## Smith, Chris B

**From:** Morgan, Jason A
**Sent:** Thursday, April 4, 2019 10:35 AM
**To:** Smith, Chris B
**Subject:** fish trophic level info

Chris,

As you requested, just providing a brief explanation of the decisions made regarding trophic level assignments for selected fish species.
Jeff Bailey and I worked collectively on this. We essentially followed the guidance provided in the NHANES document pertaining to best professional judgement when assigning trophic levels. I've provided a breakdown of the decision for each species or group.

1. Bass and Trout- Addressing these together because the same explanation applies to both. By evaluating these as a group and not by individual species, we felt it was most appropriate to split the group between TL3 and TL4. Primary feeding habits are variable among bass and trout species. Some species tend to consume more herbivores and omnivores (insects, small minnows, crayfish, etc.) while others likely consume more carnivores (other large fish, mammals, amphibians, etc.). This could also vary by waterbody and types of prey items available.

2. Panfish - Generally consume insects, small minnows, and snails which would mostly be herbivores/omnivores. Assigned to TL3.

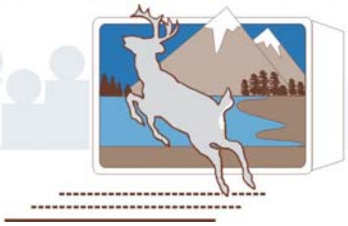
3. Catfish – We agreed with the designation provided in the NHANES document. Catfish (as a group) generally consume any type of prey item available. Some species are more commonly regarded as carnivores while others are omnivores, so splitting the group between TL3 and TL4 was most appropriate.

4. Sauger - Primarily consumes carnivores, but similar to bass, also consumes herbivores. Is currently a TL4, but could be split between TL3 and TL4.

Let me know if you need any additional info or have other questions

**Jason Morgan**
Fisheries Biologist / ERS III
WV Dept. of Environmental Protection
Div. of Water and Waste Management – Watershed Assessment Branch
601 57th St. SE
Charleston, WV 25304
304-926-0499 ext. 1079
Jason.a.morgan@wv.gov

Responsive Management



# SURVEY OF WEST VIRGINIA RESIDENTS' CONSUMPTION OF FISH

**Conducted for the West Virginia Department of Environmental Protection**

**by Responsive Management**

**November 2008**

# SURVEY OF WEST VIRGINIA RESIDENTS' CONSUMPTION OF FISH

**November 2008**


**Responsive Management National Office**
Mark Damian Duda, Executive Director
Martin Jones, Senior Research Associate
Tom Beppler, Research Associate
Steven J. Bissell, Ph.D., Qualitative Research Associate
Andrea Criscione, Research Associate
James B. Herrick, Ph.D., Research Associate
Joanne Nobile, Research Associate
Amanda Ritchie, Research Associate
Carol L. Schilli, Research Associate
Megan Wilkes, Research Associate
Tim Winegord, Survey Center Manager
Alison Lanier, Business Manager

130 Franklin Street
Harrisonburg, VA 22801
Phone: 540/432-1888 Fax: 540/432-1892
E-mail: mark@responsivemanagement.com
www.responsivemanagement.com

## Acknowledgements

Responsive Management would like to thank Scott Mandirola of the West Virginia Department of Environmental Protection for his input, support, and guidance on this project, as well as Cheryl Atkinson, Jeff Bigler, and Caroline Whitehead of the U.S. Environmental Protection Agency, and Steve Bradbard and Amy Lando of the U.S. Food and Drug Administration for their assistance with the study.

# EXECUTIVE SUMMARY

## INTRODUCTION AND METHODOLOGY

This study was conducted for the West Virginia Department of Environmental Protection to determine rates of freshwater fish consumption among the general public in West Virginia. The study entailed a telephone survey of West Virginia residents 18 years of age and older; the research team selected telephones as the preferred sampling medium because of the universality of telephone ownership. Responsive Management conducted the interviews Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., local time.

Responsive Management conducted the survey in October 2008 and obtained a total of 1,687 completed interviews. The software used for data collection was Questionnaire Programming Language 4.1. Throughout this report, findings of the telephone survey are reported at a 95% confidence interval. For the entire sample of West Virginia residents, the sampling error is at most plus or minus 2.385 percentage points.

## GENERAL FISH CONSUMPTION

- The survey asked West Virginia residents if they had eaten any freshwater fish, saltwater fish, or shellfish in the 12 months prior to the survey, and a majority (57%) responded that they had.
  - Residents who had eaten fish most commonly said that the fish they had eaten in the 12 months prior to the survey was primarily saltwater fish (38%), while just over a quarter (28%) said they had eaten primarily freshwater fish; a third (33%) said they had eaten both about equally.
  - Among those who said they had eaten primarily saltwater fish, about a third (32%) had also consumed freshwater fish in the 12 months prior to the survey.
  - In total, 43% of West Virginia residents had eaten freshwater fish in the 12 months prior to the survey.

## RECENT FISH CONSUMPTION

- Those who said they had eaten freshwater fish in the 12 months prior to the survey were asked if they had eaten any freshwater fish in the 30 days prior to the survey, and just under half (45%) responded that they had.
  - Most of those who had eaten freshwater fish in the 30 days prior to the survey had eaten no more than 2 meals with freshwater fish; the mean was 3.16 meals with freshwater fish.
  - While a bare majority (51%) of residents had not had a meal with freshwater fish in the week prior to the survey, over a third (37%) said that they had eaten a single meal with freshwater fish in the same time period; the mean was 0.63 meals in the previous week.

## FISHING PARTICIPATION

- Nearly half (46%) of the West Virginia residents who had eaten freshwater fish in the 12 months prior to the survey said they had also been freshwater fishing within the same time period.

## FISH CONSUMPTION BEHAVIOR

### Amount of Freshwater Fish Consumed

- The survey asked those who had eaten freshwater fish in the 12 months prior to the survey if they had eaten a portion smaller than, larger than, or about the same size as an 8-ounce serving, or a thin paperback book. Respondents most commonly said they ate freshwater fish portions about the same size as an 8-ounce portion (47%); meanwhile, about a quarter of respondents said they had eaten portions smaller than 8 ounces (25%) and about the same percentage said they had eaten portions larger than 8 ounces (27%).

### Species Consumed

- The survey asked about the species or types of freshwater fish West Virginia residents had consumed in the 12 months prior to the survey, and trout (44%), tilapia (36%), and catfish/bullhead (27%) were the most commonly named species, each with at least a quarter of residents who had eaten freshwater fish in the past 12 months saying they had eaten these types of fish.

- Notable percentages indicated they had eaten bass (15%) and panfish (11%) in the 12 months prior to the survey.
- The overwhelming majority of West Virginia residents who had eaten freshwater fish in the past 12 months (85%) did not eat fish for which they did not know the species.

### Frequency of Consumption of Species

- For each species of fish they indicated eating, respondents were asked how many meals including that species they had eaten per month in three-month periods throughout the year prior to the survey. For example, respondents who said they had eaten bass were asked how many meals that included bass they had eaten per month in September/October/November in the year prior to the survey, how many they had eaten per month in December/January /February, etc.

- Throughout the year, trout and tilapia were the most commonly consumed species, while walleye/sauger were eaten the least by West Virginians.

- West Virginia residents generally appear slightly less likely to eat meals with freshwater fish in the winter than in the other seasons of the year; otherwise, there are few marked seasonal differences in residents' consumption of various species.
  - For the fall period of September/October/November, trout was the most commonly eaten fish per month, with a mean of 0.80 meals per month, while walleye/sauger was the least commonly eaten, with a mean of 0.05 meals eaten per month by West Virginia residents during these months.
  - For the winter period of December/January/February, tilapia was the most commonly eaten fish per month, with a mean of 0.68 meals eaten per month; walleye/sauger was again at the other end of the scale with a mean of 0.03 meals eaten per month during these months.
  - For the spring period of March/April/May, West Virginia residents most commonly ate trout (mean of 1.18 meals per month), while they were again least likely to eat walleye/sauger (mean of 0.05 meals per month).

- For the summer months of June/July/August, trout was the most commonly eaten fish per month, with a mean of 0.77 meals eaten per month, and walleye/sauger was the least commonly eaten (mean of 0.06 meals eaten per month).

### Sources of Freshwater Fish Consumed, by Species

- West Virginia residents most commonly catch for themselves the bass, trout, walleye/sauger, and panfish they eat, while tilapia is most commonly purchased at a store or market. Catfish/bullhead is also most likely to be either purchased at a store, market, or restaurant, although a substantial percentage of West Virginia residents (41%) catch the catfish/bullhead they eat.

### Preparation of Fish Consumed, by Species

- Substantial percentages of respondents indicated that they cut steaks from bass, trout, catfish/bullhead, and walleye/sauger, as well as trimming or removing some of the fat from these species prior to cooking (such as the belly fat and fat from the back and sides of the fish).
  - Respondents appear most likely to trim or remove completely the fat from walleye/sauger.
  - Over a third of respondents (38%) say that since the tilapia they eat is store-bought, they are generally unsure of how exactly the fish has been prepared.
  - Over a quarter of respondents (27%) say that when eating trout, they eat the whole fish.

- Overall, West Virginia residents appear most likely to pan-fry the fish they eat, though panfish is by far the most likely to be cooked this way, and tilapia is the least likely to be cooked this way.
  - Tilapia is most likely to be broiled or baked, while trout is the most likely species to be grilled by West Virginia residents.

### Children's Freshwater Fish Consumption

- The survey asked respondents if they had children in the household aged 17 or younger, and a third (33%) said that they did. Respondents were then asked about the number of children

aged 17 or younger they had living in their household; for respondents with more than one child aged 17 or younger, the survey randomly selected a child whose fresh fish consumption the respondent was asked to discuss in a series of questions that followed (respondents with just one child discussed that child's freshwater fish consumption). This randomization allowed the researchers to extrapolate overall freshwater fish consumption habits among children in West Virginia.

- About a third (30%) of West Virginia residents with children age 17 or younger said that at least one child had eaten freshwater fish in the 12 months prior to the survey.
  - More than three-quarters (80%) of West Virginians with children age 17 or younger said their child had eaten no more than 3 meals with freshwater fish per month in the 12 months prior to the survey; the mean number of meals was 2.20 per month.
  - Trout (50%), tilapia (31%), and catfish/bullhead (24%) predominate the freshwater species consumed by children age 17 or younger.
  - A slightly majority of respondents with children age 17 or younger (52%) indicated that their child had eaten freshwater fish caught while fishing, while nearly a third (32%) said their child ate freshwater fish purchased at a store or market; meanwhile, 11% said their child ate freshwater fish purchased at a restaurant.

# TABLE OF CONTENTS

# INTRODUCTION AND METHODOLOGY

This study was conducted for the West Virginia Department of Environmental Protection (hereinafter referred to as WVDEP) to determine rates of freshwater fish consumption among the general public in West Virginia. The study entailed a telephone survey of West Virginia residents 18 years of age and older. Specific aspects of the research methodology are discussed below.

For the survey, the research team selected telephones as the preferred sampling medium because of the universality of telephone ownership. In addition, a central polling site at the Responsive Management office allowed for rigorous quality control over the interviews and data collection. Responsive Management maintains its own in-house telephone interviewing facilities. These facilities are staffed by interviewers with experience conducting computer-assisted telephone interviews on the subjects of natural resources and outdoor recreation. Responsive Management developed the telephone survey questionnaire cooperatively with the WVDEP. Responsive Management conducted a pre-test of the questionnaire to ensure proper wording, logic, and flow.

To ensure the integrity of the telephone survey data, Responsive Management has interviewers who have been trained according to the standards established by the Council of American Survey Research Organizations. Methods of instruction included lecture and role-playing. The Survey Center Managers and other professional staff conducted project briefings with the interviewers prior to the administration of this survey. Interviewers were instructed on type of study, study goals and objectives, handling of survey questions, interview length, termination points and qualifiers for participation, interviewer instructions within the survey instrument, reading of the survey instrument, skip patterns, and probing and clarifying techniques necessary for specific questions on the survey instrument. The Survey Center Managers and statisticians monitored the data collection, including monitoring of the actual telephone interviews without the interviewers' knowledge, to evaluate the performance of each interviewer and ensure the integrity of the data. After the surveys were obtained by the interviewers, the Survey Center Managers and/or statisticians checked each completed survey to ensure clarity and completeness.

Responsive Management conducted the interviews Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., local time, using a five-callback design to maintain the representativeness of the sample, to avoid bias toward people easy to reach by telephone, and to provide an equal opportunity for all to participate. When a respondent could not be reached on the first call, interviewers placed subsequent calls on different days of the week and at different times of the day. Responsive Management conducted the survey in October 2008 and obtained a total of 1,687 completed interviews.

The software used for data collection was Questionnaire Programming Language 4.1 (QPL). The survey data were entered into the computer as each interview was being conducted, eliminating manual data entry after the completion of the survey and the concomitant data entry errors that may occur with manual data entry. The survey instrument was programmed so that QPL branched, coded, and substituted phrases in the survey based on previous responses to ensure the integrity and consistency of the data collection. The research team analyzed the data using Statistical Package for the Social Sciences software as well as proprietary software developed by Responsive Management.

The results were weighted so that the proportions of the sample among the regions matched the distribution of the population statewide. In other words, the results were weighted so that 5.58% of the sample were 18- to 24-year-old males, which matches the state population, 5.86% of which is made up of 18- to 24-year-old males. The tabulation below shows the weighting factors (the table continues on the next page).

**Weighting Factors**

| Age group | Actual Sample | Proportion of Total Sample | Weighting Factor | Weighted Proportion of Sample | Population Proportion |
|---|---|---|---|---|---|
| 18- to 24-year-old males | 21 | 1.24% | 4.71 | 5.58% | 5.86% |
| 25- to 34-year-old males | 92 | 5.45% | 1.43 | 7.45% | 7.78% |
| 35- to 44-year-old males | 109 | 6.46% | 1.35 | 8.64% | 8.72% |
| 45- to 54-year-old males | 149 | 8.83% | 1.07 | 9.04% | 9.49% |
| 55- to 64-year-old males | 147 | 8.71% | 0.93 | 7.95% | 8.12% |
| 65 years or older males | 181 | 10.73% | 0.78 | 8.17% | 8.36% |

| Age group | Actual Sample | Proportion of Total Sample | Weighting Factor | Weighted Proportion of Sample | Population Proportion |
|---|---|---|---|---|---|
| 18- to 24-year-old females | 40 | 2.37% | 2.36 | 4.61% | 5.59% |
| 25- to 34-year-old females | 95 | 5.63% | 1.40 | 7.29% | 7.87% |
| 35- to 44-year-old females | 148 | 8.77% | 0.99 | 8.06% | 8.70% |
| 45- to 54-year-old females | 200 | 11.86% | 0.82 | 9.48% | 9.77% |
| 55- to 64-year-old females | 219 | 12.98% | 0.65 | 8.09% | 8.40% |
| 65 years or older females | 286 | 16.95% | 0.67 | 10.95% | 11.34% |
| Total | 1,687 | | | | |

Throughout this report, findings of the telephone survey are reported at a 95% confidence interval. For the entire sample of West Virginia residents, the sampling error is at most plus or minus 2.385 percentage points. This means that if the survey were conducted 100 times on different samples that were selected in the same way, the findings of 95 out of the 100 surveys would fall within plus or minus 2.385 percentage points of each other. Sampling error was calculated using the formula described below, with a sample size of 1,687 and a population size of 1,424,576 West Virginia residents 18 years old or older.

**Sampling error equation:**

$$B = \left( \sqrt{\frac{\frac{N_p(.25)}{N_s} - .25}{N_p - 1}} \right)(1.96)$$

Where: B = maximum sampling error (as decimal)

$N_P$ = pop. size (i.e., total number who could be surveyed)

$N_S$ = sample size (i.e., total number of respondents surveyed)

Derived from formula: p. 206 in Dillman, D. A. 2000. *Mail and Internet Surveys*. John Wiley & Sons, NY.

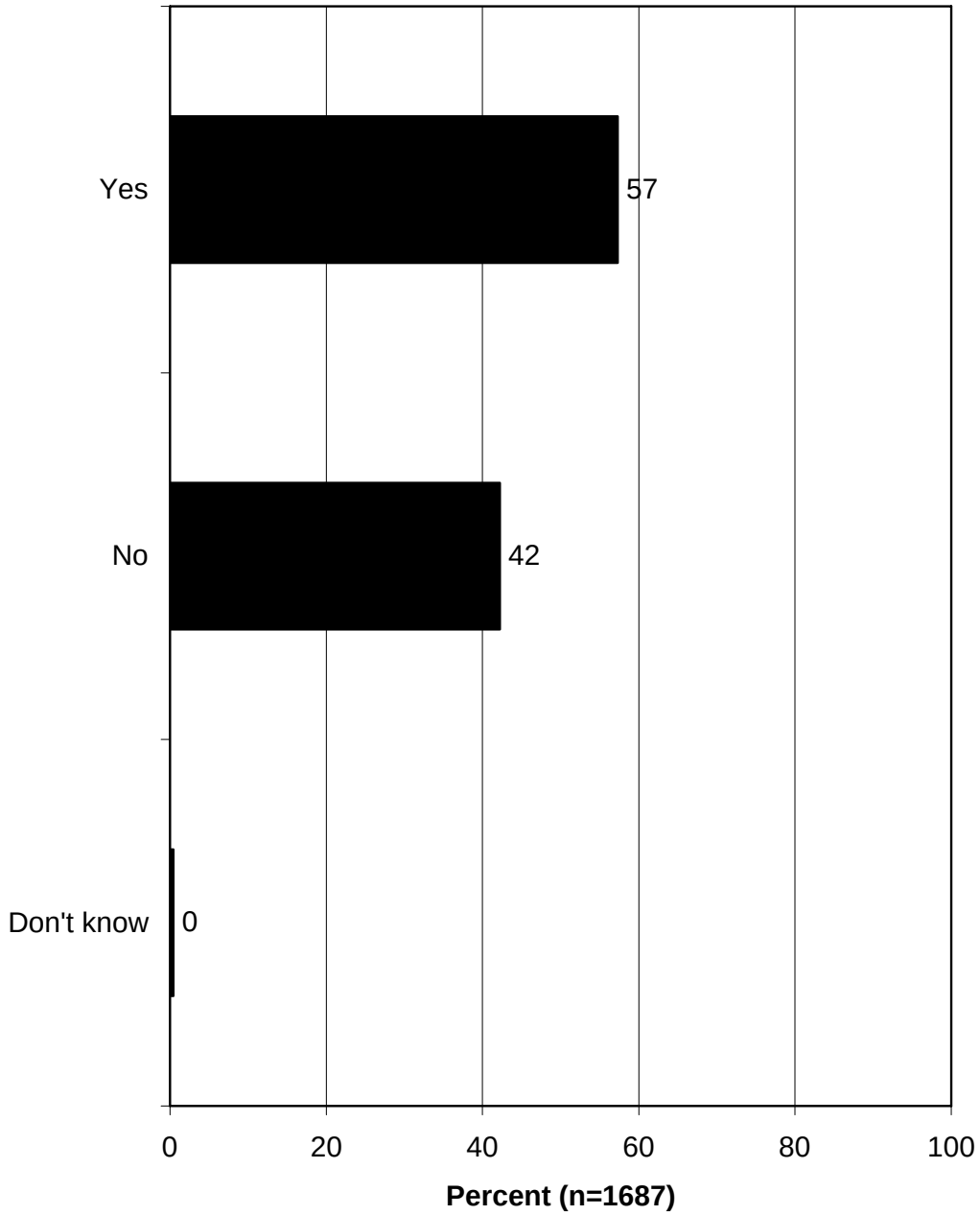
**Note**: This is a simplified version of the formula that calculates the *maximum* sampling error using a 50:50 split (the most conservative calculation because a 50:50 split would give maximum variation).

Note that some results may not sum to exactly 100% because of rounding. Additionally, rounding on the graphs may cause apparent discrepancies of 1 percentage point between the graphs and the reported results of combined responses (e.g., when "strongly support" and "moderately support" are summed to determine the total percentage in support). Finally, the sample size on some graphs is lower than 1,687 (the total number of respondents) because some questions were not asked of all respondents.

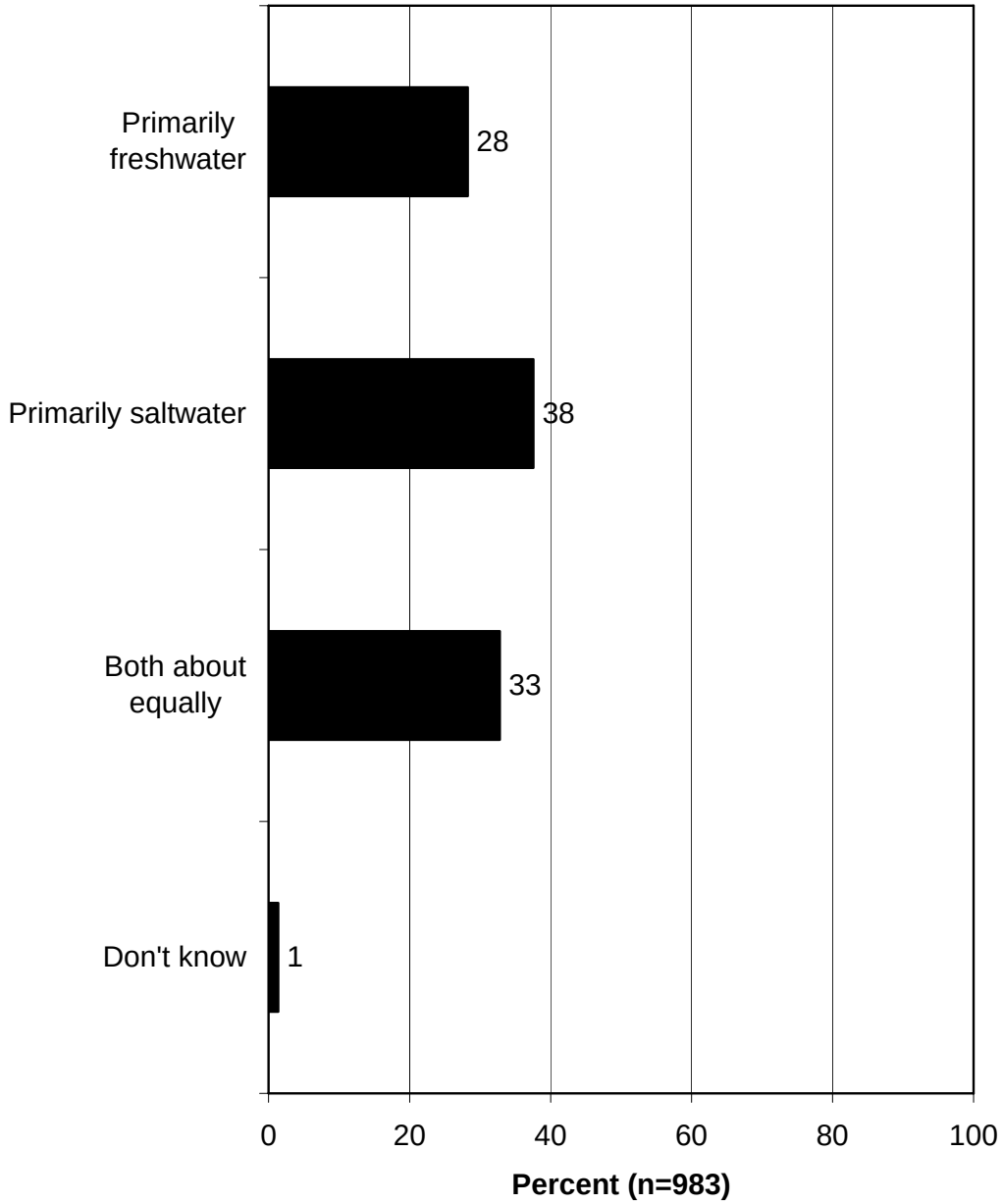
# GENERAL FISH CONSUMPTION

- The survey asked West Virginia residents if they had eaten any freshwater fish, saltwater fish, or shellfish in the 12 months prior to the survey, and a majority (57%) responded that they had.
  - Residents who had eaten fish most commonly said that the fish they had eaten in the 12 months prior to the survey was primarily saltwater fish (38%), while just over a quarter (28%) said they had eaten primarily freshwater fish; a third (33%) said they had eaten both about equally.
  - Among those who said they had eaten primarily saltwater fish, about a third (32%) had also consumed freshwater fish in the 12 months prior to the survey.
  - In total, 43% of West Virginia residents had eaten freshwater fish in the 12 months prior to the survey.

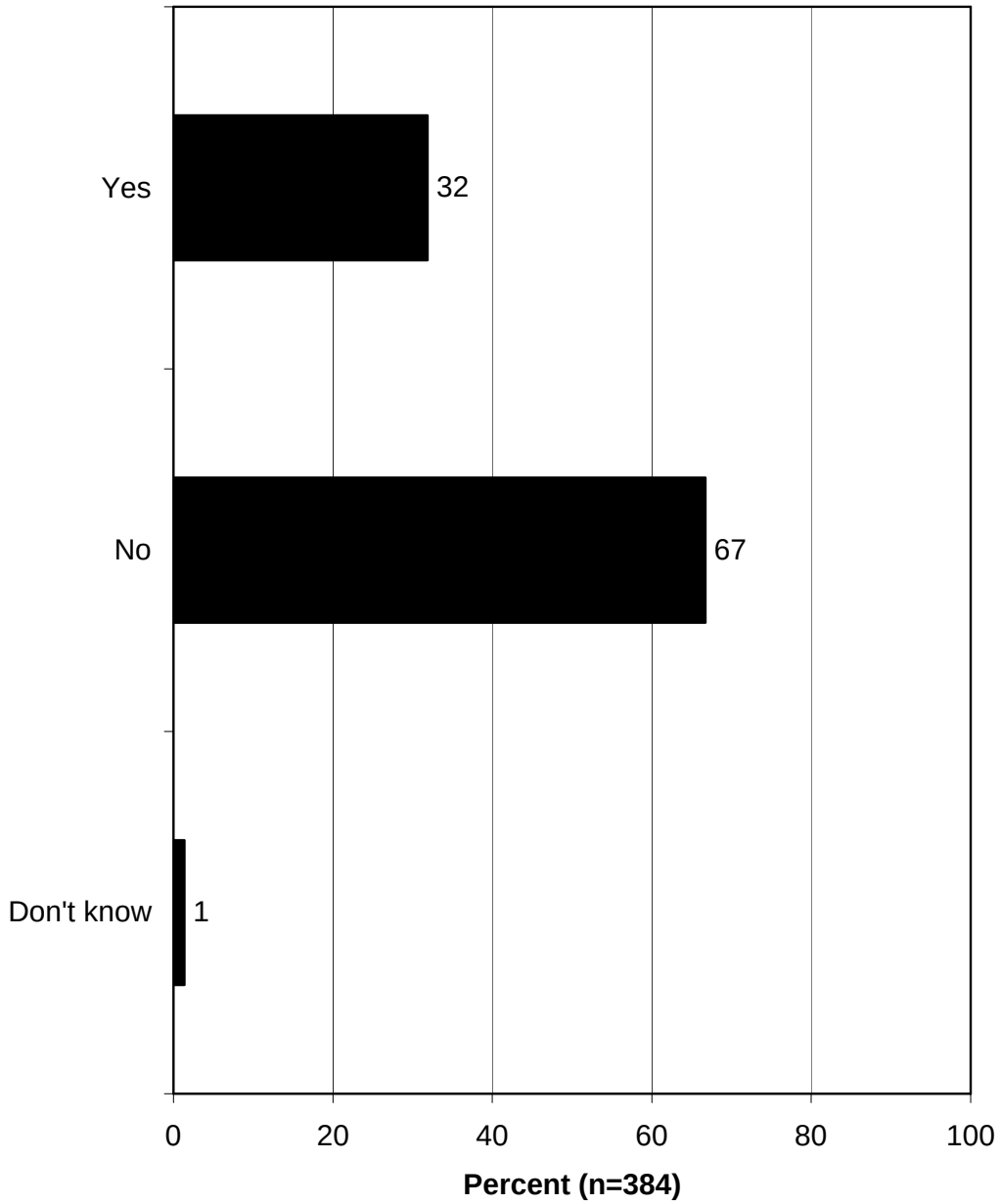
## Q11. Have you eaten any freshwater fish, saltwater fish, or shellfish in the past 12 months?



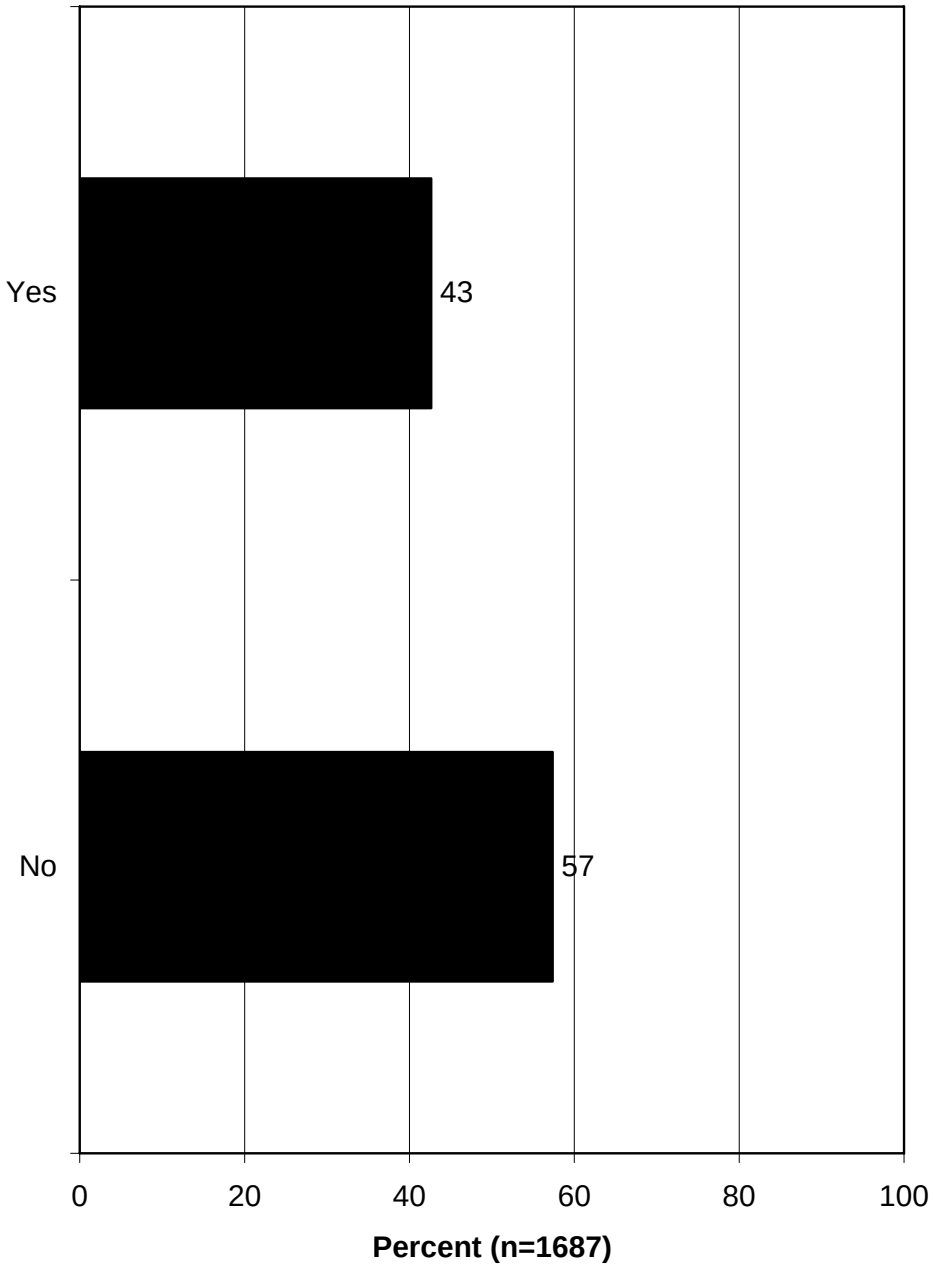
**Q15. Was the fish you ate in the past 12 months primarily freshwater or saltwater fish or did you eat both about equally? (Asked of those who have eaten any freshwater fish, saltwater fish, or shellfish in the past 12 months.)**



**Q16. You indicated that the fish you ate in the past 12 months was primarily saltwater fish. Have you eaten any freshwater fish in the past 12 months? (Asked of those who have primarily eaten saltwater fish in the past 12 months.)**



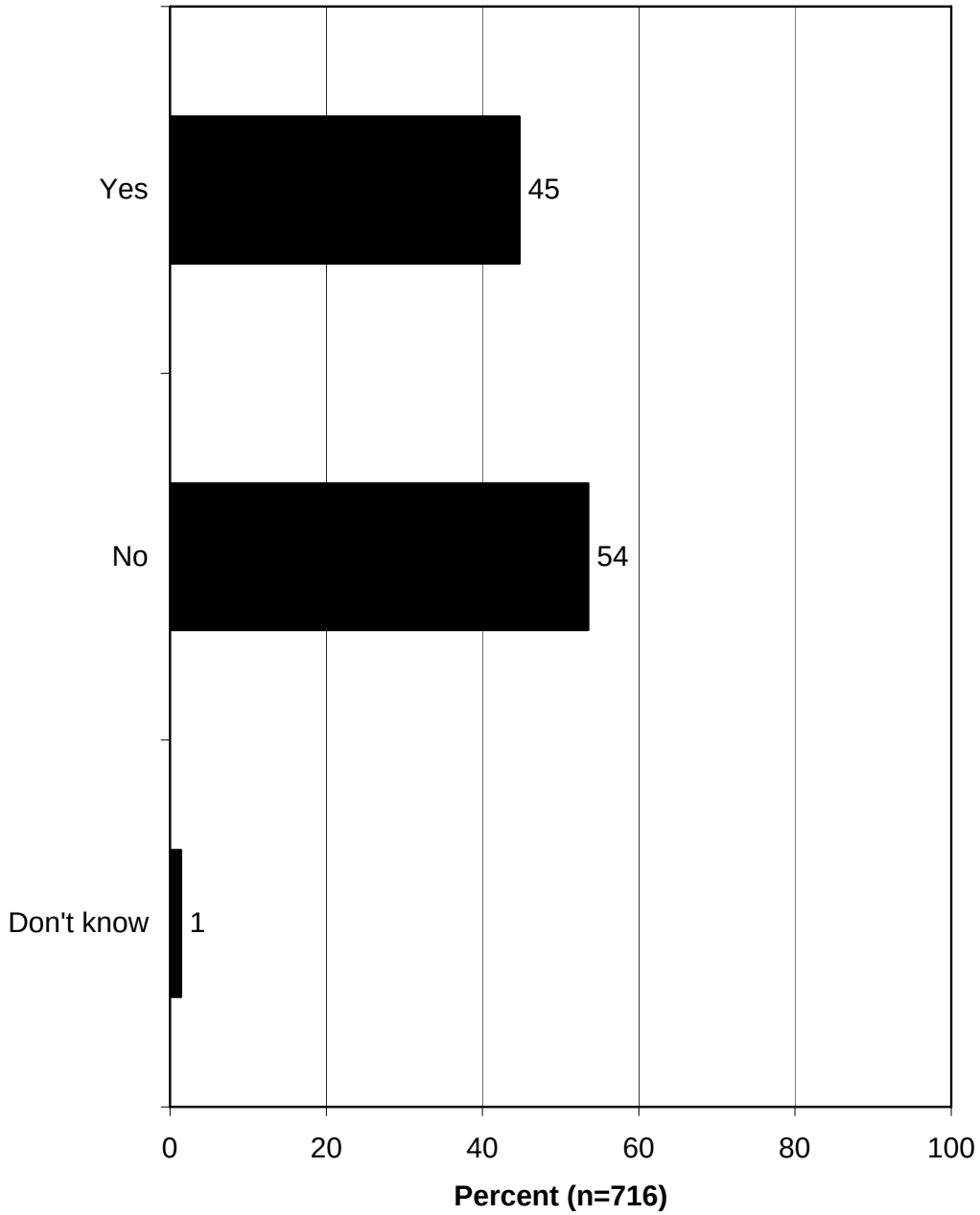
**Total percentage of all West Virginia residents from the sample who have eaten freshwater fish in the past 12 months.**



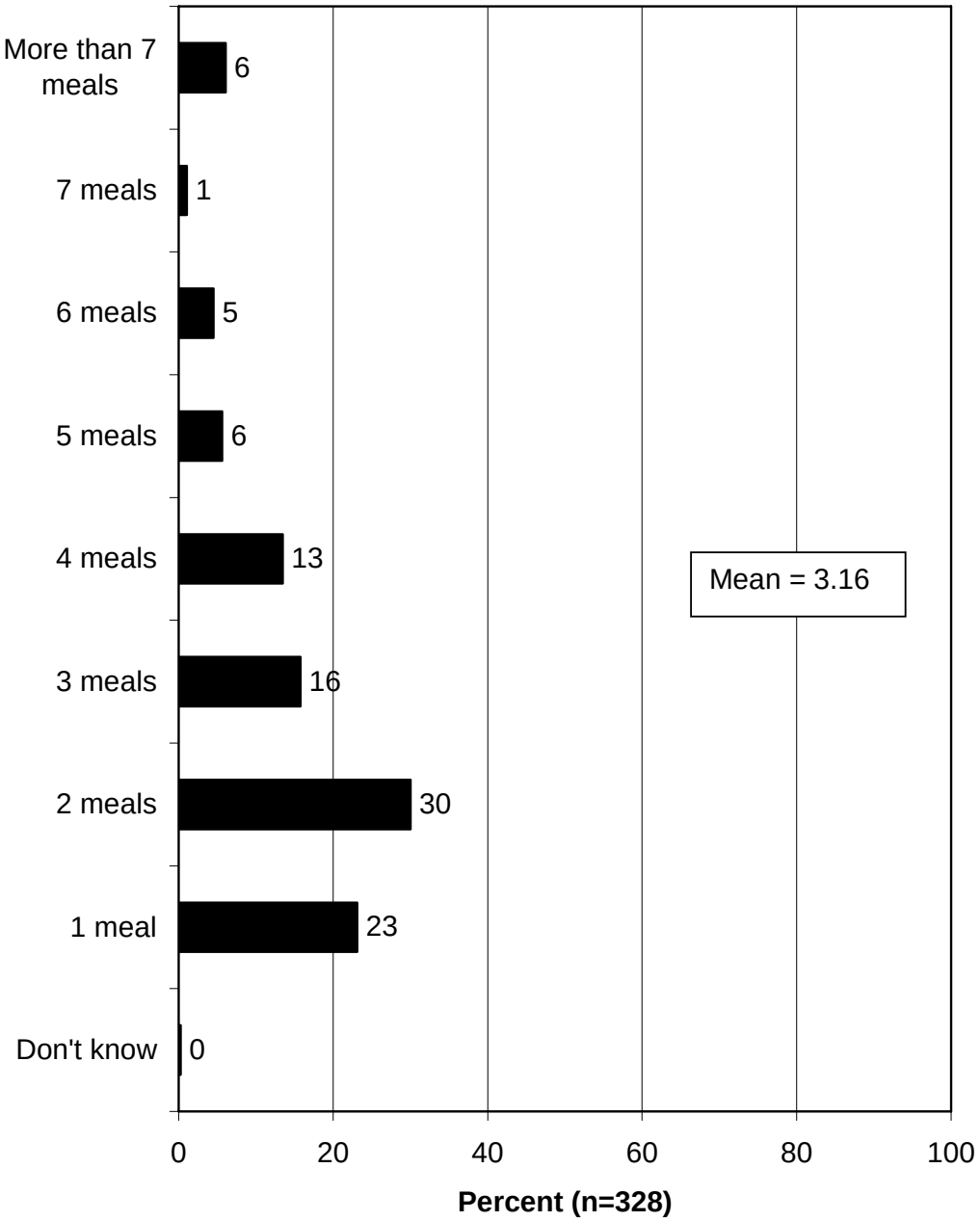
# RECENT FISH CONSUMPTION

- Those who said they had eaten freshwater fish in the 12 months prior to the survey were asked if they had eaten any freshwater fish in the 30 days prior to the survey, and just under half (45%) responded that they had.
  - Most of those who had eaten freshwater fish in the 30 days prior to the survey had eaten no more than 2 meals with freshwater fish; the mean was 3.16 meals with freshwater fish.
  - While a bare majority (51%) of residents had not had a meal with freshwater fish in the week prior to the survey, over a third (37%) said that they had eaten a single meal with freshwater fish in the same time period; the mean was 0.63 meals in the previous week.

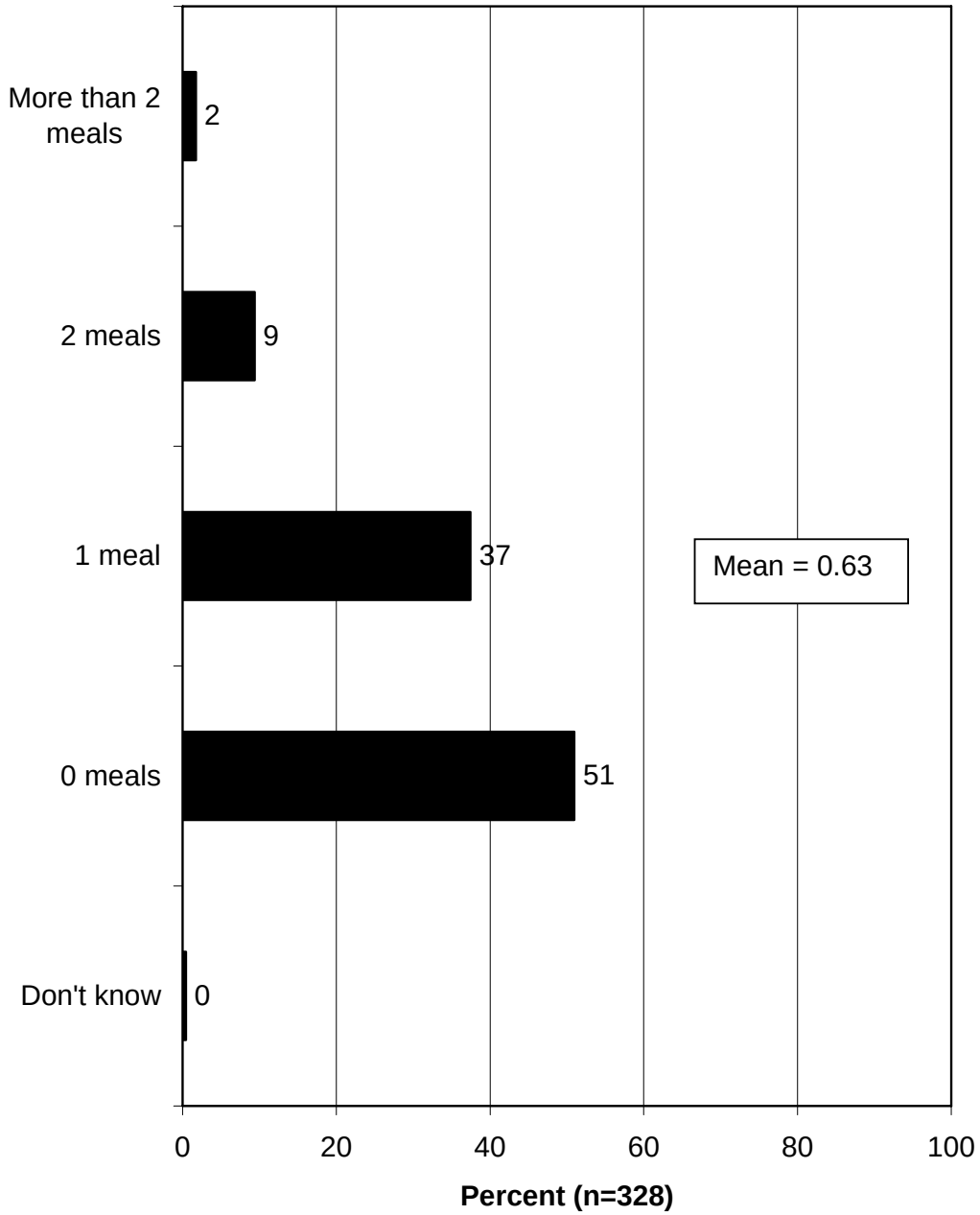
## Q17. Have you eaten any freshwater fish in the past 30 days? (Asked of those who have eaten any freshwater fish in the past 12 months.)



**Q18. How many meals with freshwater fish would you say you have eaten in the past 30 days? (Asked of those who ate freshwater fish in the past 30 days.)**



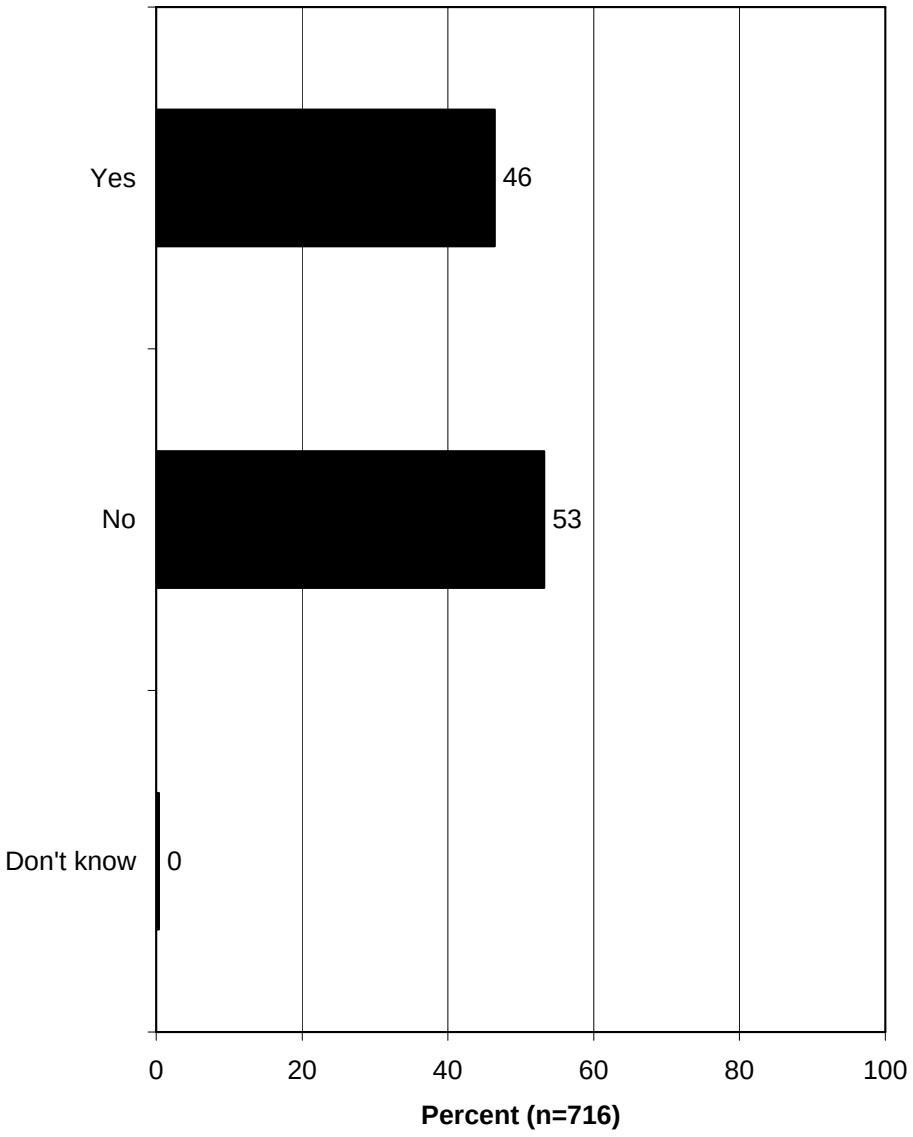
**Q21. How many meals with freshwater fish would you say you have eaten in the past 7 days? (Asked of those who ate freshwater fish in the past 30 days.)**



# FISHING PARTICIPATION

- Nearly half (46%) of the West Virginia residents who had eaten freshwater fish in the 12 months prior to the survey said they had also been freshwater fishing within the same time period.

**Q24. Have you been freshwater fishing in the past 12 months? (Asked of those who have eaten freshwater fish in the past 12 months.)**



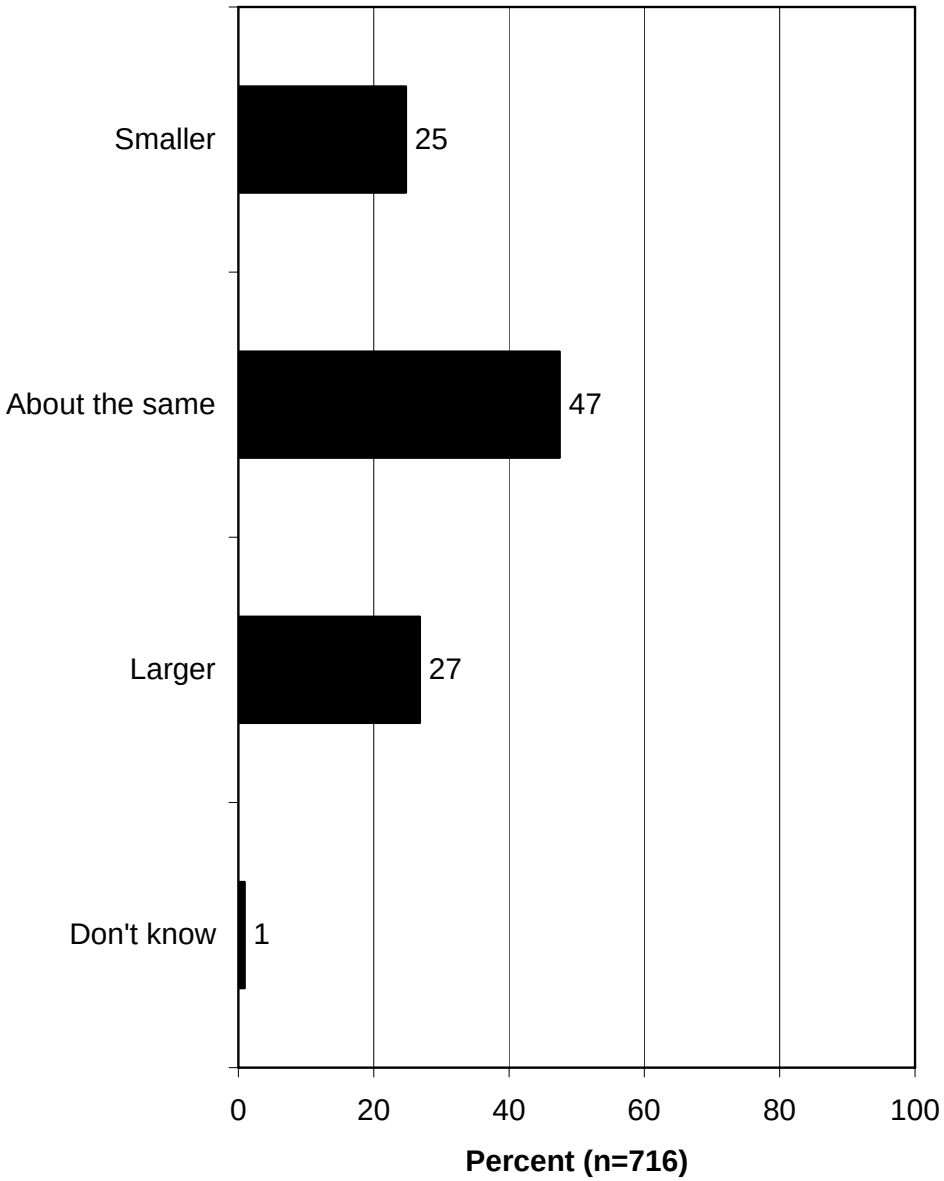
# FISH CONSUMPTION BEHAVIOR

## AMOUNT OF FRESHWATER FISH CONSUMED

- The survey asked those who had eaten freshwater fish in the 12 months prior to the survey if they had eaten a portion smaller than, larger than, or about the same size as an 8-ounce serving, or a thin paperback book. Respondents most commonly said they ate freshwater fish portions about the same size as an 8-ounce portion (47%); meanwhile, about a quarter of respondents said they had eaten portions smaller than 8 ounces (25%) and about the same percentage said they had eaten portions larger than 8 ounces (27%).
  - The example given for reference in the survey—that 8 ounces is about the size of a thin paperback book—is from the American Cancer Society and can be found on the organization's website.[1]

[1] American Cancer Society 8-ounce comparison source: http://www.cancer.org/docroot/PED/content/PED_3_2x_Portion_Control.asp?sitearea=PED.

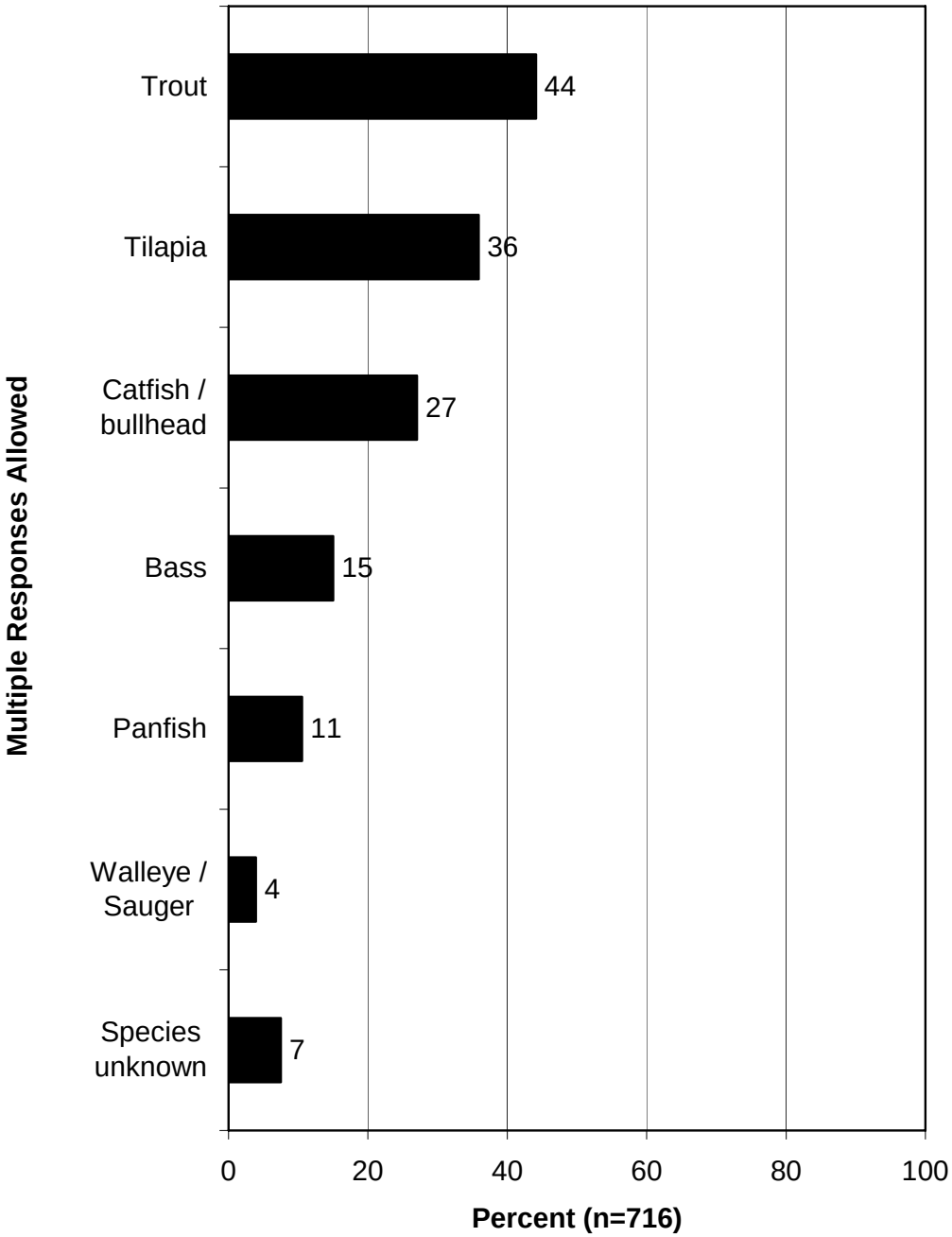
**Q26. When you ate freshwater fish in the past 12 months, would you say you usually ate a portion that was smaller, about the same, or larger than 8 ounces? (Asked of those who have eaten freshwater fish in the past 12 months.)**



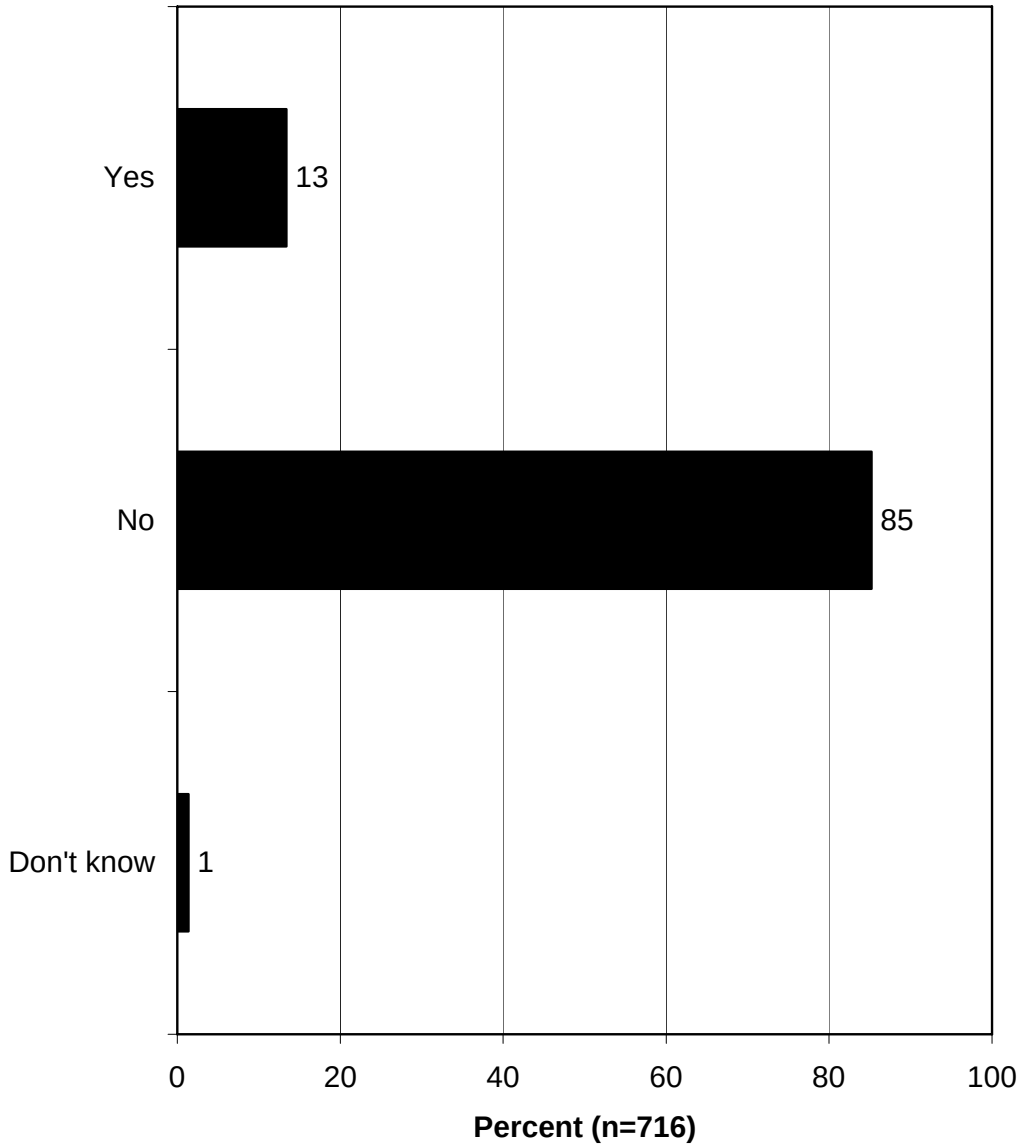
## SPECIES CONSUMED

- The survey asked about the species or types of freshwater fish West Virginia residents had consumed in the 12 months prior to the survey, and trout (44%), tilapia (36%), and catfish/bullhead (27%) were the most commonly named species, each with at least a quarter of residents who had eaten freshwater fish in the past 12 months saying they had eaten these types of fish.
  - Notable percentages indicated they had eaten bass (15%) and panfish (11%) in the 12 months prior to the survey.
  - The overwhelming majority of West Virginia residents who had eaten freshwater fish in the past 12 months (85%) did not eat fish for which they did not know the species.

**Q27. Which species or type of freshwater fish did you eat in the past 12 months? (Asked of those who have eaten freshwater fish in the past 12 months.)**



**Q225. Sometimes you may not know the species or type of fish you ate. For example, a friend may have given you some fish he caught and you did not know what species it was. Or, you may have bought some freshwater fish at a restaurant or a market and have forgotten what species it was. Did you eat any fish in the past 12 months for which you did not know the species?**



## FREQUENCY OF CONSUMPTION OF SPECIES

- For each species of fish they indicated eating, respondents were asked how many meals including that species they had eaten per month in three-month periods throughout the year prior to the survey. For example, respondents who said they had eaten bass were asked how many meals that included bass they had eaten per month in September/October/November in the year prior to the survey, how many they had eaten per month in December/January/February, etc.

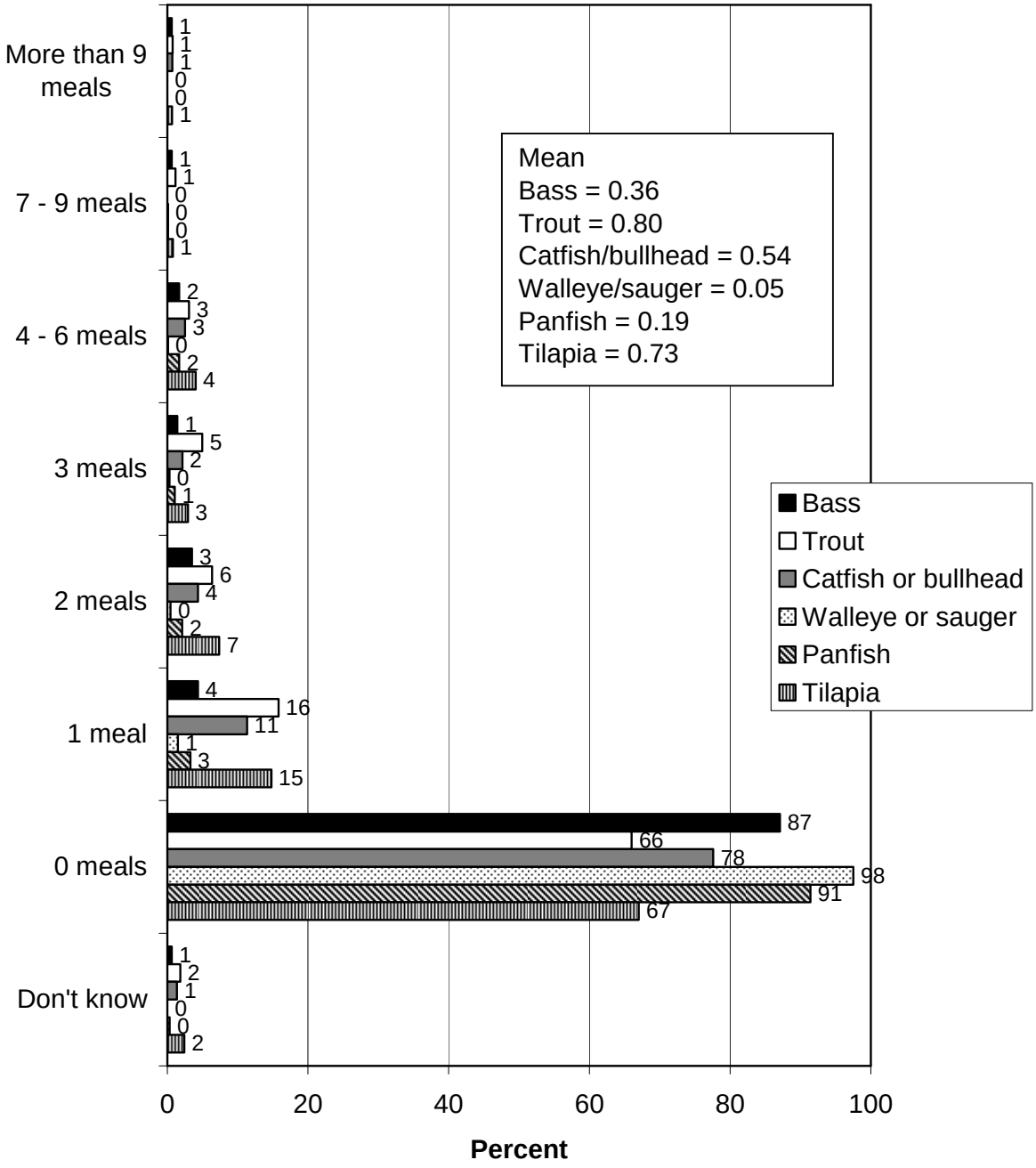
- Throughout the year, trout and tilapia were the most commonly consumed species, while walleye/sauger were eaten the least by West Virginians.

- West Virginia residents generally appear slightly less likely to eat meals with freshwater fish in the winter than in the other seasons of the year; otherwise, there are few marked seasonal differences in residents' consumption of various species.
  - For the fall period of September/October/November, trout was the most commonly eaten fish per month, with a mean of 0.80 meals per month, while walleye/sauger was the least commonly eaten, with a mean of 0.05 meals eaten per month by West Virginia residents during these months.
  - For the winter period of December/January/February, tilapia was the most commonly eaten fish per month, with a mean of 0.68 meals eaten per month; walleye/sauger was again at the other end of the scale with a mean of 0.03 meals eaten per month during these months.
  - For the spring period of March/April/May, West Virginia residents most commonly ate trout (mean of 1.18 meals per month), while they were again least likely to eat walleye/sauger (mean of 0.05 meals per month).
  - For the summer months of June/July/August, trout was the most commonly eaten fish per month, with a mean of 0.77 meals eaten per month, and walleye/sauger was the least commonly eaten (mean of 0.06 meals eaten per month).
  - Note that residents who did not eat that species were coded as having eaten 0 meals in each time period.

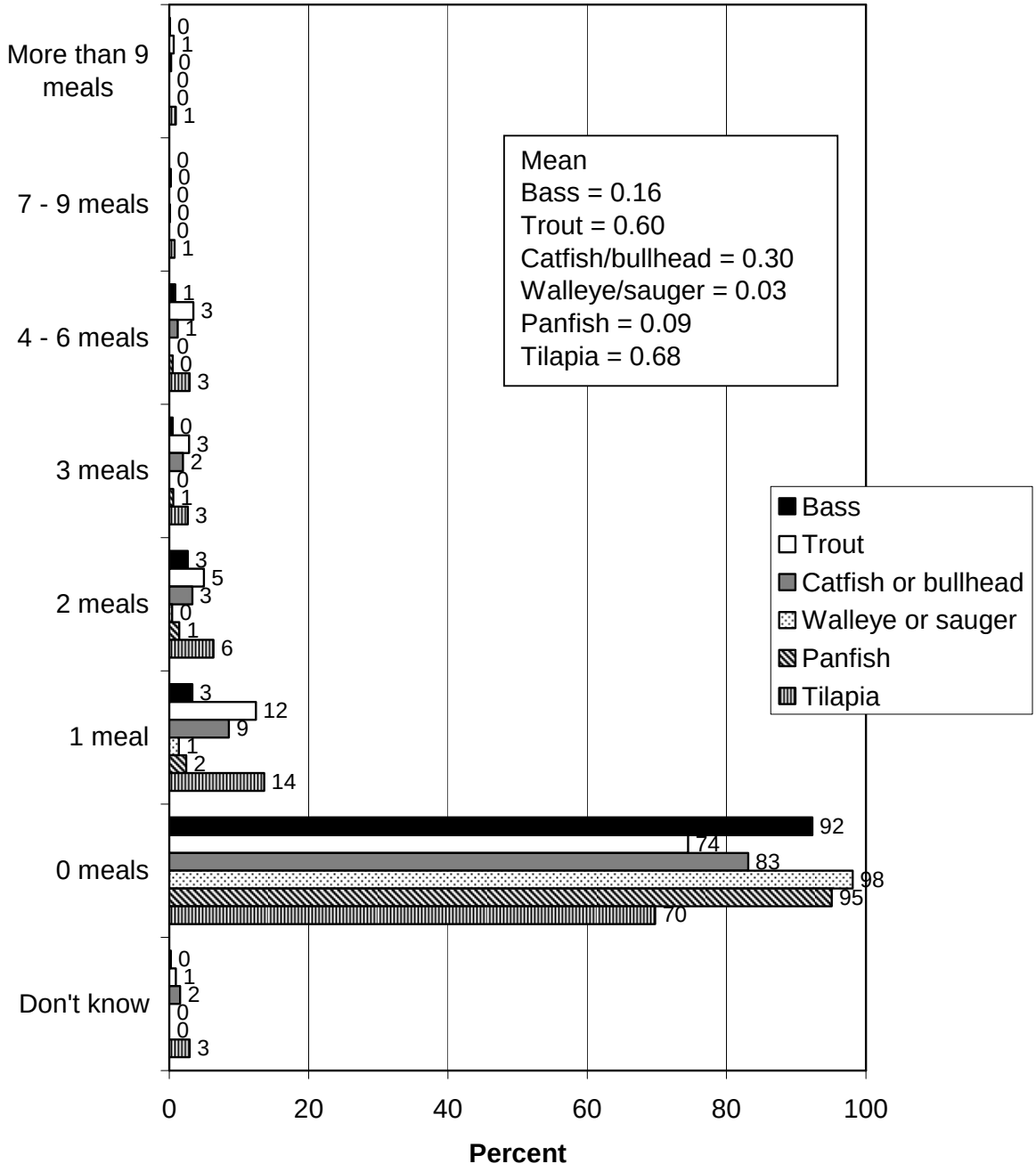
- Those respondents who had eaten fish for which they were unsure of the species were asked how many meals with unknown freshwater fish species they had eaten per month during each of the four seasons. The survey found that West Virginia residents appear most likely to consume meals with unknown freshwater fish species during the winter months of December/January/February, when the per-month mean number of meals with unknown fish species was highest.
  - For September/October/November, the mean number of meals with freshwater fish for which residents were unsure of the species was 1.57 meals per month.
  - For December/January/February, the mean number of meals with unknown fish species was 1.71 meals per month.
  - For March/April/May, the mean number of meals with unknown fish species was 1.50 meals per month.
  - For June/July/August, the mean number of meals with freshwater fish for which residents were unsure of the species was 1.69 meals per month.

- Graphs in this section are presented first by freshwater fish meals consumed during the separate three-month periods, followed by graphs showing the consumption rates for each individual species; finally, a frequency table shows all meals eaten that included freshwater fish in the 12 months prior to the survey.

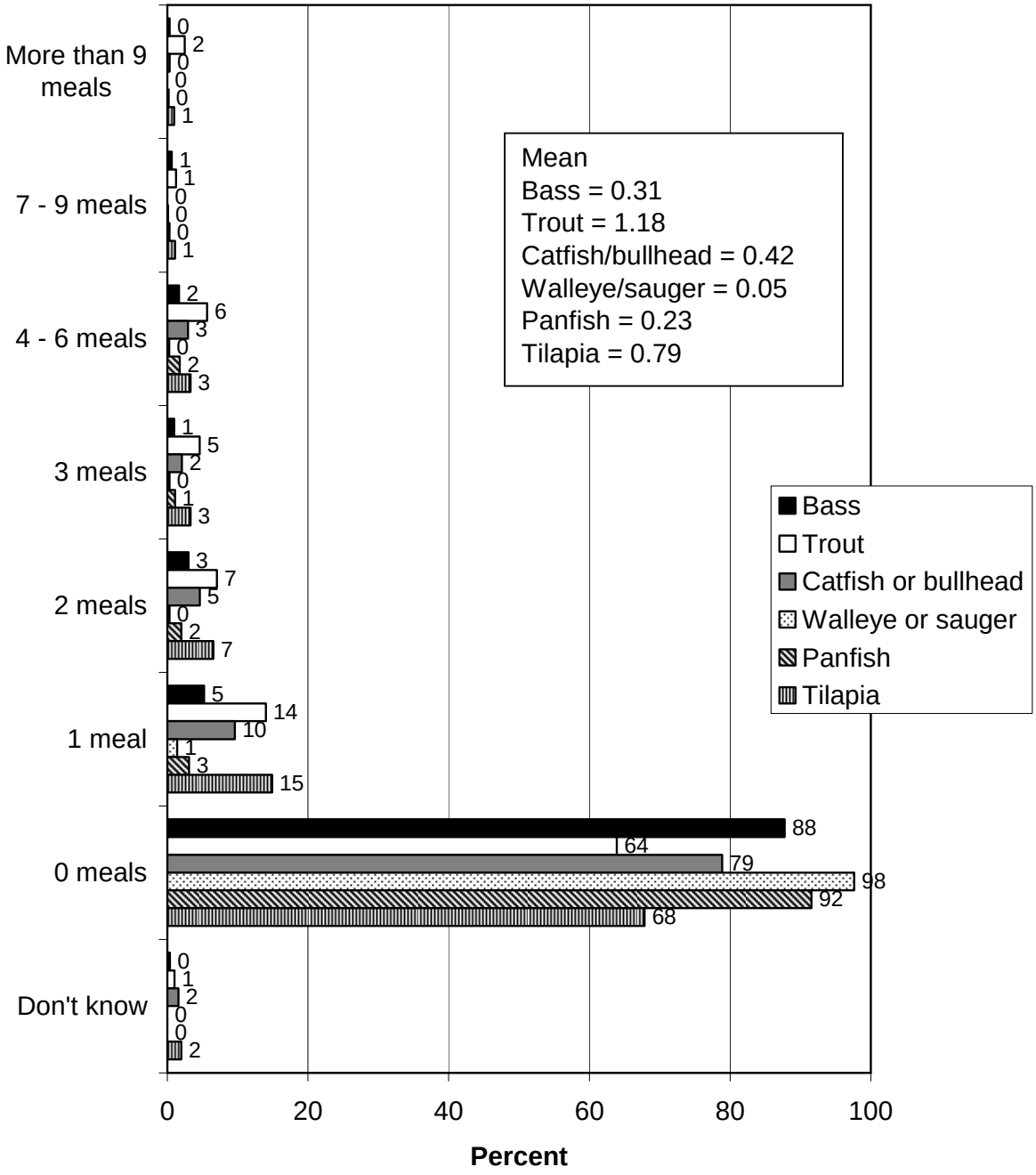
## Number of meals typically eaten in September, October, and November.



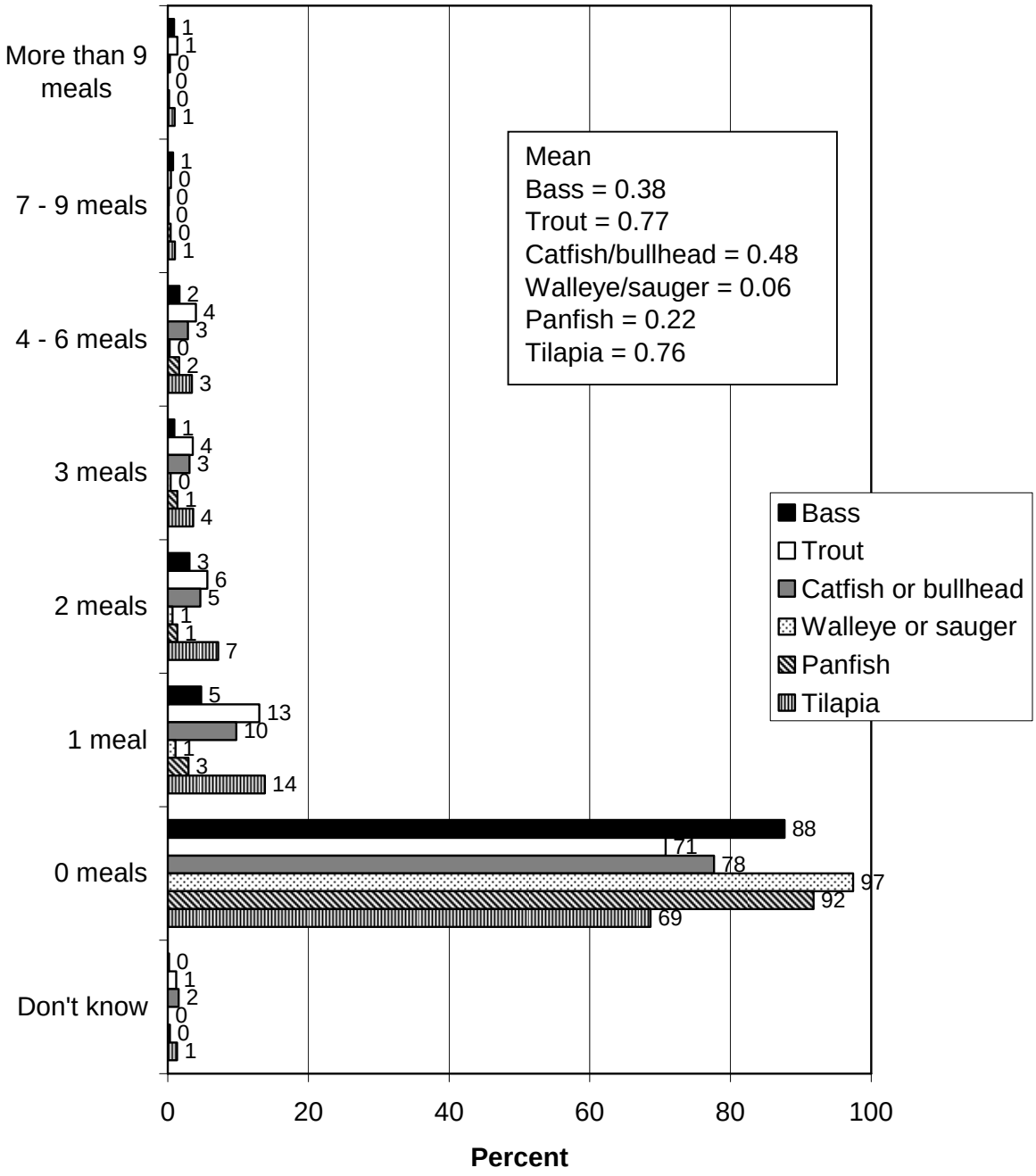
## Number of meals typically eaten in December, January, and February.



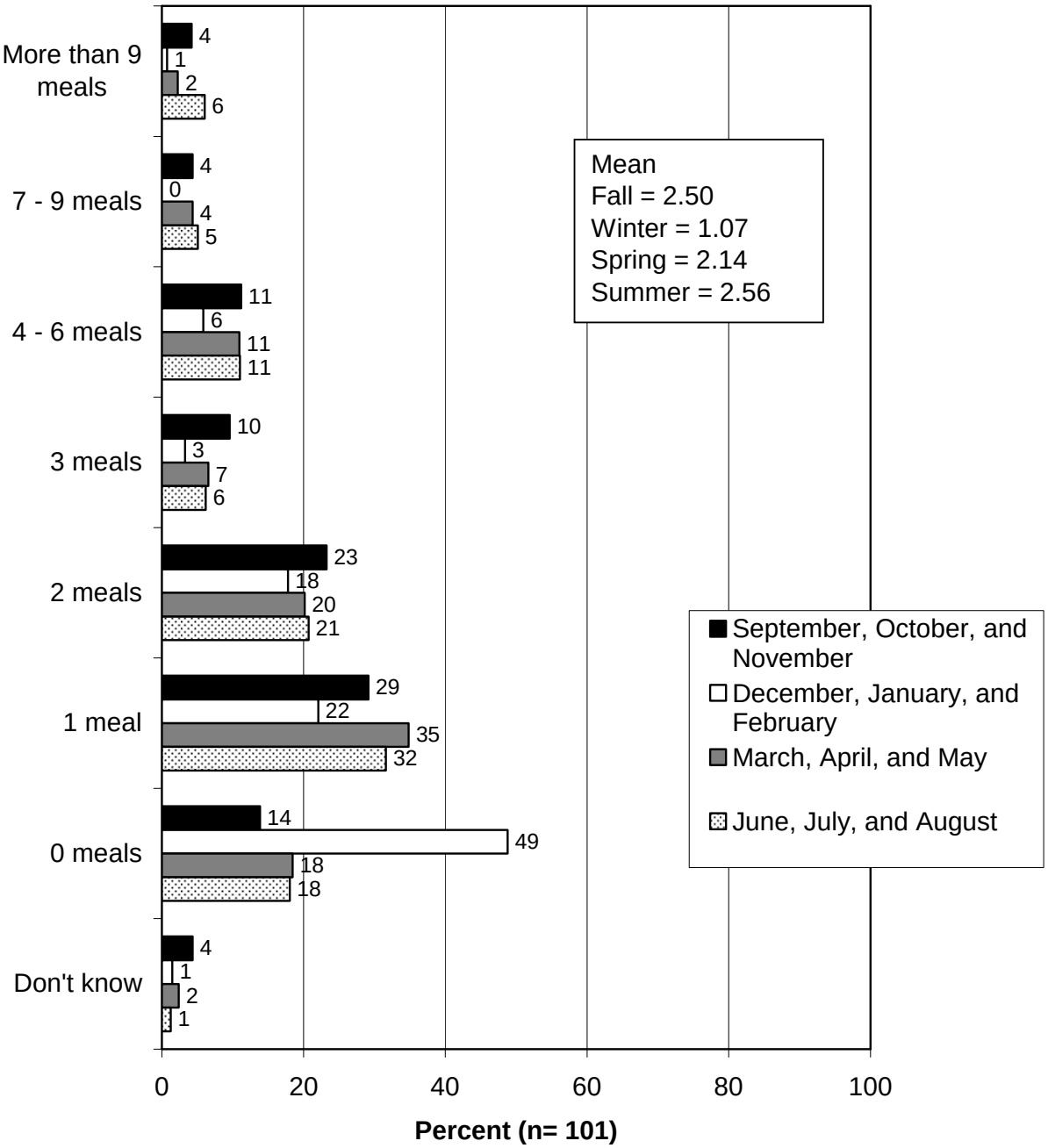
## Number of meals typically eaten in March, April, and May.



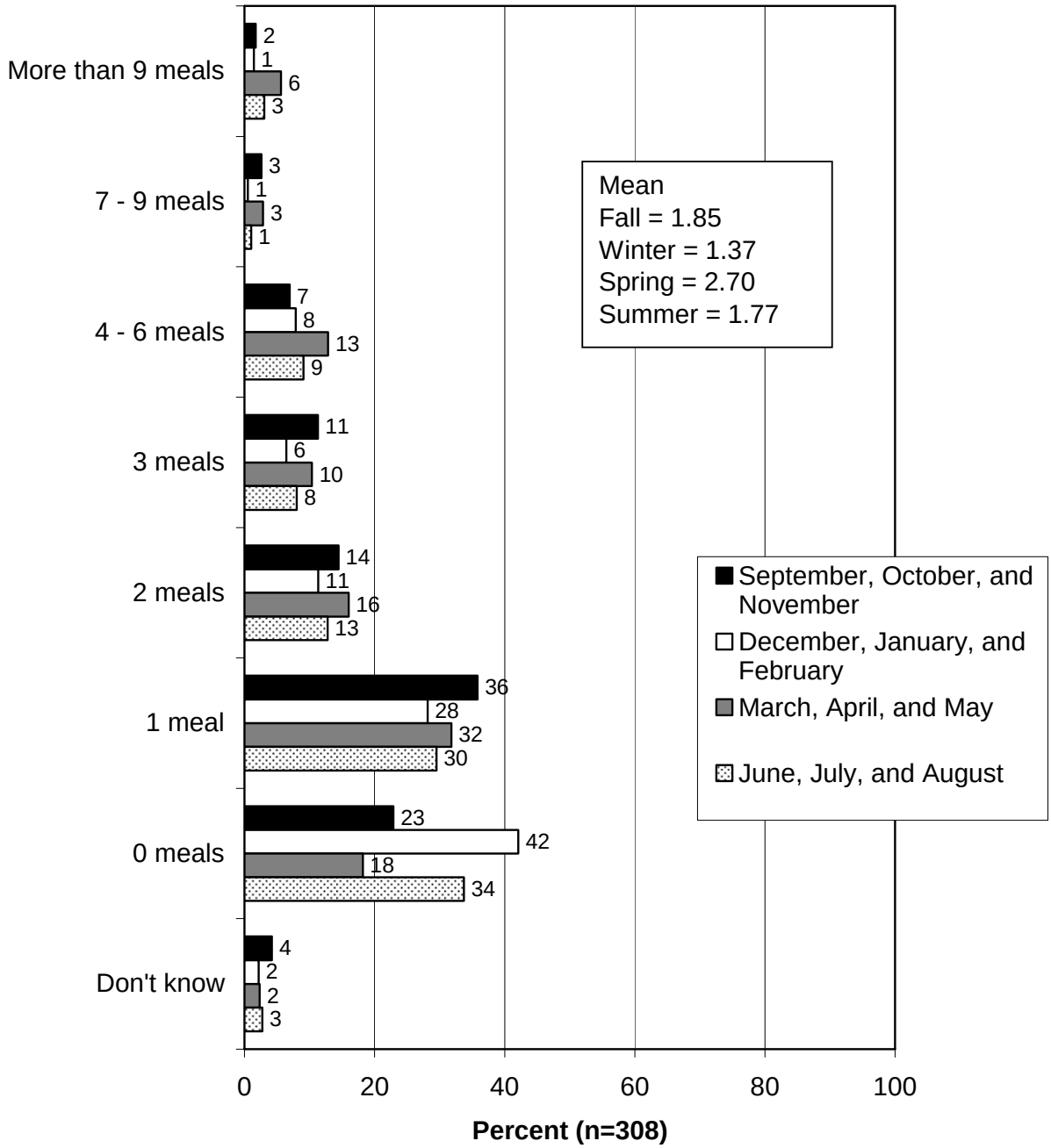
## Number of meals typically eaten in June, July, and August.



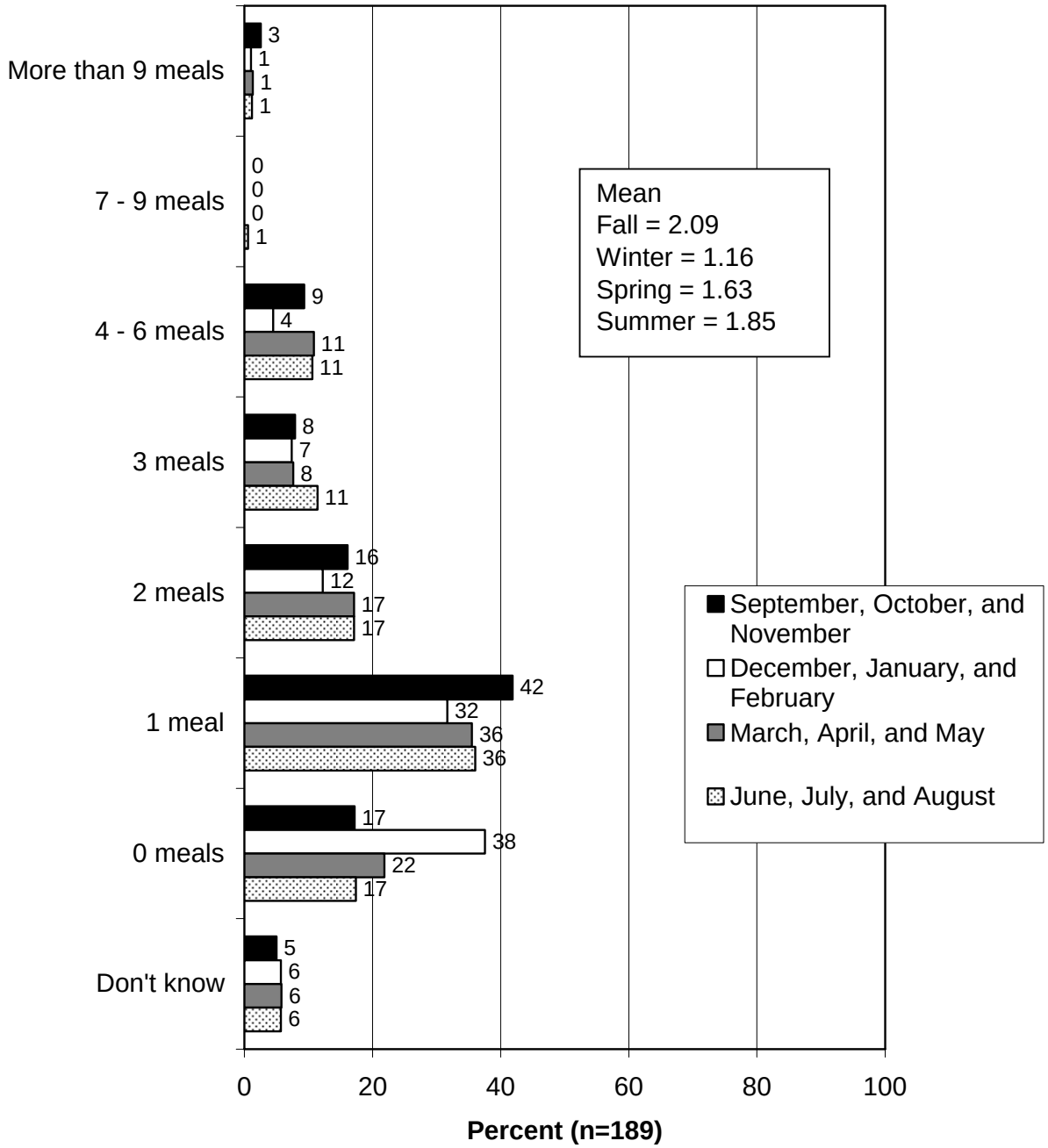
**Number of meals including bass typically eaten in the past 12 months, by time period. (Asked of those who ate bass.)**



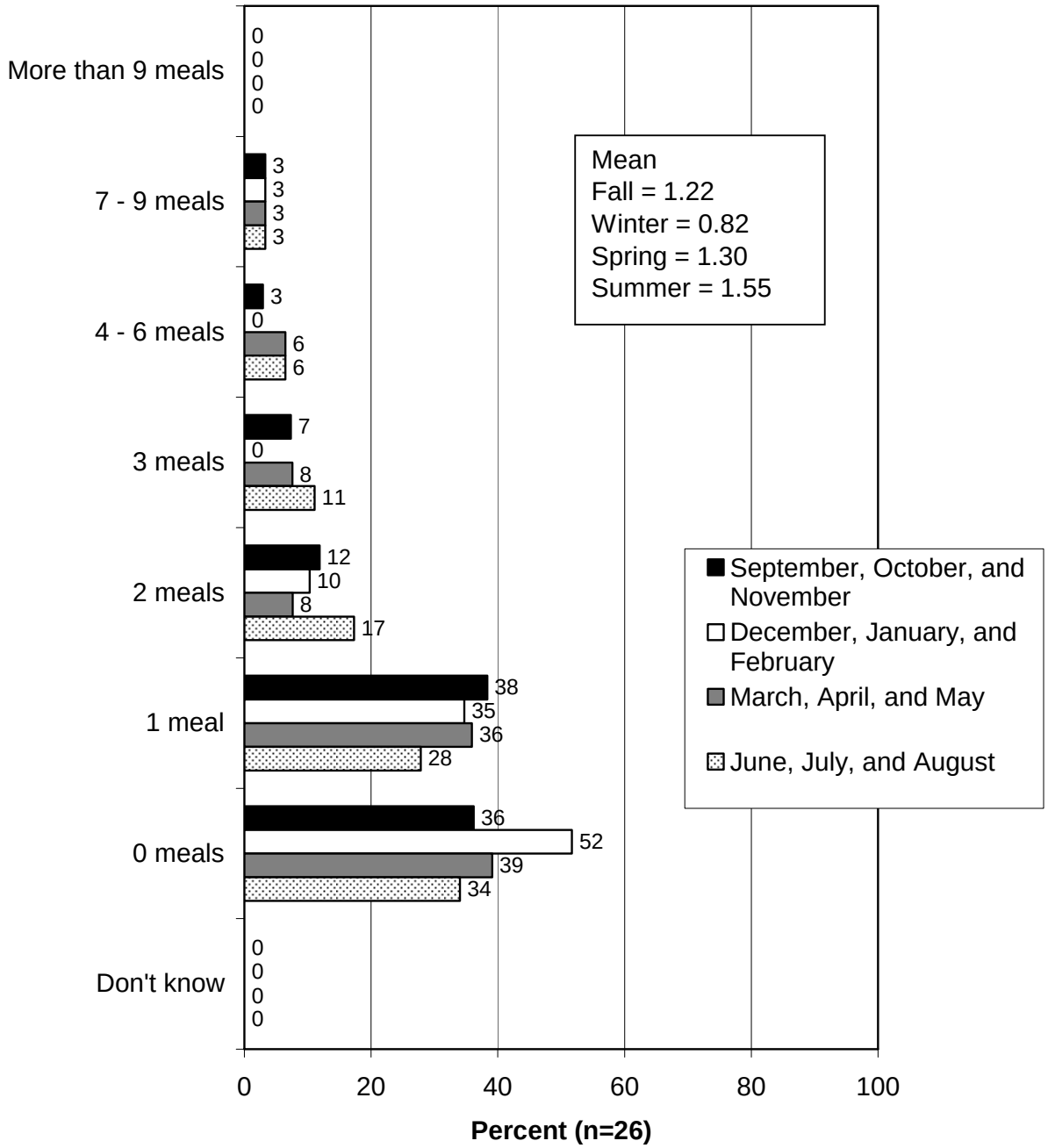
## Number of meals including trout typically eaten in the past 12 months, by time period. (Asked of those who ate trout.)



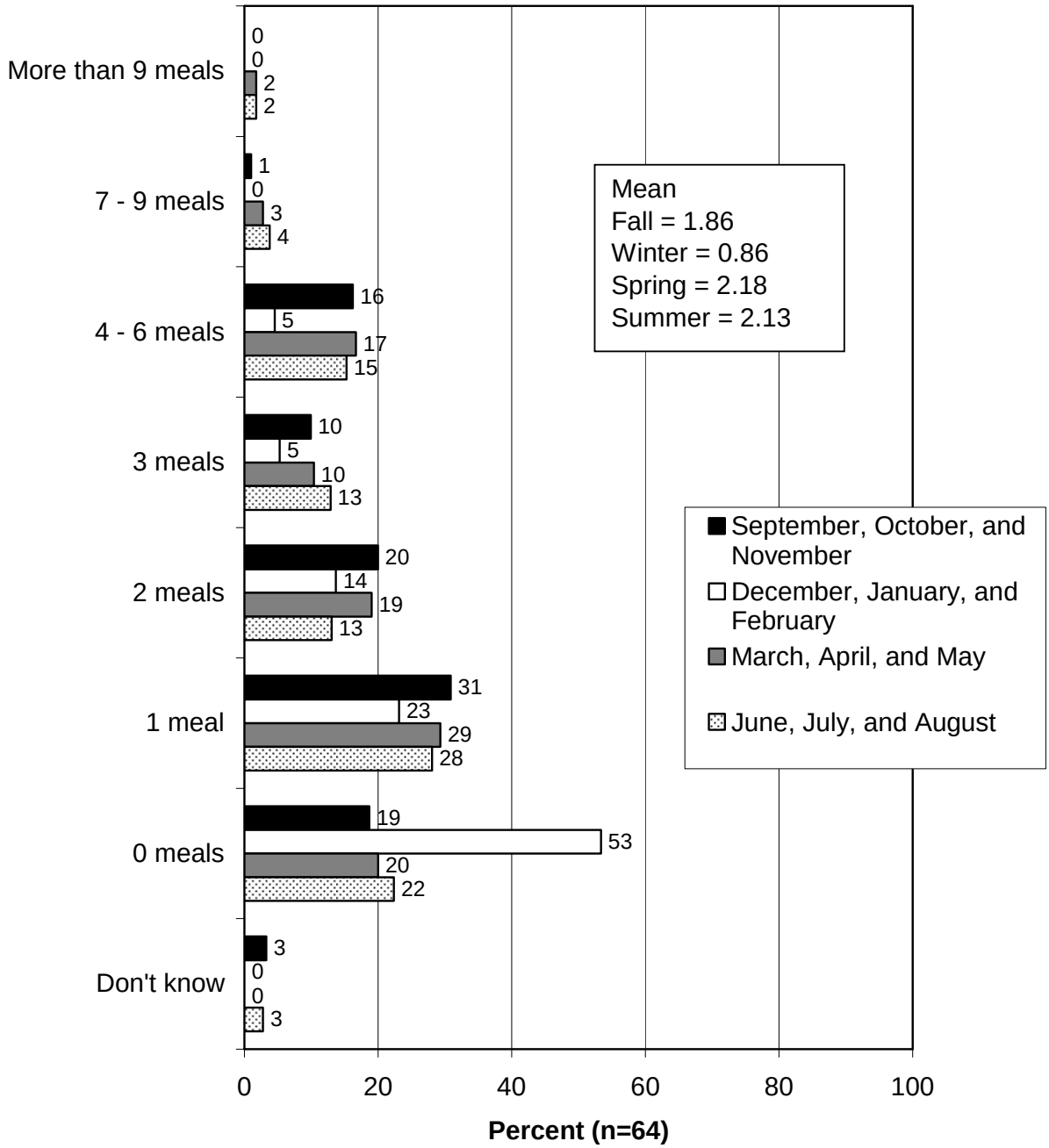
**Number of meals including catfish or bullhead typically eaten in the past 12 months, by time period. (Asked of those who ate catfish or bullhead.)**



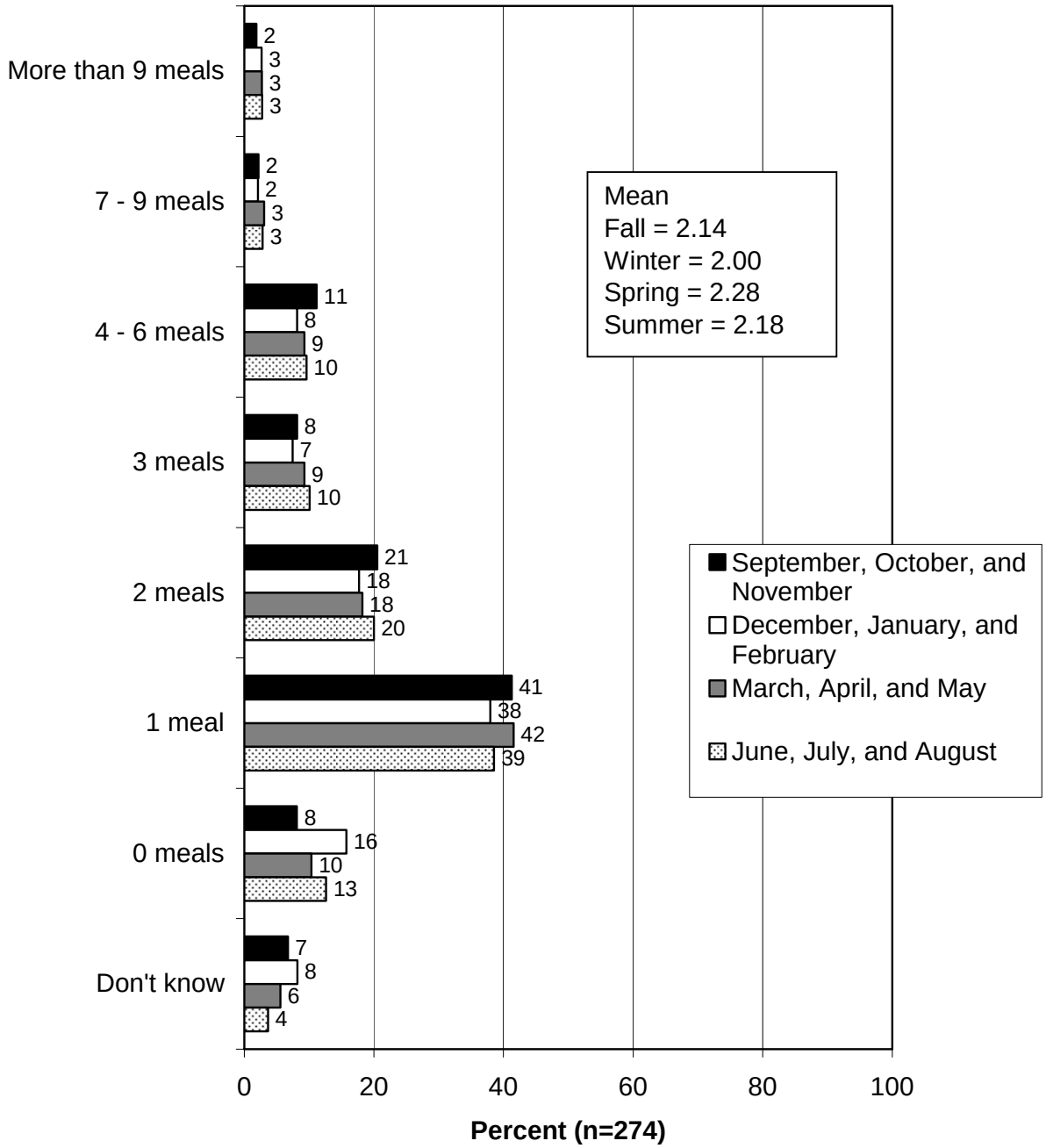
**Number of meals including walleye or sauger typically eaten in the past 12 months, by time period. (Asked of those who ate walleye or sauger.)**



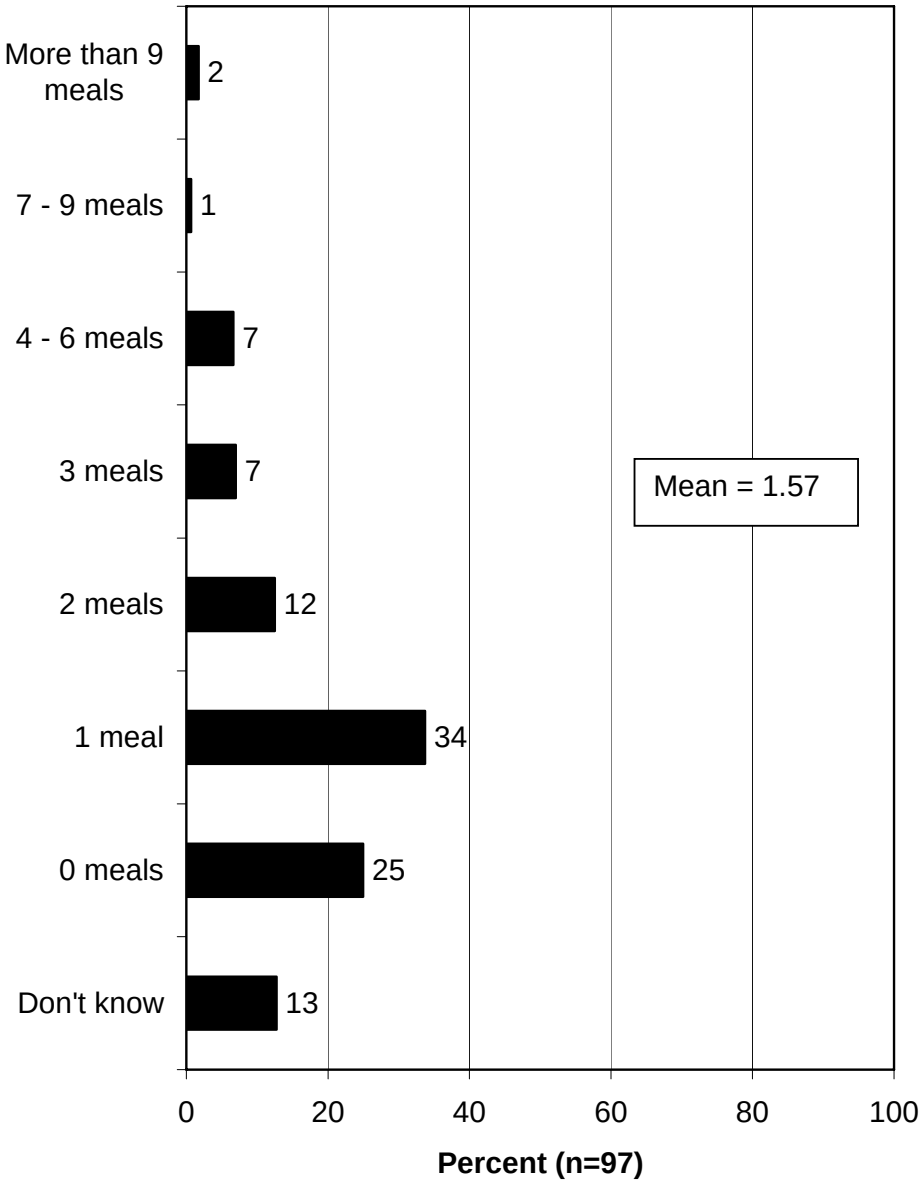
**Number of meals including panfish typically eaten in the past 12 months, by time period. (Asked of those who ate panfish.)**



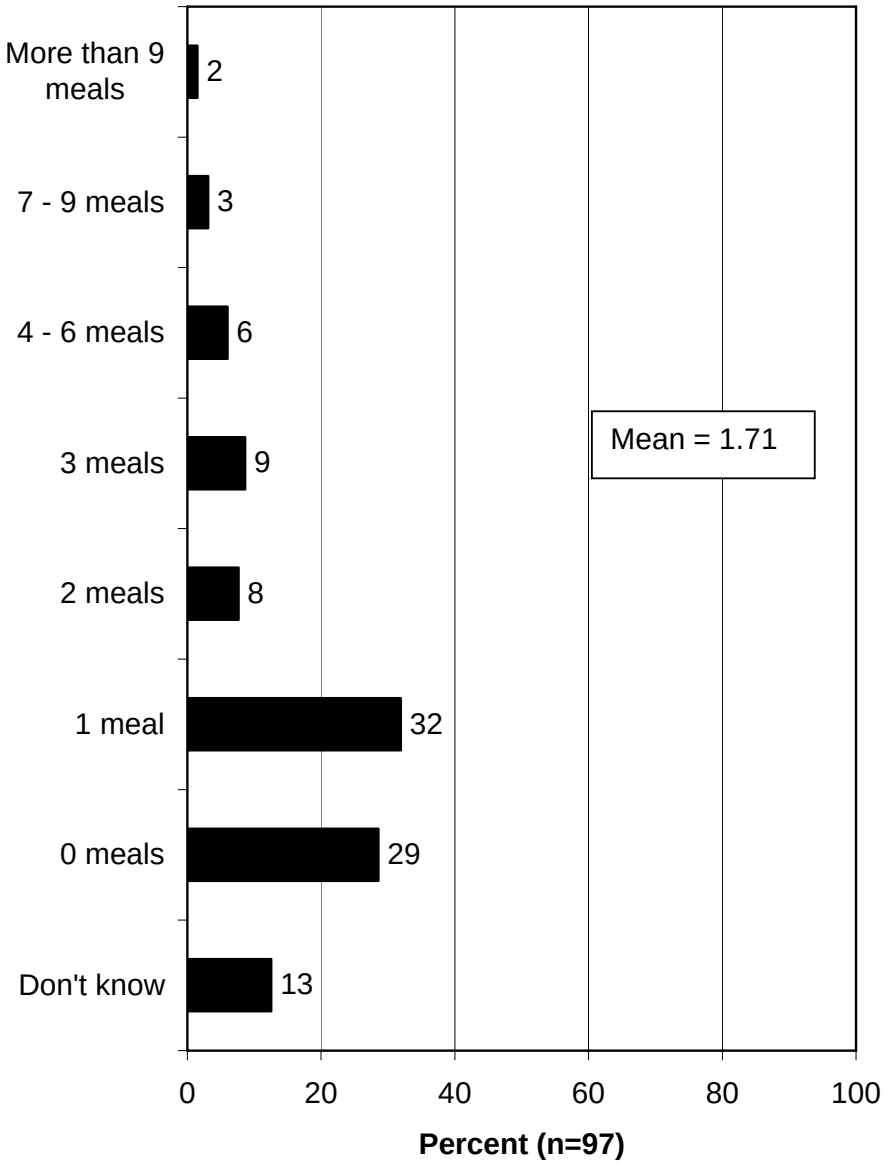
**Number of meals including tilapia typically eaten in the past 12 months, by time period. (Asked of those who ate tilapia.)**



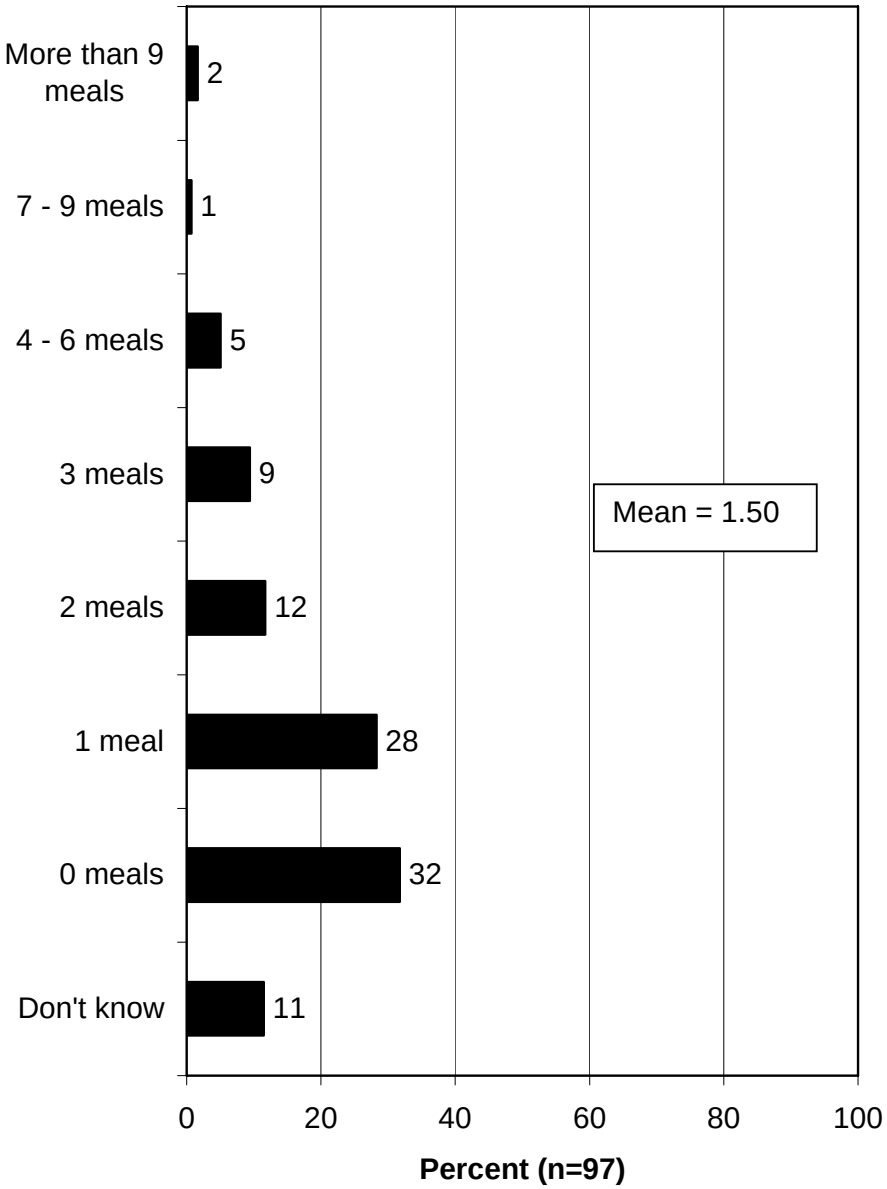
**Q227. How many meals with freshwater fish for which you did not know the species did you typically eat per month during September, October, and November of last year? (Asked of those who ate an unknown species of freshwater fish.)**



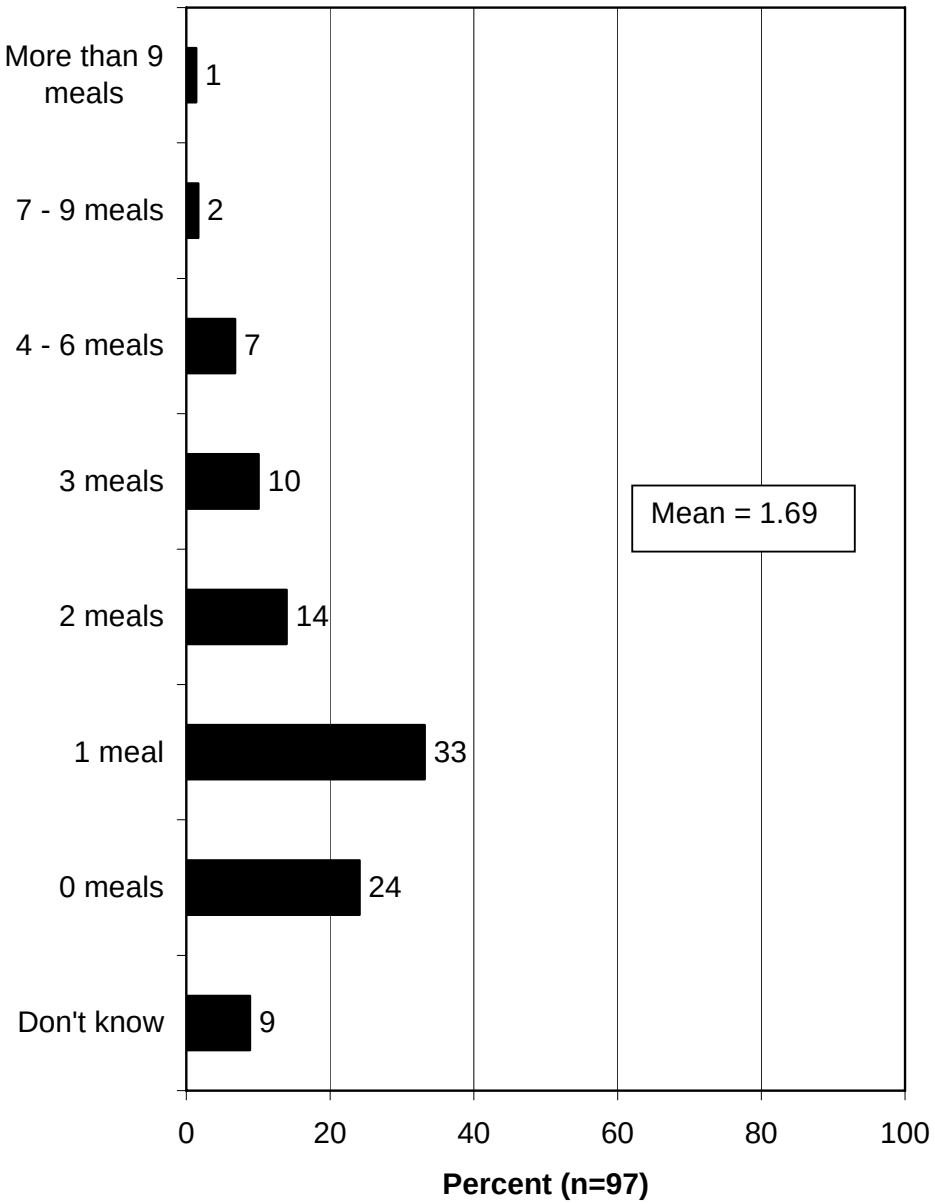
**Q231. How many meals with freshwater fish for which you did not know the species did you typically eat per month during this past December, January, and February? (Asked of those who ate an unknown species of freshwater fish.)**



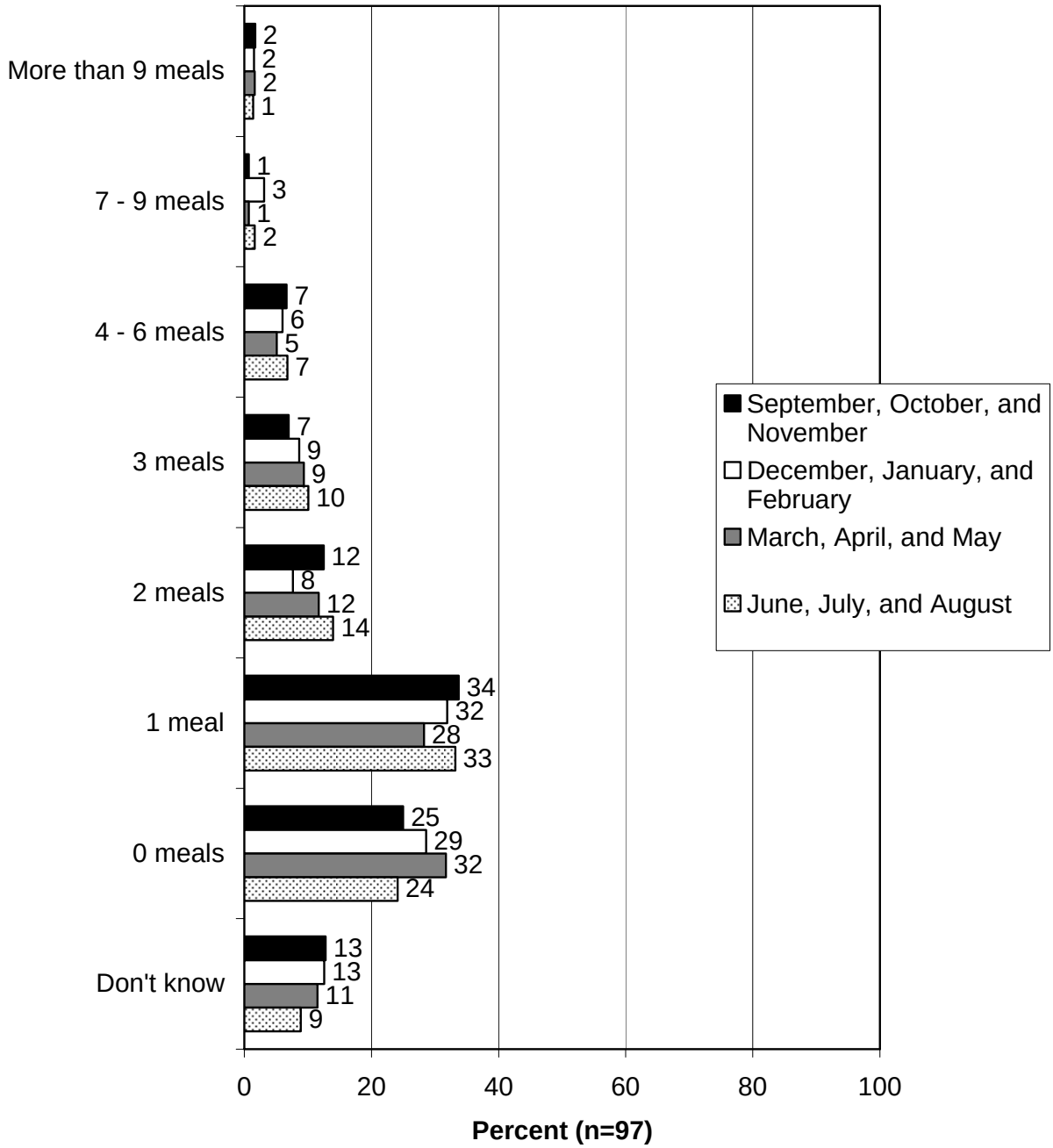
**Q235. How many meals with freshwater fish for which you did not know the species did you typically eat per month during March, April, and May of this year? (Asked of those who ate an unknown species of freshwater fish.)**



**Q239. How many meals with freshwater fish for which you did not know the species did you typically eat per month during June, July, and August of this year? (Asked of those who ate an unknown species of freshwater fish.)**



**How many meals with freshwater fish for which you did not know the species did you typically eat per month last year? (Asked of those who ate an unknown species of freshwater fish.)**



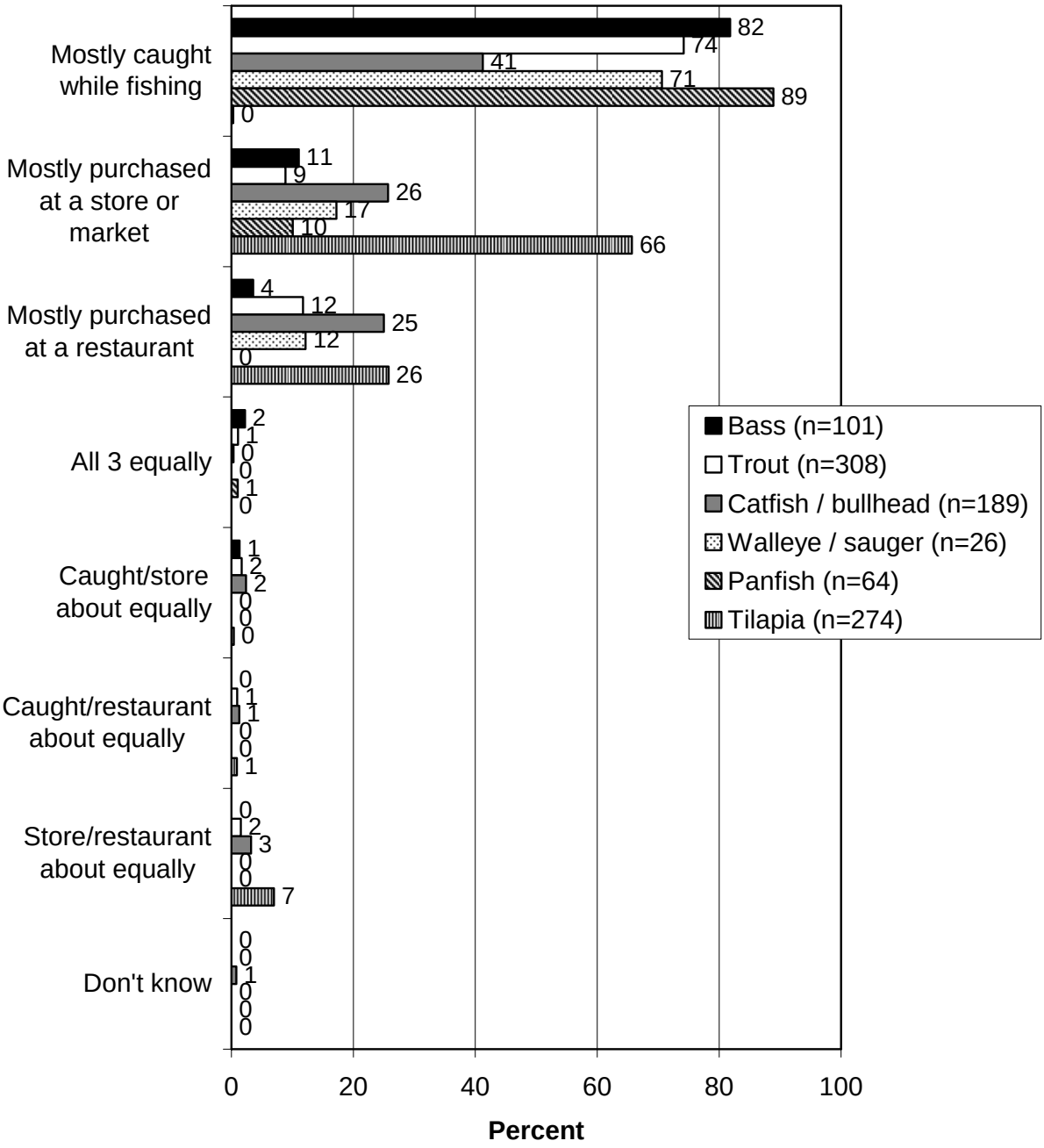
| Meals eaten with freshwater fish in past 12 months | | | | | | | |
|---|---|---|---|---|---|---|---|
| (frequencies shown, not percentages) | | | | | | | |
| | Months | Bass | Trout | Catfish or bullhead | Walleye or Sauger | Panfish | Tilapia |
| More than 9 meals | September, October, and November | 5 | 6 | 5 | 0 | 0 | 5 |
| | December, January, and February | 1 | 5 | 2 | 0 | 0 | 7 |
| | March, April, and May | 2 | 18 | 3 | 0 | 1 | 7 |
| | June, July, and August | 7 | 10 | 2 | 0 | 1 | 7 |
| 7 - 9 meals | September, October, and November | 5 | 8 | 0 | 1 | 1 | 6 |
| | December, January, and February | 0 | 2 | 0 | 1 | 0 | 5 |
| | March, April, and May | 5 | 9 | 0 | 1 | 2 | 8 |
| | June, July, and August | 5 | 3 | 1 | 1 | 3 | 7 |
| 4 - 6 meals | September, October, and November | 12 | 22 | 18 | 1 | 12 | 29 |
| | December, January, and February | 6 | 25 | 9 | 0 | 3 | 21 |
| | March, April, and May | 12 | 41 | 21 | 2 | 13 | 24 |
| | June, July, and August | 12 | 29 | 21 | 2 | 12 | 25 |
| 3 meals | September, October, and November | 10 | 36 | 15 | 2 | 8 | 21 |
| | December, January, and February | 4 | 20 | 14 | 0 | 4 | 19 |
| | March, April, and May | 7 | 33 | 15 | 2 | 8 | 24 |
| | June, July, and August | 7 | 26 | 22 | 3 | 10 | 26 |
| 2 meals | September, October, and November | 25 | 46 | 31 | 3 | 15 | 53 |
| | December, January, and February | 19 | 36 | 24 | 3 | 10 | 46 |
| | March, April, and May | 22 | 51 | 33 | 2 | 14 | 47 |
| | June, July, and August | 22 | 41 | 33 | 5 | 10 | 52 |
| 1 meal | September, October, and November | 31 | 114 | 81 | 11 | 23 | 107 |
| | December, January, and February | 24 | 89 | 62 | 10 | 18 | 98 |
| | March, April, and May | 38 | 101 | 69 | 10 | 22 | 107 |
| | June, July, and August | 34 | 94 | 70 | 8 | 21 | 99 |
| 0 meals | September, October, and November | 623 | 471 | 556 | 698 | 654 | 478 |
| | December, January, and February | 660 | 532 | 594 | 702 | 681 | 499 |
| | March, April, and May | 627 | 456 | 564 | 699 | 656 | 485 |
| | June, July, and August | 628 | 504 | 556 | 697 | 657 | 491 |
| Don't know | September, October, and November | 5 | 13 | 10 | 0 | 3 | 17 |
| | December, January, and February | 2 | 7 | 11 | 0 | 0 | 21 |
| | March, April, and May | 3 | 7 | 11 | 0 | 0 | 14 |
| | June, July, and August | 1 | 9 | 11 | 0 | 2 | 9 |

## SOURCES OF FRESHWATER FISH CONSUMED, BY SPECIES

- West Virginia residents most commonly catch for themselves the bass, trout, walleye/sauger, and panfish they eat, while tilapia is most commonly purchased at a store or market. Catfish/bullhead is also most likely to be either purchased at a store, market, or restaurant, although a substantial percentage of West Virginia residents (41%) catch the catfish/bullhead they eat.

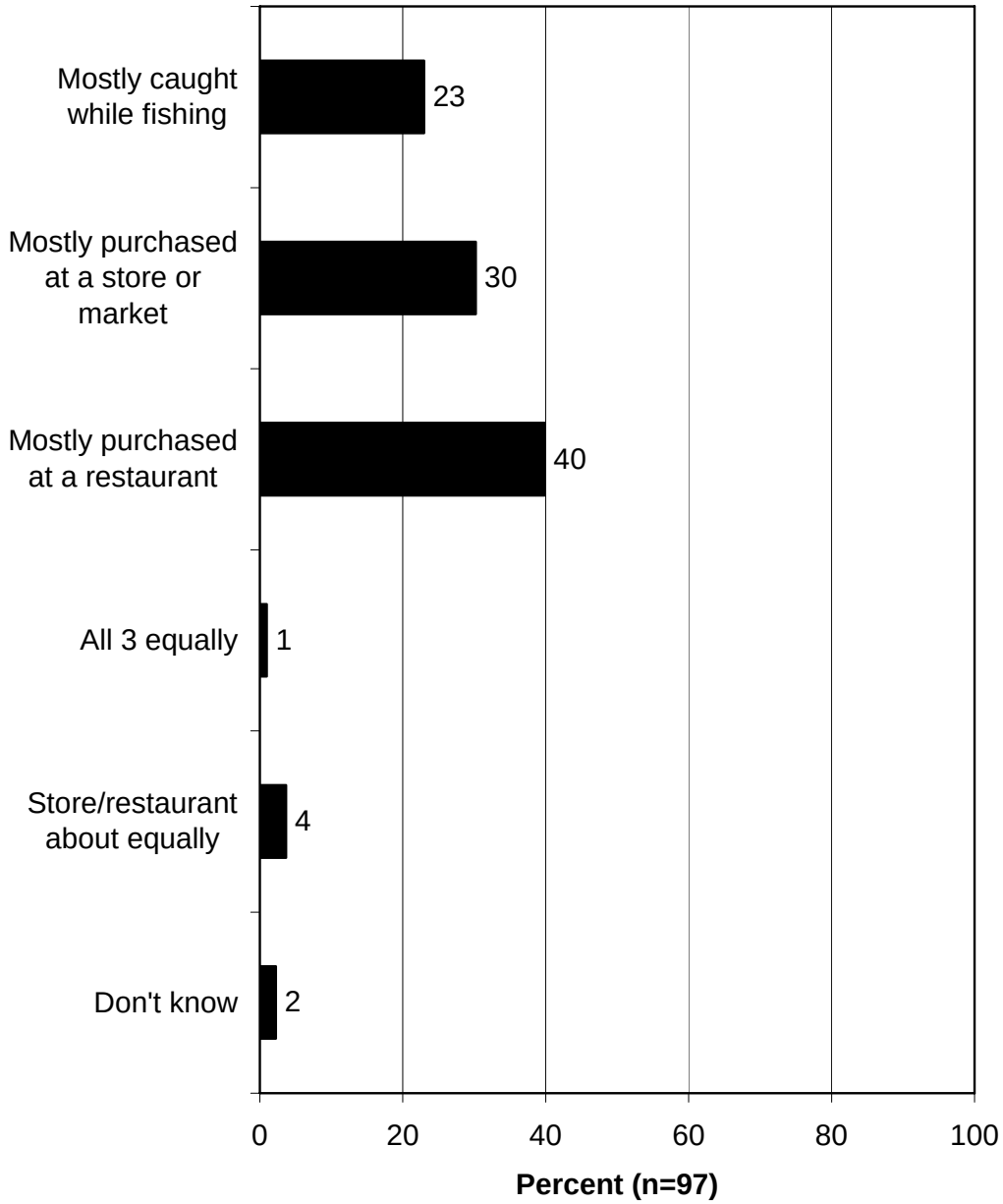
- Regarding their consumption of freshwater fish for which they were unsure of the species, West Virginia residents most commonly purchased such fish in restaurants (40%), stores or markets (30%), or caught the unknown fish species while fishing (23%).

## Q92. Was the freshwater fish you ate in the past 12 months mostly caught while fishing by you, family, or a friend, mostly purchased at a store or market, or mostly purchased at a restaurant?




**Asked of those who ate freshwater fish in the past 12 months.**

**Q244. Was the freshwater fish for which you did not know the species that you ate in the past 12 months mostly caught while fishing by you, family, or a friend, mostly purchased at a store or market, or mostly purchased at a restaurant?**




**Asked of those who ate an unknown species of freshwater fish in the past 12 months.**

## PREPARATION OF FISH CONSUMED, BY SPECIES

- Substantial percentages of respondents indicated that they cut steaks from bass, trout, catfish/bullhead, and walleye/sauger, as well as trimming or removing some of the fat from these species prior to cooking (such as the belly fat and fat from the back and sides of the fish).
  - Respondents appear most likely to trim or remove completely the fat from walleye/sauger.
  - Over a third of respondents (38%) say that since the tilapia they eat is store-bought, they are generally unsure of how exactly the fish has been prepared.
  - Over a quarter of respondents (27%) say that when eating trout, they eat the whole fish.

- Overall, West Virginia residents appear most likely to pan-fry the fish they eat, though panfish is by far the most likely to be cooked this way, and tilapia is the least likely to be cooked this way.
  - Tilapia is most likely to be broiled or baked, while trout is the most likely species to be grilled by West Virginia residents.

- The survey asked about the sources of the unknown fish species respondents had eaten, and the most common response was that such fish species had been purchased to eat in restaurants (40%).
  - Nearly a third of respondents (30%) purchased unknown fish species to eat at stores or markets, and just under a quarter (23%) caught unknown fish species while fishing.

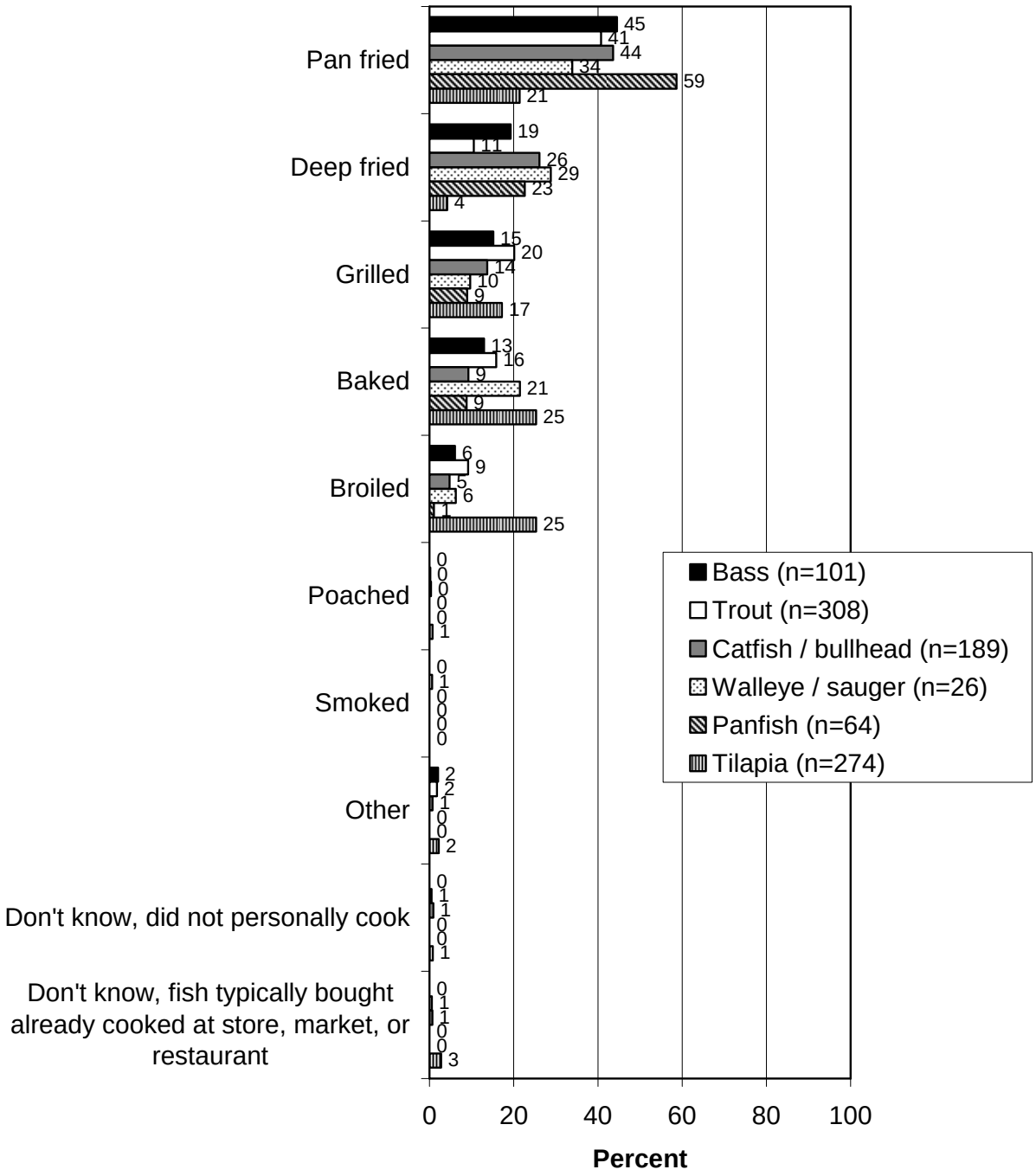
- Regarding the most common methods of preparing fish for which respondents did not know the species, about a third of West Virginia residents (32%) said they cut a steak from the fish.
  - A quarter of residents (25%) said the fish had been bought already prepared at a store, market, or restaurant, and a further fifth of residents (20%) simply said they did not know how the fish was prepared.

- Deep frying and pan frying are the most common methods of cooking unknown fish species.

## Q96. When you ate [species] in the past 12 months, how did you typically prepare it?

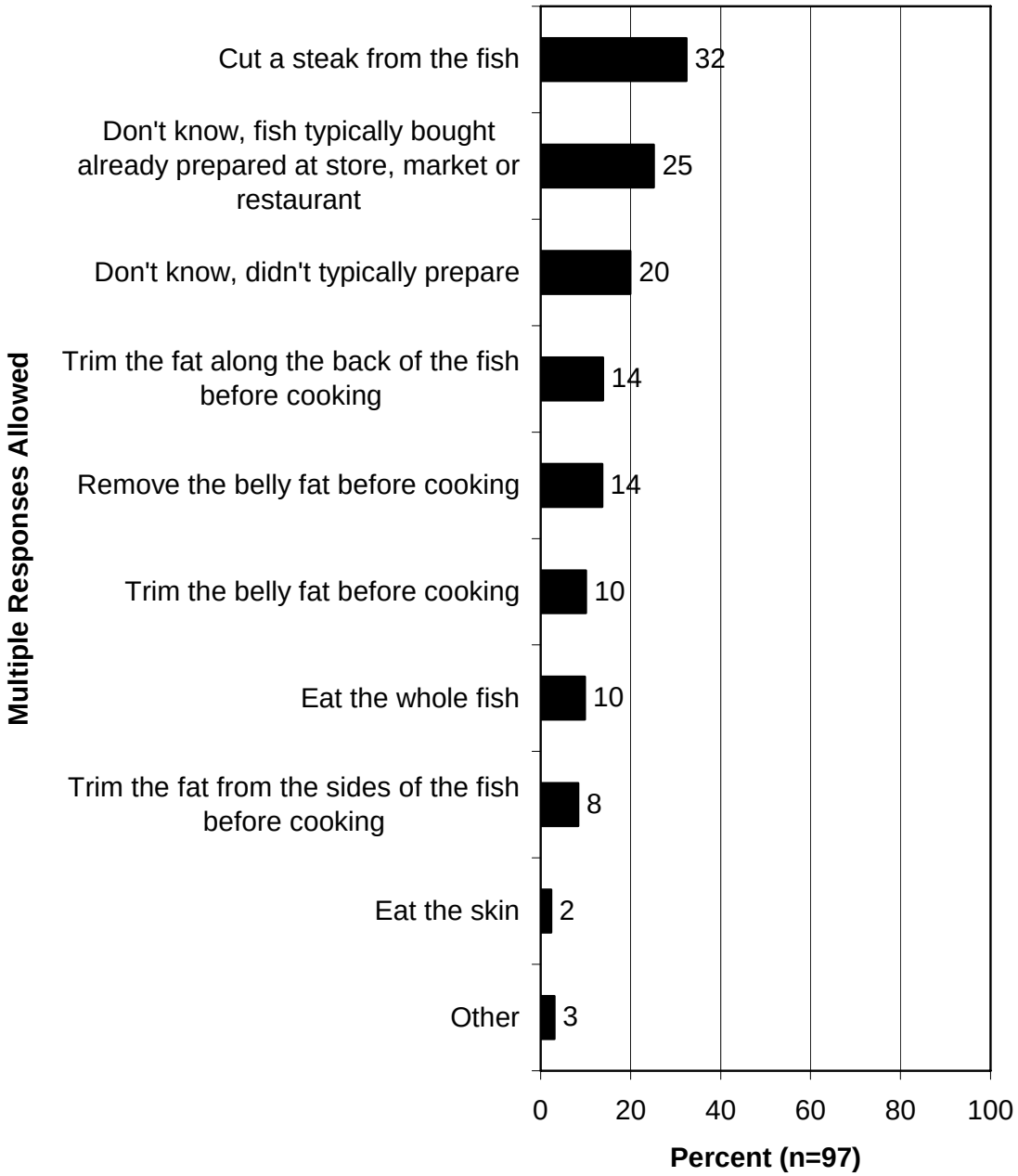

**Asked of those who ate freshwater fish in the past 12 months.**

## Q98. When you ate freshwater fish in the past 12 months, how was the fish typically cooked?



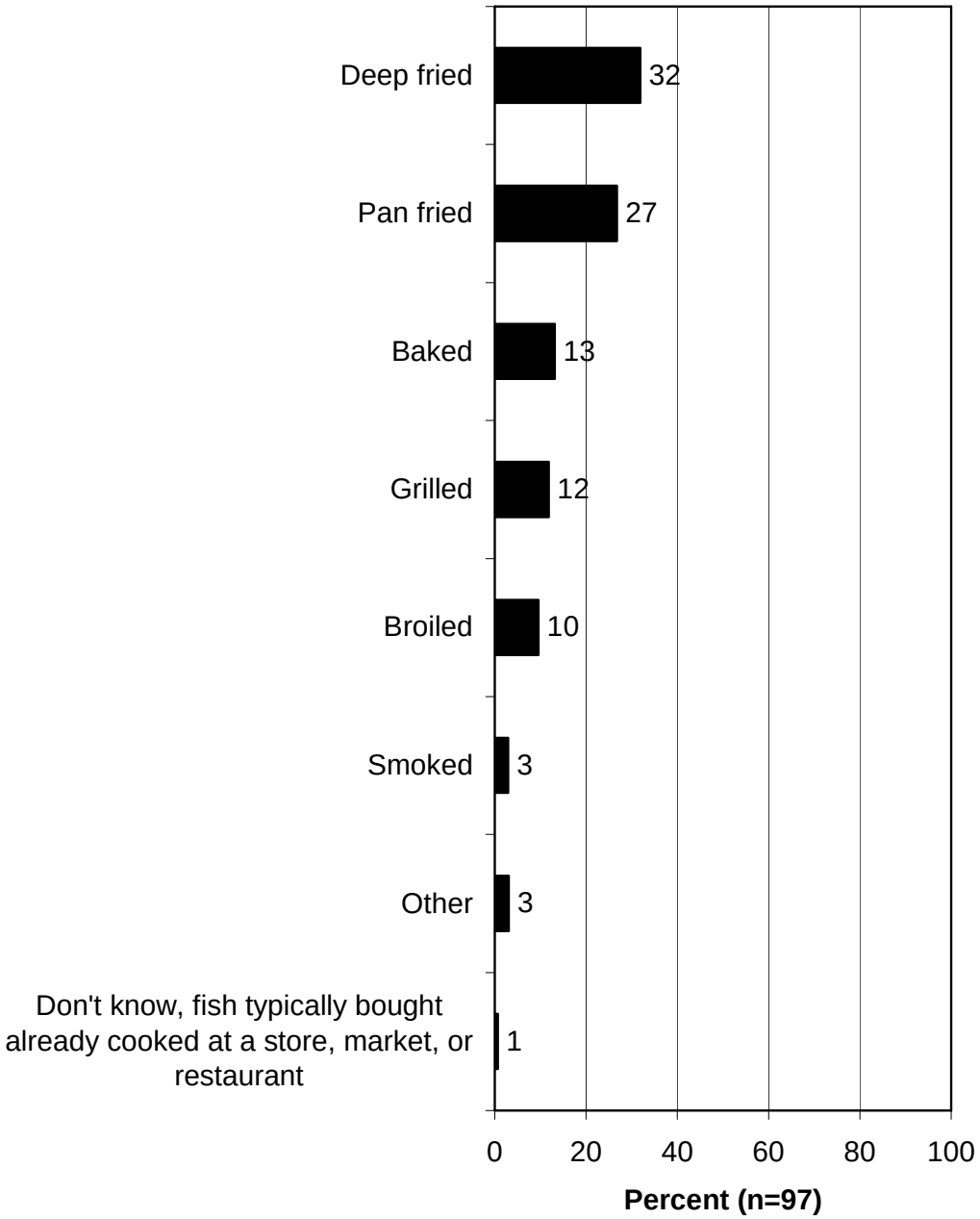

**Asked of those who ate freshwater fish in the past 12 months.**

## Q247. When you ate freshwater fish for which you did not know the species in the past 12 months, how did you typically prepare it?




**Asked of those who ate an unknown species of freshwater fish in the past 12 months.**

## Q249. When you ate freshwater fish for which you did not know the species in the past 12 months, how was the fish typically cooked?




**Asked of those who ate an unknown species of freshwater fish in the past 12 months.**

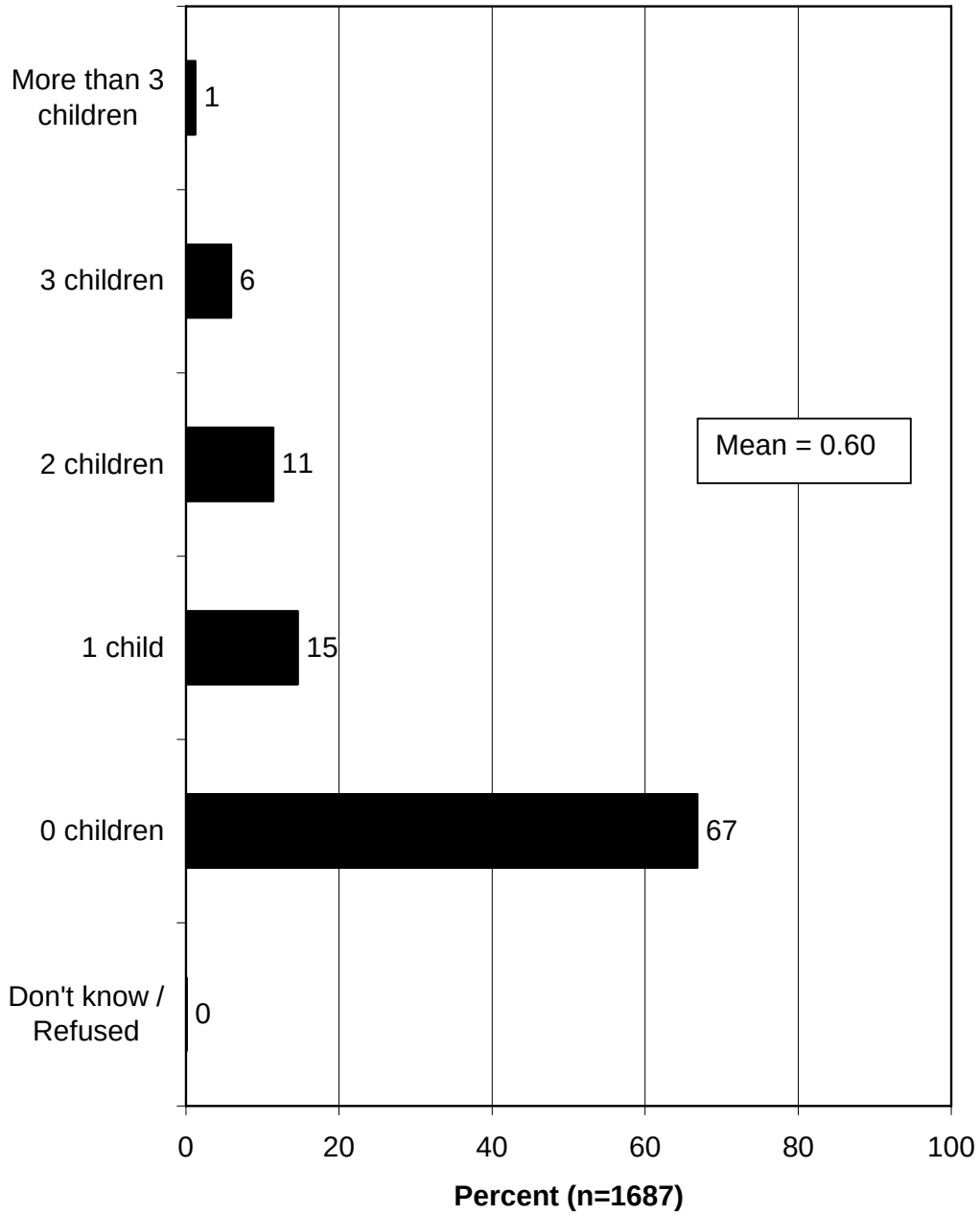
## CHILDREN'S FRESHWATER FISH CONSUMPTION

- The survey asked respondents if they had children in the household aged 17 or younger, and a third (33%) said that they did. Respondents were then asked about the number of children aged 17 or younger they had living in their household; for respondents with more than one child aged 17 or younger, the survey randomly selected a child whose fresh fish consumption the respondent was asked to discuss in a series of questions that followed (respondents with just one child discussed that child's freshwater fish consumption). This randomization allowed the researchers to extrapolate overall freshwater fish consumption habits among children in West Virginia.

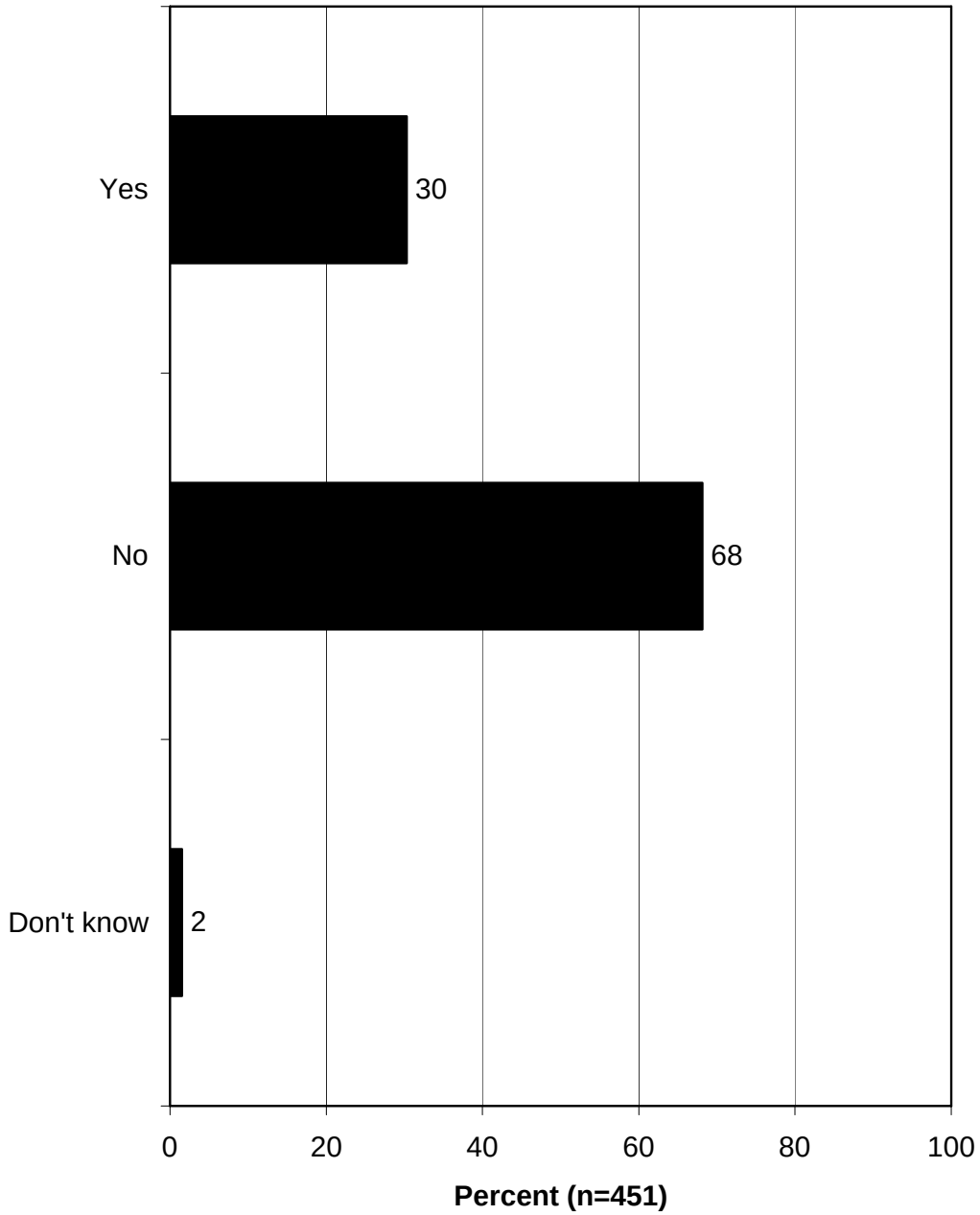
- About a third (30%) of West Virginia residents with children aged 17 or younger said that the child randomly selected by the survey had eaten freshwater fish in the 12 months prior to the survey.
  - More than three-quarters (80%) of West Virginians with children aged 17 or younger said their child had eaten no more than 3 meals with freshwater fish per month in the 12 months prior to the survey; the mean number of meals was 2.20 per month.
  - Trout (50%), tilapia (31%), and catfish/bullhead (24%) predominate the freshwater species consumed by children age 17 or younger.
  - The survey asked respondents with children aged 17 or younger whether their child had eaten any fish in the 12 months prior to the survey for which respondents did not know the species, and the overwhelming majority (91%) said their child had not.
  - A slightly majority of respondents with children aged 17 or younger (52%) indicated that their child had mostly eaten freshwater fish caught while fishing, while nearly a third (32%) said their child mostly ate freshwater fish purchased at a store or market; meanwhile, 11% said their child mostly ate freshwater fish purchased at a restaurant.
  - Respondents with more than one child aged 17 or younger were asked if their other child/children generally eat more, about the same, or less freshwater fish than the child whose fish consumption was initially discussed by the respondent, and 70% responded that their other child/children generally eat about the same amount of freshwater fish.

- A tabulation at the end of this section summarizes the various combinations of respondent/child fish consumption rates, the most common of which are respondents who had not eaten freshwater fish in the 12 months prior to the survey and had no children aged 17 or younger.

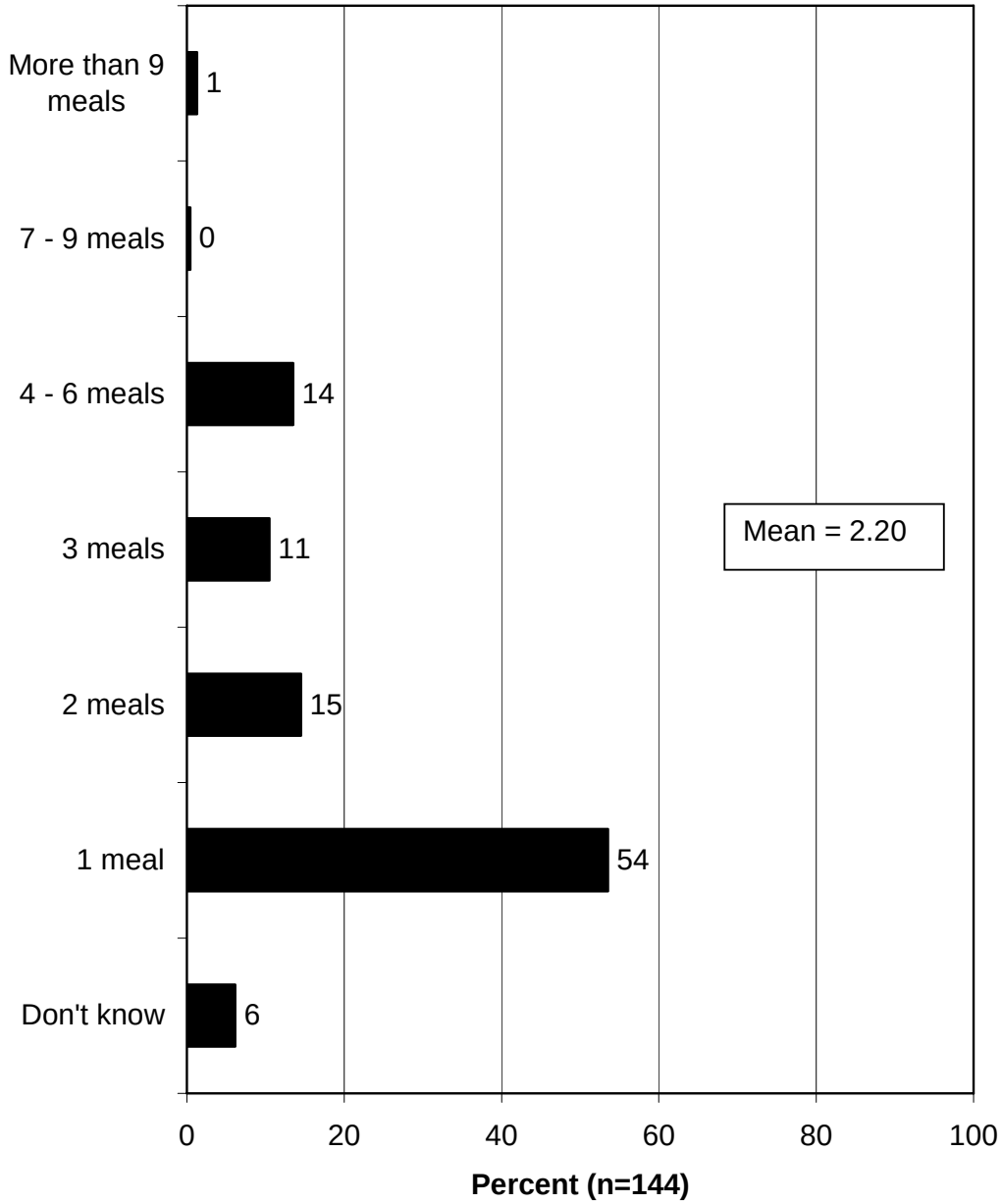
## Q251. How many children, age 17 or younger, do you have living in your household?



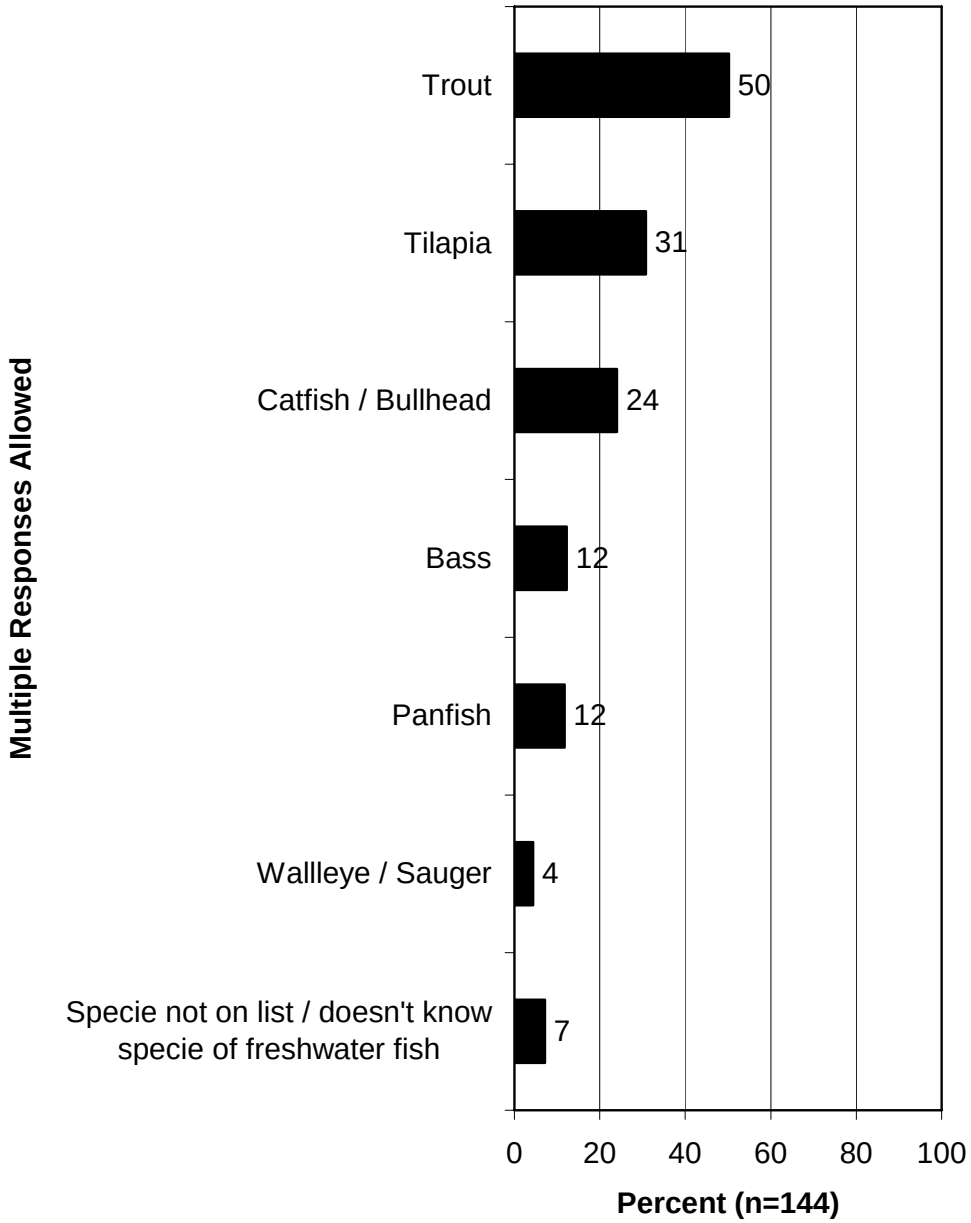
**Q280. Has your child eaten any freshwater fish in the past 12 months? (Asked of those who have at least one child 17 or younger living in the household.)**



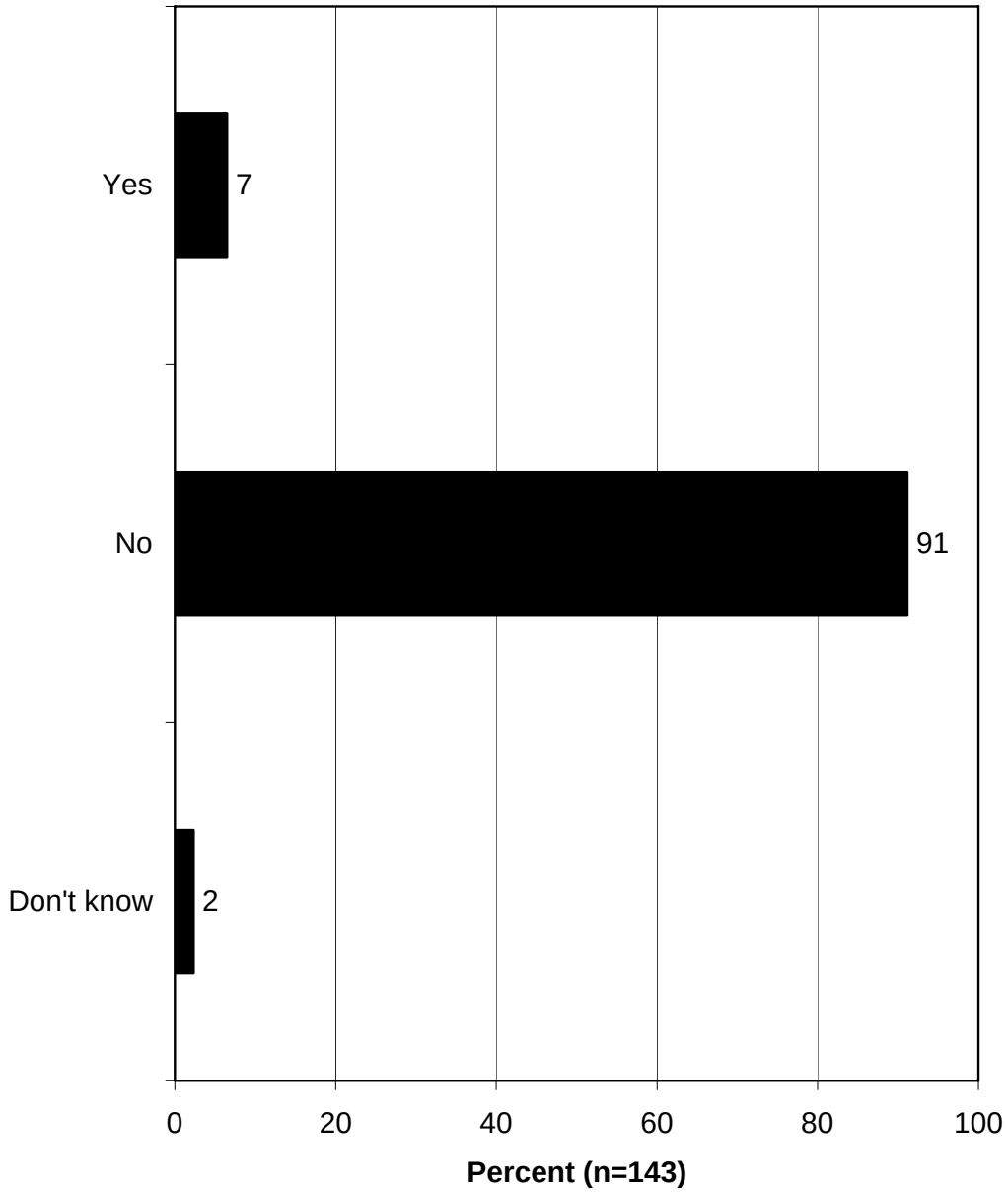
**Q281. How many meals with freshwater fish did your child typically eat per month in the past 12 months? (Asked of those who have at least one child 17 or younger living in the household who has eaten freshwater fish in the past 12 months.)**



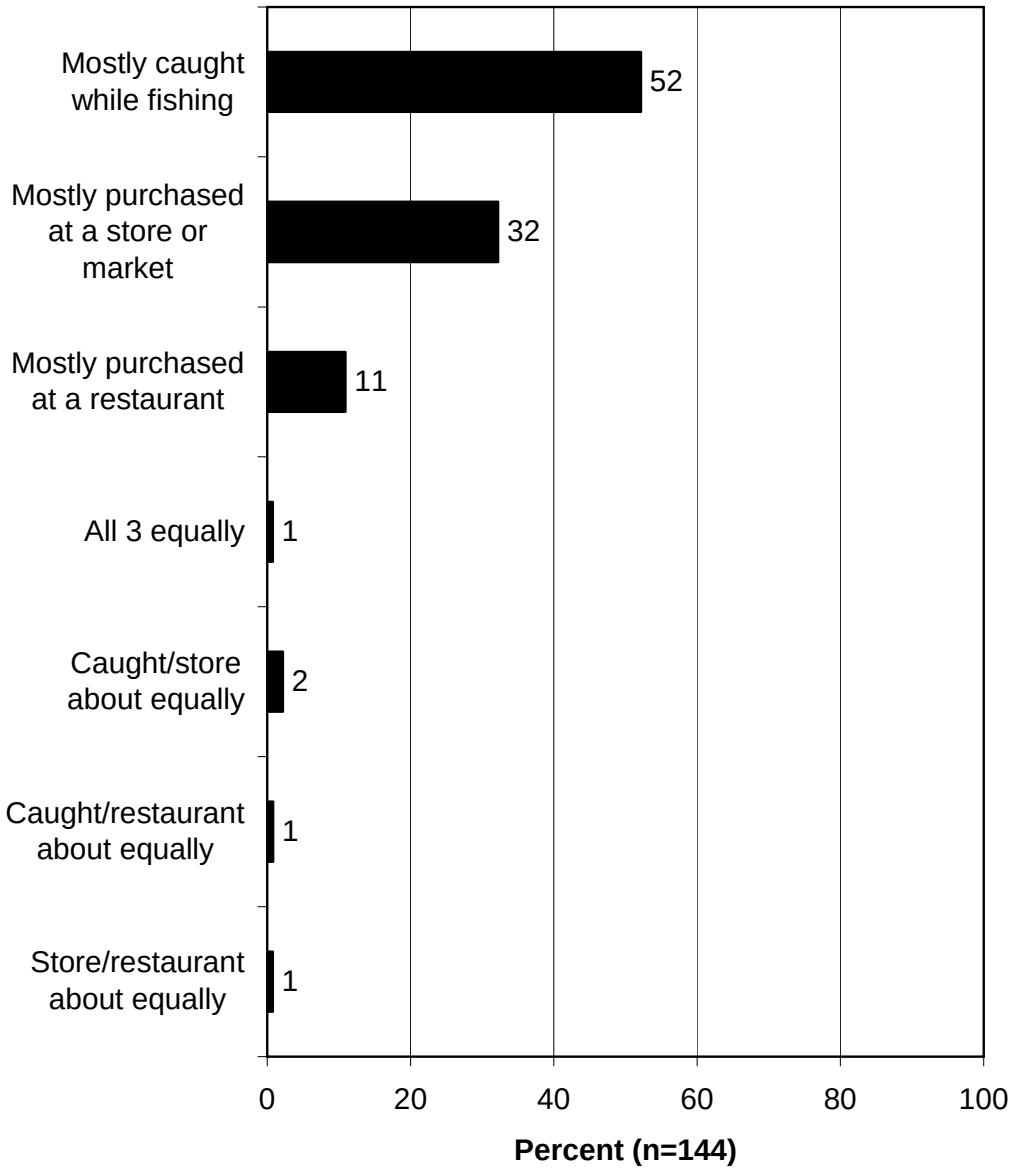
**Q284. Which species of freshwater fish did your child eat in the past 12 months? (Asked of those who have at least one child 17 or younger living in the household who has eaten freshwater fish in the past 12 months.)**



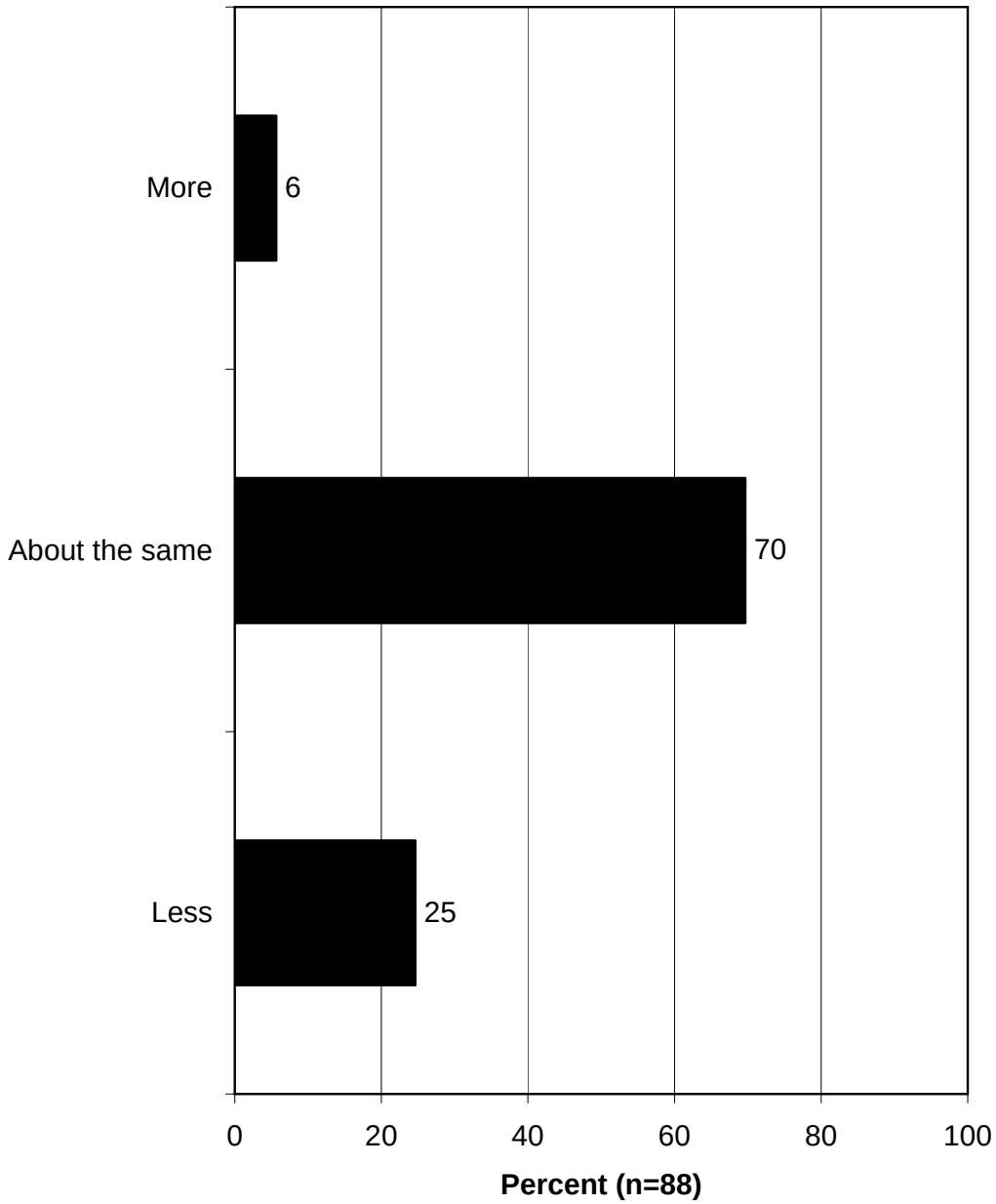
**Q302. Did your child eat any freshwater fish in the past 12 months for which you did not know the species? For example, your child may have eaten some freshwater fish at a friend's house. (Asked of those who have at least one child 17 or younger living in the household who has eaten freshwater fish in the past 12 months.)**



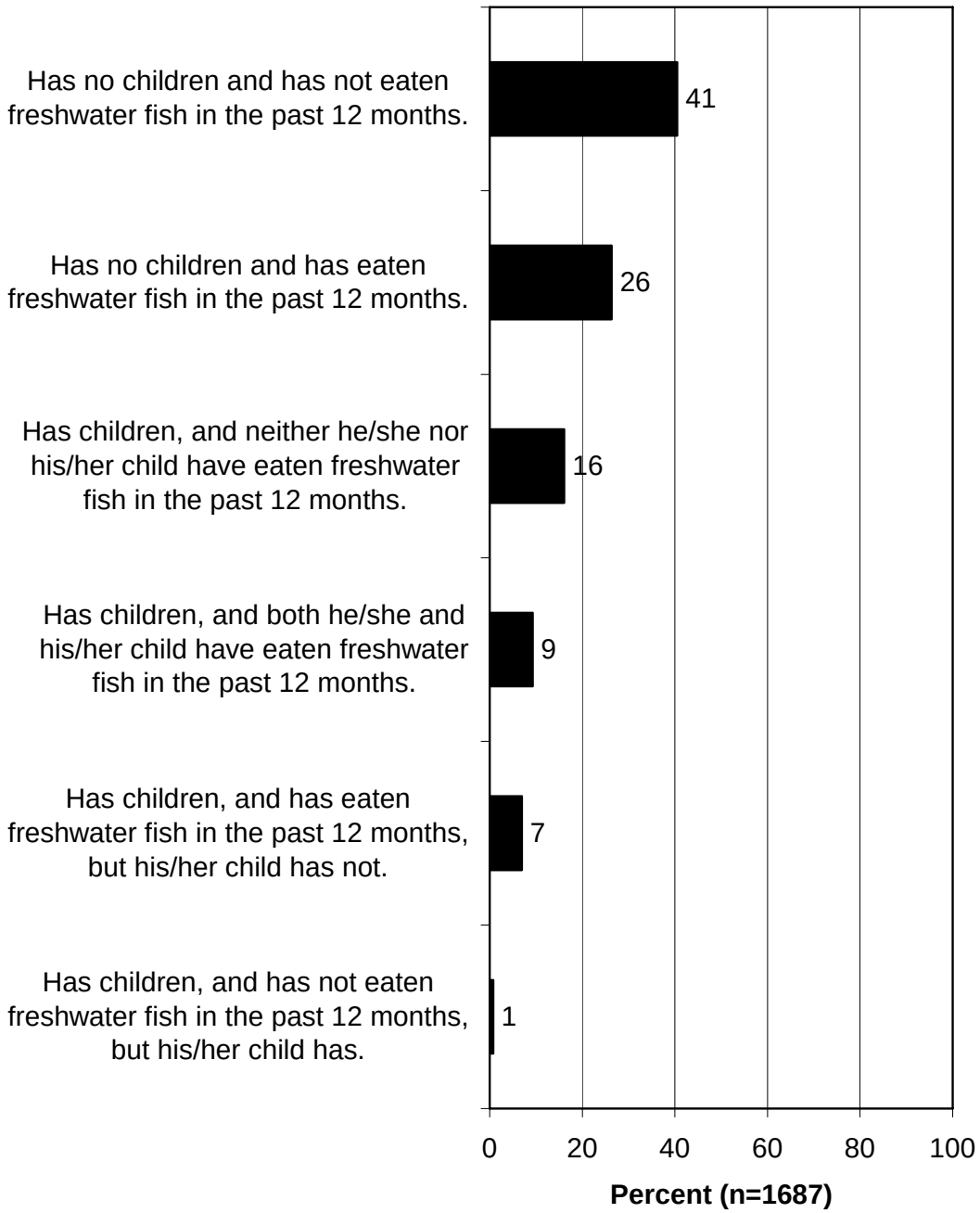
**Q303. In general, was the freshwater fish your child ate in the past 12 months mostly caught while fishing by you, family, or a friend, mostly purchased at a store or market, or mostly purchased at a restaurant? (Asked of those who have at least one child 17 or younger living in the household who has eaten freshwater fish in the past 12 months.)**



**Q304. Did your other children generally eat more, about the same, or less freshwater fish than the child you have already told me about? (Asked of those who have more than one child 17 or younger living in the household.)**



**Respondent / child's freshwater fish consumption for entire sample of West Virginia residents.**



# DEMOGRAPHIC INFORMATION

- Respondents' years of residency in West Virginia are fairly well distributed; the mean is 39.60 years.

- The vast majority of respondents (95%) do not have an additional telephone in the household on which they receive calls.

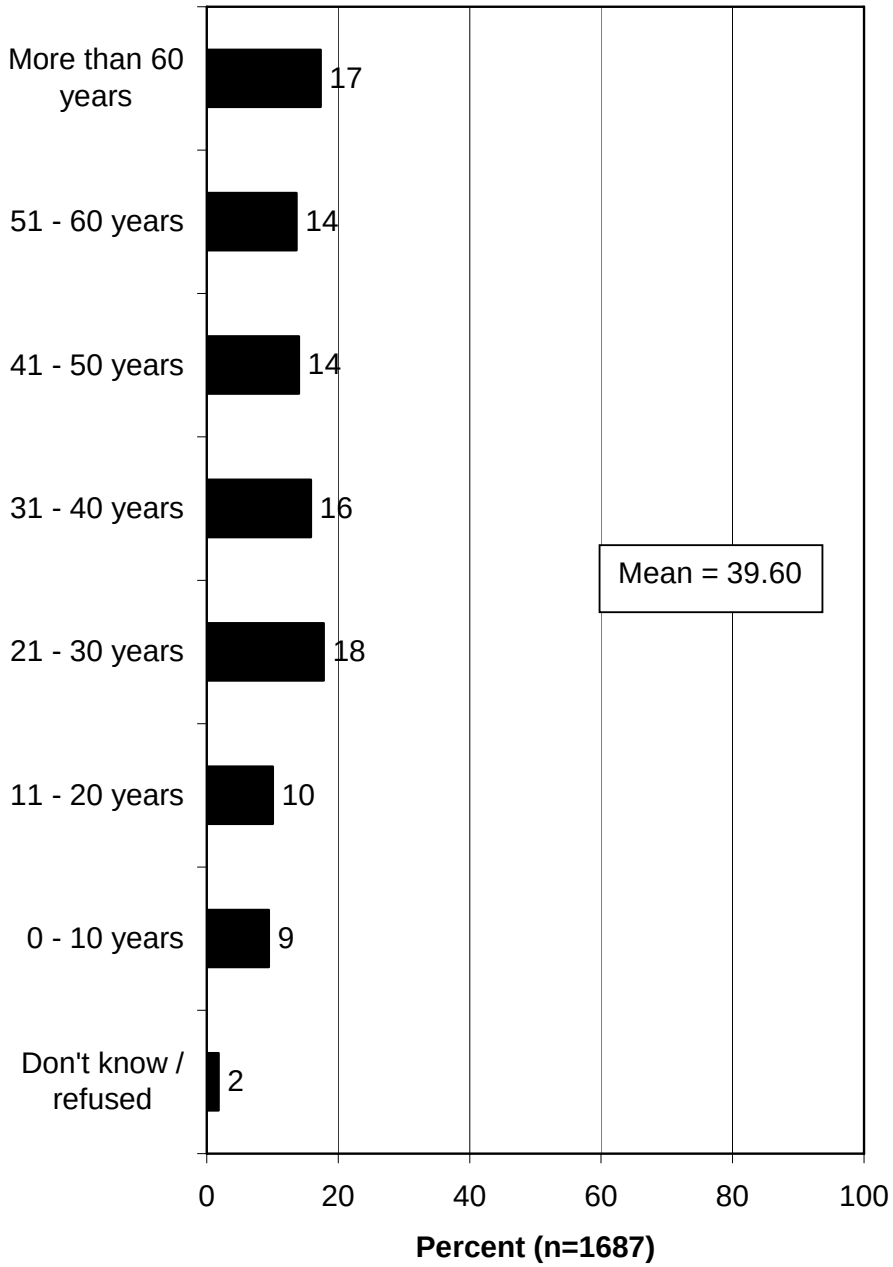
- Most respondents to the survey live in small cities or towns or rural areas.

- The majority of respondents (52%) have attended some college or trade school, with or without a degree.

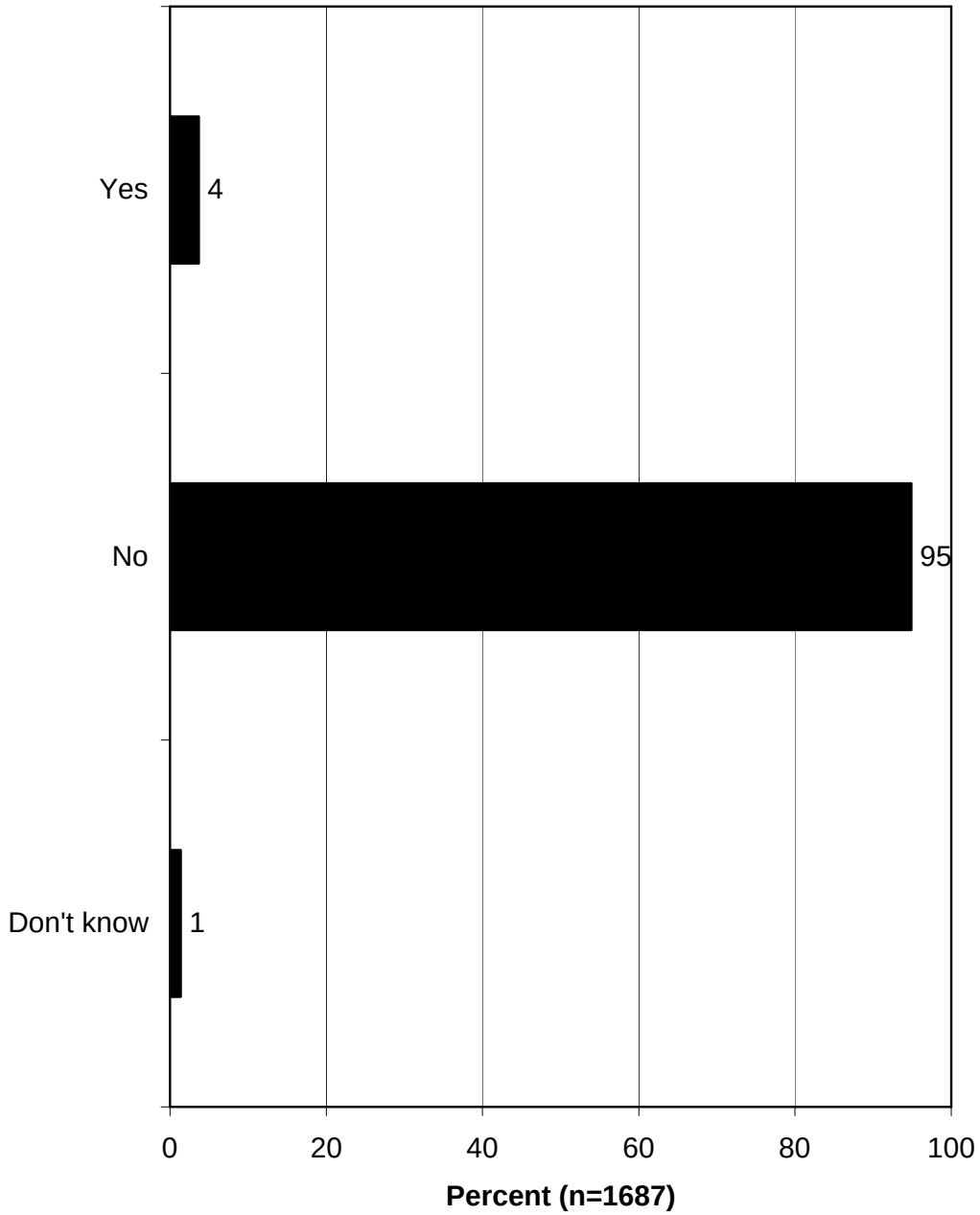
- Income levels are shown.

- The overwhelming majority of respondents (95%) do not consider themselves to be of Hispanic or Latino origin; whites/Caucasians predominate among survey respondents.

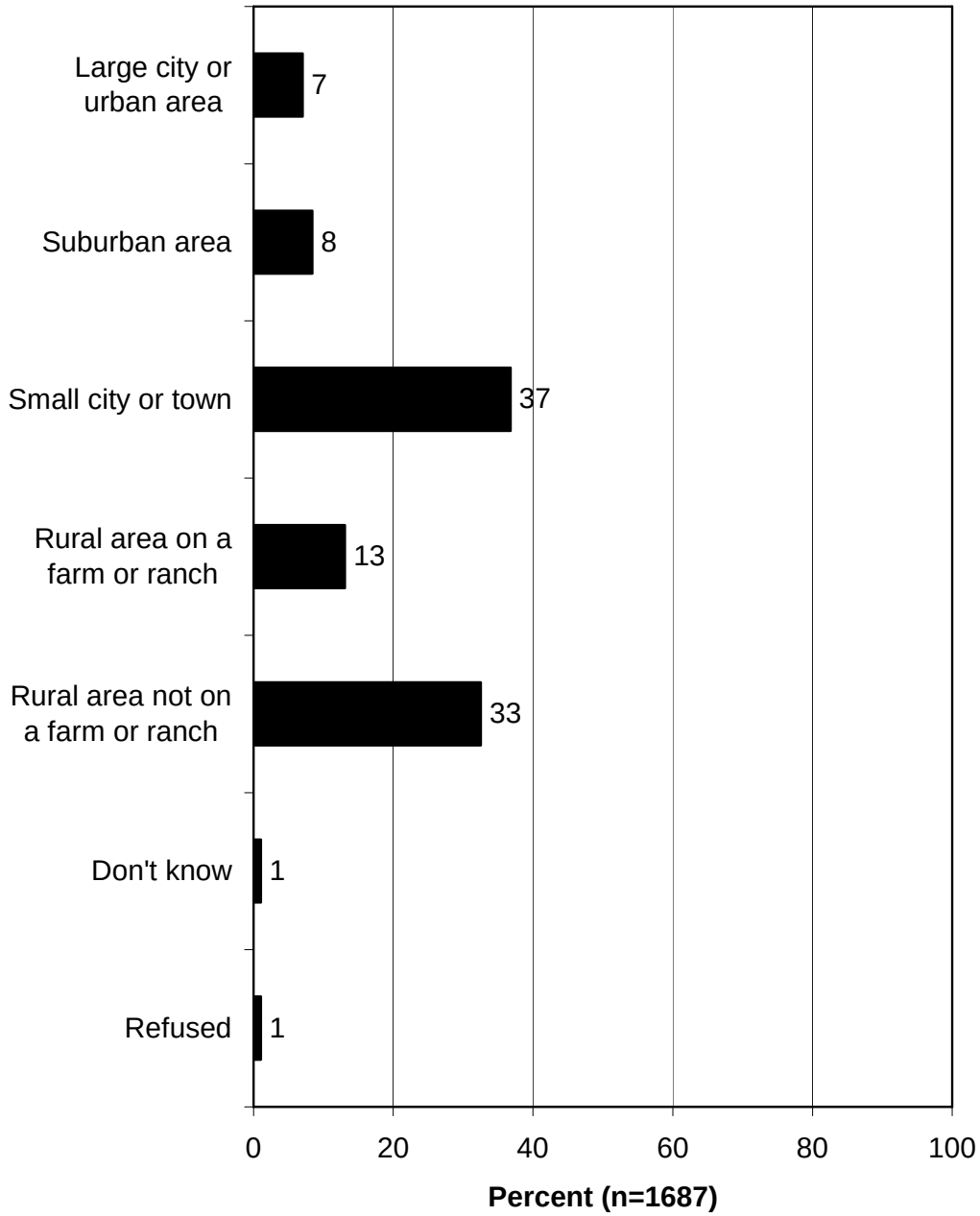
## Q306. How many years have you been a full-time West Virginia resident?



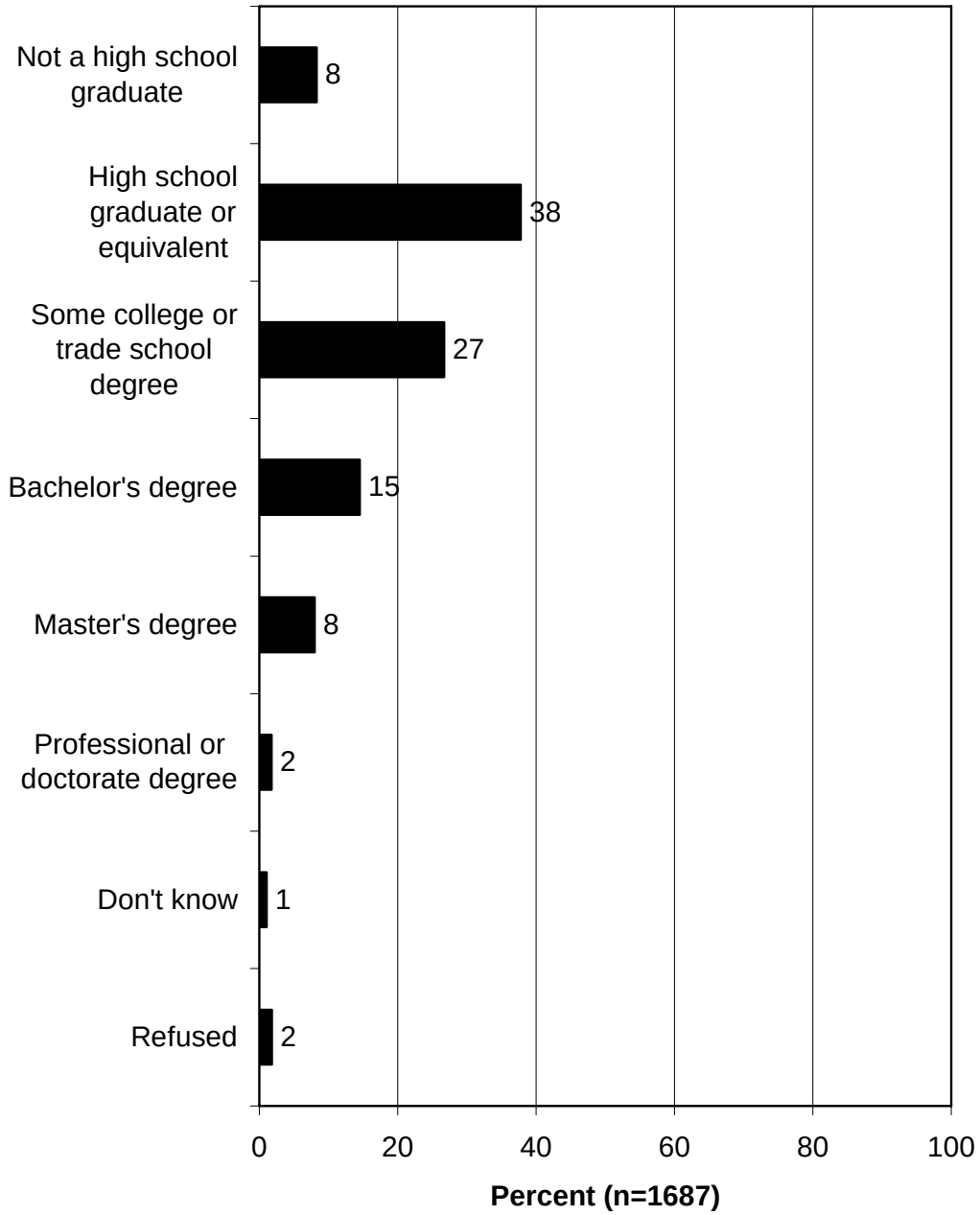
## Q311. Not including cell phones, are there any telephone numbers in addition to [primary telephone] in your home that you receive calls on?



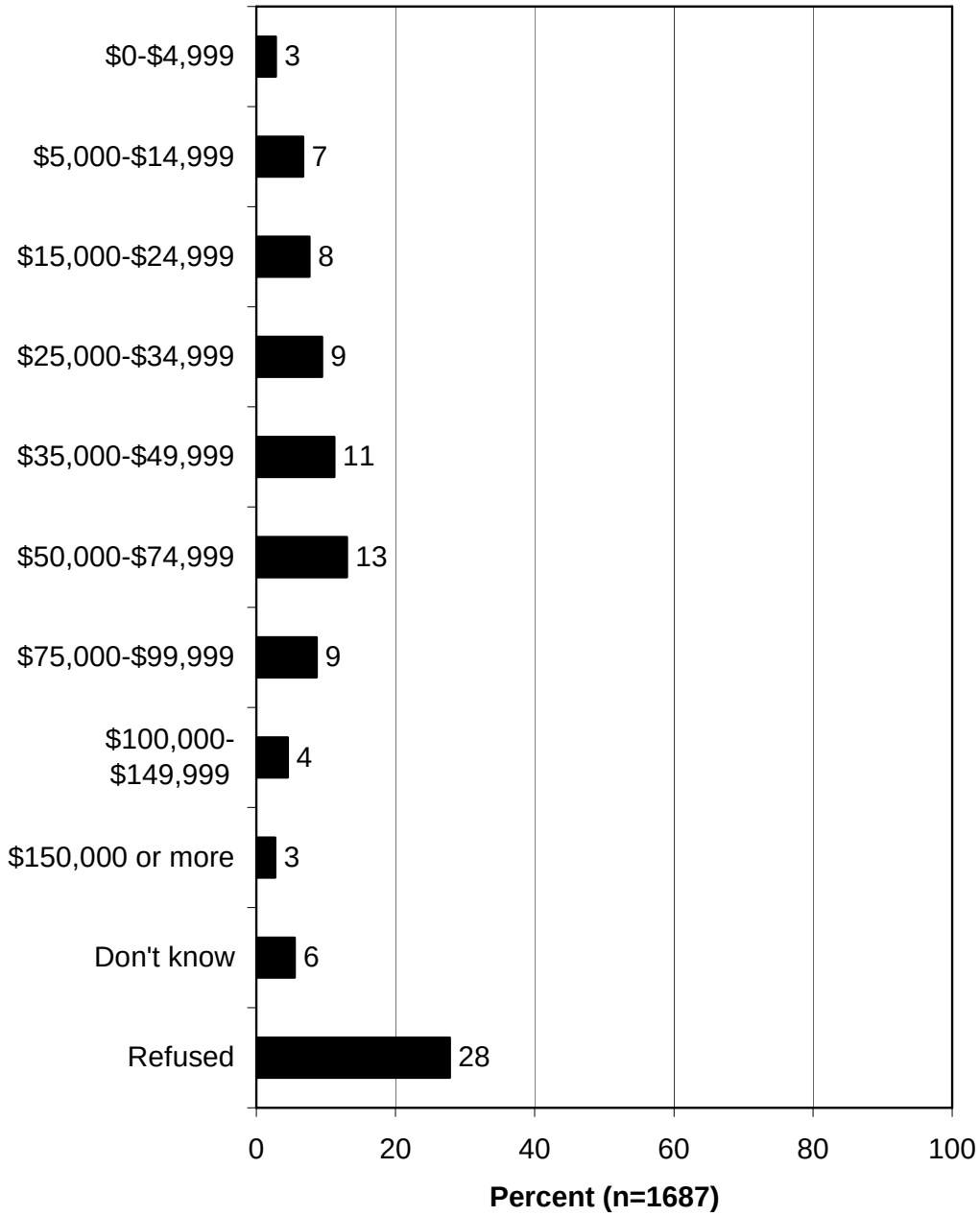
**Q318. Do you consider your place of residence to be a large city or urban area, a suburban area, a small city or town, a rural area on a farm or ranch, or a rural area not on a farm or ranch?**



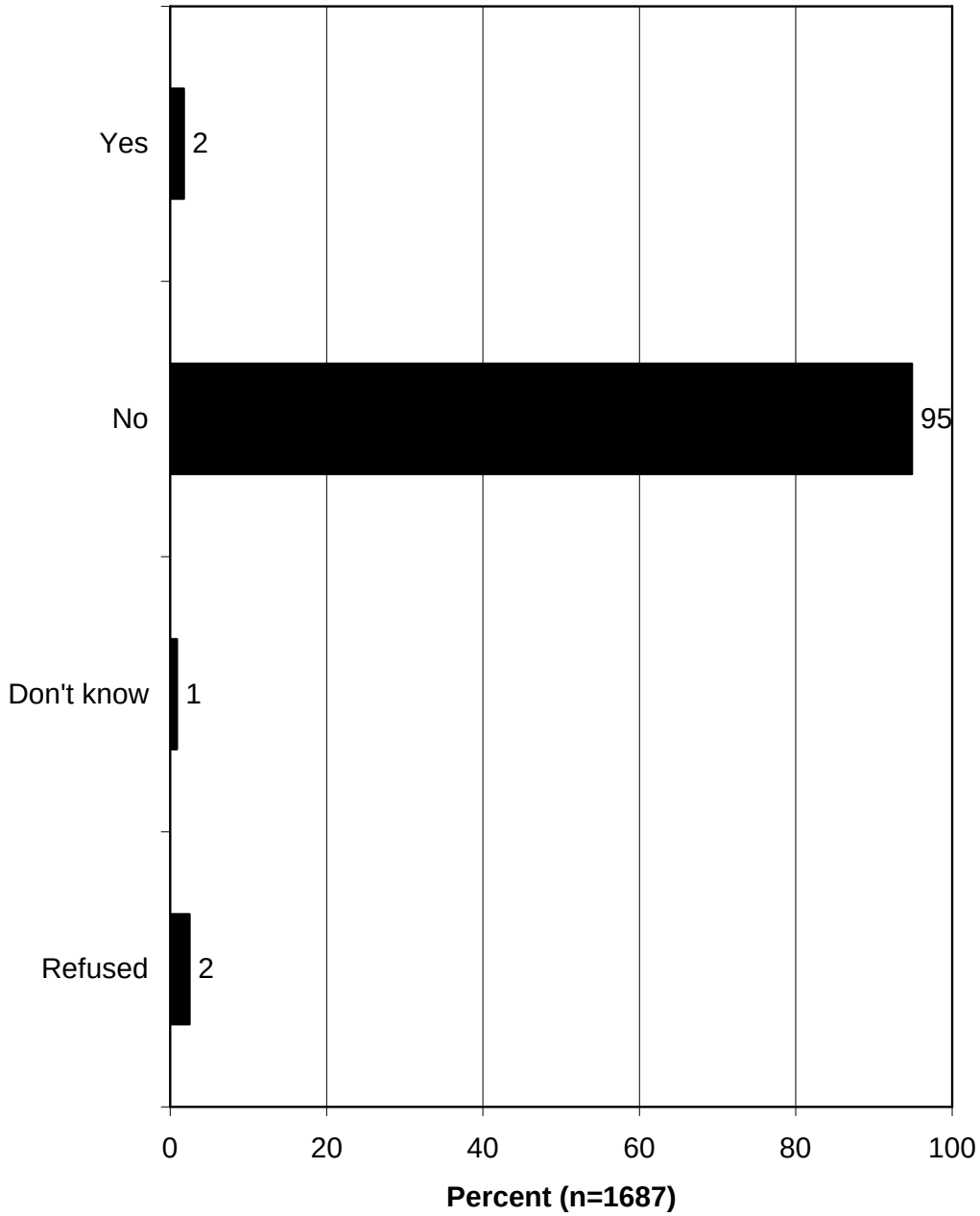
## Q319. What is the highest level of education you have completed?



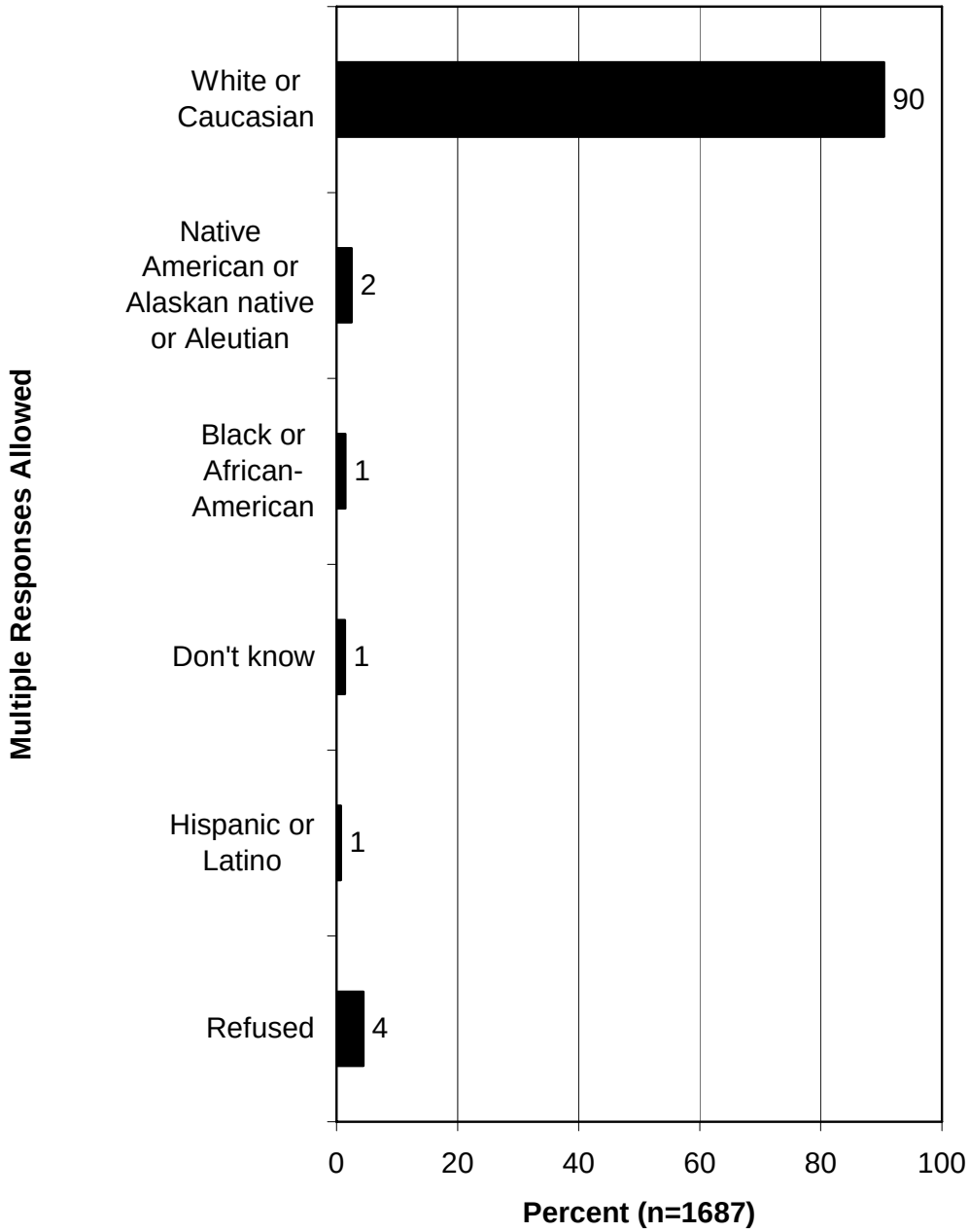
## Q320. Which of these categories best describes your total household income before taxes last year?



## Q321. Do you consider yourself to be of Hispanic or Latino origin?



## Q324. What races or ethnic background do you consider yourself?



# ABOUT RESPONSIVE MANAGEMENT

Responsive Management is a nationally recognized public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues. Its mission is to help natural resource and outdoor recreation agencies and organizations better understand and work with their constituents, customers, and the public.

Utilizing its in-house, full-service, computer-assisted telephone and mail survey center with 45 professional interviewers, Responsive Management has conducted more than 1,000 telephone surveys, mail surveys, personal interviews, and focus groups, as well as numerous marketing and communications plans, needs assessments, and program evaluations on natural resource and outdoor recreation issues.

Clients include most of the federal and state natural resource, outdoor recreation, and environmental agencies, and most of the top conservation organizations. Responsive Management also collects attitude and opinion data for many of the nation's top universities, including the University of Southern California, Virginia Tech, Colorado State University, Auburn, Texas Tech, the University of California—Davis, Michigan State University, the University of Florida, North Carolina State University, Penn State, West Virginia University, and others.

Among the wide range of work Responsive Management has completed during the past 20 years are studies on how the general population values natural resources and outdoor recreation, and their opinions on and attitudes toward an array of natural resource-related issues. Responsive Management has conducted dozens of studies of selected groups of outdoor recreationists, including anglers, boaters, hunters, wildlife watchers, birdwatchers, park visitors, historic site visitors, hikers, and campers, as well as selected groups within the general population, such as landowners, farmers, urban and rural residents, women, senior citizens, children, Hispanics, Asians, and African-Americans. Responsive Management has conducted studies on environmental education, endangered species, waterfowl, wetlands, water quality, and the reintroduction of numerous species such as wolves, grizzly bears, the California condor, and the Florida panther.

Responsive Management has conducted research on numerous natural resource ballot initiatives and referenda and helped agencies and organizations find alternative funding and increase their memberships and donations. Responsive Management has conducted major agency and organizational program needs assessments and helped develop more effective programs based upon a solid foundation of fact. Responsive Management has developed Websites for natural resource organizations, conducted training workshops on the human dimensions of natural resources, and presented numerous studies each year in presentations and as keynote speakers at major natural resource, outdoor recreation, conservation, and environmental conferences and meetings.

Responsive Management has conducted research on public attitudes toward natural resources and outdoor recreation in almost every state in the United States, as well as in Canada, Australia, the United Kingdom, France, Germany, and Japan. Responsive Management routinely conducts surveys in Spanish and has also conducted surveys and focus groups in Chinese, Korean, Japanese, and Vietnamese.

Responsive Management's research has been featured in most of the nation's major media, including CNN's *Crossfire*, ESPN, *The Washington Post*, *The Washington Times*, *The New York Times*, *Newsweek*, *The Wall Street Journal*, and on the front page of *USA Today*.

Visit the Responsive Management Website at:
**www.responsivemanagement.com**

Scott and Michael,

Below are the results from calculating the daily freshwater fish consumption of West Virginia residents 18 years old and older at the 90th percentile.

## WV Daily Freshwater Fish Consumption

| | | |
|---|---|---|
| Weighted | random | 90% of West Virginia residents 18 and older consume up to **9.94175056657534** grams of freshwater fish daily. |
| | fixed | 90% of West Virginia residents 18 and older consume up to **9.94175056657534** grams of freshwater fish daily. |
| Unweighted | random | 90% of West Virginia residents 18 and older consume up to **9.24272122986301** grams of freshwater fish daily. |
| | fixed | 90% of West Virginia residents 18 and older consume up to **9.32039115616438** grams of freshwater fish daily. |

Please note that our calculations were performed using data we collected with survey questions developed from the direction and recommendations of the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA). The final survey was the result of approximately a year-long review with and final approval from the West Virginia Department of Environmental Protection, EPA, and FDA. Using the survey instrument developed during this process, we derived the numbers shown above in the following manner:

- Each West Virginia resident 18 years old or older who responded to the survey was included in the calculation, including those who did not eat any freshwater fish at all in the past 12 months.
- Each respondent who ate freshwater fish was asked how many meals he/she typically eats per month during each season of the year for each species of freshwater fish (those who did not eat any freshwater fish were assigned "0" for each frequency).
- The number of meals per month per season was added up for each species to determine the total number of meals eaten per year.
- Each respondent who ate freshwater fish was asked whether the size of the portion he/she usually ate over the past 12 months was smaller than 8 ounces, about 8 ounces, or larger than 8 ounces (those who did not eat any freshwater fish were assigned "0"). (Eight ounces was described as the size of a thin paperback book, a description taken from the American Cancer Society's website.)
- To determine an exact figure for the amount of fish consumed, a number had to be assigned to the responses "smaller than 8 ounces" and "larger than 8 ounces" for the

question about typical portion size. Numeric assignments for these responses were made in two different ways but yielded consistent results (please see the final results shown in the table):

1. The computer analysis program assigned a random number between 2 and 7 ounces for "smaller than 8 ounces" responses and between 9 and 14 for "larger than 8 ounces" responses. A range beginning with 2 ounces was chosen for smaller portions because it was assumed very few people would eat 1 ounce or less for a serving of fish, which resulted in six whole numbers less than 8 ounces that the computer could randomly assign. Thus, six whole numbers with a value higher than 8 (beginning with 9 for a continuum) were made available (i.e., 9 to 14) for randomly assigned values for larger portions.
2. A single fixed number was assigned to represent all smaller and larger portions: 4 ounces for smaller portions because it is approximately half the size of an 8-ounce portion and 12 ounces for larger portions because it would be the next logical interval in the scale: 4 ounces, 8 ounces, and 12 ounces.

- For each respondent, the total number of meals per year was multiplied by the typical serving size to obtain the total number of ounces consumed by the respondent in the past 12 months.
- Once the total number of ounces was determined for each respondent, the total was converted into grams (1 dry ounce = 28.3495231 grams).
- After converting the total amount of fish consumed to grams, the figure was divided by 365 to obtain the number of grams consumed per day per respondent.
- After calculating the number of grams of freshwater fish consumed per day per respondent, the 90th percentile was identified and is shown in the table above for each calculation method used.
- The table above shows four different results for total consumption per day at the 90th percentile. In addition to the two methods of calculating the size of portions smaller and larger than 8 ounces, the data was also analyzed unweighted and weighted for age and gender (to match the age and gender distribution of the population of West Virginia residents 18 years old and older). Data was run unweighted and weighted for each method, resulting in the four numbers shown in the table above. Thus, the table shows the results for calculating the number of grams consumed per day per person in four different ways:
    1. Data weighted for age and gender and calculated using a randomly assigned number to represent meals consumed that were smaller or larger than 8 ounces.
    2. Data weighted for age and gender and calculated using a fixed assigned number to represent meals consumed that were smaller or larger than 8 ounces.
    3. Data not weighted and calculated using a randomly assigned number to represent meals consumed that were smaller or larger than 8 ounces.
    4. Data not weighted and calculated using a fixed assigned number to represent meals consumed that were smaller or larger than 8 ounces.

If you have any questions about the above calculations or our description of the methodology used for the calculations, please don't hesitate to give us a call.

Thank you,

Andrea Criscione
Research Associate
Responsive Management
www.responsivemanagement.com
(540) 432-1888