HEALTH **IMPACT** ASSESSMENT

Assessing the Impact of a Transportation Utility Fee in Columbia, MO

A Health Impact Assessment | *Summer 2013*

prepared by the HIA Partner Team

Public Health
Prevent. Promote. Protect.
Columbia/Boone County
Public Health & Human Services

PedNet

CMCA
Central Missouri Community Action

Funding for this HIA provided by

Robert Wood Johnson Foundation

EXECUTIVE SUMMARY

BACKGROUND

Community health is influenced by policies and programs from other domains, including education, transportation, and urban development. A Health Impact Assessment (HIA) is an evidence-based research tool used to inform decision-makers about the potential health risks and benefits of policies, programs, and projects outside the health sector. An HIA identifies potential health effects and their likely distribution within the population, then recommends how a proposed program or policy might be altered to increase positive and decrease negative health outcomes.

Increased student ridership, new routes, budget cuts and higher fuel costs have stressed the current Columbia Transit system, which is now considering potential funding mechanisms for redesigned routes, expanded operating hours, and more timely service. From 2011-12, the Columbia/Boone County Department of Public Health and Human Services partnered with the PedNet Coalition and Central Missouri Community Action to perform an HIA on the health effects of expanding and improving bus service in Columbia. Based on a city council request, this year the partner team performed a second HIA to identify potential health outcomes of a utility fee designated specifically to fund public transportation. In conjunction, these studies provide information for the community dialogue concerning funding and expanding public transit in Columbia. Funding for both HIAs was provided by grants from the Robert Wood Johnson Foundation; the Missouri Foundation for Health also funded the first HIA.

CORE GOALS OF THE HIA PROJECT:

- Assess potential health effects of funding expanded public transit in Columbia via a designated transportation utility fee.
- Determine the likelihood of these health effects, given the best possible evidence.
- Provide recommendations for how funding transit expansion could maximize positive and minimize negative health outcomes.
- Increase awareness among decision-makers and within the community about how different policies and programs influence health.
- Promote the use of HIA as a decision-making tool among policymakers and other stakeholders.

PROJECT METHODS

The specific research question addressed by this HIA is: *"How will a monthly transportation utility fee affect low- and fixed-income households?"* The HIA Partner Team met in January 2013 to define the scope of the project and identified four indicators found to influence health that were also determined most likely to be affected by the addition of a transportation utility fee and a decrease in residents' disposable income. These indicators include:

- **Food insecurity**
- **Stress**
- **Decreased health care access**
- **Poor housing conditions and housing security**

Our assessment of these indicators included a variety of data sources. We performed literature reviews; partnered with Columbia Transit to conduct a community-based survey about transportation difficulties and the effect of an additional utility fee among low- and fixed-income city residents, bus users, and clients of local health and social service agencies; and interviewed select stakeholders more extensively to pinpoint nuanced effects previously unidentified in our research.

KEY STAKEHOLDERS

We collaborated with the following government and community stakeholders during the preparation of this report.

- City of Columbia
  - Columbia Transit
  - Public Works Department
  - Columbia/Boone County Public Health & Human Services, Division of Human Services
- Central Missouri Community Action
- Columbia Housing Authority
- The PedNet Coalition

KEY FINDINGS

Review of the literature and input from key informants and community members strongly suggests that what may seem like an insignificant amount to some – $2-4 monthly – could further harm the most vulnerable Columbia residents. A transportation utility fee added to households' rent or mortgage payments along with energy expenses would additionally drain limited disposable income. For low- and fixed-income families, money for food, health care, households items, car payments and maintenance, etc., is already limited so that any extra expenses threaten the residents' health and well-being. Therefore, it is important to note the potential health effects of funding transit operation and expansion with a transportation utility fee depend on the monthly amounts charged to residents and businesses and the potential introduction of waivers or reduced fees for low- and fixed-income households.

FOOD INSECURITY: Families with limited and strained disposable incomes prioritize rent or mortgage payments and utilities over food. Additional expenses further decrease their food budgets, causing households to change their eating patterns; alter the quality, variety, or desirability of their diets; or cut their food intake. These actions lead to hunger and malnutrition, stunted physical development, lowered immunity, and reduced productivity at school or work. See page 18 for more information.

DECREASED HEALTH CARE ACCESS: The gap in health outcomes and health care use between high- and low-income people is growing, with the latter less likely to have insurance, visit a primary care physician, or seek medical or dental care. Low- and fixed-income households pay fixed expenses before spending money on medical supplies or for preventive care, leading to additional illnesses, decreased quality of life, and costly treatments later on. See page 20 for more information.

POOR HOUSING CONDITIONS & HOUSING SECURITY: After rent/mortgage payments, low-income households pay their utility bills, which are often required as part of assistance offers from social service agencies. Individuals and families at or below the Federal Poverty Level spent a greater percentage of their incomes on energy than an average household. To compensate for additional fixed expenses, such as a transportation utility fee, households will likely seek to lower their energy bills by relying on unsafe alternative heating and cooling methods such as personal space heaters. See page 21 for more information.

STRESS: Being low-income and/or living in low-education households affects people's mental health and children's development. Individuals and families with lower incomes are often forced to live in neighborhoods with a high preponderance of stress-inducing problems such as undesirable physical qualities (safety issues, trash, vandalism, or poor housing), lack of social support, and crime. See page 25 for more information.

RECOMMENDATIONS

- Create routes and timetables that are consistent throughout the week and post them at all stops. Also ensure the Columbia Transit website is timely and easy to navigate. Survey respondents indicated it is by far their most used source of information about the bus system (72.1%).
- Increase public outreach about how the bus system works, how little it costs compared to driving (parking, gas, car maintenance), and its efficiency with the new, faster routes and extended times. Survey respondents suggested more middle-income residents would use the busses if using public transit became normalized.
- Research alternative funding sources that have worked in other communities.
- Further solicit community input on funding options when gathering data for public transit proposals such as CoMO Connect.
- Adjust the transit hours of operation to accommodate hourly workers at hotels, hospitals, retail venues and restaurants, where operating hours run earlier and later than the traditional 8-5 schedule of most residents.
- If a transportation utility fee is chosen as a funding source, consider reducing or waiving altogether the fee for low- and fixed-income and other at-risk populations.
- Consider adding Sunday service, which would allow residents to access employment, health care, grocery stores, and religious worship, which, in some cases, reduces stress and increases community support.
- Ensure that bus stops are located near grocery stores, the food bank, farmers markets; health care facilities utilized more frequently by socially disadvantaged residents, such as MedZou, Planned Parenthood, Family Health Center, Family Dental Center, and Columbia/Boone County Public Health and Human Services; neighborhood parks and recreation facilities; and social welfare and community services such as Central Missouri Community Action, Columbia Housing Authority, Columbia Public Library, and Services for Independent Living.

Table 1: Evidence Quality Legend

EXPECTED CHANGE BASED ON LITERATURE	**No change** – The literature achieves consensus that this indicator will likely remain unchanged. **Mixed** – The literature lacks consensus about this indicator's potential impact. **Increase** – The literature achieves consensus that this indicator will likely increase. **Decrease** – The literature achieves consensus that this indicator will likely decrease **N/A** – There is no available literature on this indicator.
STAKEHOLDER PROJECTIONS	**No change** – Stakeholders did not anticipate any changes. **Mixed** – Stakeholders were divided in their opinions. **Increase** – Stakeholders anticipated an increase. **Decrease** – Stakeholders anticipated a decrease. **N/A** – Stakeholders did not express their opinions.
EXPECTED HEALTH IMPACT	**Positive** – Changes that may improve health. **Negative** – Changes that may impair health. **Mixed** – Changes may be both positive as well as negative. **Uncertain** – Unknown how health will be impacted. **No effect** – No identified impact on health.
MAGNITUDE OF IMPACT	**Low** – Affects very few people. **Medium** – Affects large numbers of people. **High** – Affects many people.
LIKELIHOOD OF IMPACT	**Likely** – Likely that impacts will occur as the result of the proposal. **Possible** – Possible that impacts will occur as the result of the proposal. **Unlikely** – Unlikely that impacts will occur as the result of the proposal. **Uncertain** – Uncertain that impacts will occur as the result of the proposal.
DISTRIBUTION WITHIN THE POPULATION	The population most likely to be affected by the changes in health factors or outcomes.
QUALITY OF EVIDENCE	**** More than five strong studies. *** Five or more moderate studies. ** Five weak studies. * Fewer than five studies.

Table 2: Evidence Quality

			Based Primarily on Evidence from Literature				
Health Factor or Outcome	**Expected Change Based on Literature**	**Stakeholder Projections**	**Expected Health Impact**	**Magnitude of Impact**	**Likelihood of Impact**	**Distribution within the Population**	**Quality of Evidence**
Research Question: How will a monthly transportation utility fee affect low- and fixed-income households? Health determinant: Income							
STRESS	Increase	Increase	Increase	High	Likely	Low-income Fixed income	****
FOOD INSECURITY	Increase	Increase	Increase	High	Likely	Low-income Fixed income	****
HEALTH CARE UTILIZATION	Decrease	Decrease	Negative	High	Likely	Low-income Fixed income	****
OVER-CROWDING	Mixed	Increase	Negative	Medium	Possible`	Low-income Fixed income	*
HOUSING STABILITY	Decrease	Decrease	Negative	Low	Uncertain	Low-income Fixed income	***
USE OF ALTERNATIVE HEATING AND COOLING SOURCES	Increase	Increase	Negative	High	Likely	Low-income Fixed income	****
SAFETY	Decrease	Decrease	Negative	Low to Medium	Possible	Low-income Fixed income	***

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INTRODUCTION

BACKGROUND

Health Impact Assessment 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 the effects within the population. HIA provides recommendations on monitoring and managing those effects" (National Research Council, 2011).

Put simply, HIA is an evidence-based research tool used to inform decision-makers about the unintended health effects of a potential decision before it is made. HIA also includes recommendations to ensure that the planned policies, programs, and projects being studied maximize health benefits and minimize negative health impacts. It is important to note that HIA is not an advocacy tool. It is to be used strictly to inform the decision-making process so that the final policy or program maximizes health outcomes and minimizes adverse effects. HIA is also based on the best available evidence, both quantitative, such as surveys, and qualitative, such as in-depth interviews with stakeholders.

HIA can be performed in a number of ways to accommodate available resources and the time frame for the decision. A rapid HIA can be performed in a few weeks or a month. Generally, a rapid HIA is conducted for a less complex decision, and the evidence gathered may be only a few literature reviews and expert opinions. Intermediate and comprehensive HIAs focus on more complex policies and decisions; therefore, more time is required to perform literature reviews, gather expert and stakeholder opinions, collect new primary data, and inform decision-makers. This HIA would be considered a rapid HIA given the time frame in which it was conducted (January-May, 2013).

STEPS OF AN HIA

An HIA is typically performed in six steps.

Screening assesses the value, need and feasibility of performing an HIA; the available resources are identified, the potential impact is considered, and the specific program, plan, or policy decision to be studied is determined.

Scoping creates the formal plan and timeline for conducting the HIA. It establishes partners' roles and the goals of the HIA, identifies populations and geographic boundaries, formulates research questions, and identifies the potential health impacts of the decision to be evaluated.

Assessment is performed in two steps: data is gathered to describe the baseline conditions of the groups involved in the decision, and then it is evaluated against peer-reviewed literature or government reports, interviews or focus groups, and new data collected expressly to address the research questions posed in the HIA.

Recommendations identify the risks, benefits, and potential costs of decision choices, and provide practice, feasible and informative ways to promote health.

Reporting involves producing and distributing a comprehensive, transparent, and health literate HIA report.

Monitoring and Evaluation assesses the results of the HIA on the decision-making process and tracks the impacts of the health determinants.

PROFILE OF COLUMBIA

With a population of approximately 110,000, Columbia is the fifth-largest city in Missouri and the county seat of Boone County, which includes 162,642 residents total. The county was ranked ninth overall in the 2012 County Health Rankings out of 115 counties in Missouri. The number of persons per physician in the county is 559:1, less than half the overall state ratio of 1,274:1, and residents are educated: 86% have graduated from high school and 75% have received some college education (national benchmark = 68%, state mean = 61%).

However, the county does mirror some state and national trends for negative health behaviors. Adult smoking in the county is at 19%, similar to the national rate at 19.3%, but below the state rate of 21.1%. Missouri has the eleventh-highest rate of adult smoking in the nation. According to the 2011 Missouri Department of Health and Senior Services Behavioral Risk-Factor Surveillance System (BRFSS), about 28% of Missouri adults participated in no leisure time physical activity. Only half (49.5%) of Missouri adults achieved the recommended amount of daily physical activity. Relatedly, Missouri is the eleventh-most obese state with an adult rate of 30.3%, and the tenth-most inactive state with regard to physical activity. If the current obesity trend continues, Missouri is projected to have an adult obesity rate of 61.9% by 2030. Missouri's obesity-attributable direct health care cost per adult is among the highest in the nation. The state is projected to spend $761 per person in 2013 and $1,834 per person by 2018 (Thorpe, 2009). However, Boone County does have slightly lower rates of adult inactivity (21%) and obesity (28%) compared with overall state averages (2012 County Health Rankings).

Visit Appendixes 2 and 3 for more information about the City of Columbia and its health status.

TRANSIT EXPANSION HIA, 2011-12

In 2011, HIA staff from Columbia/Boone County Department of Public Health and Human Services in partnership with the PedNet Coalition and Central Missouri Community Action (CMCA) performed an HIA on the potential health impacts of expanding public transit in Columbia, Missouri. The Robert Wood Johnson Foundation and the Missouri Foundation for Health provided funding for the project. The study focused on four indicators found to influence health that were also determined most likely to be affected by expansion of public transit. The four health indicators were:

- **Physical activity**
- **Exposure to the outdoors**
- **Access to health care, employment, education, and healthy food options**
- **Creation of a livable and sustainable community**

Our findings suggested that, for a majority of these indicators, expanding public transit would lead to positive health outcomes. With regard to how public transit would impact physical activity, review of the literature found solid evidence to suggest that those who use public transit accrue more physical activity throughout the day, by walking or biking to and from bus stops. Besser and Dannenberg (2005) found that individuals without a car were nearly twice as likely to walk about 30 minutes to and from their public transit destinations.

Expanding public transit would also increase exposure to the outdoors, mostly by improving Columbia residents' ability to access parks and trails. Deshpande et al. (2005) reported that respondents who had used parks in the past month were more than four times more likely to have engaged in physical activity at least five times per week for more than 30 minutes per episode.

Our findings were very strong in connecting public transit expansion to health care access. A community-based survey of Columbia residents conducted at social service agencies, health care providers, and other locations in central Columbia found links between dependence on public transit and missed health care. Of 201 respondents, 18.3% said they "very often" and 37% said they "sometimes" missed health care appointments or had been unable to get the health care they need because of transportation problems. However, respondents who reported riding the bus at least once a week were more likely than those who rode the bus never or hardly ever to report having missed health care because of transportation problems ($t(199) = 5.53$, $p < .001$). In a regression model used to determine which variables predicted missing health care appointments, the strongest predictor of whether a family missed health care appointments was transportation problems ($\boldsymbol{\beta} = 0.17$, $p = .01$), followed by frequency of bus travel ($\boldsymbol{\beta} = 0.17$, $p = .04$). Most respondents considered proximity to a bus stop when picking a doctor or other health care provider; 25.6% said they considered proximity to a bus stop "a lot" and 28.3% said "a medium amount." Respondents who reported riding the bus at least once a week were also significantly more likely than those who rode the bus never or hardly ever to report that they considered proximity to a bus stop when selecting health care providers ($t(199) = 5.53$, $p < .001$). Barriers to accessing health services result in unmet and delayed care, inability to get preventive services, and preventable hospitalizations (Healthy People 2020).

There also was quite a bit of evidence linking expansion of public transit and employment. Of 201 respondents in the community-based survey,

16.4% reported missing work "very often" because of difficulties with transportation, 40.2% reported missing work "sometimes," 17.4% reported missing work "not very often," and 18.7% reported missing work "never."

Car ownership and bus ridership was significantly associated with missing work due to transportation problems. Those who did not own a car were more likely to report missing work than those who did own a car ($t(199) = 6.21$; $p < .001$). The same pattern was true for those who rode the bus frequently compared with those who did not ($t(199) = 5.81$, $p < .001$). Additionally, in a regression model used to determine which variables predicted missing work, likelihood of picking employment based on proximity to the bus was the strongest predictor ($\boldsymbol{\beta} = 0.28$, $p < .001$), followed by likelihood of missing health care appointments due to transportation problems ($\boldsymbol{\beta} = 0.24$, $p = .001$), how frequently family missed work due to transportation problems ($\boldsymbol{\beta} = 0.14$, $p = .03$), and frequency of bus travel ($\boldsymbol{\beta} = 0.14$, $p = .09$). Those who usually relied on walking, biking, or public transit to travel more frequently reported problems with transportation than did those who usually drove their own car. Those who use ParaTransit or the city bus (32.4%) were most likely to report missing work based on transportation problems, followed by those who usually received rides from someone else (21.9%), those who drove themselves (25.6%), and those who walked or biked (11.4%).

Most participants said they considered proximity to a bus station when looking for employment; 27.9% said they considered it "a lot," 26.5% said "a medium amount," 14.6% said "a little," and 22.4% said "not at all." Participants who did not own a car were more likely to consider proximity to a bus station when looking for employment ($t(196) = 5.28$, $p < .001$). Participants who rode the bus were also more likely to consider proximity to a bus station ($t(197) = 4.55$, $p < .001$).

Clearly, being able to access health care and employment is important to creating a livable, sustainable, community. HIA findings supported the premise that expanding public transit could increase community cohesion and social capital by providing more opportunities for social interaction. Better social capital, defined as the resources accrued through social interaction, is linked with improved health. Although the analysis is limited to the four identified health indicators, we found no evidence to suggest expanding bus services in Columbia would negatively impact community health.

At the conclusion of the Columbia Transit System Expansion HIA, HIA staff from Columbia/Boone County Department of Public Health and Human Services (PHHS) presented findings and recommendations of the assessment before Columbia City Council on February 4, 2013. Columbia City Council were compelled by the evidence linking expansion of public transit to health outcomes, and requested HIA staff to perform an HIA on a utility fee that could help fund Columbia Transit operations but could also potentially affect the health of low- and fixed-income and diverse populations as a result of additional financial stress. Funding for the second HIA was provided by the Robert Wood Johnson Foundation.

TRANSIT UTILITY FEE HIA, 2012-13

Virtually all public transit systems in the United States do not make a profit. Fares often cover less than half of transit operating costs. As a result, public transit systems rely heavily on federal and state subsidies, as well as local sources to fund operations. Common local sources of revenue include transportation sales taxes, fuel taxes, and property taxes. However, federal and state subsidies have decreased over time, and recent economic conditions have made some local funding sources potentially unsustainable (Junge & Levinson, 2012). A relatively new, alternative local funding source for public transit is a transportation utility fee. This source has become popular on the West Coast, particularly in Oregon, where 19 cities have a transportation utility fee (www.orcity.org).

The concept of the transportation utility fee is that the transportation system (including roads) is operated as a public utility. Water and sewer systems, for instance, are funded by charging users for the amount they use the systems (Junge & Levinson, 2012). Similarly, users are charged a transportation utility fee to connect their share of costs to the benefit they receive from the transportation system. The transportation utility fee is most often based on the number of trips that are generated by residential and commercial properties; properties that contribute more trips contribute a higher fee per month. Fees are based on standards established in the Trip Generation manual published by the Institute for Transportation Engineers (Junge & Levinson, 2012). Residential rates are normally determined by unit (single-family or multi-family homes), and commercial rates are usually determined by the number of trips generated per 1,000 square feet of property. However, local jurisdictions may choose other methods to decide the amount of residential and commercial fees.

A review of local transportation utility fees for residential properties used in different jurisdictions nationwide found a minimum fee of approximately $1.50 per month and a maximum fee of $6 per month. The HIA Partner Team determined that for the purpose of the HIA, single-family homes in Columbia would be considered to be assessed a $4 per month fee while multi-family homes would be assessed a $2 per month fee. These fees fall realistically within the amounts assessed by jurisdictions currently using transportation utility fees.

Due to the limited amount of time to complete the HIA and the length of time to assess each commercial property an appropriate fee, the HIA Partner Team used an already existing fee structure created by the Hillsboro, Oregon, Ad Hoc Transportation Finance Committee for its commercial transportation utility fees (based on the Trip Generation manual). The Hillsboro fee structure can be found in Appendix 4. The committee sorted each commercial property into one of six corresponding "bins" determined by the amount of daily trips the property created. The property was then assessed a monthly fee per 1,000 and 10,000 square feet of property space. For the purpose of the HIA, the partner team averaged the cost of each 1,000 and 10,000 square feet of property from each bin. For example, in Hillsboro's fee structure, a 1,000 square foot building had six different fees according to their assigned bin: $0.22, $.53, $1.78, $3.73, $10.18, and $18.41. Those fees were averaged and a fee of $5.80 per 1,000 square feet would be assigned to commercial properties in Columbia between 1,000 and 9,999 square feet, while a transportation utility fee of $58.14 per 10,000 square feet would be assigned to properties 10,000 square feet and larger. The number of residential

and commercial utilities and square footage of commercial buildings was provided by the City of Columbia Public Works Department. Exempt properties such as schools and churches were not included. If a property had an odd amount of square footage, such as 35,000 sq. ft., it would be assessed the 10,000 square feet fee of $58.14 three times ($58.14 /10,000 sq. ft. x 3 = $174.42) and the 1,000 square foot fee five times ($5.80/1,000 sq. ft x 5 = $29). Therefore, the total transportation utility fee assessed to a 35,000 square foot property per month would be $203.42.

Table 3 on page 13 lists the class of commercial properties in Columbia (by square feet), the number of each structure in the class; the monthly transportation utility fee assessed, and the yearly total contributed by class of structure. The yearly total has been rounded to the nearest dollar.
Table 4, also located on page 13, lists the number of single- and multi-family homes in Columbia, the number of each home, the monthly transportation utility fee assessed, and the yearly total contributed by all residential structures. The yearly total has been rounded to the nearest dollar.

Table 3: Commercial Property Notes - Columbia, MO

CLASS (AREA IN SQUARE FEET)	NUMBER OF STRUCTURES IN EACH CLASS	MONTHLY TRANSPORTATION UTILITY FEE AMOUNT	YEARLY TOTAL BY CLASS
5,000	753	$29.00	$262,044
10,000	450	$58.14	$313,360
15,000	204	$87.14	$213,318
20,000	93	$116.28	$129,768
25,000	54	$145.28	$94,141
30,000	48	$174.42	$100,465
35,000	28	$203.42	$68,349
40,000	21	$232.56	$58,605
45,000	13	$261.56	$40,803
50,000	19	$290.70	$66,279
60,000	25	$348.84	$104,652
70,000	16	$406.98	$78,140
80,000	9	$465.12	$50,232
90,000	12	$523.26	$75,349
100,000	3	$581.40	$20,930
125,000	11	$726.68	$95,921
150,000	6	$782.10	$62,791
175,000	3	$1,017.38	$36,625
200,000	4	$1,162.80	$55,814
225,000	1	$1,308.00	$15,696
300,000	1	$1,744.20	$20,930
375,000	1	$2,180.18	$26,162
450,000	1	$2,616.30	$31,395

Table 4: Residential Property Notes - Columbia, MO

CLASS	NUMBER OF STRUCTURES IN EACH CLASS	MONTHLY TRANSPORTATION UTILITY FEE AMOUNT	YEARLY TOTAL BY CLASS
Single-family	24,168	$4.00	$1,160,064
Multi-family	24,452	$2.00	$586,848

Under this model, the total amount raised from a transportation utility fee would be $3,768,708 per year. Commercial properties would contribute $2,021,796 (54% of total) while residential properties would contribute $1,746,912 (46% of total). There are 24,168 single-family homes and 24,452 multi-family homes in Columbia, for a total of 48,620.

For Fiscal Year 2013, Columbia Transit received $1,866,813 from the local Transportation Sales Tax (TST). The Transportation Sales Tax is a one-half cent sales tax that is used to subsidize Columbia Regional Airport, Columbia Transit activities, road projects, and various street and sidewalk projects. Transit staff assume that if the transportation utility fee were to go into effect, Columbia Transit would only receive one-half of their current portion of the TST, approximately $933,406, which would fund capital purchases such as vehicle replacement and maintenance. Additional federal assistance would also be available as a greater local match would be available through the transportation utility frees collected.

The transportation utility fee, transportation sales tax, and matching federal assistance would provide Columbia Transit an additional 3,530 hours in operations per year. There are a number of annual fixed route service increases that could potentially occur. The following increases are only a few examples.

The easiest fixed route increase would be to add eight hours of Sunday service with buses running their current routes and maintaining current headways. Adding additional service hours on weekdays or reducing headways during peak hours are more expensive options, but would allow for earlier and/or later service or could reduce the current 40-minute weekday peak-hour headways to 20 minutes by adding buses to each route. A caveat to any increase in additional service is that the pay structure for bus drivers would also increase, as current drivers would work more often or additional drivers would be hired. Other capital purchases also would need to be made such as adding more buses to the current fleet and fueling them. Although it is beyond the scope of this particular HIA, Columbia Para-Transit hours would also need to increase by an equal number.

SCREENING

The Columbia/Boone County Department of Public Health and Human Services (PHHS) HIA staff in partnership with the PedNet Coalition and Central Missouri Community Action (jointly, the HIA Partner Team) performed this rapid HIA by direct request from the Columbia City Council. The request came after HIA staff reported findings and recommendations of the Columbia Transit Expansion HIA performed in 2012. The council requested the HIA be performed on a potential transportation utility fee that would help fund Columbia Transit, and identify potential health effects on diverse and low- and fixed-income populations as a result of the fee.

SCOPING

The scope of the HIA was further determined by the HIA Partner Team. During this phase, participant roles, research questions, data sources, and target populations were identified.

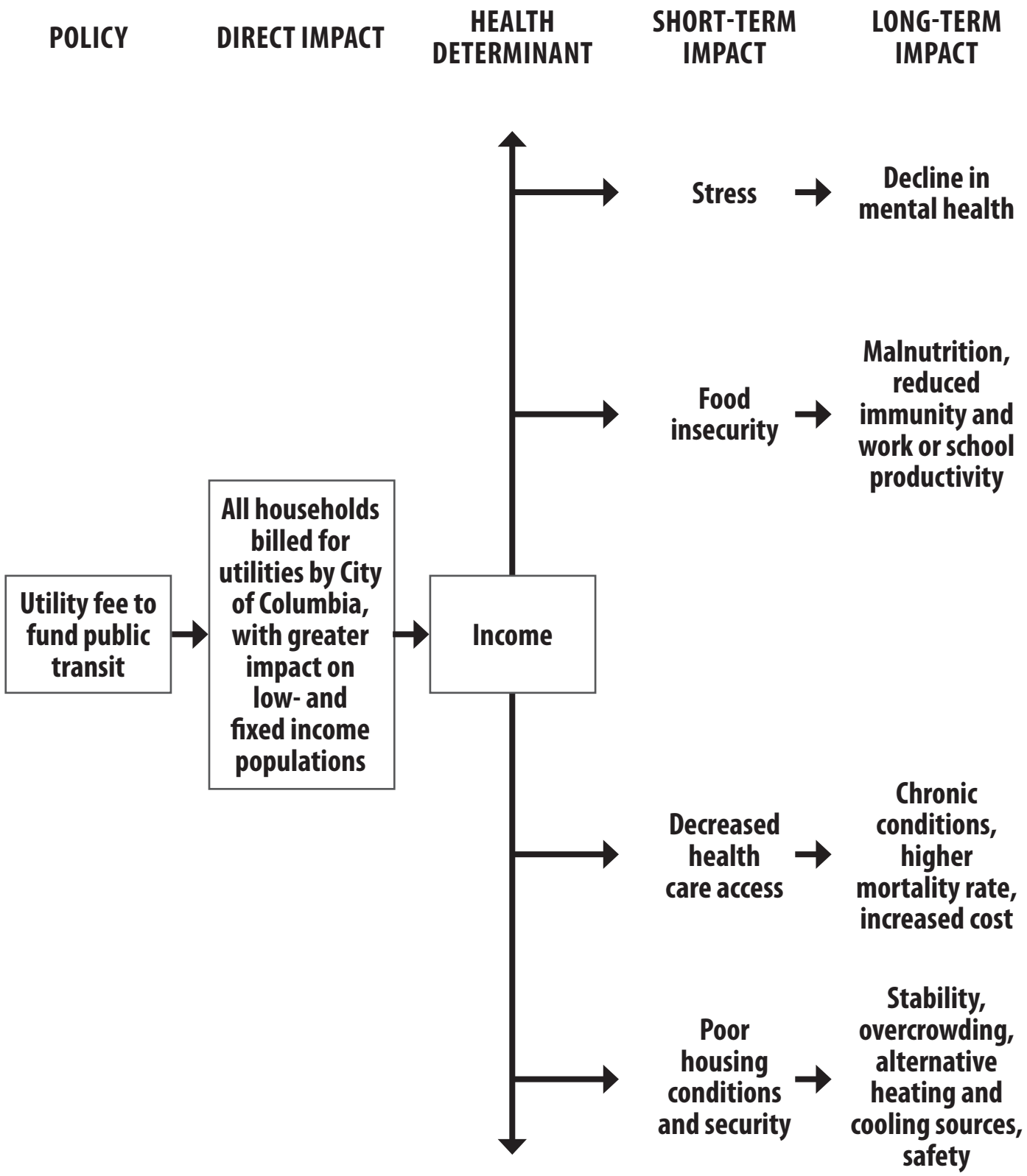
ROLES. HIA staff from PHHS directed the HIA process, including data collection, dissemination of the results of the assessment, and other communications related to the HIA. Staff from PedNet and CMCA assisted in data collection and arranged key informant interviews.

TARGET POPULATION. The population targeted by the HIA is individuals and families up to 150% of Federal Poverty Guidelines (FPG). For 2013, 150% FPG defined by the U.S. Department of Health and Human Services for a family of three is $29,295. Columbia's poverty rate is approximately 19.2%, affecting approximately 11,100 of the 48,620 households. Also included in the target population are fixed-income households, such as seniors.

The population was identified using data from energy assistance resources in Boone County. Low-Income Household Energy Assistance Program (LIHEAP) is a federally funded assistance program which aids clients with home energy bills, energy crisis, and weatherization and energy-related minor home repairs to reduce the risk of health and safety problems caused by home heating and cooling. It is only available to individuals and families at or below 135% FPG. Winter 2012 (October 2012 - May 2013) LIHEAP funds for Boone County totaled $651,384. There were a total of 2,781 applicants from across the county. Second, Energy Crisis Intervention Program (ECIP) funds (which are separate from LIHEAP funds) totaling $340,243 were also available during Winter 2012. ECIP served 1,070 Columbia households that season after residents had received disconnect notices or their energy had been turned off. Additionally, energy assistance contributions made by the City of Columbia (which are separate from LIHEAP assistance) extend to 150% FPG. City of Columbia energy assistance contributions are donated by utility customers through either Citizens Assisting Seniors and Handicapped (C.A.S.H.) or the Heat Energy and Light Program (H.E.L.P.). During Winter 2012, $17,900 in donations was made to C.A.S.H. and $16,000 to H.E.L.P, aiding 340 Columbia households. City utility assistance is available to a household one time per calendar year; the maximum amount of aid is $100.

HEALTH DETERMINANTS. The primary health determinant identified by the HIA Partner Team to be most likely impacted by a transportation utility fee was income. Short-term impacts include stress, food insecurity, decreased health care access, and poor housing conditions and housing safety. A causal model of the policy, health determinant, and related health impacts appears in Figure 5.

Figure 5: Causal Model Depicting Policy Impacts, Health Determinants and Related Health Impacts



RESEARCH METHODS. A number of research methods were used for the HIA. We evaluated peer-reviewed literature published in academic journals, gathered reports and information from third-party sources, interviewed topic experts and stakeholders, and collected and analyzed new data in the form of a survey. Third-party sources included but were not limited to the Robert Wood Johnson Foundation, Kaiser Family Foundation, Environmental Protection Agency, and the United States Department of Housing and Urban Development. Topic experts included representatives from Central Missouri Community Action, Columbia Housing Authority, and the Columbia/Boone County Department of Public Health and Human Services. Our community survey coordinated in partnership with Columbia Transit during April 2013 collected 456 responses on current and potential transit users' attitudes toward the bus system and funding mechanisms.

STAKEHOLDER ENGAGEMENT. The HIA Partner Team engaged several stakeholders during the course of the HIA. Key informant interviews were done with utility assistance providers from both Central Missouri Community Action (CMCA) and the Columbia/Boone County Department of Public Health and Human Services. Staff from Columbia Housing Authority (CHA) were also interviewed regarding the application process for Section 8 housing vouchers and trade-offs made by tenants. Our survey resulted in access to data for the HIA and supplied Columbia Transit with feedback for use when redesigning its service area, operating timetable, and communication methods.

ASSESSMENT OF EVIDENCE

The costs of food, energy, higher education, housing and health care increased during the most recent economic downturn, when the median household income for the City of Columbia dropped 13.34% to just under $41,000 from 2007 to 2010 (Malone, 2012). These added expenses disproportionately burden low-income and fixed-income families, including working families, female-headed households, minority households, retirees, and a record number of long-term unemployed adults affected by the poor economy.

Despite assistance from expanded unemployment insurance and food and energy resources, many families struggle to afford rent, utilities, food, medical supplies and other basic household needs. About 18-19% of Boone County residents live below poverty level (the level fluctuates yearly). Of those, 34% are single-mother households (Columbia Daily Tribune, 2013).

Additional fixed costs strain many households' already lean disposable incomes. A transportation utility fee of $2-4 monthly will most likely negatively affect families' ability to purchase nutritious food, access health care, afford and maintain safe homes, and also will impact their mental health. For example, energy assistance providers reported that families who seek assistance from the Columbia/Boone County Department of Public Health and Human Services are put into a lottery system to receive financial assistance with their city utility bills. Fee increases might increase competition for utility assistance and more severely affect families' budgets.

FOOD INSECURITY

By decreasing the amount of disposable income a family has, the transportation utility fee could have negative impacts on the amount and type of food for the family. Low-income and fixed-income families make trade-offs to save money on energy costs, the "heat or eat" dilemma. Rent or mortgage payments are usually the highest priority, then utilities, and finally food (Kaiser Family Foundation, 2004). The Food Research and Action Center (FRAC) found that low-income families find it easier to reduce energy and food costs (FRAC, 2005). Families who decrease their food expenses by altering their eating patterns; changing the quality, variety, or desirability of their diets, or cutting their intake are food insecure – defined by the United States Department of Agriculture (USDA) as not having access to enough food for an active, healthy life.

The most obvious, immediate effect of food insecurity is hunger, but the long-term effects are far-reaching. When people fail to consume the essential nutrients or when their bodies are unable to absorb nutrients, their immune systems are weakened. As a result, people become more susceptible to infectious diseases, which then lower their appetite, causing them to consume even fewer nutrients, stunting their development and increasing their risk of mortality. In addition to physiologic hunger, lowered brain functioning, and reduced immunity, other consequences of food insecurity include:

- **economic outcomes, such as reduced productivity at work**
- **unemployment**
- **income loss**
- **increased health care costs due to chronic illness**
- **greater demand for public services and benefits**
- **further reduced household budgets**

For children, hunger is also linked to a decline in academic performance, decreased productivity in school, low birth weight, and developmental problems (Foulkes, Hermsen, Raedeke, Rikoon, & Whiting, 2005).

In the "Missouri Hunger Atlas 2010," Dawdy et al. (2010) sum up the critical status of food insecurity in the state. They wrote, "Missouri is one of 17 states with rising rates of food insecurity with hunger, and the increase over the first decade of the 21st century is among the highest five in the country." Since 2005, Missouri has had a food insecurity rate of 15.8%, slightly higher than the national average of 14.9%; Boone County has a slightly lower rate at 12.3% (Dawdy et al., 2010). Approximately 23,490 county residents are food insecure, including more than 7,000 children (The Food Bank for Central and Northeast Missouri, 2010). Boone County is considered one of 25 low-need, low-performance counties in Missouri, meaning that rates of food uncertainty are lower than the state average (most likely because the population is large), available assistance programs and resource are inadequate to meet the need, and a low percentage of eligible residents participate (Dawdy, et al., 2010).

Not surprisingly, low-income status is a strong predictor of food insecurity. In Boone County, about 19.2% of the population lives below poverty level, compared to 14.3% in Missouri (U.S. Census, 2013). Additionally, although children are often shielded from hunger, households with children experienced food insecurity at a rate of 20.6% nationwide; single-parent households managed by women had the highest rate at 36.8% (Coleman-Jensen, Nord, Andrews & Carlson, 2012).

KEY INFORMANT INPUT: Interviewees described residents' trade-offs concerning food, health care, and energy usage. Laina Fullum, director of nutrition services for Columbia Public Schools, reported that the $2 transportation utility fee monthly increase on families' utilities bills is equivalent to a week of school lunches for a child in the free and reduced lunch program. There were approximately 6,650 Columbia Public School children receiving free and reduced lunches as of October 2012.

Staff at Central Missouri Community Action said the fee could be a "breaking point" for those on fixed incomes, Social Security Insurance, or Temporary Assistance for Needy Families, who have to control household outputs by adjusting utility usage and food intake to live within their means because rent and fees are beyond their control.

DECREASED HEALTH CARE ACCESS

Implementing a transportation utility fee, due to its impact on disposable income, could also result in less health care access and use. Low-income status and lack of health insurance are associated with barriers accessing health care, especially preventive care. Braveman and Egerter (as cited in Woolf and Braveman, 2011) found that U.S. adults living in poverty are more than five times more likely to report being in poor or fair health than adults living over four times the Federal Poverty Level (FPL). About 19% of Boone County residents live below poverty level and about 17% of the eligible population (under age 65) are uninsured, higher than the state averages of 14.3% and 14.2%, respectively (Columbia/Boone County Public Health and Human Services, 2011). These two subgroups are more likely to have unmet health care needs and are less likely to have a usual primary care provider or continuous insurance coverage. Kushel, Gupta, Gee, and Haas (2006) found that low-income families with housing insecurity and food insecurity were less likely to have a consistent source of health care, often postpone care, and report high emergency room use.

Some households go without health care or prescribed medications in order to keep utilities connected. Nationally, the 2011 National Energy Assistance Survey found that as many as 37% of LIHEAP recipient households went without medical or dental care while 34% did not fill a prescription or took less than their prescribed dose. Additionally, the gap in having and using health care between low- and high-income residents is increasing (Lillie-Blanton, Maleque, & Miller, 2008).

The gap in health outcomes based on socioeconomic status has its roots in childhood, with higher-income families more likely to use preventive and curative services and low-income families relying more on the latter, which include castings, emergency room services, antibiotics, etc. (Allin & Stabile, 2012). Overall, people with incomes over 400% FPG live approximately 6.5 years longer than those living below FPG. Higher-income residents also report better health status (Lillie-Blanton, Maleque, & Miller, 2008). The disparity grows with age; lower socioeconomic status is linked with higher risk of death, especially in those 45-65, who spend a significant amount of their income on health care and are not yet eligible for Medicare (Adler & Newman, 2002). Higher incomes allow people to not only purchase health care, but also enable them to buy higher quality food and afford better schools and recreation (Adler & Newman, 2002). Meanwhile, low socioeconomic status is associated with cancer and heart disease, which are the most significant causes of death in Boone County at rates of 179.8 and 145.9 people per 100,000, respectively (Columbia/Boone County Public Health and Human Services, 2011).

The average American family spent about $12,000 on health care in 2004. Families in the lowest income quintile (less than $14,000) spent about $3,000, while those with incomes of about $200,000 in the highest quintile spent three times as much. As a percentage of income, however, the lowest income spent about 20% of their incomes on health care, half in out-of-pocket payments, compared to 15-16% spent by those in all other quintiles (Ketsche, Adams, Wallace, Kannan, & Kannan, 2011). For many,

upcoming changes to the health insurance system require greater out-of-pocket spending and private premiums; these may further stress those who can least afford health services, leading them to forgo insurance totally or to go without needed care now only to require more expensive care later.

KEY INFORMANT INPUT: Energy assistance providers offered a number of stories about energy assistance recipients forgoing health care or making health care-related trade-offs. The cost of a potential $2-4 utility fee to fund public transit could be the co-pay cost of medication. One assistance recipient could not afford insulin needles for her diabetes care and resorted to reusing them. Rebecca Roesslet, Social Services supervisor at the Columbia/Boone County Department of Public Health and Human Services, compared the potential fee to the cost of an oxygen concentrator or catheter, and said she knew of one woman who rinsed and reused colostomy bags because of the cost. With vulnerable populations, there is always chance of an outside intervention and loss of independence.

POOR HOUSING CONDITIONS AND HOUSING SECURITY

Housing Affordability

Implementing a transportation utility fee may impact low-income residents' abilities to find affordable housing. Rising energy costs force low-income households to juggle priorities and make trade-offs that affect health. Families use a variety of strategies, such as rotating bills (paying portions but not the total balance) to avoid eviction, keep utilities connected, and meet basic household needs. As previously mentioned, rent or mortgage payments are usually the highest priority for low-income households, then utilities, and finally food (Kaiser Family Foundation, 2004).

Power (as cited in Emmel et al., 2010) found that individuals and families at or below the Federal Poverty Level paid a greater percentage of their income for the energy they used compared with an average household. Emmel et al. (2010) also note that income is the biggest predictor of energy consumption. According to the LIHEAP Home Energy Notebook for Fiscal Year 2009, average residential energy costs for all households in the United States were $2,180, with a mean individual energy burden of about 7% of total income. Low-income households had average energy expenditures of $1,885, with a mean individual burden of about 14%. Households receiving LIHEAP funds had average residential energy expenditures of $2,087, with an individual burden of over 16%. Regionally, all households in the Midwest spend on average $2,350 per year on energy. This amount is greater than the national average. Households that receive LIHEAP assistance still pay large utility bills because LIHEAP funds only cover

heating and cooling costs. Other charges added to utility bills, such as sewer or trash, are not covered by LIHEAP assistance. Using the above data along with Columbia's median household income from 2007-2011($43,102), the average household in Columbia has a mean individual energy burden of about 5% of total income.

Large energy bills can lead to energy insecurity, which is when a family lacks consistent access to affordable energy needed for a healthy and safe life in a particular geographic location (Children's Health Watch, 2011). It is measured on households that have experienced one of the following conditions within the past year: threatened utility shut-off or refusal to deliver heating fuel, actual utility shut off or refused delivery of heating fuel, an unheated or uncooled day because of inability to pay energy bills, and use of a cooking stove for heating purposes. Energy insecurity has been associated with poor health outcomes, especially in children. Children in energy insecure households are at increased risk for food insecurity, housing insecurity, and developmental delays. Families that are energy insecure are 29% more likely than energy secure families to have moved two or more times in the past year (Children's Health Watch, 2011).

Having to pay a transportation utility fee has implications for a family's ability to pay for the cost of housing overall. Traditionally, a home is considered affordable for renters when the costs (including utilities) consume no more than 30% of household income. Between 2007 and 2010, the number of households in the United States paying more than half of their incomes on housing increased by 2.3 million, bringing the total to 20.2 million. Renters account for more than half of severely cost-burden households (Joint Center for Housing Studies, 2012). A recent study performed in Columbia regarding barriers to affordable housing found 22.8% of homeowners pay more than 30% of total household income in mortgage costs to own their home. Of those living in rental units, 49.7% pay greater than 30% of total household income towards rent (Christensen, Meyer, & Pickett, 2013).

The affordability of housing has health implications. Low- and fixed-income families often are relegated to substandard housing conditions and neighborhoods with safety issues, high poverty rates, crime, and fewer health-promoting resources (Robert Wood Johnson Foundation, 2008). Poor housing conditions and homes that are not properly insulated and weatherized drive up energy costs and increase the risk of illnesses associated with inadequate utility usage. Adults living in unaffordable housing are more likely to rate themselves as being in poor or fair health compared to adults living in affordable housing.

KEY INFORMANT INPUT: A recent estimate of the wait time for Section 8 housing in Columbia is approximately two-and-a-half years. As of November 2010, there were 1,200 Section 8 housing applicants on the Columbia Housing Authority waiting list. A new list was opened in September 2012 and contained over 1,500 applicants, 54% of whom had children. During a key informant interview, Columbia Housing Authority staff noted that individuals and families living in Section 8 housing spend between 30% and 40% of their incomes on housing and utilities. Termination from housing is common, happening approximately 10 to 15 times out of 1,000

housing units per month. Additionally, if utilities are shut off, the household has 24 hours to get them back on or they are terminated from their home. Termination due to unpaid utility bills happens a few times each month.

Parents who are housing insecure have a legitimate concern that they will lose custody of their children if someone finds out their utilities have been turned off. The parents are unlikely to reach out for help for fear they will be reported to the Children's Division of the Missouri Department of Social Services.

Overcrowding

Higher utility fees further strain low- and fixed-income residents' limited budgets, leading to trade-offs in housing safety and security. In some cases, residents may either move into homes that aren't large enough to accommodate their families or they might take in additional tenants. Overcrowding is normally measured by the number of persons per room at a one-to-one ratio. The prevalence of overcrowding in the U.S. has decreased in the past 20 years as people gained the ability to afford homes and had fewer children, and as home sizes increased. It is more common among renters, who typically live in homes of about 1,344 square feet compared to owners' 1,858 square feet. In 2005, about 2.4% of people were overcrowded; only 1% of owners had more than one person per room compared to 5% of renters. Although overcrowding has decreased among those with the greatest economic need (i.e. households with negative or no income and those who earn less than $25,000/year), it has risen among those who make between $25,000-$100,000 (U.S. Department of Housing and Urban Development, 2007).

The effects of overcrowding on health include increases in the spread of airborne infections, including bronchitis, pneumonia, tuberculosis and meningitis. Effects are also significantly related to mental health. Housing members sharing the same space may need to limit certain noisy activities and may argue more, which can lead to anxiety and depression (Rohe & Han, 2012).

KEY INFORMANT INPUT: Overcrowding is the least influential of the four health effects identified by community partners in this health impact assessment.

Housing Safety

Exposure to substandard housing conditions has been associated with poor health and mortality. Damp and cold housing has been shown to cause chronic respiratory conditions and asthma. These cooler conditions also provide an environment for pests, such as cockroaches and mites, which further exacerbate respiratory conditions. Likewise, heat is the primary weather-related cause of death in the United States (Davis, Knappenberger, Michaels, & Novicoff, 2003). Studies have found an association between extreme high temperatures and increased mortality rates. Populations that are at increased risk due to exposure to temperature extremes include low-income households, the elderly, children, and those with chronic medical conditions (Basu & Samet, 2002; Medina-Ramon, Zanobetti, Cavanagh, & Schwartz, 2006; Schwartz, 2000). High energy bills can force people to either lower or raise indoor air temperatures to unsafe levels in order to save money.

This trade-off has a number of health consequences. When households are forced to lower their indoor temperatures to unsafe levels, they often use alternative heating sources. Examples of alternative heating sources include space heaters, ovens, stoves, and fireplaces or wood stoves. While they provide relief from cold temperatures, these heating sources pose potential safety hazards.

Using alternative heating sources also increases the risk of starting a fire in the home. In 2011, there were approximately 386,000 residential fires in the United States, accounting for 80% of all structure fires. More than 3,000 deaths also occurred and over 17,000 people were injured. Additionally, there was an estimated $11.7 billion in property damage. Cooking and heating equipment were responsible for 58% of home structure fires, 38% of civilian deaths, and 49% of civilian injuries in a study conducted from 2003-2007 (Karter, 2011). During the same time, people ages 5 and under, or 75 and older, had twice the risk of dying from structure fires caused by heating equipment; adults age 50-64 were also at increased risk of death. The same age groups also have a higher risk of dying from fires caused by cooking equipment (Flynn, 2010).

Space heaters cause an estimated 25,000 residential fires each year, resulting in more than 300 deaths. Additionally, approximately 6,000 people per year seek emergency room care due to burns from space heaters (energy.gov). Gas stoves, wood stoves, and fireplaces release combustion pollutants into the home. Major combustion pollutants include carbon monoxide, nitrogen dioxide, and particulates (sulfates, organic chemicals, metals, and soil or dust particles). Inadequate ventilation increases the concentration of these pollutants. Immediate effects of exposure to these pollutants include irritation of the eyes, nose, and throat, headaches, dizziness and fatigue (Environmental Protection Agency). Long-term health effects of exposure include some respiratory diseases, neurological disorders, heart disease, and cancer.

Other risk factors of residential fires include older homes and low-income neighborhoods. Older houses were built when there was less demand for electricity; therefore, they have fewer original electrical outlets. Residents compensate by overloading an outlet or using extension cords. If the cords wear or become overloaded, they pose a fire hazard (Shai, 2006). Research has indicated that injuries related to house fires are highest in elderly, minority, and low-income populations (Istre, McCoy, Osborn, Barnard, & Bolton, 2001), and households who have been cited for health and safety violations (Shai, 2006).

KEY INFORMANT INPUT: Key informant interviews with utility assistance providers offered insight into Columbia and Boone County families' use of alternative heating sources and other means of dealing with temperature extremes. Many households will simply go without heat during the winter and rely on wearing winter clothes inside their homes and sitting in front of a warm oven. One family placed space heaters at the bottom of their sleeping bags, while another cuddled with family pets because they had no other source of heat. Some providers indicated that cooling issues during summer months are not nearly as severe as heating issues during the winter months. However, much like heating during winter months, households will not use cooling systems for fear of increasing their utility bills.

STRESS

Implementing a transportation utility fee will decrease the amount of disposable income families in Columbia have. Few researchers have studied the effect of individual housing conditions on mental health. However, some studies have shown that people who live in poor housing conditions are more likely to experience psychological distress. Factors such as cleanliness, climate conditions, hazards and structural quality can harm residents' mental health (Krieger & Higgins, 2002).

To begin, simply having less money can impact mental health. Social factors such as family income and education significantly affect children's mental health and development. Poor children have higher rates of any disorder, including conduct, anxiety and mood disorders and Attention Deficit Hyperactivity Disorder (ADHD), than their wealthier peers (Ries, Merikangas, He, Brody, Fisher, Bourdon, & Koretz, 2010). Children and adolescents who live in low-income, low-education households or neighborhoods with undesirable physical qualities (safety issues, trash, vandalism or poor housing) where parents feel they aren't supported are more likely to experience anxiety, depression and ADHD regardless of their individual families' sociodemographic factors and parents' mental health (Butler, Kowalkowski, Jones, & Raphael, 2012).

Individuals and families with lower incomes are often forced to live in neighborhoods with a high preponderance of stress-inducing problems. Research on neighborhood-level outcomes bears out the connection between living in a high poverty neighborhood and mental health outcomes. Children who live in neighborhoods with poor physical qualities are more likely to have behavior problems than their more advantaged peers. Examples include arguing too much, disobeying and bullying. Children from low socioeconomic status (SES) neighborhoods and households, as measured by education, occupation and/or income, were found to be 1.9 times more likely to have serious behavior problems, according to a 2012 study by the U.S. Department of Health and Human Services. Further, neighborhood and households conditions affect physical inactivity, youth violence and perceived health status (Singh, & Ghandour, 2012).

Adults are similarly affected by low socioeconomic status, but little research has been done on housing conditions and specific mental health consequences in the U.S. within the past decade. The cumulative effects of experiencing financial insecurity on mental health throughout a lifetime are staggering. People who reported suffering more food insecurity or housing instability, had employment issues, or failed to see doctors or take medication as prescribed because of the high cost were significantly more likely to consider themselves of in poor/fair health, depressed or stressed, were more likely to smoke or use illicit drugs (Bisgaier, & Rhodes, 2011).

KEY INFORMANT INPUT: Key informant interviews with utility assistance providers provided perspectives on low-income families' mental health statuses in Columbia and Boone County. Increased competition for energy assistance funding causes additional mental stress, as low-income families need to have active utility service to remain in

Section 8 housing. Low- and fixed-income families are especially impacted by additional fees and make trade-offs to compensate, including forgoing food, heat or air conditioning, medications or supplies; stalling on necessary home maintenance; or moving to another residence.

The consequences cause psychological distress throughout different life stages. Households in Columbia who apply to receive LIHEAP funding can only receive energy assistance if they've paid the other fees for trash, water, sewage and tests, which cannot be covered by decreasing federal funding. If residents are denied because of lack of funding, they're put on a waitlist that can grow by as many as 100 families each day depending on the season. Sometimes, parents don't reach out for help because they're worried about losing custody of their children. Children living with housing instability are psychologically distressed as well. They're more likely to be exhausted from caring for young children, and as a result, their academic and work performance suffers. Older adults worry that their children will find out they're living in poor housing conditions and force them into nursing homes, stripping the elderly of much of their independence.

Finally, one informant suggested a utility fee increase will be an additional stressor also for families who make more than 135% FPG for Central Missouri Community Action assistance or 150% FPG for City of Columbia energy assistance or who don't qualify, including middle- and upper-income families. "Families we serve are already hurting, and to add another tax or charge could stress them out even worse," said Colita Harvey, Information and Referral specialist at Central Missouri Community Action.

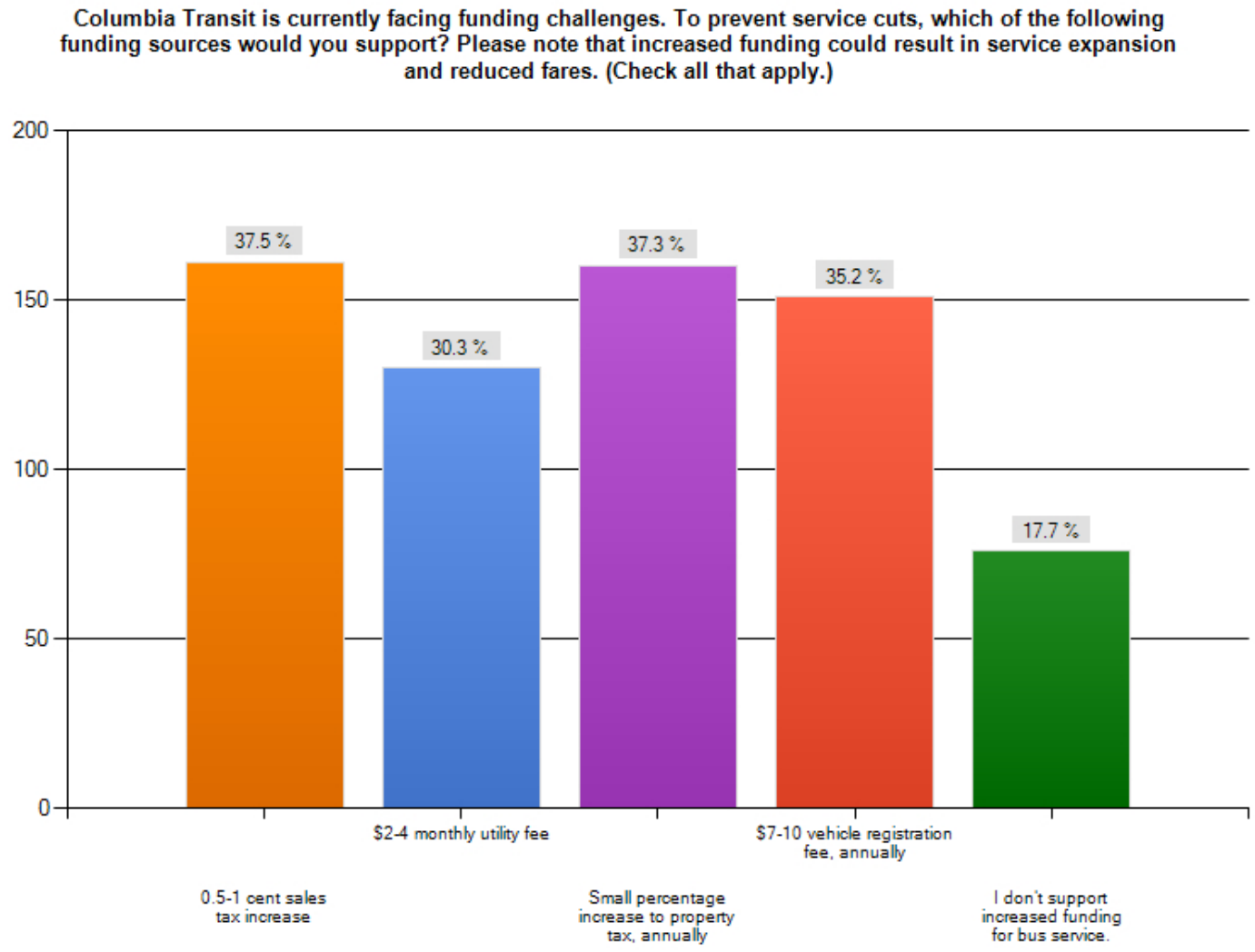
COMMUNITY SURVEY

In April 2013, the HIA Partner Team included questions related to future transit funding on a Columbia Transit ridership survey. The survey was administered over a period of two weeks in April 2013 by Columbia Transit staff and volunteers on buses and at various locations throughout Columbia. A total of 456 responses were recorded. Of these, 40.3% of respondents are 41-65 years old and about one-fifth qualified for half-fare. Most (43.3%) never ride the bus, 25.1% use it very rarely, and 18.2% ride it most days. For the full survey, see Appendix 1. Some survey results are described here; visit http://tinyurl.com/HIAcommunitysurvey for the complete results.

People cited the service hours, routes and timetable as reasons they ride the bus less. They recommended more frequent buses, more or different bus stops and later hours as changes that would increase their ridership. Many people said bus system improvements would help them get to their current jobs and to shopping centers.

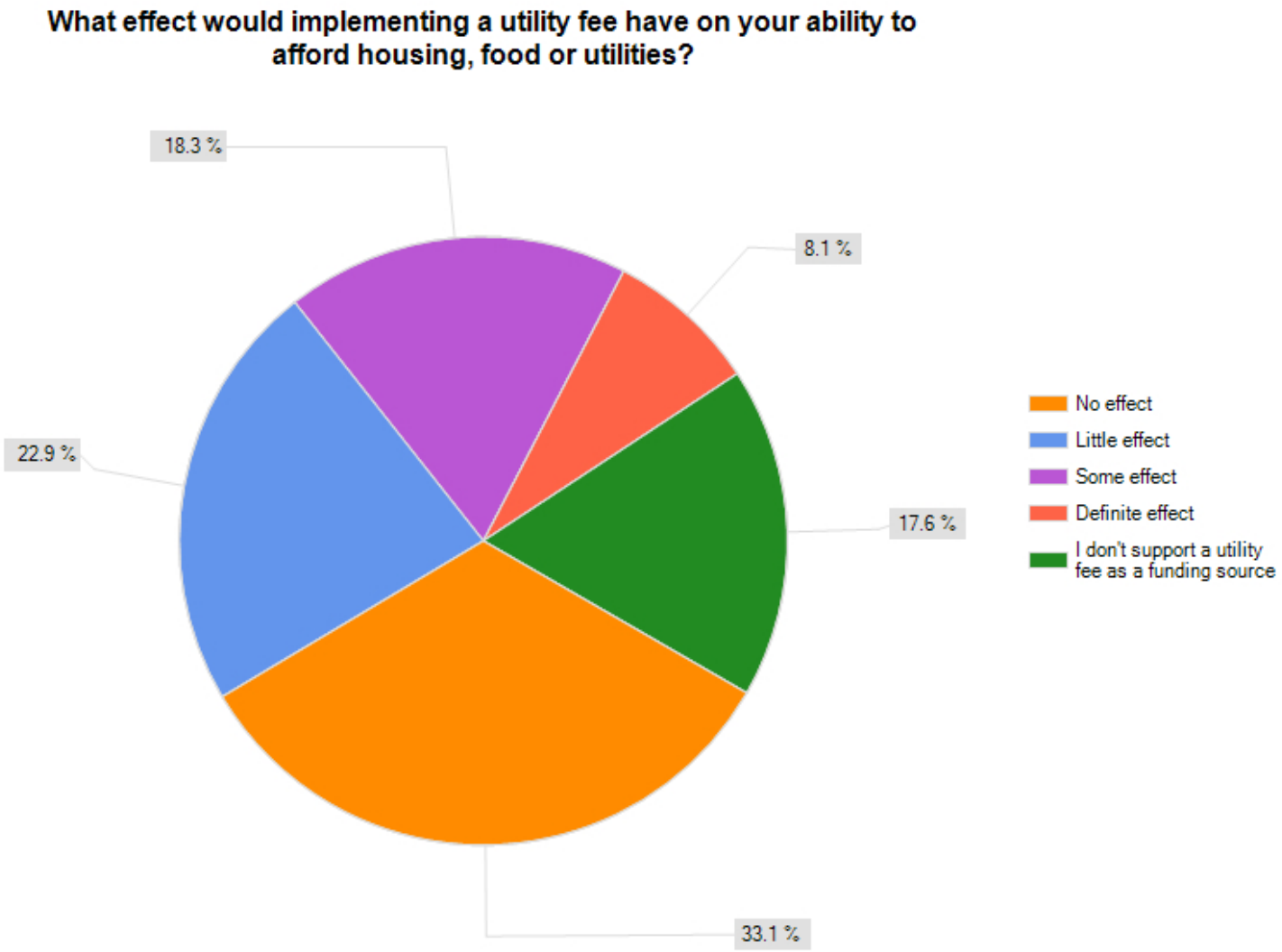
Respondents' support of the proposed funding sources was fairly evenly split among the following: a 0.5-1 cent sales tax increase, a small annual percentage increase to property tax, a $7-10 annual vehicle registration fee, and a $2-4 monthly utility fee. Seventy-six people (17.7%) didn't support a funding increase. (People could choose more than one funding source, so the number of responses is higher than the number of respondents.)

Chart 6: Columbia Transit Ridership Survey Results



One-third of respondents said a utility fee wouldn't affect their ability to afford housing, food or utilities, but 8.1% said it would have a definite effect.

Chart 7: Columbia Transit Ridership Survey Results (continued)



About 20% of respondents qualified for half-fare, restricted to people with disabilities, the elderly, Medicare and Medicaid recipients, low-income residents and those ages 5-17. Specifically of those who qualify for half-fare, a small percentage increase in the property tax was the preferred option of funding, but it wasn't significantly more preferred over the suggested sales tax increase. Also, most half-fare riders said a utility fee wouldn't affect their budgets, but improved transit would help them access groceries, shopping and health care.

SELECTED COMMENTS

"First and foremost **SERVICE THE PEOPLE WHO MOST NEED PUBLIC TRANSIT.** Go to low-income neighborhoods and ask when and where they need the bus to go. Add smaller more frequent buses if you need to do so. Second, 'normalize' using transit with testimonials from middle-class Columbians who actually use transit. . . Marketing messages needs to be different to these two very different segments of the population. Middle class residents will be more likely to try transit if you hold their hand and sell them on the idea of fitness or duplicating co-worker experiences. Lower income individuals will need transit to make ends meet. Make the system work for them... It is not convenient to have to stand in line for change while you watch your bus rolling out of the station - not everyone can afford a $30 pass on any given day."

"I feel MU has a large dependence on Columbia Public Transit (shuttles to MU commuter parking, FastCAT, etc.), but I fear this may be taking resources away from the citizens of this city who are around 12 months of the year. **PERHAPS MINIMIZING HOW MUCH ATTENTION IS GIVEN TO SHORT-DISTANCE STUDENT BUS SERVICES** (FastCAT route can be walked fairly easily, which means having two buses on the route seems really ineffective; also, the shuttles could be more spaced out, which is often the case for normal buses for the rest of the citizens of this city) in favor of longer hours on weekdays or more frequent stops would really help create some useful infrastructure for this city, which could lead to more commerce and job creation because of the increased traffic for those with currently limited mobility."

"Columbia Transit provides a useful service given the resources available. However, a few things could improve even without additional resources. One of the most important is

RELIABLE INFORMATION.

For example, the website indicates that passengers can flag the bus or request stops along the route. However, I often have had drivers tell me that they couldn't make a stop at a specific location, even a corner where there is a stop sign. The night Tiger Line Downtown Loop is supposed to leave the MU Student Center every 30 minutes during the evening. However, drivers often direct me to the less-direct Campus Loop because they are taking their meal break. During daytime hours, Columbia Transit should focus only on areas where service can be provided every 15, 30 or 60 minutes. Outlying areas should be served only during commute hours and only if reasonable, easy-to-remember schedules can be maintained. Transit should work for those most likely to ride it. However, our current bus system focuses too much on providing service to harder-to-reach areas on the edge of the city. The 101 South Loop is badly designed. Buses go by the city's largest travel destination without stopping. This loop should be rerouted so that buses travel through campus. If the city can find resources, expansion of service hours into the evening and Sundays should begin first by connecting the college campuses and central city to shopping and service jobs at Columbia Mall, on West and East Broadway and near South Providence Road. The next priority should be providing regional connections between downtown, MU, Columbia Airport and Jefferson City Amtrak. Ideally, this would be a daily service, but it could start with heavy travel days such as Friday and Sunday when colleges are in session. After that, service should expand to provide off-peak coverage throughout the city."

"The extending of bus hours on weekdays should really be considered. Usually the excuses I hear concerning people not riding the bus is because, due to their work hours, they would either not be able to ride the bus to work (if they start early), or from work if they have later hours.

AFTER ALL, WHY BOTHER TAKING THE BUS, IF YOU'LL NEED TO TAKE A CAB FOR THE RETURN TRIP.

Also, the infrequent route times when combined with the $1.50 fee is a bit of a put-off for students, and those who are not well-off. Paying a minimum of $3 per trip (more so if you have to make a stop or two) combined with the hour-long waits does not really make riding the bus an appealing prospect. (And, yes, while one can get the 30-day passes, it is not a viable expense for those who may only need/want to take the bus for a week or two. Though maybe selling day or week passes might help remedy this issue.)."

NEXT STEPS

Following HIA best practices, the health department staff will conduct both process and impact evaluations of the HIA to identify areas for future improvement and to monitor the implementation of recommendations made. For example, this spring, Columbia Transit redesigned its bus routes and service timetable to accommodate more riders, expand the service area, decrease the route times, and increase the hours buses operate. Transportation administrator Drew Brooks said the department reflected on findings and recommendations from the first HIA on transit expansion to improve access to health care in its new design. For example, transit staff plotted current and proposed locations of health care facilities before experimenting with new routes. The HIA Partner Team will monitor the CoMO Connect proposal and potential implementation.

Additionally, the HIA Partner Team will communicate its findings through a full report and executive summary available to stakeholders via mail and on the Columbia/Boone County Department of Public Health and Human Services website. Presentations of the findings will be made to the Board of Health and the Columbia City Council, among others.

LIMITATIONS

The most significant limitation experienced was the short time frame in which the HIA was conducted. Data collection, analysis, and review took place during a four-month period (February 2013 through May 2013). This condensed time frame did not allow staff and partners to compile all the data they would have under ideal conditions.

CONCLUSION

For many in the Columbia and Boone County community, $2-4 is a forgettable amount easily spent without considering the impact to an individual or family's budget. However, for the approximately one in five residents living in poverty, as well as those who live just above Federal Poverty Guidelines, an additional monthly fee means even less money for food, health care, heating and cooling, and education. Overall, the evidence base, data collection, and input from key informants suggests that a transportation utility fee will negatively affect low- and fixed-income residents, further exasperating their conditions concerning food security, health care access and use, housing conditions and security, and stress. The magnitude and distribution of these effects will be determined by the amount of the transportation utility fee and the possibility of reduced or waived fees for at-risk populations.

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APPENDIX 1.

Columbia Transit 2013 Ridership Survey

Find this survey and the results online at http://tinyurl.com/HIAcommunitysurvey

1. WHAT AGE RANGE DESCRIBES YOU?

a. 12-17
b. 18-24
c. 25-40
d. 41-65
e. Older than 65

2. DO YOU QUALIFY FOR HALF-FARE?

a. Yes
   i. Skip Logic: Which of the following would best describe why you get half-fare? (Check all that apply.)
      1. Age- I'm 17 years old or younger
      2. Age- I'm 65+ years old
      3. I meet the low income requirement
      4. I receive Medicaid
      5. I receive Medicare
      6. I receive Disability
b. No
c. I'm not sure
   ii. Skip Logic: Do any of the following describe you? (Check all that apply.)
      1. Age- I'm 17 years old or younger
      2. Age- I'm 65+ years old
      3. I meet the low income requirement
      4. I receive Medicaid
      5. I receive Medicare
      6. I receive Disability
      7. No. I do not meet any of these requirements for half-fare.

3. HOW OFTEN DO YOU RIDE COLUMBIA TRANSIT BUSES?

a. Never
b. Very rarely
c. A few times a month
d. 1-2 times a week
e. Most days

4. IN THE LAST YEAR HAS YOUR RIDERSHIP...

a. Increased

i. Skip Logic: What caused your ridership to increase? (Check all that apply.)

1. New or different job
2. Rising gas prices
3. Cost to own a vehicle
4. Other [Fill in]

b. Decreased

ii. Skip Logic: What caused your ridership to decrease? (Check all that apply.)

1. Transfer challenges
2. The fare is too high
3. Service hours don't work with my schedule
4. Riding the bus takes too long
5. The bus doesn't go where I need it to
6. Other [Fill in]

c. Stayed about the same

5. WHAT BUS SYSTEM CHANGES WOULD INCREASE THE AMOUNT YOU RIDE? (CHECK ALL THAT APPLY.)

a. Shorter wait times or more frequent buses
b. Earlier hours
c. Later hours
d. More or different bus stops
e. Bus tracking and estimated time of arrival information via text, email or website
f. Less expensive fares
g. Sunday service
h. Other [Fill in]

6. **COLUMBIA TRANSIT IS CURRENTLY FACING FUNDING CHALLENGES. TO PREVENT SERVICE CUTS, WHICH OF THE FOLLOWING FUNDING SOURCES WOULD YOU SUPPORT? PLEASE NOTE THAT INCREASED FUNDING COULD RESULT IN SERVICE EXPANSION AND REDUCED FARES. (CHECK ALL THAT APPLY.)**
   a. 0.5-1 cent sales tax increase
   b. $2-4 monthly utility fee
      i. Skip Logic: What effect would implementing a utility fee have on your ability to afford housing, food or utilities?
         1. No effect
         2. Little effect
         3. Some effect
         4. Definite effect
         5. I don't support a utility fee as a funding source
   c. Small percentage increase to property tax, annually
   d. $7-10 vehicle registration fee, annually
   e. I don't support increased funding for bus service.

7. **HOW WOULD BUS SYSTEM IMPROVEMENTS HELP YOU? (CHECK ALL THAT APPLY.)**
   a. It would help me get to my current job easier.
   b. It would open more job opportunities and flexibility
   c. I am currently unemployed, but more bus service could help me change that.
   d. It would help me with access to health care
   e. It would help me with access to grocery and other shopping
   f. It would help me get to class and school functions more easily
   g. The current system works fine with my schedule.

8. **WHERE DO YOU GO FOR INFORMATION ABOUT THE BUS (EXAMPLE: DETOURS, ROUTE CHANGES, SCHEDULE STATUS, ETC.)? (CHECK ALL THAT APPLY.)**
   a. Customer Service Phone Line
   b. Columbia Transit Social Media: Twitter or Facebook
   c. Local News Stations
   d. Local Newspaper
   e. Columbia Transit Website
   f. Email transit@gocolumbiamo.com

9. **ANY ADDITIONAL COMMENTS? [FILL IN]**

APPENDIX 2.

City, County, and State Demographic Characteristics

	Columbia	Boone County	Missouri
Population, 2011 estimate	110,438	165,627	6,010,688
Population, % change, April 1, 2010 to July 1, 2011	1.8%	1.8%	0.4%
Population, 2010	108,500	162,642	5,988,927
Age, % of population			
Under 5 years	6.0%	6.1%	6.4%
Under 18 years	18.8%	20.7%	23.5%
Under 65 years	8.5%	9.4%	14.2%
Female persons, % of population	51.7%	51.5%	51.0%
Race, % of population			
White	79.0%	83.6%	84.0%
Black or African American	11.3%	9.4%	11.7%
American Indian/Alaska native	0.3%	0.5%	0.5%
Asian origin	5.2%	3.9%	1.7%
Native Hawaiian/other Pacific Islander	0.1%	0.1%	0.1%
Two or more races reported	3.1%	2.7%	1.9%
Ethnicity, % of population			
Hispanic or Latino origin	3.4%	3.2%	3.7%
White, non-Hispanic or Latino origin	77.0%	80.9%	80.8%
Foreign-born persons, % of population, 2006-2010	8.1%	5.9%	3.7%

	Columbia	Boone County	Missouri
Language other than English spoken at home, % of population older than 5 years, 2006-2010	10.7%	8.1%	5.9%
High school graduates, % of population older than 25 years, 2006-2010	92.6%	91.9%	86.2%
Bachelor's degree, % of population	51.6%	45.2%	25.0%
Number of veterans, 2006-2010	NA	10,616	511,253
Mean travel time to work (minutes), workers age 16+, 2006-2010	16.0	17.8	23.2
Number of housing units, 2011	NA	69,961	2,723,415
Homeownership rate, 2006-2010	48.5%	57.6%	70.0%
Housing units in multi-unit structures, %, 2006-2010	39.9%	30.6%	19.6%
Median value of owner-occupied housing units, 2006-2010	$164,700	$153,900	$137,700
Number of households, 2006-2010	42,114	63,420	2,349,955
Mean number of persons per household, 2006-2010	2.26	2.34	2.45
Per capita money income in the past 12 months (2010 dollars), 2006-2010	$23,859	$25,124	$24,724
Median household income 2006-2010	$41,287	$45,786	$46,262
Poverty level, % of population, 2006-2010	22.9%	18.4%	14.0%

Data from U.S. Census, 2012

APPENDIX 3.

Local and State Health Outcomes Compared to the National Benchmark

HEALTH OUTCOMES	Boone County	Missouri	National Benchmark *
Poor or fair health, % of population	12%	16%	10%
Poor physical health days, mean days/month	2.9/month	3.6/month	2.6/month
Poor mental health days, mean days/month	3.4/month	3.7/month	2.3/month
Adult smoking, % of population	19%	24%	14%
Adult obesity, % of population	28%	31%	25%
Physical inactivity, % of population	21%	28%	21%
Motor vehicle crash death rate	16/100,000	19/100,000	12/100,000
Uninsured, % of population	13%	15%	11%
Primary care physician to total population ratio	559:1	1,274:1	631:1
Preventable hospital stays**	55	75	49
High school, % of population	86%	86%	NA
Some college, % of population	75%	61%	68%
Unemployment, % of population	6.4%	9.6%	5.4%
Children in poverty, % of population	17%	21%	13%
Inadequate social support, % of population	18%	19%	14%
Violent crime	433/100,000	518/100,000	73/100,000
Limited access to healthy foods, % of population	16%	8%	NA

* The National Benchmark is the 90th percentile for all counties.

** Preventable hospital stays are measured as the hospital discharge rate for ambulatory care-sensitive conditions per 1,000 Medicare enrollees.

Data from the County Health Rankings website (www.countyhealthrankings.org)

APPENDIX 4.

Hillsboro, Oregon, Transportation Utility Fee Pricing for Non-Residential Rates

EXAMPLE MONTHLY FEES FOR SCENERIOS AND LAND USES

	LAND USES IN BIN	BUILDING SQ.FT.	MONTHLY FEE
BIN 1	GENERAL LIGHT INDUSTRIAL, GENERAL HEAVY INDUSTRIAL, INDUSTRIAL PARK, MANUFACTURING, WAREHOUSING, MINI-WAREHOUSE, MULTIPURPOSE RECREATIONAL FACILITY, NURSING HOME, WHOLESALE MARKET, FURNITURE STORE	1000	$ 0.22
		10000	$ 2.20
		100000	$ 22.00
BIN 2	ELEMENTARY SCHOOL, MIDDLE SCHOOL/JR. HIGH, HIGH SCHOOL, PRIVATE SCHOOL (K-12), CHURCH, HOSPITAL, GENERAL OFFICE BUILDING, CORPORATE HEADQUARTERS BUILDING, OFFICE PARK, RESEARCH AND DEVELOPMENT CENTER, BUSINESS PARK, TIRE SUPERSTORE	1000	$ 0.53
		10000	$ 5.30
		100000	$ 53.00
BIN 3	BOWLING ALLEY, HEALTH/FITNESS CLUB, RECREATIONAL COMMUNITY CENTER, JUNIOR/COMMUNITY COLLEGE, CLINIC, MEDICAL/DENTAL OFFICE, GOVERNMENT OFFICE COMPLEX, BUILDING MATERIAL AND LUMBER STORE, SPECIALTY RETAIL CENTER, HARDWARE/PAINT STORE, NURSERY (GARDEN CENTE	1000	$ 1.78
		10000	$ 17.80
		100000	$ 178.00
BIN 4	MOVIE THEATER W/O MATINEE, PRIVATE SCHOOL (K-8), DAY CARE CENTER, PRISON, LIBRARY, GOVERNMENT OFFICE BUILDING, UNITED STATES POST OFFICE, FREE-STANDING DISCOUNT STORE, AUTOMOBILE PARTS SALES, SUPERMARKET, DISCOUNT SUPERMARKET, QUALITY RESTAURANT, HIGH TU	1000	$ 3.73
		10000	$ 37.30
		100000	$ 373.00
BIN 5	VIDEO RENTAL STORE, WALK IN BANK, DRIVE IN BANK	1000	$ 10.18
		10000	$ 101.80
BIN 6	CONVENIENCE MARKET (OPEN 24 HOURS), FAST FOOD RESTAURANT	1000	$ 18.41
		10000	$ 184.41

BIN 7

USE	BASIS	BASIS UNITS	
UTILITIES	ACRE (PEAK PROJECTED)	11	$ 22.64
ALL SUITES HOTEL	OCCUPIED ROOM	122	$ 35.04
BUSINESS HOTEL	OCCUPIED ROOM	106	$ 35.47
MOTEL	OCCUPIED ROOM	123	$ 51.57
CITY PARK	ACRE	63	$ 4.63
GOLF COURSE	ACRE	51	$ 11.76
MULTIPLEX MOVIE THEATER	SCREENS	13	$ 69.03
UNIVERSITY/COLLEGE	STUDENT	580	$ 63.53
CEMETARY	ACRE	39	$ 8.60
GASOLINE/SERVICE STATION	VEHICLE FUELING POSITIONS	16	$ 69.03
GASOLINE/SERVICE STATION WITH CONVENIENCE MARKET	VEHICLE FUELING POSITIONS	12	$ 69.03
SELF-SERVICE CAR WASH	WASH STALLS	4	$ 19.88