OKI Evaluation of Intelligent Transportation System

prepared for

Ohio-Kentucky-Indiana
Regional Council of Governments

prepared by

Cambridge Systematics, Inc.

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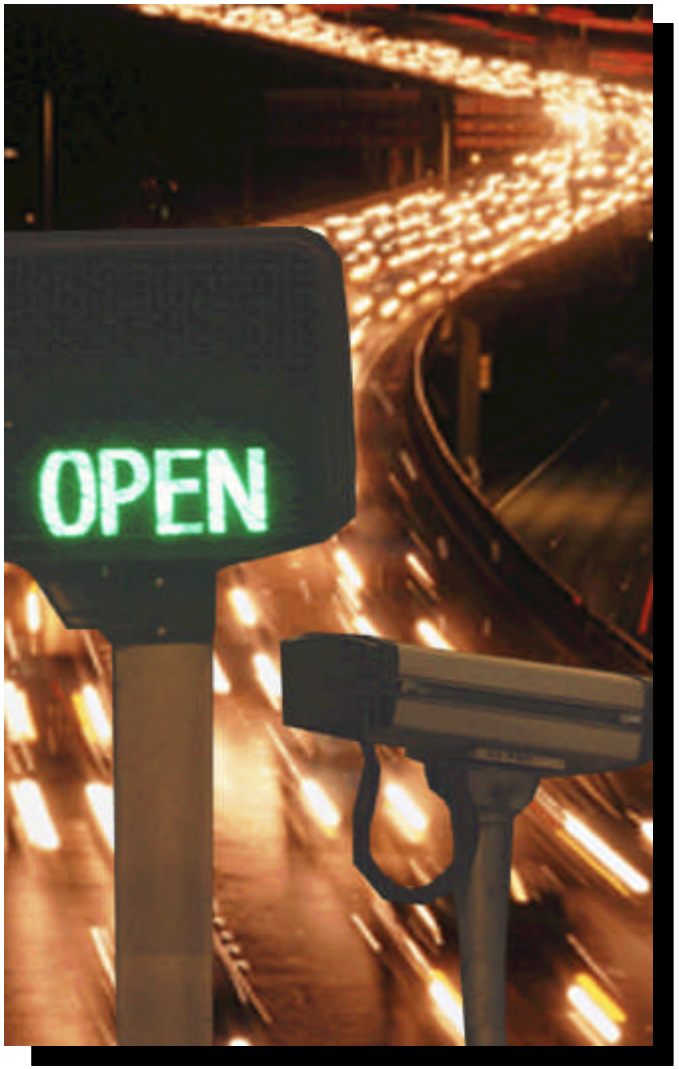
Introduction

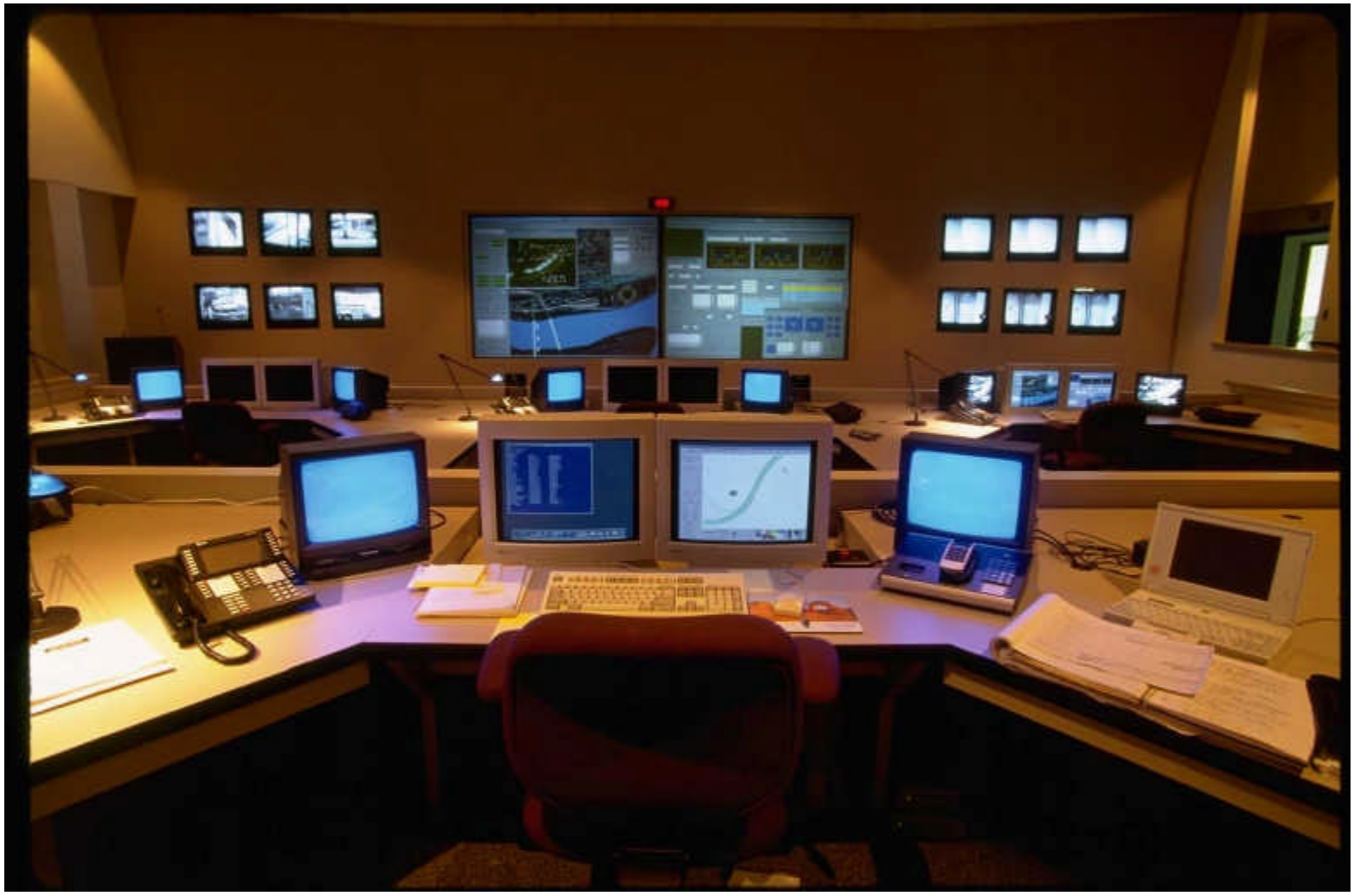
Introduction
Project Overview

- **ARTIMIS is one of the earliest ITS systems deployed in the US with preliminary studies being initiated in the late 1980's and early 1990's.**
  - ✓ **ARTIMIS provides traffic management on major routes within the greater Cincinnati and Northern Kentucky regions (see Control Center on next page.)**
  - ✓ **ARTIMIS components include changeable message signs, mobile 211#, highway advisory radio, service patrol vans, reference markers, vehicle detectors and total station electronic surveying equipment.**
- **The major goals of ARTIMIS are to provide quick identification and clearance of incidents, and enhance public safety and the quality of life through the provision of real-time, advanced traveler information.**
- **With this in mind, OKI, the Ohio Department of Transportation and other agencies commissioned an evaluation of ARTIMIS in order to:**
  - ✓ **Measure the public's awareness and use of travel information, and ARTIMIS and its components;**
  - ✓ **Assess the need for public traveler information;**
  - ✓ **Identify actions to strengthen support for ARTIMIS.**



Introduction

Project Overview - ARTIMIS Control Center



Introduction
Project Issues

- **The strategic issues that were addressed for the first task of the evaluation included:**

Task 1 - Public Perceptions

- **What is the public's perception of ARTIMIS?**
- **What is the public's attitude toward ARTIMIS components?**
- **Has prior publicity about ARTIMIS influenced public perceptions?**
- **Which advanced traveler information and ARTIMIS services are used by the general public?**
- **What improvements would the public like to see made to ARTIMIS?**

Introduction
Project Issues (continued)

- **While, the issues addressed for the second task included:**

Task 2 - Agency Perceptions

- **What are local transportation and public safety agencies' perceptions of ARTIMIS?**
- **What benefits are achieved by ARTIMIS in terms of improving incident response times and safety?**
- **Have cost and operating efficiencies been achieved as a result of ARTIMIS?**
- **What ARTIMIS improvements would be beneficial to emergency response agencies?**

Introduction
Project Tasks Descriptions

- **The evaluation of ARTIMIS proceeded on two levels, where different methods of data collection were used to obtain information pertaining to:**

  Task 1 - Public Perceptions

  - *Qualitative Research:* **identify highway travelers' need for advanced traveler information and preferences for how it should be delivered;**
  - *Quantitative Research:* **gauge the awareness and usage of ARTIMIS components and provide direction for future improvements.**

  Task 2 - Agency Perceptions

  - *Qualitative Research*: **uncover specific ARTIMIS benefits to emergency response and local transportation operations personnel.**

- **It should be noted, however, that only the results from Task 1 are presented in the remaining sections of this two-part report.**

Introduction
Project Research Design: Task 1 - Public Perceptions

Qualitative Research

- **A total of two focus group sessions were conducted on February 16, 2000 in Cincinnati, Ohio.**
- **These sessions were held among travelers who take three or more trips per week for:**
  - ✓ **Work-related (commuters) or commercial purposes; and,**
  - ✓ **Travel on routes served by ARTIMIS (I-75, I-71, I-295, Norwood Lateral, Ronald Reagan Hwy).**
- **The two groups were distinguished on the basis of the amount of advanced information sought by travelers as follows:**
  - ✓ ***High Travel Information Users -***
    use the mobile 211# or landline toll free phone, HAR or Internet web site at least once per week
  - ✓ ***Low Travel Information Users -***
    do not use any of these sources or use each source less than once per week
- **A brief overview of the key findings from the qualitative research phase is presented in the next section, while a more detailed management summary can be found in Appendix B.**

Introduction

Project Research Design: Task 1 - Public Perceptions (continued)

Quantitative Research

- **A total of 375 telephone interviews (CATI) were completed between April 3 - 7, 2000 within the greater Cincinnati and Northern Kentucky regions.**
- **Interviews were conducted among a proportionate random sample (RDD) of households located in seven different counties served by ARTIMIS as follows :**

Ohio (N = 305)	Kentucky (N= 70)
Butler	Boone
Clermont	Campbell
Hamilton	Kenton
Warren	

- **The sample was drawn to reflect the actual distribution of households within each county across both states.**
- **To qualify for participation in the survey, individuals had to:**
  - ✓ **Reside in one of the seven counties;**
  - ✓ **Be over 18 years of age; and,**
  - ✓ **Not competitively employed.**
- **For purposes of analysis, heavy ARTIMIS travelers were defined as taking 6 or more trips (legs) per week.**

Introduction

Project Research Design: Task 1 - Public Perceptions (continued)

Quantitative Research Survey

- **A CATI-formatted telephone survey was developed in order to capture the general publics' responses to each of the issues previously delineated for Task 1 (see Appendix C).**
- **The specific content areas of the survey included:**
  - ✓ **General travel behaviors and habits;**
  - ✓ **Awareness and usage of information sources;**
  - ✓ **Awareness and perceptions of ARTIMIS;**
  - ✓ **Alternative travel behaviors;**
  - ✓ **Household demographics.**
- **Also, OKI was identified as the sponsor of this research in an effort to increase initial cooperation and completion of the survey.**

Implications & Recommendations

Implications and Recommendations

Based on a synthesis of information gleaned from both qualitative and quantitative phases of research, there are several clear-cut implications that can be leveraged to strengthen overall support for ARTIMIS.

Overall awareness of ARTIMIS is marginal at best -

- **Proactive marketing and communications campaigns such as television and radio spots or road signs are needed to strengthen public recognition.**
- **The need to increase awareness is especially true for heavy travelers who would benefit most from having advanced information.**

The term ARTIMIS conveys little meaning and is difficult to remember -

- **Creating a strong brand image can result in increased system usage and the perceived quality of services provided - this can be likened to a halo effect where the more positive the image, the more positive the perceptions will be about the system and its components.**

Despite awareness, ARTIMIS is having a significant impact on the quality of commuter life -

- **Satisfaction is quite high for the overall quality and reliability of the services provided.**
- **Traffic conditions and the quality of information in general is perceived as improving.**

Implications and Recommendations

If you want to reach travelers, the best method for disseminating information is through the radio, especially on commercial stations and for some over dedicated HAR channels -

- **Associating ARTIMIS with a highly credible "on-air" personality can increase general awareness, strengthen the perceived quality and accuracy of information provided, and lead to greater traffic information utilization.**

The use of ARTIMIS system components is not nearly where it should be when viewed from the stand point of original investments -

- **Travelers tend to use traditional passive sources like the radio and TV that do not require a great deal of technological sophistication and manipulation such as a mobile phone.**
- **More advertising dollars need to be spent promoting the benefits of using the mobile phone 211 number and the Internet as reliable advanced traveler information sources.**

The most prominent ARTIMIS system component, Changeable Message Signs, is not considered as useful as it could be -

- **There is a need to optimize the content and location of signs before deciding to build more of them - this could include displaying "estimated travel times" to specific nodes while en route among others of value.**

Analysis:

Task 1 - Qualitative Research

Key Learnings
Overall Implications

A number of strategic marketing and communications implications emerged from the qualitative research that were generally supported by information obtained in the subsequent quantitative phase of research presented in the next section of the analysis.

- **The term "ARTIMIS" has very little equity in the general public.**
  - ✓ *It can't be spelled out; and,*
  - ✓ *It does not convey any information about the system or what it delivers.*

- **Travelers have very little knowledge about the types of information services provided by ARTIMIS.**
  - ✓ *Awareness and usage of system components is relatively low; while,*
  - ✓ *Changeable Message Signs and emergency service vans are the exceptions.*

- **There are few, if any, lingering effects of prior negative press.**
  - ✓ *Unfavorable press during the initial phases of system construction is not recalled; and,*
  - ✓ *Current press is viewed as being more sensational than news worthy.*

- **Travelers do not feel that ARTIMIS delivers high quality and reliable travel information services.**
  - ✓ *Other information sources had greater credibility, especially the radio; and,*
  - ✓ *Passive information sources are more convenient and safer to use.*

Key Learnings
Action Items

- **Based on comments made by participants in the group sessions, suggestions for enhancing the overall quality and reliability of ARTIMIS included:**

1. **Change the way Changeable Message Signs are configured in terms of content, number and locations;**
2. **Make the 211 number more user friendly and provide more accurate, timely information;**
3. **Provide broader signal coverage for Highway Advisory Radio and broadcast continuous traffic information for locations experiencing major congestion;**
4. **Develop a Highway Advisory Radio system with dedicated frequencies for reporting traffic congestion on specific routes;**
5. **Create an automatic E-mail notification system to alert PC users about traffic congestion on their specific routes.**

Analysis:

Task 1 - Quantitative Research

What Do People Know About ARTMIS?

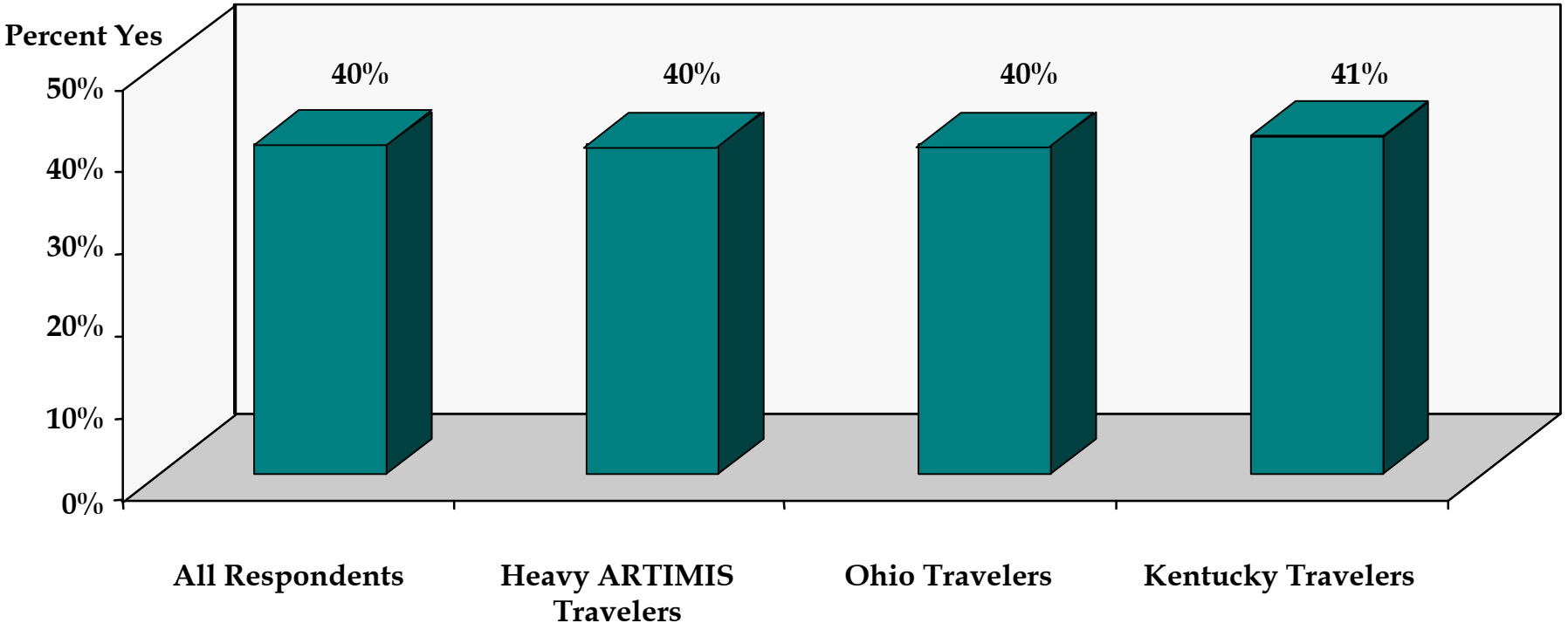
What Do People Know About ARTIMIS?
Key Learnings

- **Overall, about 40% of the general public claimed to be aware of the term ARTIMIS on an unaided basis, which was also consistent among those who frequently traveled routes served by it (40%).**
- **However, when a brief description of the term was given to those individuals who did not know about ARTIMIS, aided awareness only increased by a modest 6% (total awareness = 46%).**
- **Additionally, among those individuals who had any level of awareness, less than half (44%) thought the term had something to do with "traveler information and services".**
  - ✓ **Also, only 7% of them were able to correctly define the term; and,**
  - ✓ **Even heavy travelers were unable to provide a correct definition.**
- **With regard to the general publics' awareness of specific ARTIMIS components, overhead message signs (76%) were the most recognizable.**
  - ✓ **Heavy ARTIMIS travelers had a proportionately higher level of awareness for the HAR (24%).**
  - ✓ **Compared to Ohio, Kentucky residents had lower levels of awareness for the Internet web site (5% Vs. 15%) and the HAR (15% Vs. 21%).**
- **Approximately two-thirds (67%) of all residents were aware of the emergency service patrol vans, and among these individuals, 10% had actually used this service.**
  - ✓ **Heavy ARTIMIS travelers had much higher levels of awareness (75%) as was true of Kentucky residents (95%).**
  - ✓ **And for those travelers who used this service (10%), all of them were very satisfied (100%).**

What Do People Know About ARTIMIS?
Key Learnings (continued)

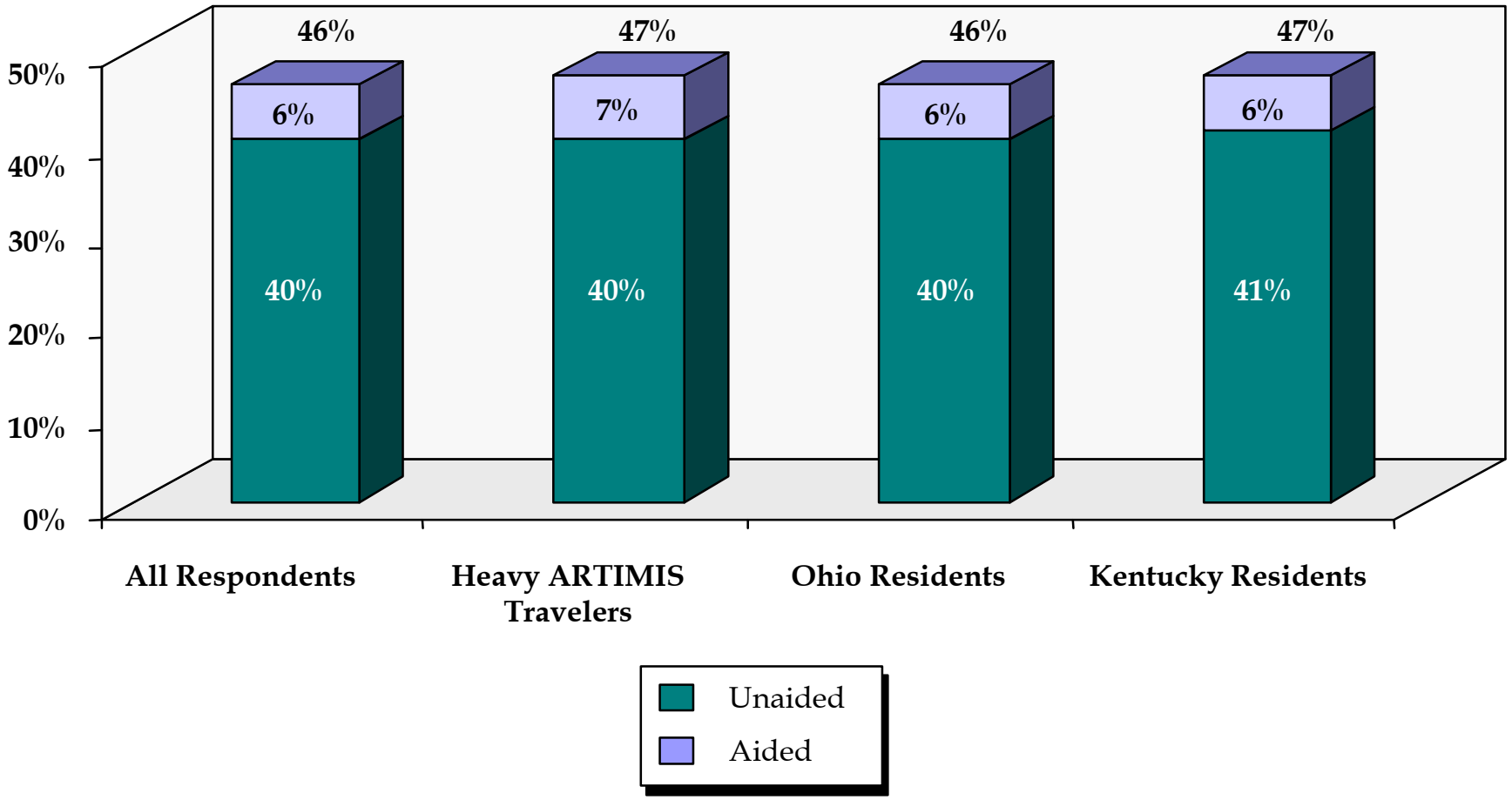
- **Consistent with the results revealed from the initial qualitative phase of research, only about one-third (32%) of the residents recalled hearing or seeing anything about ARTIMIS in the media.**
  - ✓ **Also, slightly more than half (53%) felt that the impression given by such media was favorable, while another quarter of them (24%) thought the treatment was neutral.**
  - ✓ **Also, more than two-thirds (69%) believed the media portrayal of ARTIMIS was both fair and accurate.**
- **Finally, roughly similar favorable beliefs about the media's depiction of ARTIMIS were found across each of the various subgroups examined.**

ARTIMIS Awareness
Unaided Recall



ARTIMIS Awareness

Total Awareness - Aided and Unaided



ARTMIS Awareness
Knowledge of Term "ARTIMIS"

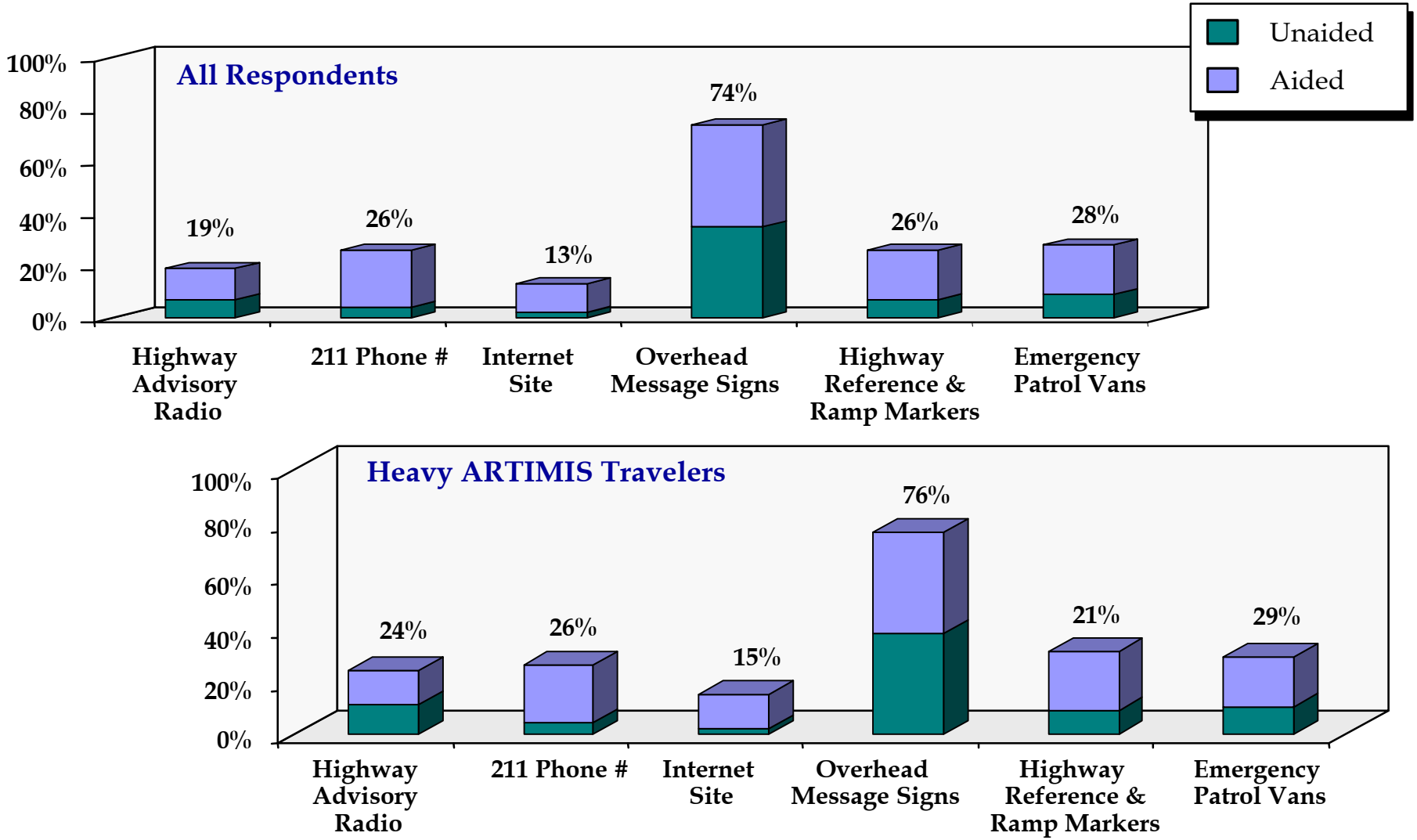
All Respondents

Traveler Information and Services	**44%**
Advanced Regional Travel Information Service	**7%**
Other Terms	**11%**
Don't Know	**38%**

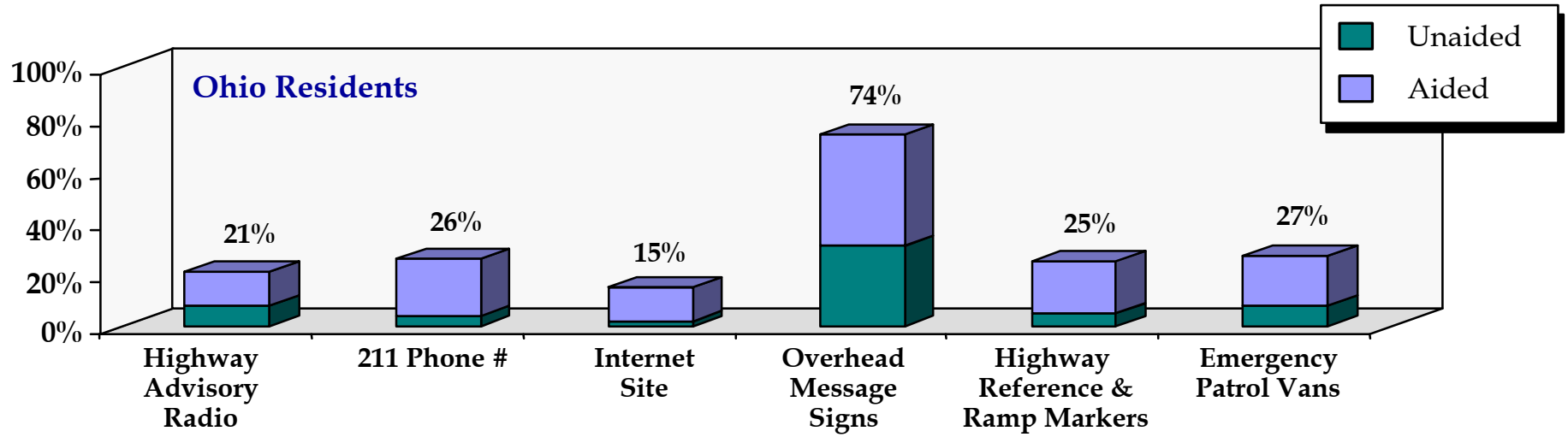
Heavy ARTIMIS travelers and Ohio and Kentucky residents had similar levels of knowledge of the term.

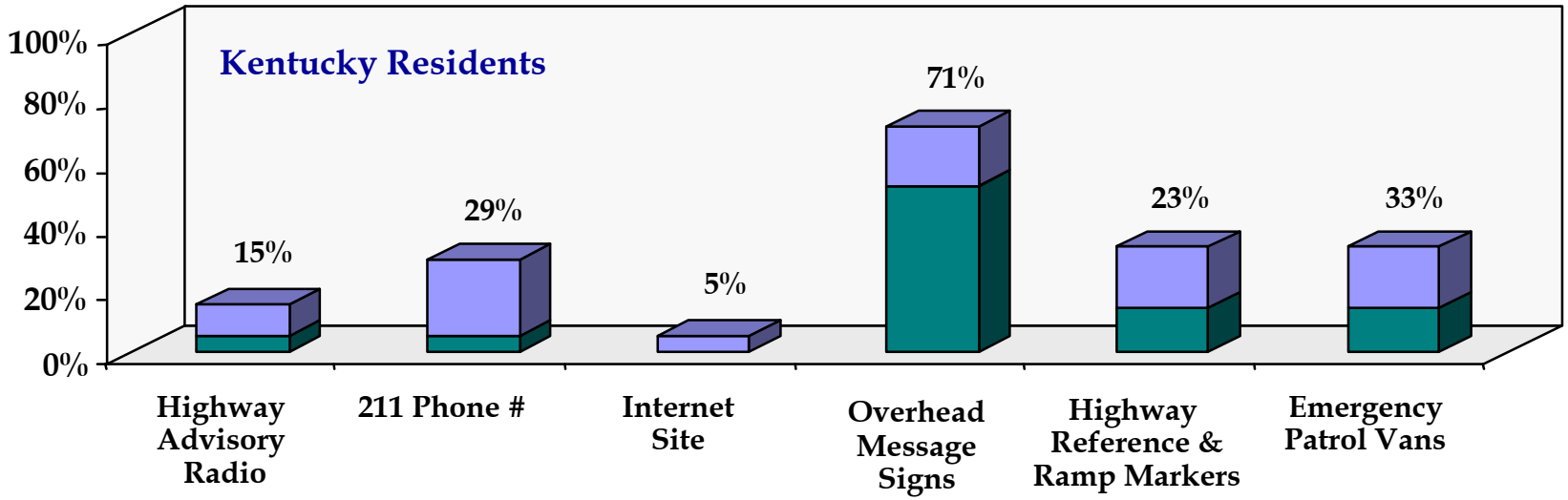
ARTIMIS Awareness

Traveler Information Services Components

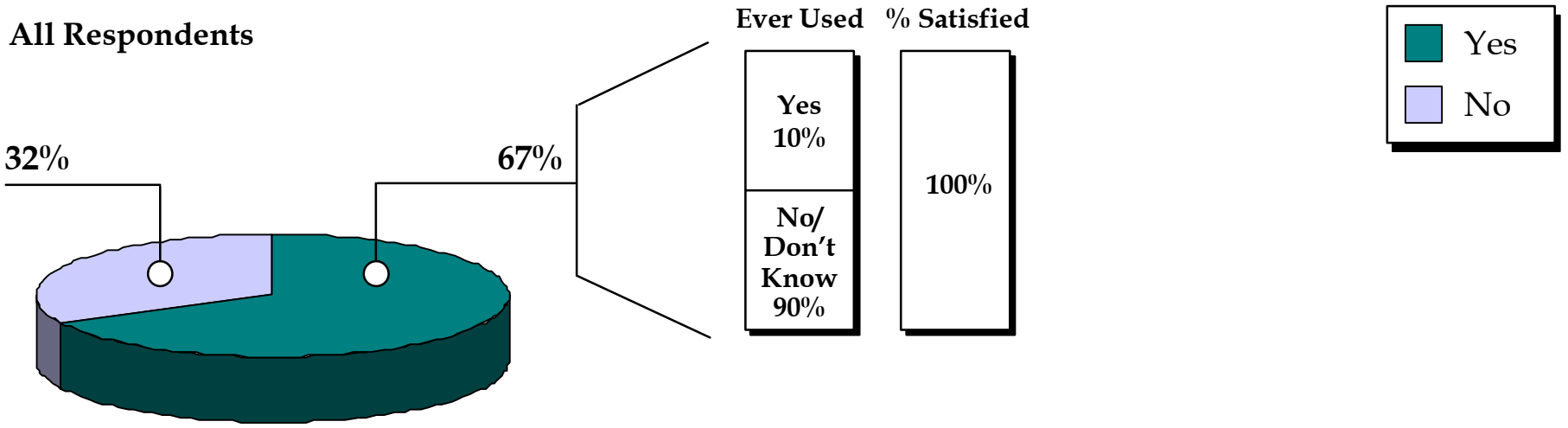


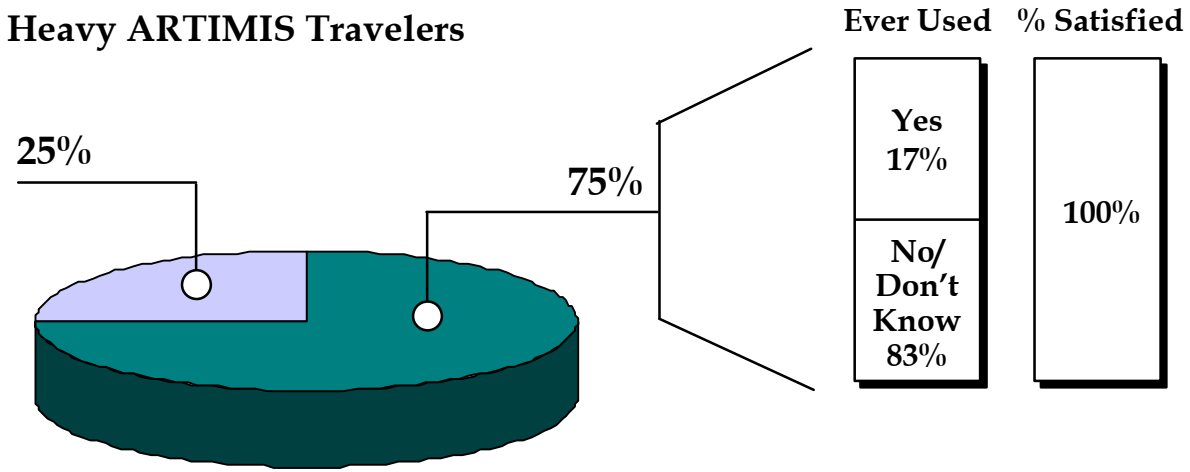
ARTIMIS Awareness
Traveler Information Services Components



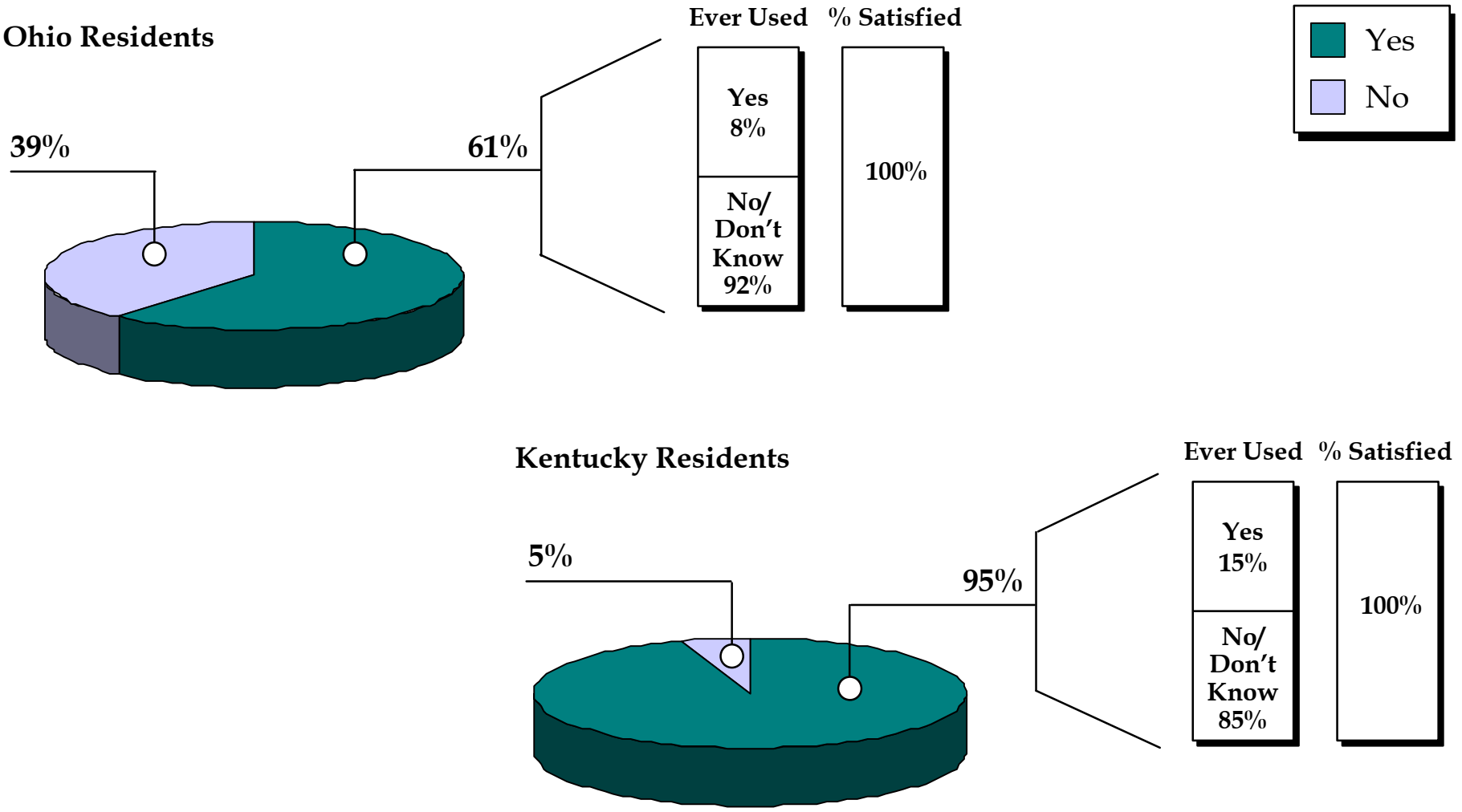


ARTIMIS Awareness
Emergency Service Patrol Vans



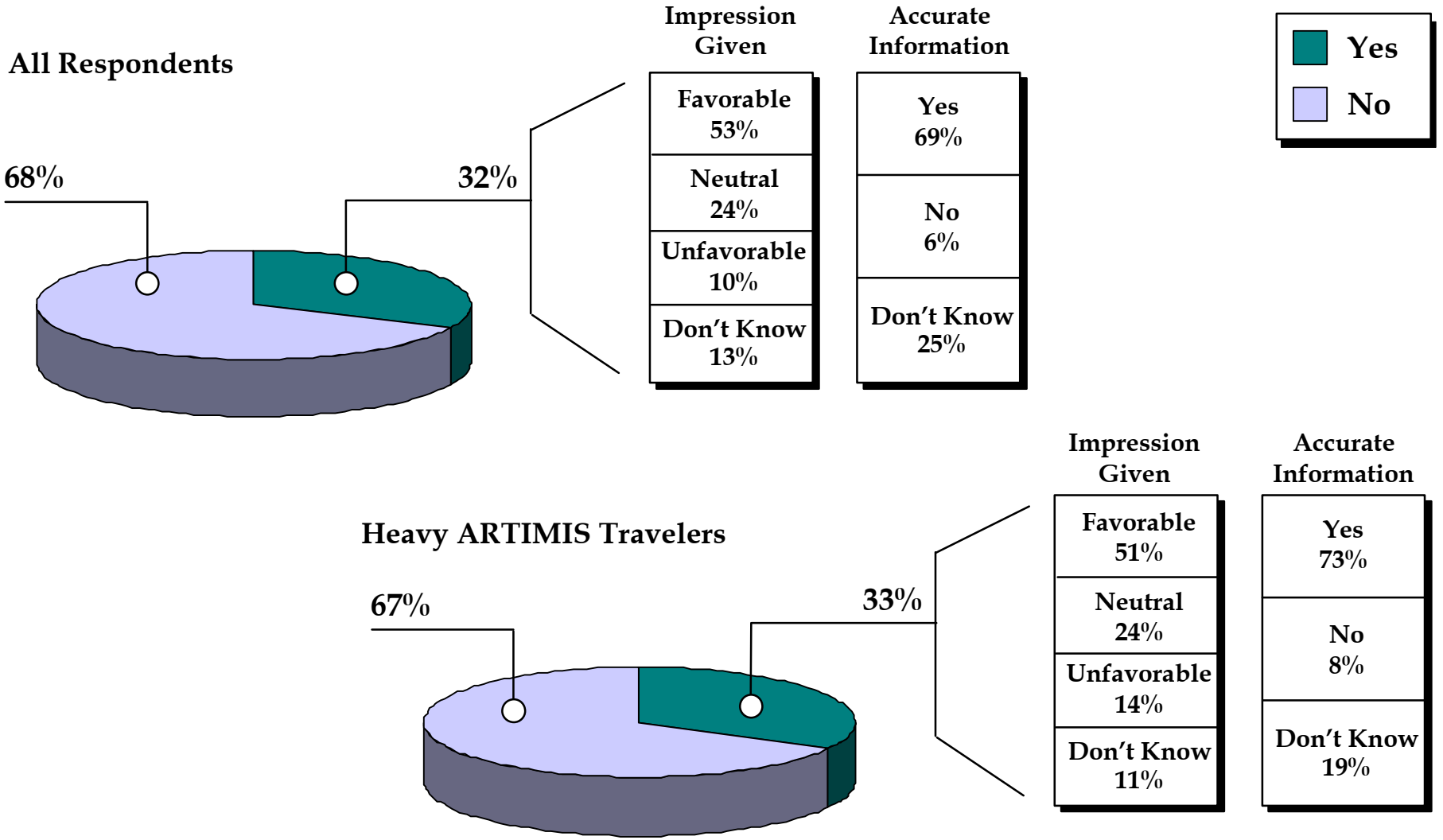


ARTIMIS Awareness
Emergency Service Patrol Vans



ARTIMIS Awareness

Heard or Seen Information About ARTIMIS in the Media



ARTIMIS Awareness

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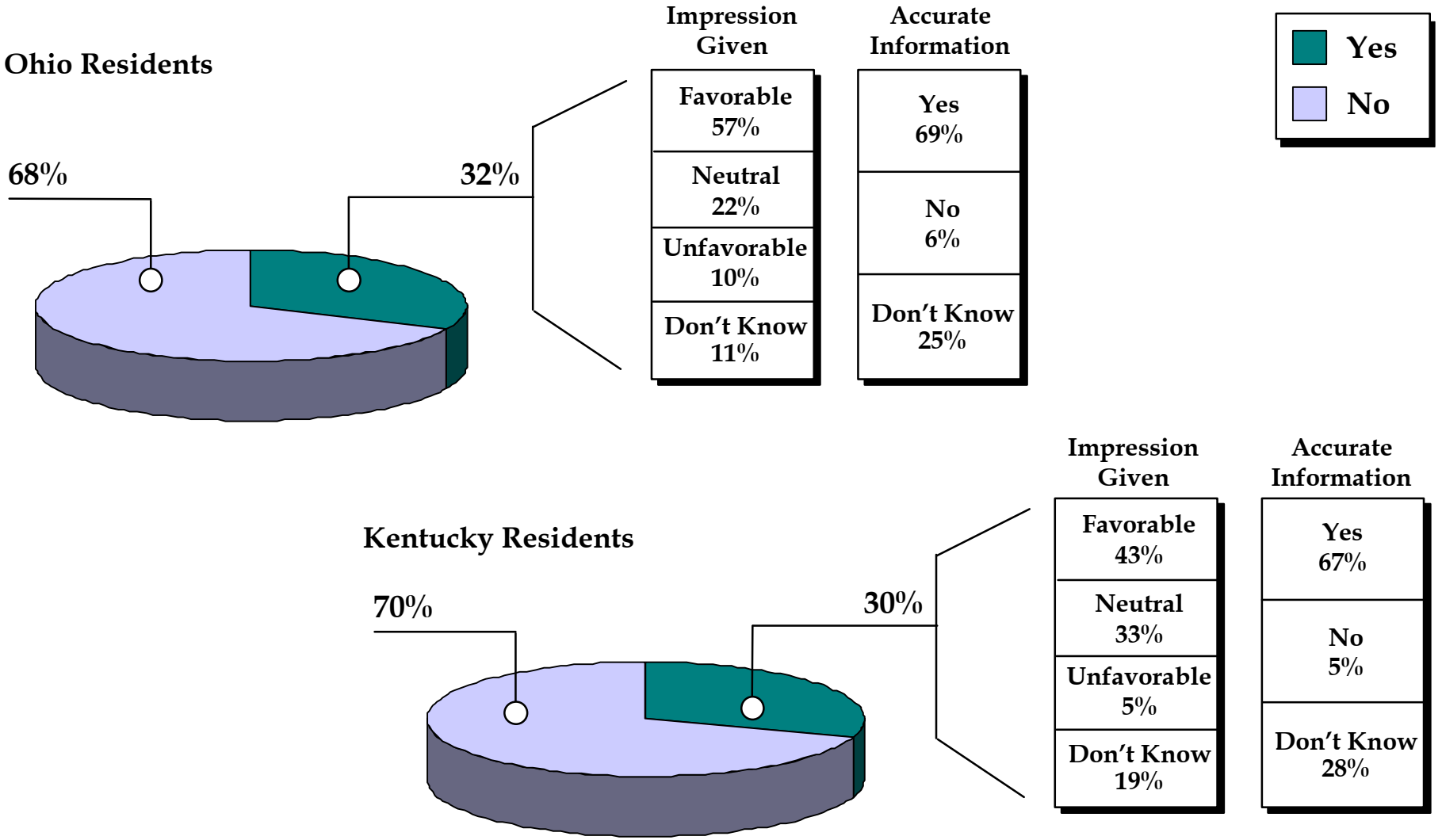


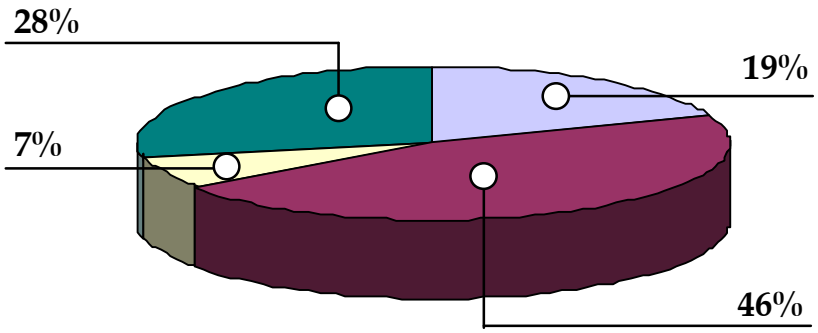
What Do People Think About ARTMIS?

What do People think About ARTIMIS?
Key Learnings

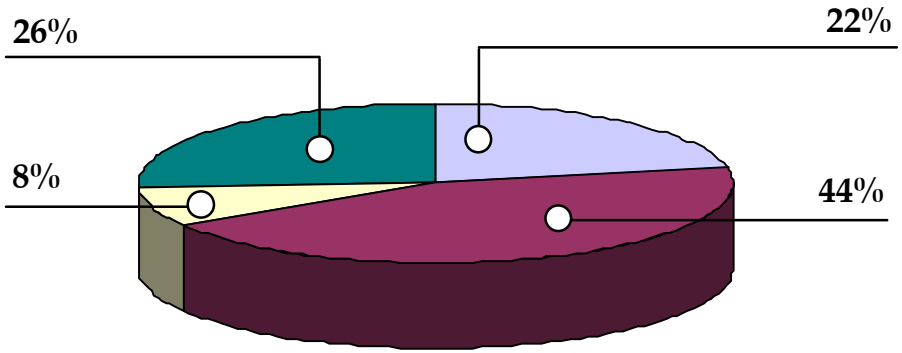
- **Despite a general lack of overall awareness, about two-thirds of all travelers who used routes served by ARTIMIS were either very or somewhat satisfied with the information services provided through the system.**
- **Further, residents also felt that highway traffic conditions in general have gotten better over the past three years, since:**
  - ✓ **43% mentioned that condition were either "much or somewhat better";**
  - ✓ **22% reported that conditions were about the same; and**
  - ✓ **Only 9% said they have gotten worse.**
- **Interestingly, Kentucky residents were less apt to say that conditions have have become "much or somewhat better" compared to their Ohio counterparts (37% Vs. 45%, respectively).**
- **Suggestions given for what residents would like to see improved mainly pertained to "placing message signs to provide more advanced notice" (15%) of traffic congestion, followed by:**
  - ✓ **Constructing more overhead message signs (12%); and,**
  - ✓ **Updating messages on signs on a more frequent basis (11%).**

Quality and Reliability of ARTIMIS
Overall Satisfaction

All Respondents

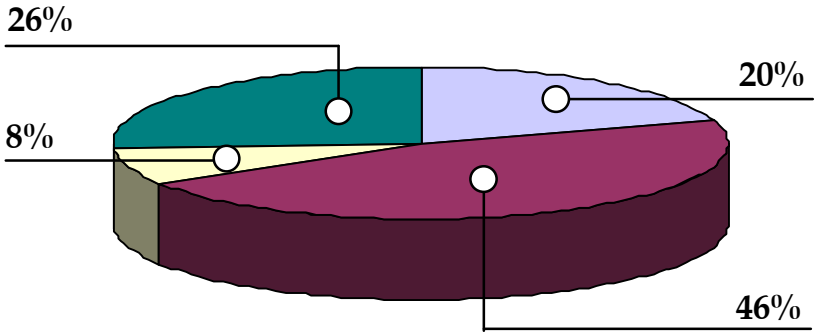


Heavy ARTIMIS Travelers

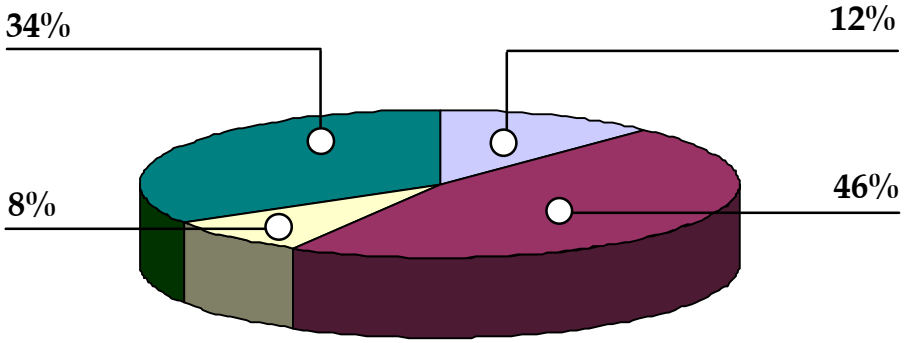


Quality and Reliability of ARTIMIS
Overall Satisfaction (continued)

Ohio Residents



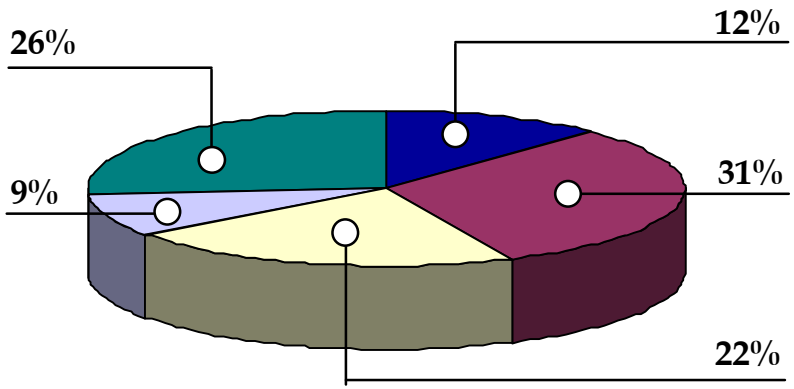
Kentucky Residents



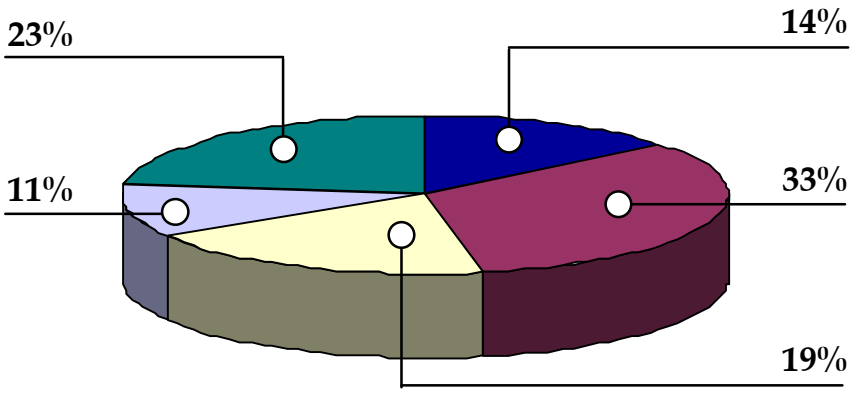
Highway Traffic Conditions

Perceived Improvements Over the Past Three Years

All Respondents



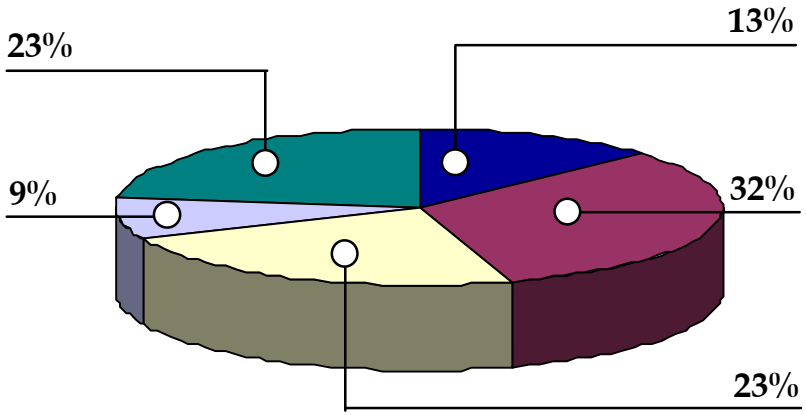
Heavy ARTIMIS Travelers



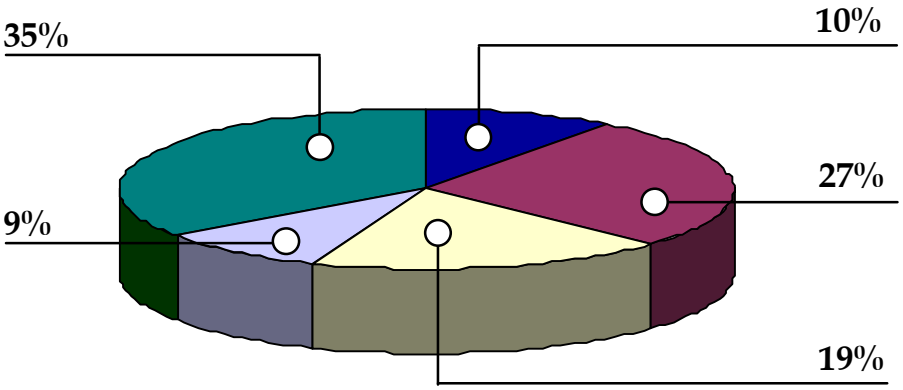
Highway Traffic Conditions

Perceived Improvements Over the Past Three Years

Ohio Residents



Kentucky Residents



Suggested Improvements to ARTIMIS

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Communications				
Placement of Signs to Provide More Advance Notice	15%	20%	14%	16%
More Signs/Overhead Signs	12%	15%	12%	13%
Update Signs More Frequently	11%	15%	11%	13%
Post More Information	7%	8%	7%	8%
Improve Accuracy of Information	5%	6%	4%	7%
Keep Signs On At All Times	5%	5%	4%	9%
Have Information Available Through Radio Signal/Station	4%	7%	4%	5%
Post Alternate Route/Detour	4%	3%	4%	3%
Post Weather Conditions	2%	1%	2%	-
Other Comments	9%	11%	9%	8%
Safety				
Emergency Call Boxes	3%	3%	2%	5%
Other Safety Comments	1%	1%	1%	3%
Miscellaneous				
Satisfied	8%	7%	9%	6%
Not Familiar	4%	3%	4%	3%
Advertise More	4%	6%	4%	2%
Other Miscellaneous	5%	6%	4%	9%
Nothing/Don't Know	34%	24%	34%	34%

What Traffic Information Services Do People Use

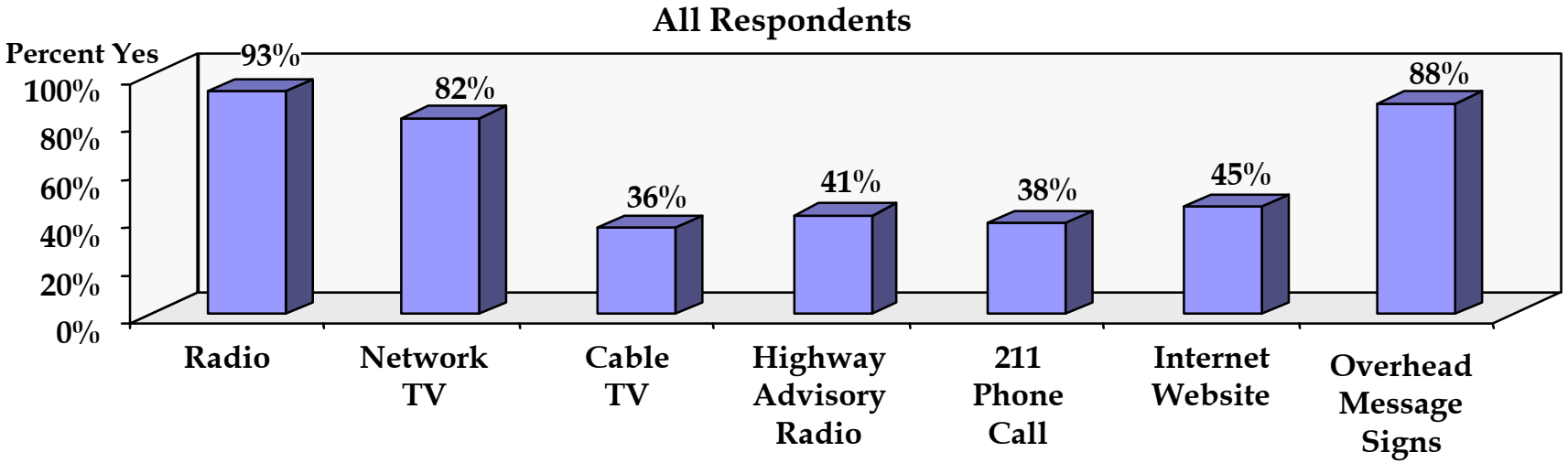
What Traffic Information Services Do People Use?
Key Learnings

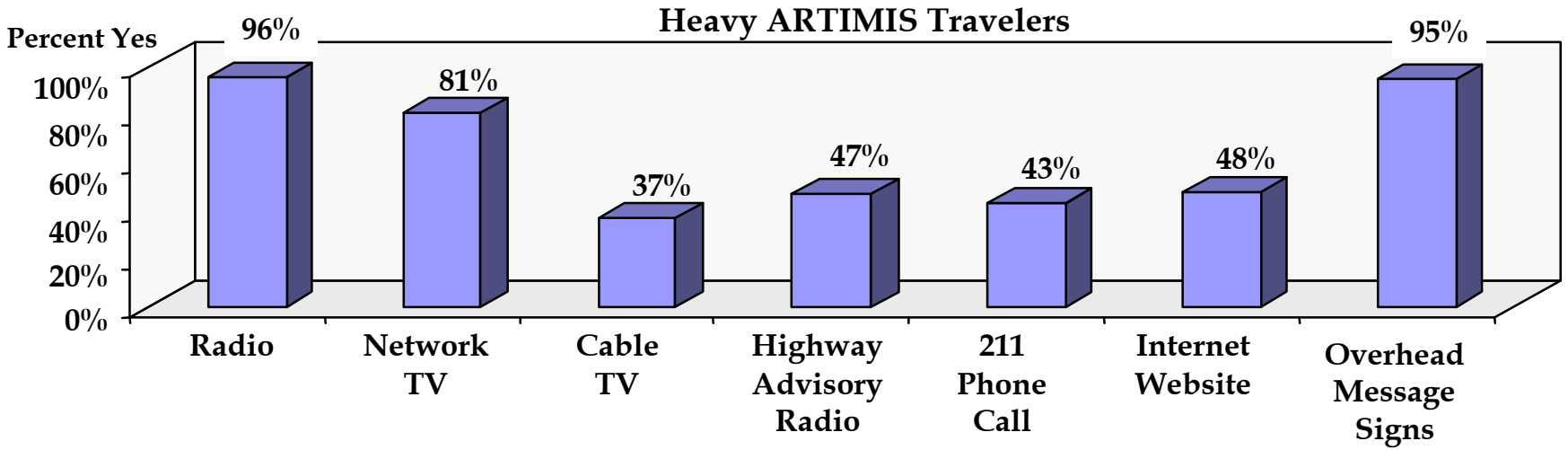
- **By far, the most widely recalled source of traffic information on an unaided basis was the radio (81%), which was remarkably consistent across all subgroups examined.**
  - ✓ **Recall of information provided by TV was a distant second (43%); and,**
  - ✓ **ARTIMIS services were about one-quarter (20%) of the level of awareness cited for radio.**
- **Surprisingly enough, recall of "overhead message signs" was not cited as a top-of-mind source since it rose ten-fold (from 8% to 88%) when residents were prompted about this source on an aided basis.**
  - ✓ **This was also true for many of the other ARTIMIS components where aided awareness ranged from about 39% to a high of 49%.**
  - ✓ **Of course, heavy travelers were comparatively more aware of specific ARTMIS components compared to the general public (aided awareness ranged from 43% to 95% for overhead message signs).**
- **In keeping with these findings, overhead message signs had the highest overall usage (83%) and frequency of use levels (41% used it more than one time per week), while the radio (63%), network TV (67%) had the next highest levels of usage.**
- **It should be noted that in terms of travelers perceptions of these information sources, all of the sources evaluated had slightly higher satisfaction ratings (7 on a 1-10 scale) than those found for overhead message signs (rating of 6).**

Awareness of Traffic Information Sources
Unaided Recall

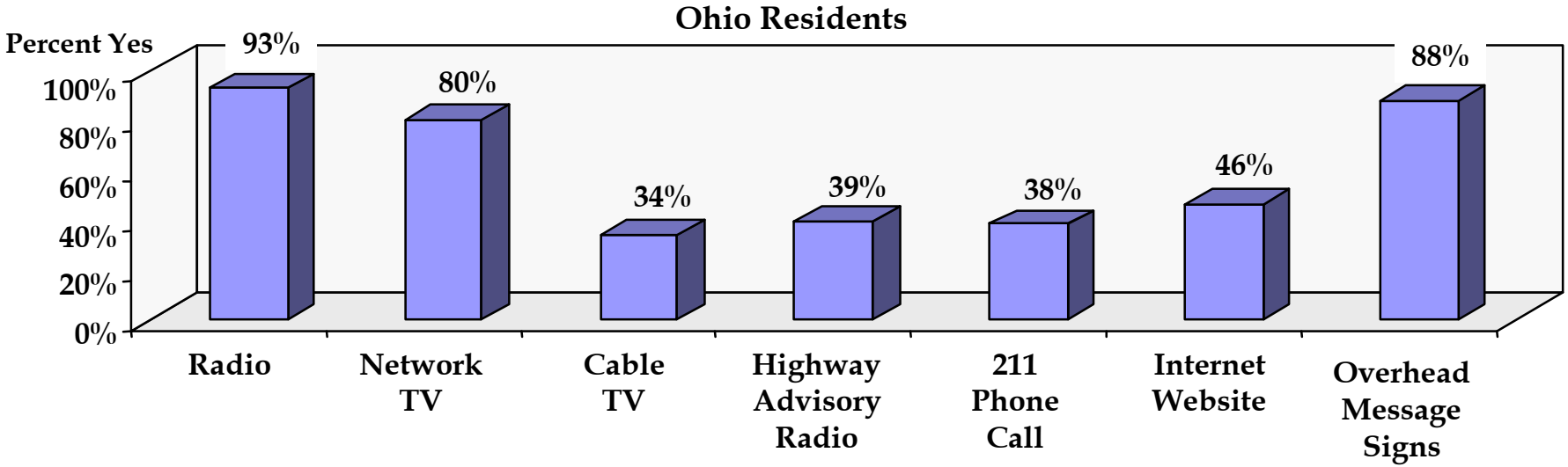
	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Radio	**81%**	**87%**	**81%**	**83%**
TV	**48%**	**43%**	**47%**	**56%**
ARTIMIS	**20%**	**28%**	**21%**	**17%**
Overhead Signs	8%	10%	7%	11%
Internet	7%	9%	8%	3%
211 Phone	6%	6%	6%	4%
Highway Advisory/Radio 540	4%	6%	3%	4%
Newspaper	**4%**	**3%**	**3%**	**4%**
Other	**7%**	**6%**	**7%**	**4%**
None/Don't Know	**7%**	**5%**	**8%**	**4%**

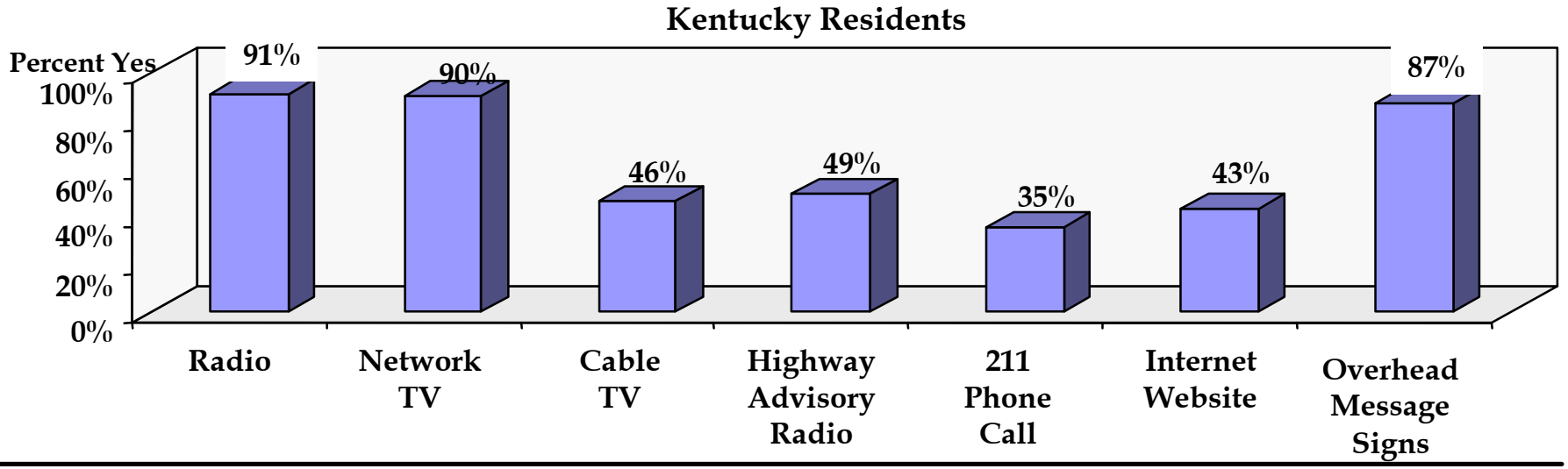
Awareness of Traffic Information Sources
Aided Recall





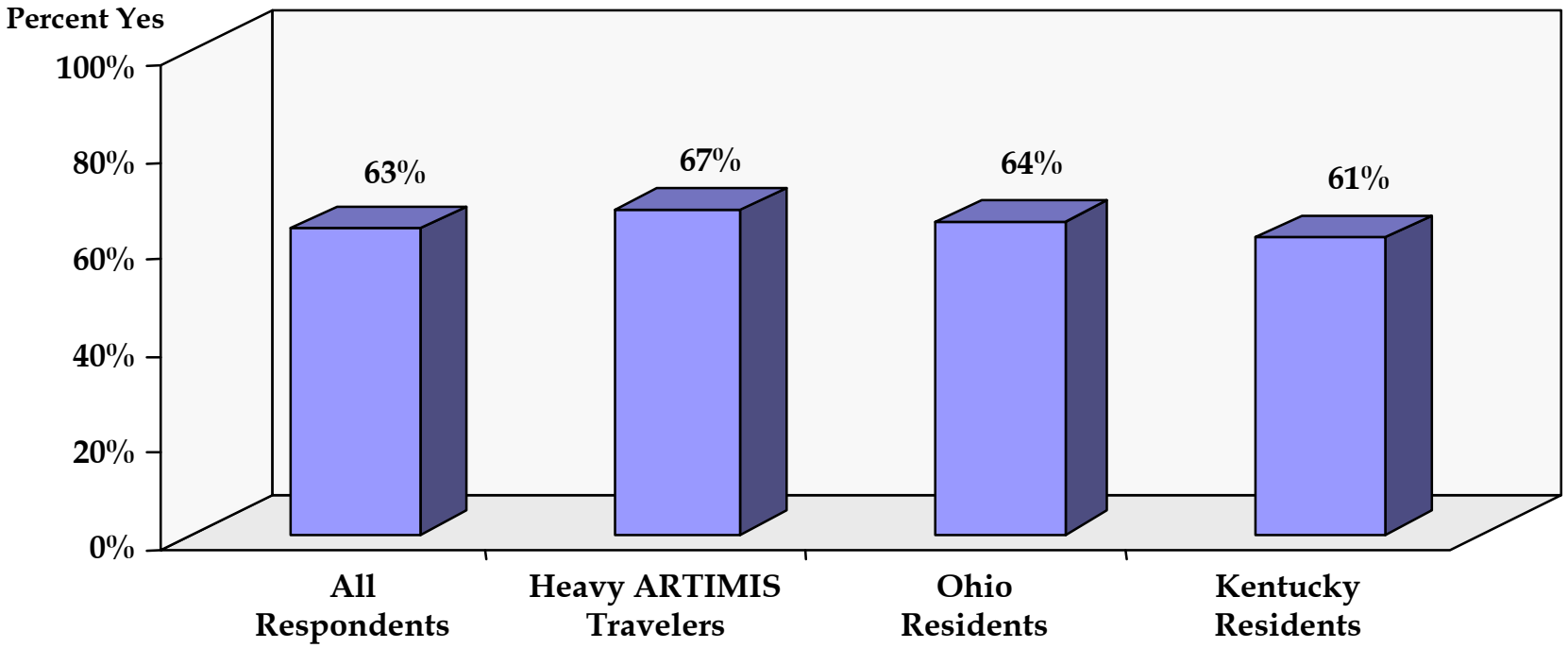
Awareness of Traffic Information Sources
Aided Recall





Aware of Radio as Traffic Information Source

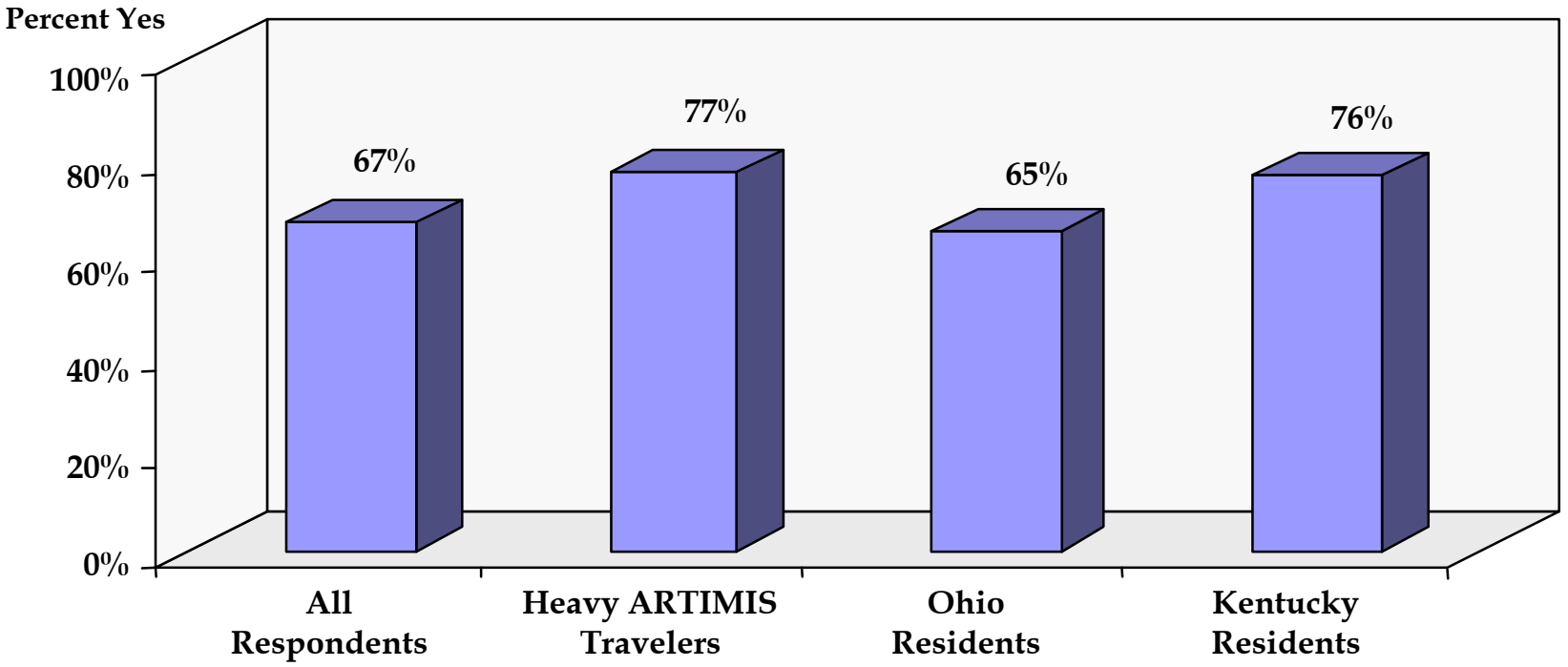
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	24%	23%	22%	31%
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	7	8

Aware of Network TV as Traffic Information Source

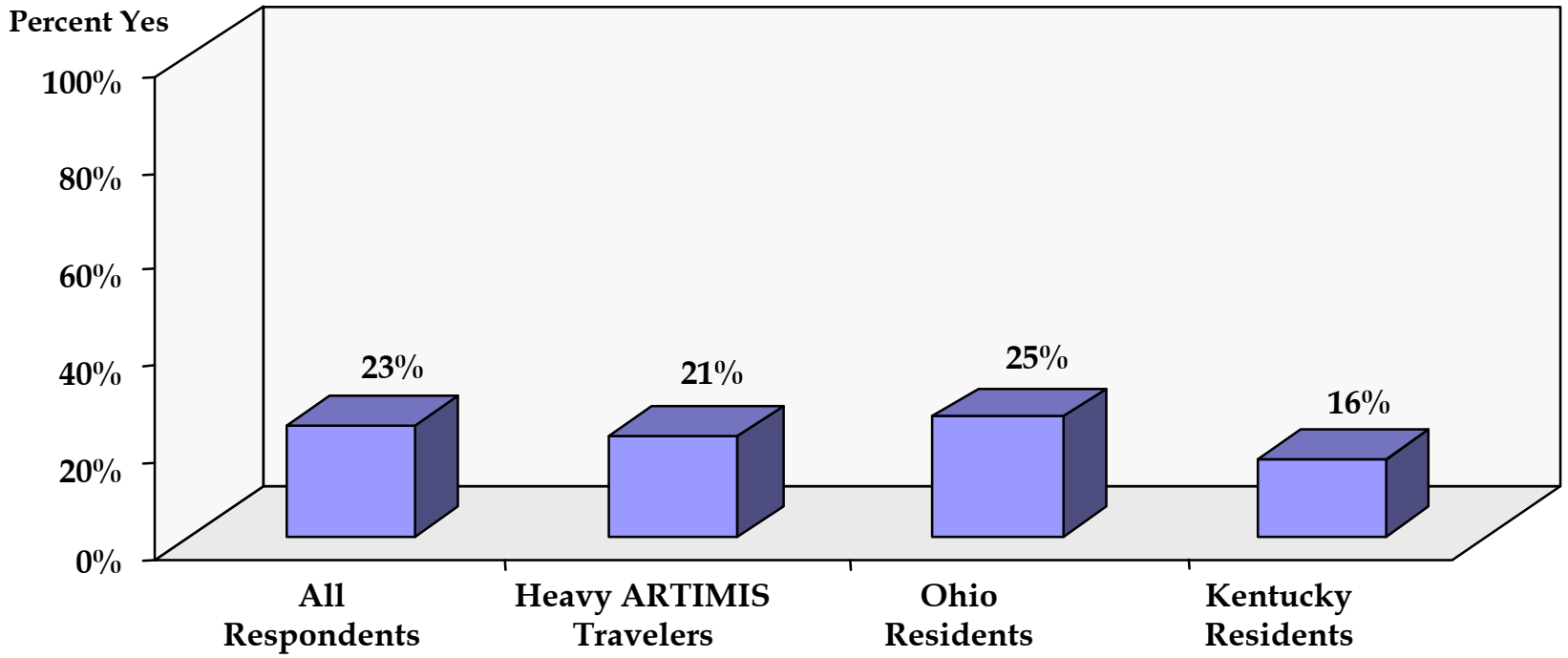
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	63%	61%	65%	58%
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	7	7

Aware of Cable TV as Traffic Information Source

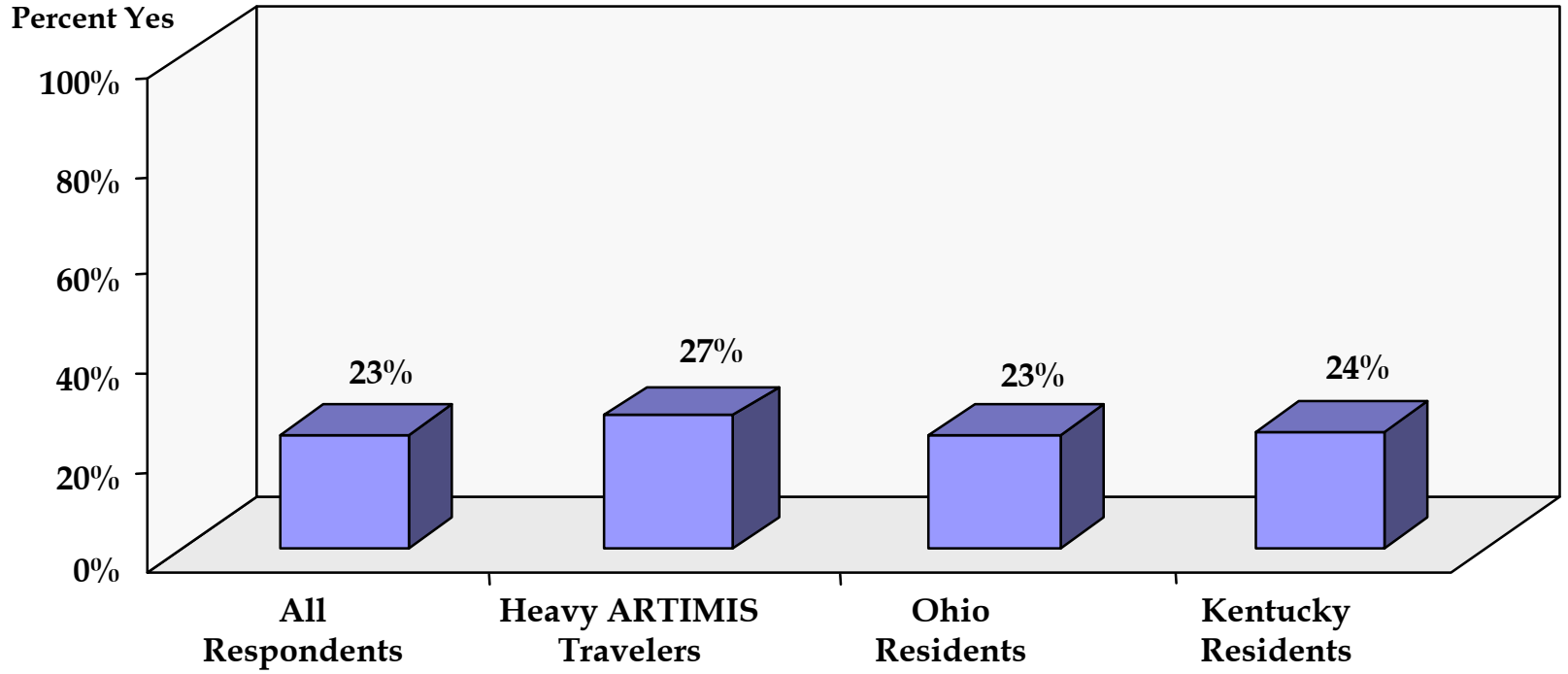
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	54%	43%	55%	50%
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	7	6

Aware of Highway Advisory Radio as Traffic Information Source

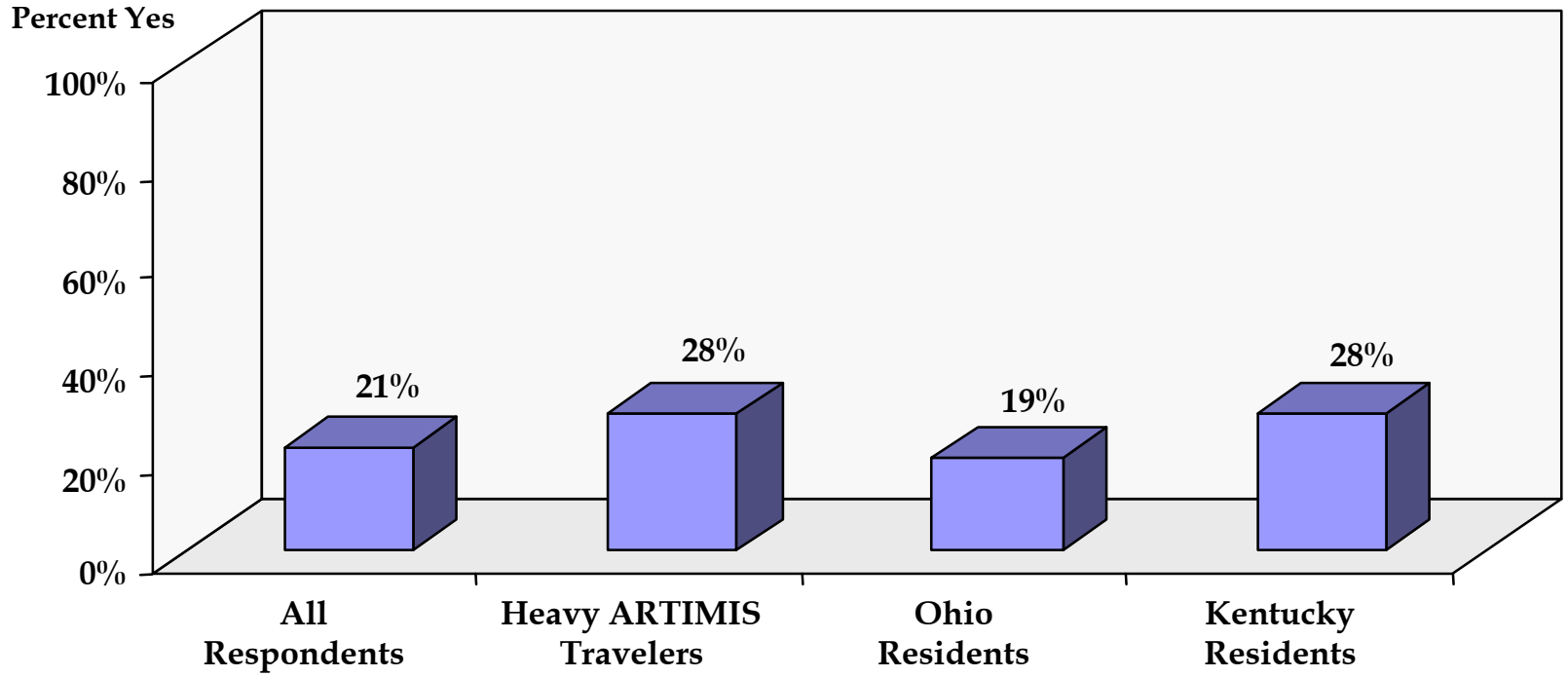
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	26%	20%	26%	25%
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	6	8

Aware of 211 Phone Call as Traffic Information Source

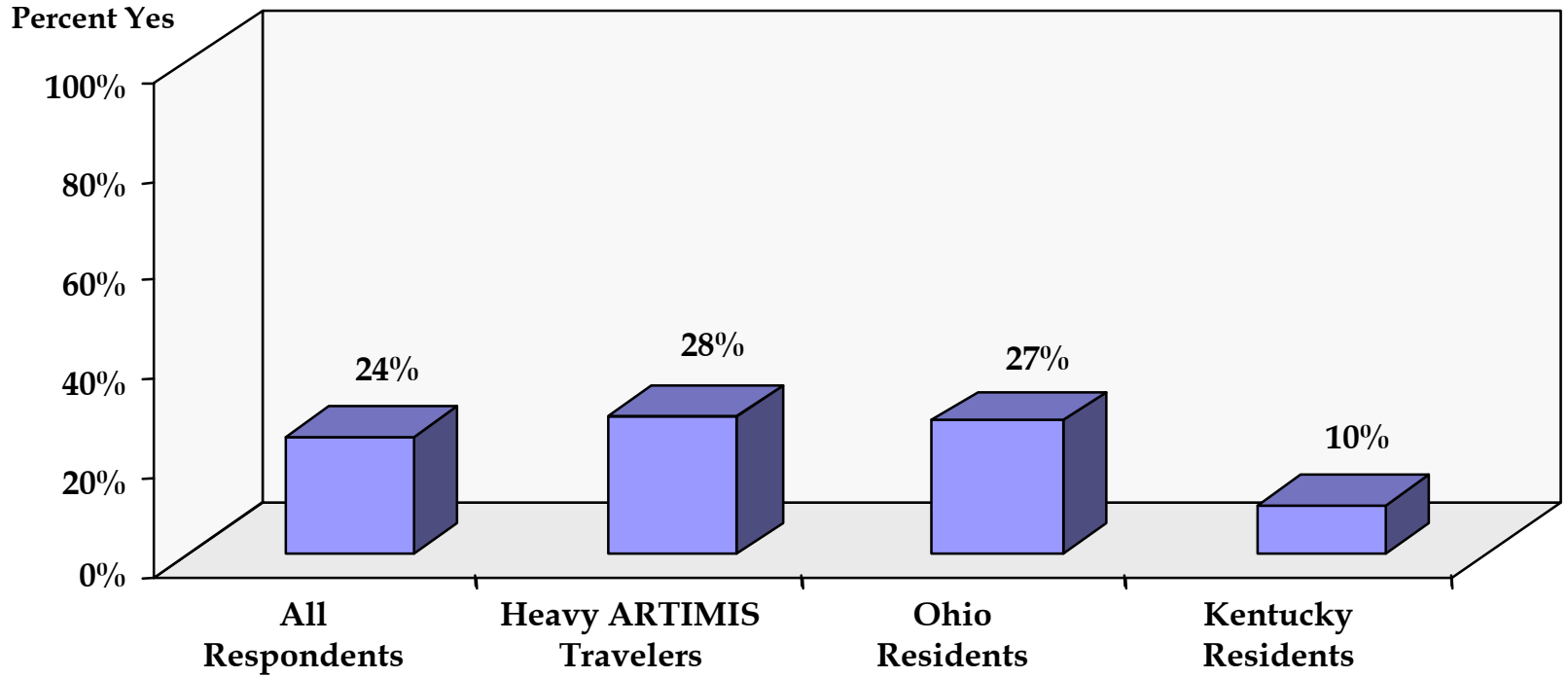
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	21%	21%	27%	0%
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	6	8

Aware of Internet Site/Web Page as Traffic Information Source

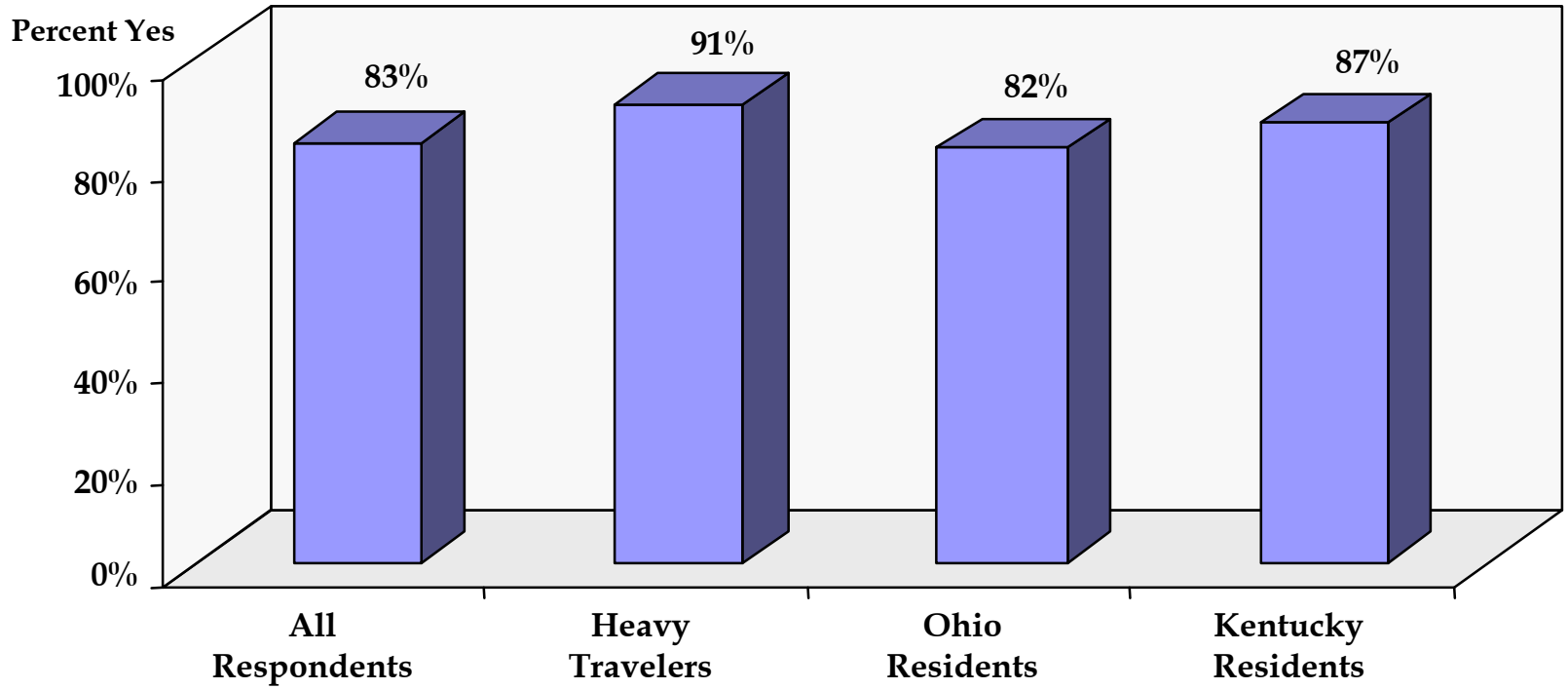
Percent Ever Used Source



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	33%	29%	30%	-
Satisfaction 1-10 (10 = Extremely Satisfied)	7	7	7	6

Aware of Overhead Message Sign as Traffic Information Source

Percent Ever Used Source



	All Respondents	Heavy Travelers	Ohio Residents	Kentucky Residents
Use More Than 1/Week	41%	52%	40%	45%
Satisfaction 1-10 (10 = Extremely Satisfied)	6	6	6	7

What Do People Think About Traffic Information Sources

What Do People Think About Traffic Information Sources?
Key Learnings

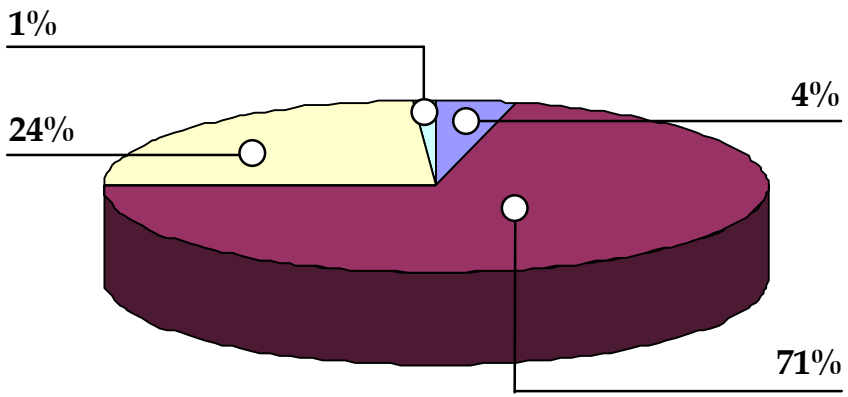
- **Perhaps not surprisingly, use of the radio was voted as the most preferred source for obtaining traffic information (56%), and was even more preferred among heavy ARTIMIS travelers (62%).**
  - ✓ **TV (21%) was the next most preferred source except for heavy travelers (13%); while,**
  - ✓ **Overhead message signs (11%) was the third most preferred source across all subgroups.**
- **The general public's perceptions of traffic information provided over the last three years was also quite positive since:**
  - ✓ **71% claimed it was more accurate;**
  - ✓ **76% said it was somewhat or more up-to-date; and,**
  - ✓ **76% felt that it was somewhat or much improved.**
- **Interestingly, Kentucky residents mentioned that traffic information was even more up-to-date (somewhat/more - 87%) and has improved more so (somewhat/much - 86%) compared to Ohio residents.**

Most Preferred Source of Traffic Information

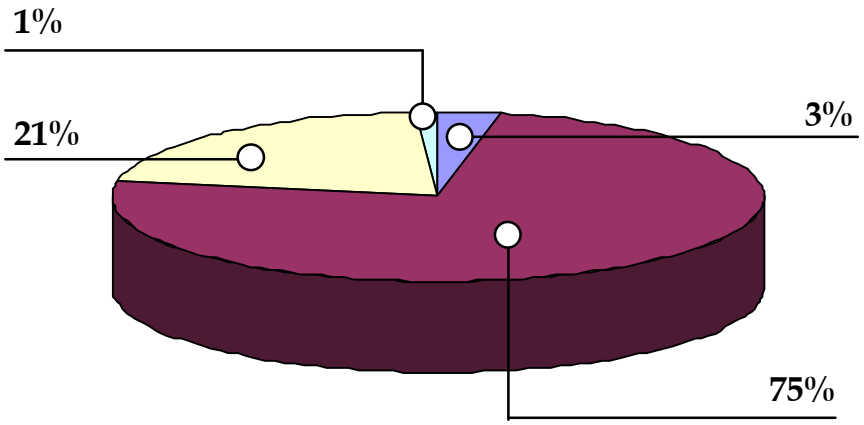
	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Radio	56%	62%	57%	52%
TV	21%	13%	20%	24%
HAR 530AM	4%	4%	5%	2%
211 Phone Call	6%	5%	6%	6%
Internet	2%	3%	2%	2%
Overhead Message Sign	11%	13%	10%	14%

Accuracy of General Traffic Information Provided Over Past Three Years

All Respondents

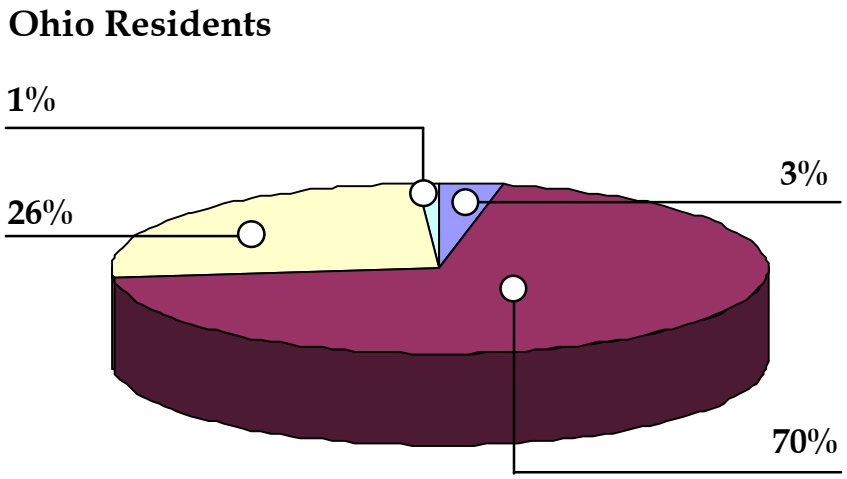


Heavy ARTIMIS Travelers

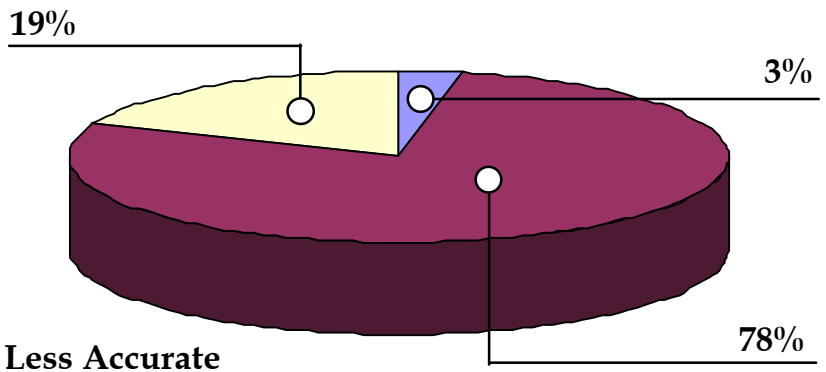


Accuracy of the Traffic Information Provided Over Past Three Years

Ohio Residents



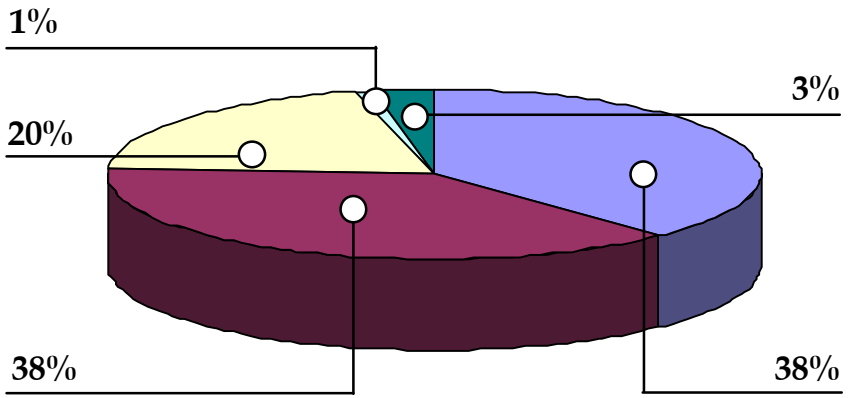
Kentucky Residents



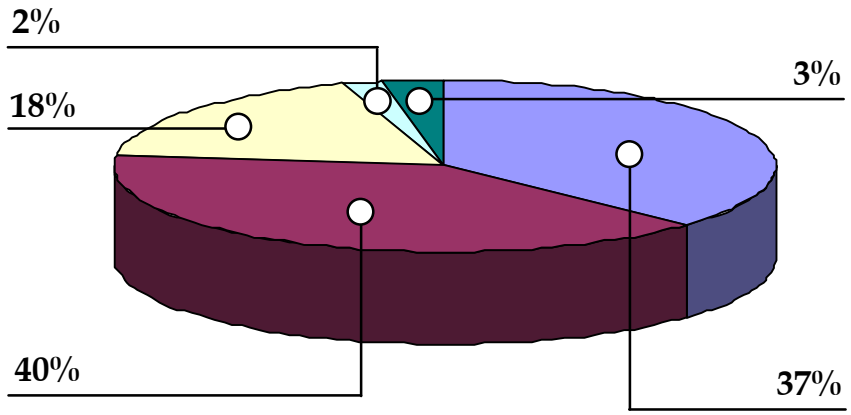
Less Accurate
0%

Timeliness of General Traffic Information Provided Over Past Three Years

All Respondents

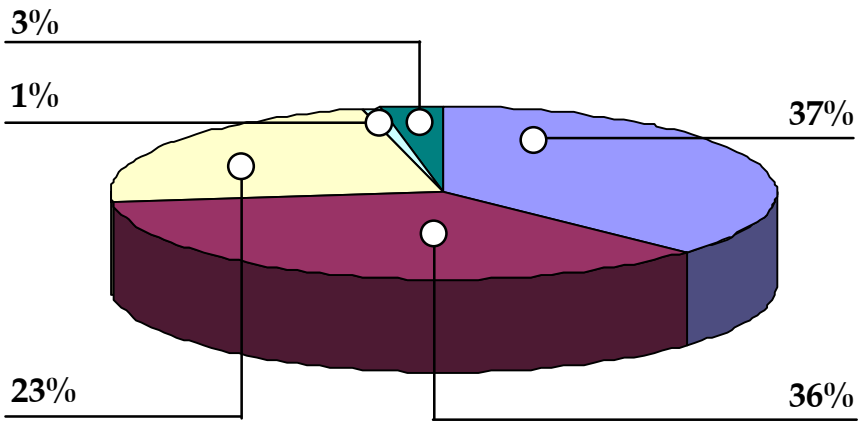


Heavy ARTIMIS Travelers

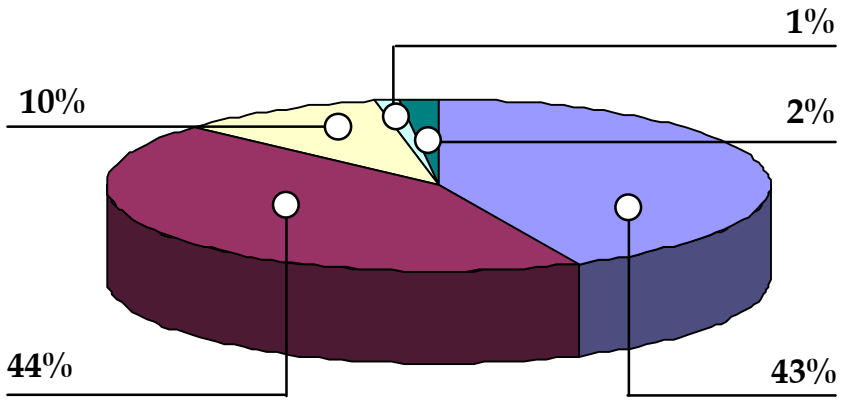


Timeliness of Traffic Information Provided Over Past Three Years

Ohio Residents

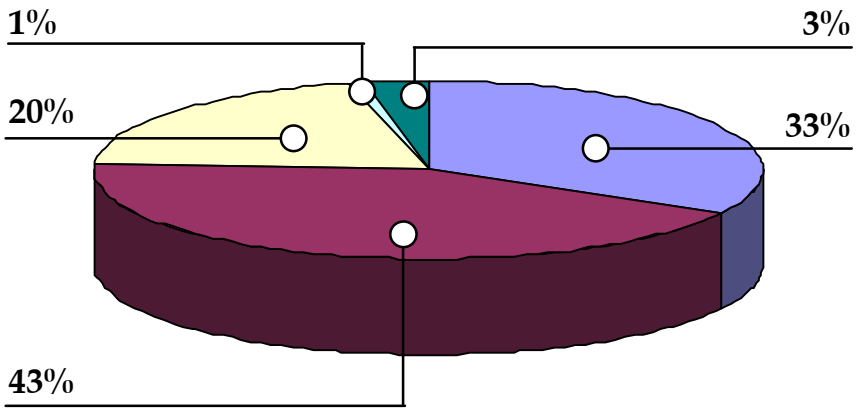


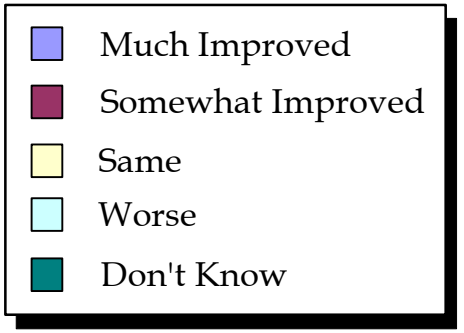
Kentucky Residents



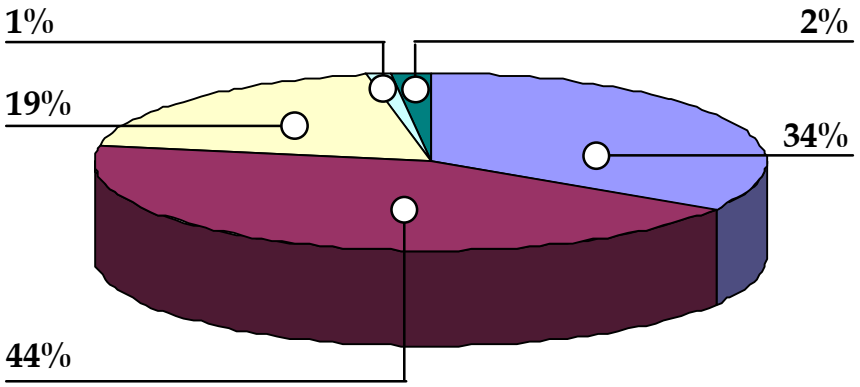
Improvement of General Traffic Information Provided Over Past Three Years

All Respondents



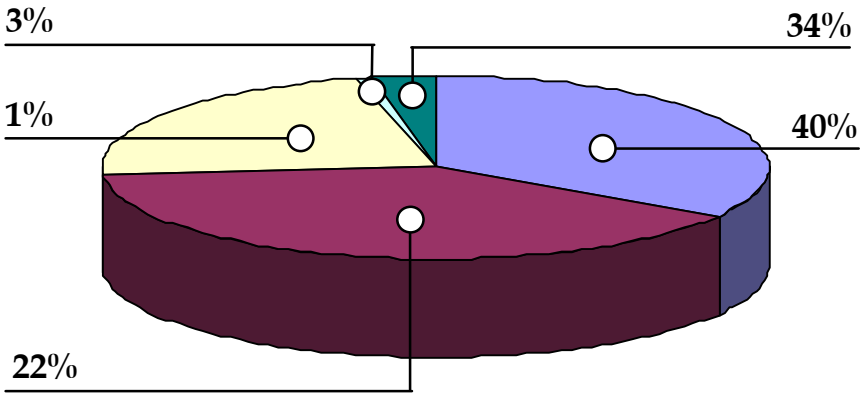


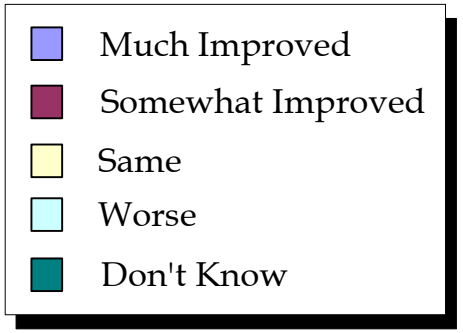
Heavy ARTIMIS Travelers



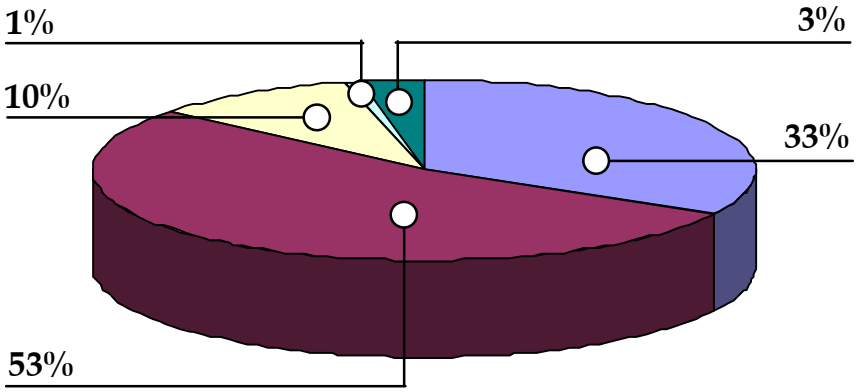
Improvement of General Traffic Information Provided Over Past Three Years

Ohio Residents





Kentucky Residents



Does Advanced Traffic Information Change Habits

Does Advanced Traffic Information Change Habits?
Key Learnings

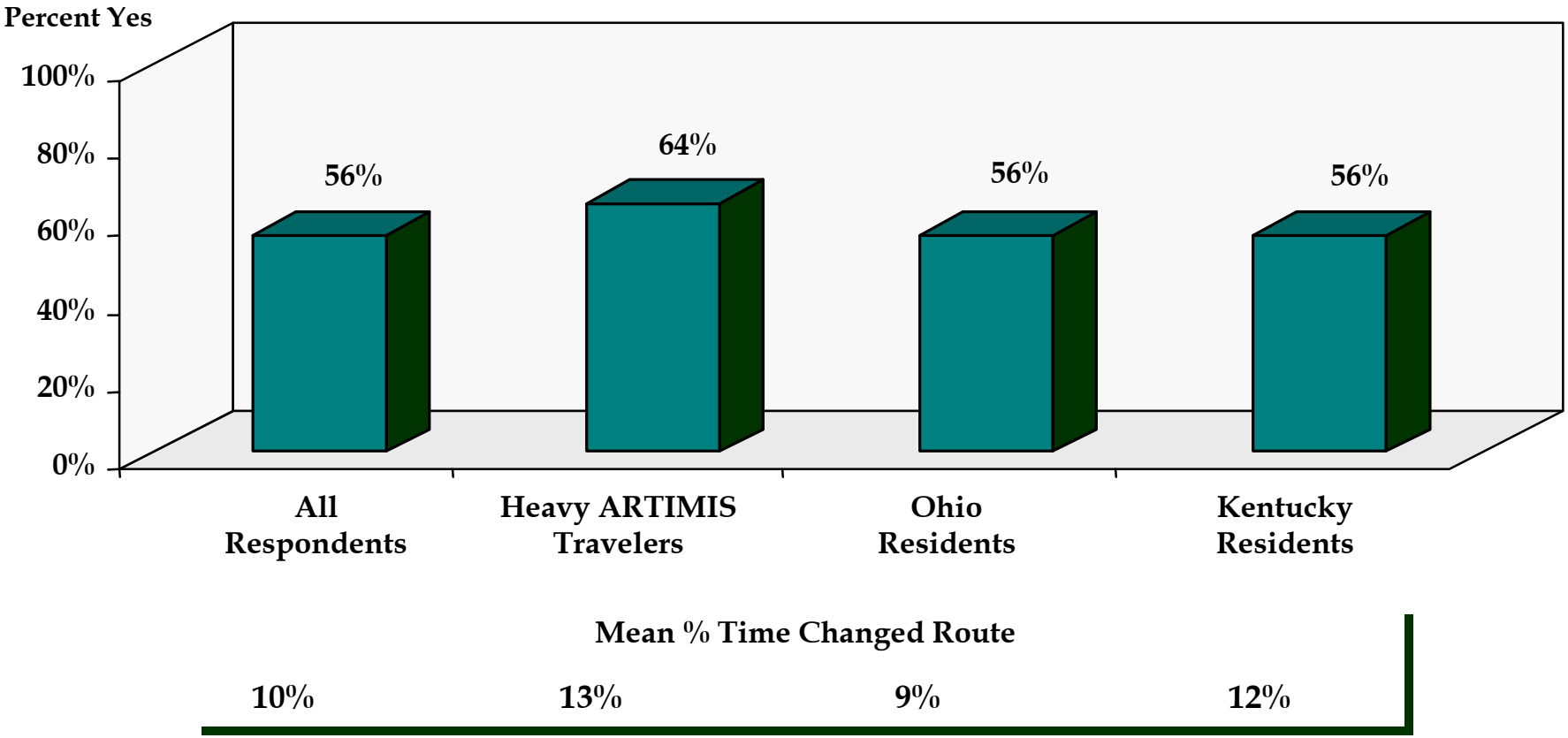
- **It appeared that ARTIMIS was having a substantial impact on highway travel behavior in the region since:**
  - ✓ **56% of the residents changed their morning routes based on the availability of traffic information, and even more so among heavy ARTIMIS travelers (64%);**
  - ✓ **80% were aware of an alternative route which saved them about 7 minutes; while,**
  - ✓ **Only 39% indicated that the alternate route was either very or extremely convenient.**
- **Also, about half of the residents (52%) reported changing their morning departure times as a result of advanced traffic information, and about 8 minutes in total was saved by changing times.**
- **In terms of afternoon commutes, even more travelers (62%) changed routes based on the availability of traffic information, especially heavy ARTIMIS travelers (75%).**
- **During this period:**
  - ✓ **85% were aware of an alternative route which saved them about 12 minutes; while,**
  - ✓ **an even lesser number (25%) indicated that the alternate route was either very or extremely convenient.**
- **However, only 40% reported changing their afternoon departure times as a result of advanced traffic information, and about 11 minutes in total was saved by changing times.**
- **Overall, travelers reasons for changing routes or departure times for morning or afternoon commutes were a result of learning about traffic accidents/incidents, followed by normal traffic congestion and roadway construction.**

Does Advanced Traffic Information Change Habits?
Key Learnings (continued)

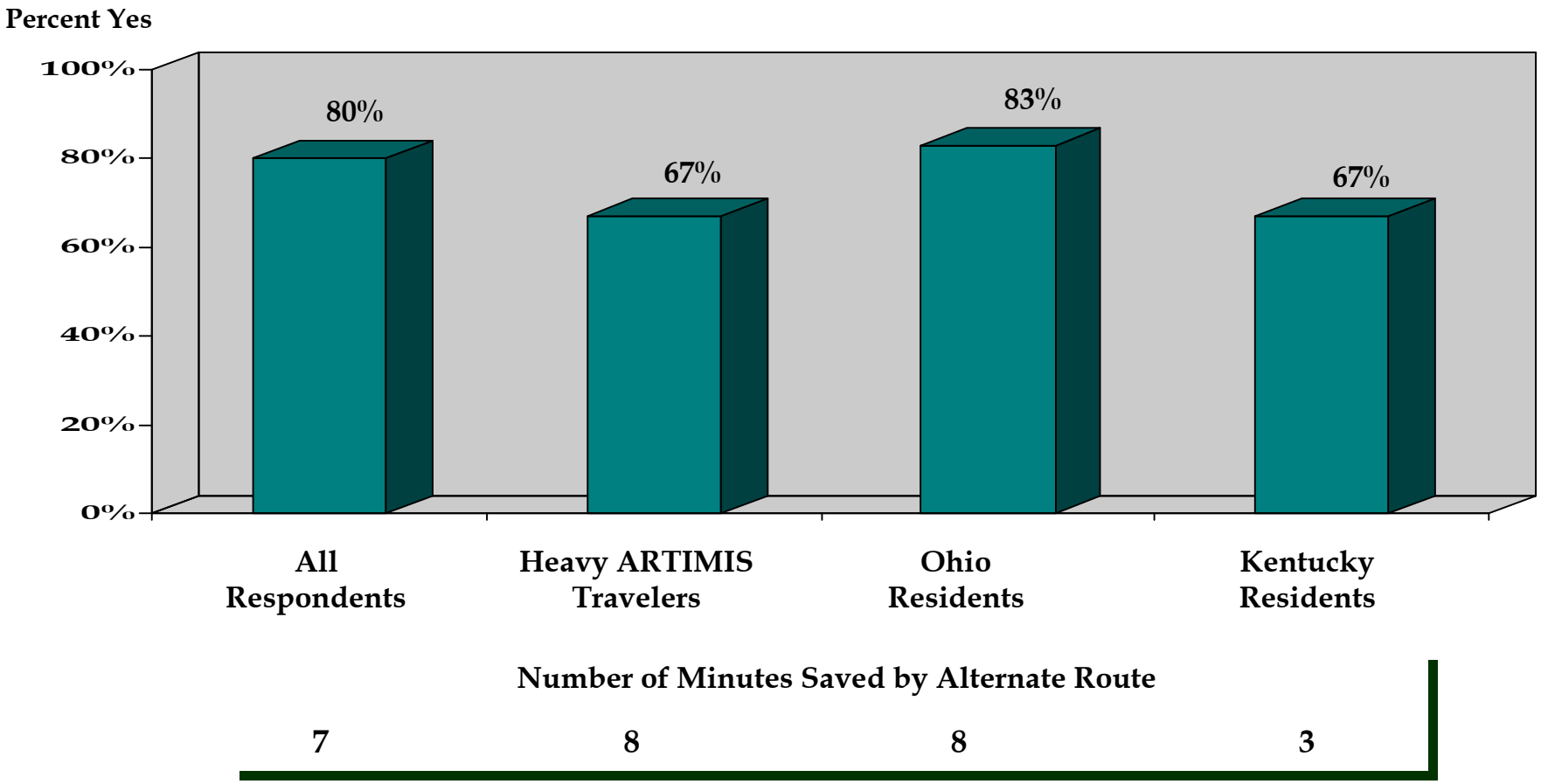
- **Consistent with the results reported for morning commutes, about 49% of travelers changed routes as a consequence of information provided on an overhead message sign, which ended up saving them the most amount (17 minutes) of travel time.**
- **Also, heavy ARTIMIS travelers (61%) and Kentucky residents (57%) were more likely to report changing routes based on information from this source compared to less frequent travelers and Ohio residents.**

A.M. Commute

Change Route Based on Traffic Information



A.M. Commute
Aware of Alternate Routes to Use



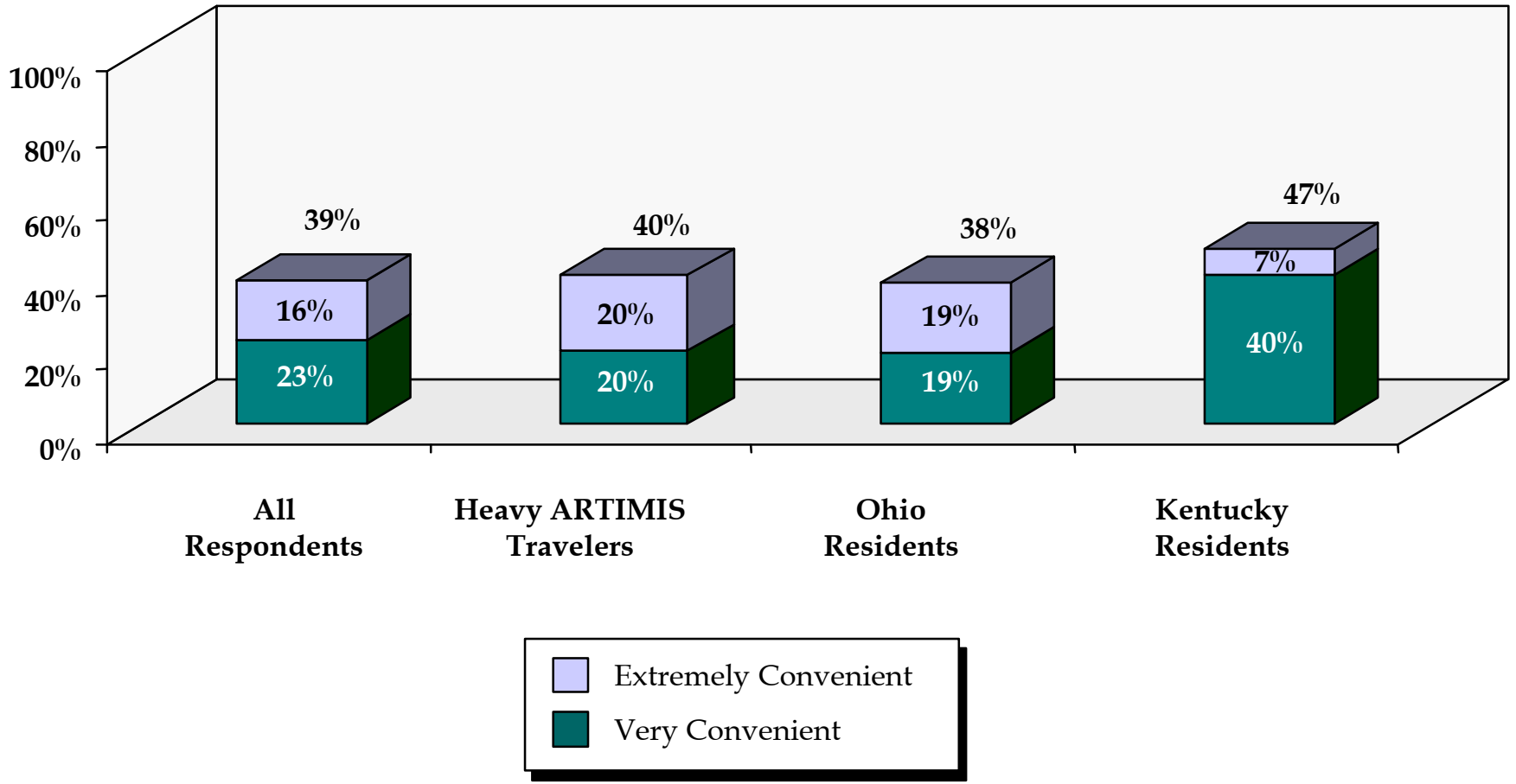
A.M. Commute
*Reasons for Changing Routes**

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Traffic Accident or Incident	59%	64%	66%	39%
Normal Traffic Congestion	31%	33%	27%	46%
Roadway Construction	28%	27%	24%	39%
Bad Weather	20%	33%	12%	46%
Business or Personal Reasons	7%	9%	5%	15%
Don't Know/No Reason	2%	3%	2%	--

*Note: Multiple responses given - total to more than 100%

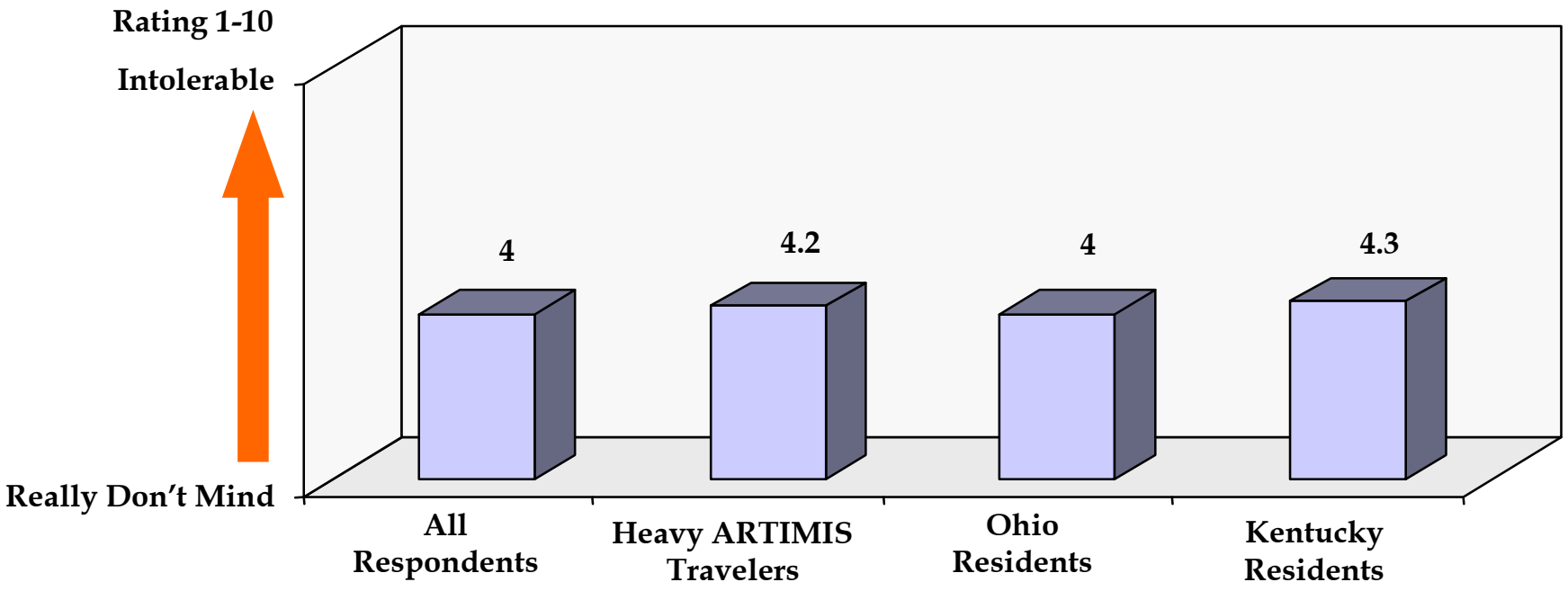
A.M. Commute

Convenience of Alternate Route Taken



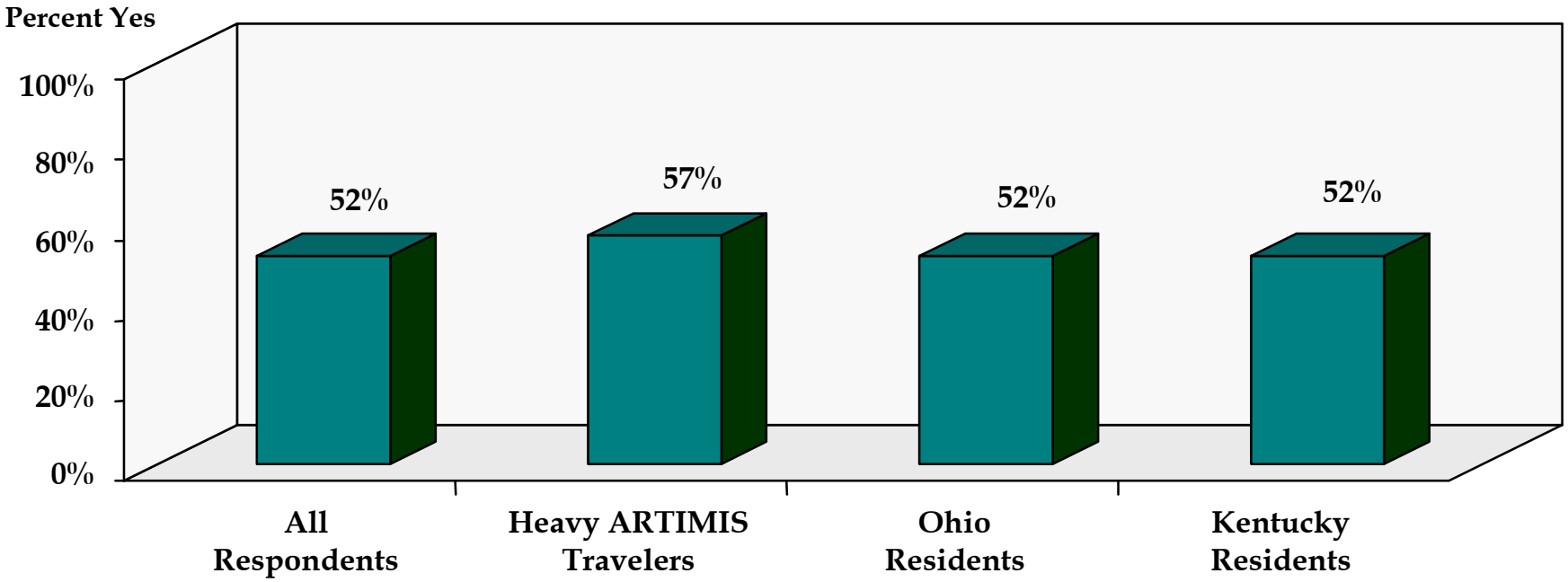
A.M. Commute

Level of Tolerance for Traffic Congestion on Alternate Route



A.M. Commute

Change Departure Time Based on Traffic Information



Mean % Time Changed Route			
9%	12%	9%	10%

Number of Minutes Saved by Changing Time			
8	9	8	8

A.M. Commute

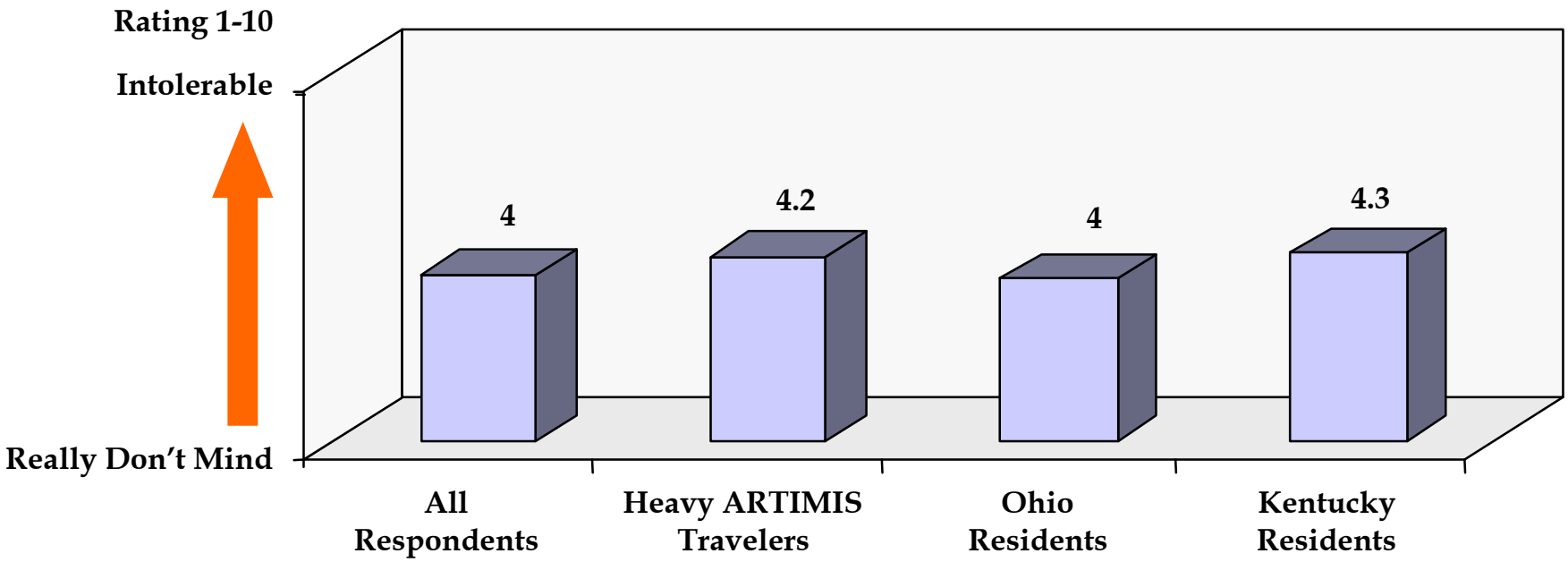
*Reasons for Changing Morning Departure Time**

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Traffic Accident or Incident	59%	63%	60%	58%
Normal Traffic Congestion	22%	17%	24%	17%
Roadway Construction	29%	30%	30%	25%
Bad Weather	18%	23%	14%	33%
Business or Personal Reasons	14%	23%	14%	17%
Don't Know/No Reason	--	--	--	--

*Note: Multiple responses given - total to more than 100%

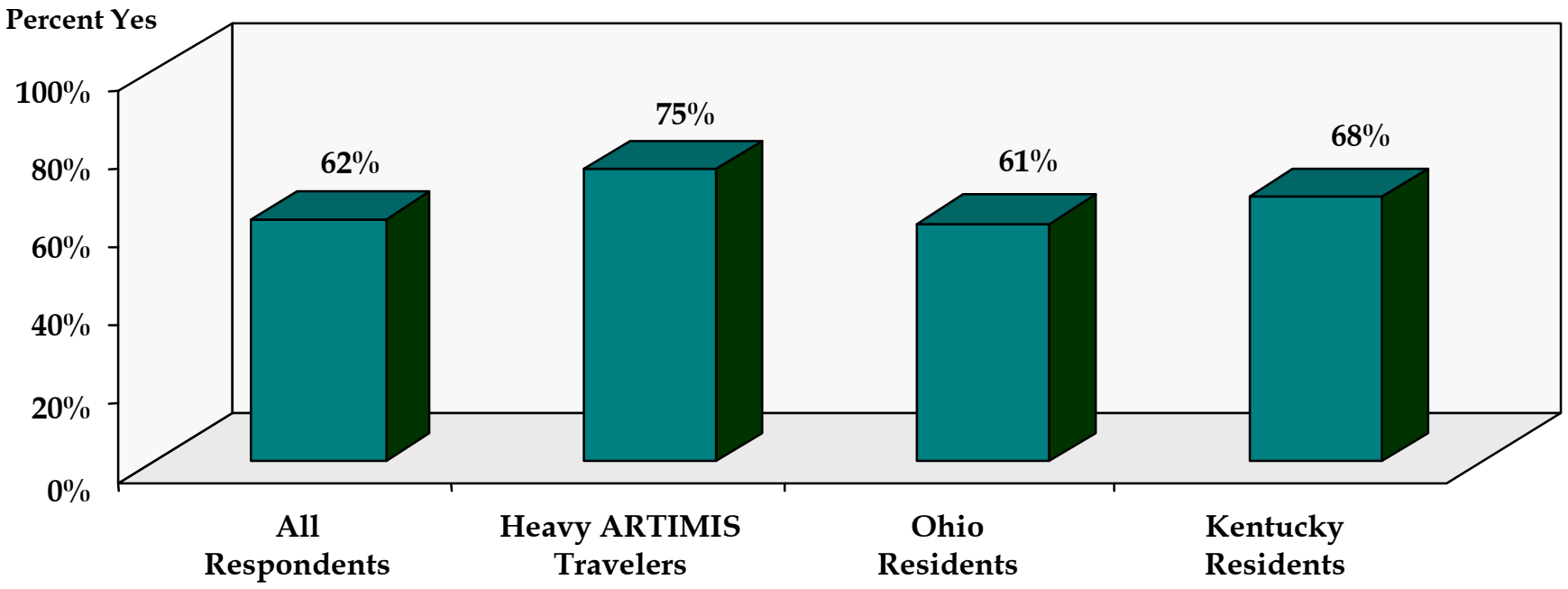
A.M. Commute

Level of Tolerance for Traffic Congestion When Departure Time Changed

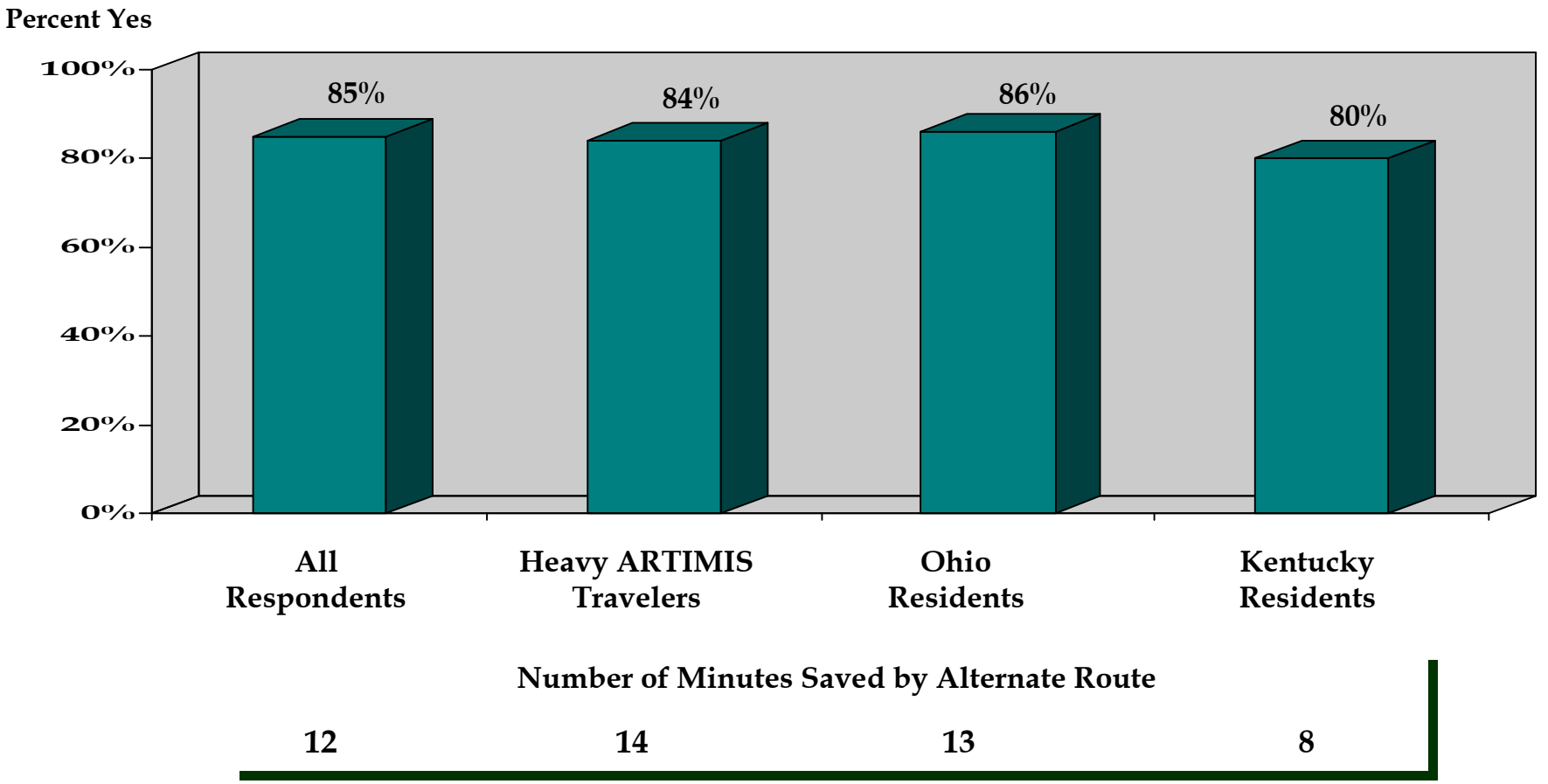


P.M. Commute

Change Route Based on Traffic Information



P.M. Commute
Aware of Alternate Routes to Use

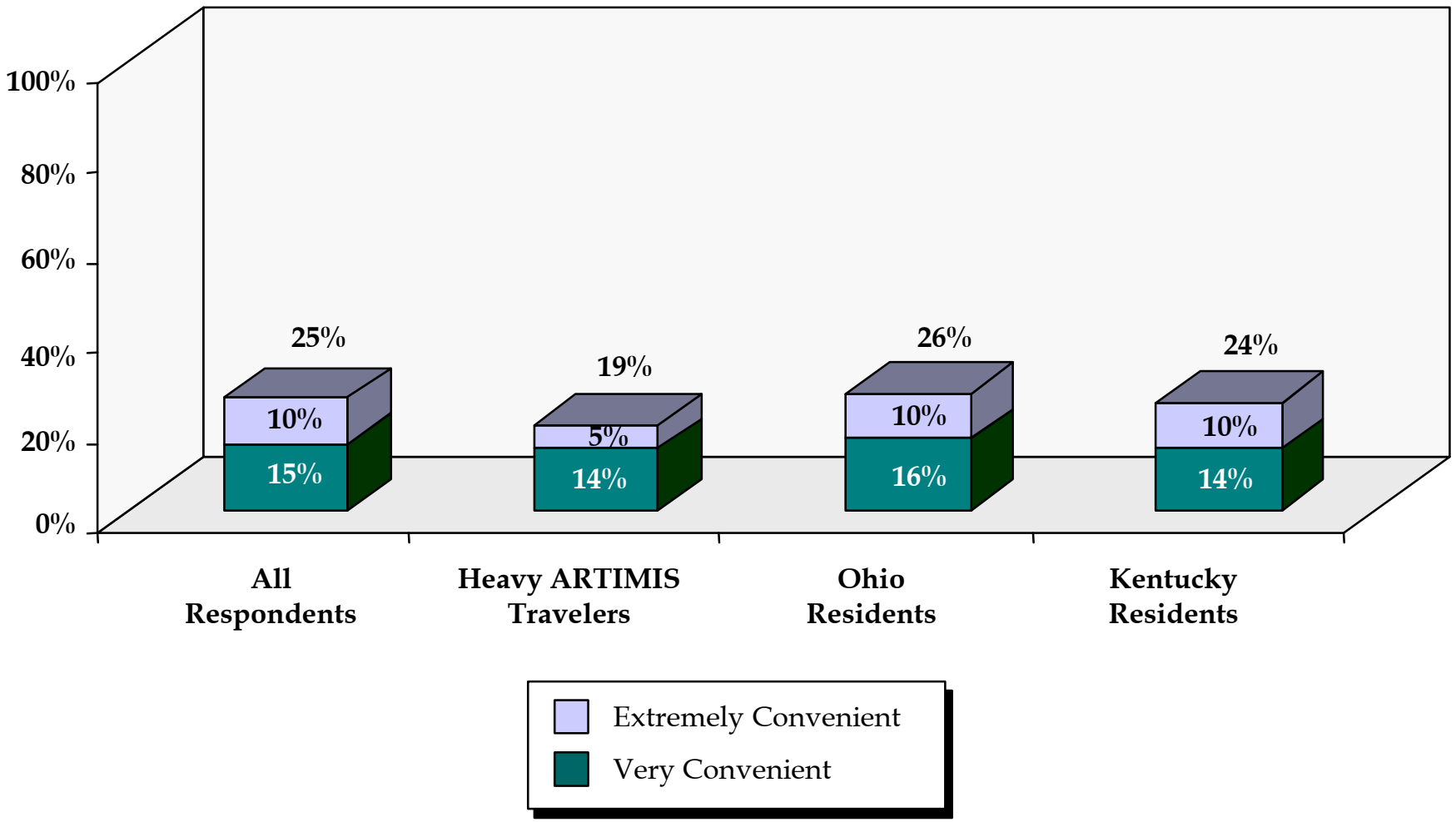


A.M. Commute
*Reasons for Changing Routes**

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Traffic Accident or Incident	56%	55%	59%	44%
Normal Traffic Congestion	40%	47%	36%	56%
Roadway Construction	32%	18%	27%	50%
Bad Weather	9%	8%	8%	11%
Business or Personal Reasons	11%	12%	11%	11%
Don't Know/No Reason	--	--	--	--

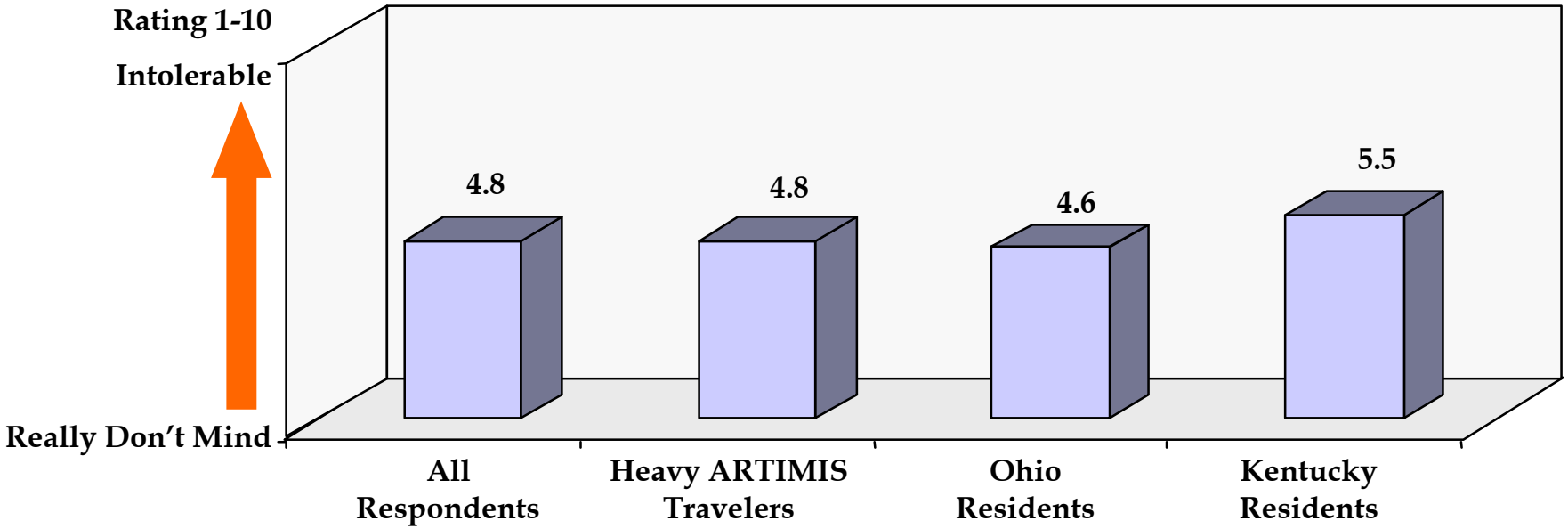
***Note:** Multiple responses given - total to more than 100%

P.M. Commute
Convenience of Alternate Route Taken



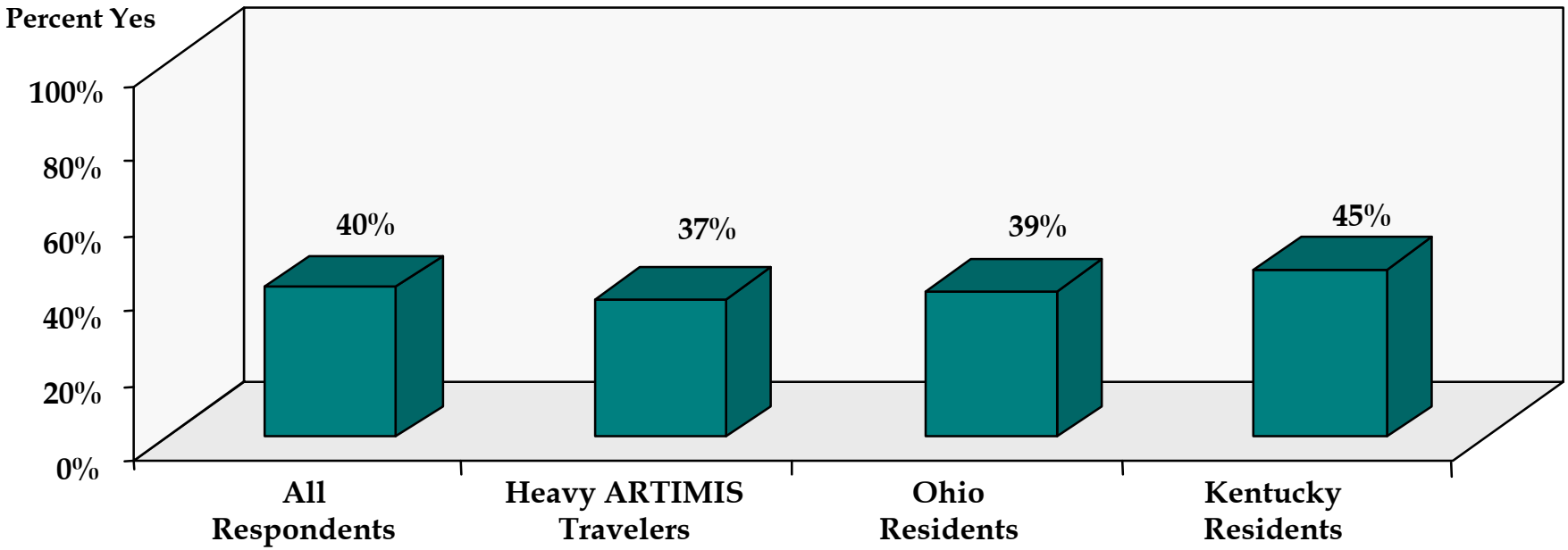
P.M. Commute

Level of Tolerance for Traffic Congestion on Alternate Route



P.M. Commute

Change Departure Time Based on Traffic Information



Mean % Time Changed Route			
14%	18%	12%	22%

Number of Minutes Saved by Changing Time			
11	13	9	16

P.M. Commute

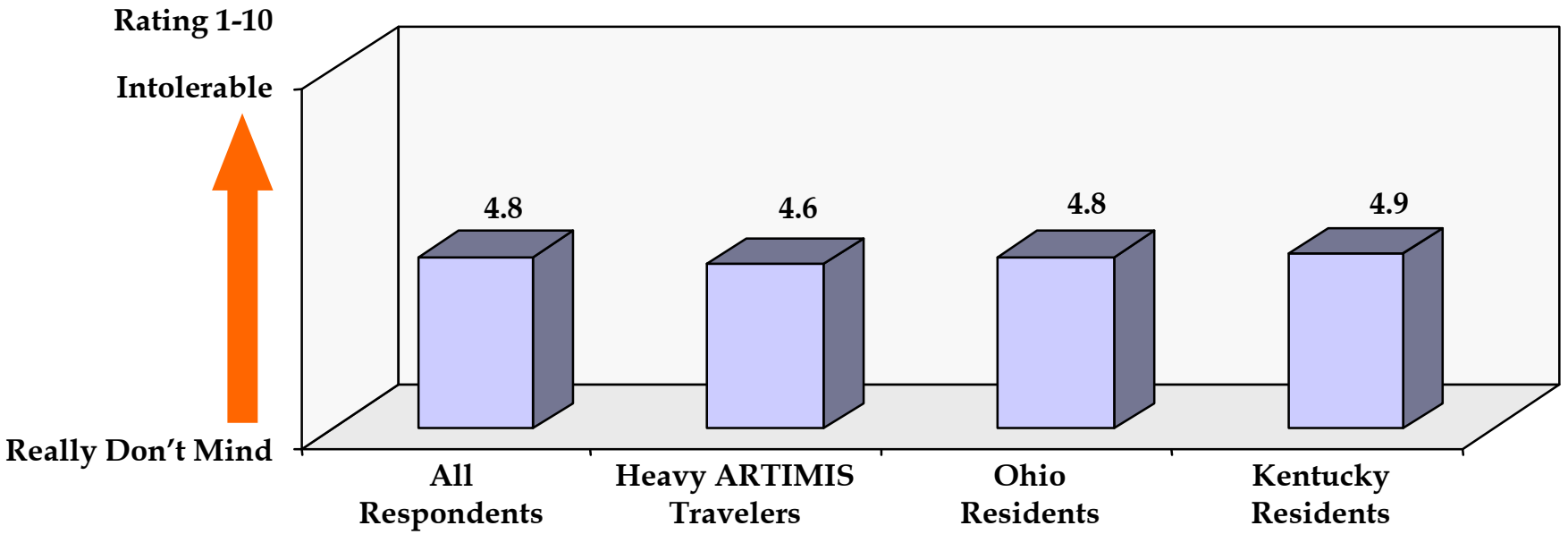
*Reasons for Changing Afternoon Departure Time**

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Traffic Accident or Incident	47%	39%	51%	36%
Normal Traffic Congestion	41%	42%	43%	36%
Roadway Construction	22%	27%	20%	29%
Bad Weather	14%	15%	17%	7%
Business or Personal Reasons	8%	12%	3%	21%
Don't Know/No Reason	--	--	--	--

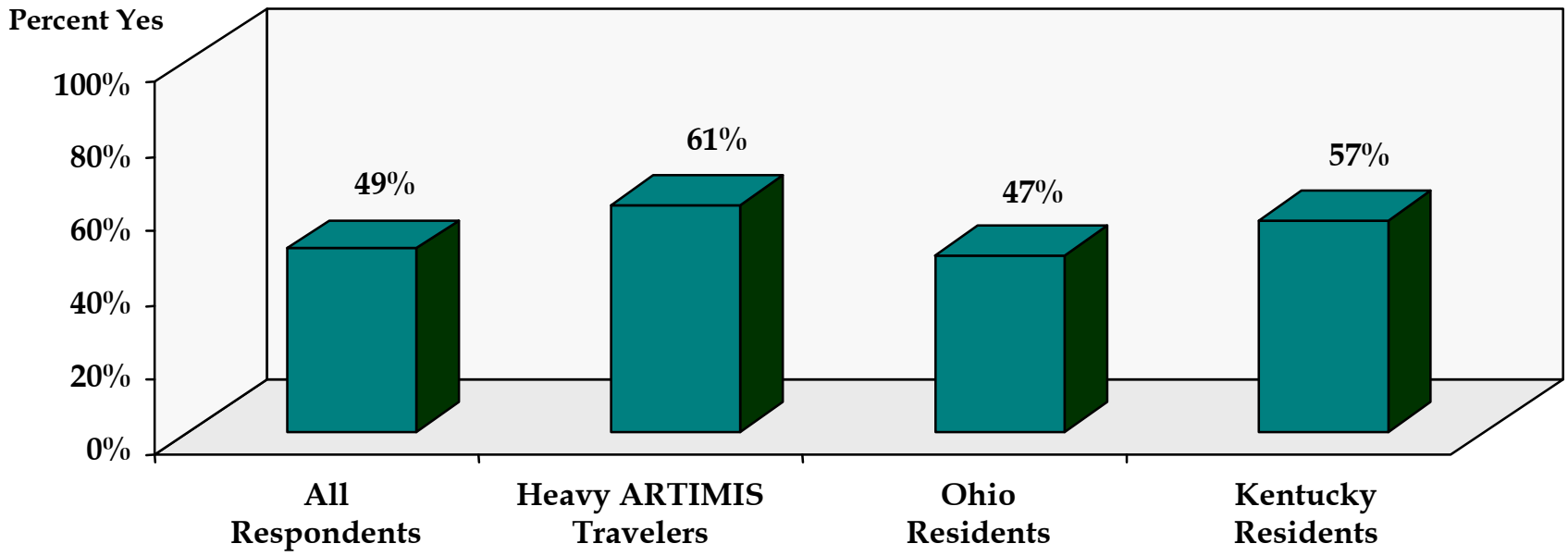
***Note:** Multiple responses given - total to more than 100%

P.M. Commute

Level of Tolerance for Traffic Congestion When Departure Time Changed



Change Route Based on Overhead Message Sign



	All Respondents	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Mean % Time Changed Route	24%	23%	22%	31%
Number of Minutes Saved by Changing Route	17	17	18	16

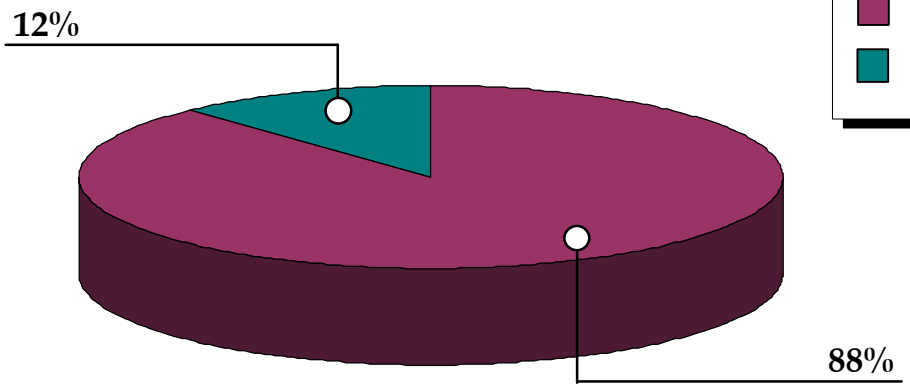
What Are The Travel Behaviors Of ARTIMIS Users?

What Are The Travel Behaviors of ARTIMIS Users?
Key Learnings

- **Perhaps not surprising given the concentration of businesses in the greater Cincinnati area, about 88% of the general population surveyed claimed to travel on one of the routes served by ARTIMIS for either commuting, commercial or personal driving purposes.**
  - ✓ **The most frequently traveled routes were I-75 (68%) and the I-275 belt (63%).**
  - ✓ **The main reasons given for traveling these routes were commute to work or school (59%) and visiting friends/relatives/others (23%).**
  - ✓ **The use of these routes for commercial purposes was only about 5%.**
- **The average number of trips taken in an average week was about 9, while those taken by heavy ARTMIS users were much greater (15) by comparison.**
- **Finally, the most frequently traveled times periods were weekdays from 6AM to 7PM, and Kentucky residents were less likely to use these roadways on weekends and holidays (5%) compared to Ohio residents (10%).**

Travel on Routes Served by ARTIMIS

All Respondents

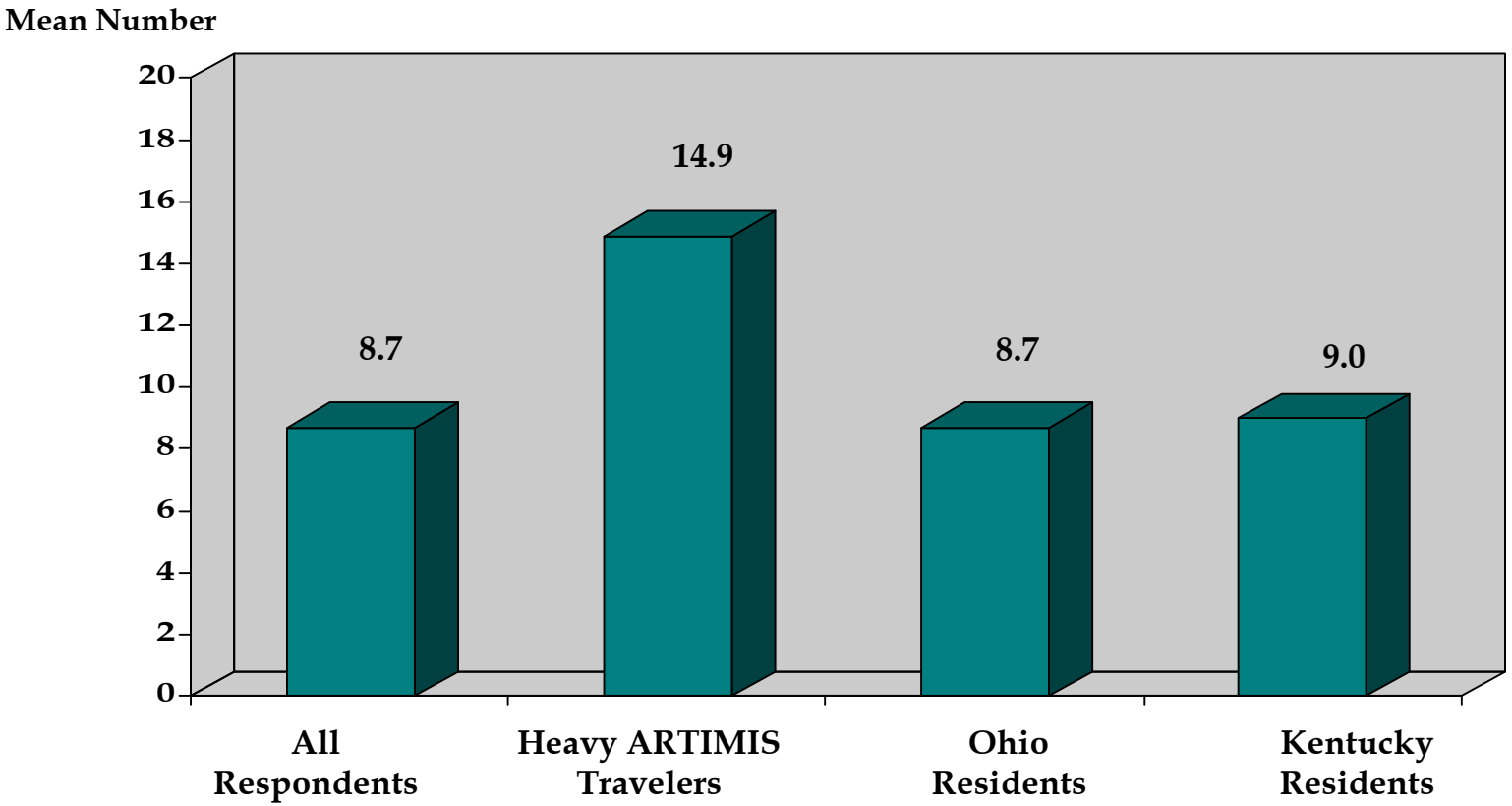


Percent Traveling on Roadways	
I-75	68%
Northern Cincinnati/ Southern Portions of I-275	63%
I-71 Between I-275 Belt	51%
Norwood Lateral	38%
Ronald Reagan Highway	41%

Reasons for Travel	
Commute to Work/Business/School	59%
Visiting Others	23%
Shopping	17%
Entertainment	17%
Commercial Purposes	5%
Appointments	5%
Sporting Events	4%
Personal Reasons	4%

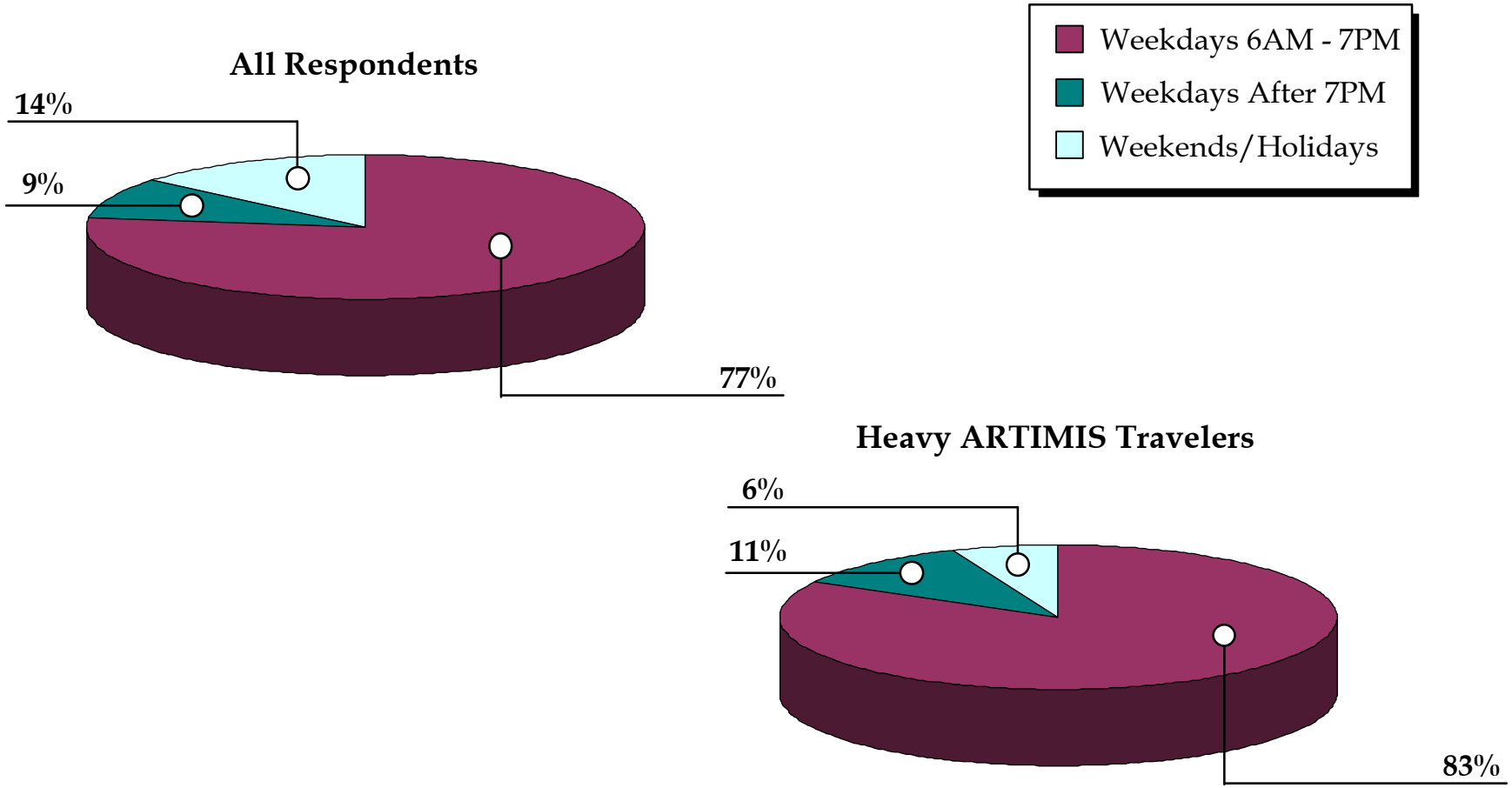
Travel on Routes Served by ARTIMIS

Average Trips Per Weeks



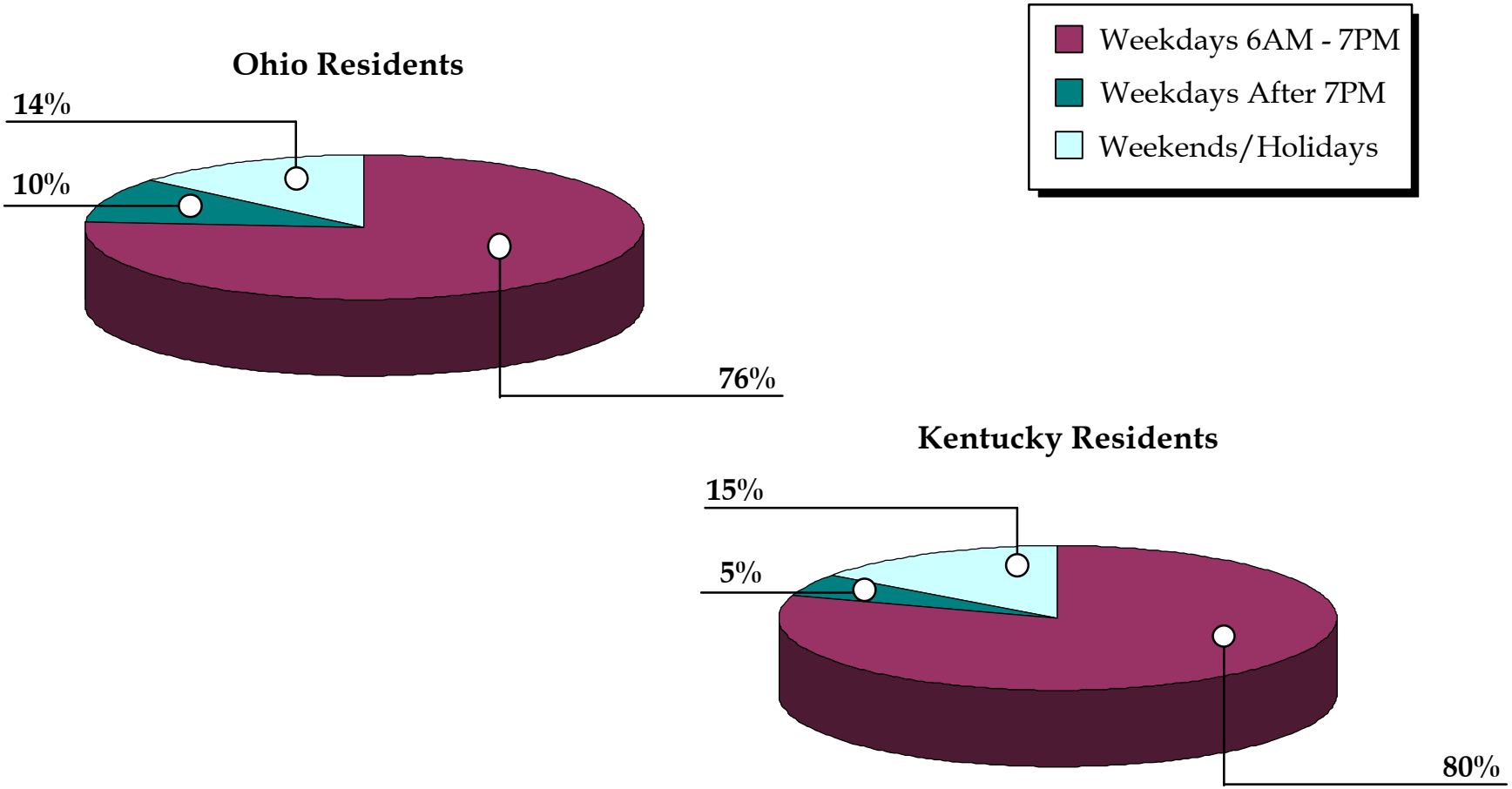
Travel on Routes Served by ARTIMIS

Most Frequently Traveled Times



Travel on Routes Served by ARTIMIS

Most Frequently Traveled Times



Next Steps

Next Steps

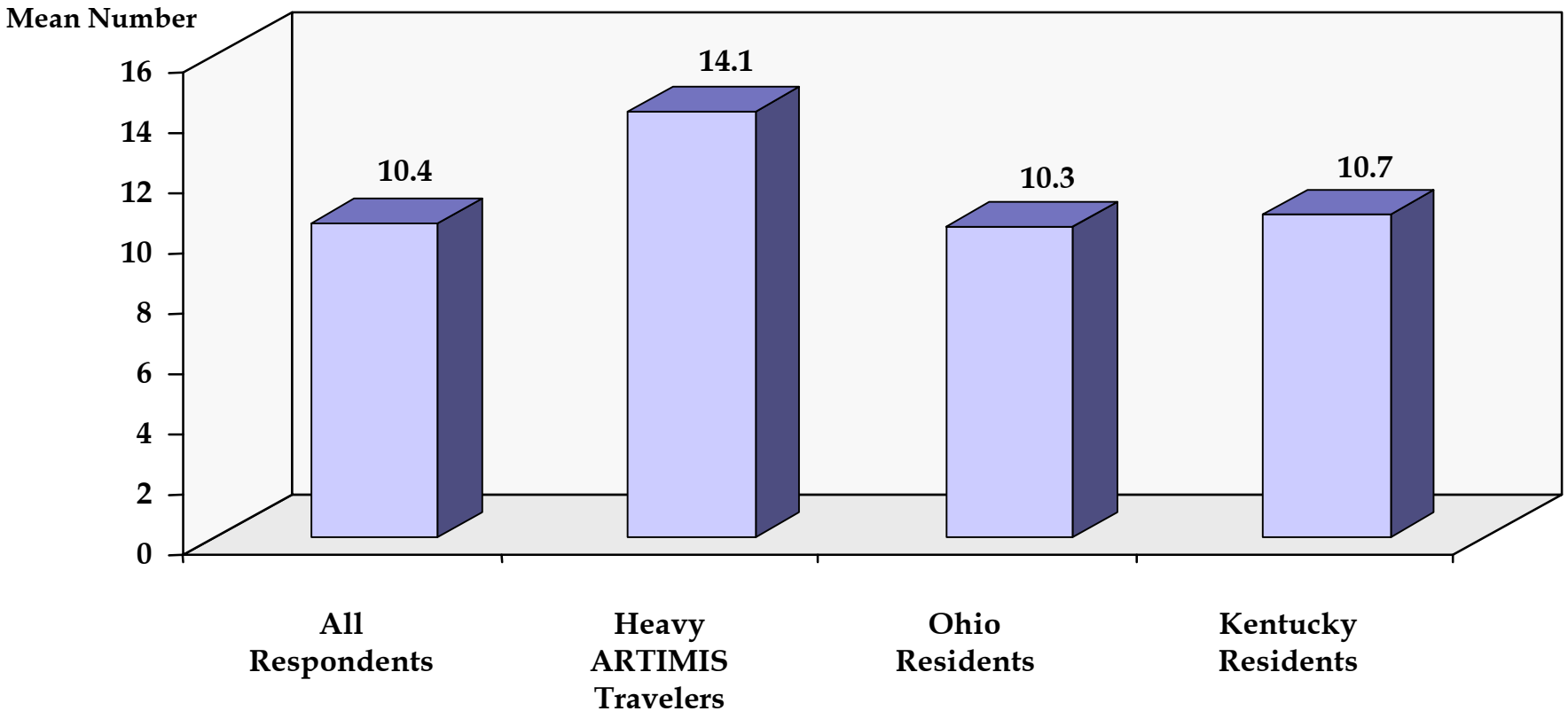
- **Report Emergency Responder Impacts**
- **IDAS Cost/Benefit Analysis**
- **Equipment Performance Evaluation**

Appendix A

General Travel Behavior & Demographics

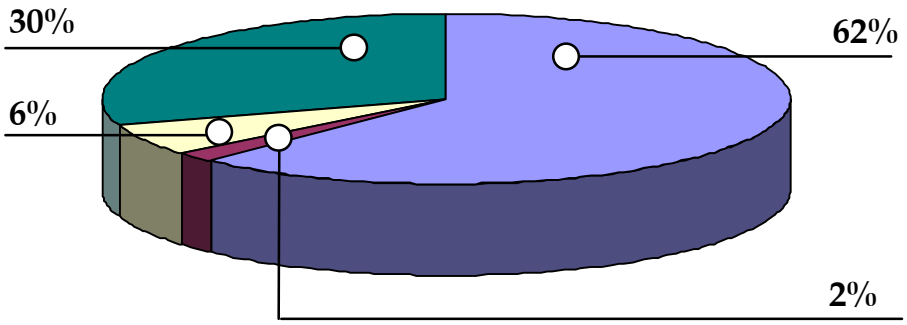
Trips Made Outside the Household

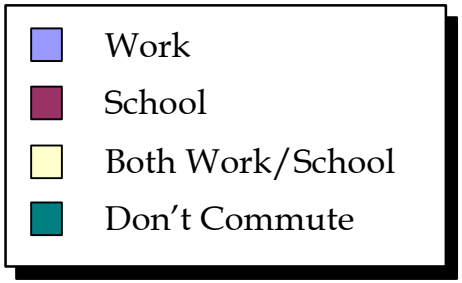
Average per Week



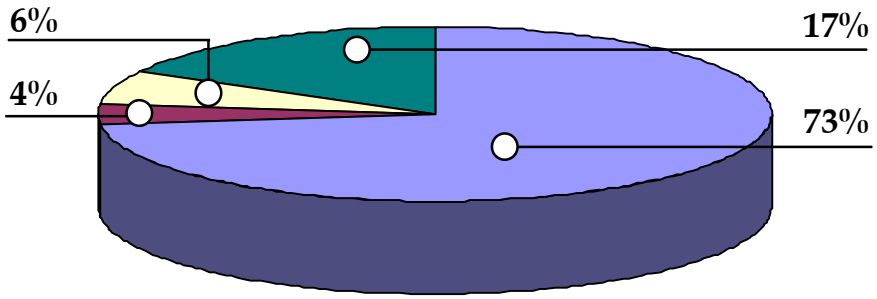
Reasons for Commuting

All Respondents



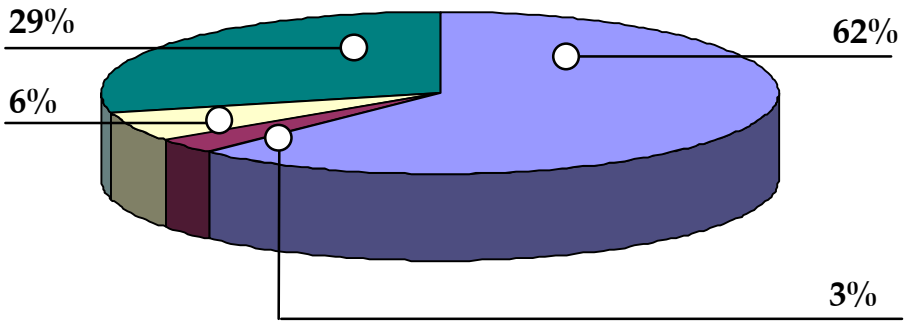


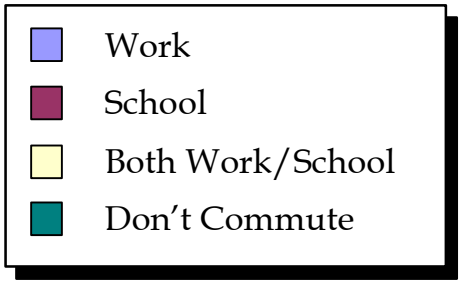
Heavy ARTIMIS Travelers



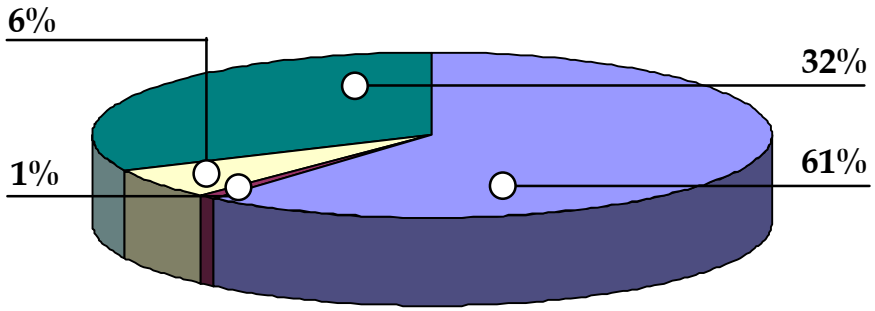
Reasons for Commuting

Ohio Residents





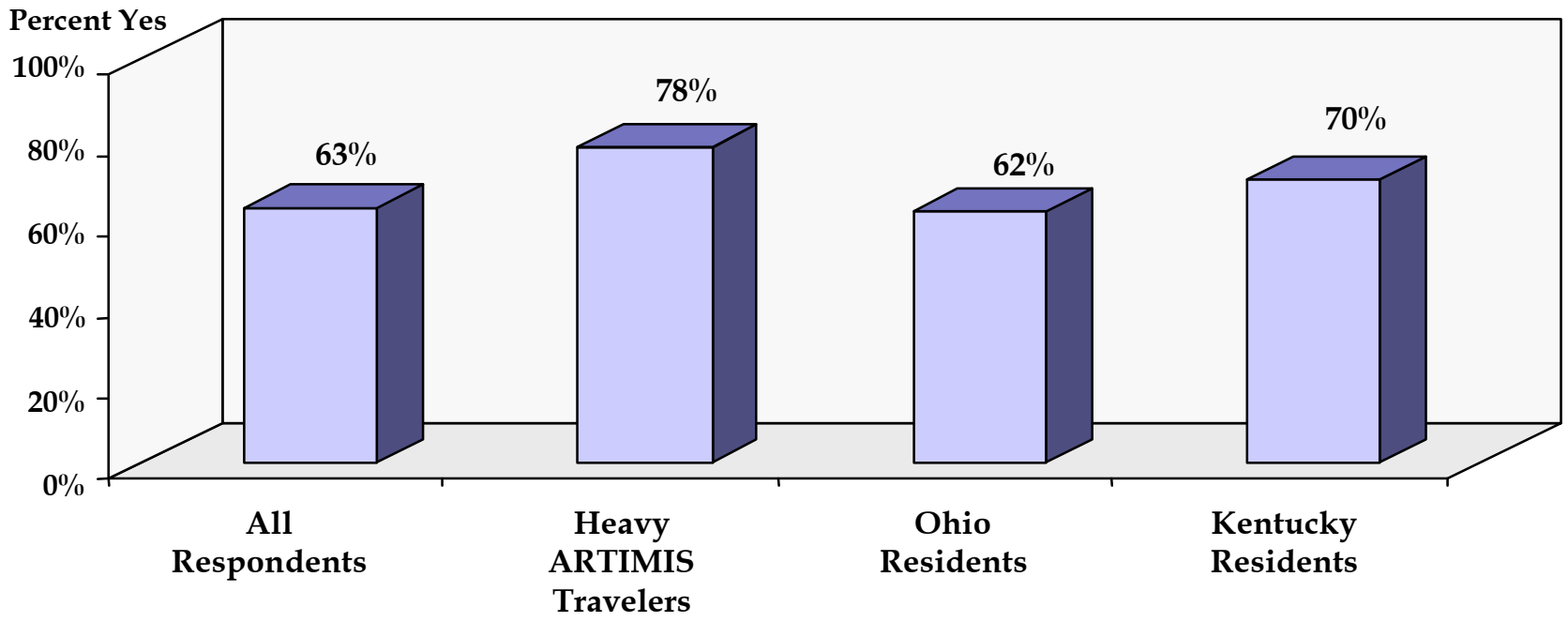
Kentucky Residents



Modes Used for Commuting to Work

	All Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
Use Own Vehicle	91%	92%	91%	93%
Use Company Vehicle	5%	5%	5%	4%
Walk/Bicycle/Public Transit	4%	3%	4%	3%

Regularly Commute in Morning (6 A.M. - 9 A.M.)

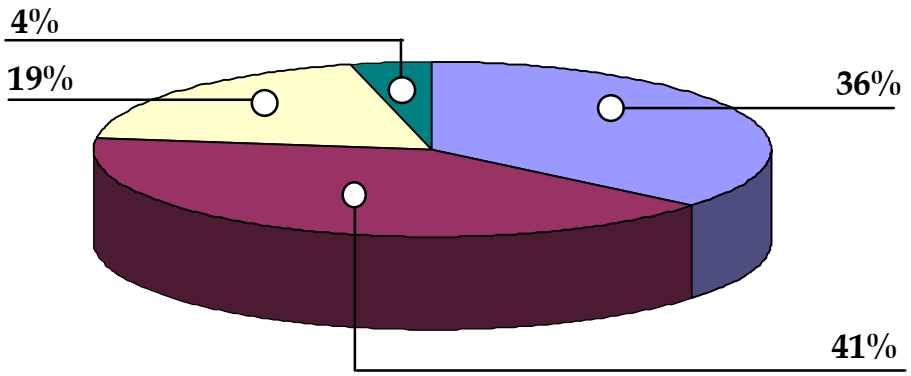


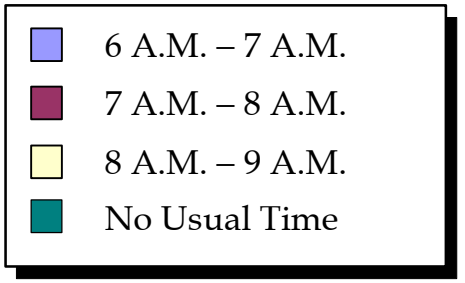
Average Number of Days Commute			
4.6	4.7	4.6	4.7

Total Number of Minutes Commuting			
25	27	25	26

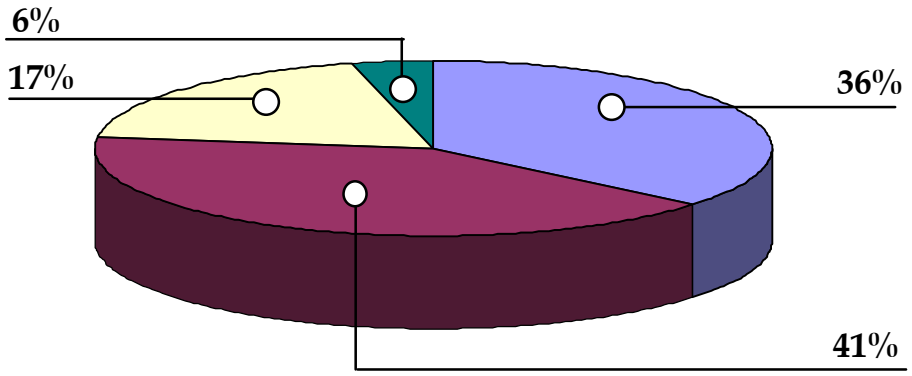
Usual Morning Departure Time

All Respondents



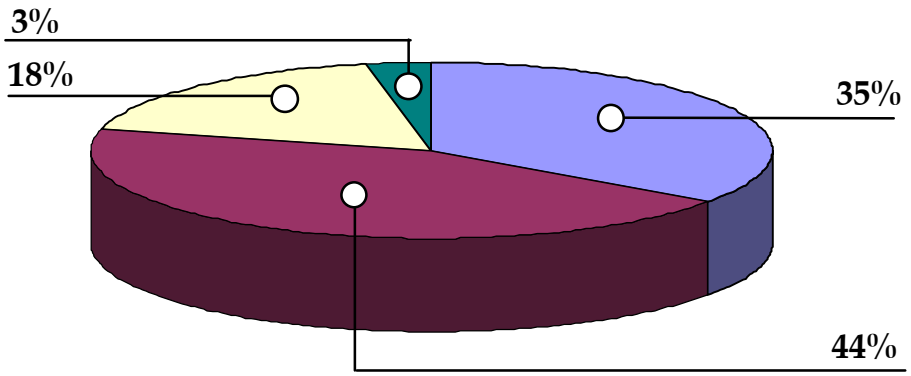


Heavy ARTIMIS Travelers

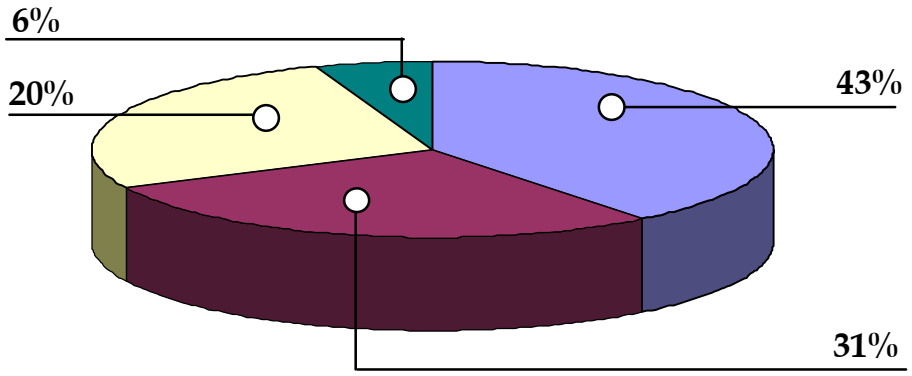


Usual Morning Departure Time

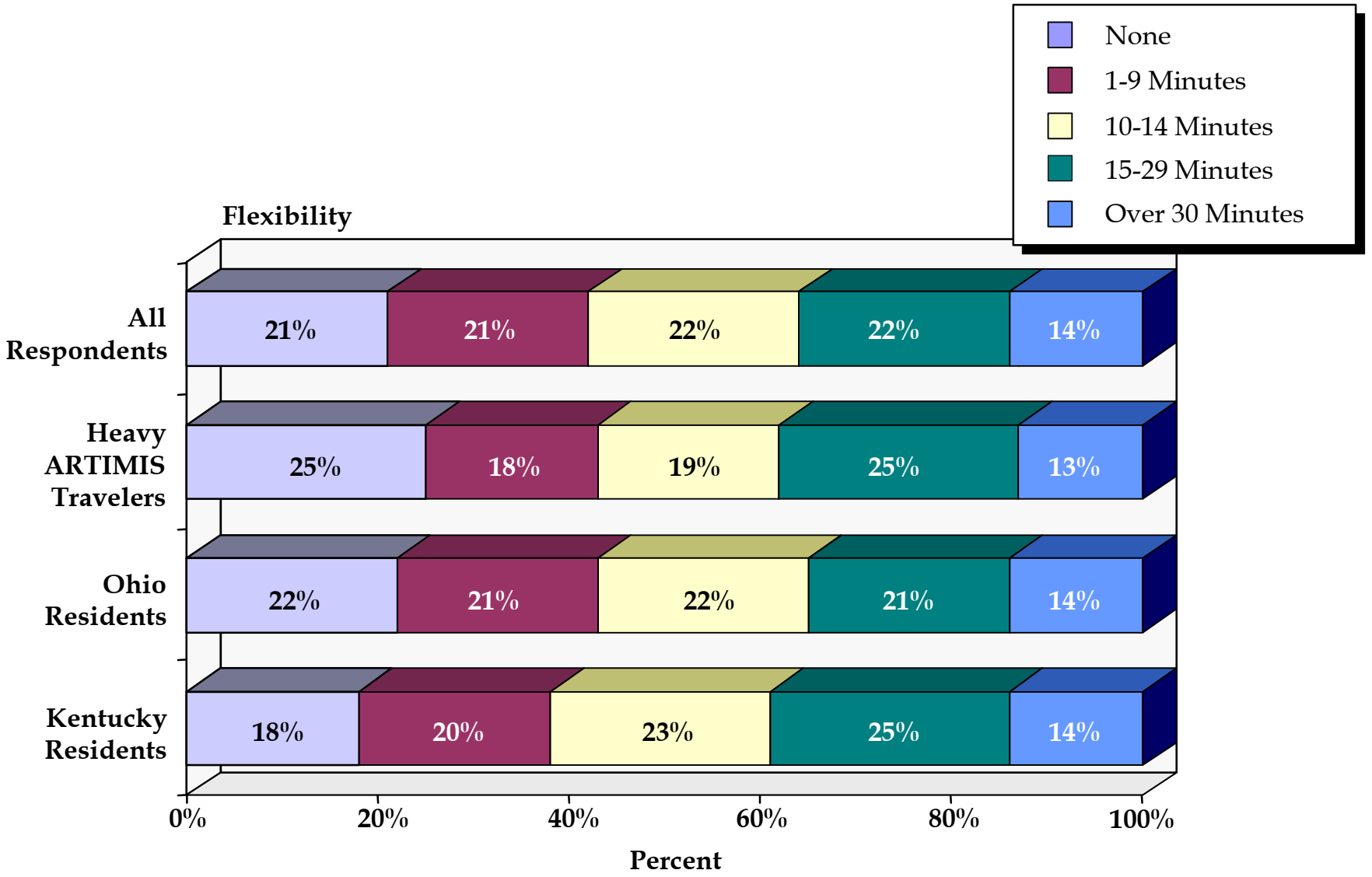
Ohio Residents



Kentucky Residents

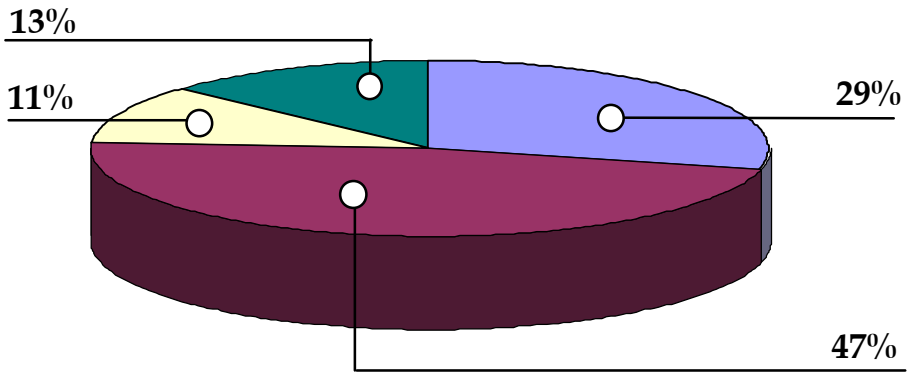


Flexibility in Morning Departure Time

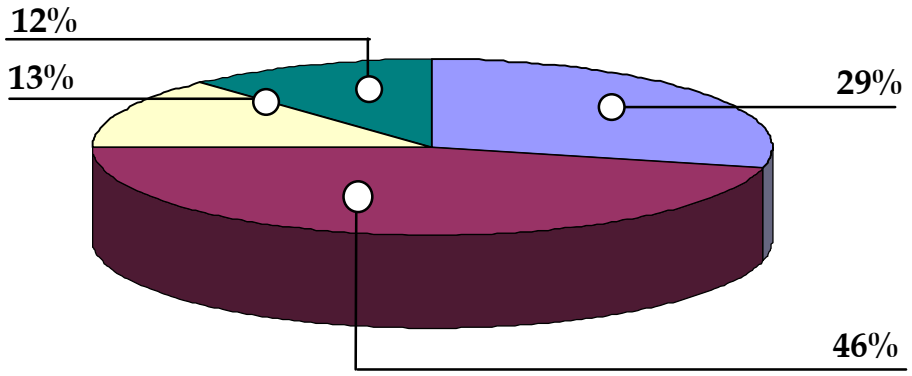


Morning Commute Destinations

All Respondents

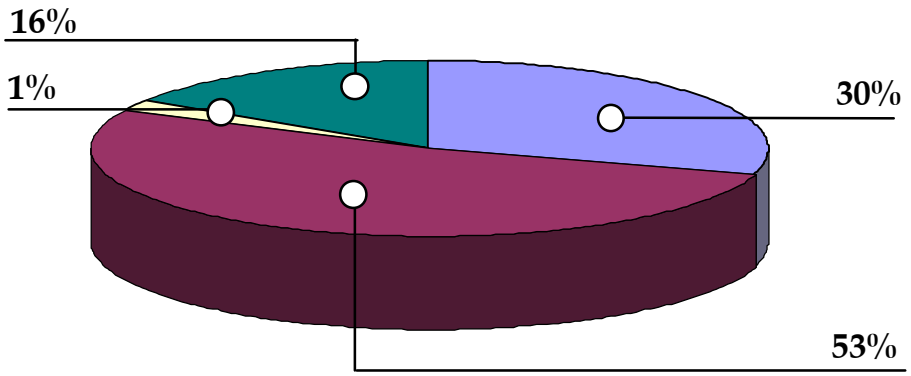


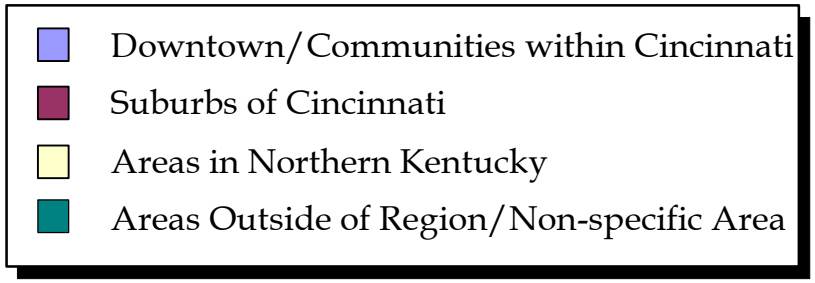
Heavy ARTIMIS Travelers



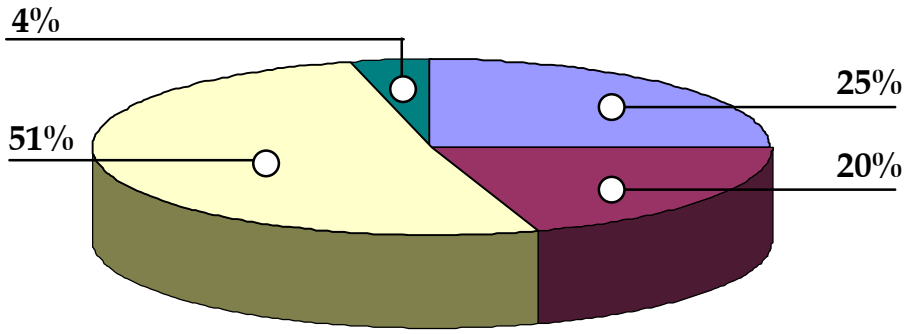
Morning Commute Destinations

Ohio Residents

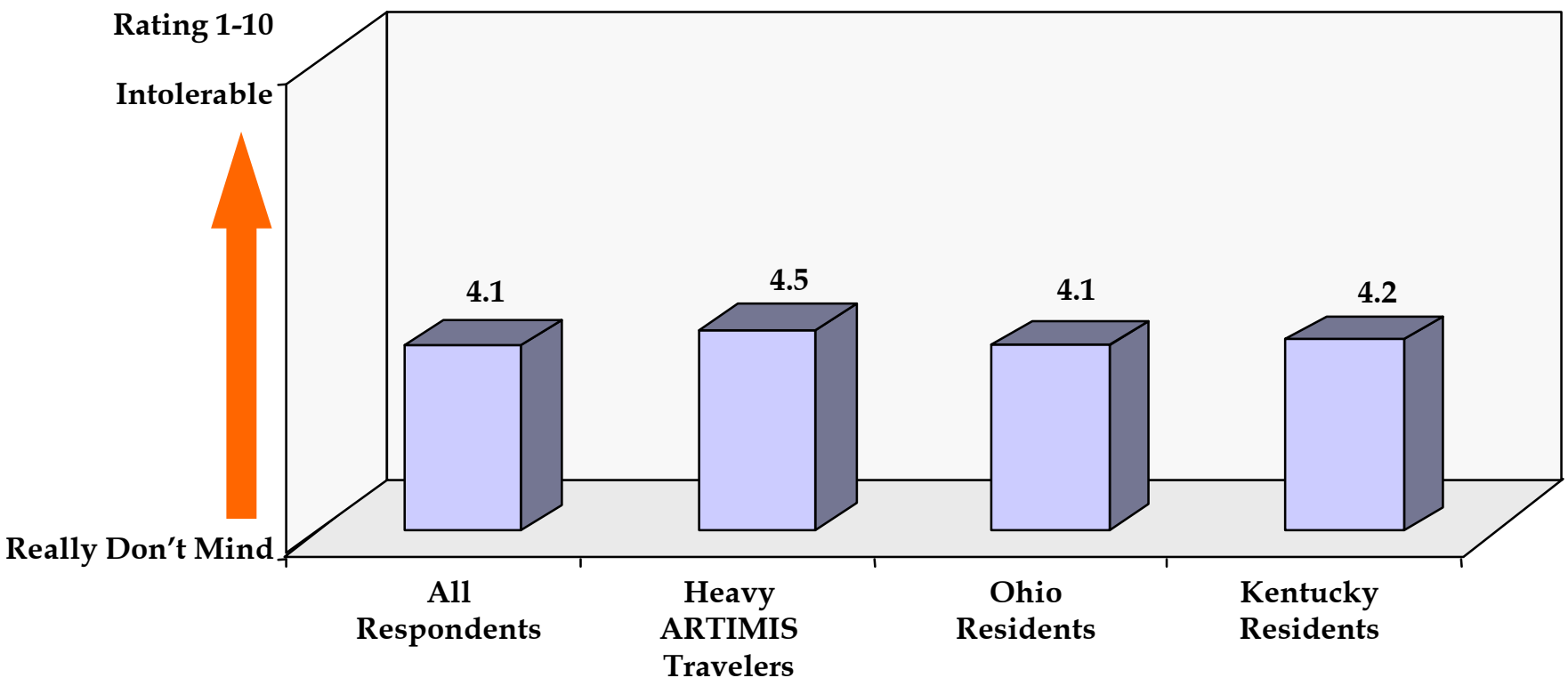




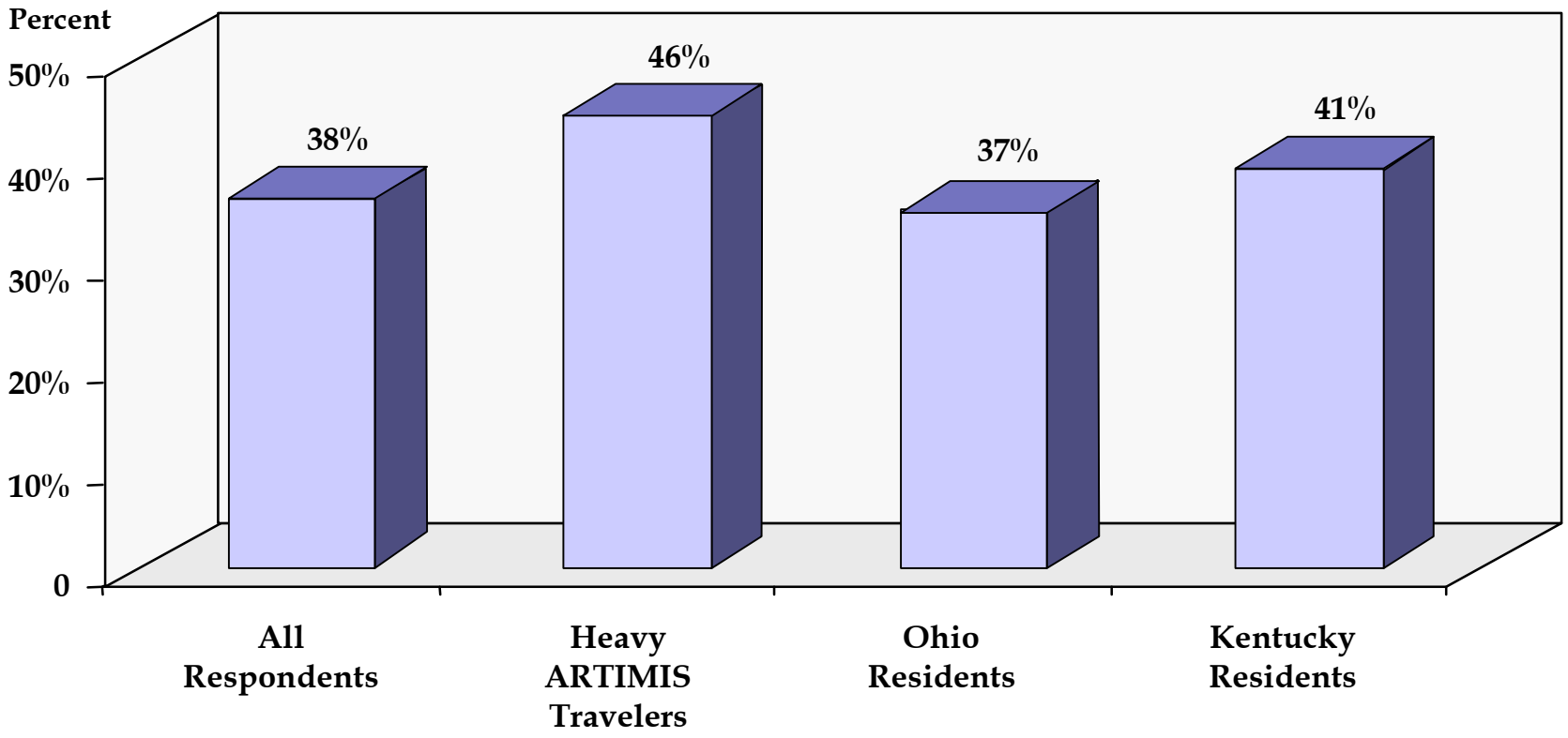
Kentucky Residents



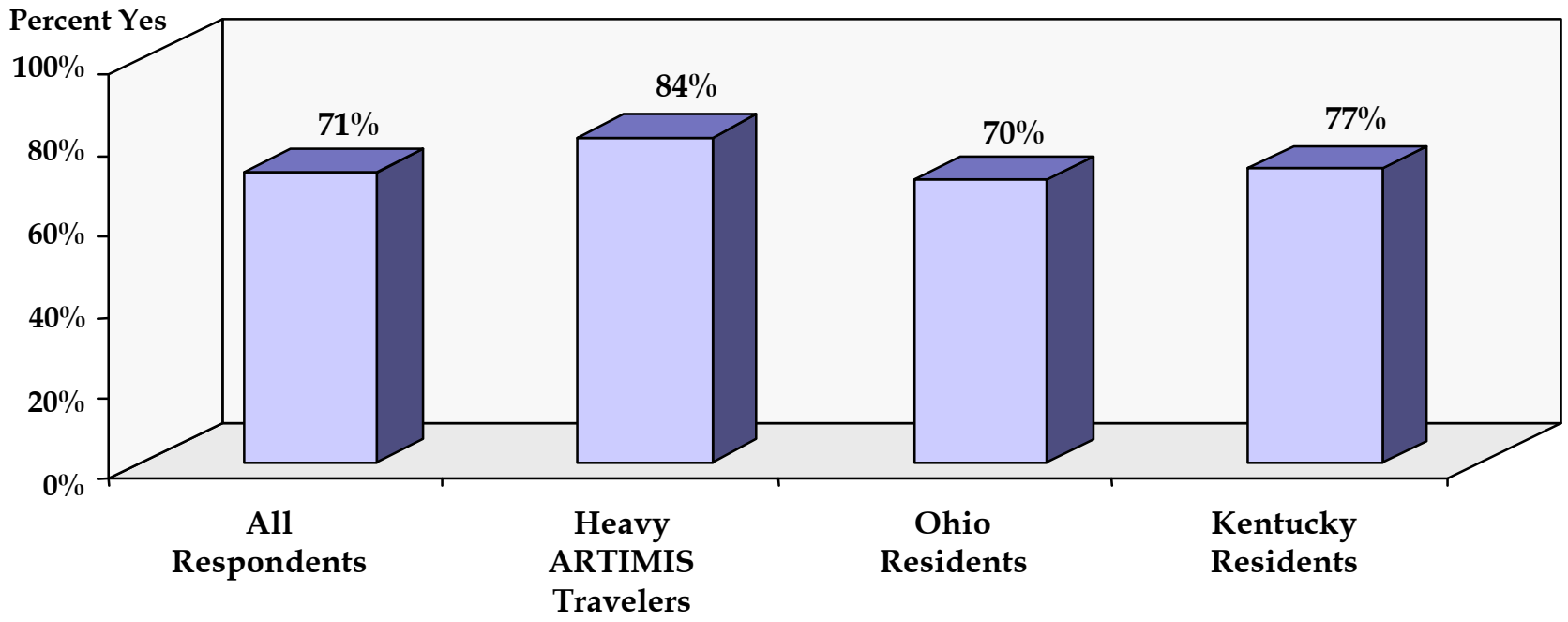
Level of Tolerance for Morning Commute



Percent of Morning Travel Time Spent on Highways



Regularly Commute in Afternoon (3 P.M. - 7 P.M.)

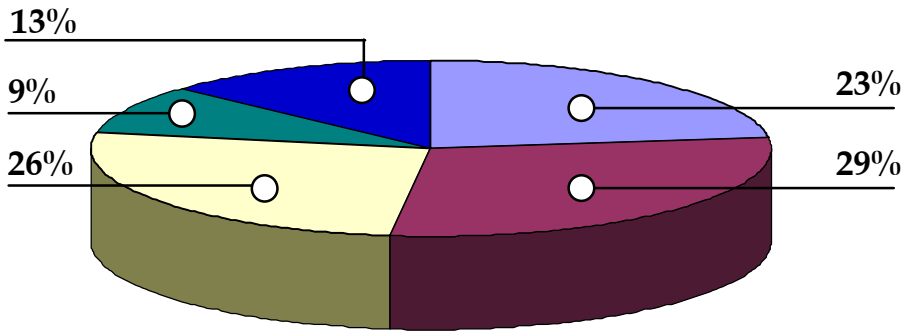


Average Number of Days Commute			
4.5	4.8	4.5	4.7

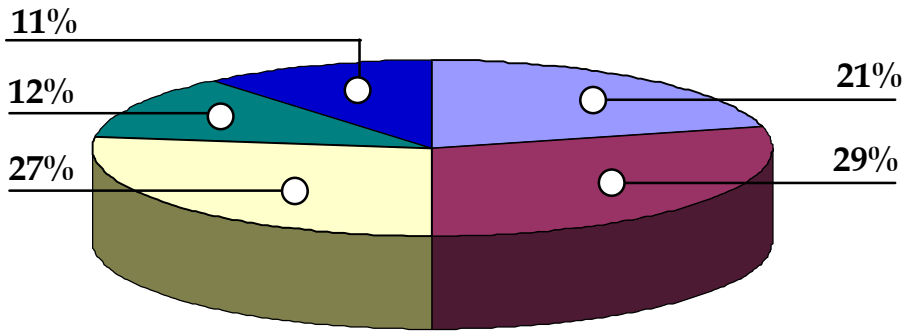
Total Number of Minutes Commuting			
28	31	29	26

Usual Afternoon Departure Time

All Respondents

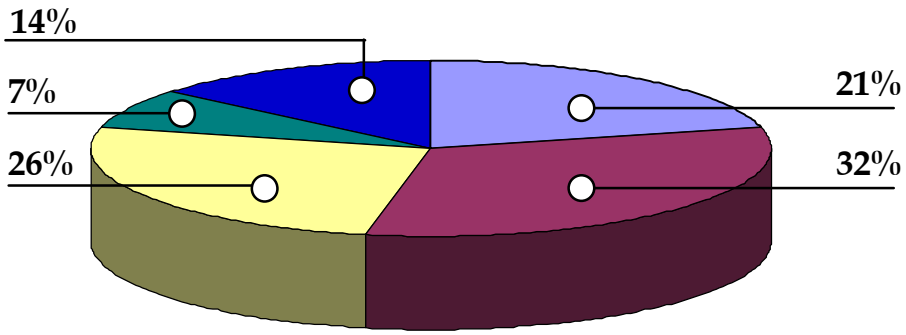


Heavy ARTIMIS Travelers

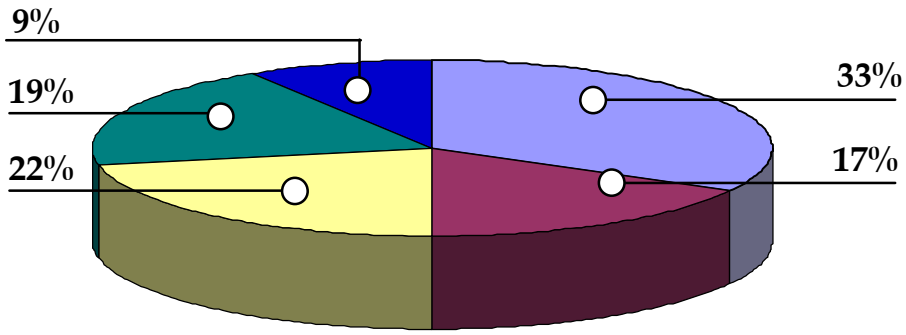


Usual Afternoon Departure Time

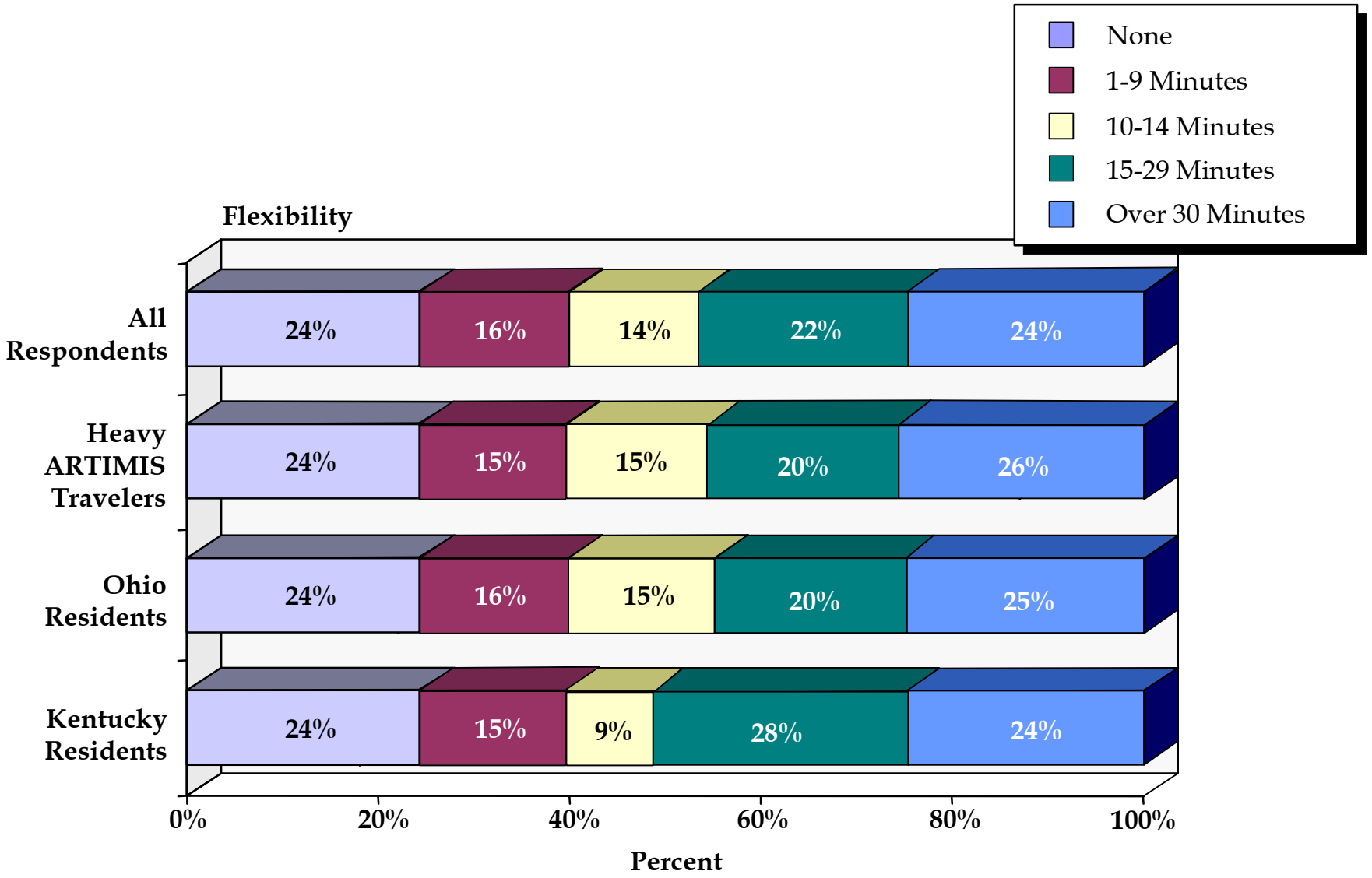
Ohio Residents



Kentucky Residents



Flexibility in Afternoon Departure Time



Household Demographics

Electronic Equipment/Services Owned

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
(Base)	(375)	(156)	(305)	(70)
Cable/Satellite TV	**74%**	**71%**	**74%**	**77%**
Mobile Phone	**62%**	**75%**	**62%**	**60%**
Pager/Beeper	**23%**	**29%**	**25%**	**17%**
Personal Digital Assistant (PDA)	**4%**	**4%**	**4%**	**3%**
Hand-held PC w/ Internet	**8%**	**7%**	**8%**	**10%**
GPS/In-vehicle Navigation	**2%**	**3%**	**2%**	**–**

Household Demographics

Internet Access and Use

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
(Base)	(375)	(156)	(305)	(70)
Internet Access on PC	**76%**	**88%**	**77%**	**73%**
– Home	56%	67%	56%	56%
– Business	46%	64%	45%	51%
– School/Library	46%	53%	45%	49%
Internet Use				
– Daily	50%	56%	52%	43%
– At Least Once per Week	24%	23%	23%	27%
– Less Than Once per Week	4%	4%	4%	4%
– Rarely/Never	22%	17%	21%	26%

Household Demographics

Level of Education

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
(Base)	(375)	(156)	(305)	(70)
High School or Less	**37%**	**27%**	**36%**	**40%**
1-3 Years of College	**30%**	**37%**	**31%**	**26%**
College Graduate	**18%**	**21%**	**17%**	**23%**
Post College Graduate	**13%**	**15%**	**13%**	**11%**

Household Demographics

Occupation

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
(Base)	(375)	(156)	(305)	(70)
Self-Employed	**12%**	**16%**	**13%**	**10%**
Non-office Worker	**9%**	**11%**	**9%**	**11%**
Clerical/Secretarial	**9%**	**10%**	**9%**	**7%**
Sales/Marketing/Retail	**9%**	**10%**	**8%**	**13%**
Management/Technical/Professional	**33%**	**37%**	**33%**	**36%**
Homemaker	**8%**	**5%**	**8%**	**9%**
Student	**1%**	**2%**	**1%**	**1%**
Retired	**14%**	**5%**	**14%**	**13%**
Unemployed	**2%**	**2%**	**2%**	**–**
Other	**1%**	**–**	**1%**	**–**

Household Demographics

Other Characteristics

	Total Sample	Heavy ARTIMIS Travelers	Ohio Residents	Kentucky Residents
(Base)	(375)	(156)	(305)	(70)
Average Number in Household	**2.8**	**3.0**	**2.8**	**2.7**
Average Age in Years	**45.5**	**41.8**	**45.7**	**44.9**
Average Household Income	**$56,600**	**$63,700**	**$56,100**	**$58,100**
Gender				
– Male	40%	47%	39%	41%
– Female	60%	53%	61%	59%

Appendix B

Qualitative Research Final Report & Study Materials

Appendix C

Quantitative Research Study Materials