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Collaboratively Connecting: Public Polling as a Foundation for Integrated Transportation Decision-Making Networks

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CSUTC California State University Transportation Consortium

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COLLABORATIVELY CONNECTING: PUBLIC POLLING AS A FOUNDATION FOR INTEGRATED TRANSPORTATION DECISION-MAKING NETWORKS

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16. Abstract

Over the past few years, there have been notable trends in the areas of tracking public opinion, especially in public issues such as transportation. Such powerful processes continue to be a critical (and often mandated) component of the democratic process as they help policy makers connect with affected constituencies. This study explores travel trends and transportation preferences of a sample of adults in the California Central Valley of Fresno, an increasingly congested region that is also heavily agricultural and regarded as an expected launching pad for California's first high-speed rail system. Relying on an e-survey modeled off a statewide polling project, this study used a modified electronic survey as a valuable predictor of public opinion. Findings include preferences skewing toward concern about local issues (road conditions, safety, accessible active transport) and a lack of knowledge about future mobility options (high-speed rail, driverless cars). Based on these results, Fresno should be viewed as a prime area for focused public information campaigns to foster behavior change and attitudes about potential transportation improvements.

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EXECUTIVE SUMMARY

Over the past few years, there have been notable trends in the areas of tracking public opinion, especially in public issues such as transportation. Such powerful processes continue to be a critical (and often mandated) component of the democratic process as they help policy makers connect with affected constituencies. This study explores travel trends and transportation preferences of a sample of adults in the California Central Valley of Fresno, an increasingly congested region that is also heavily agricultural and regarded as an expected launching pad for California's first high-speed rail system. Relying on an e-survey modeled off a statewide polling project, this study used a modified electronic survey as a valuable predictor of public opinion. Findings include preferences skewing toward concern about local issues (road conditions, safety, accessible active transport) and a lack of knowledge about future mobility options (high-speed rail, driverless cars). Based on these results, Fresno should be viewed as a prime area for focused public information campaigns to foster behavior change and attitudes about potential transportation improvements.

I. INTRODUCTION

The Fresno County area of California's Central Valley region faces many challenges related to transportation, energy development, and air quality. As recognized in the California State Legislature's Road Repair and Accountability Act of 2017, also known as Senate Bill 1 the region is increasingly recognized as a congested corridor, whose complex regional challenges have the potential to be addressed by public policies. The area is also an agricultural oasis; for instance, agriculture contributes 25% to the total GDP and generates 17% of the total employment in the region.[1] Pulled together, the area's demographics reflect great challenges ranging from homelessness and desert conditions to air quality and drought. These challenges require technical and scientific expertise, as well as valued public feedback.

To that end, support from multiple stakeholders in the region, including technical experts as well as members of the general public, is needed to identify feasible and desirable solutions for the region while also meeting legal mandates for public involvement. Much has been written about this dynamic process; since the 1950s, legal mandates call for participation measures to ensure that the lay public is involved in decision-making.[2]

This project aims to take a step in exploring how a decision-making approach based on informed deliberation between experts, stakeholders, decision-makers, and the public that could recognize public opinions, needs, and desires concerning regional transportation. Using a 42-question design, we administered a survey with questions culled from the as-yet unpublished 2018 California Survey administered by the Institute of Transportation Studies at the University of California, Davis, which has been conducting statewide research about travel trends and lifestyle preferences of California residents.[3] When paired with predictive conversations with transportation decision-makers, the results of the survey adds to the body of knowledge about the Fresno area, and also how US transportation policy makers and planners may meet mandates for citizen involvement in decision-making. Furthermore, as a gathering of opinions by many involved in regional transportation, this report is intended to foster a learning environment that may help future transportation planning efforts.

II. MATERIALS AND METHODS

This report's findings are based on a survey of adults 19-years-old or older who live and/or work in the San Joaquin Valley in California, with a focus on these counties: Fresno, Kings, Madera, Merced, and Tulare. We used a snowball sampling technique, first emailing all FSTI board members and asking them to forward the survey to colleagues. In addition to the FSTI opinion leaders, we also targeted representatives of the K-12 community because of their increased interest in active transportation and regional transportation policies. Altogether, 113 people, representing a broad range of perspectives and levels of involvement in the planning of transportation in the Fresno area, as noted above, responded to the survey. To maintain anonymity, we have omitted names and other identifying characteristics; in addition, everyone who participated in this effort was given the opportunity to see this final report. While much of the data we report is quantitative, we also include direct quotes to clearly capture the sentiments expressed by the participants.

This survey was developed using an already existing and previous validated survey and was also approved by the Institutional Review Board at California State University, Fresno. The 42 questions included a variety of types, including: closed-ended; demographic; Likert scale; multiple choice; open-ended; picture choice; and rating questions. All respondents chose the e-survey option over the possibility of telephone or in-person responses, which reflects current communication trends about successful online public participation rates.[4] We focused on capturing public opinions over email because, while traditional telephone and mail surveys once enjoyed a response rate of about 40% in 1997, the rates of successful responses have dropped to 9% or less.[5] Such a low response rate, often attributed to increased use of cell phones and caller ID features, is problematic because of potential bias since some people consistently participate in such surveys.[6] In addition, recent studies suggest that online and face-to-face deliberations produce similar results in terms of participants' issue knowledge.[7]

There was a response total of 113 adults who recorded one or more responses to the survey, with 74 of those (~65%) completing the survey in its entirety. The survey was open for responses from March 10 until March 30, 2019, with most responses received between March 17 and March 21. The margin of error for the survey is ±4.2 percent at the 95 percent confidence level for the unweighted sample of 541 adults. There are other possible sources of error beyond sampling variability, such as question wording, question sequencing, and survey timing.

Based on the years in which respondents identified their birth years, 60% of survey participants were between the ages of 35 - 61 (n=35). The majority of respondents were born in the United States (90%; n=67). More respondents identified as female (57%; n=42) than as male (43%; n=32), with nobody choosing transgender or declining to answer. By ethnicity, 64% of respondents identified themselves as Caucasian/White; 19% as Hispanic/Latino; 9% as Asian or Pacific Islander; 3% as Black/African American; 2% as Native American; and 3% as "other".

In terms of employment, 57.1% of respondents identified themselves as being employed full time (n=52); 23.1% as part-time employed (n=21); 7.7% as not working or retired (n=7); and 6.6% as working two or more jobs (n=6). The majority of respondents reported working between 40–60 hours per week (62.7%; n=52). Most respondents were not enrolled in college (73.5%; n=61), while 22.3% identified themselves as full-time college students (n=19) and 3.6% were enrolled part-time (n=3).

Respondents were also asked about their educational background. In descending order, of the 74 respondents, 39% received a Bachelor's degree, 35% a graduate degree (such as a Master of Science, Doctor of Philosophy, or Master of Business Administration), and 18% attended some college or technical school. Professional degrees, such as a Juris Doctor or Doctor of Dental Surgery, were attained by 7%, and 2% completed high school or received a General Education Degree. Because this survey targeted key opinion leaders and other members of the public, it is not surprising to see the high levels of degrees among respondents. It is also of interest that 73% of respondents are not paying off student loans (n=54).

A final important demographic marker is household income, with a "household" defined as a set of people who live together and who share at least some financial resources; under this definition, housemates/roommates are not usually considered members of the same household. Census figures for Fresno County report over 21% of people living in poverty, but we expected to see higher levels of income in our project given our intentional sampling of key opinion leaders for this survey.[8] Respondents described their approximate annual household income before taxes. The distribution of annual gross income among 74 respondents showed that 28% attained $150,000 or more, 24% received between $100,000 and $149,000, and 16% reported receiving less than $25,000. Finally, 15% attained between $75,000 and $99,000, 11% received between $26,000 and $49,000, and 5% reported receiving $50,000 to $74,999.

III. FINDINGS

To most closely correspond to the formatting of the survey itself, we separate these findings into three sections: current travel choices; emerging travel choices; and future mobility.

CURRENT TRAVEL CHOICES

Given that how individuals choose their mode of transportation is a factor of travel behavior that "affects the efficiency of the transport system," it is important to determine preferences by geography and other demographics.[9] Fresno residents, like most Californians, drive frequently; one resident described the population as being "in love with their cars." Over the past year, over 95% out of 86 respondents drive their individual cars to work or school (n=82), with 58% typically spending between 15–30 minutes on a one-way trip. This corresponds with similar findings from national studies, with 66% of respondents reporting a one-way commute distance of less than 20 miles.[10]

When asked about major issues facing Fresno area transportation, out of 74 respondents, local road conditions were tied with safety/accidents as the most-cited top concerns. Respondents were asked to choose between eight factors, with these being ranked as their top concerns:

1. Local road conditions (27%, n=20);

   Safety / accidents (27%, n=20)

2. Traffic congestion / parking difficulties (18%, n=13)

3. Reliability of public transportation and

4. Active transportation (both ranked #3 with 5%, n=4)

Nearly all respondents responded in depth about their ratings, displaying common themes and answers that focus on the day-to-day impacts of transportation issues.

Table 1. Transportation Concerns of Fresno Area Respondents

Concern	Themes/Comments
Local Road Conditions	"Rural roads are in desperate need of repair." Specifically mentioned recurrently: The 180, 168, 41, and 99 interchanges; the 180/41-north entrance; Cedar from Shaw to Herndon, especially Barstow. Most commonly mentioned issue under "Local Road Conditions" was "Potholes."
Safety/Accidents	"Most importantly, our roads here in the Fresno area are full of potholes, and can be very hazardous." "The lights are not synchronized, many red light runners…" Most commonly mentioned issue under "Safety/Accidents" was "Traffic lights"
Traffic Congestion / Parking Difficulties	"I drive a lot, and often think about traffic congestion. I will plan my route around it, so I don't get caught in it." "Parking is impossible in Fresno sometimes …" "Fresno has far too many traffic lights which impede the flow of traffic and add to congestion and negatively affect our air quality." Most common mentioned issue under "Traffic Congestion/Parking Difficulties" was "Increasing Congestion"
Reliability of Public Transportation	"When you go out of the area, for instance, Sacramento area, they have [light rail] which many commuters take. We need to update our sources and roads to make it appealing to the middle class to take public transportation." "It takes too many connections to use the transit bus system for the City of Fresno residents." Most commonly mentioned issue under "Reliability of Public Transportation" was "Unreliable Schedule"
Active Transportation (pathways, bikeways, etc.)	"I'm a big cyclist and would ride my bike to work if I felt the roads were safe and cars respectful of cyclists." "Bicycle facility improvements are needed." "When I get on my bike, it is very dangerous, especially in the 'gaps' where the bike lanes stop/start. I choose to walk/jog now due to gaps in the bike lanes--too dangerous." Most commonly mentioned complaint under "Active Transportation" was "Bike Trails"

The comments in Table 3 reflect the majority of concerns about transportation in the Fresno area, largely emphasizing local infrastructure issues such as potholes, traffic lights, and bike trails.

EMERGING TRAVEL CHOICES

A rapid shift has been occurring in public transportation usage, due to three technological breakthroughs: self-driving cars, electric cars, and carsharing. We asked respondents about their current and projected uses of specific alternative modes of transportation, such as:

- Carsharing (Zipcar, Car2Go, Turn);
- Ride-hailing (Lyft, Uber);
- Shared ride-hailing (UberPool, Lyft Line); and
- Bikesharing.

First, we asked about their knowledge and current level of use of alternative modes; their answers are summarized in Table 4.

Table 2. Interest in Buying/Leasing an Alternative Fuel Vehicle

Level of Interest (n=86)	Carsharing	Ride-hailing	Bikesharing
Not familiar with it	50%	8%	32%
Familiar, but have never used it	30%	23%	39%
Used it in the past, but not anymore	9%	15%	3%
Use it 1–3 times a month	1%	29%	0%
Use it 1–2 times a week	1%	0%	0%
Use it 3 or more times a week	1%	1%	0%

Responses indicate that a clear majority (80%) of respondents are either not familiar with these modes or have never used them, with the exception of ride hailing, which was most commonly used 1–3 times per month.

Next, we asked respondents about their predicted future use of these transportation services. For all the alternative modes of transportation listed, few anticipated changing their current patterns of usage.

Carsharing

When asked about carsharing methods, such as ZipCar, most Fresno area respondents indicate little interest. Such consumer preference data aids in the development and implementation of fuel and technology research.

Table 3. Use of Carsharing Within Next Year

Carsharing Use	Percentage (n=74)
Continue not using carsharing	64%
Keep using carsharing	5%
Don’t know/Not sure	31%

As seen in Table 5, nearly two thirds of respondents have no plans to begin using carsharing, while five percent identify that they will continue to use this mode of transportation. The fraction of people who are unsure of their projected usage—a substantial 31%—reflects a potential market to which to introduce carsharing.

Alternative Fuel Vehicles

When asked about the power source used by their current primary vehicle, few respondents indicated using anything but gasoline.

Table 4. Types of Fuel Used by Primary Vehicles

Primary Vehicle Fuel	Percentage of Users (n=73)
Gasoline	80%
Gasoline hybrid (e.g. Toyota Prius)	14%
Battery electric (e.g. Nissan Leaf)	3%
Other:	3%

As seen above, only 20% of our respondents use fuels other than gasoline for their current primary vehicles.

After asking about the power sources used in currently-owned vehicles, we asked about interest in alternative power sources for future vehicle ownership and purchases.

Table 5. Interest in Buying/Leasing an Alternative Fuel Vehicle

Vehicle	Percentage of Respondents (n=74)
Gasoline hybrid (e.g. Toyota Prius)	31%
Battery electric (e.g. Nissan Leaf)	25%
Flexible-fuel vehicle (e.g. runs on gasoline or ethanol)	22%
Hydrogen fuel cell (e.g. Toyota Mirai)	18%
Other:	4%

As seen above in Table 7, the majority of respondents were not that interested in buying or leasing an alternative fuel vehicle, although nearly one-third might consider a gasoline hybrid and approximately 25% indicated interest in battery-electric or flexible-fuel possibilities.

Because employment with ride-hailing services such as Lyft and Uber is considered part of the "economy," often defined as an on-demand single task for which a worker is hired through a digital marketplace, we asked respondents if they would ever considered becoming a driver for such companies.[11] Of 74 respondents: 88% do not plan on becoming a driver; 4% are currently a driver; 4% would like to drive but are ineligible because of visa, licensing, or other issues; and 1% is planning on becoming a driver.

FUTURE MOBILITY

Whether describing opinions about alternatively-fueled vehicles or a future of driverless cars, many respondents touched on how transportation issues are tied to questions of income and lifestyle. Such factors can deter the the success or failure of future mobiity options, as noted by respondents who believe "we're still a ways off" of embracing a future of alternative fuels and technologies.

One of the most-discussed transportation topics in the Fresno area is the proposed high-speed rail system (HSR), originally intended to connect Los Angeles and the Bay

Area, running through the Central Valley as part of the 2002 Senate Bill 1856, "Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century."[12] As of this writing, construction has already begun on this project, within several elevated concrete piers dotting the Fresno region. However, the 800-mile rail system was scaled-back in February 2019 by newly-elected California Governor Gavin Newsom to a 171-mile stretch as a Bakersfield-Fresno-Merced section.[13]

This was the one question added to the UCD survey because it is so specifically of interest to the Fresno area: Does the public feel that high-speed rail is or is not of value, and why do they believe that? Of the 74 respondents to this open-ended question, results were mostly split: 49% (n=36) described high-speed rail as valuable, while 51% (n=38) did not see it as a benefit to the Fresno region. Among the top reasons given for these opinions:

- High speed rail is not valuable: The most commonly-cited reason respondents gave for HSR not being valuable was that it's "too expensive and ridership will be limited unless subsidized". Several respondents echoed this disapproval of the high-speed rail throughout the rest of the survey as well, calling the project "a huge boondoggle" and saying that "funds could be [better] used to upgrade our freeways and roads." Other negative opinions about the project included a perceived poor design and a lack of potential ridership in the Central Valley; in addition, several reported thinking that "it is never going to be ready." Several also reported believing that the farming and agricultural industries would be destroyed by construction of the current design.

- High speed rail is valuable: A commonly expressed belief was that the HSR system would "connect our communities to both ends to enhance work opportunities, cultural experiences, academic opportunities, and leisure experiences," although several respondents wondered if its shorter route would truly connect the state. Others stated that it "would get cars off the freeway and would be quick and safe transportation," also citing fuel efficiency and decreased pollution as benefits. Some, who believed that HSR trips would be "easier and quicker and cheaper" than currently available options, expressed the opinion that there is a need for "more options for that kind of travel."

While the high-speed rail project is years away from completion respondents believe that their current preferred mode of transportation would remain largely the same over the next three years.

Table 6. Projected Car Ownership Within the Next Three Years

Projected Ownership	Percentage of Respondents (n=74)
Keep the same total but replacing one or more cars	47%
Increase the number of cars	24%
Do not change -- will not add, get rid, or replace a car	19%
Do not know	7%
Decrease the number of cars	3%

As seen in Table 8, only 3% of participants plan to decrease their number of vehicles. It is possible, however, given the previously mentioned concerns about Fresno area transportation, that this percentage would be different, with residents being more receptive to decreasing their car use, if public transit, road repair, and other issues were to be adequately addressed.

Respondents were also asked for their opinions about about fully autonomous self-driving vehicles; such vehicles drive themselves, control all operations, and are even able to travel without a human inside. The results are presented in Table 9.

Table 7. Highest Level of Concern about Self-Driving Vehicles

Concern	Percentage of Respondents (n=82)
Safety	46%
Cost	28%
Feasibility	26%

Cost is a primary concern of respondents when asked about future mobility possibilities. They also resported feeling that options involving alternative fuels and driverless vehicles are not feasible for those who are not able to afford them; according to one respondent, “Access to this technology is limited...similar to what’s available only to the private jet set economic elite.” Interestingly, despite these stated concerns, previous research has found that fuel price is not a strong predictor of public support for mass transit, although volatility in fuel price is a predictor. This result illustrates the importance of empirically measuring the degree to which fuel prices influence respondents’ willingness to support transportation alternatives, including investment in alternative fuel technology as well as in mass transit improvements.[14]

Safety was also mentioned as a concern regarding potential future transportation options, especially in reference to autonomous vehicles. A driverless car is a complex system and recent news articles about crashes of driverless cars, including a fatal accident by an Uber automated driving system, were cited by several as reasons for distrust of fully autonomous vehicles.

Feasibility was the final concern mentioned: this factor concerns the question of which transportation solutions may be most easily accomplished, considered separately from safety and cost concerns. Overall, respondents’ concerns are in accordance with the goals of the Fresno County Regional Active Transportation Plan to improve health, reduce air pollution, and foster savings on car expenses.[15]

These findings echo other studies about pubic perceptions of autonomous vehicles. For instance, a recent study of early adopters in Berkeley, California, found that benefits were viewed as potential safety issues, ease of parking, and ability to mulltitask while en route. In contrast, concerns were the costs of technology, losing control of the vehicle, and liability.[16]

IV. DISCUSSION

This project had two scholarly goals: One goal was to poll selected Fresno citizens by administering a portion of a survey recognized statewide as a model of public opinion. These results can help policymakers and others plan and develop services that are responsive to identified needs and desires of their communities. The second goal was to identify opportunities to advocate for transportation innovations in this area. Boiled down, this survey showed that respondents see a need to increase public outcome expectations that investing in innovative options will lead to a better return on investment, including:

- Addressing safety and road conditions in the Fresno area
- Education and promotion of ridesharing, alternative fuel, and autonomous transportation solutions, such as increased, target public information campaigns about:
    - Types of solutions (focusing on what is present and available)
    - How to access solutions (which are better than the status quo)
    - Benefits/challenges of initiatives (asking about perceived high-speed rail threats to agriculture and safety factors of self-driving vehicles)

Based on our findings, Fresno should be viewed as a prime area for focused public information campaigns to foster improvements to current travel patterns, especially tied to attitudes about commuting patterns. There is potential to grow carsharing and ride-hailing markets in the San Joaquin Valley, for instance, where currently, significant numbers of residents either are unaware of or have never used these modes of travel. Additionally, our respondents' concern about the safety of driverless cars could be addressed by discussions about the car rates of driverless versus driven cars, given that 94% of vehicle crashes had driver-related errors, such as poor recognition, decision-making, and performance.[17]

Multiple health concerns were also expressed about San Joaquin Valley air quality and public safety, issues which can be linked to efficient transportation planning. Studies are needed about how and when the lay public chooses to become involved in active transportation benefits, active transportation options, and facilities and barriers to active transportation. Such strategies will lead Fresno from the passive "awareness" state to "action," from public "information" to "participation."

It is also essential for communication to only inform the citizenry, but also to be informed by their concerns, while also recognizing that traditional polling efforts (such as telephone surveys) face decreasing response rates, making it harder to gauge issues of interest when symbolic roles of participation are more important than instrumental roles.[18] Part of this struggle is the mixture of quantitative survey answers with more qualitative statements from responders, a difficulty with open-ended data that does not always fit perfectly into assumed coding categories.

Future projects could poll larger samples by approaching a more representative sample of the population. As noted previously, the latter could be accomplished by using the U.S Census Bureau's most recent American Community Survey estimates of regional demographics to weight the survey's results in order to improve representativeness. Efforts could also target a greater number of key stakeholders from special interest groups, such as bicyclists who are inherently supportive of active transport. While this survey purposefully targeted a small population within the area, a larger, more diverse cross-section of citizens would add richness to the discussion, as would the use of quantification for measuring and analyzing viewpoints. This would overcome limitations of this project given that findings are largely limited to the responses of the 74 people who fully completed the survey, thus reducing generalizability. Such a small sample size also reflects the perspectives of mostly educated respondents who were well above the median household income threshold.

Finally, this study encourages examinations of democratic rhetoric patterns and other methods of involving key opinion leaders in fostering citizenship engagement and learning.[19] To increase success in public polling and deliberation, we recommend exploring options other than the traditional surveys, town halls, and websites. Researchers are seeing a number of methodologies that combine qualitative and quantitative methods; for instance, the Nevada Department of Transportation conducted public workshops (for open-field qualitative responses), while also promoting web-based options that give more quantitative data.[20] Such interactive approaches may inspire deeper citizen discussions that move beyond local issues to larger perspectives. The Fresno area is not alone in needing more solicitations of public opinion to identify barriers to the adoption of innovative transportation solutions, including issues of accessibility and other factors and perspectives. To that end, we recommend that regional transportation agencies and key opinion leaders consider the adoption of frameworks that increase the value of public engagement through a programmatic approach. For instance, the Texas A & M Transportation Institute provides this list of eight steps to achieve effective public engagement, some of which are modified here for the Fresno area:[21]

1. Enlist and continually expand community-based networks of movers and doers (both elected and non-elected) to assist in educating various community segments. (Tools: Accessible events that expand the scope of potential solutions and clear project information that is consistent across projects.)

2. Ensure that leader/educator networks have ongoing, meaningful interaction with citizens in a manner that accurately reflects the input and opinions of those whose lives are affected on a daily basis by issues such as worsening traffic congestion, air quality, and local road conditions. (Tool: Engaging interactions, such as interactive discussions, tabling at community events, etc.)

3. Ensure that public engagement efforts at all levels are sufficiently funded so to ensure that all audiences are heard from, and that feedback from those audiences is accurate and meaningful. (Tool: Coordinating consistency and goals of engagement efforts by multiple agencies that include regional partnerships with targeted funding.)

4. Expand the use of technology in public engagement. (Tools: Multi-platform strategies will increase the reach and impact of efforts when participation is possible through print, online, and in-person communications.)

Such collaborations could also include specific public engagement activities that are project-specific; for instance, information gaps about the benefits of high-speed rail, driverless cars, or active transportation could go beyond reaching a small proportion of the affected public with broader partnerships. Such strategies should include multiple assessment measures, such as targeted polls, in order to measure the reach and success of campaigns.

This project is intended to help set the stage for the deployment of a variety of norms and tools on the part of public agencies and officials seeking to enhance the citizenry's collective voice. In future research, polls, surveys, and other one-time measurements that reflect only a respondent's reactions could be greatly enriched with prior deliberative processes in which respondents are able to hear and engage with each other's views.[22] Future research efforts that include pre- and post-interviews with transportation decision-makers can potentially add significant value to the body of knowledge about evaluative models of democratic deliberation, adding a valuable dimension to traditional polling projects that seek to measure levels of thoughts or concerns about risks and benefits of transportation.

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