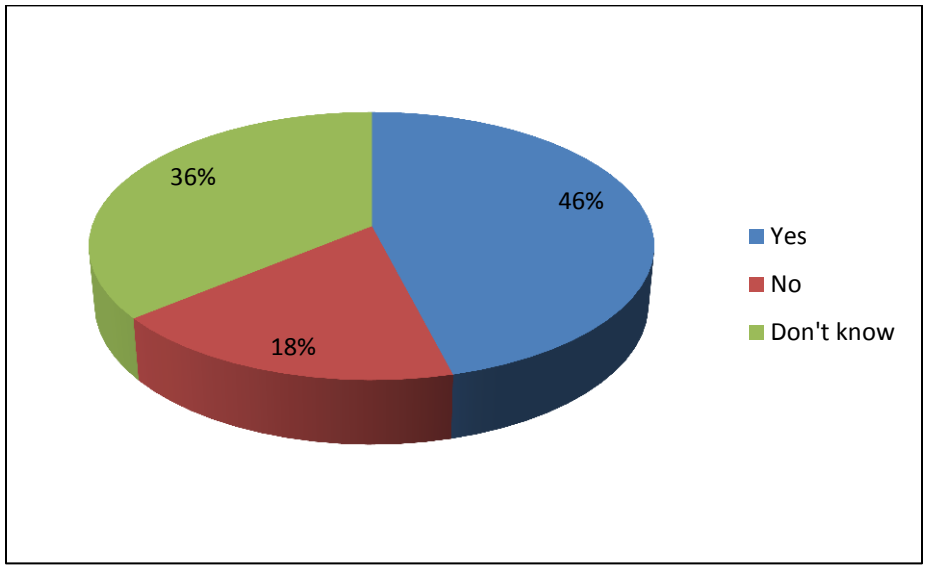
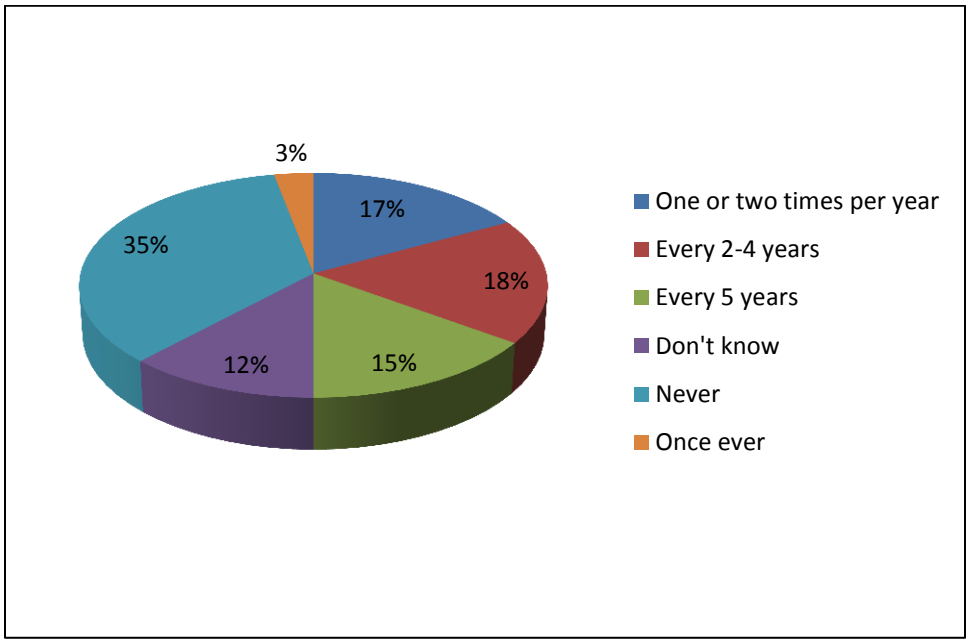


Figure 15. Frequency with which septic tanks are pumped out in Vinton.



Public Health Conditions

Results for current health conditions from the household survey are provided in Figures 16-20 and Tables 11-12, including the common health problems, absenteeism at school or work from health problems, and where residents of Vinton access health care. The most commonly reported health problems reported by any family member within the past 6 months for both Vinton and Westway are shown in Figure 16. The issues of concern that might be related to poor water quality and/or sanitation include: 1) Numbness, cramping, or tingling in fingers, arms, or legs,

30% of respondents in Vinton (could be related to As); 2) Gastro-intestinal problems, 28% of respondents in Vinton (could be related to poor water quality and/or sanitation); and 3) Skin problems, 26% of respondents in Vinton (could be related to high salt content of water which leads to excessive dryness and/or to As). Gastro-intestinal ailments and skin problems tended to be more prevalent in Vinton compared to Westway but the difference was not statistically significant. There were no reports of serious illnesses related to water or poor sanitation such as methemoglobinemia, hepatitis, or West Nile virus. The results that we obtained represent self-reported illnesses, not necessarily severe enough to seek medical attention, though some did seek medical attention for these illnesses (see Table 11). We collected information on access to health care, where residents of Vinton access health care and how they pay for it. These results are presented in Tables X.7-8 in the Appendix.

Health problems within the past 30 days are presented in Figure 17. The frequency of gastrointestinal illnesses and skin problems were 22-31% and 19%, respectively, in Vinton. The prevalence of these ailments tended to be greater in Vinton compared to Westway. In particular , the prevalence of stomach or abdominal pain in Vinton (31%) was significantly greater than in Westway (12%). Since these are self-reported complaints, there are no other reliable data from independent studies with which to compare these frequencies.

Figure 16. Ailments in the last 6 months reported by survey respondents in Vinton and Westway (any family member).

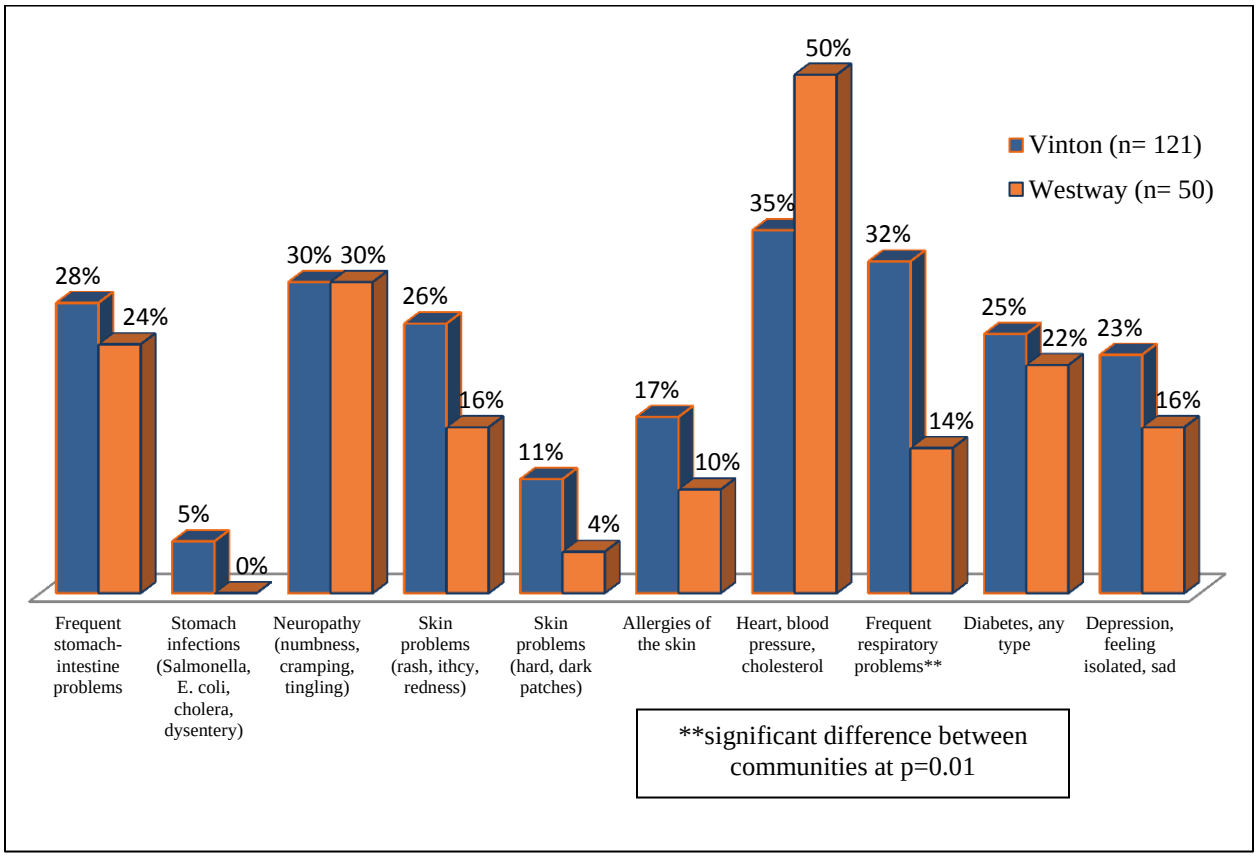
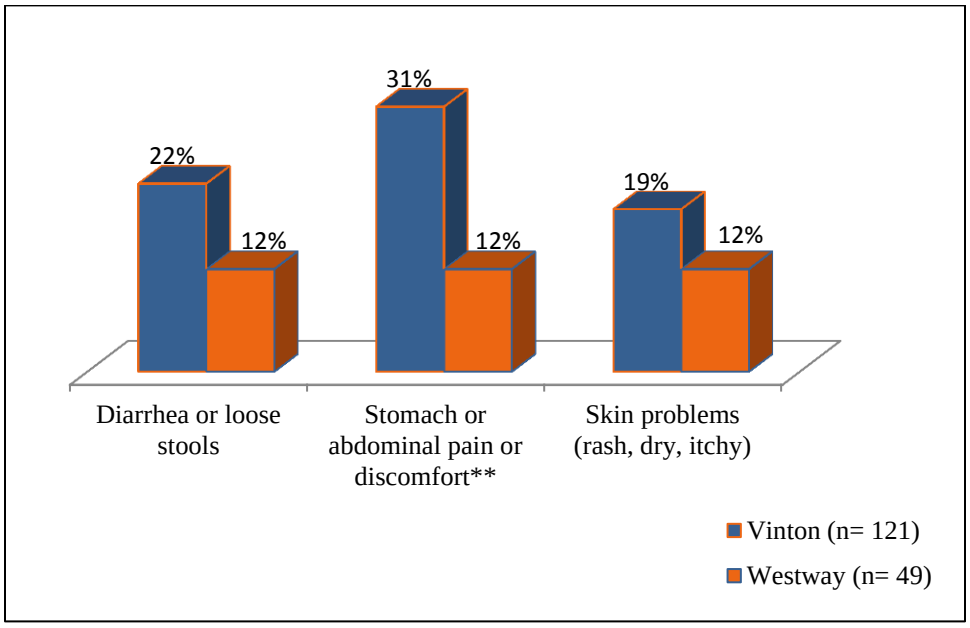


Figure 17. Ailments in the last 30 days reported by survey respondents in Vinton and Westway (any family member).



**significant difference between communities at p=.01

Table 11 presents reports of absenteeism from school or work related to gastro-intestinal ailments or skin problems. Seven to 10% of participants reported either children missing school or adults missing work due to gastro-intestinal or skin ailments.

Table 11. Illnesses requiring Medical Attention and absenteeism from School or Work

	Frequency (n=121)	%
Households with at least one member of the family requiring medical attention (pharmacy, nurse, doctor, hospital) for…		
Diarrhea or loose stools	9	7.4
Stomach or abdominal pain or discomfort	12	9.9
Skin problems such as rash, redness, dryness, itchiness, open wounds	8	6.6
School or Work Missing Days: households with at least one member missing school or workdays…		
Minor missing school-days or returned from school because of stomach-related ailments	8	11.8*
Person missing work-days because of stomach –related ailments	8	6.6

* 68 households reported school-age children of the 73 households with children.

No other reliable data for Vinton or at the county level are available for these relatively non-severe ailments; so it is hard to compare against a reference condition. There are some data available for El Paso County for more serious ailments. These are presented below in Table 12. Also, data from the La Fe Community Clinic in Westway shows that 4.4% of patients complain of abdominal pain (La Fe Westway Clnic, 2013).

TABLE 12. Prevalence of Various Gastrointestinal Illnesses in City of El Paso

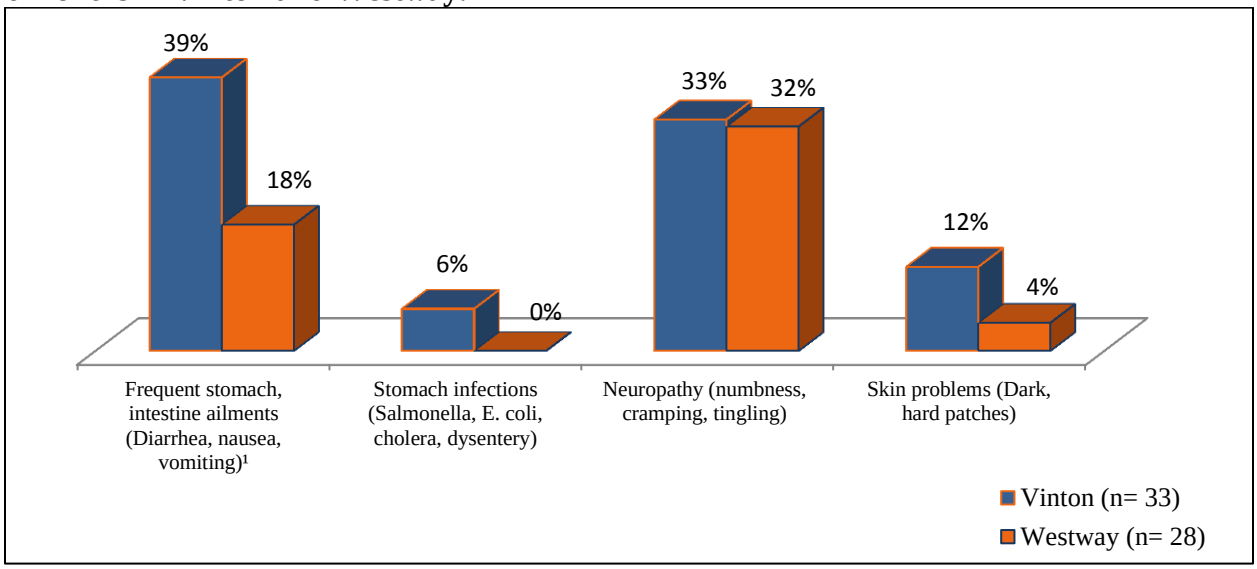
Diagnosed illnesses reported to Surveillance System (symptomatic or non-symptomatic)	Cases Jan-Aug 2013	Prevalence Per 100,000
Amebiasis	1	
Campylobacteriosis	34	4.4 cases per 100,000
Cryptosporidiosis	1	
E. coli, shiga-toxin producing	2	
Salmonellosis	79	10.2 cases per 100,000
Shigellosis	14	1.8 cases per 100,000

Source: El Paso Department of Public Health: http://home.elpasotexas.gov/health/epidemiology.php

Figures 18-19 shows the prevalence of gastrointestinal illnesses, skin problems, and numbness in limbs for households that drink tap water. These results show that these ailments are much more prevalent in Vinton than in Westway. In particular, the prevalence of gastrointestinal complaints is significantly higher in Vinton for households that drink tap water compared to Westway. Previously presented results in Figures 16-17 were for all households whether they drank tap water or not.

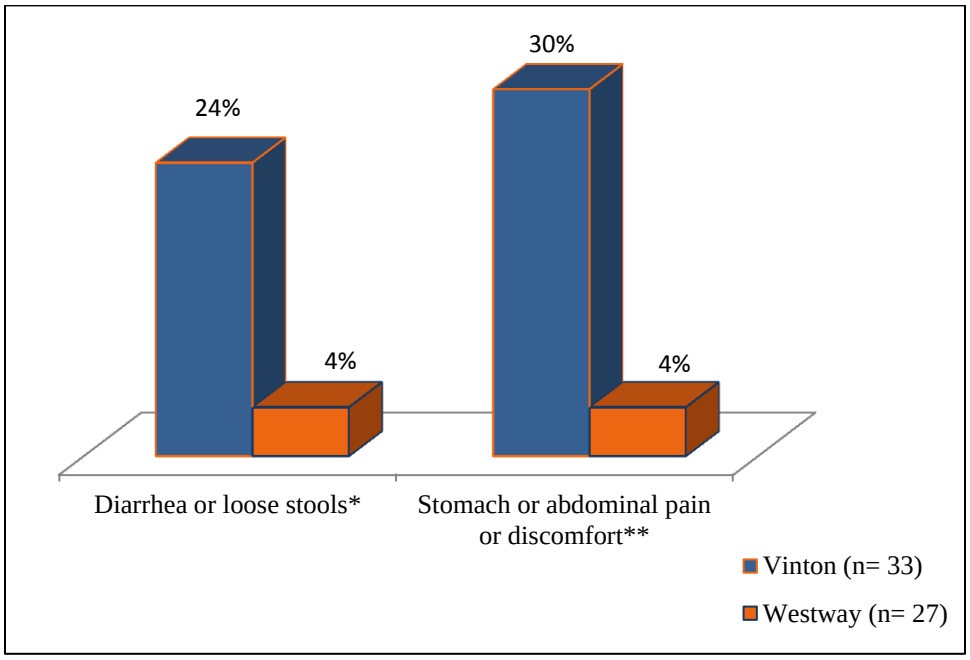
Figure 20 shows the prevalence of skin problems in relation to water source, either local wells in Vinton or EPWU in either Vinton or Westway. The prevalence of skin problems where the water source is local wells is about twice that for EPWU as a water source. This difference is statistically significant. The results for gastrointestinal ailments and skin problems when local wells is the water source for drinking and washing point to exposure to arsenic, salts, and coliform bacteria in water as potential determinants of health in Vinton compared to Westway.

Figure 18. Proportion of households drinking tap water and reporting ailments in the last 6 months in Vinton and Westway.



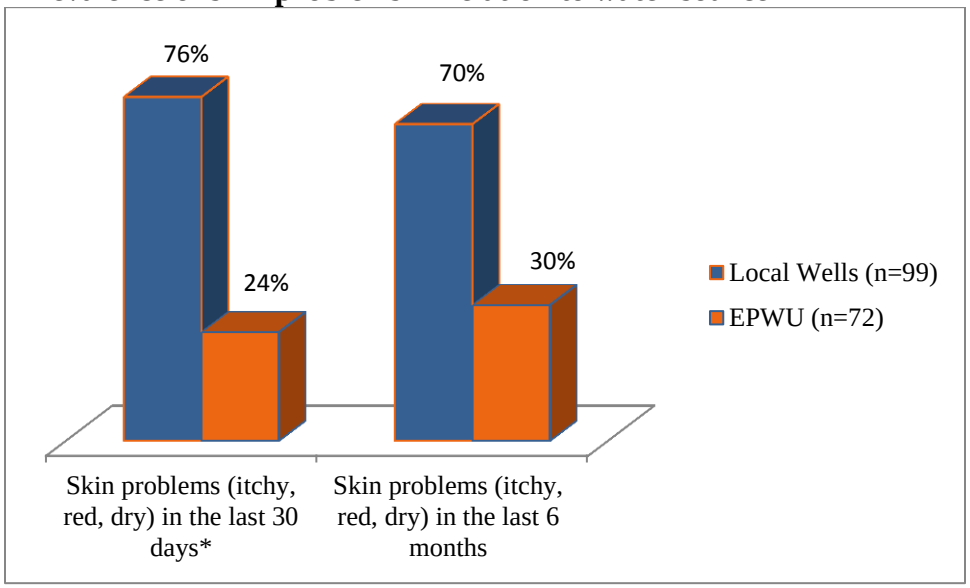
Significant difference between communities at p=.07 across all health issues.
Note: Vinton includes only households with water from local wells; Westway includes only households with water from EPWU.

Figure 19. Proportion of households drinking tap water and reporting ailments in the last 30 days in Vinton and Westway.



*Significant difference between communities at p=.03.
**Significant difference between communities at p=.007.
Note: Vinton includes only households with water from local wells; Westway includes only households with water from EPWU.

Figure 20. Prevalence of skin problems in relation to water source



*Significant difference between water sources at p=.04.
Note: Local wells are in Vinton only; EPWU includes Vinton and Westway.

We did not collect specific information about the prevalence of parasites in Vinton. However, there are some older data available. In the Canutillo School District where Vinton children attend school, over 22% of participant first graders in elementary schools, Vinton elementary included, were found to be infected with at least one parasite (i.e *Blastocystis hominis, Giardia lamblia,*and *E. c*oli among others). Specifically in Vinton, 18.5% of children attending Childress Elementary were infected with a parasite (Escobedo et al., 2003). This prevalence could be associated with poor water quality and/or sanitation. These results are also over 10 years old; the prevalence could be greater or less now.

Health Care Access

There are two private clinics in Vinton and one of those is open only three days per week. These two clinics provide limited services, and no more than 20% of residents access health care at one of these two clinics. Table 13 summarizes where residents of Vinton access health care. Additional detail is provided in the Appendix on health care access and how residents pay for health care (Tables X.7-8.). Residents commonly go to neighboring communities/towns to access health care, El Paso being the most common. A significant number of adults (13%) cross the border to Ciudad Juarez to access health care where costs are cheaper.

Table 13. Where residents of Vinton access health care

WHERE RESIDENTS OF VINTON GO TO ADDRESS HEALTH ISSUES		
Location	Children %	Adults %
El Paso	51	41
Vinton	20	16
Towns nearby	25	28
Cd. Juarez	3	13

Discussion of Contaminants in Water, Health Outcomes, and Relative Risks in Vinton

Arsenic in Drinking Water

There is a dearth of published studies conducted in the U.S. on health outcomes from arsenic in drinking water; most are from arid and semi-arid areas outside the U.S. According to the World Health Organization (WHO), "acute effects of arsenic exposure include vomiting, abdominal pain, and diarrhea. These are followed by numbness and tingling of the extremities, muscle cramping and death in extreme cases." (WHO, 2012). According to research, chronic exposure to arsenic is generally manifested through skin lesions and pigmentation. Other symptoms include peripheral neuropathy, lung and cardiovascular diseases, conjunctivitis, weakness, anemia, diarrhea, hepatomegaly, fetal loss and infant mortality. According to Battacharjee et al (2012), 15-20% of exposed individuals manifest skin lesions. In other studies, the prevalence of unexplained skin rashes was associated with arsenic in drinking water (>10 ppb) (Valentine et al., 1992; Yoshida et al., 2004). In a study conducted in Texas counties along the U.S./Mexico

border, Dutton et al (2000) found that 3% of individuals living in colonias reported skin rashes compared to only 1% of individuals not living in a colonia. Recently studies have linked exposure to As in water to respiratory illnesses, including abnormal lung function among individuals who also have skin lesions (ATSDR, 2007). In animal studies, Ramsey et al (2013) showed that *in* utero exposure and early life exposure to As in drinking water exacerbated the inflammatory response to influenza A. Most recently, Wasserman et al (2014) showed that chronic exposure to drinking water As concentrations as low as 5 ppb negatively impacted the IQ of children and other child development parameters. These published results collectively indicate at least a potential relationship between arsenic in drinking water and the prevalence of skin rashes, gastrointestinal disorders, and neuropathy in extremities in our assessment. The impact of chronic levels of exposure to As in drinking water on children and pregnant mothers needs more attention, but certainly the recent study by Wasserman (2014) raises concern about relatively low (5 ppb) concentrations of As in drinking water.

Total Dissolved Solids in Water

Published studies on health impacts of drinking water exceeding 1000 ppm are very limited. A report from WHO (2003) summarizes impacts of total dissolved solids in drinking water on health. One study from Australia found that the risk of ischemic heart disease and acute myocardial infarction were increased in communities with drinking water sources with high levels of soluble salts, calcium, magnesium, sulfate, chloride, fluoride, alkalinity, total hardness, and pH. In the former Soviet Union, a study found that limited cases of inflammation of the gallbladder and gallstones increased with increasing levels of total dissolved solids in groundwater. High salt content of water used for washing and bathing can result in excessive drying of the skin, skin irritation, and skin rashes and infections (Personal communication, Dr. Victor Cardenas, June, 2013). Although almost no direct results for health impacts exist, high TDS levels influence consumers' acceptability of drinking water because of the taste. Certain TDS components result in excessive scaling in water pipes, heaters, boilers, and appliances.

Bacteria and Other Biological Contaminants

There is ample evidence for negative impacts of bacteria, such as *E.coli* and *Salmonella*, and other organisms, such as *Giardia* and *Cryptosporidium*, in drinking water or even exposure through contact with contaminated water on public health. We did not find *Giardia* or *Cryptosporidium*in any of our water samples, but we did find *E.coli* and other coliform bacteria. In the study by Dutton et al (2000) in Texas border counties, children living in colonias who were 1-5 years in age were much more likely than non-colonia children to have had diarrhea in the past two weeks. In colonias without water or sanitation, 20% of children <1 year of age had diarrhea in the past two weeks. Results from El Paso County in 2013 (El Paso Department of Public Health, 2013) show the following prevalence rates related to stomach infections and dysentery:

- *Campylobacteriosis* – 716 cases/100,000 people
- *Salmonellosis* – 14.5 cases/100,000 people
- *E.coli* – 0.24 cases/100,000 people

We found limited information on the occurrence of parasites in children of Vinton (See p.32). In a more general study of parasites and other environmentally related infections on both sides of the U.S. Mexico border (El Paso and Ciudad Juarez), of 386 asymptomatic participants, 38.2%

had *H. pylori*, 3.3% had *Taenia*, 2.7% had *Giardia*, and 1.9% had *Cryptosporidium* (Cárdenas et al., 2010). Regarding parasites in children and adults, the literature shows "...a consistent correlation between rates of infection in children and rates in adult populations." (Escobedo, 2003, p.5). In addition, a study in semi-rural areas of El Paso County reported that 17% of school children tested positive for Hepatitis A (Redlinger et al., 1997), but no data were available that was specific to Vinton. Also these studies just report the prevalence of the disorders without any association to an environmental exposure.

Relative Risks

The "relative risk" measures the magnitude of association between a factor (exposure) and the effect (disease) and "indicates the likelihood of developing the disease in the exposed group relative to those who are not exposed" (Henneken and Buring, 1987). We calculated the relative risk associated with drinking tap water from local wells in Vinton for various illnesses according to the following equation:

$$\text{Relative Risk} = I_e / I_o$$

where

I_e = incidence of disease in the exposed group (individuals with a disease / total individuals exposed), and

I_o = incidence of disease in the non-exposed group (individuals with a disease / total individuals non-exposed).

For example, a relative risk of 1.4 indicates that people exposed to a certain factor had 1.4 times the risk or were 40% more likely to develop a disease (i.e. 1.4 minus the null value of 1.0). A relative risk of 1 means that the incidence of a disease in the exposed and the non-exposed groups are identical. Thus, there is no association between exposure and the disease. A relative risk >1, means that there is **an increased risk of having the disease** among those exposed to a certain factor. The confidence interval (CI) represents the range within which the magnitude of risk lies within a certain degree of assurance, or in other words, defines the range in relative risk that is or is not statistically significant. If the confidence intervals are from <1 to a certain level, then the association is greater than p=.05, thus, not statistically significant. If the CI is from >1 to a certain level, then the association is significant.

The relative risk for some of the commonly reported ailments in Vinton associated with drinking tap water from local wells compared to drinking water from EPWU is shown in Figure 21. Participants drinking tap water from local wells in Vinton have 2.2 times more risk associated with gastrointestinal problems and 3.4 times more risk associated with skin problems compared to participants drinking water from EPWU. The CI indicates that the relative risk of gastrointestinal illness among Vinton residents is statistically significant.

The relative risk of gastrointestinal disorders in the past 30 days associated with drinking tap water from local wells in Vinton compared to drinking water from EPWU is shown in Figure 22. Residents of Vinton who drink tap water from local wells have 6.55 times more risk for diarrhea and 8.2 times more risk for other stomach or intestinal problems compared to residents of Westway who drink tap water from EPWU.

Figure 21. Relative risk of gastrointestinal ailments, skin problems, and neuropathy in the last 6 months associated with drinking tap water from local wells in Vinton compared to drinking water from EPWU.

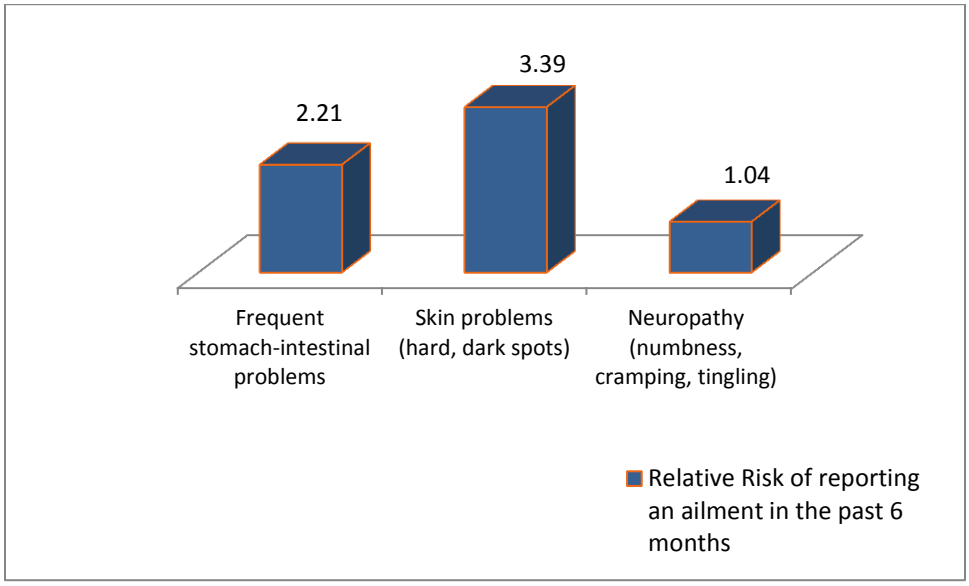
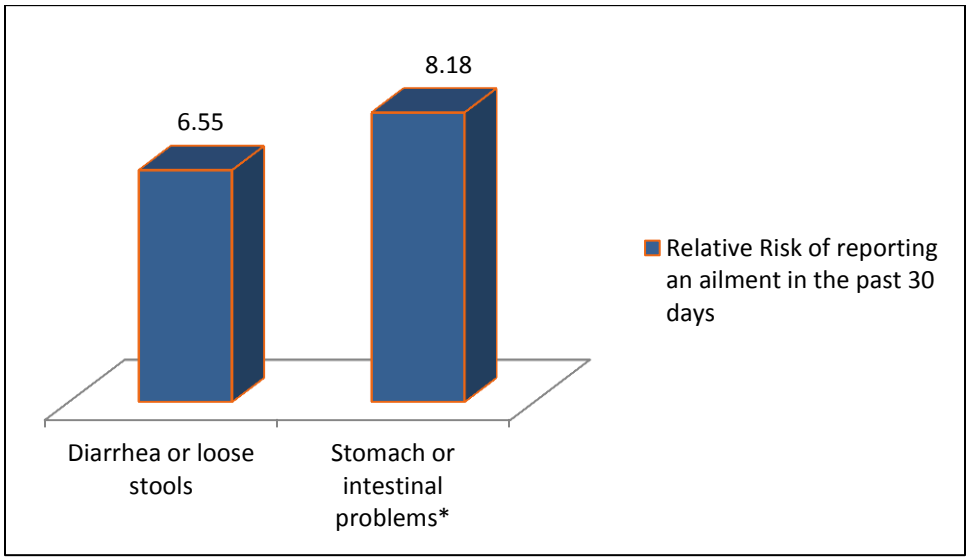


Figure 22. Relative risk of gastrointestinal disorders in the past 30 days associated with drinking tap water from local wells in Vinton compared to drinking water from EPWU.



*Significant difference (p=.01)

<u>Costs of Water and Willingness to Pay for Improvements in Water and Sanitation</u>

The costs of the infrastructure improvements and the monthly costs of water and sanitation are a concern in a community where so many live under the poverty level, which is one of the few potentially negative impacts of the proposed project. Numerous residents and key informants

identified the high cost of the infrastructure and the higher monthly costs for residents as a concern. Table 14 presents average household expenditures for water, including expenditures for bottled water. Households spend, on the average, almost $23/mo on bottled water. There is a wide range in total expenditures for water, due to how much bottled water is purchased and how much water is used for landscaping and other outdoor uses. In Vinton, the range is $4-324/mo, with a mean value of $53/mo. Households in Vinton spend much less on piped water from private providers compared to EPWU (about $33/mo vs. about $59/mo), but if you add the purchased bottled water, the costs are similar ($55.50 vs. $59). In Westway, the costs that we collected in our survey includes water and sanitation (average of $71/mo). EPWU charges for sanitation on a prorated basis on water usage. Assuming that sewage costs are about 30% of the total monthly bill, (a reasonable estimate according to EPWU), the costs of water alone in Westway would average about $50/mo, or about $9 less than EPWU customers inVinton and $5 less than households in Vinton purchasing piped water plus bottled water. It appears that if

TABLE 14. Expenditures for water by individual households in Vinton and Westway.

VINTON				
Water Source	**N**	**Mean**	**Minimum**	**Maximum**
El Paso Water Utilities[1]	22	$58.88	$13	$300
Local Wells/Private Providers[2]	77	$32.94	$12	$100
Vinton Hills Subdivision	38	$33.39	$12	$86
Vinton Village Estates	22	$27.21	$12	$62
Villa Alegre Estates	5	$28.40	$17	$40
Hillside Water Works	12	$43.92	$20	$100
All Purchased Piped Water[3]	99	$38.71	$12	$300
Bottled Water[4]	103	$22.52	$2	$100
Total[5]	115	$53.12	$4	$324
WESTWAY				
Water Source	**N**	**Mean**	**Minimum**	**Maximum**
El Paso Water Utilities[6]	46	$71.11	$35	$175
Estimated Sewage[7]	46	$21.33	$10	$52
Estimated Water Only[8]	46	$49.78	$25	$123
Bottled Water[9]	41	$18.56	$1	$75
Total[10]	46	$66.32	$25	$145

[1]Water only; no sewage in Vinton
[2]All private providers of piped water; excludes domestic wells & EPWU; followed by breakdown for each private provider system
[3]All piped water excluding domestic wells
[4]All bottled water purchases, including households with domestic wells
[5]Total spent on water, including piped and bottled water for 99 households plus 16 households that have domestic wells
[6]Includes water plus sewer in Westway
[7]Sewage estimated at 30% of the total cost
[8]Water estimated by subtracting estimated sewage from total
[9]All bottled water purchases
[10]Total spent on water; piped plus bottled

Vinton would be connected to EPWU but households drink tap water instead of bottled water, their costs could be less than they pay today for water considering what they pay now for both piped water and bottled water. Currently 85% of households in Vinton purchase at least some bottled water to drink. Definitely those households that have domestic wells and pay essentially nothing for water will experience higher monthly costs. These higher costs could negatively impact resources available for other health promoting expenditures or activities, such as having less money available for food, especially fresh fruits and vegetables, or health care, especially preventative health care.

The willingness to pay for improved water and sanitation by connecting to EPWU is reported in Figures 23-24. The preponderance of respondents are willing to pay for improvements in water and sanitation (72-77%).

Figure 23. Willingness to pay for improvements in water.

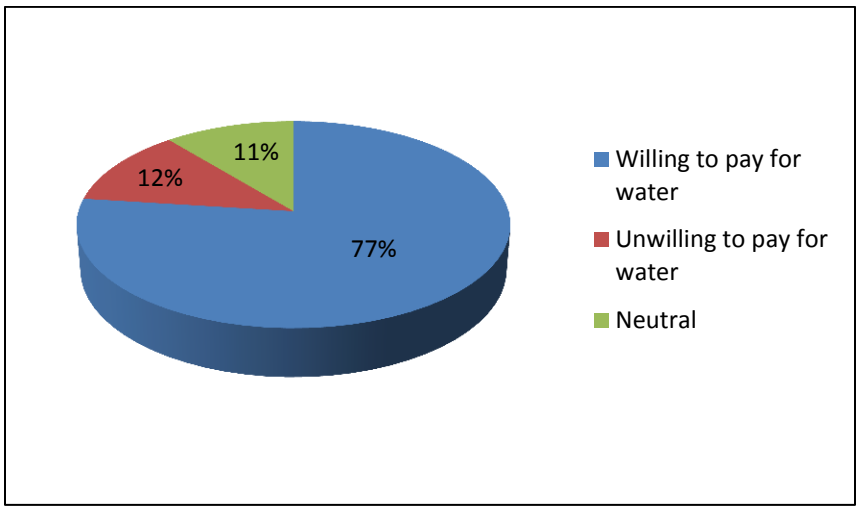
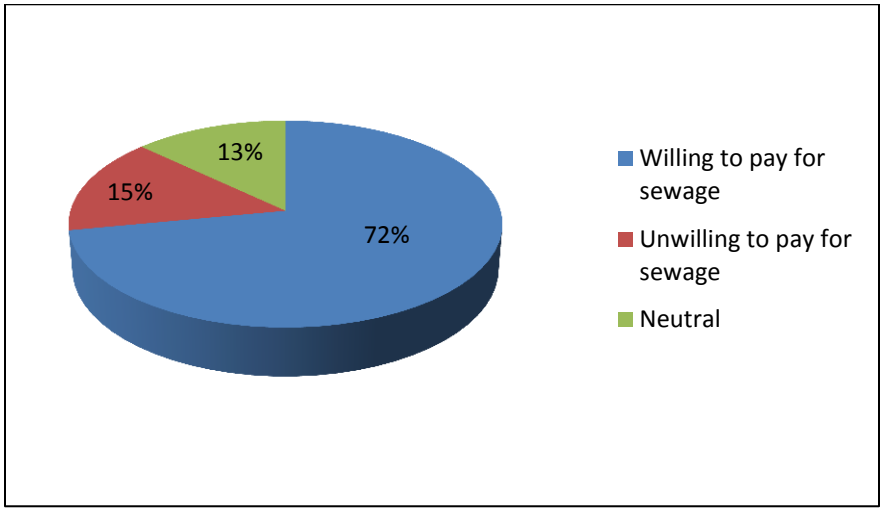


Figure 24. Willingness to pay for improvements in sanitation.



Other Findings: Results from Focus Groups and Interviews

Through our survey, interviews with key informants, and focus groups, we identified a number of other factors related to our scoping criteria; these are identified and discussed below.

Economic Development

Manufacturing and Retail Businesses. It is clear from our focus group discussions and from the household survey that community leaders, business leaders, and residents believe that water and sanitation will encourage growth in local retail and manufacturing businesses. Vinton is considered a "good place to do business", but without water and sanitation the potential for growth is limited. There is considerable undeveloped land along I-10 which could be developed as commercial property if it had access to water and sanitation. An increase in retail and manufacturing businesses would also lead to more local jobs for the community.

Property Values. Another outcome of having improved water and sanitation would be a likely increase in property values. A number of key informants and residents mentioned this as a likely outcome though the impact is difficult to quantify. Through key informant interviews, we identified a potential increase in property values of about 20% after at least five years following the connection to EPWU water and sanitation, based on the experience of EPWU personnel. Furthermore, using a combination of census data, county data, and some survey data, we estimate that property values in Westway, a community similar to Vinton, increased by about 18% over the period from 2000 before they connected to water and sanitation to 2012, a period of 10-12 years after connection. During the same time period, property values in Vinton decreased by about 7%. A negative result of property value increases for owners would be an increase in taxes. We did not attempt to quantify this impact.

Fire Insurance. The main industrial area of Vinton has no fire hydrants. This results in high rates of fire insurance for manufacturing businesses in Vinton and a large concern for fire safety for employees of these industries. The high cost of insurance was a major concern expressed in focus group sessions with business leaders in the community.

Community Development

Fire Safety. Due to low water pressure, 53% of the fire hydrants in Vinton are non-functional. Another nine streets in Vinton have no fire hydrants at all. At least one home burned to the ground in the last two years; there was no fire hydrant nearby to fight the fire. Lack of functioning fire hydrants is a major deterrent to community and economic development.

Water Security. Due to prolonged drought in the region and the reduced flow in the Rio Grande, which is connected to shallow groundwater in the area, residents are fearful that groundwater levels will fall to a level that will make local wells "run dry". There is concern that water will not be available at all in the near term. Some residents who live near the Rio Grande and have their own domestic wells that draw on the alluvial aquifer are already running out of water. There is a USGS monitoring well in Vinton near the Rio Grande. We accessed the data on the web (USGS, 2014) and found that the groundwater level has dropped at least 15 feet in the last year alone. For the period of record (about 25 years), the water level is in the lowest 10% quartile.

Recreation Space. Vinton has two public parks that are used sparingly. Neither of the parks has a water fountain or access to drinking water, which could be a factor in limiting their use. Health Care Services. Vinton has one full-time and one part-time health clinic with limited services. Lack of adequate water and sanitation limits the expansion of health care services in Vinton.

Summary of Existing Conditions

A summary of our findings regarding existing conditions is presented below in Table 15 for each of our original scoping categories. The prevalence of gastro-intestinal disorders, numbness or tingling in extremities, and skin rashes/infections are high in Vinton. Twenty-six to thirty percent of residents report one or more of these problems. Though it is impossible to say how much of these disorders can be attributed to water and/or sanitation, certainly gastro-intestinal disorders can be related to water and/or sanitation issues; numbness can be related to arsenic in water, and skin rashes can be related to arsenic in drinking water and/or high salt content of water that is used for bathing and washing. Water samples collected in Vinton show that E. coli contamination is a problem in private wells; In several cases, the concentration of arsenic exceeded the drinking water standard; and salt concentrations from private and community water supplies were commonly greater than the secondary standard used in Texas (1000 ppm) and always greater than the secondary standard used by EPA (500 ppm).

Local well of private provider in Vinton

Street sign showing support for sewer project

TABLE 15. HIA Summary of Findings

SCOPING CATEGORY	HEALTH DETERMINANT/OUTCOME	INDICATOR	EVIDENCE/DATA
WATER QUALITY	Gastrointestinal Diseases	Frequent stomach & intestine ailments by at least one family member in the last 6 months OR Diarrhea or loose stools in the last 30 days by at least one member of the family (adult and/or child)	29% households exceeded the arsenic MCL of 10 ppb.
			14% and 3% of households were positive for total coliform bacteria and E. Coli, respectively. Drinking water standard is ZERO cfu's/l
			Risks from poorly maintained residential STs: 35% ST never pumped out; 12% unknown location in backyard; 40% ST had at least one unhealthy condition observed; 67% residents ever received information on ST maintenance.
	Neuropathy	Strange feelings in extremities, such as numbness, cramping, or tingling by at least one family member in the last 6 mos.	29% households exceeded thearsenic MCL of 10 ppb.
	Skin Irritation	Skin problems such as rash, redness, itchiness, dryness in the last 6 months by any member of the family	93% households exceeded the TDS secondary standard recommended by EPA (500 ppm.) ; 6% exceeded the Texas secondary standard of 1000 ppm. 29% households exceeded the arsenic MCL of 10 ppb.
		Skin problems in any part of the body (hard patches or calluses of darker skin color)	29% households exceeded the arsenic MCL of 10 ppb..
SANITATION	Gastrointestinal Diseases	Frequent stomach & intestine ailments by at least one family member in the last 6 months OR Diarrhea or loose stools in the last 30 days by at least one member of the family (adult and/or child).	Poorly maintained septic tanks; 35% never pumped out; 12% unknown location; 40% had at least one unhealthy condition observed; 67% residents never received information on proper maintenance.
	Skin Irritation	Skin problems such as rash, redness, itchiness, dryness in the last 6 months by any member of the family	Poorly maintained septic tanks; 35% never pumped out; 12% unknown location; 40% had at least one unhealthy condition observed; 67% residents never received information on proper maintenance.
COMMUNITY	Fire Control Public Safety	Number of adequate fire hydrants	53% of the fire hydrants are not functional due to the lack of water pressure; these are located on 9 streets. Additionally, 8 residential streets and the industrial street lack any fire hydrants.
	Health Care Access	Number of local clinics or health providers	Two private clinics are located in Vinton. One is open 3 days per week.
	Recreation Space	# of citizens utilizing park	No public water fountains are installed in the two public parks in Vinton.
ECONOMIC	Fire Liability Insurance	Fire control insurance cost	Business representatives report elevated rates for fire insurance
	Net Worth of Households	Property values	Residents and businesses believe that their property values will increase with water and sanitation.
	Economic Growth In Community	Number of retail and manufacturing businesses and number of local jobs	Residents and business leaders believe that business opportunities have been lost due to lack of water and sanitation.
	Household Costs	Cost of connection to EPWU water and monthly payments	Based on interviews with EPWU officials and household survey
		Cost of connection to EPWU sewage and decommission of septic tank	Based on interviews with EPWU officials and household survey
		Increased property taxes	Based on household survey and focus groups

Predicted Impacts

For each scoping category, we summarize in Table 16 our predictions for each health determinant/outcome and the populations likely to be most impacted if the decision is made to connect to EPWU for water and sanitation in Vinton. To characterize the effects of the decision to connect to EPWU, we used the following descriptors in the table:

Direction of Impact

- Positive – changes that improve health
- Negative – changes that may detract from health

Magnitude of Impact

- Low – causes impacts to no or few people
- Medium – causes impacts to a wider number of people
- High – causes impacts to many people

Severity of Impact

- Low – causes impacts that can be quickly and easily managed or do not require treatment
- Medium – causes impacts that necessitate treatment or medical management and are reversible
- High – Causes impacts that are chronic, irreversible, or fatal

Likelihood of Impact

- Likely - it is likely that impacts will occur as a result of the proposal
- Possible – it is possible that impacts will occur as a result of the proposal
- Uncertain – it is unclear if impacts will occur as a result of the proposal

We elaborate on these below for each scoping category.

Water Quality. We conclude that current water sources do not meet drinking water standards in some cases and there is a risk of water scarcity in the short-term due to prolonged drought in the region. El Paso Water Utilities draws water from multiple sources, including deeper and reliable aquifers, keeps adequate water pressure, and complies with drinking water standards. This supplier is more reliable and dependable for the future and increases trust in piped water that can result in less bottled water consumption.

A third of respondents report numbness and/or cramping in legs and arms, 28% report frequent stomach and abdominal problems, and 26% report skin problems in the last 6 months. Prevalence of these ailments is less in the neighboring community of Westway which is already connected to EPWU for water and sanitation. **We conclude that current tap water quality in Vinton poses a moderate risk to public health because these ailments can be related to arsenic, salts, and fecal contamination of drinking water.** Our study does not prove these ailments are due to water contamination; these ailments can also be caused by other factors unrelated to water. **But, because the prevalence of these ailments is less in Westway who already has EPWU water, we predict that connecting to EPWU for water will have a positive impact on public health in Vinton.**

Sanitation**.** Septic tanks are not properly managed. Half of residences do not have a Certificate of Compliance, never pumped-out their septic tank, and never received information about proper maintenance. **We conclude that poorly managed septic tanks pose a moderate risk to public health. During the rainy season, they can produce odors, contaminate the aquifer, and are at risk of overflow. The risk of gastrointestinal disease and skin irritations is predicted to decrease if Vinton is connected to EPWU for sanitation and septic tanks are decommissioned. We predict that connecting to EPWU for sanitation will have a positive impact on public health in Vinton.**

Community Development**.** Fire control is a concern due to either lack of piped water or low water pressure. A third of the streets lack fire hydrants, including the industrial street. Of the streets with fire hydrants, half are not functional due to low water pressure. **We conclude that the lack of piped water and low water pressure pose a risk to control fires to homes and businesses and result in high costs for fire insurance. We predict that having the appropriate number of functioning fire hydrants in Vinton will lessen the risk of injuries, deaths, and property damage from fire, and reduce the costs of fire insurance.**

There is limited health care access in Vinton due to the presence of only two health clinics that provide modest services. Having a better quality and more reliable water and sanitation system could enable improvement health care services in Vinton by expansion of current facilities or building new ones. **We predict that connection to EPWU could improve health care access in Vinton.**

There are two public parks in Vinton with no access to drinking water and limited shade. Connection to EPWU could improve water availability at the parks for drinking and for improved landscaping/shade trees. **We predict that connection to EPWU could increase utilization of the parks for exercise and recreation.**

Economic Development and Concerns**.** Residents and businesses agree that improved water and sanitation will result in long-term public health, economic, and community development benefits. They are willing to pay the cost of connections, but also are concerned about the economic burdens and want to know the exact costs. **Positive economic impacts associated with connecting to EPWU include reduced fire insurance costs, increased property values, and potential growth in retail and manufacturing businesses. Negative economic impacts include the costs of connection for water and sanitation for each household, the cost of decommissioning septic tanks, and the potential increase in property taxes. In terms of monthly costs, converting to EPWU and drinking tap water instead of bottled water would result in very little change in total amount spent on water, and perhaps for some residents a net savings on the EPWU system.**

Conclusion. **We conclude that improved infrastructure in Vinton will result in several positive long-term benefits: 1) improved public health; 2) reliable water quality, quantity, and pressure; 3) reduced risks from wastewater overflow, odors, and aquifer contamination; 4) higher property values; 5) potential growth in retail and manufacturing businesses.**

TABLE 16. HIA Predicted Impacts

SCOPING CATEGORY	HEALTH DETERMINANT/ OUTCOME		CHARACTERIZATION OF EFFECTS				
			Direction	Magnitude	Severity	Likelihood	Distribution: Populations Most Impacted
WATER QUALITY	Gastrointestinal Diseases		POSITIVE	MEDIUM	MEDIUM	LIKELY	**GROUP 1**; Households with poor water quality (As & TDS, TC and E. coli) are at greater risk. **GROUP 2**: Residents living in Vinton >5 yrs.; **GROUP 3**: Families with children 5 years of age and younger. **GROUP 4**: Families with ≥1 member with one chronic illness. **GROUP 5**: Families with ≥1 member >65 yrs. of age.
	Neurological Disorders		POSTIVE	MEDIUM	LOW	POSSIBLE	**GROUP 1**; Households with arsenic >MCL. **GROUP 2**: Residents living in Vinton >5 yrs.; **GROUP 3**: Families with children 5 years of age and younger. **GROUP 4**: Families with ≥1 member with one chronic illness. **GROUP 5**: Families with ≥1 member > 65 yrs. of age.
	Skin Irritation from arsenic in Drinking Wáter (top row) and Salt in Bathing/Wash Wáter (bottom row)		POSITIVE	LOW	LOW	LIKELY	**GROUP 1:** Households with arsenic > MCL. **GROUP 2**: Residents living in Vinton >5 yrs**. GROUP 4**: Families with ≥1 member with one chronic illness. **GROUP 5**: Families with ≥1 member > 65 yrs. of age.
			POSITIVE	LOW	LOW	POSSIBLE	**GROUP 1**; Households with TDS >500 ppm;**GROUP 2**: Residents living in Vinton >5 yrs.; **GROUP 3**: Families with children 5 years of age and younger. **GROUP 4**: Families with ≥1 member with one chronic illness. **GROUP 5**: Families with ≥1 member > 65 yrs. of age.
SANITATION	Gastrointestinal Diseases		POSITIVE	MEDIUM	MEDIUM	LIKELY	Population groups from any age, income, or health condition will be impacted. Some population groups will continue having the risk due to the construction phases.
	Skin Irritation		POSITIVE	MEDIUM	LOW	POSSIBLE	Population groups from any age, income, or health condition will be impacted. Some population groups will continue having the risk due to the construction phases.
COMMUNITY	Fire Control Public Safety		POSITIVE	LOW	HIGH	POSSIBLE	Population groups from any age, income, or health condition will be impacted by more pressure in fire hydrants due to connection to public water service.
	Health Care Access		POSITIVE	MEDIUM	LOW	POSSIBLE	Population groups from any age, income or health conditions may be impacted by more local health care facilities and providers.
	Recreation Space		POSITIVE	MEDIUM	LOW	POSSIBLE	Population groups from any age, income, or health condition can be impacted, but children most likely to be impacted
ECONOMIC	Fire Liability Insurance		POSITIVE	MEDIUM	LOW	POSSIBLE	All businesses and residences, but businesses will likely benefit the most from reduced fire insurance costs.
	Net Worth of Households		POSITIVE	HIGH	LOW	POSSIBLE	Low income families and retirees could be impacted by the property tax increase.
	Economic Growth In Community		POSITIVE	MEDIUM	LOW	UNCERTAIN	Working youth, women, and retired populations could benefit from increased businesses and employment opportunities. Overall population and children could benefit from improved tax base and better public services.
	Household Costs	Costs to Connect to Water	NEGATIVE	HIGH	MEDIUM	LIKELY	Low income families; retirees; Families with difficulties to provide adequate documentation (ownership, citizenship) to access grant funds.
		Costs to Connect to Sanitation	NEGATIVE	HIGH	MEDIUM	LIKELY	Low income families; retirees; families with difficulties to provide adequate documentation (ownership, citizenship) to access grant funds.
		Costs of Property Taxes	NEGATIVE	HIGH	MEDIUM	LIKELY	Low income families, Retirees

Agency Briefings: Potential Funders or Technical Assistance Providers

During the period Jan 17-March 28, 2014, we visited a number of agencies, decision makers, and/or policy makers to share the results of this HIA and to discuss their potential interest in assisting Vinton. All of these agencies or individuals have the ability to provide funding, technical assistance, or political support to Vinton. Table 17 summarizes these meetings.

TABLE 17. AGENCY BRIEFINGS

Date 2014	Organization Person(s) Site	Comments and Results
Jan 17	**Congress Representative, 16th District** Ha Diem-assistant of Beto O'Rourke	Glad to have this study that can help them to apply to other parts in the county. They are willing to provide letters of support and talk with other potential funders to support Vinton's efforts.
Jan 17	**El Paso County Judge** Veronica Escobar & Ruben Vogt El Paso TX.	Agreed on the need of this study to show the need to residents. They were concerned about current overexposure and overpayments by low income families, who have to use poor quality water and to pay more plus purchase bottled water to protect their health. They offered letters of support to Vinton's process to obtain funds.
Jan 24	**State Representative, District 78, El Paso County** Joe Moody El Paso, TX	Agrees that lack of water and sanitation negatively impacts health in Vinton. He's very interested in the lack of fire hydrants for fire control. He'll continue working on a proposition about it. He provided a copy of the new "Proposition 6" for funds to finance priority projects in state water plan. He suggested Vinton to submit an application to this new fund.
Jan 27	**Public Health Dept.** Fernando Gonzalez Epidemiologist El Paso, TX	Great to have this study. In El Paso, surveillance focuses on "reportable diseases" only; the lack of personnel at the Health Department limits the ability to collect additional data or to conduct studies. Provided a list of "Reportable Diseases" with outcomes from Jan-Dec 2013. Agrees that universities and the public health department could "COLLABORATE" to address specific issues, such as outcomes/exposures in Vinton.
Jan 29	**Canutillo Independent School District** Dr. Pedro Galaviz Superintendent El Paso, TX	Dr. Galaviz was very interested and supportive of health and environmental issues related to children. He is supportive of continuing the study of water and health with children related to a new study by Dr. Christina Sobin at UTEP. He recommended our study and shared our results to his brother, Dr. Abel Galaviz, author of the Texas Health Atlas. Dr. Abel Galaviz sent an email and I spoke with him. He says Dr.Lawrence Estaville (Author of Texas Atlas) is very interested and has resources to support potential studies.

Feb 3	**Rio Grande Council of Governments** – Annette Gutierrez, Executive Director **Texas Commission of Environmental Quality – TCEQ**, David Will and Daniel Leyva, El Paso, TX	Agreed with the results, outcomes as expected. They asked if we informed residents about total coliforms and E. coli found in our water analysis. Concerns were raised about purchasing the current private providers' infrastructure in order to convert to EPWU. TCEQ explained the procedure to decommission septic tanks and potential funding sources to support low-income families.
Feb 5	**Border Environment Cooperation Commission-BECC** 10 participants, including Executive Director Maria Elena Giner Cd. Juárez, Chih. México	Considered the information important. This HIA will be very helpful before certification of future projects in BECC. Very interested in developing indicators and streamline processes for future HIA inclusion in their processes. Suggested to collect more economic information as impact of improved infrastructure.
Feb 11	**US Department of Agriculture-USDA, Area office** John E. Perkins Area Director Fort Stockton, TX	Mr. Perkins agrees that this HIA confirms what they suspected. Comparing EPWU with local community wells, he believes that public health will improve, while monthly costs will decrease. Retail businesses and local employment should also increase as well as property taxes. He reviewed proposal by Vinton and returned it to complete/clarify some information. Expected to be ready in Feb-Mar. He agrees that infrastructure will be completed in phases to allow Vinton to pay loans/request new grants/loans every 2-3 years. He believes each family will pay at least $1500 to connect.
Feb 19	**US Department of Agriculture – USDA Rural Development** Michael B. Canales, Community Programs Director Connie Petru, Community Program Specialist Temple, TX	The HIA presents what Vinton needs. It needs to be clarified who will be the owner of the service and to focus mainly on what residents need. They note that Vinton government must show they are committed to support grants/loans for septic tanks decommissioning and residential hook ups. They believe the infrastructure will be introduced in phases to see if Vinton can pay back each phase and to pull different funders to reduce costs. They propose the need to meet with Vinton representatives to come out with a suitable agreement between Vinton and USDA. Suggest businesses could pay all costs/or great amount of expenses as a form of contribution to Vinton.
Feb 19	**Texas Water Development Board and TX Dept. of Agriculture, Office of Rural Affairs** Luis Farias, Erika Garza, Tom Melsinger, Cindy Miller, Leo Ruiz Austin, TX	Participants agreed that this HIA is corroborating what they expected from Vinton situation. All agreed that this HIA could be useful to apply in every 'water and sanitation' project planned for Texas, especially in colonias. They were disappointed that Vinton rejected over 75% of loan forgiveness in the past. Vinton can be part of "Economic Distress Areas" to apply for loans and grants from the state.

Mar 26	**EPA, Region 6 – Border Program** Gina Weber and Troy Hill Dallas, TX.	Very interested in utilizing HIA in their own project decisions for the Border 2020 Program and for the Colonias Program. They would be interested in utilizing the streamlined process or tool if we develop it. Their water program can provide some support to the Vinton project if they apply.
Mar 28	**ParkHill, Smith & Cooper, Vinton's Engineers** Michael Ramirez, Corporate Associate-Vinton's Water and Sewage Plan El Paso, TX.	All the materials and presentation were presented and shared with the engineers of Vinton in charge of reviewing/editing the new Water and Sewage Plan. The purpose is to include the HIA findings and recommendations in their planning design.

The overall tone of these meetings was very positive. In general, there are numerous sources of financial and technical support available to Vinton. All of the agencies expressed willingness to consider proposals from Vinton to support their infrastructure project. Agencies also expressed interest and support for HIA. In particular, BECC, EPA, TX Water Development Board. and TX Department of Agriculture Office of Rural Affairs are all interested in further discussions and consideration of using HIA principles to consider health in project decision making.

HIA Training Workshop conducted by Health Impact Partners at UTEP (April, 2013)

SECTION VI. RECOMMENDATIONS

We summarize our recommendations and the concomitant monitoring actions below in Table 18.

Considering the health outcomes and changes in health determinants summarized in Table V.12, our chief recommendation and the recommendation of the majority of residents, business leaders, and community leaders is to connect Vinton to EPWU for water and sanitation, as the opportunity for new infrastructure has the potential to not only positively impact health in the community, but also to positively impact economic development and quality of life in the community. Paramount to action on this recommendation is the vote of the Village of Vinton City Council to go forward with the proposed infrastructure project.

Based on the assessment findings, one of the few negative impacts associated with connecting to EPWU is the high cost, not only of the basic infrastructure but also the cost of connection at the household level and the monthly costs of water and sanitation. Therefore, we also recommend that Vinton seek financial assistance for the project from government agencies, including not only assistance for the basic infrastructure but also assistance for individual households to meet the costs of connection. Government assistance for individual households is mostly available for low income, disadvantaged households. The Village of Vinton is eligible to apply for a number of grants and/or loans to meet the high cost of the infrastructure, plus could apply on behalf of its citizens for financial assistance in meeting the costs of connection at the household level. The household level costs include costs of meters, additional piping to connect to the mains, and decommissioning of septic tanks.

In addition, we have a number of related recommendations that are identified in Table VI.1.and that we discuss below. Chief among these is that EPWU should install the appropriate number of functioning water hydrants. This stems from the finding that about half of the current fire hydrants in Vinton are not functional due to low water pressure and that there are a number of streets in Vinton, including the main industrial street, that do not have fire hydrants at all. The Vinton City Council should insist on achieving the standard number of functional fire hydrants specified by the county.

If water and sanitation are approved, there are a number of opportunities for Vinton in terms of economic and community development. We recommend that the Village of Vinton develop a strategic plan for how they will improve the Village through economic and community development. In their strategic plan, we recommend that Vinton:

1) Install drinking water fountains in the village recreational parks. Our findings showed no drinking water access in the village parks. In a desert climate such as Vinton, drinking water is essential for recreational areas. If drinking water were available in the parks, their use could potentially increase.

2) Advocate for expanded health care services. Our findings show that there is only one full time clinic with limited services and one part-time clinic in Vinton. The residents would like expanded and affordable health care services in the village so that they do not have to travel to

neighboring cities or towns for health care. There are several possibilities including county clinics, La Fe clinics (which has a clinic in neighboring Westway), and other private providers.

3) Try to attract new businesses to Vinton. Our findings indicate that businesses have been hesitant to locate in Vinton due to lack of water and sanitation. Having access to dependable good quality water and sanitation, combined with the excellent location of Vinton on I-10 should be attractive to businesses to locate in Vinton. Expansion of manufacturing and/or retail businesses will also increase the availability of local jobs.

Finally, we recommend educational campaigns in Vinton to educate residents, politicians and decision makes, and youth of the benefits of improving water quality and sanitation in terms of public health. Educating the residents should improve the community support for the proposed infrastructure projects. Also educating and engaging youth is important for the future of Vinton. Educating politicians and decision makers includes both the local level, for example new Council members in coming years, and regional such as state legislators. Also in order to address the potential monthly costs for water and sanitation at the household level, we recommend an educational campaign focused on water conservation measures that might help residents reduce water use, lessening their monthly fees. Conservation measures like improved water efficient appliances, water efficient shower heads and toilets, and water-efficient landscaping could reduce total water consumption and reduce monthly costs for residents. UTEP should conduct this educational campaign in collaboration with other agency partners.

UTEP students processing water samples

Collecting water sample at kitchen sink

TABLE 18. Recommendations and monitoring actions

Scoping Category	Key Findings	Recommendation	Responsible Entity	Monitoring Indicator	Monitoring Agency	Timing
Water	Some current water sources do not meet drinking water standards for As, salt, and/or bacteria, and there is a risk of water scarcity in the short-term due to prolonged drought. A third of survey respondents report neuropathy and/or cramping in extremities; 28% report frequent stomach and abdominal problems, and 26% report skin problems. These ailments can be related to As, salt, and/or bacteria in water. Prevalence of these ailments is greater in Vinton compared to a neighboring community that is connected to EPWU for water.	1. Connect to EPWU for water 2. Conduct an educational campaign on water quality and public health 3. Organize meetings with key decision makers (legislative) to seek assistance 4. Monitor groundwater levels	1. Vinton City Council should vote to adopt plan 2. UTEP 3. Mayor of Vinton and UTEP 4. UTEP	1. Vote on proposal to connect to EPWU 2. # of individuals reached by campaign 3. # meetings 4.Monitoring wells	1. UTEP 2. UTEP 3. UTEP 4. UTEP	1. 2014 2. 2014 3. 2014 4.2014-2017
Sanitation	Septic tanks are not properly managed. Half of residences do not have a Certificate of Compliance, never pumped-out their septic tank, and do not have knowledge about proper maintenance. Non-functioning septic tanks can produce odors, contaminate the soil and groundwater, and are at risk of overflow. Contact with or ingestion of contaminated water or soil can result in gastrointestinal disease and/or skin irritations.	1. Connect to EPWU for sanitation; decommission septic tanks 2. Conduct an educational campaign focusing on sanitation/septic tank management and public health	1. Vinton City Council should vote to adopt plan 2. UTEP	1. Vote on proposal to connect to EPWU 2. # of residents reached by campaign	1. UTEP 2. UTEP	1. 2014 2. 2014

Community Development	Fire control is a concern; a third of the streets lack fire hydrants, including the industrial street; half of the current fire hydrants are not functional due to low water pressure.	If project approved, EPWU should install appropriate number of functioning water hydrants	Vinton City Council; Project design engineers	# of functioning water hydrants	Village of Vinton	2017
	There is limited health care access in Vinton due to the presence of only two health clinics that provide modest services. Having a better quality and more reliable water and sanitation system could enable expansion of health care services.	Village of Vinton leadership should advocate for expanded health care services	Vinton City Council	# of health care providers and level of service	Village of Vinton	2017
	There are two public parks with no access to drinking water. Connection to EPWU could improve water availability at the parks for drinking.	Village of Vinton should install drinking water fountains in parks	Vinton City Council	# of drinking water fountains	Village of Vinton	2017
Economic Development	Cost of fire insurance is high due to lack of functioning fire hydrants	EPWU should install appropriate number of water hydrants	Vinton City Council; project design engineers	# functioning water hydrants	Village of Vinton	2017
	There are opportunities for economic growth in retail businesses and industries	Vinton leaders should try to attract new businesses	Vinton leaders	# of new businesses	Village of Vinton	2017
	The costs for the water and sanitation infrastructure are high.	Apply for financial assistance from all possible sources	Village of Vinton staff	Applications for financial assistance	Village of Vinton	2014
	There are household level costs associated with water meters, connections to the mains, and decommissioning of septic tanks.	Apply for financial assistance to programs that can help households	Village of Vinton staff	Applications for financial assistance	Village of Vinton	2015
	Household monthly bills could be greater compared to current situation	Conduct educational campaign focusing on conservation	UTEP	# of residents reached	UTEP	2014

SECTION VII. MONITORING

We have identified four broad areas for monitoring into the future: 1) Vinton's decision to adopt the EPWU plan or not, and their applications for financial assistance; 2) key health determinants related to water and sanitation; 3) community development; and 4) economic development. Each of these and the appropriate indicators are discussed below.

The Decision. We anticipate that the Vinton City Council will make a decision as to whether they would like to adopt the EPWU plan or not by August, 2014. Their engineering plans and project costs are being updated. We will attend council meetings and/or check in with village staff to monitor the progress on the decision. We will monitor the requests for financial assistance to state and federal agencies. In order to fully implement the project, the Council will be faced with as many as 23 votes over as long as three years in order to complete every step towards the final implementation. This means that it is also possible that some council members will change over the critical time period, requiring new education of new decision makers. UTEP will try to provide educational materials and ongoing briefings to council members. UTEP also will conduct educational campaigns aimed at public health impacts of water and sanitation and water conservation measures that can be implemented at the household level. UTEP will monitor participation in these campaigns. Meetings with key decision makers (state and federal legislators) could result in greater assistance for Vinton. UTEP will monitor legislator meetings and response. Long-term drought in the region is resulting in dropping water tables. USGS has one monitoring well nearby and the Elephant Butte Irrigation District in southern New Mexico monitors groundwater levels. UTEP will collect this information and share it with Vinton. Responsibility: UTEP

Key Health Determinants. Rather than monitor illnesses or public health directly, we will monitor key determinants of health related to water and sanitation, including: 1) water quality in Vinton water sources; 2) consumption of bottled water in households (as measured in a mail-in survey); and 3) changes in sanitation. We will make at least one assessment of these determinants three years after the completion of the project. Responsibility: UTEP

Community Development. The community development actions relate to improving fire safety, health care access, and recreation parks. UTEP will determine the number of functional fire hydrants in 3 years, from village staff. Connection to EPWU for water and sanitation could enable expansion of health care services in Vinton. Vinton should advocate for expanded health care services and monitor the number of health care providers and level of service. Village of Vinton will monitor. The Village of Vinton should install drinking water fountains in the two public parks. Village of Vinton will monitor and report these improvements. Responsibility: UTEP and Village of Vinton leadership

Economic Development. Economic development impacts will be more long range. We recommend assessment of: 1) # retail businesses; 2) # of jobs; and 3) changes in property taxes in 5-7 years from the time of the decision. Responsibility: Village of Vinton

SECTION VIII. CONCLUSIONS

Conclusions from the Findings of the Assessment

We conclude that current water sources in Vinton do not meet drinking water standards in some cases and there is a risk of water scarcity in the short-term due to prolonged drought in the region. El Paso Water Utilities draws water from multiple sources, including deeper and reliable aquifers, keeps adequate water pressure, and complies with drinking water standards. This supplier is more reliable and dependable for the future and increases trust in piped water that can result in less bottled water expenses.

We conclude that improved infrastructure will result in several positive long-term benefits: 1) improved public health; 2) reliable water quality, quantity, and pressure; 3) reduced risks from wastewater overflow, odors, and aquifer contamination; 4) higher property values; 5) potential growth in retail and manufacturing businesses; and 6) improved community development and quality of life in Vinton. A negative impact is the cost to households for 1) connection to EPWU for water and the monthly costs for water; 2) connection to EPWU for sanitation, the decommissioning of septic tanks, and the monthly costs for sanitation; and 3) increased property taxes.

We recommend that the Village of Vinton Council vote to accept the proposal to connect to EPWU for water and sanitation. Furthermore, to ameliorate the negative impacts of the high costs, the Village should seek financial assistance for the project from government agencies, including not only assistance for the basic infrastructure but also assistance for individual households to meet the costs of connection. The household level costs include costs of meters, additional piping to connect to the mains, and decommissioning of septic tanks.

In addition, we recommend that the Village insist that EPWU should install the appropriate number of functioning water hydrants, as specified by the county. This stems from the finding that about half of the current fire hydrants in Vinton are not functional due to low water pressure and that there are a number of streets in Vinton, including the main industrial street, that do not have fire hydrants at all.

If water and sanitation are approved, there are a number of opportunities for Vinton in terms of economic and community development. We recommend that the Village of Vinton develop a strategic plan for how they will improve the Village through economic and community development. Some specific recommendations for their strategic plan include:

- Improve recreational space by installing drinking water fountains in the village recreational parks and add shade trees to the parks.
- Advocate for expanded health care services.
- Try to attract new businesses to Vinton. Expansion of manufacturing and/or retail businesses will also increase the availability of local jobs.

Finally, we recommend educational campaigns in Vinton to educate decision makers and residents of the benefits of improving water quality and sanitation in terms of public health and community development, which will inform the community's decision about whether to support the proposed infrastructure projects, and water conservation, which will help minimize monthly

costs if they transition to EPWU. UTEP could conduct this educational campaign in collaboration with other agency partners.

Conclusion from the Process of the Assessment

In addition to the findings, we have a number of observations and conclusions drawn from the HIA process in Vinton.

1) As a result of the HIA, the residents of Vinton became much more aware of their water quality and sanitation issues, and their common health impacts. Decision-makers, funders, and other stakeholders have increased awareness of the complexities in water, sanitation, public health, costs and financial tradeoffs, and community and economic development. An example of one such complexity is the realization that the economic impacts of improved infrastructure will be much greater for certain population groups, such as low income families, households with one-two residents over 65 years of age, retirees, and undocumented families.

2) Through the HIA, the level of dialogue and conversation within the community about health, water, sanitation, and the quality of life in Vinton were heightened. Public participation through surveys, focus groups, public meetings, fairs, interviews, etc. became an invaluable opportunity to bring community and other stakeholder perspectives and concerns to the discussion. Civic discourse had been undermined by a dysfunctional and hostile city council.

3) Over the past few years the level of trust and communication of residents with their local government has eroded. Trust and a modicum of honest and open dialogue are slowly returning, initiated by the open communications of the HIA and the sharing of its findings. Through the process, residents became more aware of some of the inequities embedded in the current water systems. In particular, our household survey provided a safe venue for residents to express their concerns about the public discourse surrounding water and sanitation in Vinton. Personal opinions were expressed that otherwise would not have been expressed because of intimidation, limited English language skills, or apathy.

4) The HIA provided a very important experiential learning opportunity for UTEP students. The students who participated expressed pride and satisfaction in using their technical training to do something positive in a local community.

5) For UTEP as an institution, the HIA demonstrated not only to Vinton but to our metropolitan region the power of science-based information in decision making and the role of the local university in providing unbiased information.

6) From the state and federal agencies related to this project, we learned that there is a dearth of science-based information related to water and sanitation and their impacts on rural communities in Texas. Most agencies and professionals accept that water and sanitation have public health benefits, but the benefits are not all identified nor well quantified for most infrastructure projects as well as the negative impacts that could arise with infrastructure changes that are implemented with public funding.

7) This HIA, in a rural community with very limited data already available, required us to collect

original data and make direct observations for the assessment. This combined with our community based participatory approach resulted in a much greater time requirement and personnel investment in order to complete this HIA. For example, the Project Director and Project Coordinator spent at least twice as much time as anticipated on the project. Similarly, the Advisory Committee required more time commitment than anticipated. The participation of several Advisory Committee members "tailed off" as the project progressed, presumably due to the time commitment. The community had its own pace, needs, and calendar. Building trust with the community required a significant investment of staff time and commitment from our Leadership Team.

8) The HIA process opened the door to identify other needs, concerns, and ideas for community improvement. Vinton has embarked on a "green development" project and is developing a human security plan. These activities were catalyzed by the HIA discussions and facilitated by some of the HIA project staff.

Fire hydrant in Vinton painted black because it is not functional due to lack of pressure.

UTEP students completing "paperwork" for water samples.

SECTION IX. REFERENCES

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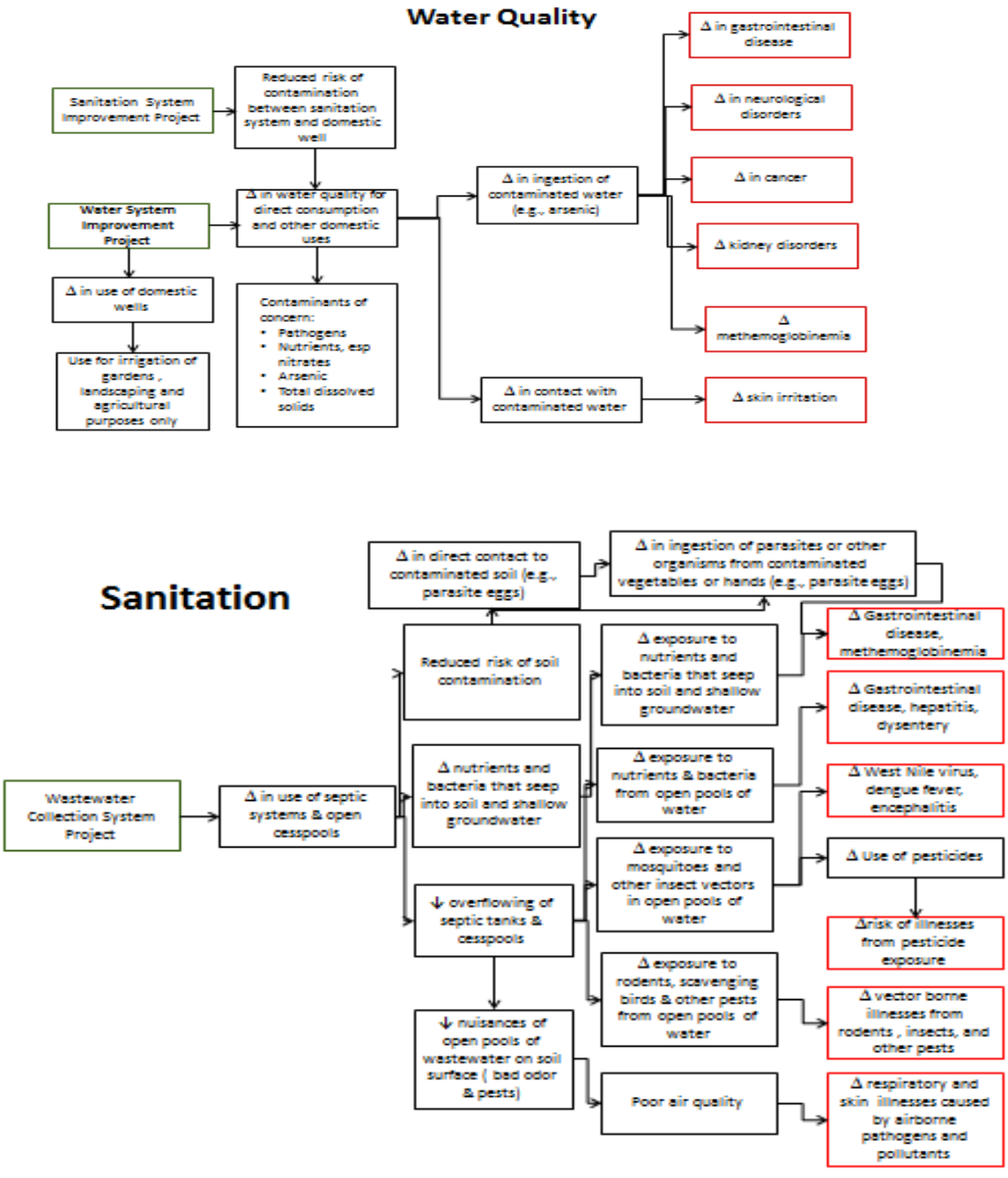
Mayor of Vinton working with local resident

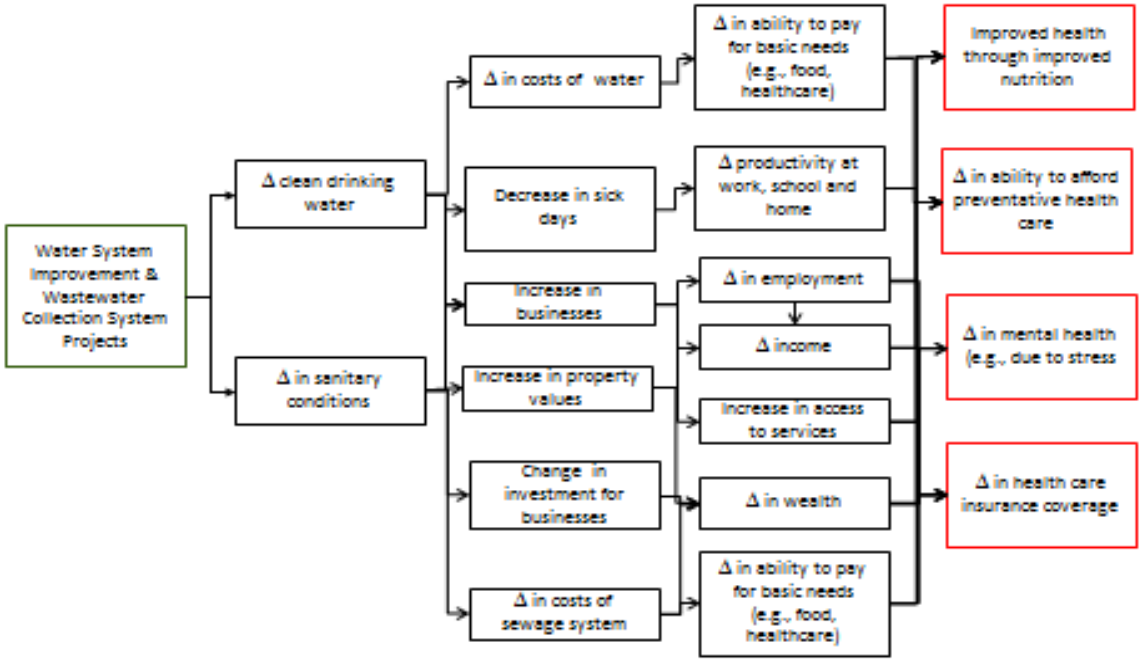
UTEP students conducting household survey

SECTION X. APPENDIX

FIGURE X.1. Pathway Diagrams



Economic Impacts



Community Development

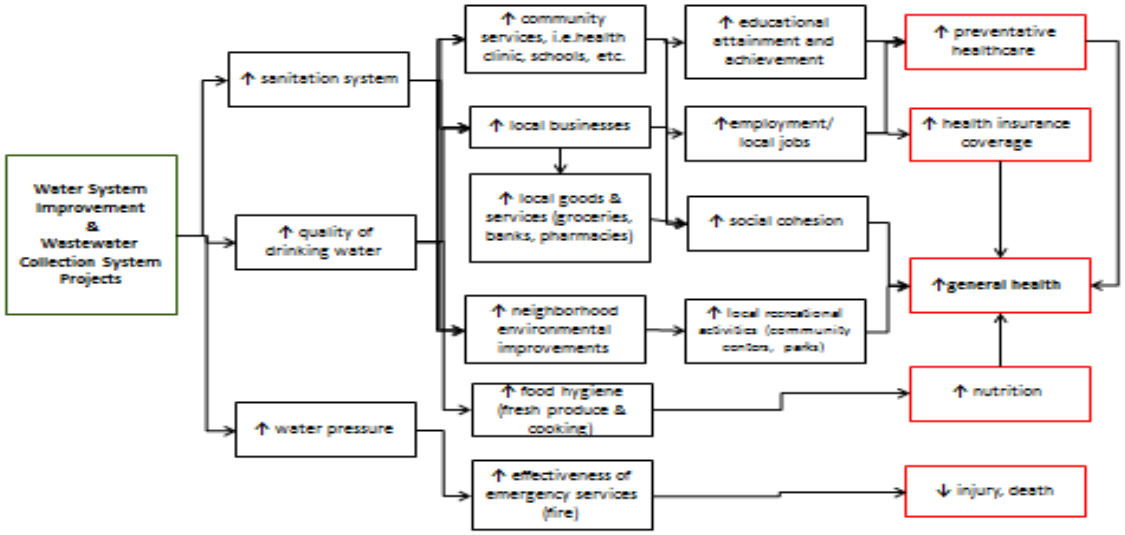


TABLE X.2. List of Public Meetings and Focus Groups

Public Meetings to Introduce the Project

1) Vinton's Council and Mayor: June 4, 2013. Vinton City Hall.
2) Residents: May 16, 2013. Bill Childress Elementary School.

Public Meeting to Share Results

1) Residents: October 23, 2013. Bill Childress Elementary School (Share water results)
2) Residents: October 26, 2013. "Keep Vinton Beautiful" fair. Fire Station (Share water results)
3) Vinton's Council and Mayor: December 3, 2013. Vinton City Hall (Overall results & recommendations)

Focus Groups

Total participants: 25 (12 male, 13 female)

1) Business sector: November 11, 2013. Great American Cattle Restaurant-Vinton
2) Leadership team: November 14, 2013. PAHO's office
3) Residents: November 19, 2013. Great American Cattle Restaurant-Vinton
4) Advisory Team: November 25, 2013. PAHO's office

TABLE X.3. List of key informants.

SECTOR	AREA	Name, position, contact information
Health	Canutillo	**Dr. Ruben Roncallo** Pediatric and Women's Health-Northwest Community Health Center – next to St. Patrick Catholic Church- 2nd Street Recommended by Fr. Mata: 877-5006 St. Patrick Church: 877-3997 **Olga Isela de los Santos-Clinic Manager-Interviewee**
	Canutillo NM	**Dr. Carranza, Pediatric Center** (recommended by Dr. Victor Cárdenas) (575) 882-2956; Fax (575) 882-1863 1265 Anthony Dr., Anthony NM
	Vinton	**Vinton Health Clinic**- 886-3399; 7920 Doniphan Rd. Mark Ramirez-Manager, 7920 Doniphan
Education	Canutillo	**Canutillo Independent School District** **Gustavo Reveles (CISD):** greveles@canutillo-isd.org; 877-7481
Environmental	Regional	**EPA-Region 6 Regional Border Office** **Carlos Rincon** El Paso, TX
	Water and Sewage Infrastructure	**El Paso Water Utilities** **Felipe Lopez**, Utility Engineering Division Manager
Food Business	Vinton	**Emilianos' Pizza** **Belen Templos, Manager** Vinton Rd.
Housing	Vinton	**Housing Assistance Program** **Mr. Anibal Olague,** Border Housing Solutions aolague@borderhousingsolutions.com
Colonias Program	Texas-Border Colonias Program	**Kathryn Hairston** Ombudsperson 401 E. Franklin, Ste. 540 A, El Paso, TX 79901 Ph: (915) 834-5630 (915) 834-5630, Cellular (915) 309-9721 Fax (915) 834-5631
Community Organizing for Public Services	Canutillo, Vinton, Westway	**El Paso Interreligious Sponsoring Organization (EPISO)** **Arturo Aguilar**, Director **Alicia Franco**-Community Organizer
Residents Mayfair-Nuway	Canutillo- Nuway with recent water infrastructure	**Rosa Gomez** Nuway resident. Area with recent water connection

FIGURE X.4. HOUSEHOLD SURVEY INSTRUMENT

We appreciate your support to identify the benefits and challenges of water and wastewater public systems for the residents of the Village of Vinton. Please think carefully before answering.

I. Water

1. What is the source of the **water in your house**? (i.e. the source of the water in your kitchen, shower, toilet, etc.)	( ) Own private well in your property ( ) Company name:_____ ( ) El Paso Water Utilities ( ) Shared well-name: _____ ( ) Other, specify:
2. **Where** does your family get its **drinking** water from?	( ) Tap water ( ) Bottled water/water you fill in the machine ( ) Bottled water by a company's delivery service ( ) Other, specify:
3. **Where** does your family get its water to **cook/prepare** meals from?	( ) Tap water ( ) Bottled water/water you fill in the machine ( ) Bottled water by a company's delivery service ( ) Other. specify:
4. What method do you use to **disinfect, purify,** or **treat** your family's **drinking water**?	( ) Chlorination, iodine, other chemical ( ) Boiling ( ) Filter, purifier ( ) Other, specify:_____ ( ) Never disinfect/treat water at home
5. What method do you use to **disinfect, purify,** or **treat** the **water to cook/prepare meals**?	( ) Chlorination (bleach), iodine, other chemical ( ) Boiling ( ) Filter, purifier ( ) Other, specify: _____ ( ) Never disinfect/treat water at home
6. How **often** is your tap water **cloudy** or has a color (i.e. yellowish, brownish, darker color)	( ) Daily ( ) 3-4 times per week ( ) Once or twice per week ( ) Once or twice per month ( ) Very few times ( ) Never

7. During the last 12 months, how often was the water service interrupted **by the provider** (maintenance, repairing, construction, etc.)? (**little water or no water)**	( ) Never ( ) Once per year ( ) Twice per year ( ) Three or more times per year ( ) Once ever ( ) N/A-has private well
8. During the **last 30 days**, **how many** water containers **<u>did your family</u> purchase** in the store or **fill** in the water machine?	# _____ water containers of 5 gallons # _____ water containers of other volume (¼, ½) ( ) Never purchased water in a store or filled containers in a water machine (skip to #11)
9. How **often** do you **wash** the inside of the containers with **soap/detergent** before filling them out in the water machine? READ the answers	( ) **Every time** before filling them out in the machine ( ) **Every other time** before filling them out ( ) **After 2-3 uses**/fillings ( ) **Once** per month ( ) Not using soap/detergent, only rinses the containers ( ) N/A-Never fill out containers in the machine
10. Besides soap, how do you **disinfect** the **inside** of the containers before filling them in the water machine?	( ) Describe: ( ) Does not disinfect containers
11. During the **last 30 days**, **how many** water containers **<u>were delivered</u>** to your home by a company	#_____ water containers of 5 gallons ( ) A company never delivers bottled water to the home

II. Water Perceptions

Now let's talk about your thinking about water. Please think carefully about each statement. To answer, choose a number from 1 to 5 according to what best describes your opinion. Only choose "neutral" (#3) when you **are not sure or do not have a strong opinion**. [**READ** the scale]

Speaking about your water…	**1**	**2**	**3**	**4**	**5**
12. Your **tap** water **tastes**… ( ) Never	Very bad taste	Somehow bad taste	Neutral	Somehow good taste	Very good taste
13. Your **tap** water **smells**… ( ) Never	Very bad smell	Somehow bad smell	Neutral	Very little bad smell	Does not

					smells at all
14. Speaking about **water pressure**, how **satisfied** are you with the water pressure to keep your **air conditioner working adequately**? ( )N/A (no air conditioner, evaporative)	Not satisfied at all	Sometimes unsatisfied	Neutral	Somehow satisfied	Very satisfied
15. Speaking about **water pressure**, how **satisfied** are you with your water pressure that allows you to **use it in various activities at the same time**? (for example shower and laundry at the same time)	Not satisfied at all	Sometimes unsatisfied	Neutral	Sometimes satisfied	Very satisfied
16. How much do you **trust the quality** of your **tap** water	Not trusted at all	Somehow not trust	Neutral	More or less trusted	Highly trusted
17. How much do you **trust the quality** of the water you **purchase at stores or fill** in the machine ( ) N/A-do not purchase or fill	Not trusted at all	Somehow not trust	Neutral	Somehow trust	Highly trusted
18. How much do you **trust the quality** of the **water delivered** to your home by a service company ( ) N/A (no water delivery service)	Not trusted at all	Somehow not trust	Neutral	Somehow trust	Highly trusted

Speaking about water and health…

19. The water in your house, how **safe** is the quality of the water for your health in general (water for drinking, cooking, shower, etc.)	Not safe at all	Somehow unsafe	Neutral	Somehow safe	Very safe
20. The water you **purchase** at stores or fill out in the **machine**, how **safe** is the quality of the water for your health in general (water for drinking, cooking, etc.) ( ) N/A-Never purchase water or fill container	Not safe at all	Somehow unsafe	Neutral	Somehow safe	Very safe
21. The **water delivered** to your home by a company, how **safe** is the quality of the water for your health in general (water	Not safe at all	Somehow unsafe	Neutral	Somehow safe	Very safe

for drinking, cooking, etc.)
( ) N/A (No delivery service)

22. How **many gallons** of water were consumed in this house according to the last **water bill?** (or the most recent water bill)

_____ # gallons consumed
_____ N/A (private well or not able to document consumption)

23. In average, what is the total **amount you pay** for water of your house?

In the summer $_____ ( ) per week or ( ) per month
In the winter $_____ ( ) per week or ( ) per month
( ) N/A (uses water from own private well)

24. In average, how **much do you spend** for bottled **water of the store and/or filling** water containers?

In the summer $_____ per ( ) week or ( ) month
In the winter $_____ per ( ) week or ( ) month
( ) N/A-Never purchase bottle water or fill water containers

25. In average, how **much do you spend** for **water service delivery**?

In the summer $_____ per ( ) week or ( ) month
In the winter $_____ per ( ) week or ( ) month
( ) N/A-Never water service delivery to this house

III. Wastewater

26. Where do you discharge the toilet water? (flush the toilet)	( ) Single private septic tank in your property ( ) Single private cesspool ( ) Septic tank shared with various families–mobile park ( ) Septic tank shared with another house ( ) Other, specify:
27. Please, tell us where you normally discharge (send away) the water from… READ the options	Shower: Hand washing: Dishwashing: Laundry: Household chores:
28. What is the size of your septic tank? READ the options	( ) 1000 gallons ( ) 1500 gallons ( ) Another size: ( ) Don't know
29. What year was your septic tank or cesspool constructed?	Year constructed: ( ) Don't know
30. Do you have a certificate of compliance (license) for your septic tank?	( ) Yes ( ) No ( ) Don't know, don't remember

31. How often is your septic tank or cesspool **pumped out-cleaned**? READ the options	( ) every 6 months or less ( ) Once per year ( ) Every 2 years ( ) Every 3 or 4 years ( ) Every 5 years or more ( ) Don't know ( ) Never (Skip to #33)
32. The last time you **pumped out-**cleaned the septic tank, how much did you **pay**?	Amount $: ( ) Didn't pay anything, free ( ) Don't know, don't remember
33. When was the last time this septic tank was **inspected**? READ the options	( ) During the last 3 months ( ) From 4 to 6 months ago ( ) From 12 to 18 months ago ( ) Over 2 years or more ( ) Nobody has informed him/her (the owner does not notify this) ( ) Don't know, don't remember ( ) Never (Skip to #35)
34. The last time you **inspected** your septic tank, how much did you **pay**?	Amount $: ( ) Don't know, don't remember
35. Has your **septic tank ever backed-up** into your home?	( ) Yes ( ) No ( ) Don't remember
36. How often is there a **wet area or free standing water** near your septic tank area or in the **drainage field**? READ the options by season	In the **summer** ( ) Daily ( ) 2-3 times/week ( ) Weekly ( ) Monthly ( ) Other frequency: ( ) Never In the **winter** ( ) Daily ( ) 2-3 times/week ( ) Weekly ( ) Monthly ( ) Other frequency: ( ) Never
37. Have you ever received information or materials on how to manage or maintain your septic tank?	( ) Yes, who gave you information? ( ) No, never ( ) Don't know, don't remember

IV. Household

38. Type of household	( ) single house in the property ( ) mobile home in a mobile park- apartment complex ( ) mobile home in a single property ( ) single house with a mobile home in the property

39. How many years have you **been living** in this household?	
40. How many more years are you **planning to live** in **this property** or **here in** Vinton?	
41. How many people live in this house according to the following **age** groups? READ the options	0-3 years of age _____ 4-5 years of age _____ 6-10 years of age _____ 11-13 years of age _____ 14-17 years of age _____ 18-34 years of age _____ 35 to 49 years of age _____ 50-64 years of age _____ 65 years and over _____ Total members: _____
42. From the following table, please point to the range that includes your household **income** in 2012 SHOW the ranges	( ) $10,000 or less ( ) $11,000 to $15,000 ( ) $16,000 to $20,000 ( ) $21,000 to $30,000 ( ) $31,000 to $40,000 ( ) $41,000 to $60,000 ( ) $61,000 to $80,000 ( ) More than $80,000 ( ) Don't know, Don't remember

V. Health

43. I will mention a health condition and would you please tell me if **anyone** in this family **has or ever had that condition in the past 6 months** READ each option	( ) Any illness of the heart or arteries (heart, high blood pressure) ( ) Frequent ailments of the stomach-intestine (diarrhea, nausea, vomiting, gastritis) ( ) Stomach infections: Salmonella, E. coli, cholera, dysentery ( ) Hepatitis A, E ( ) Allergies (skin) ( ) Skin problems in any part of the body (rash, itchy, redness, dryness) ( ) Skin problems in any part of the body (hard patches or calluses of darker skin color-in areas not related to work or shoes) ( ) Strange feelings in fingers, arms or legs such as numbness , cramping, or tingling ( ) Any type of cancer ( ) A chronic condition such as HIV/AIDS, tuberculosis

	( ) West Nile virus-mosquitoes ( ) Blue-baby syndrome (called methemoglobinemia)-happens to babies less than 6 months of age with bluish or slate-gray on the skin, lips, or nailbeds ( ) Asthma, respiratory problems (frequent cough, short of breath, chest pain) ( ) Depression, feeling isolated, sad, without energy to do things. ( ) Diabetes, any type ( ) Pregnancy problems (stillbirth, miscarriages, preeclampsia) ( ) Fertility problems (difficulties to get pregnant) ( ) Any other health condition? specify:
44. In the past 30 days**, how many members** of this family had **diarrhea** (or loose stools)?	_____ adults _____ children _____ None (skip to #46)
45. Was that **diarrhea** severe enough that the person(s) required medical attention (pharmacy, nurse, doctor, hospital)	_____ Yes (includes one or more members of the family) _____ No _____ Don't know-don't remember
46. In the past 30 days, **how many members** of this family had a **stomach or abdominal pain** or **discomfort**?	_____ adults _____ children _____ None (skip to #48)
47. Was that **stomach or abdominal problem or discomfort** severe enough that the person(s) required **medical attention** (pharmacy, nurse, doctor, hospital)	_____ Yes (includes one or more members of the family) _____ No _____ Don't know-don't remember
48. In the past 30 days, **how many members** of this family had a **skin problem** such as a rash, redness, dryness, itchiness, and open wounds?	_____ adults _____ children _____ None (skip to #50)
49. Was that **skin** problem severe enough that the person(s) required **medical attention**? (pharmacy, nurse, doctor, hospital)	_____ Yes (for some or all members with skin problems) _____ No _____ Don't know-don't remember
50. In the last 3 months, has any minor missed **school-days** or **was returned from school** because of a stomach related ailments (i.e. diarrhea, vomiting, nausea, pain, infection, discomfort)?	( ) Yes, how many times: _____ ( ) No ( ) N/A, no children in this household (skip to #53)
51. To address the health of your children,	City:

where do they **usually** go?	Place (name of clinic, doctor's office, hospital, pharmacy):
52. How do you **usually pay** for the health care and treatments of your **children**? READ all options, mark all that apply	( ) Medicaid ( ) Medicare ( ) CHIP (children's Medicaid in Texas) ( ) Job insurance ( ) Own medical insurance (paid totally by yourself) ( ) Own packet payment (cash or credit card)-not a co-payment ( ) Free, no charge ( ) Other, specify:
53. To address the health of the **adults** of this family, **where** do they **usually** go?	City: Place (clinic, doctor's office, hospital, pharmacy):
54. How do you usually **pay** for the health care and treatments of the **adults** of this family? READ all options, mark all that apply	( ) Medicaid ( ) Medicare ( ) Job insurance ( ) Own medical insurance (paid totally by yourself) ( ) Own packet payment (cash or credit card)-not a co-payment ( ) Free, no charge ( ) Other, specify:
55. In the last 3 months, has anyone missed **work-days** because of stomach-related ailments (i.e. diarrhea, vomiting, nausea, pain, infection, discomfort, etc.)?	( ) Yes, how many times? _____ ( ) No

VI. Water and Wastewater Perceptions

Now let's talk about your thinking about water. Please think carefully about each statement. Choose a number from 1 to 5 according to what best describes your opinion. Choose only "neutral" (#3) when you are not sure or do not have a strong opinion. [**READ** the options]

Speaking about a public water supply in Vinton…	**1**	**2**	**3**	**4**	**5**
56. If the **potable water of your house is upgraded by EPWU OR** do you think the **water consumption** would be * Or, after it was upgraded, the	Much lower consumption than prior service	Little less consumption than prior service	The same consumption as the prior service	Somehow more consumption than prior service	Much higher consumption than prior service

consumption is…					
57. How difficult would it be for your family **to pay** the monthly water bill if you **upgrade the water source** of EPWU for your house? *Or how difficult it is to pay…	Very difficult to pay	Little difficult	Neutral	Somehow affordable	Very easy to pay
58. How willing are you to pay **the costs to upgrade the water source** of EPWU for your house? * Or how willing you were to pay the upgrade…	Not willing to pay at all	Somehow unwilling to pay	Neutral	Somehow willing to pay	Totally willing to pay
59. How much do you agree with the following? Vinton increases the chance of having more services and amenities such as community centers, health centers, grocery stores, parks, etc. as a result of **upgrading the water source by connecting to EPWU**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree
60. How much do you agree with the following? The **public health** in Vinton would be improved as a result of **upgrading the water source by connecting to EPWU**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree

Speaking about the public sewage system in Vinton…

61. By connecting to the public sewage system and closing down your septic tank, your **water consumption would be**…	Much lower consumption than now	Little less consumption than now	The same consumption as it is now	Somehow more consumption than now	Much higher consumption than now
62. Compared to the septic tank money you spend now, the money you would spend to discharge/get rid of dirt water to the public sewage system would be…	Less money than now	Little less money than now	Neutral	Somehow more money than now	Much more money than now
63. How willing are you to pay for **the costs to connect to the public** sewage system	Not willing to pay at all	Somehow unwilling to pay	Neutral	Somehow willing to pay	Totally willing to pay
64. How much do you agree with the following? Vinton increases the chance of having more services and amenities such as community centers, health centers, grocery stores, parks, etc. as a result of connecting to the **new EPWU public sewage system**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree
65. How much do you agree with the following?	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree

The **public health** in Vinton would be improved if connected to the **new EPWU public sewage** system					

VII. General Information

66. Gender	( ) Female ( ) Male
67. Age	
68. What is your highest school year completed	
Number and Street:	

69. **Lastly**, would you please **show** us the site of your septic tank or cesspool to see if it smells or is wet at this moment?

Observation of septic system drainage field…

	Yes	No
smells bad	( )	( )
nearby field is wet-soggy	( )	( )
fresh crops nearby ST	( )	( )
children play area nearby ST	( )	( )

Notes:

Thank you very much for your time and valuable information. Would you **like to tell us** any additional comment, doubt, or opinion?

NOTES [By interviewers)

Time starts: _____ Time ends: _____

Conducted by: _____ Date: _____

FIGURE X.5. Westway household survey

WESTWAY - HOUSEHOLD SURVEY

We appreciate your support to help us understand the health, water, and sanitation issues of residents living in Westway and Vinton. Please think carefully before answering.

VIII. Water

70. All the water in your house comes from EPWU? (kitchen, bathroom, shower, cleaning, etc.)	( ) Yes, only from EPWU ( ) Also water is from other:
71. How many years ago did your family connect to water from EPWU?	Years: ( ) Don't know, don't remember
72. **Where** does your family usually get its **drinking** water from?	( ) Tap water ( ) Bottled water/water you fill in the machine ( ) Bottled water by a company's delivery service ( ) Other, specify:
73. What method do you use at home to **disinfect, purify,** or **treat** your family's **drinking water**?	( ) Chlorination, iodine, other chemical ( ) Boiling ( ) Filter, purifier ( ) Other, specify:_____ ( ) Never disinfects or treats water at home
74. If you use bottled water, during the **last 30 days**, **how many** water containers **did your family purchase** in the store or **fill** in the water machine?	# _____ water containers of 5 gallons # _____ water containers of other volume (bottles, gallons, etc.) ( ) Never purchased water in a store or filled containers in a water machine

IX. Water Perceptions

Now let's talk about your opinions about water. Please think carefully before answering. Choose a number from 1 to 5 according to what best describes your opinion. Only choose "neutral" (#3) when you **are not sure or do not have a strong opinion**. [**READ** the scale]

	1	**2**	**3**	**4**	**5**
75. Your **tap** water **tastes**… ( ) Never	Very bad taste	Somehow bad taste	Neutral	Somehow good taste	Very good taste
76. Your **tap** water **smells**… ( ) Never	Very bad smell	Somehow bad smell	Neutral	Very little bad smell	Does not smells at all

77. Speaking about **water pressure**, how **satisfied** are you with the water pressure to keep your **air conditioner working adequately**? ( ) No air conditioner or evaporative cooler	Not satisfied at all	Sometimes unsatisfied	Neutral	Somehow satisfied	Very satisfied
78. Speaking about **water pressure**, how **satisfied** are you with your water pressure that allows you to **use it in various activities at the same time**? (for example shower and laundry at the same time)	Not satisfied at all	Sometimes unsatisfied	Neutral	Sometimes satisfied	Very satisfied
79. How much do you **trust the quality** of your **tap** water	Not trusted at all	Somehow not trust	Neutral	More or less trusted	Highly trusted
80. How much do you **trust the quality** of the water you **purchase at stores or fill** in the machine ( ) Do not purchase or fill containers	Not trusted at all	Somehow not trust	Neutral	Somehow trust	Highly trusted
81. The water in your house, how **safe** is the quality of the water **for your health** in general (water for drinking, cooking, shower, etc.)	Not safe at all	Somehow unsafe	Neutral	Somehow safe	Very safe
82. The water you **purchase** at stores or fill out in the **machine**, how **safe** is the quality of the water for your health in general (water for drinking, cooking, etc.) ( ) Never purchase water or fill container	Not safe at all	Somehow unsafe	Neutral	Somehow safe	Very safe

83. How much did your family pay in advance to connect to EPWU? _____dollars
    ( ) Did not pay to connect
    ( ) Don't remember-don't know

84. In average, what is the **amount you pay per month** for water and sewage?
    In the summer $_____
    In the winter $_____

85. In average, how **much do you spend** for purchasing bottled **water in the store and/or filling** water containers?
    In the summer $_____ ( ) per week or ( ) month
    In the winter $_____ ( ) per week or ( ) month

( ) Never purchases bottled water or fill water containers

X. Wastewater

86. How many years ago did your family connect to sewage from EPWU?	Years:
87. Before EPWU, for how long did your family rely on a septic tank or cesspool?	Years: ( ) Don't know-don't remember

XI. Household

88. Type of household	( ) single house in the property ( ) mobile home in a mobile park- apartment complex ( ) mobile home in a single property ( ) single house with a mobile home in the property
89. How many years have you **been living** in this household?	Years:
90. How many people live in this house according to the following **age** groups? READ the options	0-3 years of age _____ 4-5 years of age _____ 6-10 years of age _____ 11-13 years of age _____ 14-17 years of age _____ 18-64 years of age _____ 65 years and over _____ Total members: _____
91. From the following table, please point to the range that includes your household **income** in 2012 SHOW the ranges	( ) $10,000 or less ( ) $11,000 to $15,000 ( ) $16,000 to $20,000 ( ) $21,000 to $30,000 ( ) $31,000 to $40,000 ( ) $41,000 to $60,000 ( ) $61,000 to $80,000 ( ) More than $80,000 ( ) Don't know, Don't remember
92. Gender	( ) Female ( ) Male
93. Age	
94. What is your highest	

school year completed?

XII. Health

95. I will mention a health condition and would you please tell me if **anyone** in this family **has or ever had that condition in the past 6 months** **READ every option**	( ) Any illness of the heart or arteries (heart, high blood pressure) ( ) **Frequent** ailments of the stomach-intestine (diarrhea, nausea, vomiting, gastritis) ( ) Any stomach infection such as Salmonella, E. coli, cholera, dysentery ( ) Hepatitis A, E ( ) Allergies (skin) ( ) Skin problems in any part of the body (rash, itchy, redness, dryness) ( ) Skin problems in any part of the body (hard patches or calluses of darker skin color-in areas not related to work or shoes) ( ) Strange feelings in fingers, arms or legs such as numbness , cramping, or tingling ( ) Any type of cancer ( ) A chronic condition such as HIV/AIDS, tuberculosis ( ) West Nile virus-mosquitoes ( ) Blue-baby syndrome (called methemoglobinemia)-happens to babies less than 6 months of age with bluish or slate-gray on the skin, lips, or nailbeds ( ) Asthma or respiratory problems (frequent cough, short of breath, chest pain) ( ) Depression, feeling isolated, sad, without energy to do things. ( ) Diabetes, any type ( ) Pregnancy problems (stillbirth, miscarriages, preeclampsia) ( ) Fertility problems (difficulties to get pregnant) ( ) Any other health condition? specify:
96. In the past 30 days**, how many members** of this family had **diarrhea** (or loose stools)?	_____ adults _____ children _____ None (skip to #29)
97. Was that **diarrhea** severe enough that the person(s) required medical attention (pharmacy, nurse, doctor, hospital)	_____ Yes (includes one or more members of the family) _____ No _____ Don't know-don't remember
98. In the past 30 days, **how many members** of this family had a **stomach or abdominal pain** or **discomfort**?	_____ adults _____ children _____ None (skip to #31)

99. Was that **stomach or abdominal problem or discomfort** severe enough that the person(s) required **medical attention** (pharmacy, nurse, doctor, hospital)	_____ Yes (includes one or more members of the family) _____ No _____ Don't know-don't remember
100. In the past 30 days, **how many members** of this family had a **skin problem** such as a rash, redness, dryness, itchiness, and open wounds?	_____ adults _____ children _____ None (skip to #33)
101. Was that **skin** problem severe enough that the person(s) required **medical attention**? (pharmacy, nurse, doctor, hospital)	_____ Yes (includes one or more members with skin problems) _____ No _____ Don't know-don't remember
102. In the last 3 months, has any minor missed **school-days** or **was returned from school** because of a stomach related ailments (i.e. diarrhea, vomiting, nausea, pain, infection, discomfort)?	( ) Yes, how many times: _____ ( ) No ( ) No children in this household (skip to #36)
103. To address the **health of your children**, **where** do they usually go?	City: Name of place, clinic, doctor, hospital, pharmacy:
104. How do you **usually pay** for the health care and treatments of your **children**? READ all options, mark all that apply	( ) Medicaid ( ) CHIP (children's Medicaid in Texas) ( ) Job insurance ( ) Own medical insurance (paid totally by yourself) ( ) Own packet payment (cash or credit card)-not a co-payment ( ) Free, no charge ( ) Other, specify:
105. To address the health of the **adults** of this family, **where** do they **usually** go?	City: Name of place, clinic, doctor, hospital, or pharmacy:
106. How do you usually **pay** for the health care and treatments of the **adults** of this family? READ all options, mark all that apply	( ) Medicaid ( ) Medicare ( ) Job insurance ( ) Own medical insurance (paid totally by yourself) ( ) Own packet payment (cash or credit card)-not a co-payment ( ) Free, no charge ( ) Other, specify:
107. In the last 3 months, has anyone missed **work-days** because of stomach-related ailments (i.e. diarrhea, vomiting, nausea, pain, infection, discomfort, etc.)?	( ) Yes, how many times? _____ ( ) No

XIII. Water and Sewage Perceptions

Please think carefully and choose a number from 1 to 5 according to what best describes your opinion. Choose only "neutral" (#3) when you are not sure or do not have a strong opinion. [**READ** the options]

	1	**2**	**3**	**4**	**5**
108. **Comparing your water consumption** before EPWU, now with EPWU your family consumes…? ( ) Don't' remember, don't know	Much lower consumption than prior service	Little less consumption than prior service	The same consumption as the prior service	Somehow more consumption than prior service	Much higher consumption than prior service
109. If you remember, how difficult or easy was to your family to pay **the initial costs to connect** to EPWU? ( ) Did not pay anything to connect	Very difficult to pay	Somehow difficult to pay	Neutral	Somehow easy to pay	Totally easy to pay
110. How much do you agree…? Westway **increased the chance**s of having more services and amenities such as community centers, health centers, grocery stores, parks, etc. as a result of **connecting to water of EPWU**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree
111. How much do you agree…? Westway **increased the chances** of having more services and amenities such as community centers, health centers, grocery stores, parks, etc. as a result of connecting to the **EPWU public sewage system**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree
112. How much do you agree…? The **public health** in Westway improved as a result of **connecting to water of EPWU**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree
113. How much do you agree…? The **public health** in Westway improved after connected to the **EPWU sewage**	Totally disagree	Somehow disagree	Neutral	Somehow agree	Totally agree

Would you **like to tell us** any additional comment, doubt, or opinion?

Thank you very much for your time and valuable information.

NOTES [By interviewers)

Time starts: _____ Time ends: _____ Date: _____

Conducted by: _____

Address: _____

TABLE X.6. Rate of recruitment for household survey

Well System	Recruitment Results				Houses Approached
	Accepts	Rejects	No answers the door	No adult available	
Vinton Hills Subdivision	40	8	26	1	75
Vinton Village Estates	24	4	28	4	60
Hillside Water Works	12	0	0	0	12
El Paso Water Utilities	22	4	11	0	37
Villa Alegre Estates	5	0	6	0	11
Private Well	18	0	2	0	20
Total	**121**	16	73	5	215
Response Rate	**58% (121/210)**				

TABLE X.7. Where respondents access health care

City or town to address health problems	Frequency (Yes)	%
Children (n=70)		
El Paso	36	51.4
Vinton	14	20.0
Westway	7	10.0
Anthony	7	10.0
Canutillo	3	4.3
Juarez, Mexico	2	2.9
Adults (n=117)		
El Paso	48	41.0
Westway	23	19.7
Vinton	19	16.2
Juarez, Mexico	15	12.8
Canutillo	5	4.3
Santa Teresa	4	3.4
Anthony	1	0.9
Other US state (Arizona, California)	2	1.8

TABLE X.8. Type of Payment for Health Care

Type of Health Coverage	Frequency (Yes)	%
Children (n=72)		
Medicaid	32	44.4
CHIP	14	19.4
Own packet payment (cash or credit card), not copayment	13	18.1
Job medical insurance	12	16.7
Own medical insurance	1	1.4
Adults (n=119)		
Own packet payment (cash or credit card), not a copayment	52	43.7
Job insurance	24	20.2
Medicare	18	15.1
Medicaid	13	10.9
Own medical insurance (paid totally by yourself)	4	3.4
Free	8	6.7