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U.S. Residential Miscellaneous Refrigeration Products: Results from Amazon Mechanical Turk Surveys

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Abstract

Amazon Mechanical Turk was used, for the first time, to collect statistically representative survey data from U.S. households on the presence, number, type and usage of refrigerators, freezers, and various "miscellaneous" refrigeration products (wine/beverage coolers, residential icemakers and non-vapor compression refrigerators and freezers), along with household and demographic information. Such products have been poorly studied to date, with almost no information available about shipments, stocks, capacities, energy use, etc. A total of 9,981 clean survey responses were obtained from five distinct surveys deployed in 2012. General refrigeration product survey responses were weighted to demographics in the U.S. Energy Information Administration's Residential Energy Consumption Survey 2009 dataset. Miscellaneous refrigeration product survey responses were weighted according to demographics of product ownership found in the general refrigeration product surveys. Model number matching for a portion of miscellaneous refrigeration product responses allowed validation of refrigeration product characteristics, which enabled more accurate estimates of the penetrations of these products in U.S. households. We estimated that there were 12.3±1.0 million wine/beverage coolers, 5.5(−3.5,+3.2) million residential icemakers and 4.4(−2.7,+2.3) million non-vapor compression refrigerators in U.S. households in 2012. (All numerical results are expressed with ranges indicating the 95% confidence interval.) No evidence was found for the existence of non-vapor compression freezers. Moreover, we found that 15% of wine/beverage coolers used vapor compression cooling technology, while 85% used thermoelectric cooling technology, with the vast majority of thermoelectric units having capacities of less than 30 wine bottles (approximately 3.5 cubic feet). No evidence was found for the existence of wine/beverage coolers with absorption cooling technology. Additionally, we estimated that there were 3.6±1.0 million hybrid refrigerator-wine/beverage coolers and 0.9±0.5 million hybrid freezer-wine/beverage coolers in U.S. households. We also obtained estimates of miscellaneous refrigeration product capacities, lifetimes, purchase and installation costs, repair frequencies and costs, and maintenance costs. For wine/beverage coolers, we also obtained information on the penetration of built-in units, AC/DC operating capability, the use of internal lights, and distributions of door opening frequencies. This information is essential to develop detailed estimates of national energy usage and life-cycle costs, and would be helpful in obtaining

information on other plug-load appliances. Additional information not highlighted in the main report was presented in Appendices.

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1 Introduction

The Energy Information Administration (EIA) within the U.S. Department of Energy (DOE) reports that the share of energy used by plug-load appliance and consumer electronics devices has increased in U.S. households from 17% in 1978 to 31% in 2005 (EIA, 2011). This number is expected to increase in the future with growing demand for more and better quality household appliances and consumer electronics, despite significant improvements in energy efficiency.

There are several existing sources of household device information, including public data from the Residential Energy Consumption Survey (RECS) administered by EIA (RECS, 2009), the Association of Home Appliance Manufacturers (AHAM),[1] and Appliance Magazine.[2] Other data are available from private market research firms such as The NPD Group,[3] The Nielsen Company,[4] IMS Research,[5] and DisplaySearch.[6] These data can be used to estimate device sales, numbers and types of devices per household, national energy use and potential savings, and to perform a detailed cost-benefit analysis of improved efficiency, for most major household device types (heating, cooling and ventilation equipment; "white goods" such as refrigerators, water heaters, clothes washers, etc.; and consumer electronics such as televisions and computers, and other miscellaneous plug-load appliances).

Despite the abundance of information that these sources provide, there remain important data gaps, in some cases making the estimate of potential national energy savings for specific devices very uncertain. The major limitation of RECS is that it covers a wide range of devices; therefore its questions are sometimes too general to provide the information needed for detailed calculations. For instance, the latest RECS survey (RECS, 2009) indicates the number of refrigerators and freezers in a home along with door style, defrost technology and some capacity information, but the latter information is divided into fairly coarse bins. Also, it has no information about the type of cooling technology used, or the presence of other types of less common refrigeration products (described below). These turn out to be crucial variables in developing economic models for analyzing the impacts of improved efficiency.

In response to this and other data needs, LBNL has recently begun gathering data using a low-cost, online survey approach based on Amazon Mechanical Turk (AMT).[7] We chose to use AMT as our data collection platform because of its large user base (more than 250,000 in the U.S.—Paolacci et al., 2010; Amazon, 2011), affordability (roughly $1 to $3 per survey

[1] http://www.aham.org/
[2] http://www.appliancemagazine.com/
[3] http://www.npd.com/
[4] http://www.nielsen.com/
[5] http://www.imsresearch.com/
[6] http://www.displaysearch.com/
[7] http://www.mturk.com/

respondent), ease of use, and prior experience at LBNL. The surveys sample a wide range of U.S. demographics; however, the online U.S. population does not necessarily match the general U.S. population. Therefore, we developed two complementary methods (called post-stratification weighting, described briefly in Section 2 and in detail in Greenblatt et al., 2013) that are applied to the online survey data to correct for demographic biases that may exist, by assigning weights to individual responses.

This report focuses on miscellaneous refrigeration products, including wine chillers (also known as wine coolers, beverage centers or beverage coolers; hereafter referred to as "wine/beverage coolers"), residential icemakers and a number of refrigeration products that use cooling technology other than vapor compression (thermoelectric or absorption cooling). These so-called "non-vapor compression" refrigeration products consist primarily of wine/beverage coolers but also some refrigerators and possibly freezers. Little is currently known about these products, but shipments of wine/beverage coolers have been non-trivial in recent years (NPD, 2011) and such products may now be present in a non-trivial fraction of homes (Parekh et al., 2012). Moreover, shipments of all refrigeration products have been rising for many years (DOE, 2011). Therefore, it is worthwhile to collect more detailed data on these products in order to more accurately characterize national energy use, and serve as inputs for cost-benefit analysis of potential efficiency improvements. To our knowledge, this report forms the first comprehensive dataset on miscellaneous refrigeration products to be published.

2 Data and methods

2.1 Data sources

The following data sources were used in this report.

2.1.1 Amazon Mechanical Turk

AMT was used to deploy surveys of refrigeration products (specifically, refrigerators, freezers, wine/beverage coolers, residential icemakers and non-vapor compression refrigerators and freezers) in U.S. households. AMT was started in 2005 by Amazon.com as a crowd-sourcing tool. This virtual workplace allows "requesters" to post Human Intelligence Tasks (HITs) and "workers" to pick tasks they want to complete in exchange for a certain amount of monetary compensation (called a "reward"). Those HITs usually require human discretion and action that cannot be replaced by computers, such as image identification, adding tags or flags, finding correct websites, language translation, or survey questionnaires. Roughly half of the more than 500,000 AMT users globally are from the U.S. (Paolacci et al., 2010; Amazon, 2011), providing a large, diverse subject pool, especially for U.S.-based research.

Paolacci et al. (2010) demonstrated that the population of AMT is "at least as representative of the U.S. population as traditional subject pools," and Gosling et al. (2004) concluded that online surveys have been shown to be "relatively diverse with respect to

gender, socioeconomic status, geographic region, and age…and are consistent with findings from traditional methods." However, these comparisons are made to traditional sources of data in psychology research, which tend to include student convenience samples. Ipeirotis (2010) showed that the geographical distribution and race composition of workers generally match those of Internet users, but when compared with the general U.S. demographics, they found that AMT workers are on average younger, more typically female, and have higher education levels and fewer children. These demographics are not representative of the general population, but all relevant demographic groups are still present, albeit with lower frequencies of occurrence. Therefore, weighting online panel data has become a common way to adjust survey results to match more closely to the general population. A brief description of the weighting methods used can be found in Section 2.5.

For more information about AMT and weighting techniques, see Greenblatt et al. (2013).

2.1.2 Residential Energy Consumption Survey

The Residential Energy Consumption Survey (RECS) is published every few years by the U.S. Energy Information Administration (EIA), a branch of the U.S. Department of Energy (DOE). It asks hundreds of questions about home characteristics, appliances, and demographics, and is designed to be a representative sample of U.S. households. Data from RECS is used for many purposes, by researchers both inside and outside of DOE. Among its primary uses is to inform national energy use projections that are published each year in the Annual Energy Outlook (EIA, 2012). For many products, RECS is the only nationally-representative source of data available.

The most recent survey (RECS, 2009) contained more than 12,000 households representing every Census region (McNary and Berry, 2012). Data were assigned weights (as part of the public data product) indicating the number of households each sample represented. RECS data were used as a basis for assigning weights to AMT survey data, using the demographic questions contained in RECS. We used RECS demographics as a reference sample for weighting AMT survey results, using one of two methods described in Section 2.5.

2.1.3 The NPD Group, Inc.

The NPD Group, Inc. (NPD) is a private marketing research firm who collects monthly U.S. shipments of a wide variety of consumer products. These are point-of-sale data; thus, they record actual numbers of units sold across the U.S. for the fraction of retail transactions covered by their network. The detailed data lists products by specific brand and model number, and contains ancillary information such as capacity and features that allows for classification into many product categories. We used NPD data to provide shipments of wine/beverage coolers from 2005-2011 (NPD, 2011). NPD estimates that its shipments represent 25-40% of U.S. sales, though they admit this is a rough approximation. Our analysis suggests that this estimate is too large by at least a factor of four.

2.2 Survey design

Surveys were developed for deployment using AMT focusing on various types of refrigeration products. Surveys shared in common a set of demographic questions, placed at the end of the survey, which were based strongly on questions found in RECS (see below). Within each survey, both "general population" samples (all demographics) and demographic "subgroup" samples (e.g., only Black/African American race) were deployed, in order to collect adequate numbers of samples across all demographic groups.

A summary of the surveys deployed, including the focus of each survey, is found below in Table 1. Note that one survey (RP1) was excluded due to its preliminary nature.

Table 1. AMT surveys used in this report

Survey Code	Refrige-rators	Freezers	Wine/ beverage coolers	Residential icemakers	Non-vapor compression products*	Hybrid products	AC/DC products	Detailed questions	Brand/ model numbers
RP1**	X	X	X			X	X		
RP2	X	X	X	X	X	X	X	X	X
RP3	X	X	X	X	X				
WC1			X					X	X
RI1				X				X	X
NV1	X	X			X			X	X

* Other than wine/beverage coolers
** Survey excluded from analysis

2.2.1 Inclusion of questions from other data sources

We used the RECS (2009) survey to provide the format and wording of most of the demographic questions used in our surveys, as well as its demographic data for weighting our surveys. The demographic questions included were:

- Zipcode
- Gender
- Hispanic/Latino origin
- Race
- Highest education level
- Number of occupants by age
- Total number of occupants in household
- Annual household income
- Type of home (for some surveys)
- Owned vs. rented home (for some surveys)

2.2.2 Modifications to RECS questions

We modified some questions from how they were phrased in RECS in order to increase the accuracy of the responses. For instance, questions about the number of various types of refrigeration products in the home all had the following basic structure:

How many refrigerators are plugged-in and turned on in your home?

Number of Refrigerators: _____

We modified the format of the questions to ensure that certain types of devices were included, and others excluded. Based on the professional survey experience of our team, we know that respondents tend to answer the last thing they read. Therefore, if the list of what to exclude immediately precedes the answers, some respondents may answer opposite to what is desired. For this reason, we repeated the list of what to include, and also repeated the question (simplified and rephrased) to ensure that is the last thing read before the answers are presented:

How many <u>refrigerators</u> are plugged in at your home right now?

DO NOT INCLUDE:

- Stand-alone freezers
- Stand-alone icemakers
- Stand-alone wine/beverage coolers

INCLUDE:

- Full-size refrigerators
- Compact refrigerators
- Refrigerators with separate freezers, automatic icemakers, or wine/beverage cooler compartments

Check the number of refrigerators:

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

We also ensured that every question had a "Don't know" or "Decline to state" option, to provide respondents with the ability to answer every question even if they did not provide information. This was important both for addressing possible discomfort when answering demographic questions (race, household income, etc.), as well as distinguishing respondents who skipped questions (answer left blank) from those who answered the question but did not provide information.

In addition, some of the demographic questions were phrased differently than in RECS. Specifically:

- We avoided the term "householder" and instead asked about the person completing the survey.
- For the question about race, some answers that were chosen very infrequently in RECS (e.g., Alaskan Native) were replaced with combined categories. Also, because there was a separate question about Hispanic origin (as in RECS), we eliminated the option of also indicating "Hispanic" in the question on race, because this option was seldom used in RECS responses and in our opinion needlessly confused the results. For the RP3, RI1 and NV1 surveys, instead of allowing the respondent to check multiple races, we allowed only one response but provided a "Two or more races" response to take care of those who considered themselves part of more than one race.
- We asked for the total number of household occupants differently than in RECS:
    - AMT: **How many persons live in your household for at least six months of the year? Please include yourself in that number.**
    - RECS: **Including yourself, how many people normally live in this household? Do not include anyone who is just visiting, those away in the military, or children who are away at college.**
- The way we asked about the ages of occupants was different from RECS, which asked for the age of each household member in order of decreasing age. In our approach, we asked the respondent to indicate the number of occupants within each age range (0-9, 10-19, etc.). We also provided an "age unknown" category to account for those where age may be uncertain.

2.2.3 Inclusion of "cheater" questions to increase data quality

Not all respondents answered honestly or accurately. After the RP1 survey was deployed, we noticed that a small minority of respondents appeared to be providing strange answers to many questions, but we could not prove that their answers were "wrong." For subsequent surveys, we introduced a number of non-topical questions we termed "cheater" questions. These were designed so that any U.S. resident would be able to answer them easily, unless they were distracted or deliberately trying to confound the survey. The questions were mildly disguised by embedding them among topical product questions, with incorrect answers that often strongly resembled those of the surrounding questions. Individual responses with one or more cheater questions answered incorrectly were eliminated from further analysis. Examples of "cheater" questions are summarized below:

- **What material are wine bottles typically made from?** (Choices: Fabric, Glass, Rubber, Tile, Wood, Don't know)
- **How many bottles of wine are there in a dozen?** (Choices: 1, 2, 6, 12, 24, 50 or more, Don't know)
- **What are ice cubes typically made from?** (Choices: Air, Glass, Steel, Water, Oil, Don't know)
- **Who is the current president of the U.S.?** (Choices: "Obama" embedded in a number of refrigeration product brand names)

We also included another question both meant to catch "cheaters" as well as to double-check that the answers they provided two different ways actually matched. The question concerned the number of full-time occupants living in the home. We both asked for the total number as well as the number in each of several age bands (including an "unknown age" band). The sum of the age-based responses was compared against the response to the total number of occupants. Responses that differed by more than ±1 (to account for honest mistakes in arithmetic) were classified as "cheaters" and eliminated from further analysis.

2.2.4 Additional demographic subgroups

In order to correct for biases in the sampling of demographic groups in AMT, one or more demographic subgroup surveys were also deployed to increase numbers of under-represented demographics. These were done in addition to deploying a survey that sampled the entire population of possible respondents. Figure 1 shows typical unweighted general population AMT demographics (from the RP2 survey) in comparison with (weighted) RECS data. Circled items indicate demographic categories with significant deficits (i.e., where AMT populations are approximately half or lower than RECS), indicating a possible need for demographic subgroup sampling. Note that AMT data shown did not include "Decline to state" answers.

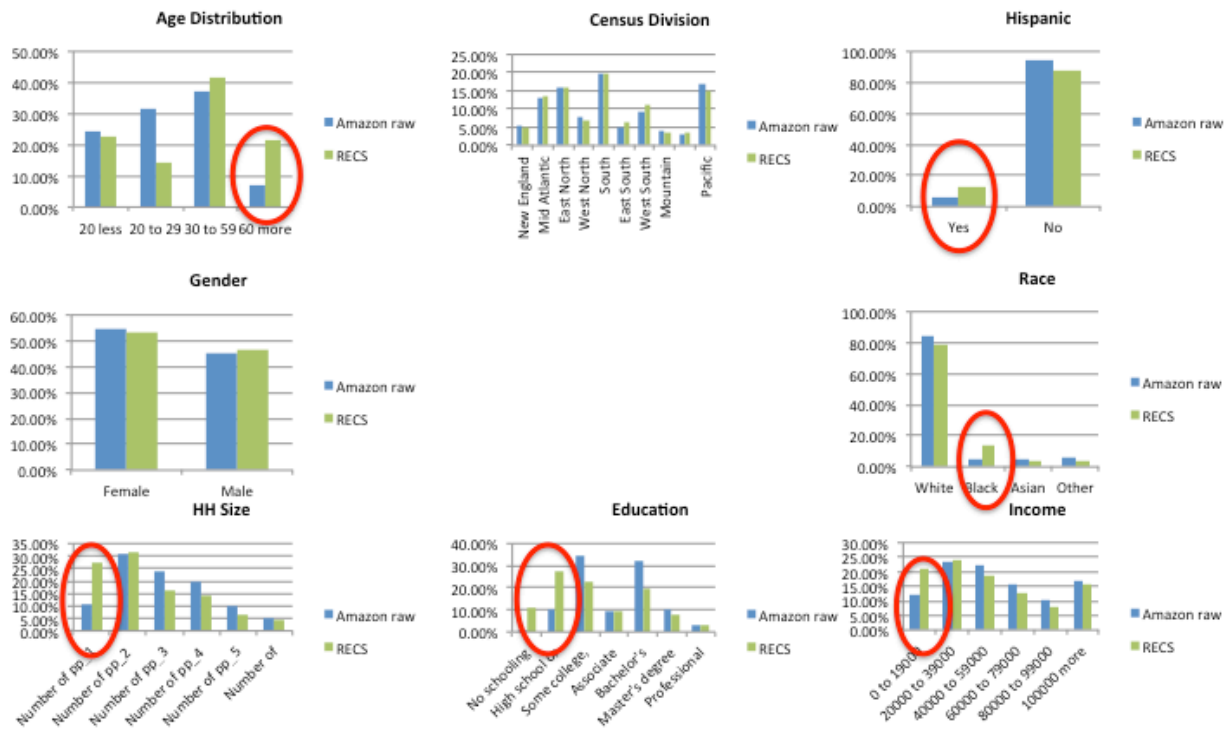

Figure 1. Comparison of demographic distributions in unweighted AMT RP2 and (weighted) RECS general population data. Circles indicate those categories with significant deficits (AMT populations approximately half or lower than in RECS).

Specifically, we found that the following demographic groups were generally under-represented in the unweighted AMT data by about a factor of two or more compared with RECS:

1) Black/African American households
2) Households with persons age 60 and older
3) Respondents with no college education
4) One-person households
5) Hispanic households
6) Low-income households (<$20,000/year)

For the RP1 survey, we included the first four demographic categories, but for the other surveys, we dropped one-person households and focused on the first three. These demographics had smaller populations than RECS and were therefore the most deficient compared to the general population. By including the additional surveys, the populations of these demographic subgroups were brought to within a factor of two of the RECS populations.

2.2.5 Qualification language

All surveys also included a header that clearly announced the qualifications for taking the survey and getting paid. Those who did not adhere to the qualifications were not paid. The RP2 survey header is shown below:

Qualifications: U.S. residents at least 18 years old.

Please answer honestly and accurately! We have provided plenty of time for you to answer every question carefully.

NOTE: You will NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

For the WC1, RI1 and NV1 surveys, we further targeted a specific portion of the population who owned targeted devices (e.g., residential icemaker):

You must have at least one STAND-ALONE ICEMAKER in your home to take this survey.

For surveys where a specific demographic subgroup was targeted (e.g., no college education), in addition to identifying clearly in the survey title which demographic group was required (e.g., "Refrigeration Products Survey for people who never attended college"), a warning was provided in the survey header:

Qualifications: U.S. residents at least 18 years old, who have NEVER ATTENDED COLLEGE. If you have attended college, even if you did not graduate, you DO NOT QUALIFY for this survey and we will NOT approve it.

Finally, we included warnings about taking a survey more than once, even if the respondent otherwise qualified for the survey. Such "duplicates" were identified by matching worker IDs (an anonymous identifier code unique to every worker) from each survey, and the duplicate participant responses were eliminated from further analysis. For most surveys, the HIT IDs (unique identifiers associated with each survey launched) were included explicitly, as in the below example:

If you have already taken the survey titled "Refrigeration Products Survey" (with or without another demographic group specified), HIT-ID "2A3B3L0FBJ9IJ1ZQ4G5VI5RQ8CVYM1", "26VOBDDP8PJWFKTPTMDB7Q3AGN74FS" or "25CQIHPCGJ2DXR4FHUOH4JPQAGY280", you CANNOT take this survey. Duplications will be identified and will NOT BE PAID.

2.3 Survey deployment

2.3.1 Logistics

We typically began with a test of 100 responses, to ensure that responses received were reasonable (e.g., that the questions asked were being correctly interpreted), and that the majority of respondents were paid an adequate amount based on the time spent answering

the survey (see below). This amount was sometimes subsequently adjusted before launching the full survey. The time limit was also examined to ensure that every respondent in the test had ample time to complete the survey, and adjusted if necessary.

The general population survey was launched first, followed by the demographic subgroup surveys once enough demographic data had been accumulated to validate needed demographic groups. In some cases, demographic subgroups were not launched due to adequate demographics or time constraints.

2.3.2 Costs and speed

AMT reports that the average worker expects to make $6/hr. on average, but surveys that pay above this amount will be more popular and therefore complete faster. We decided to adopt a policy where 90% of respondents were paid at least $6/hr., which, given the typical distribution of completion times generally resulted in the median response-time worker earning $10-12/hr. As a rough guide, this translated into a price paid of approximately $0.25 per 10 questions asked (depending on complexity), with the average survey paying about $1.50. In most cases, we also paid a premium (up to double the base price) for some demographic subgroups, in order to increase the response rates of these surveys. Most surveys completed their targeted number of responses (see below) within 3 weeks of launching.

2.3.3 Target numbers of samples

We aimed for at least 2,500 final responses or ±1% accuracy for each targeted product survey, assuming normal binomial statistics (see Greenblatt et al., 2013 for more information). This accuracy level was partly driven by affordability; as we aimed to spend less than $5,000 per survey (including all demographic subgroups and discarded responses), at $1.50 per response, plus Amazon 10% overhead, we found that we could obtain approximately 3,000 gross responses within our per-survey budget.

2.4 Filtering

Several categories of responses resulted in exclusion from analysis:

- Non-qualified responses (did not own the required device or match the required demographics)
- Duplicate responses (worker ID found in more than one survey within the set)
- Responses with an excessive number of skipped questions (3-5, depending on the survey)
- Answered one or more cheater questions incorrectly

Finally, we made a limited number of modifications to the data when:

- Respondents e-mailed us with corrected data
- We identified misspelled brand names, etc. in the survey and made corrections

The resulting datasets were referred to as unweighted (filtered) data.

2.5 Demographic weighting

We developed two distinct approaches for weighting the demographic survey data. Both compared unweighted AMT demographic distributions to a reference dataset (e.g., RECS) and applied weights to make them resemble the reference distributions as closely as possible. To help with visualization, Figure 2 below provides a cartoon illustration showing the demographic variables as a cube that represents a larger, multi-dimensional "hypercube," where each dimension is one demographic variable, and each division of a given dimension represents a variable choice (e.g., for the number of occupants: 1, 2, 3, etc.).

One method ("sequential") applied weights based on distributions of single demographic variables one at a time in sequence, while the other method ("simultaneous") applied weights based on several demographic variables at the same time. A summary of each method is described below. For more information, including critical comparisons, see Greenblatt et al. (2013).

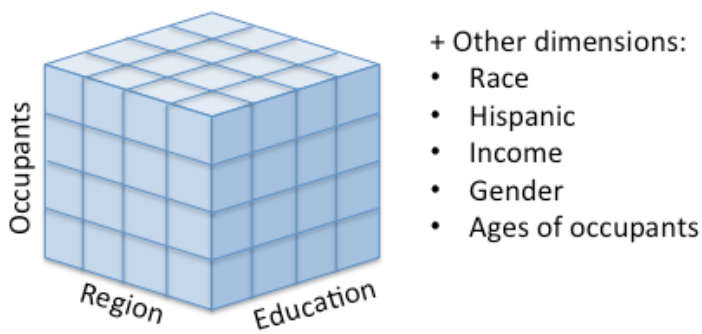

Figure 2. Cartoon representation of demographic variable "hypercube"

2.5.1 Sequential weighting method

In this sequential or iterative method, demographic distributions were compared on one demographic variable at a time, with weights assigned based on the ratio of population shares in the reference sample versus AMT. Weights were assigned to each response in that particular demographic category, and were then used to calculate demographic distributions for the next demographic variable, from which a second set of weights were assigned. This process then continued for each demographic variable under consideration (typically, eight variables). The procedure then repeated, iterating until the weight of each response changed by less than a threshold amount (usually set to 0.5%).

A cartoon illustration is shown below (demographic variables are not necessarily in the same order as implemented by the algorithm):

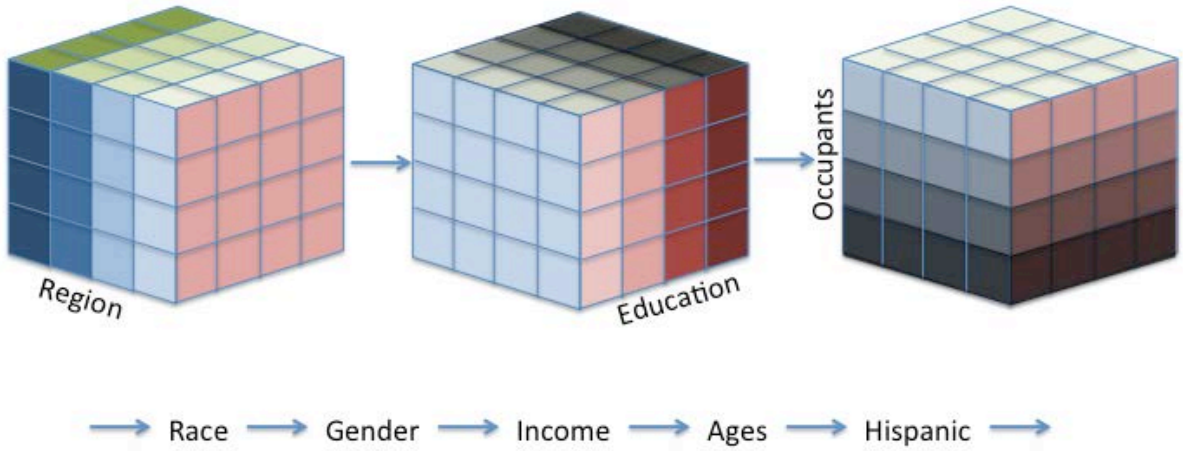

Figure 3. Cartoon illustration of the sequential demographic weighting method.

2.5.2 Simultaneous weighting method

In the simultaneous method, one begins as for the one-dimensional iterative method, with a single demographic group for which weights are calculated based on the reference population. The next step, however, is unlike the iterative method, because it adds a second demographic variable while retaining the first; e.g., the sample becomes more finely divided. For instance, the method usually begins with geographic region; once weights are calculated for each region, the sample is further subdivided by number of occupants, so that reference weights for a given geographic region *and* number of occupants is calculated. This process is then repeated with additional demographic variables until there are no reference samples that correspond. In the case where an AMT response is unknown (e.g., the respondent indicates "Don't know" or "Decline to state"), the method terminates for that response and retains its cumulative weight.

The order of the sequence was: region, number of occupants, race, number of 20-29 year olds, and education. The remaining variables were left unweighted. This selection of variables was the result of much experimentation and represents our optimum solution thus far. Further experimentation may improve results slightly, but is unlikely to result in a large improvement. These demographic variables were chosen as they correct the largest known biases in the AMT population. Region was chosen as the first variable as there was a valid answer for every survey response, (i.e., "Don't know/Decline to state"), ensuring every response had an initial weight. Number of occupants also had very few invalid answers, and corrected the proportion of "Under 20 year olds" in the age category. Experimentation with the order of the remaining variables determined that race was the most appropriate to weight next. When other variables, i.e., education, were placed before race, the correction to education was very similar to having it at the end, while the correction to race was significantly worse. The case was similar for the number of 20-29 year-olds category. This age group was chosen as its own category because it had a very strong bias, i.e., more than 50% of the unweighted AMT survey responses had at least one 20-29 year old, whereas in RECS less than 20% of households did. Income was left out, because education and income are highly correlated, thus correcting for one typically

corrects for the other, and education had fewer "Don't know/Decline to state" answers. Although there is a female bias in the AMT data, it is very slight and therefore was not explicitly addressed. Due to the finite number of responses in RECS, any additional demographic variables would subdivide the sample too finely, resulting in reference subsamples with few or no responses.

Figure 4 illustrates this process schematically.

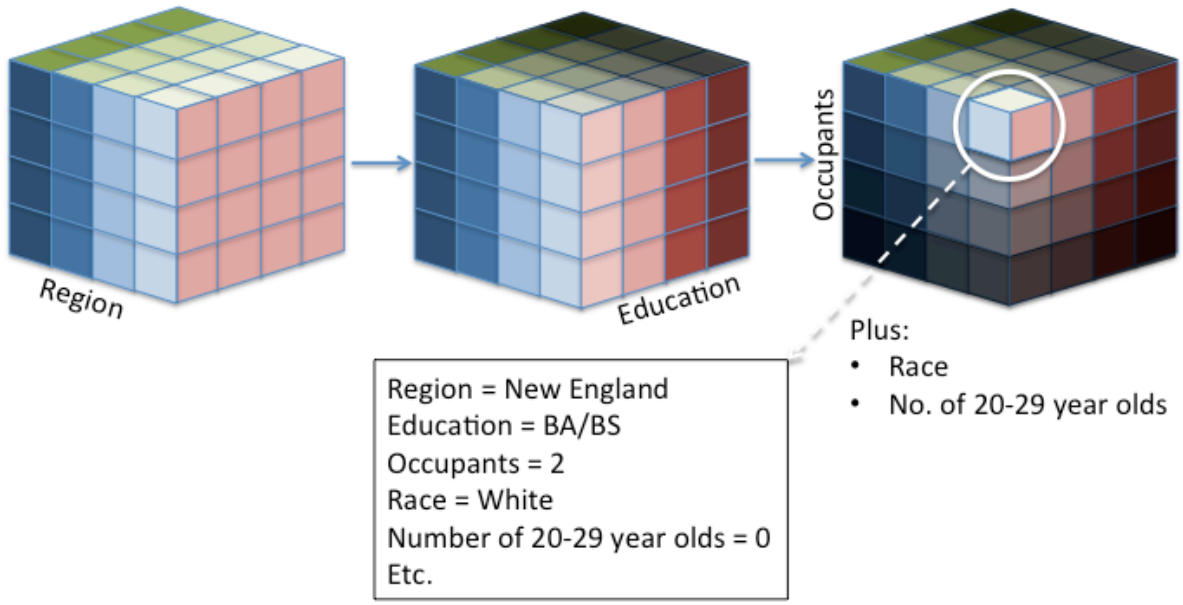

Figure 4. Cartoon illustration of the simultaneous demographic weighting method.

2.5.3 Weighting methods used for each survey

The weighting method used for each survey varied. For surveys targeting all U.S. households (RP2 and RP3), we used the RECS 2009 sample as our reference with over 12,000 data points, and the simultaneous weighting method that was previously demonstrated to provide superior results to the sequential weighting method (Greenblatt et al., 2013).

The remaining surveys (WC1, RI1 and NV1) were targeted at small U.S. sub-populations that owned specific refrigeration products (wine /beverage coolers, residential icemakers and non-vapor compression refrigeration products, respectively). Because these sub-populations did not necessarily have the same demographics as the U.S. population as a whole, we used the weighted RP2 and RP3 surveys as our reference sample, filtered by those households who indicated they owned the targeted refrigeration products. Although the total number of samples in RP2 and RP3 was large (almost 7,000 data points), the numbers of households with the targeted products were much lower (between 505 and 1,100 data points). As a result, the reference sample was unacceptably small for use with the simultaneous method, resulting in a large number (ca. 20%) of responses in the target

sample that had no corresponding demographic match in the reference sample. Therefore, we were only able to use the sequential method for these surveys.

Also, for the targeted-population surveys, we attempted to authenticate the brand and model numbers provided by respondents, to ensure that responses in the sample referred to actual targeted refrigeration products. For the WC1 survey, only 511 respondents (24%) provided such information, but out of the 402 positively-identified models, 96% were authenticated as wine/beverage coolers, so we were reasonably confident that the entire sample largely reflected actual wine/beverage cooler owners, and no filtering was performed (other than eliminating the 11 respondents who indicated that they did not own a wine/beverage cooler or left this question blank).

For the RI1 survey, nearly all respondents provided brand and model numbers, and 89% were positively identified, with 86% of that subset authenticated as residential icemakers. Because we had such a complete set of responses with brand and model number information, we chose to use only those responses with authenticated ownership, which provided us with over 800 final sample points.

For the NV1 survey, we separately analyzed refrigerator and freezer responses. For refrigerators, nearly all (>99%) respondents indicated they had such a product, 92% provided brand and model numbers, and 87% of those were positively identified. For this product, however, only 24% of positively identified responses were authenticated as non-vapor compression refrigerators, limiting this data sample to 161. For freezers, about 36% of respondents indicated they owned such a product, and 79% of those provided brand and model numbers. However, not a single response was positively identified as being a non-vapor compression freezer, so this data sample was empty.

For more information, see Table 2.

Table 2. Weighting methods of deployed surveys

Survey code	Description	Target population	Reference survey for weighting	Number of reference samples	Weighting method	Filtering	Number of clean survey samples
RP2	All refrigeration products, including wine/beverage coolers, residential icemakers and non-vapor compression products	All U.S. households	Full RECS 2009 sample	12,089	Simultaneous	None	3,010
RP3						None	3,850
WC1	Wine/beverage coolers	Wine/beverage cooler owners	RP2+RP3 wine/beverage cooler owner sub-sample	888	Sequential	Self-identified non-wine/beverage cooler owners	2,149
RI1	Residential icemakers	Residential icemaker owners	RP2+RP3 residential icemaker owner sub-sample	505	Sequential	Authenticated residential icemaker model numbers	811
NV1	Non-vapor compression refrigeration products	Non-vapor compression refrigeration product owners	RP2+RP3 non-vapor compression refrigeration product owner sub-sample	1,100	Sequential	Authenticated non-vapor compression refrigeration product model numbers	Refrigerators: 161 Freezers: 0
	Total						9.981

2.6 Calculation of confidence intervals

We define a "proportion" as the fraction of respondents answering with a specific response to a survey question. For instance, for Question 1 in the RP2 survey ("How many refrigerators are plugged in at your home right now?"), the proportion the response of "1" was 75%.

We used the normal approximation to the binomial distribution (Wikipedia, 2012a) to calculate the standard error for a single proportion as:

$$\sigma_x = \sqrt{\frac{p_x(1 - p_x)}{N}}$$

where

σ_x = standard error for a single proportion
p_x = a single proportion
N = the total number of responses in the sample

For instance, if p_x = 0.5 and N = 2,500, then σ_x = 0.01.

We calculated the lower and upper bounds of the confidence interval as:

$$lower\ bound = p_x - z\sigma_x$$

$$upper\ bound = p_x + z\sigma_x$$

The values $-z$ and z are the standard scores bracketing the desired probability in the center of the standard normal distribution (Wikipedia, 2012b, 2012c). For example, for a 95% confidence interval, z = 1.96 because –1.96 and 1.96 are the standard scores for which the standard normal cumulative distribution function equals 2.5% and 97.5%, respectively. The confidence interval values reported in Appendix A.1 are $z\sigma_x$, or half of the extent of the full confidence interval.

When more than two response values were possible, we used the Bonferroni correction (Bailey, 1980; Cherry, 1996; Wikipedia, 2012d) to create individual confidence intervals that result in a 95% confidence level across all responses within a group. We calculated the confidence level of individual confidence intervals as:

$$C_i = 1 - \frac{\alpha}{k}$$

where

$$\alpha = 1 - C_g$$

C_i = the confidence level of an individual interval
C_g = the group-wise confidence level (i.e., 95%)
k = the number of response values in a group

We refer to these as Bonferroni-corrected confidence intervals. These intervals provide a conservative estimate of the uncertainty in the quantities than the individual 95% confidence intervals.[8] Table 3 outlines the individual confidence levels and values of z used for selected numbers of response values.

Table 3. Details of the individual confidence intervals for selected numbers of response values

Number of response values (k)	Confidence level of individual intervals (C_i)	z-value
2	95.00%	1.9600
3	98.33%	2.3940
4	98.75%	2.4977
5	99.00%	2.5758
6	99.17%	2.6383
8	99.38%	2.7344
10	99.38%	2.7344
12	99.58%	2.8653
15	99.67%	2.9352
20	99.75%	3.0233

3 Results

Because of the large number of questions asked among the deployed surveys, we have chosen not to report all results here, but focus on those results considered most important for economic impact analyses. The Appendices provide results for all questions from each survey (except those with too few responses to be considered statistically valid), as well as the text of the surveys themselves.

A note about terminology: we use the term "penetration" to indicate the fraction of U.S. homes that have at least one targeted product, and "saturation" to indicate the average

[8] Some researchers have pointed out shortcomings with this approach, which are improved with more elaborate formulations, such as Bailey (1980). Cherry (1996) compared Bailey's method with the Bonferroni-adjusted binomial distribution and found important differences for $N < \sim 500$ and $k > \sim 10$, but results were almost indistinguishable otherwise. In our cases, we are within this latter regime for most questions, and take appropriate precautions when evaluating these results.

number of targeted products across U.S. homes; for products with high penetrations, the saturation can sometimes be greater than 100% (if the average number of products per home is greater than one), but the penetration can never be greater than 100%. The saturation divided by the penetration equals the average number of products found in homes with that product.

Also, all confidence intervals are reported at the 95% group level, using the normal approximation to the binomial distribution when only two choices are available, and the Bonferroni-corrected factor when there are three or more choices; see Section 2.6.

3.1 Wine/beverage coolers

3.1.1 Number in U.S. households

Two separate general population surveys (RP2 and RP3) were conducted that asked about the presence and numbers of wine/beverage coolers in households. The results were very consistent between the two surveys, ranging from penetrations of 9.1% to 11.1%; within the confidence intervals of each survey (approximately ±1.0%), the estimates agreed. The combined average penetration, consisting of 6,846.6 weighted responses, was 9.99%, with a confidence interval of ±0.71%. See Table 4 for more information.

Table 4. Penetration of wine/beverage coolers in U.S. households

Survey Code	Households with wine/beverage coolers	Total households*	Weighted Proportion	Confidence interval
RP2	335.15	3,008.31	11.14%	1.12%
RP3	348.70	3,838.30	9.08%	0.91%
Total	683.85	6,846.61	9.99%	0.71%

* Not including "Don't know" and blank responses.

We subsequently verified identities of wine/beverage coolers among respondents who provided brand and model number information (see Section 3.1.4 below), and found a false positive rate of 4.1±1.9%. We therefore multiplied our estimates by 0.959±0.019 to correct for this bias, giving a household penetration of 9.58±0.74%. Given the Annual Energy Outlook 2012 estimate of 116.1 million households (EIA, 2012), the number of households with wine/beverage coolers was estimated to be 11.12±0.86 million.

The RP2, RP3 and WC1 surveys also asked wine/beverage cooler households how many units they had. More than 90% of households reported having only one; see Table 5 for more information. The average number per household was 1.109±0.027, giving a household saturation of 10.62±0.86%. Combined with the above information on total numbers of households with wine/beverage coolers, the estimated total number of wine/beverage coolers in U.S. households was 12.33±1.00 million.

Table 5. Number of wine/beverage coolers in U.S. households

Survey Code	Total weighted responses	Number of wine/beverage coolers					Average number per household	Confidence interval
		1	2	3	4 (4+)*	5+		
RP2	335.15	96.51%	2.94%	0.37%	0.00%	0.18%	1.044	0.051
RP3	348.70	93.22%	5.78%	0.66%	0.17%	0.17%	1.083	0.067
WC1	2,149.00	90.74%	7.30%	0.85%	1.11%	N/A	1.123	0.033
Total*	2,832.85	91.73%	6.60%	0.77%	0.90%	N/A	1.109	0.027

* Since the WC1 survey did not provide a response of five or more wine/beverage coolers, we have consolidated the total to reflect this lack of information.

3.1.2 Primary use and capacities

The WC1 survey asked whether people used their wine/beverage cooler primarily to store wine, beer or soda, or something else, as the answer affected how the user subsequently indicated capacity. Results for this "primary use" question were as follows:

Table 6. Primary use of wine/beverage cooler (Question 2, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Wine	1194	1276.28	59.39%	59.55%	2.54%
Beer or soda	913	814.26	37.89%	37.99%	2.51%
Something else	39	52.62	2.45%	2.46%	0.80%
Total of known responses	2146	2143.15	NA	100.00%	NA
Don't know	1	0.67	0.03%	NA	NA
Blank	2	5.18	0.24%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Wine/beverage cooler capacities were filtered by primary use. Because the proportion of responses that answered neither "wine" nor "beer or soda" was very small (2.5%), we ignored these responses in analyzing capacity distributions.

Table 7. Capacities of wine/beverage coolers who primary use units for storing wine (Question 3, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
1-11 bottles	420	431.96	33.85%	34.95%	3.71%
12-19 bottles	377	425.35	33.33%	34.42%	3.70%
20-29 bottles	218	226.56	17.75%	18.33%	3.01%

30-39 bottles	74	81.16	6.36%	6.57%	1.93%
40-49 bottles	31	31.68	2.48%	2.56%	1.23%
50-59 bottles	20	25.29	1.98%	2.05%	1.10%
60-89 bottles	4	2.23	0.17%	0.18%	0.33%
90+ bottles	10	11.60	0.91%	0.94%	0.75%
Total of known responses	1154	1235.84	NA	100.00%	NA
Don't know	7	5.24	0.41%	NA	NA
Blank	33	35.20	2.76%	NA	NA
Total	1194	1276.28	100.00%	NA	NA

Table 8. Capacities of wine/beverage coolers who primary use units for storing beer or soda (Question 4, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval***
1-11 bottles	52	58.33	7.16%	7.71%	2.65%
12-19 bottles	184	161.28	19.81%	21.32%	4.07%
20-29 bottles	234	184.19	22.62%	24.34%	4.27%
30-39 bottles	131	114.72	14.09%	15.16%	3.57%
40-49 bottles	92	93.70	11.51%	12.38%	3.27%
50-59 bottles	48	37.32	4.58%	4.93%	2.15%
60-89 bottles	45	53.01	6.51%	7.01%	2.54%
90+ bottles	45	54.05	6.64%	7.14%	2.56%
Total of known responses	831	756.60	NA	100.00%	NA
Don't know	21	15.07	1.85%	NA	NA
Blank	61	42.59	5.23%	NA	NA
Total	913	814.26	100.00%	NA	NA

We converted these capacity measurements into common units (cubic feet) so that they could be combined to produce an overall capacity distribution. This was accomplished through the use of capacity-volume regressions using available data from manufacturer websites. Separate regressions were developed for wine chillers (capacity in number of 750-mL wine bottles) and beverage centers (capacity in number of 12-oz. beer or soda cans), shown in Figure 5 and Figure 6. We forced both regressions to have a zero intercept to simplify the fits, though fits are very similar without this constraint. Regression results are shown in Table 9.

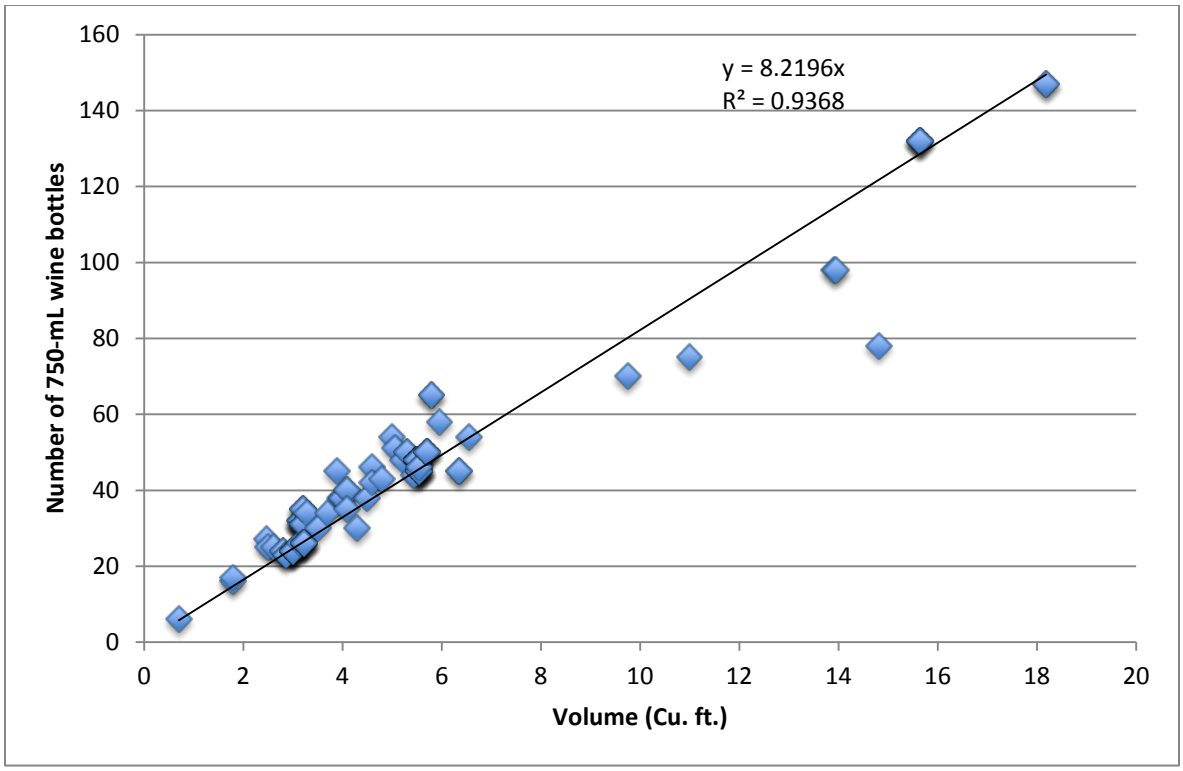

Figure 5. Capacity-volume regression for wine chillers (Source: manufacturer websites)

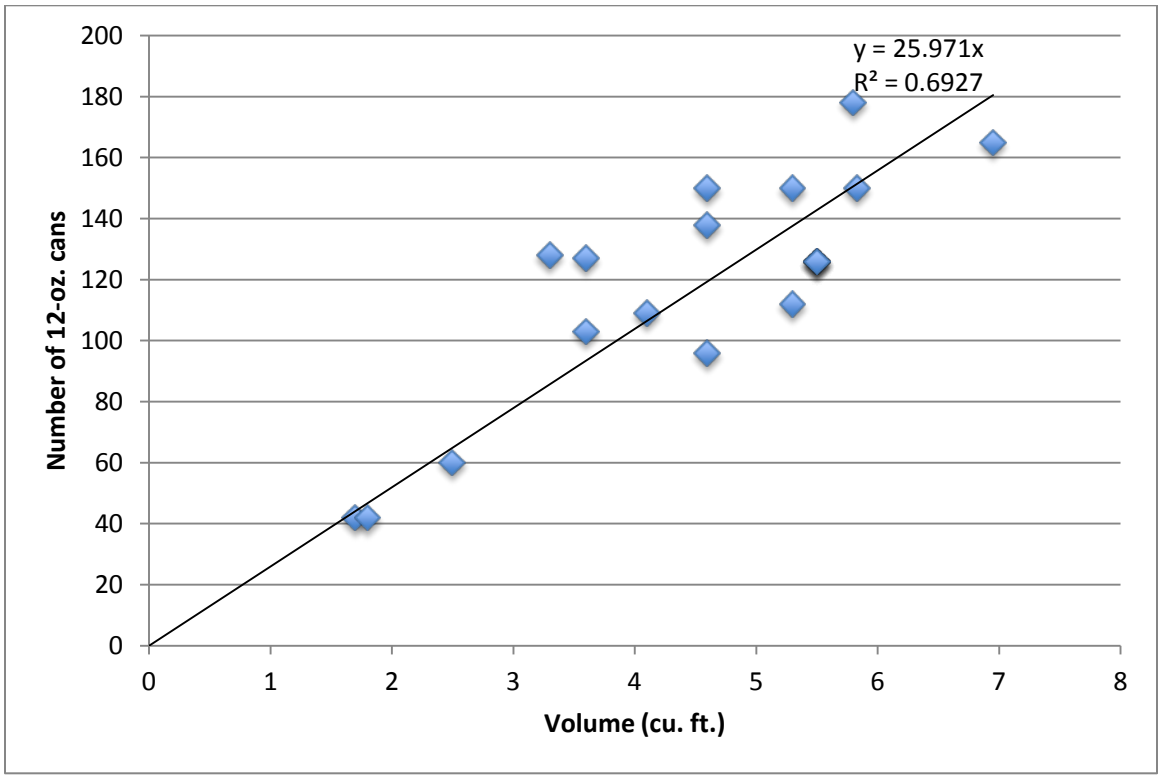

Figure 6. Capacity-volume regression for beverage centers (Source: manufacturer websites)

Table 9. Capacity-volume regression results for wine chillers and beverage centers

Parameter	Wine chillers	Beverage centers
Units	750-mL wine bottles	12-oz. beer or soda cans
Number of data points	107	19
Slope (bottles or cans per cu. ft.)	8.22	25.97
R^2	0.937	0.693

The resulting cumulative proportions of capacities are shown in Figure 7, and combined capacity distributions are shown in Table 10. Note there is a larger uncertainty for the 20-29 and 30-39 bottle categories due to an ambiguity in the number of equivalent wine bottles that correspond to the "90+ bottles" capacity for units used primarily for beer or soda. We have assigned half of this proportion (1.37%) to each category.

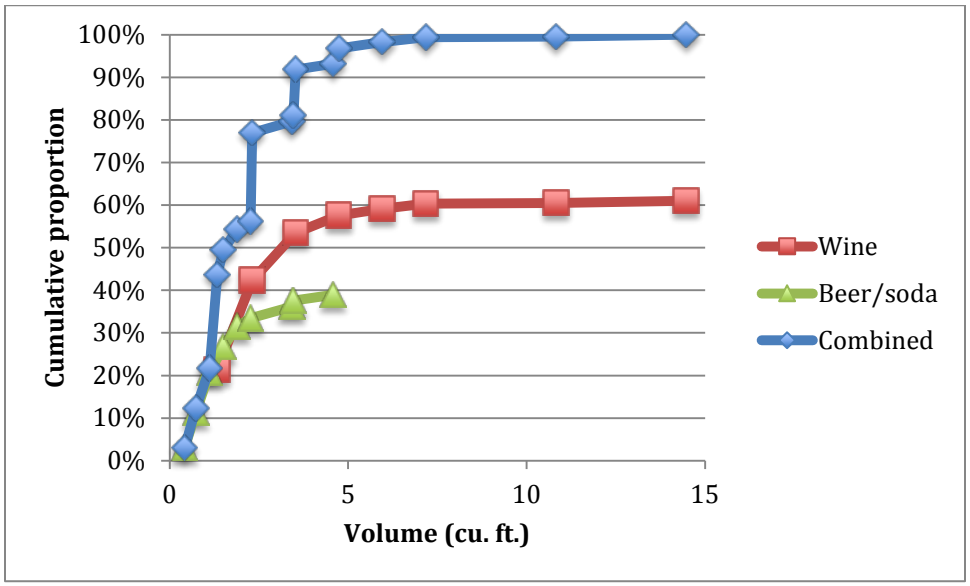

Figure 7. Cumulative proportions of wine/beverage cooler capacities by primary use (wine and beer/soda), and combined primary use

Table 10. Combined capacity distribution of wine/beverage coolers

Wine bottle capacity range	Maximum volume (cu. ft.)	Proportion of total	Confidence interval
1-11 bottles	1.34	43.68%	3.57%
12-19 bottles	2.31	33.23%	3.15%
20-29 bottles	3.53	14.90%	1.71%
30-39 bottles	4.74	4.94%	2.58%
40-49 bottles	5.96	1.51%	1.35%
50-59 bottles	7.18	1.12%	0.75%
60-89 bottles	10.83	0.14%	0.64%
90+ bottles	14.48	0.48%	0.23%
Total of known responses		100.00%	

In subsequent sections, when we refer to a capacity in terms of number of wine bottles, we are implicitly including wine/beverage coolers used primarily for beer or soda as well, using the conversion factors from Table 9 to obtain the equivalent number of wine bottles.

3.1.3 Refrigeration technology

The RP2 and WC1 surveys asked about the refrigeration technology of wine/beverage coolers in households. Approximately 30% of respondents in both surveys indicated that they had a non-vapor compression (thermoelectric or absorption) wine/beverage cooler, but another 30-47% of respondents admitted that they did not know. See Table 11.

Table 11. Reported refrigeration technology

Survey Code	Total weighted responses	Proportions				
		Vapor compress-ion	Thermo-electric	Absorp-tion	Thermo-electric or Absorp-tion	Don't know or blank
RP2	336.61	44.16%	N/A	N/A	26.35%	29.53%
WC1	2,149.00	20.56%	30.10%	2.68%	32.78%	46.67%
Total	2,485.61	23.76%	N/A	N/A	31.91%	44.33%

For the WC1 survey, we were able to further disaggregate the refrigeration technology by primary use and capacity. We binned the capacities by primary use such that they could be combined in terms of similar capacity (in cu. ft.) into an overall disaggregation independent of primary use. See Table 12 for details.

Table 12. Reported refrigeration technology by primary use and capacity

Primary use	Capacity		Total weighted responses	Respondent-indicated technology type			
	Number of bottles	Cu. ft.		Vapor compress-ion	Thermo-electric	Absorp-tion	Don't know or blank
				Weighted proportion			
Wine	1-19	0.1 to 2.3	857.31	15.51%	38.59%	2.81%	43.09%
	20-29	2.3 to 3.5	226.56	24.62%	40.02%	1.74%	33.63%
	30+	3.5+	151.96	14.61%	32.62%	4.34%	48.43%
Beer or soda	1-59	0.0 to 2.3	649.54	24.47%	18.89%	2.76%	53.88%
	60-89	2.3 to 3.4	53.01	35.44%	8.12%	0.30%	56.14%
	90+	3.4+	54.05	41.60%	10.16%	4.88%	43.36%
Total	1-19 (wine)	0.1 to 2.3	1506.85	19.38%	30.10%	2.79%	47.74%
	20-29 (wine)	2.3 to 3.5	279.57	26.67%	33.97%	1.46%	37.89%
	30+ (wine)	3.5+	206.02	21.69%	26.73%	4.49%	47.10%
				Confidence interval			

Wine	1-19	0.1 to 2.3		3.09%	4.15%	1.41%	4.22%
	20-29	2.3 to 3.5		7.15%	8.13%	2.17%	7.84%
	30+	3.5+		7.16%	9.50%	4.13%	10.13%
Beer or soda	1-59	0.0 to 2.3		4.21%	3.84%	1.61%	4.89%
	60-89	2.3 to 3.4		16.41%	9.37%	1.89%	17.02%
	90+	3.4+		16.75%	10.27%	7.32%	16.84%
Total	1-19 (wine)	0.1 to 2.3		2.54%	2.95%	1.06%	3.21%
	20-29 (wine)	2.3 to 3.5		6.61%	7.07%	1.79%	7.25%
	30+ (wine)	3.5+		7.17%	7.70%	3.60%	8.69%

Because of the large differences in the proportions of refrigeration technologies between the RP2 and WC1 surveys, as well as the large number of "Don't know" and blank responses, we subsequently examined reported brand and model numbers to verify the reported refrigeration technologies (see Section 3.1.4). We found that many of the reported refrigeration technologies were incorrect, so we applied probabilities based on the reported refrigeration technology and capacity to arrive at final estimates of the proportions of wine/beverage cooler refrigeration technologies, which are summarized in Table 13. We found that across capacity sizes, 15% of wine/beverage coolers use vapor compression technology, and 85% use thermoelectric technology. We found no evidence for absorption cooling-based wine/beverage coolers (see Section 3.1.4).

Table 13. Reported wine/beverage cooler refrigeration technology from weighted WC1 survey response, and estimated technology type by capacity size

Capacity (number of wine bottles)	Estimated technology type	Survey response				
		Vapor compres-sion	Thermo-electric	Absorp-tion	Don't know or blank	Total
1-19	Vapor compression	3.1%	0.0%	0.8%	1.6%	5.6%
	Thermoelectric	15.7%	32.1%	2.5%	44.1%	94.4%
20-29	Vapor compression	11.1%	4.6%	0.8%	8.1%	24.6%
	Thermoelectric	16.6%	27.5%	0.8%	30.6%	75.4%
30+	Vapor compression	24.8%	18.3%	3.3%	40.6%	87.1%
	Thermoelectric	1.4%	3.7%	0.0%	7.9%	12.9%
Total*	Vapor compression	6.1%	2.2%	1.0%	5.8%	15.1%
	Thermoelectric	14.7%	29.1%	2.0%	39.1%	84.9%

* Weighted by proportions of wine/beverage cooler capacities from Table 10.

3.1.4 Brand/model number verification

Of the 2,149 survey responses, 511 (24%) provided brand and model numbers that we used to verify whether units were actually wine/beverage coolers, and if so what type of refrigeration technology was employed. See Table 14.

Table 14. Unweighted number of reported versus identified wine/beverage cooler refrigeration technologies

Manufacturer website information	Survey response				
	Vapor compression	Thermo-electric	Absorption	Don't know/blank	Total
Vapor compression	40	32	5	51	128
Thermoelectric	27	144	4	91	266
Absorption	0	0	0	0	0
Not wine/beverage cooler	6	6	0	5	17
Unidentified	22	28	2	48	100
Total	95	210	11	195	511

We found 17 responses, or 4.1% of the 411 units that were positively identified, were not wine/beverage coolers (they were either refrigerators, or in one case, a printer). The confidence interval on this estimate was ±1.9%. Therefore, in the estimates of wine/beverage cooler penetration in homes in Section 3.1.1, we adjusted our estimates by 0.959±0.019.

We found that users were not very accurate in identifying the type of refrigeration technology of their wine/beverage coolers: only 42% of units reported as vapor compression were actually verified as such, while 69% of thermoelectric units, and 0% of absorption units were similarly verified. Overall, we found that about one-third of total units were in fact vapor compression, two-thirds were thermoelectric, and none were absorption. As a result, we did not include absorption technology in subsequent analysis.

Moreover, we found that the relationship between survey response and actual refrigeration technology varied strongly as a function of capacity, as shown in Table 15. Among the smallest-capacity units (<20 wine bottles), virtually all units (96%) were found to be thermoelectric, with the balance being vapor compression. For mid-range capacity units (20-29 wine bottles), 80% were thermoelectric, and for the largest-capacity units (≥30 wine bottles), only 14% were thermoelectric. This transition occurred very rapidly at a capacity of 30 wine bottles.

Table 15. Reported versus identified small-capacity (<20 bottle) wine/beverage cooler refrigeration technology, as fraction of identified units

Manufacturer website information	Survey response				
	Vapor compression	Thermo-electric	Absorption	Don't know/blank	Total
Small capacity (1-19 bottles)					
Vapor compression	16.7%	0.0%	25.0%	3.5%	3.8%
Thermoelectric	83.3%	100.0%	75.0%	96.5%	96.2%
Total (N = 183)	100.0%	100.0%	100.0%	100.0%	100.0%
Medium capacity (20-29 bottles)					

Vapor compression	40.0%	14.3%	50.0%	21.1%	20.2%
Thermoelectric	60.0%	85.7%	50.0%	78.9%	79.8%
Total (N = 99)	100.0%	100.0%	100.0%	100.0%	100.0%
Large capacity (30+ bottles)					
Vapor compression	94.7%	83.3%	100.0%	83.8%	86.4%
Thermoelectric	5.3%	16.7%	0.0%	16.2%	13.6%
Total (N = 81)	100.0%	100.0%	100.0%	100.0%	100.0%

These proportions were applied to the reported refrigeration technologies in the full WC1 survey, as discussed in Section 3.1.3.

3.1.5 Product lifetime

WC1 asked whether the most-used wine/beverage cooler was bought new; about 65% reported they were; see Table 16.

Table 16. Proportion of wine/beverage coolers bought new (Question 13, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	1281	1354.94	63.05%	65.75%	2.34%
No	755	705.90	32.85%	34.25%	2.34%
Total of known responses	2036	2060.84	NA	100.00%	NA
Don't know	105	75.11	3.50%	NA	NA
Blank	8	13.05	0.61%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

The WC1 survey also asked how old the wine/beverage cooler was if it was bought new. About 48% of valid responses indicated they were less than 2 years old, and 91% indicated they were less than 5 years old. See Table 17 for more information.

Table 17. Age of wine/beverage coolers bought new (Question 16, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 1 year ago	288	300.82	22.20%	22.44%	3.20%
At least 1 but less than 2 years ago	335	330.03	24.36%	24.62%	3.30%
At least 2 but less than 3 years ago	313	311.04	22.96%	23.20%	3.24%
At least 3 but less than 4 years ago	142	168.50	12.44%	12.57%	2.54%
At least 4 but less than 5 years	75	103.24	7.62%	7.70%	2.04%

ago					
At least 5 but less than 6 years ago	48	47.87	3.53%	3.57%	1.42%
At least 6 but less than 8 years ago	32	45.83	3.38%	3.42%	1.39%
At least 8 but less than 10 years ago	15	13.52	1.00%	1.01%	0.77%
At least 10 but less than 15 years ago	13	13.03	0.96%	0.97%	0.75%
At least 15 years ago or more	4	6.78	0.50%	0.51%	0.54%
Total of known responses	1265	1340.66	NA	100.00%	NA
Don't know	10	7.61	0.56%	NA	NA
Blank	6	6.66	0.49%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

We also examined whether the wine/beverage cooler was the first one the respondent had owned, or if it was a replacement, upgrade or additional unit. Table 18 indicates that nearly 90% of respondents had purchased for the first time.

Table 18. First-time wine/beverage cooler purchases (Question 18, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
The first one you (or the homeowner) have owned?	1880	1853.19	86.24%	87.56%	1.79%
A replacement of the same type of wine/beverage cooler that you (or the homeowner) owned before?	84	91.71	4.27%	4.33%	1.11%
An upgrade to the wine/beverage cooler you (or the homeowner) owned before?	115	126.20	5.87%	5.96%	1.29%
An additional wine/beverage cooler to the one you (or the homeowner) still own?	39	45.42	2.11%	2.15%	0.79%
Total of known responses	2118	2116.53	NA	100.00%	NA
Don't know	25	23.70	1.10%	NA	NA
Blank	6	8.77	0.41%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Because almost 90% of participants indicated that theirs was the first wine/beverage cooler they had owned, there was a concern that the age distribution might have been skewed toward newer units and thus younger average ages. To correct for this possibility,

we also examined the age distribution for the subset of respondents for whom this was not the first wine/beverage cooler they had owned. We found that fewer responses (35%) than in the full data sample indicated that units were less than 2 years old, but the same proportion (91%) indicated they were less than 5 years old. See Table 19.

Table 19. Age of wine/beverage coolers among those whom the unit was not the first one owned (Question 16, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 1 year ago	23	31.20	17.88%	18.06%	8.21%
At least 1 but less than 2 years ago	33	29.02	16.63%	16.80%	7.98%
At least 2 but less than 3 years ago	49	49.80	28.54%	28.82%	9.67%
At least 3 but less than 4 years ago	20	20.65	11.84%	11.95%	6.93%
At least 4 but less than 5 years ago	13	26.00	14.90%	15.04%	7.63%
At least 5 but less than 6 years ago	5	5.76	3.30%	3.33%	3.83%
At least 6 but less than 8 years ago	6	4.76	2.73%	2.76%	3.50%
At least 8 but less than 10 years ago	1	0.60	0.35%	0.35%	1.26%
At least 10 but less than 15 years ago	4	4.98	2.85%	2.88%	3.57%
At least 15 years ago or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	154	172.79	NA	100.00%	NA
Don't know	2	1.70	0.97%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	156	174.49	100.00%	NA	NA

We used the above information combined with NPD data on shipments of wine/beverage coolers in recent years to construct a survival function.

The survival function was assumed to have the form of a cumulative Weibull distribution.

The Weibull distribution is a probability distribution commonly used to measure failure rates. Its form is similar to an exponential distribution, which models a fixed failure rate, except that a Weibull distribution allows for a failure rate that changes over time in a particular fashion. The cumulative Weibull distribution takes the form:

$$P(x) = e^{-\left(\frac{x-\theta}{\alpha}\right)^{\beta}} \text{ for } x > \theta$$
$$P(x) = 1 \text{ for } x \leq \theta$$

where:

P(x) = probability that the appliance is still in use at age x,
x = appliance age
α = scale parameter, which would be the decay length in an exponential distribution,
β = shape parameter, which determines the way in which the failure rate changes through time, and
θ = delay parameter, which allows for a delay before any failures occur.

When β = 1, the failure rate is constant over time, giving the distribution the form of a cumulative exponential distribution. For many appliances, β is greater than 1, reflecting an increasing failure rate as appliances age; however, it can be less than one depending on the range of quality of products.

This method incorporates several assumptions:

- Appliance lifetime can be modeled by a survival function, and in particular, a Weibull distribution. This type of distribution is the standard one use in lifetime analyses, but it is not guaranteed to reflect actual real-world behavior.
- The appliance survival function does not change through time (e.g., as product design or user behaviors evolve)
- The survival function is independent of other household factors, such as household size or geographic region
- Survey respondents neither systematically overestimated nor underestimated the current age of their appliance
- The delay parameter is limited to between 1 and 5 years, to reflect the range of common appliance warranties. A delay of less than 1 year would imply that some appliances fail or are replaced within their first year of use. A delay of more than 5 years would imply that no appliances are replaced for some time after the end of the longest standard warranty.

First we fit the full dataset (data in Table 17) using relative shipment data from NPD for 2005-2011, and obtained a reasonably good fit to the cumulative age distribution, with an average lifetime of 4.0 years. See Figure 8.

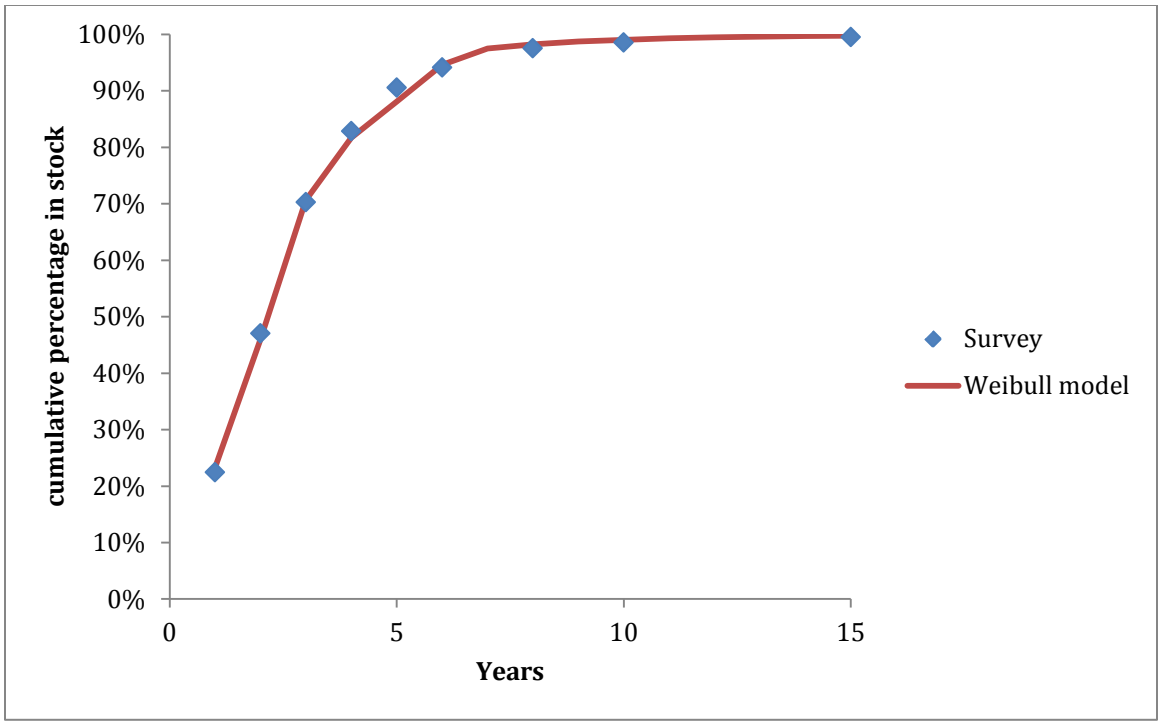

Figure 8. Fit to full wine/beverage cooler age dataset, assuming NPD relative shipments from 2005-2011

However, although the NPD data showed that the shipments peaked in 2007, then decreased by nearly 50% in 2008, continuing to decrease in subsequent years, perhaps reflecting the economic downturn in 2008, other evidence indicates that NPD data may be capturing only a very small portion of actual wine/beverage cooler sales, and therefore may not be representative of overall trends. We therefore also investigated fitting using a flat shipments assumption. In fact, the results gave a better overall fit and we obtained a slightly longer average lifetime (4.3 years). See Figure 9.

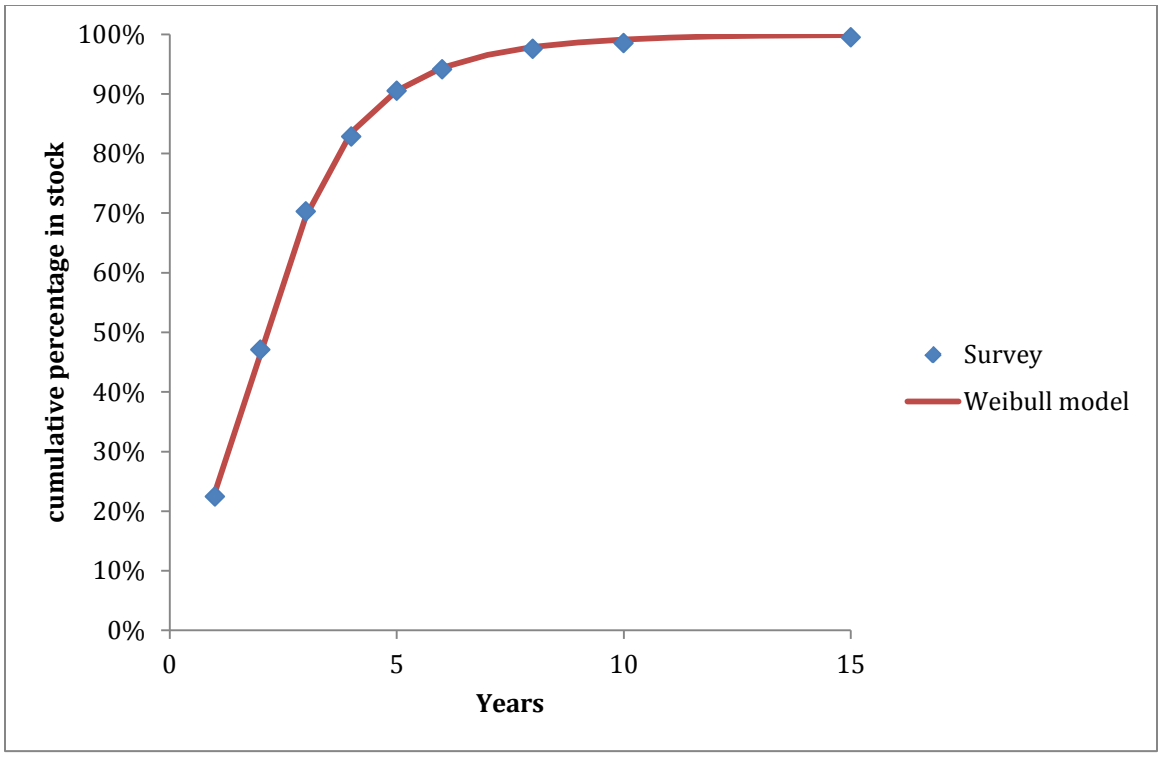

Figure 9. Fit to full wine/beverage cooler dataset, assuming flat shipments

Next, we fit data for non-first-time buyers only (data in Table 19), using both the NPD and flat shipment assumptions. Here the function fit the data decidedly somewhat worse, but this was partly due to the smaller number of samples involved. Optimal lifetimes were also somewhat longer (4.7 and 5.1 years, respectively). See Figure 10 and Figure 11.

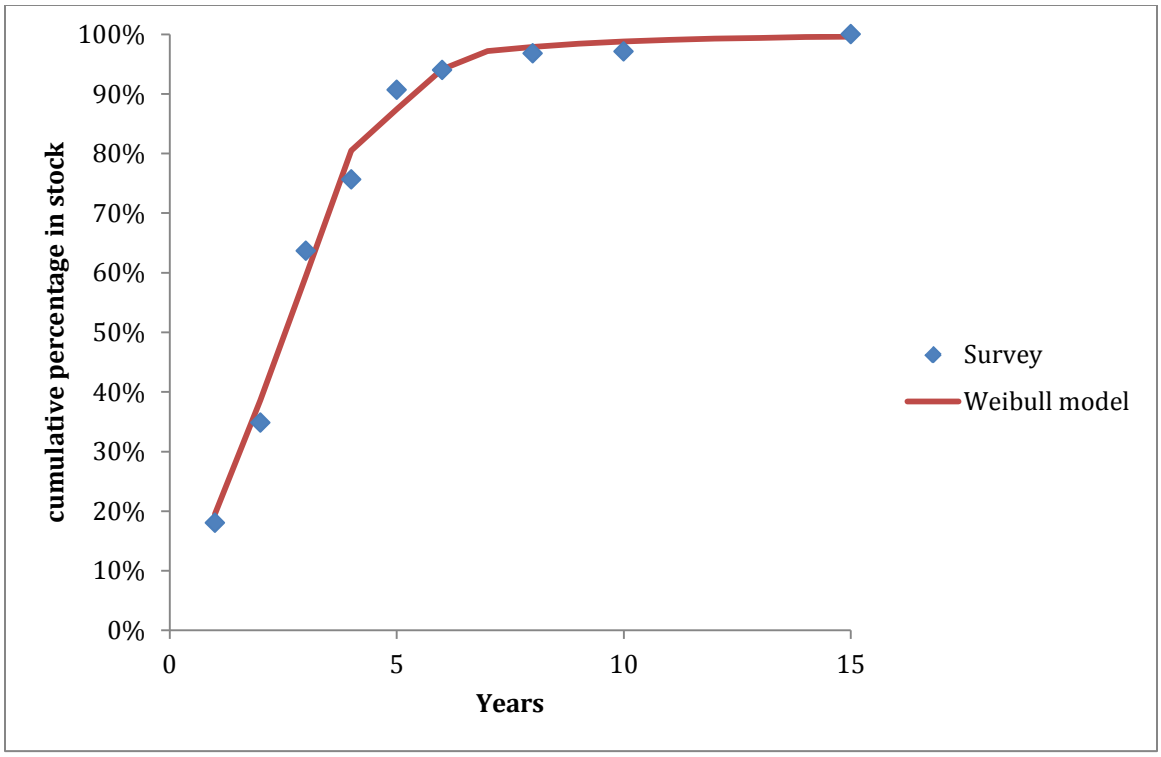

Figure 10. Fit to non-first-time wine/beverage coolers buyers, assuming NPD relative shipments from 2005-2011

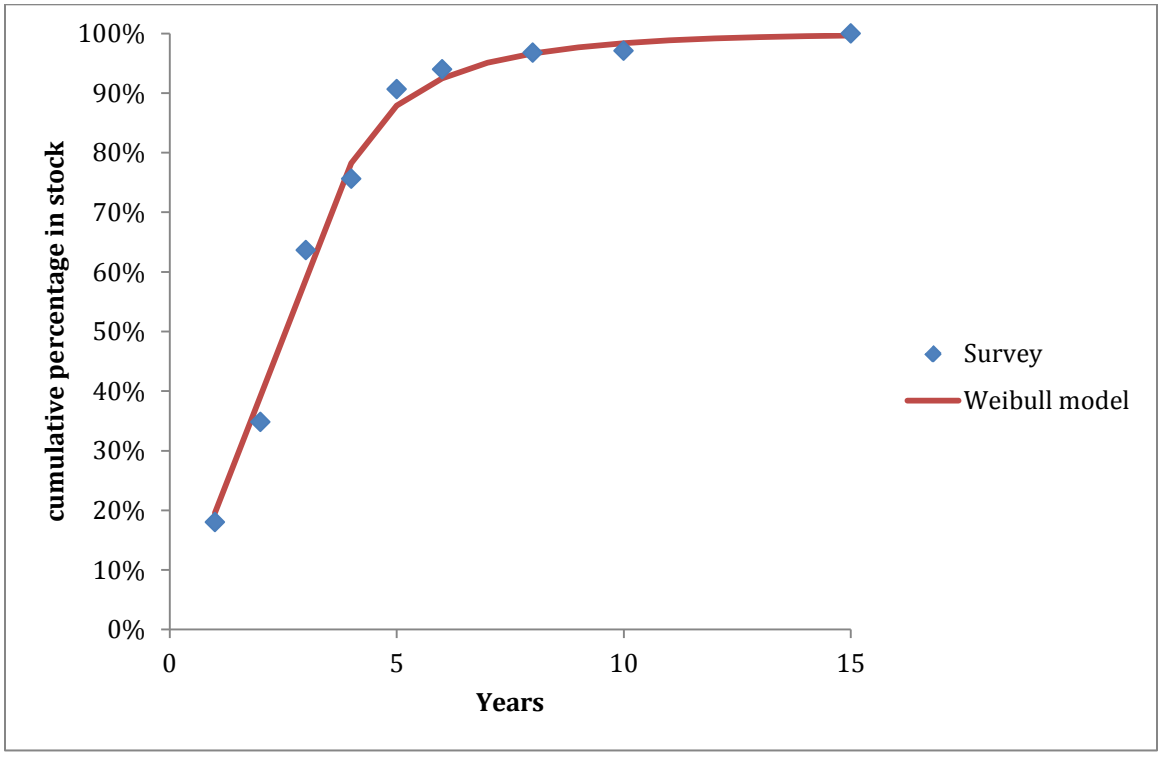

Figure 11. Fit to non-first-time wine/beverage coolers buyers, assuming flat shipments

A summary of fitting parameters is shown in Table 20. Given the range of lifetimes obtained via the different fitting approaches and our agnostic view as to which fit is most

appropriate for wine/beverage coolers, we recommend using an average lifetime from these fits (4.5 years).

Table 20. Summary of fitting parameters for wine/beverage cooler lifetime estimation

Dataset	Shipments	Offset (years)	Beta	Alpha	Lifetime (years)
All	NPD	3.5	0.60	0.70	4.00
All	flat	3.5	0.80	1.20	4.32
Non-1st time owners	NPD	4.0	0.55	0.60	4.72
Non-1st time owners	flat	4.5	0.65	0.85	5.11
Average					4.5

Table 21 shows the results of the lifetime equation for wine/beverage coolers, using all survey respondents, assuming both NPD sales and flat sales. There are three columns for each sales assumption. The first column shows the fraction of all products purchased in year 0, which are retired for the given number of years since purchase. The second column shows the fraction of total products that continue to be used or "survive." The third column shows the fraction of the remaining stock that continues to be used. The results show that all products survive the first three years, in keeping with the calculated lifetime. For NPD sales data, the survival rate drops dramatically after this time to around 44%, and continues to drop steadily reaching less than 10% after 7 years, and less than 1% after 13 years. For the flat sales assumption, the survival rate initially decreases less dramatically to 61% in the 4th year. However, after this it decreases more rapidly, also reaching less than 10% after 7 years, and then reaching less than 1% after only 11 years.

The fraction surviving to next year column indicates that the fraction of remaining stock that will continue to survive will increase over time, due to the beta value being less than 1. This is most likely due to variation in quality of available products. While many products have a relatively short lifetime of around 4 years, it appears there are some higher quality products available which have a much longer useful life.

Table 21: Results of the lifetime data equation for wine/beverage coolers using all survey responses

	NPD sales, all data			Flat sales, all data		
Years since purchase	Fraction retiring	Fraction surviving	Fraction surviving to next year	Fraction retiring	Fraction surviving	Fraction surviving to next year
1	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%
2	0.00%	100.00%	100.0%	0.00%	100.00%	100.0%
3	0.00%	100.00%	100.0%	0.00%	100.00%	100.0%
4	55.83%	44.17%	44.2%	39.13%	60.87%	60.9%
5	23.56%	20.60%	46.6%	30.61%	30.26%	49.7%
6	8.91%	11.69%	56.7%	13.71%	16.55%	54.7%
7	4.46%	7.23%	61.9%	7.05%	9.49%	57.4%
8	2.52%	4.72%	65.2%	3.87%	5.62%	59.2%

9	1.53%	3.19%	67.7%	2.22%	3.40%	60.6%
10	0.97%	2.22%	69.5%	1.30%	2.10%	61.7%
11	0.64%	1.58%	71.1%	0.79%	1.31%	62.6%
12	0.44%	1.14%	72.4%	0.48%	0.83%	63.4%
13	0.30%	0.84%	73.4%	0.30%	0.53%	64.0%
14	0.21%	0.62%	74.4%	0.19%	0.34%	64.6%
15	0.15%	0.47%	75.2%	0.12%	0.22%	65.2%
16	0.11%	0.36%	75.9%	0.08%	0.15%	65.7%
17	0.08%	0.27%	76.6%	0.05%	0.10%	66.1%
18	0.06%	0.21%	77.2%	0.03%	0.06%	66.5%
19	0.05%	0.16%	77.8%	0.02%	0.04%	66.9%
20	0.04%	0.13%	78.3%	0.01%	0.03%	67.2%

Table 22 shows the results of the lifetime equation excluding first time buyers. As explained above the average lifetime is higher in this case, and this is shown in the fraction surviving being 100 for the first four years. After four years the drop in survival rate is higher than in Table 21, with NPD survival rate dropping to 27% and the flat sales survival rate dropping to just under 50%. Both survival rates continue to decrease rapidly with NPD reaching less than 10% after 7 years and flat sales after 8 years. Both survival rates drop below 1% after 14 years.

Similar to the results in Table 21, the fraction surviving to next year increases over time.

Table 22: Results of the lifetime data equation for wine coolers excluding first time buyers

	NPD sales, excluding first time buyers			Flat sales, excluding first time buyers		
Years since purchase	Fraction retiring	Fraction surviving	Fraction surviving to next year	Fraction retiring	Fraction surviving	Fraction surviving to next year
1	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%
2	0.00%	100.00%	100.0%	0.00%	100.00%	100.0%
3	0.00%	100.00%	100.0%	0.00%	100.00%	100.0%
4	0.00%	100.00%	100.0%	0.00%	100.00%	100.0%
5	73.40%	26.60%	26.6%	50.75%	49.25%	49.2%
6	12.21%	14.38%	54.1%	25.71%	23.54%	47.8%
7	5.52%	8.86%	61.6%	10.22%	13.32%	56.6%
8	3.01%	5.85%	66.0%	5.18%	8.13%	61.1%
9	1.81%	4.04%	69.0%	2.92%	5.21%	64.1%
10	1.16%	2.88%	71.3%	1.76%	3.45%	66.3%
11	0.78%	2.10%	73.1%	1.11%	2.35%	68.0%
12	0.54%	1.57%	74.5%	0.72%	1.63%	69.4%
13	0.38%	1.19%	75.7%	0.48%	1.15%	70.5%

14	0.28%	0.91%	76.8%	0.33%	0.82%	71.5%
15	0.20%	0.71%	77.7%	0.23%	0.59%	72.4%
16	0.15%	0.55%	78.4%	0.16%	0.44%	73.2%
17	0.12%	0.44%	79.2%	0.11%	0.32%	73.9%
18	0.09%	0.35%	79.8%	0.08%	0.24%	74.5%
19	0.07%	0.28%	80.4%	0.06%	0.18%	75.1%
20	0.05%	0.23%	80.9%	0.04%	0.14%	75.6%

Although the results with first time buyers excluded provide an interesting comparison to the full data set, it is recommended that the full data set be used in favor of this due to the smaller sample size. Of the two different sales assumptions, the flat assumption is recommended in favor of the NPD sales due to the better fit with the survey data and lack of confidence that the NPD data reflects a more realistic overall trend than a flat sales assumption.

3.1.6 Purchase price and installation cost

The distribution of purchase prices of wine/beverage coolers is shown in Table 23. The prices varied over a wide range, with a median price of approximately $200, and 91% under $800. The price distributions are further disaggregated by capacity and compared to NPD price data in the Discussion (Section 4.3).

Table 23. Distribution of purchase prices of wine/beverage coolers, not including rebates (Question 14, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to $25	3	12.63	0.93%	0.99%	0.86%
Between $26 and $50	19	20.32	1.50%	1.59%	1.08%
Between $51 and $75	57	51.02	3.77%	4.00%	1.69%
Between $76 and $100	105	119.92	8.85%	9.40%	2.52%
Between $101 and $125	151	138.36	10.21%	10.84%	2.69%
Between $126 and $150	121	127.41	9.40%	9.98%	2.59%
Between $151 and $200	161	142.74	10.53%	11.18%	2.73%
Between $201 and $250	126	140.35	10.36%	11.00%	2.71%
Between $251 and $300	102	110.13	8.13%	8.63%	2.43%
Between $301 and $350	87	103.60	7.65%	8.12%	2.36%
Between $351 and $400	41	46.59	3.44%	3.65%	1.62%
Between $401 and $500	50	49.93	3.68%	3.91%	1.68%
Between $501 and $600	33	38.43	2.84%	3.01%	1.48%
Between $601 and $700	28	31.54	2.33%	2.47%	1.34%
Between $701 and $800	16	24.57	1.81%	1.92%	1.19%
Between $801 and	26	36.25	2.68%	2.84%	1.44%

$1,000					
Between $1,001 and $1,200	21	36.84	2.72%	2.89%	1.45%
Between $1,201 and $1,400	9	5.19	0.38%	0.41%	0.55%
Between $1,601 and $1,800	12	9.63	0.71%	0.75%	0.75%
Between $1,801 and $2,000	4	5.21	0.38%	0.41%	0.55%
Between $2,001 and $2,500	12	14.32	1.06%	1.12%	0.91%
Between $2,501 and $3,000	4	2.23	0.16%	0.17%	0.36%
Between $3,001 and $3,500	3	3.43	0.25%	0.27%	0.45%
Between $3,501 and $4,000	2	0.37	0.03%	0.03%	0.15%
$4001 or more	5	5.42	0.40%	0.42%	0.56%
Total of known responses	1198	1276.43	NA	100.00%	NA
Don't know	72	63.29	4.67%	NA	NA
Blank	11	15.22	1.12%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

About 92% of respondents received no rebate on their wine/beverage cooler, with the median rebate on the remainder of between $41 and $50. See Table 24.

Table 24. Rebates received on new wine/beverage cooler purchases (Question 15, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
No rebate	1105	1166.23	86.07%	91.95%	2.27%
Up to $10	12	14.49	1.07%	1.14%	0.89%
Between $11 and $20	14	10.41	0.77%	0.82%	0.75%
Between $21 and $30	11	8.26	0.61%	0.65%	0.67%
Between $31 and $40	6	3.59	0.27%	0.28%	0.44%
Between $41 and $50	20	33.60	2.48%	2.65%	1.34%
Between $51 and $60	6	4.27	0.32%	0.34%	0.48%
Between $61 and $80	3	2.25	0.17%	0.18%	0.35%
Between $81 and $100	5	7.52	0.55%	0.59%	0.64%
Between $101 and $125	7	4.85	0.36%	0.38%	0.52%
Between $126 and	1	5.73	0.42%	0.45%	0.56%

$150					
Between $151 and $200	1	0.54	0.04%	0.04%	0.17%
Between $201 and $250	4	6.11	0.45%	0.48%	0.58%
Between $251 and $300	1	0.30	0.02%	0.02%	0.13%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	1	0.14	0.01%	0.01%	0.09%
Total of known responses	1197	1268.29	NA	100.00%	NA
Don't know	67	68.77	5.08%	NA	NA
Blank	17	17.88	1.32%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

Likewise, most respondents (91%) reported that they did not pay anything to install their wine/beverage cooler, but the remaining 9% reported a range of installation cost, with a median value of about $100. See Table 25.

Table 25. Installation cost of wine/beverage coolers (Question 22, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Nothing; I installed it myself or someone installed it for free	1774	1808.12	84.14%	90.83%	1.92%
Up to $10	8	6.74	0.31%	0.34%	0.39%
Between $11 and $20	11	20.07	0.93%	1.01%	0.67%
Between $21 and $30	8	4.39	0.20%	0.22%	0.31%
Between $31 and $40	11	4.86	0.23%	0.24%	0.33%
Between $41 and $50	13	5.71	0.27%	0.29%	0.36%
Between $51 and $60	9	15.68	0.73%	0.79%	0.59%
Between $61 and $80	7	3.48	0.16%	0.18%	0.28%
Between $81 and $100	30	33.26	1.55%	1.67%	0.85%
Between $101 and $125	23	24.19	1.13%	1.22%	0.73%
Between $126 and $150	11	7.00	0.33%	0.35%	0.39%
Between $151 and $200	10	9.60	0.45%	0.48%	0.46%
Between $201 and $250	15	22.92	1.07%	1.15%	0.71%
Between $251 and $300	8	5.91	0.28%	0.30%	0.36%
Between $301 and $400	5	6.76	0.31%	0.34%	0.39%

Between $401 and $500	3	4.30	0.20%	0.22%	0.31%
$501 or more	8	7.61	0.35%	0.38%	0.41%
Total of known responses	1954	1990.60	NA	100.00%	NA
Don't know	187	154.09	7.17%	NA	NA
Blank	8	4.31	0.20%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

3.1.7 Repairs

The WC1 survey asked respondents about repairs to their wine/beverage coolers. The first question asked was whether the unit had ever been repaired; only 1.4% reported that it had. See Table 26.

Table 26. Repair incidence of wine/beverage coolers (Question 23, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	36	28.35	1.32%	1.38%	0.58%
No	2002	2026.55	94.30%	98.62%	0.58%
Total of known responses	2038	2054.90	NA	100.00%	NA
Don't know	102	76.46	3.56%	NA	NA
Blank	9	17.64	0.82%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Although the number of respondents who reported repairing their wine/beverage cooler was small (36), we felt this number was still large enough to provide some statistical information on the nature of the repairs, so we examined the responses to three other questions: how much the repair cost, how long ago it occurred, and which component(s) were repaired.

We found that about one-third of repairs were done for free (presumably under warranty), and the remaining two-thirds had a median cost of approximately $85. As for age of repair, 77% of respondents indicated the repair was made when the unit was less than two years old. Finally, we found that the most frequently repaired components were electronics and lighting (21% and 28%, respectively), followed closely by compressor and door gasket (19% each), with smaller proportions assigned to other components. See Table 27 through Table 29.

Table 27. Repair cost of wine/beverage coolers (Question 24, WC1 survey)

Response	Total responses	Known responses

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; repaired for free or under warranty	13	9.27	32.69%	33.76%	26.85%
Up to $10	3	4.45	15.70%	16.22%	20.93%
Between $11 and $20	0	0.00	0.00%	0.00%	0.00%
Between $21 and $30	4	5.97	21.05%	21.74%	23.41%
Between $31 and $40	3	0.71	2.51%	2.60%	9.03%
Between $41 and $50	1	1.51	5.34%	5.52%	12.96%
Between $51 and $60	2	0.81	2.84%	2.93%	9.58%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	1	0.38	1.34%	1.39%	6.64%
Between $101 and $125	3	1.25	4.42%	4.57%	11.85%
Between $126 and $150	1	2.56	9.05%	9.35%	16.52%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	1	0.30	1.07%	1.10%	5.93%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	1	0.23	0.80%	0.83%	5.15%
Total of known responses	33	27.44	NA	100.00%	NA
Don't know	2	0.59	2.07%	NA	NA
Blank	1	0.32	1.11%	NA	NA
Total	36	28.35	100.00%	NA	NA

Table 28. Age of wine/beverage cooler when repaired (Question 25, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 1 year	12	14.16	49.96%	51.23%	26.69%
At least 1 but less than 2 years	8	7.16	25.26%	25.91%	23.39%
At least 2 but less than 3 years	4	1.07	3.78%	3.88%	10.31%
At least 3 but less than 4 years	4	3.21	11.33%	11.62%	17.11%
At least 4 but less than 5 years	3	0.97	3.41%	3.50%	9.81%
At least 5 but less than 6 years	0	0.00	0.00%	0.00%	0.00%
At least 6 but less than 8 years	0	0.00	0.00%	0.00%	0.00%

At least 8 but less than 10 years	1	0.37	1.31%	1.34%	6.14%
At least 10 but less than 15 years	0	0.00	0.00%	0.00%	0.00%
At least 15 years or more	1	0.70	2.47%	2.53%	8.39%
Total of known responses	33	27.64	NA	100.00%	NA
Don't know	2	0.39	1.36%	NA	NA
Blank	1	0.32	1.11%	NA	NA
Total	36	28.35	100.00%	NA	NA

Table 29. Wine/beverage cooler components repaired (Question 26, WC1 survey)

	Known responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion***	**Confidence interval**
Compressor	4	6.87	19.09%	14.70%
Evaporator	6	3.12	8.68%	17.44%
Condenser	3	2.30	6.40%	12.93%
Evaporator or condenser fan	4	2.74	7.62%	14.70%
Door gasket	8	6.92	19.22%	19.45%
Other door component	2	1.21	3.36%	10.72%
Insulation	4	3.96	11.00%	14.70%
Electronics	7	7.77	21.58%	18.52%
Lighting	9	10.01	27.81%	20.26%
Something else	3	0.53	1.46%	12.93%

* Sum may be >100% since more than one response was permitted for this question.

3.1.8 Maintenance

The WC1 survey asked respondents whether they perform routine maintenance on their wine/beverage coolers; about 13% of respondents indicated that they did. As for cost, 57% of those who perform routine maintenance pay nothing for it, with the remainder spending a median value of close to $30 per year. See Table 30 and Table 31.

Table 30. Incidence of routine maintenance of wine/beverage coolers (Question 27, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	251	263.85	12.28%	12.56%	1.62%
No	1838	1837.02	85.48%	87.44%	1.62%
Total of known responses	2089	2100.87	NA	100.00%	NA
Don't know	38	26.43	1.23%	NA	NA

Blank	22	21.70	1.01%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Table 31. Cost of routine maintenance of wine/beverage coolers (Question 28, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I perform the maintenance myself or someone does it for free.	149	150.46	57.03%	57.27%	8.57%
Up to $10 per year	19	9.96	3.78%	3.79%	3.31%
Between $11 and $20 per year	27	31.67	12.00%	12.05%	5.64%
Between $21 and $30 per year	21	21.78	8.26%	8.29%	4.78%
Between $31 and $40 per year	3	20.17	7.64%	7.68%	4.61%
Between $41 and $50 per year	11	11.36	4.31%	4.32%	3.52%
Between $51 and $60 per year	7	10.11	3.83%	3.85%	3.33%
Between $61 and $80 per year	6	3.78	1.43%	1.44%	2.06%
Between $81 and $100 per year	2	2.66	1.01%	1.01%	1.73%
$101 or more per year	2	0.75	0.28%	0.28%	0.92%
Total of known responses	247	262.71	NA	100.00%	NA
Don't know	4	1.14	0.43%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	251	263.85	100.00%	NA	NA

3.1.9 Door opening frequency

The WC1 survey asked how frequently users opened the doors to add or remove bottles. The results indicate a wide range of responses, from 10 or more times per day, to once per month or less. The median response was slightly less than once per day, with more than 90% accessing their wine/beverage coolers at least once per week. See Table 32.

Table 32. Frequency of door openings of wine/beverage coolers (Question 5, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
10 or more times per day	56	43.23	2.01%	2.05%	0.87%
5-9 times per day	147	142.76	6.64%	6.77%	1.54%
3-4 times per day	357	336.66	15.67%	15.96%	2.24%
Twice per day	296	269.18	12.53%	12.76%	2.04%
Once per day	202	257.01	11.96%	12.19%	2.00%

4-6 times per week	293	278.42	12.96%	13.20%	2.07%
2-3 times per week	397	402.75	18.74%	19.10%	2.40%
Once per week	180	177.75	8.27%	8.43%	1.70%
2-3 times per month	127	121.37	5.65%	5.76%	1.42%
Once per month or less	60	79.70	3.71%	3.78%	1.17%
Total of known responses	2115	2108.84	NA	100.00%	NA
Don't know	8	4.89	0.23%	NA	NA
Blank	26	35.27	1.64%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

3.1.10 Use of internal lights

The WC1 survey asked about the presence and use of internal lights. We found that 62% had internal lights, and of those, 90% were turned off when the door was closed. Also, 80% of units with internal lights operated automatically. See Table 33 through Table 35.

Table 33. Does your wine/beverage cooler have internal lights? (Question 19, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	1311	1322.09	61.52%	62.75%	2.36%
No	806	784.97	36.53%	37.25%	2.36%
Total of known responses	2117	2107.06	NA	100.00%	NA
Don't know	29	35.61	1.66%	NA	NA
Blank	3	6.33	0.29%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Table 34. Among units with internal lights, what is their state when the door is closed? (Question 21, WC1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Off	1170	1168.46	88.38%	89.88%	1.87%
On	114	131.55	9.95%	10.12%	1.87%
Total of known responses	1284	1300.01	NA	100.00%	NA
Don't know	18	17.33	1.31%	NA	NA
Blank	9	4.75	0.36%	NA	NA
Total	1311	1322.09	100.00%	NA	NA

Table 35. Among units with internal lights, are they operated automatically, or by a manual switch? (Question 20, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Automatic	1082	1016.27	76.87%	78.17%	2.57%
Manual switch	202	283.82	21.47%	21.83%	2.57%
Total of known responses	1284	1300.08	NA	100.00%	NA
Don't know	15	12.68	0.96%	NA	NA
Blank	12	9.32	0.71%	NA	NA
Total	1311	1322.09	100.00%	NA	NA

3.1.11 Built-in units

The WC1 survey reported that about 15% of wine/beverage coolers were built-in, and 85% were freestanding. These proportions did not vary much with capacity. See Table 36 for more information.

Table 36. Built-in versus freestanding wine/beverage coolers (Question 9, WC1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Built-in	302	327.29	15.23%	15.41%	1.76%
Freestanding	1828	1796.93	83.62%	84.59%	1.76%
Total of known responses	2130	2124.23	NA	100.00%	NA
Don't know	7	3.73	0.17%	NA	NA
Blank	12	21.04	0.98%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

3.1.12 AC/DC operation

The RP2 survey asked respondents if their wine/beverage cooler could operate on DC as well as AC power. About 21% reported "Yes," though another 21% reported "Don't know." Subsequent investigation of the roughly 20% of wine/beverage cooler model numbers reported in the WC1 survey (418 units) found no evidence that any model had the capacity to run on DC power, so we considered the responses to this survey question unreliable. See Table 37 for more information.

Table 37. Wine/beverage cooler operate on AC/DC power (Question 32, WC1 survey)

Response	Total responses	Known responses

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	99	70.25	20.87%	26.70%*	6.11%
No	192	192.89	57.30%	73.30%	6.11%
Total of known responses	291	263.13	NA	100.00%	NA
Don't know	91	70.74	21.01%	NA	NA
Blank	4	2.74	0.81%	NA	NA
Total	386	336.61	100.00%	NA	NA

* The "Yes" responses were considered unreliable, as subsequent investigation revealed no models with the capacity to run on DC power.

3.1.13 Ownership demographics

The demographics of wine/beverage cooler owners differed from those of the general population. Wine/beverage cooler owners tended to be more male, more black/African American, higher annual household income (≥$40,000), higher education level (bachelor's degree or higher), less 30-59 year old occupants, larger household size (≥3 occupants), and less West Central and Pacific than the general population. See Figure 12 through Figure 19 for more information.

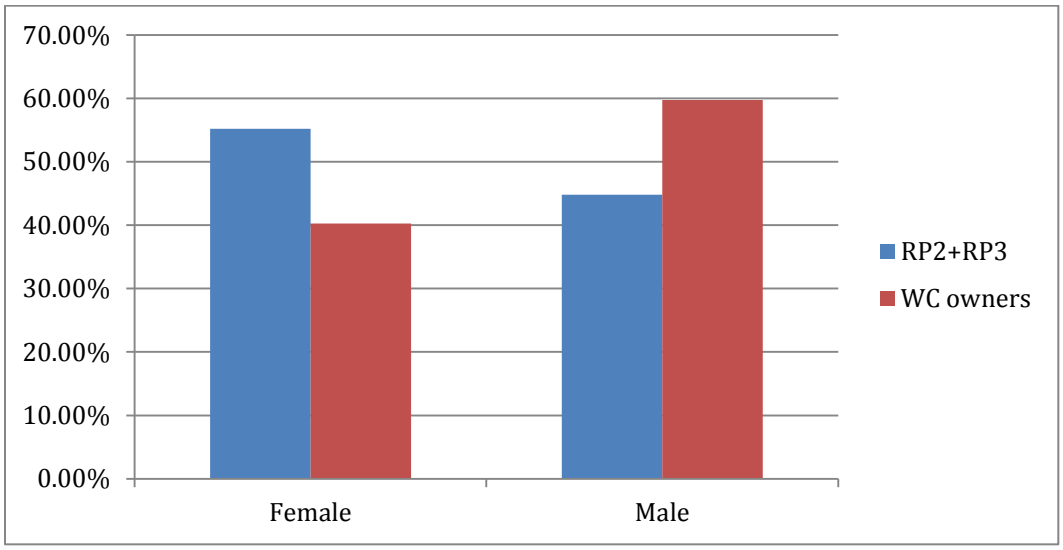

Figure 12. Gender of wine/beverage cooler owners versus general population

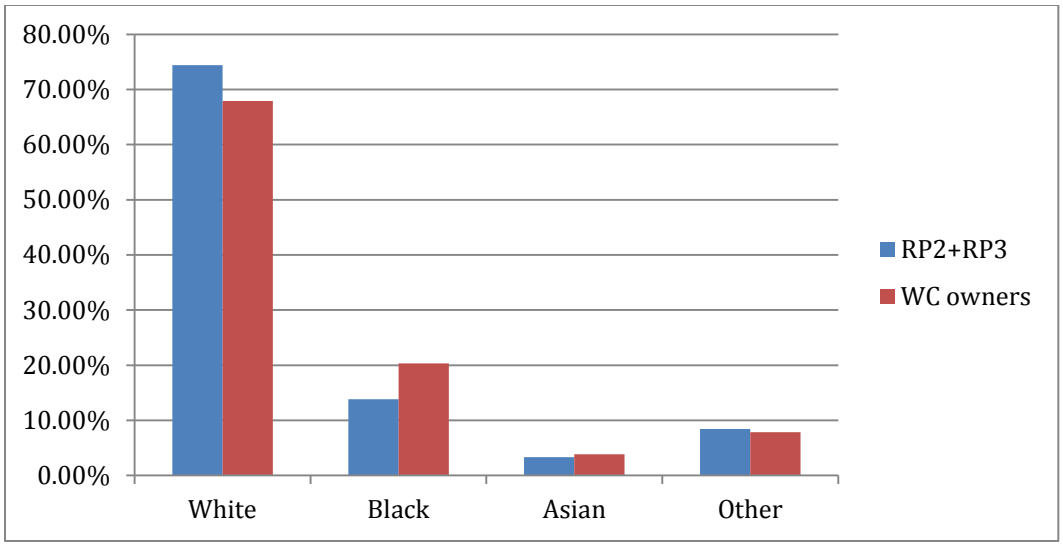

Figure 13. Race of wine/beverage cooler owners versus general population

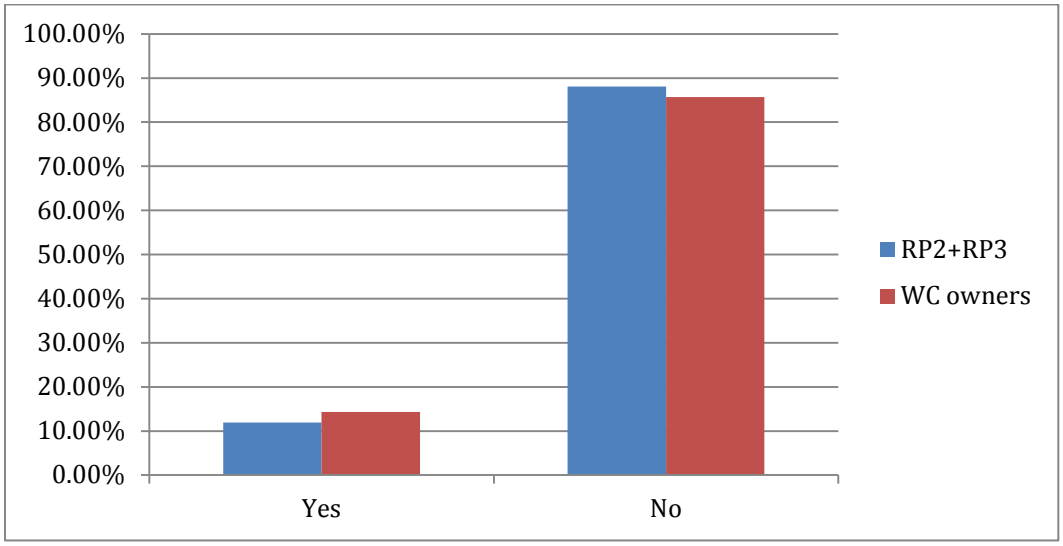

Figure 14. Hispanic origin of wine/beverage cooler owners versus general population

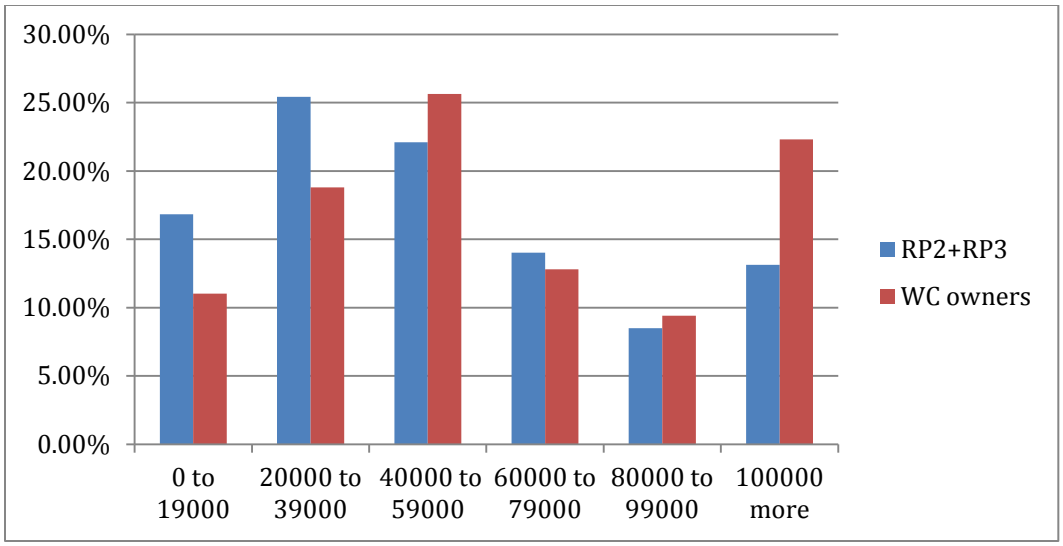

Figure 15. Annual household income of wine/beverage cooler owners versus general population

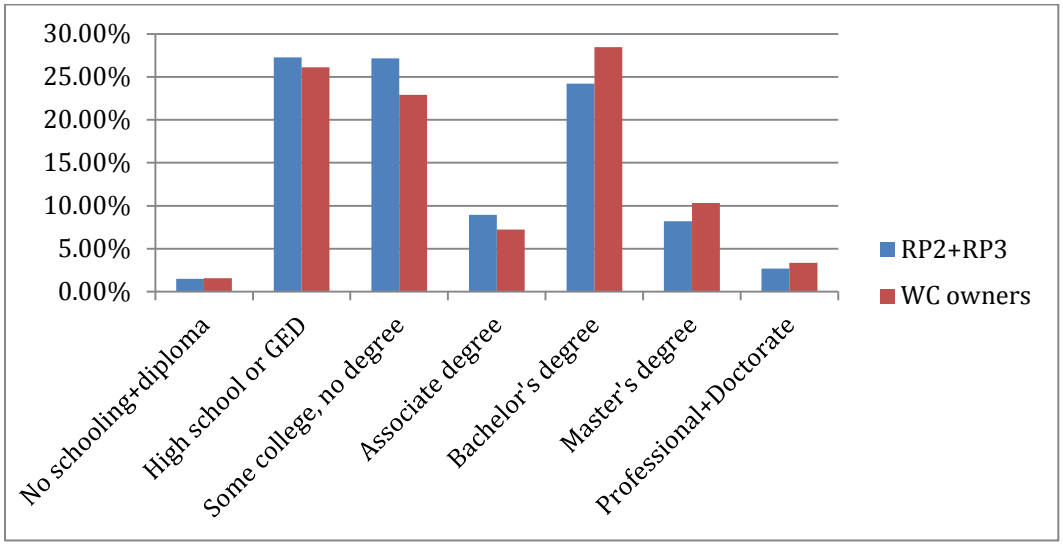

Figure 16. Education level of wine/beverage cooler owners versus general population

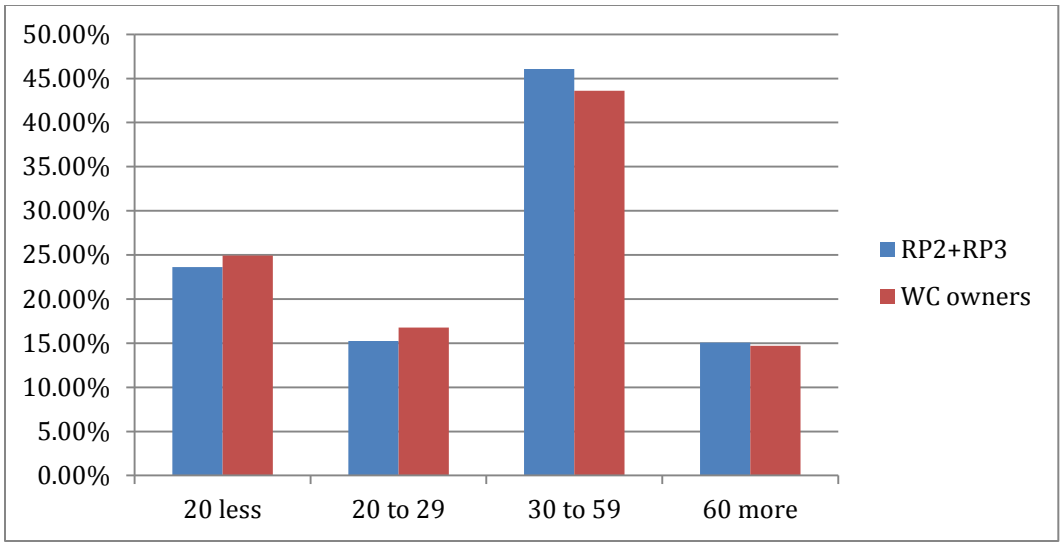

Figure 17. Occupant ages of wine/beverage cooler owners versus general population

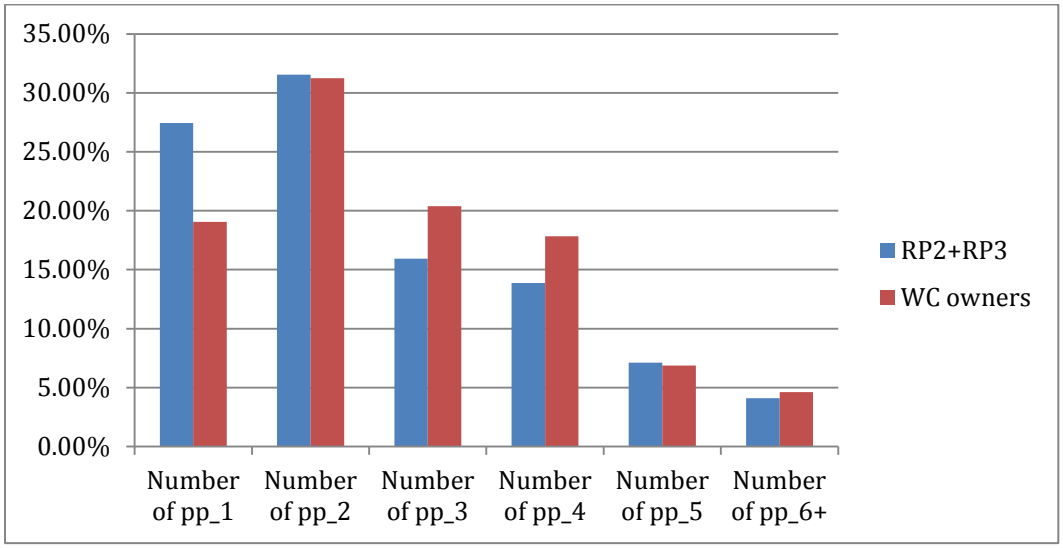

Figure 18. Household size of wine/beverage cooler owners versus general population

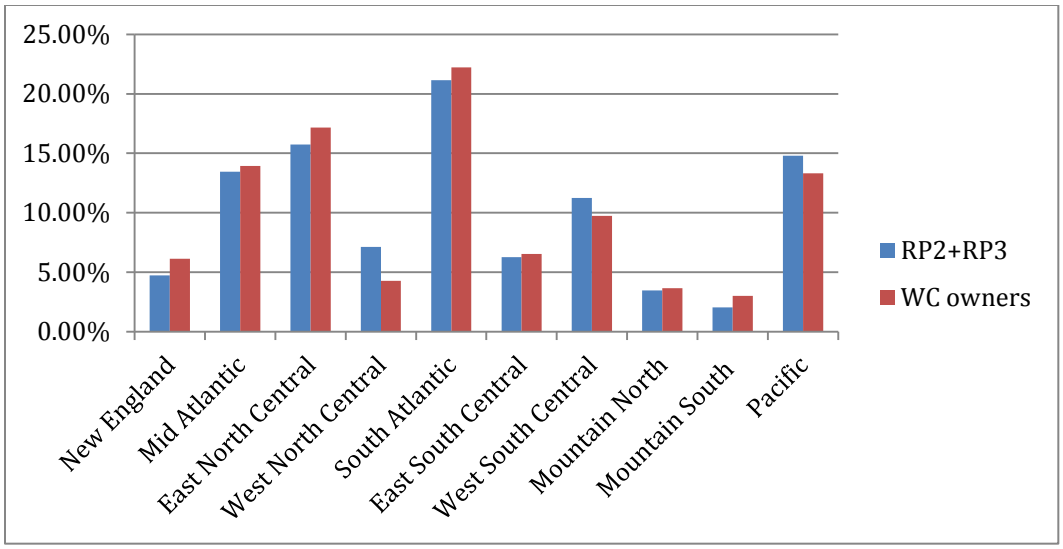

Figure 19. Geographic region of wine/beverage cooler owners versus general population

3.2 Residential icemakers

3.2.1 Number in U.S. households

Both the RP2 and RP3 surveys asked about the presence of residential icemakers. However, the proportions of households with these devices differed by a factor of approximately three between the two surveys, the difference for which fell outside their calculated confidence intervals. As a result, our combined estimate of the proportion of residential icemakers has a much larger confidence interval than normally expected for the size of the survey: 5.4(–3.4,+3.1)%. See Table 38.

Table 38. Proportion of residential icemakers in households

Survey Code	Total weighted responses	Proportion with residential icemakers	Confidence interval
RP2	3002.2	2.47%	0.56%
RP3	3831.0	7.63%	0.84%
Total	6833.2	5.4%	–3.4%, +3.1%

We then applied our assessment of the actual number of households with residential icemakers from the brand/model number verification in Section 3.2.2, which was 85.7±2.2%. The revised estimate of the proportion of households with residential icemakers was 4.6(–2.9,+2.7)%. Using the number of U.S. households in 2012 (116.1 million), we estimate the number of households with residential icemakers at 5.3(–3.4,+3.1) million.

The average numbers of residential icemakers in homes with the devices were much more consistent between surveys, with the overwhelming majority of households (>97%) having

only one residential icemaker. A total of three surveys (RP2, RP3 and RI1) were compiled to obtain this information, resulting in a combined average number of 1.032±0.023 devices per household and a total of 5.5(−3.5,+3.2) million devices in U.S. households. See Table 37.

Table 39. Number of residential icemakers in households

Survey Code	Total weighted responses	Number of residential icemakers					Average number per household	Confidence interval
		1	2	3	4	5+		
RP2	74.30	98.52%	0.94%	0.40%	0.00%	0.13%	1.023	0.079
RP3	292.20	97.23%	2.02%	0.48%	0.17%	0.10%	1.039	0.052
RI1	811.00	97.76%	1.70%	0.22%	0.31%	0.00%	1.031	0.027
Total	1,177.50	97.68%	1.73%	0.30%	0.26%	0.03%	1.032	0.023

3.2.2 Brand/model number verification

The RI1 survey asked for brand and model numbers of residential icemakers. A total of 1,018 responses (about 95%) provided this information, and of these, 93% were identifiable through manufacturer websites. Results indicated that 85.7±2.2% of unweighted identified responses were confirmed to be residential icemakers. See Table 40 below, and for a more detailed classification breakdown, Table 41.

Table 40. Proportion of RI1 responses with confirmed residential icemakers

Classification	Total (unweighted) responses	Proportion of total responses	Proportion of known responses	Confidence interval
Residential icemaker	811	76.1%	85.7%	2.2%
Not residential icemaker	135	12.7%	14.3%	2.2%
Subtotal	946	88.7%	100.0%	
Unknown	120	11.3%		
Total	1066	100.0%		

Table 41. Classification breakdown of RI1 survey

Classification	Total unweighted responses	Unweighted proportion of total	Unweighted proportion of knowns
Icemakers			
Built-in Ice Maker	110	10.3%	11.6%
Outdoor Ice Maker	5	0.5%	0.5%
Portable Ice Maker	563	52.8%	59.5%
Stand-alone Ice Maker	59	5.5%	6.2%

Undercounter Ice Maker	74	6.9%	7.8%
Residential refrigeration products			
Refrigerator	41	3.8%	4.3%
Freezer	4	0.4%	0.4%
Wine/beverage cooler	1	0.1%	0.1%
Ice Cream Maker	6	0.6%	0.6%
Ice Maker Kit	43	4.0%	4.5%
Ice Shaver	1	0.1%	0.1%
Liquor Chiller	1	0.1%	0.1%
Other products			
Commercial icemaker	32	3.0%	3.4%
Other commercial product	2	0.2%	0.2%
RV Ice Maker	1	0.1%	0.1%
Not refrigeration product	3	0.3%	0.3%
Subtotal	946	88.7%	100.0%
Not identified	72	6.8%	
Blank	48	4.5%	
Total	1066	100.0%	

3.2.3 Distribution of capacities

The reported distribution of residential icemaker capacities possessed was bimodal; the two most prevalent categories were "less than 5 pounds per day" (25%) and "between 20 and 29 pounds per day" (33%), with the latter also being the median response value. Nearly 92% of responses indicated a capacity of less than 50 pounds per day. See Table 42.

Table 42. Residential icemaker capacity (Question 5, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 5 pounds per day	173	195.01	24.05%	24.93%	4.23%
Between 5 and 9 pounds per day	42	50.24	6.19%	6.42%	2.40%
Between 10 and 14 pounds per day	66	75.53	9.31%	9.66%	2.89%
Between 15 and 19 pounds per day	20	13.29	1.64%	1.70%	1.26%
Between 20 and 29 pounds per day	266	260.21	32.08%	33.27%	4.61%
Between 30 and 49 pounds per day	132	121.96	15.04%	15.59%	3.55%
Between 50 and 79 pounds per	68	65.27	8.05%	8.35%	2.70%

day					
At least 80 pounds per day	1	0.59	0.07%	0.08%	0.27%
Total of known responses	768	782.10	NA	100.00%	NA
Don't know	43	28.90	3.56%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

3.2.4 Product lifetime

As with wine/beverage coolers, approximately 60% of respondents indicated they bought their residential icemakers new; see Table 43.

Table 43. Residential icemakers purchased new (Question 6, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	445	452.67	55.82%	57.59%	3.95%
No	334	333.36	41.10%	42.41%	3.95%
Total of known responses	779	786.03	NA	100.00%	NA
Don't know	31	23.73	2.93%	NA	NA
Blank	1	1.23	0.15%	NA	NA
Total	811	811.00	100.00%	NA	NA

The age distribution of residential icemakers purchased new was quite young, with a median age of less than 12 months, and an average age of less than 2 years. See Table 44.

Table 44. Age of residential icemakers (Question 9, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 12 months ago	273	256.71	56.71%	57.46%	6.64%
At least 1 year but less than 2 years ago	116	138.94	30.69%	31.10%	6.21%
At least 2 year but less than 3 years ago	32	37.93	8.38%	8.49%	3.74%
At least 3 year but less than 4 years ago	12	8.95	1.98%	2.00%	1.88%
At least 4 year but less than 5 years ago	2	1.84	0.41%	0.41%	0.86%
At least 5 year but less than 6 years ago	0	0.00	0.00%	0.00%	0.00%
At least 6 year but less than 8	0	0.00	0.00%	0.00%	0.00%

years ago					
At least 8 year but less than 10 years ago	2	1.79	0.40%	0.40%	0.85%
At least 10 year but less than 12 years ago	1	0.65	0.14%	0.14%	0.51%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	438	446.80	NA	100.00%	NA
Don't know	6	5.30	1.17%	NA	NA
Blank	1	0.57	0.13%	NA	NA
Total	445	452.67	100.00%	NA	NA

The lifetime of residential icemakers was estimated using the same approach as that used for wine/beverage coolers. Because we were not able to filter on the subset of owners who had previously purchased a residential icemaker, we only attempted to fit the entire dataset. Also, because no independent shipments data were available as they were for wine/beverage coolers (e.g., NPD), we assumed flat shipments. The resulting fit to the data was excellent, with an average lifetime of 1.7 years. See Figure 20 and Table 45.

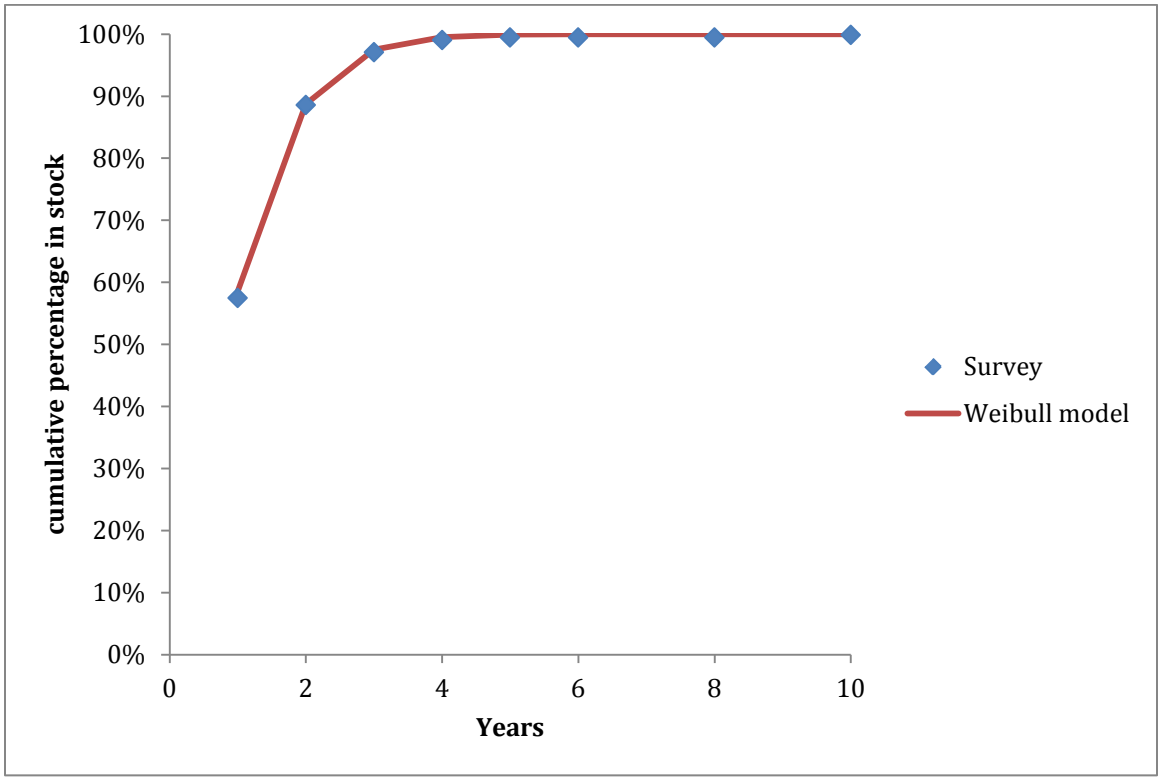

Figure 20. Lifetime function fit for residential icemakers

Table 45. Lifetime fitting parameters for residential icemakers

Data used	Shipments	Offset (years)	Beta	Alpha	Lifetime (years)
All	flat	1.2	1.3	1.1	1.71

Table 46 shows the results of the lifetime formula for residential icemakers, for 20 years from the year of purchase. The second column shows the percentage of products sold in year 0 that will survive to the year given in the first column. The third column shows the percentage of products that will be retired after the given number of years. The final column shows the percentage of the remaining stock that will survive to the next year. As explained above it was assumed that all products would survive the first year, therefore the first point is 100%. Approximately half of the products do not survive to the second year, as reflected in the mean lifetime of 1.7 years in Table 45. After 7 years the percentage surviving becomes very small. Unlike wine/beverage coolers, the percentage surviving to next year decreases with time, due to the beta value being larger than 1.

Table 46: Results of the survival function for residential icemakers

Years since purchase	Percentage surviving	Percentage retiring	Percentage surviving to next year
1	100.00%	0.00%	100.00%
2	51.63%	48.37%	51.6%
3	15.00%	36.63%	29.1%
4	3.44%	11.56%	22.9%
5	0.67%	2.78%	19.4%
6	0.11%	0.55%	16.9%
7	0.02%	0.10%	15.1%
8	0.00%	0.01%	13.6%
9	0.00%	0.00%	12.4%
10	0.00%	0.00%	11.5%
11	0.00%	0.00%	10.6%
12	0.00%	0.00%	9.9%
13	0.00%	0.00%	9.3%
14	0.00%	0.00%	8.7%
15	0.00%	0.00%	8.2%
16	0.00%	0.00%	7.8%
17	0.00%	0.00%	7.4%
18	0.00%	0.00%	6.7%
19	0.00%	0.00%	0.0%
20	0.00%	0.00%	0.0%

3.2.5 Purchase price and installation cost

The median purchase price of residential icemakers (not including taxes or rebates) was just over $200, with the highest price paid reported between $2,501 and $3000. See Table 47.

Table 47. Purchase price of residential icemaker (Question 7, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to $25	1	0.39	0.09%	0.09%	0.43%
Between $26 and $50	3	5.62	1.24%	1.26%	1.64%
Between $51 and $75	0	0.00	0.00%	0.00%	0.00%
Between $76 and $100	21	16.82	3.71%	3.76%	2.79%
Between $101 and $125	44	42.54	9.40%	9.52%	4.31%
Between $126 and $150	54	52.96	11.70%	11.85%	4.74%
Between $151 and $200	95	94.44	20.86%	21.13%	5.99%
Between $201 and $250	36	46.38	10.25%	10.38%	4.48%
Between $251 and $300	27	25.71	5.68%	5.75%	3.42%
Between $301 and $350	24	23.94	5.29%	5.36%	3.30%
Between $351 and $400	26	31.31	6.92%	7.01%	3.75%
Between $401 and $500	8	7.77	1.72%	1.74%	1.92%
Between $501 and $600	2	2.50	0.55%	0.56%	1.09%
Between $601 and $700	6	4.00	0.88%	0.89%	1.38%
Between $701 and $800	12	8.57	1.89%	1.92%	2.01%
Between $801 and $1,000	14	15.58	3.44%	3.49%	2.69%
Between $1,001 and $1,200	15	18.40	4.06%	4.12%	2.92%
Between $1,201 and $1,400	7	3.18	0.70%	0.71%	1.23%
Between $1,401 and $1,600	14	8.23	1.82%	1.84%	1.97%
Between $1,601 and $1,800	10	7.03	1.55%	1.57%	1.83%
Between $1,801 and $2,000	5	21.72	4.80%	4.86%	3.16%
Between $2,001 and $2,500	8	6.26	1.38%	1.40%	1.73%
Between $2,501 and $3,000	5	3.47	0.77%	0.78%	1.29%
Between $3,001 and $3,500	0	0.00	0.00%	0.00%	0.00%
Between $3,501 and $4,000	0	0.00	0.00%	0.00%	0.00%
$4001 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	437	446.83	NA	100.00%	NA
Don't know	8	5.85	1.29%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	445	452.67	100.00%	NA	NA

Most icemaker owners (83%) did not receive a rebate on their purchase, but the remainder received a median rebate of just over $80; see Table 48.

Table 48. Rebate of residential icemaker (Question 8, RI1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
No rebate	372	364.31	80.48%	83.28%	5.31%
Up to $10	8	8.66	1.91%	1.98%	1.98%
Between $11 and $20	6	13.54	2.99%	3.09%	2.46%
Between $21 and $30	4	1.67	0.37%	0.38%	0.88%
Between $31 and $40	2	0.81	0.18%	0.18%	0.61%
Between $41 and $50	6	8.62	1.90%	1.97%	1.98%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	3	1.33	0.29%	0.30%	0.78%
Between $81 and $100	11	24.29	5.37%	5.55%	3.26%
Between $101 and $125	2	0.68	0.15%	0.16%	0.56%
Between $126 and $150	2	0.78	0.17%	0.18%	0.60%
Between $151 and $200	3	10.07	2.22%	2.30%	2.13%
Between $201 and $250	2	1.11	0.24%	0.25%	0.71%
Between $251 and $300	1	0.18	0.04%	0.04%	0.29%
Between $301 and $400	1	0.67	0.15%	0.15%	0.56%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	2	0.75	0.17%	0.17%	0.59%
Total of known responses	425	437.46	NA	100.00%	NA
Don't know	18	13.85	3.06%	NA	NA
Blank	2	1.36	0.30%	NA	NA
Total	445	452.67	100.00%	NA	NA

Installation costs were fairly low; about 90% of respondents reported paying nothing for installation, with the remainder paying a median of between $41 and $50. See Table 49.

Table 49. Installation cost of residential icemakers (Question 11, RI1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I installed it myself or someone installed it for free	667	682.33	84.13%	89.81%	3.26%
Up to $10	7	8.28	1.02%	1.09%	1.12%
Between $11 and $20	7	5.41	0.67%	0.71%	0.91%
Between $21 and $30	6	12.02	1.48%	1.58%	1.35%
Between $31 and $40	6	4.78	0.59%	0.63%	0.85%
Between $41 and $50	15	15.39	1.90%	2.03%	1.52%
Between $51 and $60	9	7.83	0.97%	1.03%	1.09%

Between $61 and $80	7	4.04	0.50%	0.53%	0.78%
Between $81 and $100	10	6.47	0.80%	0.85%	0.99%
Between $101 and $125	3	0.97	0.12%	0.13%	0.38%
Between $126 and $150	6	3.04	0.37%	0.40%	0.68%
Between $151 and $200	4	7.52	0.93%	0.99%	1.07%
Between $201 and $250	1	0.48	0.06%	0.06%	0.27%
Between $251 and $300	1	1.21	0.15%	0.16%	0.43%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	749	759.78	NA	100.00%	NA
Don't know	59	49.36	6.09%	NA	NA
Blank	3	1.86	0.23%	NA	NA
Total	811	811.00	100.00%	NA	NA

3.2.6 Repairs

The RI1 survey asked respondents about repairs to their residential icemakers. The first question asked was whether the unit had ever been repaired; 3.4% reported that it had. See Table 50.

Table 50. Incidence of repair (Question 12, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	27	26.09	3.22%	3.38%	1.46%
No	745	746.11	92.00%	96.62%	1.46%
Total of known responses	772	772.20	NA	100.00%	NA
Don't know	39	38.80	4.78%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

As with wine/beverage coolers, although the number of respondents who did report repairing their residential icemakers was small (27), we felt this number was still large enough to provide some statistical information on the nature of the repairs, so we examined the responses to three other questions: how much the repair cost, how long ago it occurred, and which component(s) were repaired.

We found that 15% of repairs were done for free (presumably under warranty), and the remaining portion had a median cost of between $41 and $50. See Table 51.

Table 51. Cost of repair (Question 13, RI1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; repaired for free or under warranty	6	3.89	14.89%	15.12%	21.02%
Up to $10	0	0.00	0.00%	0.00%	0.00%
Between $11 and $20	1	0.37	1.43%	1.45%	7.01%
Between $21 and $30	0	0.00	0.00%	0.00%	0.00%
Between $31 and $40	1	8.92	34.19%	34.72%	27.93%
Between $41 and $50	7	4.19	16.07%	16.31%	21.68%
Between $51 and $60	3	1.93	7.40%	7.51%	15.47%
Between $61 and $80	1	3.19	12.22%	12.41%	19.34%
Between $81 and $100	4	1.69	6.47%	6.57%	14.53%
Between $101 and $125	1	0.63	2.42%	2.45%	9.08%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	1	0.48	1.84%	1.87%	7.95%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	1	0.41	1.56%	1.58%	7.32%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	26	25.70	NA	100.00%	NA
Don't know	1	0.40	1.52%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	27	26.09	100.00%	NA	NA

The RI1 survey asked what the age of the icemaker was when it was repaired ("How long after you (or the homeowner) purchased it was it repaired?"); see Table 52. However, there was a potential ambiguity in how people answered the question, because the set of responses mistakenly contained the word "ago" in it, suggesting the question was instead asking how long before the present the repair was made. As a result, we also examined the difference in number of years between this question and Question 9 ("How long ago did you (or the homeowner) purchase this new icemaker?"). Fewer responses were available; thus results are shown unweighted in Table 53. Results of both analyses indicate that approximately 90% of respondents had their icemaker repaired within two years of purchase.

Table 52. Age of residential icemaker when repaired (Question 14, RI1 survey)

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval

Less than 12 months ago	11	13.40	51.37%	53.66%	28.31%
At least 1 year but less than 2 years ago	10	9.77	37.45%	39.13%	27.71%
At least 2 year but less than 3 years ago	1	0.46	1.75%	1.83%	7.61%
At least 3 year but less than 4 years ago	1	0.86	3.31%	3.45%	10.37%
At least 4 year but less than 5 years ago	1	0.48	1.84%	1.92%	7.80%
At least 5 year but less than 6 years ago	0	0.00	0.00%	0.00%	0.00%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	0	0.00	0.00%	0.00%	0.00%
At least 10 year but less than 12 years ago	0	0.00	0.00%	0.00%	0.00%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	24	24.98	NA	100.00%	NA
Don't know	2	0.44	1.68%	NA	NA
Blank	1	0.68	2.60%	NA	NA
Total	27	26.09	100.00%	NA	NA

Table 53. Difference in age between purchase and repair of residential icemakers

	Total responses		
Difference in age	**Unweighted counts**	**Unweighted proportion**	**Confidence interval**
0	3	25.00%	31.22%
1	5	41.67%	35.55%
2	3	25.00%	31.22%
4.5	1	8.33%	19.93%
Total	12		

We found that the highest proportions for repaired components were the compressor (45%) and fan (21%), with smaller proportions for other components; however, the small size of the data sample resulted in large confidence intervals on the proportions of all components; see Table 54.

Table 54. Components of residential icemakers repaired (Question 15, RI1 survey)

Response	**Known responses**

	Unweighted counts	Weighted counts	Weighted proportion*	Confidence interval
Compressor	7	12.10	44.82%	23.67%
Evaporator	0	0.00	0.00%	0.00%
Condenser	3	1.91	7.06%	16.98%
Fan	7	5.64	20.90%	23.67%
Door gasket	3	1.74	6.43%	16.98%
Other door component	2	1.23	4.55%	14.15%
Insulation	2	1.07	3.98%	14.15%
Electronics	2	1.65	6.12%	14.15%
Lighting	5	2.77	10.25%	20.98%
Something else	3	1.23	4.55%	16.98%

* Sum may be >100% since more than one response was permitted for this question.

3.2.7 Maintenance

The RI1 survey asked respondents whether they perform routine maintenance on their residential icemakers; about 34% of respondents indicated that they did. As for cost, 67% of those who perform routine maintenance pay nothing for it, with the remainder spending a median of between $21 and $30 per year. See Table 55 and Table 56.

Table 55. Incidence of routine maintenance (Question 16, RI1 survey)

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	257	270.13	33.31%	34.33%	3.79%
No	528	516.68	63.71%	65.67%	3.79%
Total of known responses	785	786.81	NA	100.00%	NA
Don't know	24	22.89	2.82%	NA	NA
Blank	2	1.30	0.16%	NA	NA
Total	811	811.00	100.00%	NA	NA

Table 56. Cost of routine maintenance (Question 17, RI1 survey)

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I perform the maintenance myself or someone does it for free	160	178.88	66.22%	66.66%	8.56%
Up to $10	13	9.13	3.38%	3.40%	3.29%
Between $11 and $20	30	28.25	10.46%	10.53%	5.57%
Between $21 and $30	15	17.59	6.51%	6.56%	4.49%

Between $31 and $40	6	4.30	1.59%	1.60%	2.28%
Between $41 and $50	8	7.94	2.94%	2.96%	3.08%
Between $51 and $60	7	4.74	1.76%	1.77%	2.39%
Between $61 and $80	5	4.71	1.74%	1.75%	2.38%
Between $81 and $100	3	1.74	0.64%	0.65%	1.46%
Between $101 and $125	3	1.19	0.44%	0.44%	1.20%
Between $126 and $150	1	1.33	0.49%	0.49%	1.27%
Between $151 and $200	2	6.57	2.43%	2.45%	2.81%
Between $201 and $250	1	0.50	0.18%	0.18%	0.78%
Between $251 and $300	1	1.47	0.54%	0.55%	1.34%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	255	268.34	NA	100.00%	NA
Don't know	2	1.79	0.66%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	257	270.13	100.00%	NA	NA

3.2.8 Ownership demographics

The demographics of residential icemaker owners differed from those of the general population. Residential icemaker owners tended to be more male, less white, more Hispanic, higher annual household income (≥$40,000), lower education level (high school/GED or no schooling), less 30-59 year old occupants, larger household size (≥3 occupants), and more East North Central, West South Central and Pacific than the general population. See Figure 21 through Figure 28 for more information.

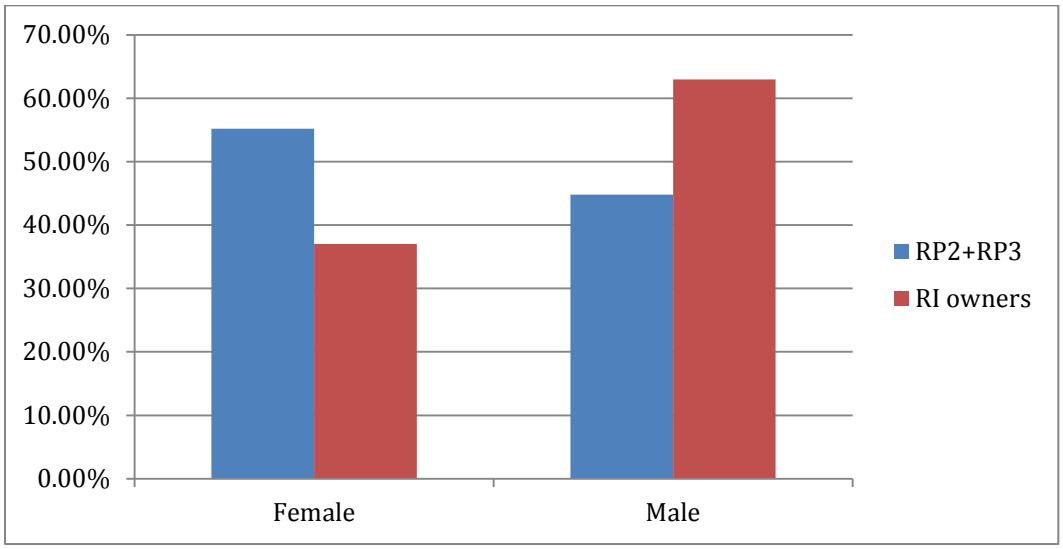

Figure 21. Gender of residential icemaker owners versus general population

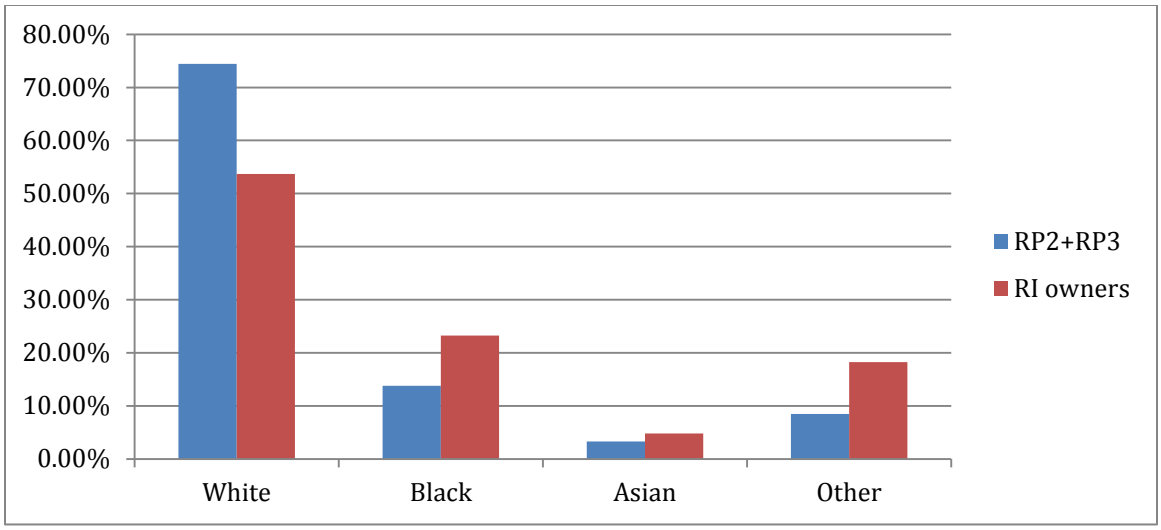

Figure 22. Race of residential icemaker owners versus general population

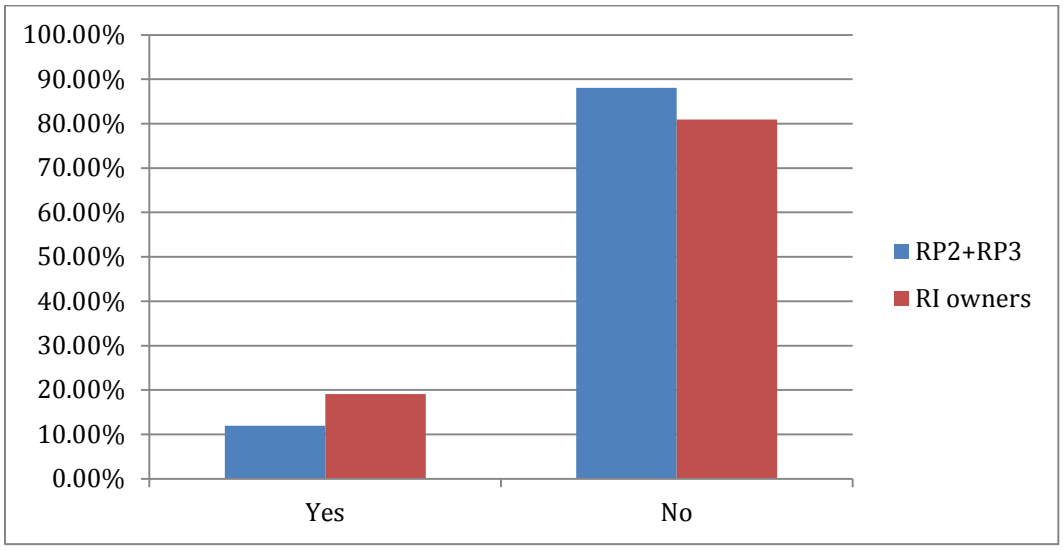

Figure 23. Hispanic origin of residential icemaker owners versus general population

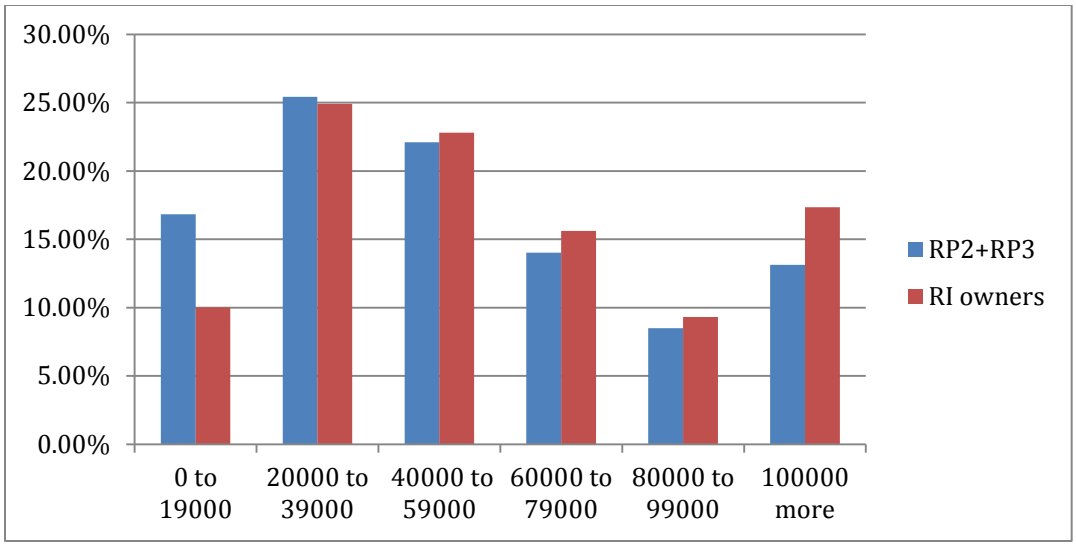

Figure 24. Annual household income of residential icemaker owners versus general population

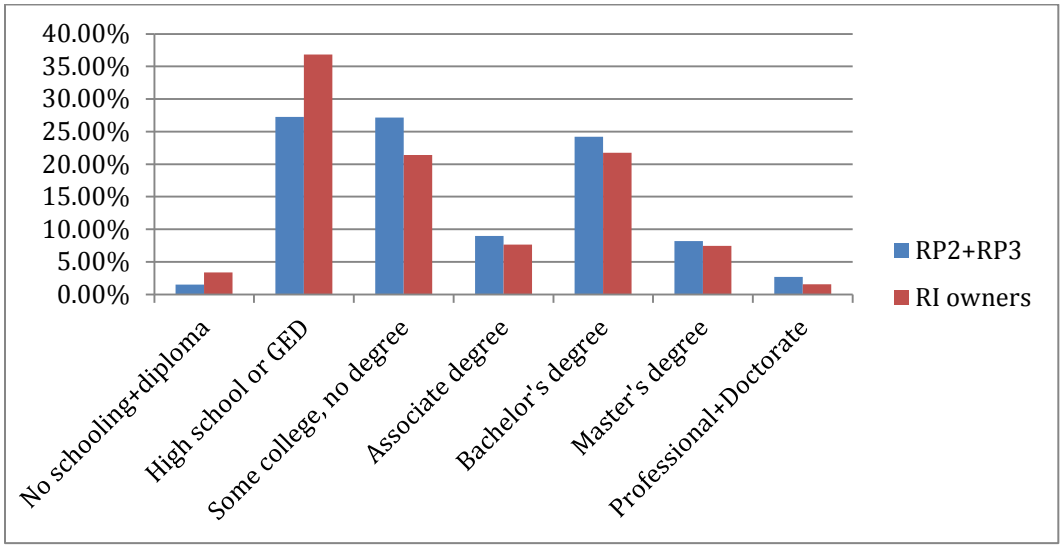

Figure 25. Education level of residential icemaker owners versus general population

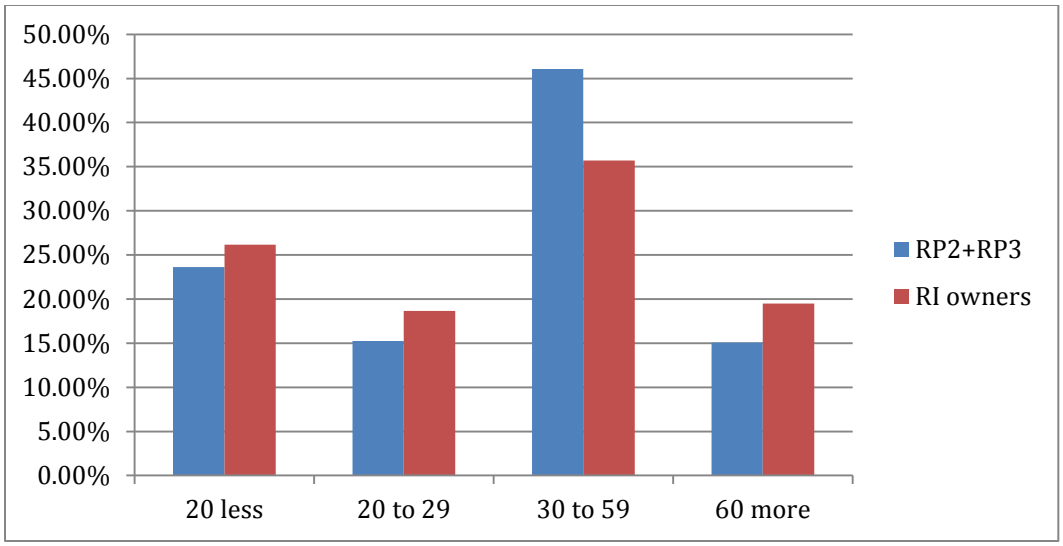

Figure 26. Occupant ages of residential icemaker owners versus general population

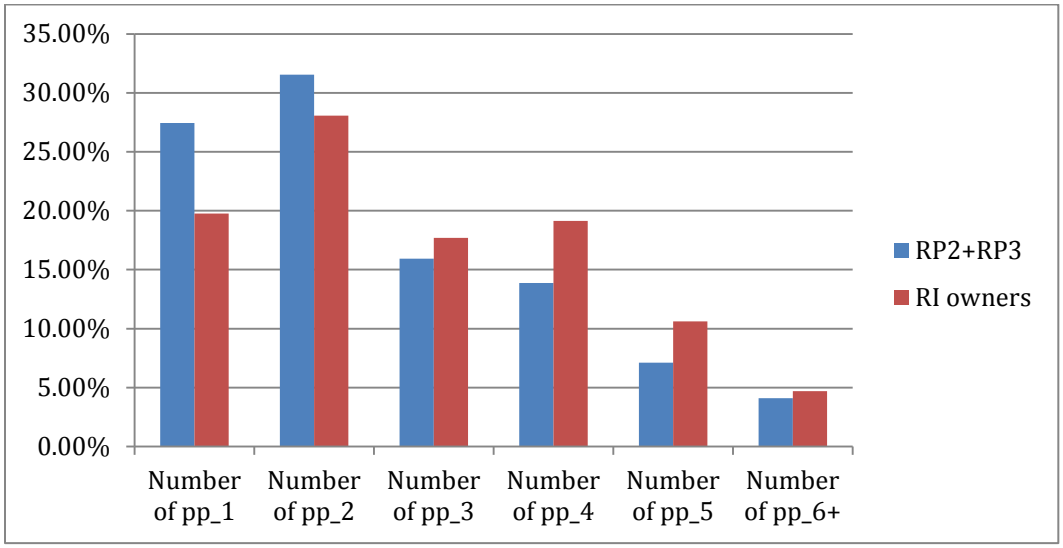

Figure 27. Household size of residential icemaker owners versus general population

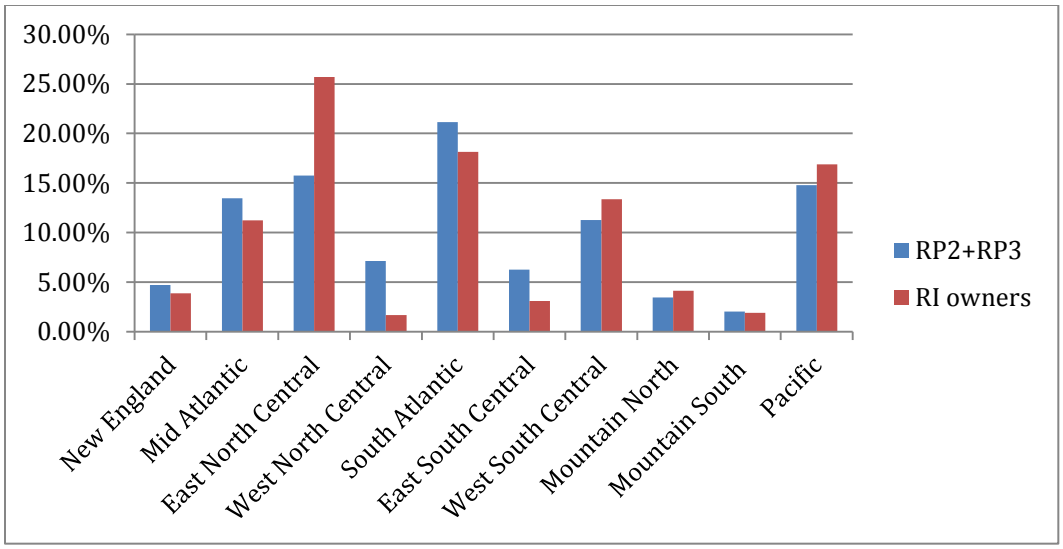

Figure 28. Geographic region of residential icemaker owners versus general population

3.3 Non-vapor compression refrigeration products

3.3.1 Number in U.S. households

Two surveys (RP2 and RP3) asked whether households contained non-vapor compression refrigerators or freezers. As we found for residential icemakers, the results of the two surveys for non-vapor compression refrigeration products were not very similar, so there is a large range in the combined estimate. See Table 57.

Table 57. Proportions of U.S. households with non-vapor compression refrigerators and freezers

Survey Code	Total weighted responses	Proportion with non-vapor compression refrigerators*	Confidence interval	Proportion with non-vapor compression freezers*	Confidence interval
RP2	3010.00	6.26%	0.87%	1.47%	0.77%
RP3	3850.00	18.07%	1.22%	8.77%	0.89%
Total	6860.00	12.9%	–7.5%, +6.4%	5.6%	–4.9%, +4.1%

* Responses of "Don't know" or blank were considered to be "no."

The RP3 and NV1 surveys also asked about the numbers of non-vapor compression refrigerators and freezers in homes. While the numbers of weighted responses in the RP3 survey were higher for both refrigerators and freezers, we found from validating model numbers in the NV1 survey that only 29.4±4.7% of respondents who claimed to have a non-vapor compression refrigerator, and no respondent who claimed to have a non-vapor compression freezer, in fact had one (see Section 3.3.2). Therefore, we concluded that the numbers of non-vapor compression refrigeration products reported in the RP3 survey are

not reliable, and recommend using the NV1 results only, where we were able to filter on only those responses where validated brand and model number information was available. See Table 58 and Table 59.

Table 58. Proportions of numbers of non-vapor compression refrigerators

Survey Code	Total weighted responses	Number of non-vapor compression refrigerators				Average number per household	Confidence interval
		1	2	3	4+		
RP3 (not recommended)	695.61	87.02%	10.81%	1.63%	0.54%	1.157	0.063
NV1 (recommended)	161.00	97.85%	2.15%	0.00%	0.00%	1.021	0.050

Table 59. Proportions of numbers of non-vapor compression freezers

Survey Code	Total weighted responses	Number of non-vapor compression freezers				Average number per household	Confidence interval
		1	2	3	4+		
RP3 (not recommended)	337.73	86.39%	12.32%	1.29%	0.00%	1.149	0.087
NV1	0.00	N/A	N/A	N/A	N/A	0	N/A

In conclusion, the estimated proportion of households with non-vapor compression refrigerators was downscaled to 3.8(–2.3,+2.0)%. Together with the average of devices per household owning at least on non-vapor compression refrigeration product (1.021±0.050) and the number of U.S. households in 2012 (116.1 million), the estimated number of households with non-vapor compression refrigerators was 4.4(–2.7,+2.3) million, and the number of non-vapor compression refrigerators was 4.5(–2.7,+2.3) million.

3.3.2 Brand/model number verification

The RP2 and NV1 surveys asked for brand and model numbers, from which we were able to verify the technology for a portion of the responses. About 20% of unweighted responses in both surveys were confirmed to be non-vapor compression units. See Table 60 below.

Table 60. Proportion of responses with confirmed non-vapor compression units

Survey Code	Total (unweighted) responses providing model	Proportion of non-vapor compression units	Confidence interval

	information		
RP2	41	17.1%	11.5%
NV1	784	20.5%	2.8%
Total	825	20.4%	2.8%

We developed a more detailed analysis for the larger NV1 survey in Table 61. Here we only examined the subset of data for which positively-identified model numbers were available (681 total responses). Using unweighted data, we conclude that 23.6±4.4% of NV1 responses were legitimate non-vapor compression refrigerators (absorption or thermoelectric refrigeration technology). Using weighted data, however, this proportion is somewhat higher: 29.4±4.7%. Because weighted data is more representative of the U.S. average, we adopted the weighted result in our subsequent analysis.

Table 61. Classification breakdown of NV1 survey

	Unweighted counts			Weighted counts		
Classification	**Total responses**	**Proportion of subtotal**	**Confi-dence interval**	**Total responses**	**Proportion of subtotal**	**Confi-dence interval**
Absorption	9	1.32%	1.18%	6.37	1.05%	1.12%
Thermoelectric	152	22.32%	4.29%	170.92	28.33%	4.93%
Thermoelectric wine/beverage cooler	172	25.26%	4.48%	110.02	18.23%	4.23%
Vapor compression	329	48.31%	5.15%	294.95	48.88%	5.47%
DC only (not residential)	11	1.62%	1.30%	12.58	2.08%	1.56%
Gas absorption	6	0.88%	0.96%	7.11	1.18%	1.18%
Not refrigerator	2	0.29%	0.56%	1.42	0.24%	0.53%
Subtotal	681	100.00%		603.37	100.00%	
Unknown	103			163.14		
No brand/model information	70			87.49		
Total	854			854.00		

3.3.3 Distribution of capacities

The majority (86%) of non-vapor compression refrigerators were compact units of less than 7.75 cubic feet capacity. A small portion was reported to be larger units (up to 20 cu. ft. capacity) but we were unable to verify this information. See Table 62.

Table 62. Capacity of non-vapor compression refrigerators (Question 5, NV1 survey)

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Small compact = less than 4 cubic feet (113 liters)	131	116.76	72.52%	77.72%	9.13%
Large compact = at least 4 but less than 7.75 cubic feet (113 to 219 liters)	11	13.15	8.16%	8.75%	6.20%
Very small = at least 7.75 but less than 12 cubic feet (220 to 340 liters)	3	5.61	3.49%	3.74%	4.16%
Small = at least 12 but less than 16 cubic feet (340 to 453 liters)	6	10.72	6.66%	7.14%	5.65%
Medium = at least 16 but less than 20 cubic feet (453 to 566 liters)	3	3.98	2.47%	2.65%	3.53%
Large = at least 20 but less than 24 cubic feet (566 to 680 liters)	0	0.00	0.00%	0.00%	0.00%
Very large = at least 24 cubic feet (680 liters)	0	0.00	0.00%	0.00%	0.00%
Total of known responses	154	150.22	NA	100.00%	NA
Don't know	7	10.78	6.70%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

3.3.4 Product lifetime

As with other refrigeration products in this report, approximately 60% of respondents indicated they bought their non-vapor compression refrigerators new; see Table 63.

Table 63. Non-vapor compression refrigerators purchased new (Question 7, NV1 survey)

Response	Total responses			Known responses	
	Unweighted	Weighted	Weighted proportion of total	Weighted proportion	Confidence interval
Yes	100	97.79	60.74%	63.41%	8.69%
No	53	56.43	35.05%	36.59%	8.69%
Total of known responses	153	154.21	NA	100.00%	NA
Don't know	8	6.79	4.22%	NA	NA

Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

The age distribution of non-vapor compression refrigerators purchased new was quite young, with 91% indicating an age of less than 2 years. See Table 64.

Table 64. Age of non-vapor compression refrigerators (Question 10, NV1 survey)

	Total responses			Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion of total**	**Weighted proportion**	**Confidence interval**
Less than 12 months ago	71	71.73	73.36%	75.99%	12.47%
At least 1 year but less than 2 years ago	18	14.41	14.74%	15.27%	10.50%
At least 2 year but less than 3 years ago	6	5.49	5.61%	5.81%	6.83%
At least 3 year but less than 4 years ago	1	1.04	1.06%	1.10%	3.04%
At least 4 year but less than 5 years ago	0	0.00	0.00%	0.00%	0.00%
At least 5 year but less than 6 years ago	1	1.73	1.77%	1.83%	3.92%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	0	0.00	0.00%	0.00%	0.00%
At least 10 year but less than 12 years ago	0	0.00	0.00%	0.00%	0.00%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	97	94.39	NA	100.00%	NA
Don't know	1	1.74	1.78%	NA	NA
Blank	2	1.66	1.69%	NA	NA
Total	100	97.79	100.00%	NA	NA

The lifetime of non-vapor compression refrigerators was estimated using the same approach as that used for other refrigeration products in this report. As for residential icemakers, we were not able to filter on the subset of owners who had previously purchased a non-vapor compression refrigerator, and no independent shipments data were available, so we fit to the entire dataset and assumed flat shipments. The resulting fit to the data was excellent, with an average lifetime of 1.3 years. See Figure 29 and Table 65.

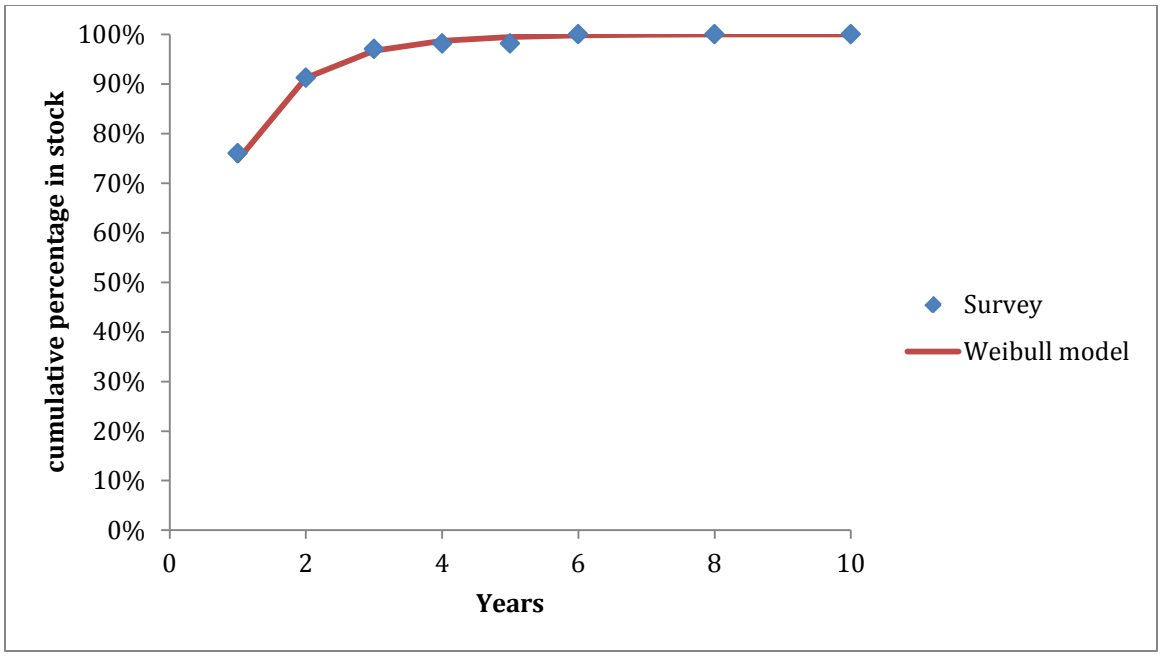

Figure 29. Lifetime function fit for non-vapor compression refrigerators

Table 65. Lifetime fitting parameters for non-vapor compression refrigerators

Data used	Shipments	Offset (years)	Beta	Alpha	Lifetime (years)
All	flat	1.0	0.8	0.6	1.34

Table 66 shows the results of the lifetime survival function for non-vapor compression refrigerators, for 20 years after purchase. As can be seen in the second and third columns, all products survive the first year, while only 22% survive to 2 years. After 12 years a very small percentage of products will survive. The fourth column shows the percentage of the remaining stock that will survive to the following year. Here the percentage increases over time, as the beta value is less than 1 in our formula. This is possibly because a portion of non-vapor compression refrigeration products are only used for a very short time, while the remainder of products are used for a very long time. However, it should be stressed that this is not a very robust result, and it is possible to fit the data with a value of beta larger than 1 as well.

Table 66: Lifetime model results for non-vapor compression refrigerators

Age	Percentage retiring	Percentage surviving	Percentage surviving to next year
1	0.00%	100.00%	100.0%
2	77.79%	22.21%	22.2%
3	14.93%	7.28%	32.8%
4	4.61%	2.67%	36.6%
5	1.62%	1.04%	39.1%

6	0.62%	0.43%	41.0%
7	0.25%	0.18%	42.5%
8	0.10%	0.08%	43.7%
9	0.04%	0.04%	44.7%
10	0.02%	0.02%	45.6%
11	0.01%	0.01%	46.4%
12	0.00%	0.00%	47.1%
13	0.00%	0.00%	47.8%
14	0.00%	0.00%	48.4%
15	0.00%	0.00%	48.9%
16	0.00%	0.00%	49.4%
17	0.00%	0.00%	49.9%
18	0.00%	0.00%	50.3%
19	0.00%	0.00%	50.7%
20	0.00%	0.00%	51.1%

3.3.5 Purchase price and installation cost

The median purchase price of non-vapor compression refrigerators (not including taxes or rebates) was between $101 and $125, with the highest price paid reported between $1,201 and $1,400. See Table 67.

Table 67. Purchase price of non-vapor compression refrigerators (Question 8, NV1 survey)

	Total responses			Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion of total**	**Weighted proportion**	**Confidence interval**
Up to $25	0	0.00	0.00%	0.00%	0.00%
Between $26 and $50	0	0.00	0.00%	0.00%	0.00%
Between $51 and $75	2	2.37	2.43%	2.44%	4.85%
Between $76 and $100	34	26.55	27.15%	27.27%	14.00%
Between $101 and $125	35	47.26	48.32%	48.53%	15.71%
Between $126 and $150	10	5.59	5.71%	5.74%	7.31%
Between $151 and $200	5	4.06	4.16%	4.17%	6.29%
Between $201 and $250	8	6.49	6.64%	6.67%	7.84%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $350	2	1.52	1.55%	1.56%	3.90%
Between $351 and $400	1	0.65	0.66%	0.66%	2.55%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
Between $501 and $600	0	0.00	0.00%	0.00%	0.00%
Between $601 and $700	0	0.00	0.00%	0.00%	0.00%

Between $701 and $800	0	0.00	0.00%	0.00%	0.00%
Between $801 and $1,000	0	0.00	0.00%	0.00%	0.00%
Between $1,001 and $1,200	1	1.86	1.90%	1.91%	4.30%
Between $1,201 and $1,400	1	1.04	1.06%	1.06%	3.22%
Between $1,401 and $1,600	0	0.00	0.00%	0.00%	0.00%
Between $1,601 and $1,800	0	0.00	0.00%	0.00%	0.00%
Between $1,801 and $2,000	0	0.00	0.00%	0.00%	0.00%
Between $2,001 and $2,500	0	0.00	0.00%	0.00%	0.00%
Between $2,501 and $3,000	0	0.00	0.00%	0.00%	0.00%
Between $3,001 and $3,500	0	0.00	0.00%	0.00%	0.00%
Between $3,501 and $4,000	0	0.00	0.00%	0.00%	0.00%
$4001 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	99	97.37	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	1	0.41	0.42%	NA	NA
Total	100	97.79	100.00%	NA	NA

Most non-vapor compression refrigerator owners (83%) did not receive a rebate on their purchase, but the remainder received a median rebate of up to $10; see Table 68.

Table 68. Rebate of non-vapor compression refrigerators (Question 9, RI1 survey)

	Total responses			Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion of total**	**Weighted proportion**	**Confidence interval**
No rebate	87	77.35	79.10%	83.39%	11.49%
Up to $10	2	11.55	11.81%	12.45%	10.20%
Between $11 and $20	2	0.65	0.66%	0.70%	2.57%
Between $21 and $30	1	0.56	0.57%	0.60%	2.39%
Between $31 and $40	0	0.00	0.00%	0.00%	0.00%
Between $41 and $50	1	0.32	0.32%	0.34%	1.80%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	1	1.73	1.77%	1.86%	4.18%
Between $101 and $125	1	0.60	0.62%	0.65%	2.48%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%

$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	95	92.75	NA	100.00%	NA
Don't know	4	4.62	4.73%	NA	NA
Blank	1	0.41	0.42%	NA	NA
Total	100	97.79	100.00%	NA	NA

The NV1 survey asked about installation costs of non-vapor compression refrigerators. Nearly all (96%) units were installed for free; the small number of respondents (10) who paid for installation reported a median cost of between $41 and $50. See Table 69.

Table 69. Cost of installation of non-vapor compression refrigerators (Question 12, NV1 survey)

	Total responses			Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion of total**	**Weighted proportion**	**Confidence interval**
Nothing; I installed it myself or someone installed it for free	147	149.68	92.97%	95.60%	4.88%
Up to $10	1	0.51	0.31%	0.32%	1.35%
Between $11 and $20	0	0.00	0.00%	0.00%	0.00%
Between $21 and $30	2	1.93	1.20%	1.23%	2.62%
Between $31 and $40	1	0.44	0.27%	0.28%	1.25%
Between $41 and $50	4	2.69	1.67%	1.72%	3.09%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	1	0.42	0.26%	0.27%	1.24%
Between $81 and $100	1	0.91	0.57%	0.58%	1.81%
Between $101 and $125	0	0.00	0.00%	0.00%	0.00%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	157	156.58	NA	100.00%	NA
Don't know	4	4.42	2.75%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

3.3.6 Repairs

The NV1 survey asked respondents about repairs to their non-vapor compression refrigerators; about 1.2% indicated that they had had repairs. See Table 70. However, given the very small number of respondents (2) who had repaired their refrigerators, we did not have sufficient data to indicate repair cost, repair frequency or components repaired, so these results are not shown.

Table 70. Incidence of repairs to non-vapor compression refrigerators (Question 13, NV1 survey)

	Total responses			Known responses	
Response	Unweighted	Weighted	Weighted proportion of total	Weighted proportion	Confidence interval
Yes	2	1.82	1.13%	1.18%	1.95%
No	152	152.75	94.88%	98.82%	1.95%
Total of known responses	154	154.58	NA	100.00%	NA
Don't know	7	6.42	3.99%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

3.3.7 Maintenance

The NV1 survey asked respondents whether they perform routine maintenance on their non-vapor compression refrigerators; about 23% of respondents indicated that they did. As for cost, 56% of those who perform routine maintenance pay nothing for it, with the remainder spending a median of between $11 and $20 per year. See Table 71 and Table 72.

Table 71. Incidence of maintenance of non-vapor compression refrigerators (Question 17, NV1 survey)

	Total responses			Known responses	
Response	Unweighted	Weighted	Weighted proportion of total	Weighted proportion	Confidence interval
Yes	30	35.63	22.13%	23.20%	7.63%
No	126	117.97	73.27%	76.80%	7.63%
Total of known responses	156	153.60	NA	100.00%	NA
Don't know	4	3.62	2.25%	NA	NA
Blank	1	3.78	2.35%	NA	NA
Total	161	161.00	100.00%	NA	NA

Table 72. Cost of maintenance of non-vapor compression refrigerators (Question 18, NV1 survey)

	Total responses		Weighted	Known responses	
Response	Unweighted	Weighted	proportion of total	Weighted proportion	Confidence interval

Nothing; I perform the maintenance myself or someone does it for free	21	19.94	55.98%	55.98%	24.73%
Up to $10	1	0.70	1.95%	1.95%	6.89%
Between $11 and $20	5	12.12	34.01%	34.01%	23.60%
Between $21 and $30	0	0.00	0.00%	0.00%	0.00%
Between $31 and $40	0	0.00	0.00%	0.00%	0.00%
Between $41 and $50	1	0.70	1.95%	1.95%	6.89%
Between $51 and $60	2	2.18	6.11%	6.11%	11.93%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	0	0.00	0.00%	0.00%	0.00%
Between $101 and $125	0	0.00	0.00%	0.00%	0.00%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	30	35.63	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	30	35.63	100.00%	NA	NA

3.3.8 Demographics of ownership

The demographics of non-vapor compression refrigerator owners differed from those of the general population. Similar to residential icemaker owners, non-vapor compression refrigerator owners tended to be more male, less white, more Hispanic, higher annual household income (≥$60,000), lower education level (high school/GED or no schooling), less 30-59 year old occupants, larger household size (≥3 occupants), less South Atlantic and more East North Central (with small differences in other geographic regions) than the general population. See Figure 30 through Figure 37 for more information.

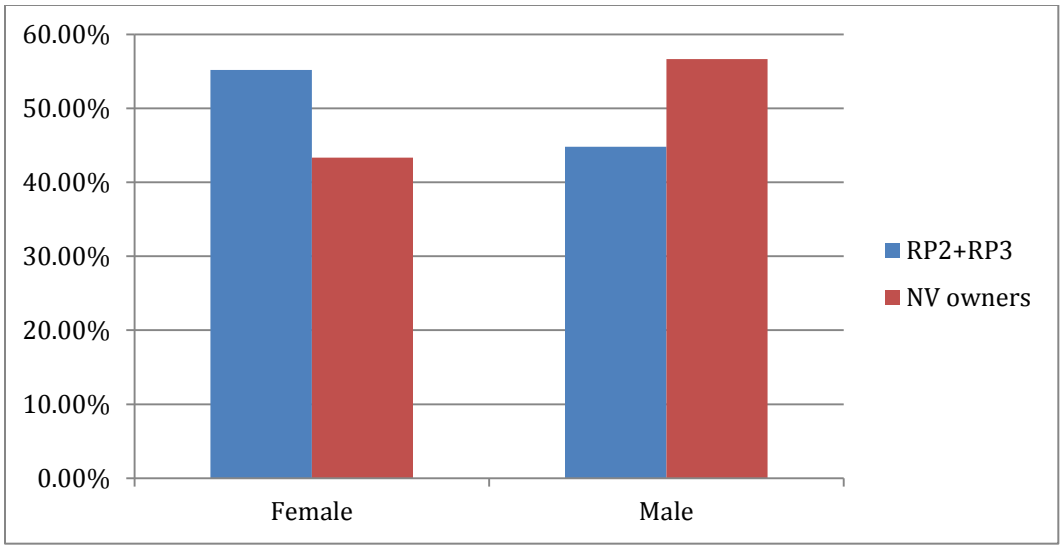

Figure 30. Gender of non-vapor compression refrigerator owners versus general population

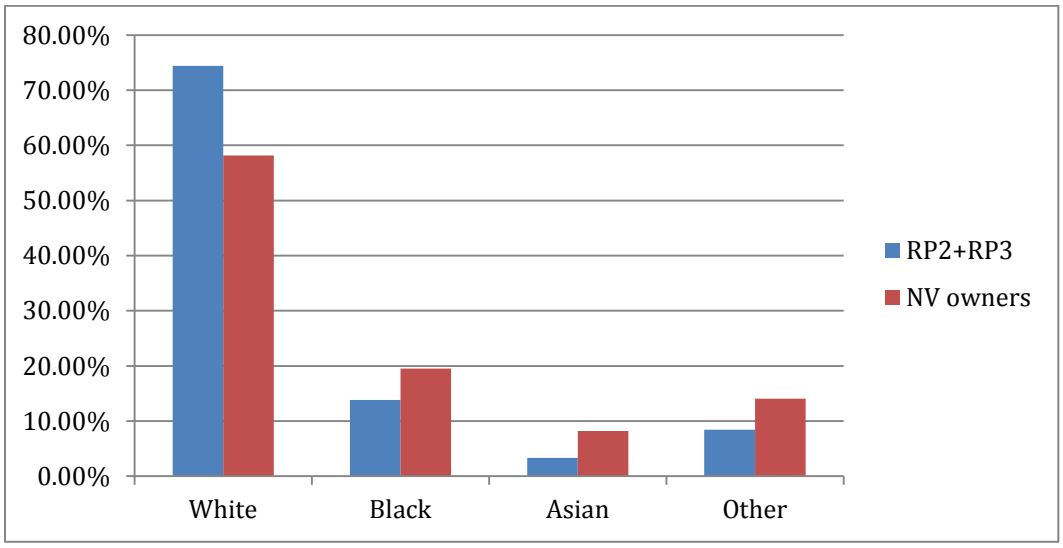

Figure 31. Race of non-vapor compression refrigerator owners versus general population

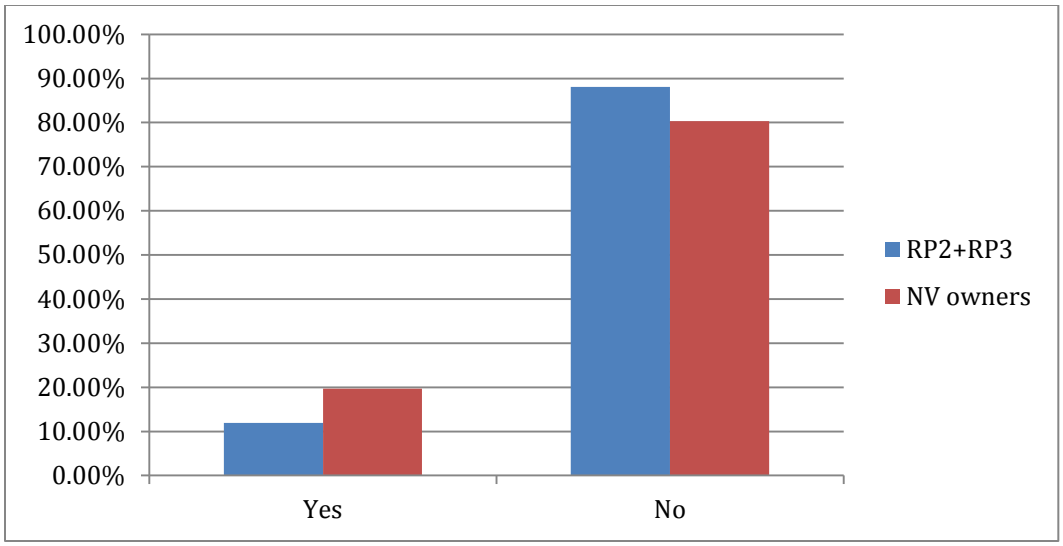

Figure 32. Hispanic origin of non-vapor compression refrigerator owners versus general population

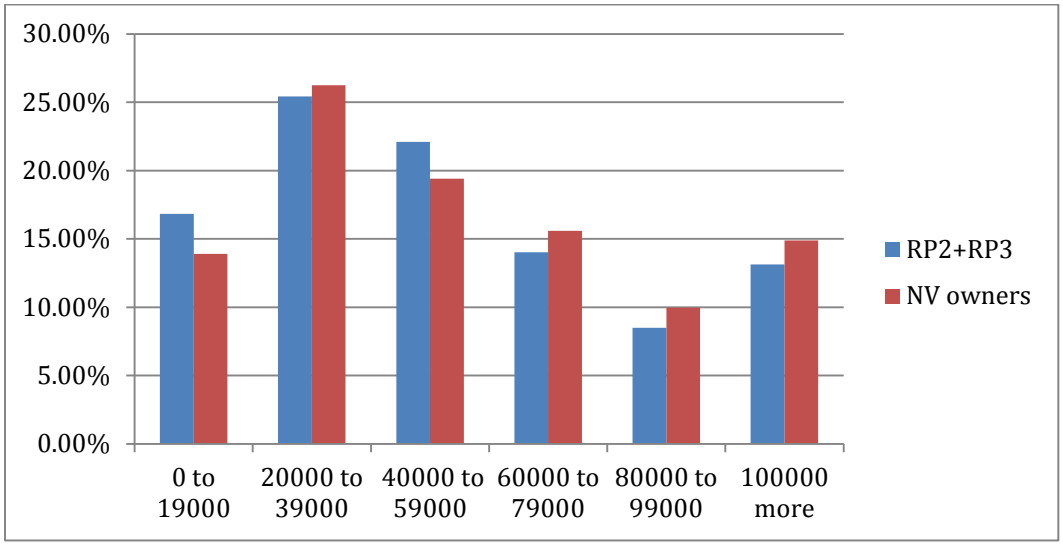

Figure 33. Annual household income of non-vapor compression refrigerator owners versus general population

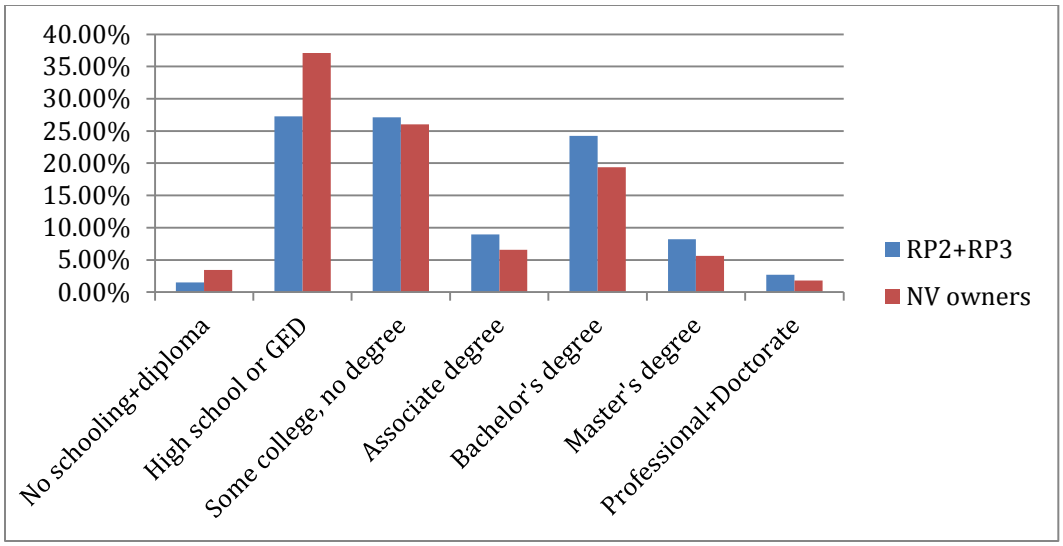

Figure 34. Education level of non-vapor compression refrigerator owners versus general population

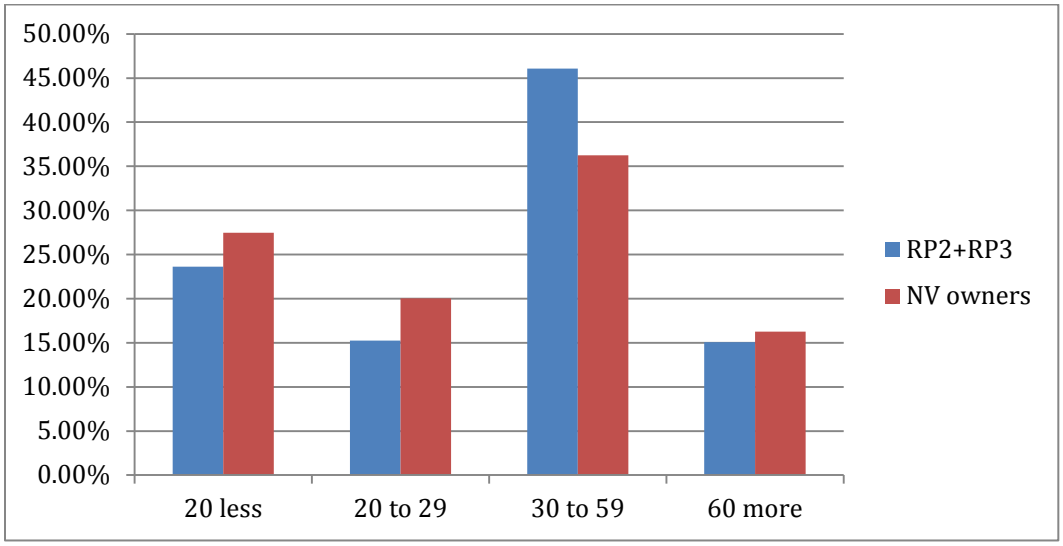

Figure 35. Occupant ages of non-vapor compression refrigerator owners versus general population

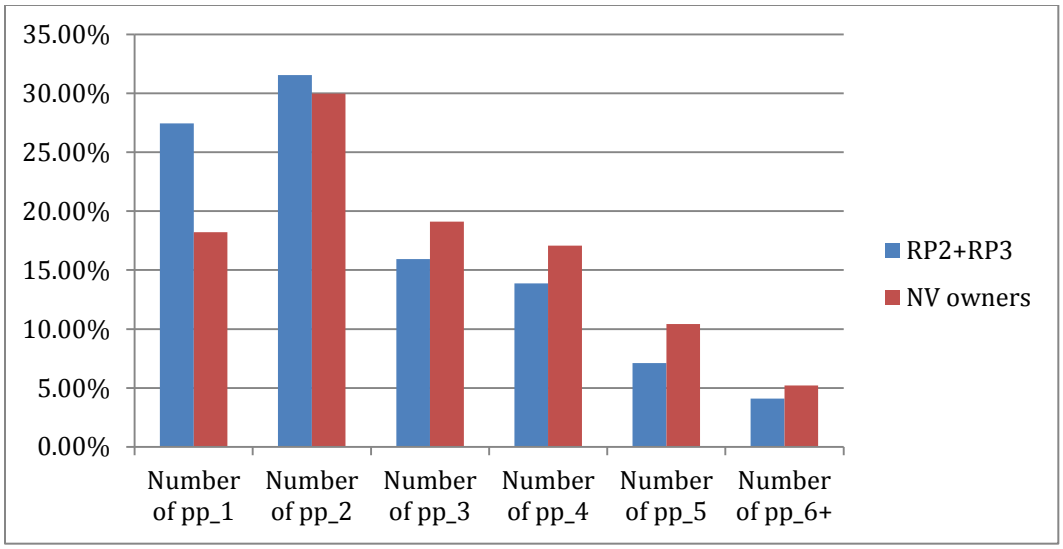

Figure 36. Household size of non-vapor compression refrigerator owners versus general population

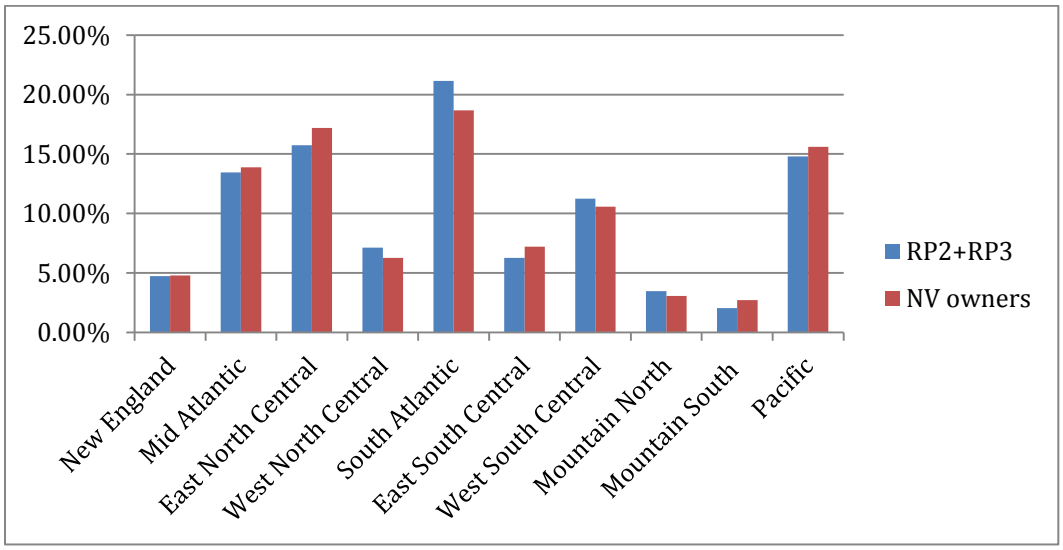

Figure 37. Geographic region of non-vapor compression refrigerator owners versus general population

3.4 Hybrid refrigeration product results

The RP2 survey asked about refrigerators and freezers with separate wine/beverage compartments. About 2.5% of refrigerators and 2.4% of freezers were reported to have such compartments, and about 2.0% were either "Don't know" or blank. See Table 73 and Table 74 for more information.

Table 73. Refrigerator with separate wine/beverage compartment? (Question 2, RP2 survey)

Response	Total responses			
	Unweighted counts	Weighted counts	Weighted proportion	Confidence interval

Yes	93	72.59	2.45%	0.71%
No	2815	2829.48	95.59%	0.94%
Don't know	47	41.20	1.39%	0.54%
Blank	13	16.67	0.56%	0.34%
Total	2968	2959.94	100.00%	

Table 74. Freezer with separate wine/beverage compartment? (Question 18, RP2 survey)

	Total responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
Yes	31	22.38	2.37%	1.19%
No	956	900.85	95.57%	1.61%
Don't know	25	14.14	1.50%	0.95%
Blank	4	5.19	0.55%	0.58%
Total	1016	942.57	100.00%	

To estimate the overall penetration and saturation of hybrid devices in U.S. households, we needed to estimate these quantities for ordinary refrigerators and freezers. In Table 75 and Table 76, we present these results for the RP2 and RP3 surveys, and also compare to RECS 2009 data.

Table 75. Households with ordinary (non-hybrid) refrigerators and freezers

	Known responses			
Survey Code	**Households with targeted devices**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
	Refrigerators			
RP2	2959.59	3001.82	98.59%	0.42%
RP3	3824.18	3843.11	99.51%	0.22%
Total	6783.77	6844.93	99.11%	-0.93%, +0.62%
RECS 2009	12062.62	12083.00	99.83%	0.07%
	Freezers			
RP2	942.32	3009.34	31.31%	1.66%
RP3	1592.2	3842.15	41.44%	1.56%
Total	2534.52	6851.49	36.99%	-7.34%, +6.01%
RECS 2009	3678.96	12083.00	30.45%	0.82%

Table 76. Average numbers of ordinary (non-hybrid) refrigerators and freezers in households with the product

	Known	Number of targeted devices					Average	Confidence
Survey code	**weighted**	**1**	**2**	**3**	**4**	**5+**	**number**	**interval**

	responses						per household	
Refrigerators								
RP2	2959.59	76.42%	20.11%	3.08%	0.34%	0.04%	1.2748	0.0015
RP3	3824.18	80.22%	17.45%	1.97%	0.26%	0.10%	1.2256	0.0010
Total	6783.77	78.56%	18.61%	2.46%	0.30%	0.07%	1.247	-0.022, +0.029
RECS 2009	12062.62	77.04%	20.78%	1.84%	0.24%	0.10%	1.2559	0.0003
Freezers								
RP2	942.32	89.76%	9.16%	1.07%	0.00%	0.01%	1.1133	0.0021
RP3	1592.2	88.29%	10.32%	1.14%	0.13%	0.12%	1.1348	0.0015
Total	2534.52	88.83%	9.89%	1.12%	0.08%	0.08%	1.127	-0.016, +0.010
RECS 2009	3678.96	91.59%	7.11%	1.31%	0.00%	0.00%	1.0972	0.0005

We find that survey results indicate the penetrations of refrigerators at 99.1(−0.9,+0.6)% and of freezers, 37.0(−7.3,+6.0)%, while the average numbers of products in homes with those products are 1.247(−0.022,+0.029) and 1.127(−0.016,+0.010), respectively. (Device saturations can be obtained by multiplying these two quantities.) These estimates compare well with RECS 2009 within their confidence intervals for all quantities except for the average number of freezers per household, which appears to be biased high relative to RECS for both the RP2 and RP3 surveys. However, the absolute difference is still quite small, about 0.030 freezers per household.

Using the more accurate RECS results, we find that the estimated household penetration of hybrid refrigerator-wine/beverage coolers is 2.4±0.8%, and the device saturation is 3.1±0.9%, yielding an estimated 2.8±0.8 million households and 3.6±1.0 million units. For freezer-wine/beverage coolers, we find that the estimated household penetration is 0.7±0.4%, and the device saturation is 0.8±0.4%, yielding an estimated 0.8±0.4 million households and 0.9±0.5 million units.

3.5 AC/DC refrigeration products

The RP2 survey asked respondents whether the refrigerators, freezers and wine/beverage coolers in their homes could operate on either AC or DC electricity. Affirmative responses were provided for approximately 15% of refrigerators and freezer owners, and 21% of wine/beverage cooler owners. However, as discussed in Section 3.1.12, we were able to verify the responses to roughly 20% of wine/beverage cooler claims (418 units) where model numbers were provided, and found no evidence that any of them could run on DC power. Therefore, our best estimate of the fraction of wine/beverage coolers that run on AC or DC power is zero. We did not have the opportunity to similarly evaluate refrigerators and freezers using model number information, but warn that results should be interpreted with caution. See Table 77 through Table 79.

Table 77. Refrigerators that can operate on either AC or DC electricity (Question 4, RP2 survey)

Response	Total responses			
	Unweighted counts	Weighted counts	Weighted proportion*	Confidence interval
Yes	456	421.30	14.23%	1.60%
No	1619	1784.37	60.28%	2.24%
Don't know	879	740.45	25.02%	1.99%
Blank	14	13.82	0.47%	0.31%
Total	2968	2959.94	100.00%	

* Based on model number verification of 418 wine/beverage coolers, we estimate that the actual proportion of refrigerators that can operate on either AC or DC electricity is much smaller than what is indicated here.

Table 78. Freezers that can operate on either AC or DC electricity (Question 20, RP2 survey)

Response	Total responses			
	Unweighted counts	Weighted counts	Weighted proportion*	Confidence interval
Yes	167	143.20	15.19%	2.81%
No	597	587.63	62.34%	3.80%
Don't know	246	204.66	21.71%	3.23%
Blank	6	7.08	0.75%	0.68%
Total	1016	942.57	100.00%	

* Based on model number verification of 418 wine/beverage coolers, we estimate that the actual proportion of freezers that can operate on either AC or DC electricity is much smaller than what is indicated here.

Table 79. Wine/beverage coolers that can operate on either AC or DC electricity (Question 32, RP2 survey)

Response	Total responses			
	Unweighted counts	Weighted counts	Weighted proportion*	Confidence interval
Yes	99	70.25	20.87%	5.17%
No	192	192.89	57.30%	6.29%
Don't know	91	70.74	21.01%	5.18%
Blank	4	2.74	0.81%	1.14%
Total	386	336.61	100.00%	

* Based on model number verification of 418 wine/beverage coolers, we estimate that the actual proportion of wine/beverage coolers that can operate on either AC or DC electricity is zero.

Given the above caveats, our estimates of the number of AC/DC refrigerators and freezers are as follows. Using the estimated numbers of ordinary refrigerators and freezers described in Section 4.4, we find that the estimated household penetration of AC/DC

refrigerators is 14.2±1.6%, and the device saturation is 17.8±2.0%, yielding an estimated 16.5±1.9 million households and 20.7±2.3 million units. For AC/DC freezers, we find that the estimated household penetration is 4.6±0.9%, and the device saturation is 5.1±1.0% yielding an estimated 5.4±1.0 million households and 5.9±1.1 million units. Again, it should be emphasized that these results should be treated with caution.

4 Discussion

4.1 Penetrations, saturations, numbers of households and numbers of devices

We summarize our calculations of the penetrations, saturations, numbers of households and numbers of devices described in Section 3 again below in Table 80 and Table 81. Also included are our best "high-bound" estimated number of devices, based on the upper confidence interval estimate in each case.

Table 80. Calculation of household penetrations of wine/beverage coolers, residential icemakers and non-vapor compression refrigeration products

	Penetration	Correction for false positives	Corrected penetration	Number of households (millions)	Number in device-owning households	Saturation	Number of units (millions)	High-bound number of units (millions)
Wine/beverage coolers								
Central value	9.99%	95.90%	9.58%	11.12	1.109	10.62%	12.33	13.29
Confidence interval	0.71%	1.90%	0.71%	0.82	0.027	0.83%	0.96	
Residential icemakers								
Central value	5.36%	85.70%	4.60%	5.34	1.032	4.75%	5.51	8.70
Low confidence interval bound	-3.44%	-2.20%	-2.95%	-3.43	-0.023	-3.05%	-3.54	
High confidence interval bound	3.10%	2.20%	2.66%	3.09	0.023	2.75%	3.19	
Non-vapor compression refrigerators								
Central value	12.89%	29.40%	3.79%	4.40	1.021	3.87%	4.49	6.85
Low confidence interval bound	-7.50%	-4.70%	-2.29%	-2.65	-0.050	-2.34%	-2.72	
High confidence interval bound	6.40%	4.70%	1.98%	2.29	0.050	2.03%	2.35	
Non-vapor compression freezers								
Central value	5.57%	0.00%	0.00%	0.00	N/A	0.00%	0.00	0.00
Low confidence interval bound	-4.87%	N/A	N/A	N/A	N/A	N/A	N/A	
High confidence interval bound	4.10%	N/A	N/A	N/A	N/A	N/A	N/A	

Table 81. Calculation of household penetrations of hybrid and AC/DC refrigeration products

	Household penetration of targeted devices	Household penetration of parent devices	Correction for false positives	Corrected household penetration of targeted devices	Number of households (millions)	Number in device-owning households	Targeted device saturation	Number of units (millions)	High-bound number of units (millions)
Hybrid refrigerator-wine/beverage coolers									
Central value	2.45%	99.831%	100%	2.446%	2.84	1.25592	3.07%	3.57	4.60
Confidence interval	0.71%	0.073%	N/A	0.71%	0.82	0.00034	0.89%	1.03	
Hybrid freezer-wine/beverage coolers									
Central value	2.37%	30.45%	100%	0.72%	0.84	1.09720	0.79%	0.92	1.38
Confidence interval	1.19%	0.82%	N/A	0.36%	0.42	0.00048	0.40%	0.46	
AC/DC refrigerators									
Central value	14.23%	99.831%	100%	14.21%	16.49	1.25592	17.84%	20.71*	23.04*
Confidence interval	1.60%	0.073%	N/A	1.60%	1.855	0.00034	2.01%	2.33	
AC/DC freezers									
Central value	15.19%	30.45%	100%	4.62%	5.37	1.09720	5.07%	5.89*	6.99*
Confidence interval	2.81%	0.82%	N/A	0.86%	1.00	0.00048	0.95%	1.10	
AC/DC wine/beverage coolers									
Central value	20.87%	9.58%	0%	0.00%	0.00	0.00	0.00%	0.00	0.00
Confidence interval	5.17%	0.71%	N/A	N/A	N/A	N/A	N/A	N/A	

*Treat results with caution, as they have not been validated against actual brand/model number data.

Our wine/beverage cooler penetration estimate of 9.6±0.7% can be compared to results from a recent Canadian survey of 394 households in 2011 that reported an average wine/beverage cooler proportion of 5.3±2.2% (Strack and Associates, 2012; Parekh et al., 2012). The two estimates do not agree within their 95% confidence intervals. However, differences between the two countries may account for the difference. We investigated the amount of wine drinking in the two countries, but concluded that they were very similar, with Canadians actually drinking slightly more wine than Americans (1.50 versus 1.36 L/capita/year of pure alcohol; WHO, 2011). However, we also found a lower average gross domestic product per capita in Canada ($40,370) versus the U.S. ($48,112) in 2011 (World Bank, 2013) as well as lower average mean and median equivalized disposable household incomes (Wikipedia, 2013). Our data indicated that the penetration of wine/beverage coolers in U.S. households was strongly correlated with income, as shown below in Figure 38, so the difference in country incomes may partially account for the differences in wine/beverage cooler proportions.

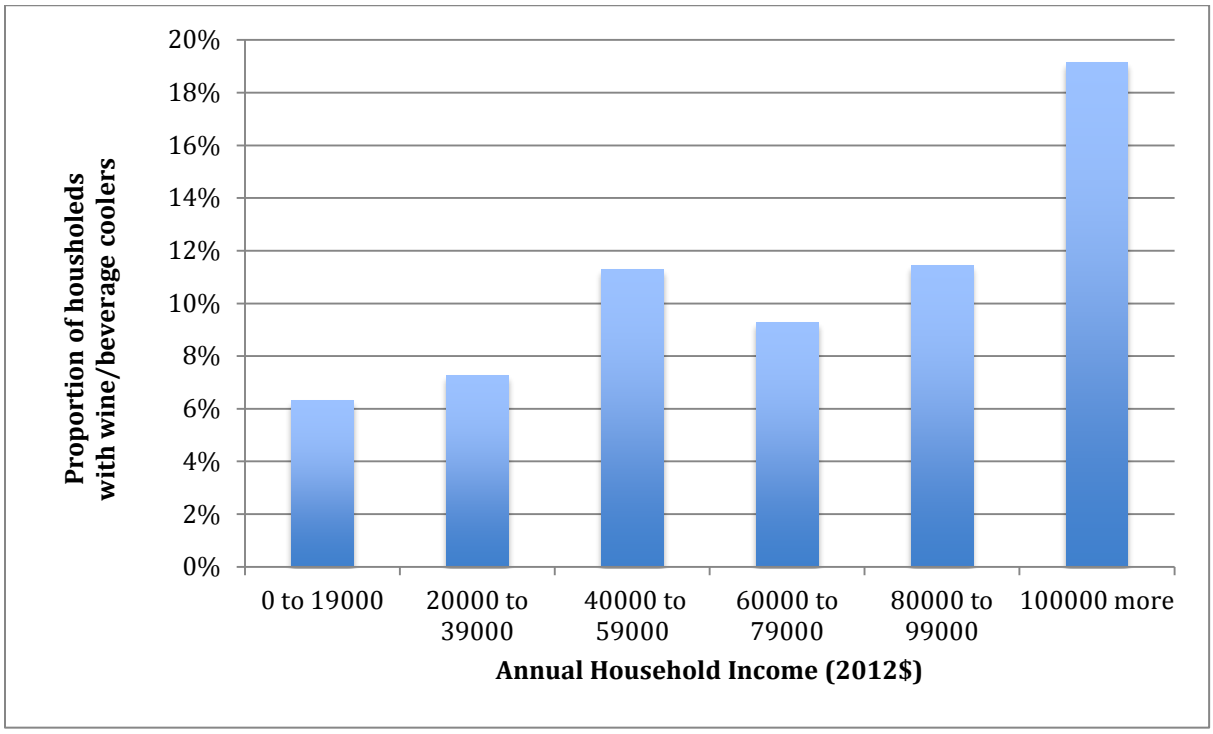

Figure 38. Penetration of wine/beverage coolers versus annual household income

NPD estimated that their wine/beverage cooler shipments data covered between 25% and 40% of the U.S. market, implying, at the upper end of the range, that they represented 10.9% of refrigerator/freezer shipments in 2007 and declined to 4.1% of refrigerator/freezer shipments in 2011. By contrast, our estimates of wine/beverage cooler shipments represent 16% of refrigerator/freezer shipments in 2012, using our derived wine/beverage cooler lifetime of 4.5 years (see Section 3.1.5)—about four times higher than the NPD estimate. See Table 82.

Based on the agreement between our surveys and RECS in the numbers of refrigerators and freezers in U.S. households, and the agreement in the proportions of wine/beverage coolers among the two surveys (RP2 and RP3), we conclude that the NPD estimates cover a much smaller portion of the U.S. market than indicated.

Table 82. Comparison of wine/beverage cooler shipment estimates between NPD and survey data

	Data source						
	DOE R/F Final Rule	NPD			Surveys (this report)		
Year	Total R/F shipments (millions)	W/BC shipments (thousands)	Implied W/BC fraction of R/F shipments (40%)*	Implied W/BC fraction of R/F shipments (25%)*	Derived W/BC stock (millions)	Implied W/BC shipments (thousands)†	Implied W/BC fraction of R/F shipments
2005	16.73	112.1	1.7%	2.7%			
2006	15.39	298.4	4.8%	7.8%			
2007	15.09	410.5	6.8%	10.9%			
2008	14.37	229.5	4.0%	6.4%			
2009	14.27	185.1	3.2%	5.2%			
2010	15.02	182.3	3.0%	4.9%			
2011	16.29	168.0	2.6%	4.1%			
2012	17.15				12.3	2,733	15.9%

Key:
R/F = refrigerator/freezer
W/BC = wine/beverage cooler
* Value in parentheses indicates NPD's own estimation of the fraction of the U.S. market covered by their data, which is provided as a range from 25% to 40%.
† Assuming a derived W/BC lifetime of 4.5 years.

4.2 Proportions of wine/beverage cooler capacities

NPD provided shipments of wine/beverage coolers by capacity from 2005 to 2011. As noted in the previous section, although NPD estimates that their data cover 25-40% of the retail market, it appears that this estimate is too high by about a factor of four. Nonetheless, we used this data to compare the relative proportions of shipments by capacity and year. See Table 83, Figure 39 and Figure 40.

Table 83. NPD shipments of wine/beverage coolers by year and capacity (note that absolute numbers do not reflect total U.S. shipments)

Capacity (in wine bottles)	Shipments by year						
	2005	2006	2007	2008	2009	2010	2011

1 to 11	3,528	90,888	162,658	92,515	72,815	75,632	73,554
12 to 19	31,357	104,713	140,917	80,519	77,924	60,525	52,931
20 to 29	32,344	25,672	36,138	22,019	6,489	8,891	7,895
30 to 39	32,234	56,242	37,488	14,975	13,544	19,605	20,539
40 to 49	2,674	13,812	16,984	5,571	10,233	15,147	10,184
50 to 59	8,267	5,710	4,779	2,415	2,664	2,163	1,982
60 to 89	1,337	1,052	989	331	125	121	103
90+	298	230	1,557	1,369	189	148	272
Not Specified	52	52	8,965	9,835	1,098	101	492
Total	112,091	298,371	410,475	229,549	185,081	182,333	167,952

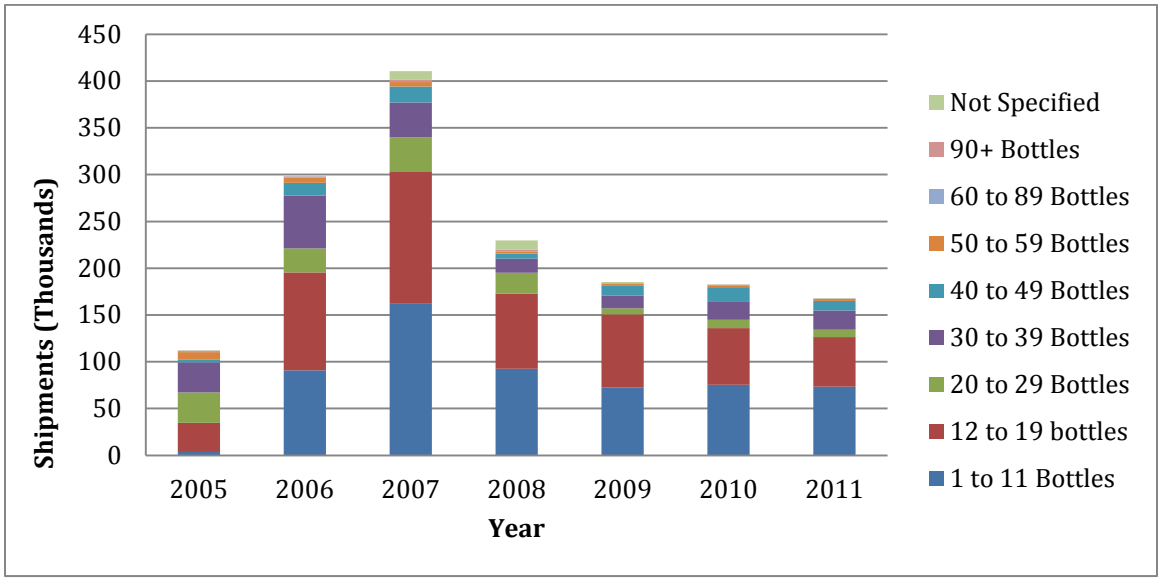

Figure 39. NPD shipments of wine/beverage coolers by year and capacity (note that absolute numbers do not reflect total U.S. shipments)

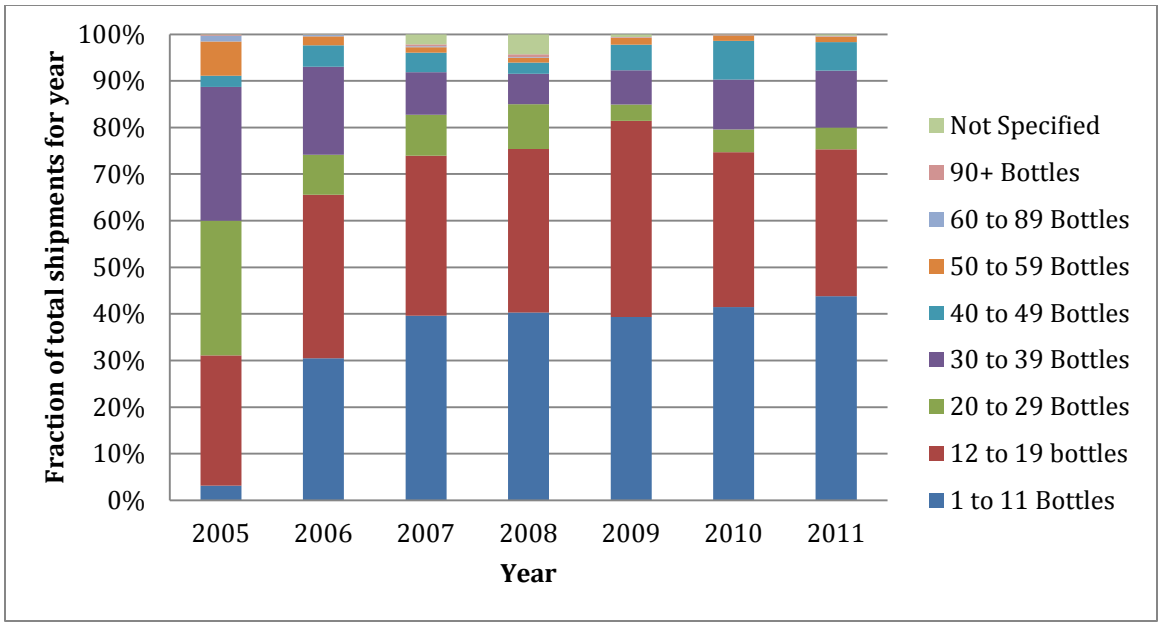

Figure 40. NPD shipments of wine/beverage coolers by year and capacity (expressed as fraction of total for each year)

The proportions of shipments by capacity appear fairly steady from 2008-2011, so we have combined shipments for these four years to obtain average proportions by capacity, shown in Table 84. Included here as well are proportions from the WC1 survey for comparison.

Table 84. Proportion of NPD shipments (2008-2011 average) by capacity, and comparison to WC1 survey (2012)

Capacity (number of wine bottles)	Proportion of total* (NPD)	Proportion of total* (WC1 survey)	Confidence interval (WC1 survey)
1 to 11	41.7%	43.7%	3.6%
12 to 19	36.1%	33.2%	3.1%
20 to 29	6.0%	14.9%	1.7%
30 to 39	9.1%	4.9%	2.6%
40 to 49	5.5%	1.5%	1.4%
50 to 59	1.2%	1.1%	0.7%
60 to 89	0.1%	0.1%	0.6%
90+	0.3%	0.5%	0.2%
Total	100.0%	100.0%	

* Not including "Not specified" shipments (NPD) or "Don't know"/blank responses (WC1 survey).

Proportions agree well for the two capacity categories with the largest market shares (1-11 and 12-19 bottles), but there are statistically-significant disagreements in the 20-29 through 40-49 bottle categories: the NPD market shares are spread more evenly among this range, while the WC1 survey market share is concentrated in the 20-29 bottle category. At large capacity sizes (50-59 bottles and larger), market shares are consistent between the two data sources. We conclude that because NPD only appears to cover a small fraction of

the total market, the data is somewhat biased away from shipments in the 20-29 bottle capacity range and toward those with larger capacities (30-49 bottles).

4.3 Price distributions of wine/beverage coolers

NPD's shipment data of wine/beverage coolers also contained retail prices by model number, allowing a very detailed disaggregation of price by capacity and year. Although data were available from 2005-2011, large changes in price distributions appeared to occur for some capacities prior to 2009, so we used the average of 2009-2011 to determine price distributions by capacity. See Figure 41 through Figure 47. The Appendix provides price distributions for all years, as well as tables summarizing the data found here.

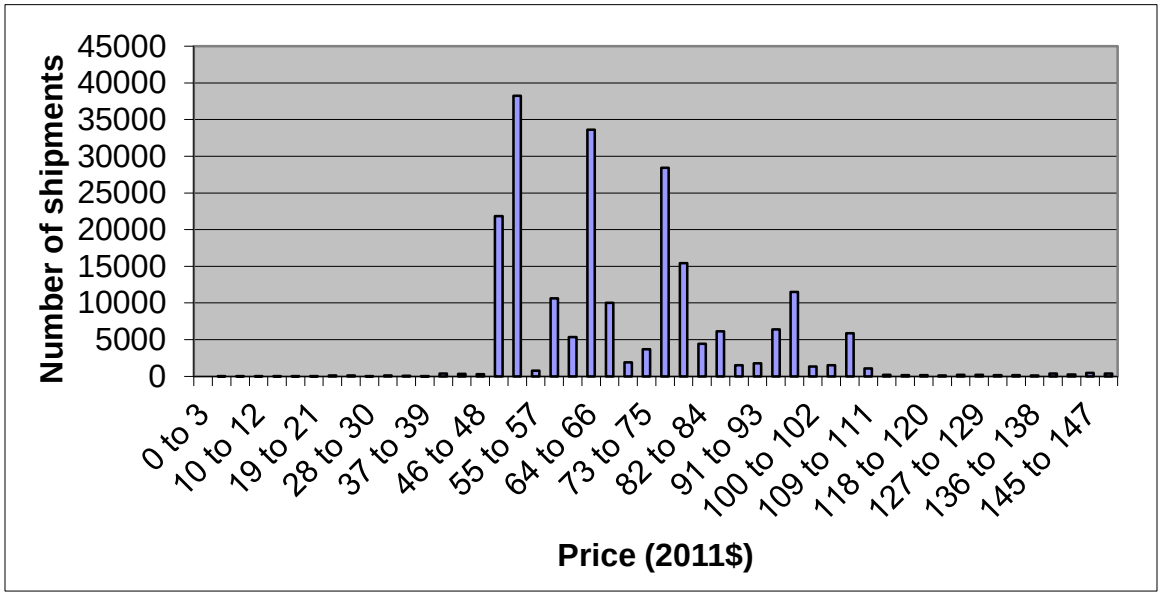

Figure 41. NPD average 2009-2011 prices for 1-11 bottle capacity wine/beverage coolers

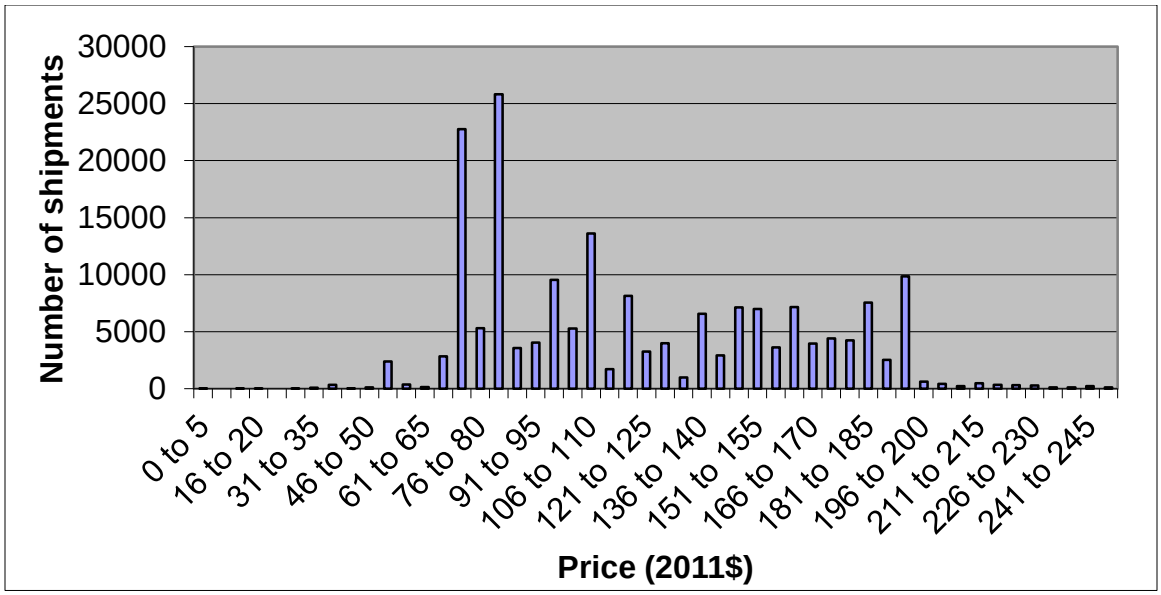

Figure 42. NPD average 2009-2011 prices for 12-19 bottle capacity wine/beverage coolers

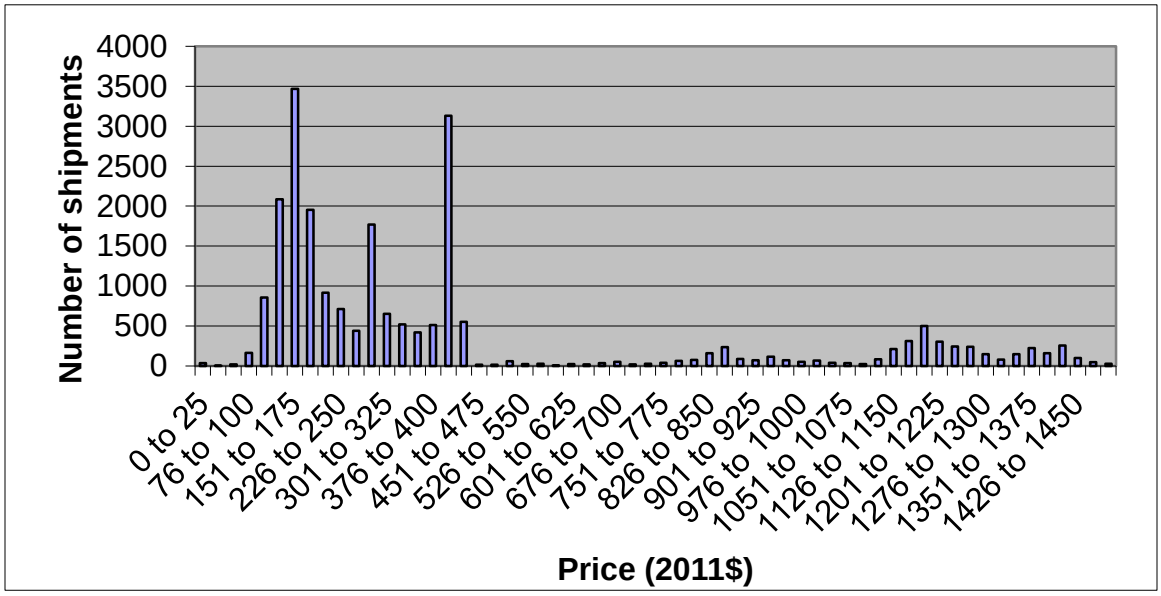

Figure 43. NPD average 2009-2011 prices for 20-29 bottle capacity wine/beverage coolers

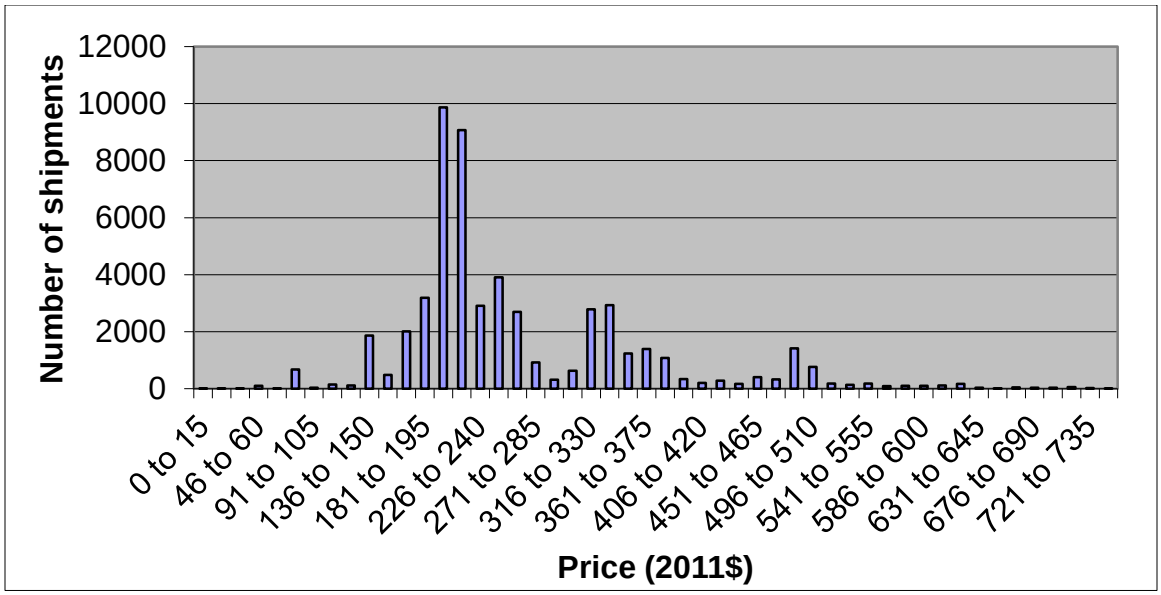

Figure 44. NPD average 2009-2011 prices for 30-39 bottle capacity wine/beverage coolers

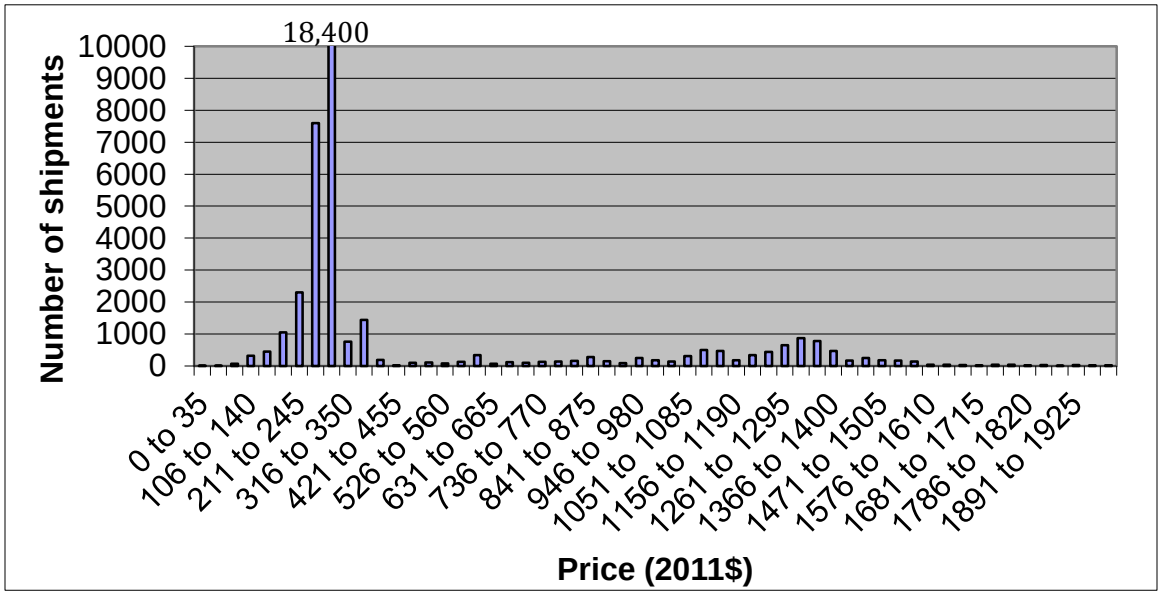

Figure 45. NPD average 2009-2011 prices for 40-59 bottle capacity wine/beverage coolers. Note that the vertical scale was expanded to show detail; the number of shipments at the one data point whose full height was truncated is labeled on the Figure.

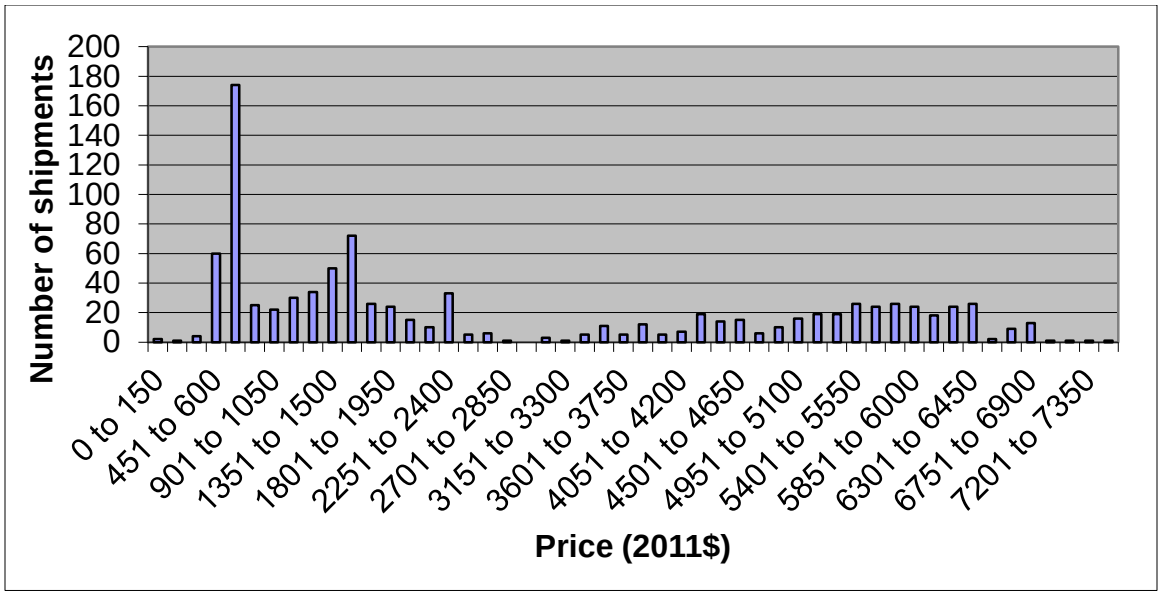

Figure 46. NPD average 2009-2011 prices for 60+ bottle capacity wine/beverage coolers

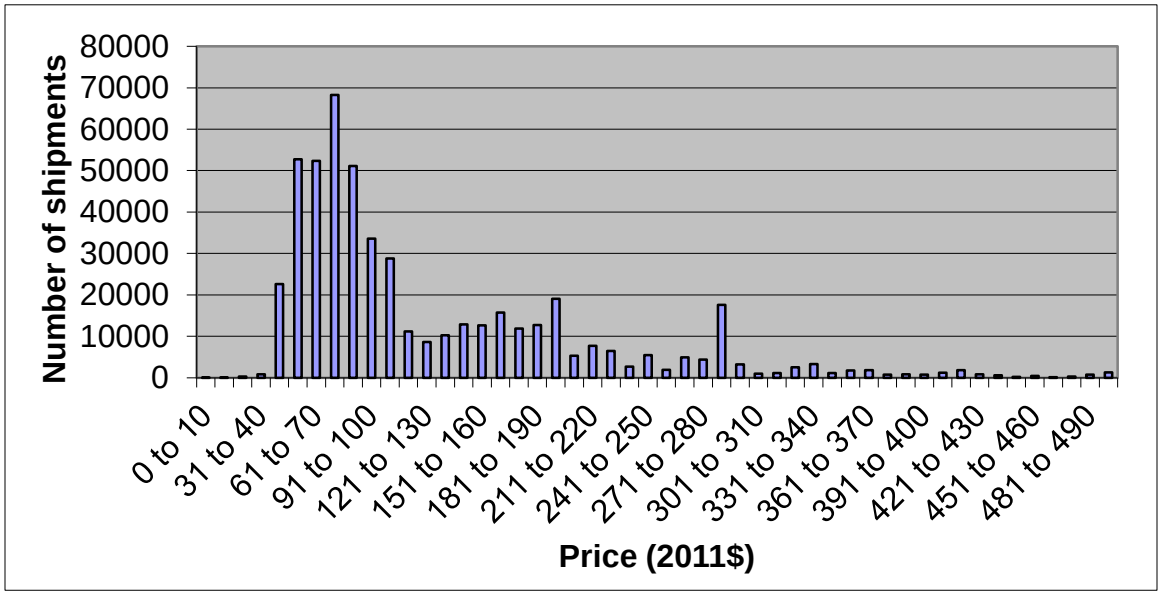

Figure 47. NPD average 2009-2011 prices for all wine/beverage coolers

We find generally increasing average prices with capacity, though distributions remain broad. For units in the 20-29 bottle and 40+ bottle capacities, we observe clustering at both low prices (<$500) and high prices (>$1000), suggesting low-end and luxury versions in the same capacity range.

We also compared the NPD price data to WC1 survey data disaggregated by capacity. Due to data limitations in the survey data, only the 1-11, 12-19 and 20-29 bottle capacities are shown in Figure 48 through Figure 50, and Table 85 through Table 87. (Note that these are composed of both units where the primary purpose was wine as well as beer/soda; the bottle capacities of the latter were converted to the equivalent number of wine bottles

using the relationships established above in Section 3.1.2). A comparison of price distributions for all capacities is also shown in Figure 51 and Table 88.

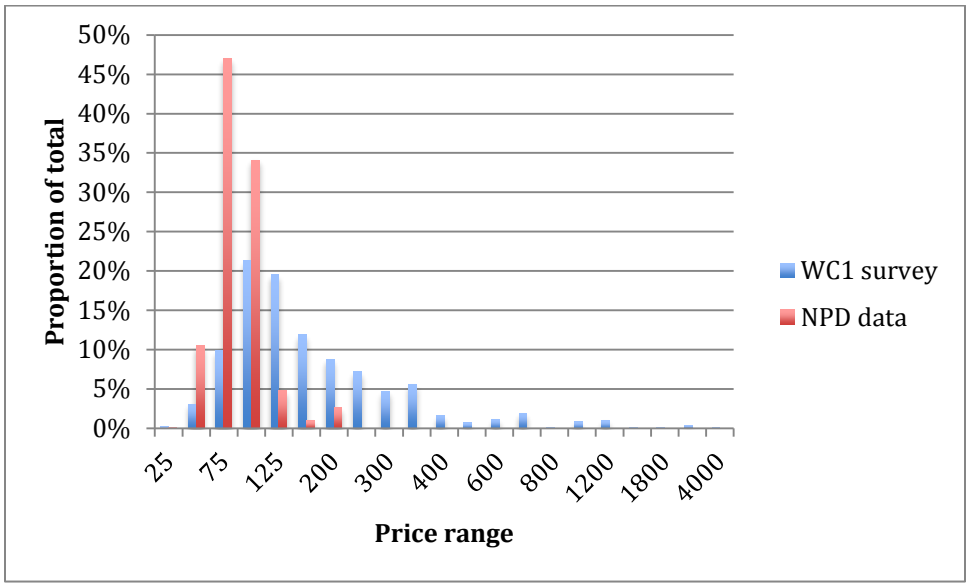

Figure 48. Comparison of 1-11 bottle capacity wine/beverage cooler prices between WC1 and NPD data

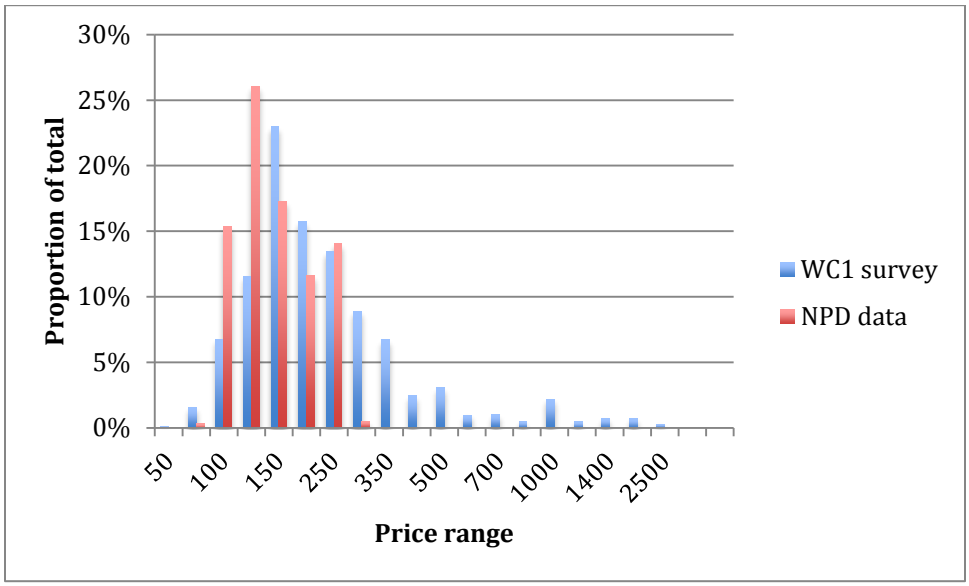

Figure 49. Comparison of 12-19 bottle capacity wine/beverage cooler prices between WC1 and NPD data

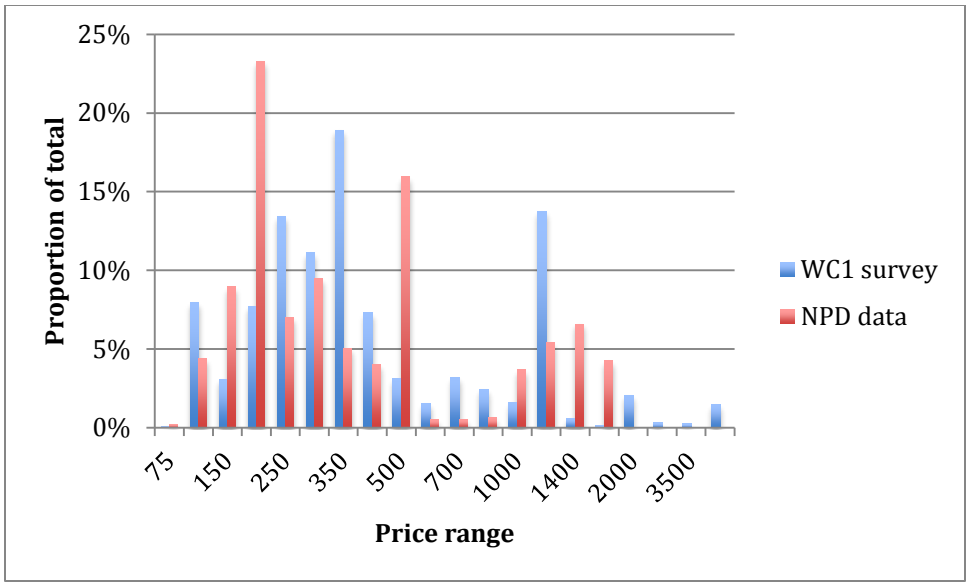

Figure 50. Comparison of 20-29 bottle capacity wine/beverage cooler prices between WC1 and NPD data

Table 85. Comparison of 1-11 bottle capacity wine/beverage cooler prices between WC1 and NPD data

Price range	WC1 survey	NPD data
0-25	0.18%	0.08%
26-50	3.08%	10.46%
51-75	9.85%	46.96%
76-100	21.35%	34.10%
101-125	19.54%	4.81%
126-150	11.94%	0.95%
151+	NA	2.65%
151-200	8.75%	NA
201-250	7.20%	NA
251-300	4.72%	NA
301-350	5.50%	NA
351-400	1.66%	NA
401-500	0.68%	NA
501-600	1.14%	NA
601-700	1.91%	NA
701-800	0.14%	NA
801-1000	0.82%	NA
1001-1200	0.95%	NA
1201-1400	0.09%	NA
1401-1600	0.00%	NA
1601-1800	0.05%	NA
1801-2500	0.00%	NA
2501-3000	0.38%	NA
3001-3500	0.00%	NA
3501-4000	0.07%	NA

Total	100.00%	100.00%

Table 86. Comparison of 12-19 bottle capacity wine/beverage cooler prices between WC1 and NPD data

Price range	WC1 survey	NPD data
0-25	0.00%	0.00%
26-50	0.09%	0.00%
51-75	1.55%	0.31%
76-100	6.71%	15.37%
101-125	11.53%	26.05%
126-150	22.98%	17.26%
151-200	15.77%	11.65%
201-250	13.42%	14.09%
251+	NA	0.52%
251-300	8.86%	NA
301-350	6.75%	NA
351-400	2.48%	NA
401-500	3.07%	NA
501-600	0.96%	NA
601-700	1.00%	NA
701-800	0.49%	NA
801-1000	2.20%	NA
1001-1200	0.47%	NA
1201-1400	0.69%	NA
1401-1600	0.00%	NA
1601-1800	0.68%	NA
1801-2000	0.00%	NA
2001-2500	0.29%	NA
Total	100.00%	100.00%

Table 87. Comparison of 20-29 bottle capacity wine/beverage cooler prices between WC1 and NPD data

Price range	WC1 survey	NPD data
0-25	0.00%	0.15%
26-50	0.00%	0.01%
51-75	0.08%	0.08%
76-100	0.00%	0.69%
101-125	7.97%	3.68%
126-150	3.07%	8.97%
151-200	7.71%	23.30%
201-250	13.40%	7.00%
251-300	11.11%	9.50%
301-350	18.92%	5.03%
351-400	7.34%	3.99%
401-500	3.12%	15.96%

501-600	1.52%	0.51%
601-700	3.18%	0.54%
701-800	2.43%	0.63%
801-1000	1.60%	3.70%
1001-1200	13.76%	5.42%
1201-1400	0.60%	6.58%
1401-1500	0.00%	1.82%
1501+	NA	2.46%
1501-1600	0.00%	NA
1601-1800	0.13%	NA
1801-2000	2.04%	NA
2001-2500	0.31%	NA
2501-3000	0.00%	NA
3001-3500	0.24%	NA
4001+	1.49%	NA
Total	100.00%	100.00%

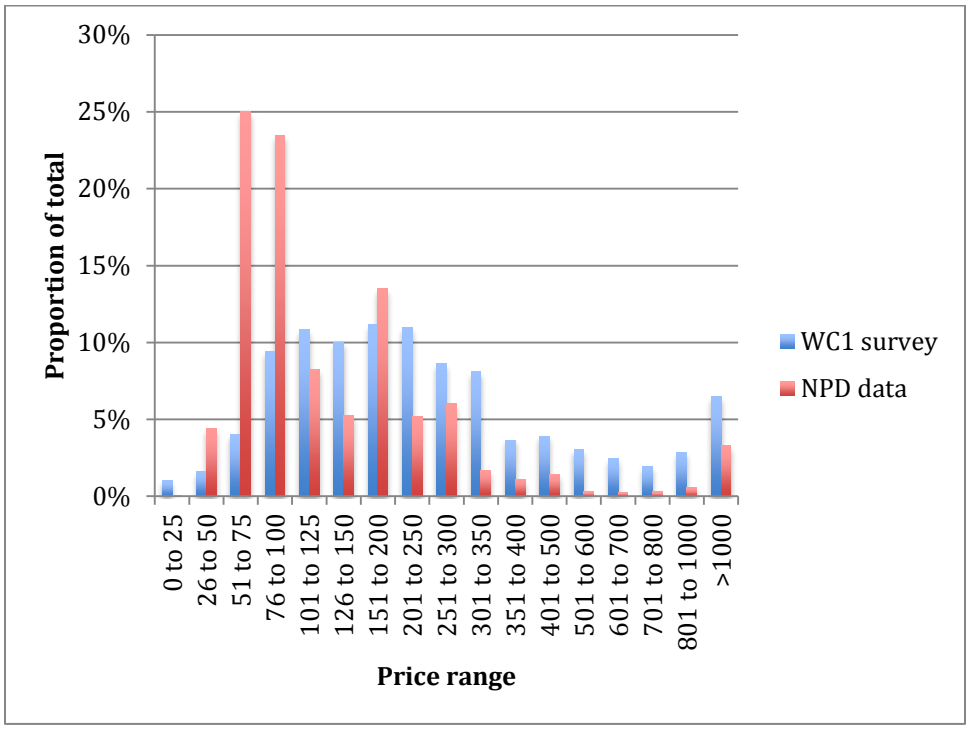

Figure 51. Comparison of all capacities of wine/beverage cooler prices between WC1 and NPD data

Table 88. Comparison of all capacities of wine/beverage cooler prices between WC1 and NPD data

Price range	WC1 survey	NPD data
0 to 25	0.99%	0.05%
26 to 50	1.59%	4.43%
51 to 75	4.00%	25.00%
76 to 100	9.40%	23.48%
101 to 125	10.84%	8.23%

126 to 150	9.98%	5.24%
151 to 200	11.18%	13.51%
201 to 250	11.00%	5.18%
251 to 300	8.63%	6.00%
301 to 350	8.12%	1.69%
351 to 400	3.65%	1.11%
401 to 500	3.91%	1.42%
501 to 600	3.01%	0.28%
601 to 700	2.47%	0.25%
701 to 800	1.92%	0.28%
801 to 1000	2.84%	0.58%
>1001	6.47%	3.27%
Total	100.00%	100.00%

While we observe some differences in the details of the distributions, and a bias in the NPD data toward lower prices at all capacities, there is general agreement in the price trends as functions of capacity, and significant overlap in the price ranges between the WC1 and NPD data, including the clustering at low and high prices in the 20-29 bottle capacity data.

5 Conclusions

We have reported on the collection of statistically representative survey data of refrigeration products from U.S. households for the first time using AMT. Data on the presence, number, type and usage of refrigerators, freezers, and various miscellaneous refrigeration products (wine/beverage coolers, residential icemakers and non-vapor compression refrigerators and freezers) were collected and analyzed, along with household and demographic information. Such products have been poorly studied to date, with almost no information available about shipments, stocks, capacities, energy use, etc. A total of 9,981 clean survey responses were obtained from five distinct surveys deployed in 2012.

Survey responses were weighted using a combination of techniques documented in detail in a previous LBNL report (Greenblatt et al., 2013). General refrigeration product survey responses were weighted to demographics in the U.S. Energy Information Administration's Residential Energy Consumption Survey 2009 dataset (RECS, 2009), while miscellaneous refrigeration product survey responses were weighted according to demographics of product ownership found in the general refrigeration product surveys.

Model number matching for a portion of miscellaneous refrigeration product responses allowed validation of refrigeration product characteristics, including the identity of miscellaneous refrigeration products, and the cooling technology of wine/beverage coolers. This enabled more accurate estimates of the penetrations of these products in U.S. households.

Overall, we estimated that there were 12.3±1.0 million wine/beverage coolers, 5.5(−3.5,+3.2) million residential icemakers and 4.4(−2.7,+2.3) million non-vapor compression refrigerators in U.S. households in 2012. (All numerical results are expressed with ranges indicating 95% confidence intervals.) No evidence was found for the existence of non-vapor compression freezers. Moreover, we found that 15% of wine/beverage coolers used vapor compression cooling technology, while 85% used thermoelectric cooling technology, with the vast majority of thermoelectric units having capacities of less than 30 wine bottles (approximately 3.5 cubic feet). No evidence was found for the existence of wine/beverage coolers with absorption cooling technology. We also estimated that there were 3.6±1.0 million hybrid refrigerator-wine/beverage coolers and 0.9±0.5 million hybrid freezer-wine/beverage coolers in U.S. households.

In addition to penetration data, we obtained estimated distributions of miscellaneous refrigeration product ages (and through fitting to a survival function, product lifetimes), capacities, purchase and installation costs, repair frequencies and costs, and maintenance costs. For wine/beverage coolers, we also obtained information on the penetration of built-in units, AC/DC operating capability, the use of internal lights, and distributions of door opening frequencies. The reported penetration of AC/DC operating capability was found to be inconsistent with verified model number-based information; no wine/beverage coolers were found to have AC/DC operating capability.

We also estimated the penetration of refrigerators and freezers with AC/DC operating capability, but based on the lack of evidence of these products among wine/beverage coolers, our estimates for refrigerators and freezers were considered suspect.

The penetrations of wine/beverage coolers were compared with data from Canadian households and found to be somewhat higher, though the difference in per capita incomes may at least partially account for this discrepancy. Implied shipments of wine/beverage coolers (calculated from the estimated stocks and lifetimes) were also compared to data obtained from the NPD Group, Inc. and found to be at least four times larger, but uncertainty in the actual portion of the U.S. market covered by the NPD data suggests such an apparent discrepancy may be possible.

The information obtained through AMT surveys is essential for developing detailed estimates of national energy usage and life-cycle costs. The use of such survey methods would be helpful in obtaining similar information about other residential plug-load appliances.

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Appendices

A.1 Complete survey results

Weighted proportions of each survey question response are presented below. In certain cases, questions have been filtered to exclude non-applicable responses (such as those from respondents who were asked to skip a question based on their response to an earlier question).

A.1.1 RP2 survey

Question 1. How many refrigerators are plugged in at your home right now?

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval*
None	34	42.23	1.40%	1.41%	0.57%
1	2097	2261.58	75.14%	75.34%	2.08%
2	723	595.29	19.78%	19.83%	1.92%
3	122	91.29	3.03%	3.04%	0.83%
4	22	10.16	0.34%	0.34%	0.28%
5 or more	2	1.27	0.04%	0.04%	0.10%
Total of known responses	3000	3001.83	NA	100.00%	NA
Don't know	2	0.34	0.01%	NA	NA
Blank	8	7.84	0.26%	NA	NA
Total responses	3010	3010.00	100.00%	NA	NA

* For all tables in these Appendices, this column refers to 95% confidence intervals. For questions with only two known response types, the standard error of a normal binomial distribution was used, while for those with more than two known response types, the Bonferroni correction was applied. See Section 2.6 for more information.

Question 2. Do you have a refrigerator with a special section or compartment designed specifically for storing wine at a warmer temperature? **[Filtered on those not responding "None" or Blank to Question 1]**

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	93	72.59	2.45%	2.50%	0.65%
No	2815	2829.48	95.59%	97.50%	0.65%
Total of known responses	2908	2902.07	NA	100.00%	NA
Don't know	47	41.20	1.39%	NA	NA

Blank	13	16.67	0.56%	NA	NA
Total responses	2968	2959.94	100.00%	NA	NA

Question 3. How many full-sized (750 mL) bottles of wine is this refrigerator's wine storage section able to hold? **[Filtered on those responding "Yes" to Question 2]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to 5 bottles	47	36.55	50.35%	50.70%	15.84%
Between 6 and 10 bottles	28	23.25	32.03%	32.26%	14.81%
Between 11 and 15 bottles	7	5.49	7.57%	7.62%	8.41%
Between 16 and 20 bottles	7	4.05	5.57%	5.61%	7.29%
Between 21 and 25 bottles	1	1.85	2.55%	2.56%	5.01%
Between 26 and 30 bottles	1	0.89	1.23%	1.24%	3.50%
31 or more bottles	0	0.00	0.00%	0.00%	0.00%
Total of known responses	91	72.08	NA	100.00%	NA
Don't know	2	0.51	0.70%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	93	72.59	100.00%	NA	NA

Question 4. Do you have a refrigerator that can operate on either AC or DC electricity?

	Total responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
Yes	456	421.30	14.23%	1.60%
No	1619	1784.37	60.28%	2.24%
Don't know	879	740.45	25.02%	1.99%
Blank	14	13.82	0.47%	0.31%
Total	2968	2959.94	100.00%	

Question 5. Do you have a refrigerator that uses thermoelectric or absorption cooling technology to provide cooling?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	195	188.51	6.37%	9.13%	1.42%

No	1805	1876.68	63.40%	90.87%	1.42%
Total of known responses	2000	2065.19	NA	100.00%	NA
Don't know	967	890.34	30.08%	NA	NA
Blank	1	4.40	0.15%	NA	NA
Total	2968	2959.94	100.00%	NA	NA

Question 6. What is the brand of this refrigerator? **[Responses not shown; see Section 3.3.2 for validation]**

Question 7. Please enter the brand name of this refrigerator **[Responses not shown; see Section 3.3.2 for validation]**

Question 8. What is the full model number of this refrigerator? **[Responses not shown; see Section 3.3.2 for validation]**

Question 9. Please indicate which cooling technology this refrigerator uses **[Filtered on those responding "Yes" to Question 5]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Thermoelectric	106	96.58	51.23%	69.60%	8.75%
Absorption cooling	41	42.18	22.38%	30.40%	8.75%
Total of known responses	147	138.76	NA	100.00%	NA
Don't know	47	49.55	26.29%	NA	NA
Blank	1	0.20	0.10%	NA	NA
Total	195	188.51	100.00%	NA	NA

Question 10. Can your absorption cooling refrigerator operate with propane as well as electricity? **[Filtered on those responding "Absorption cooling" to Question 9]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	12	19.49	46.20%	67.65%	19.54%
No	17	9.32	22.09%	32.35%	19.54%
Total of known responses	29	28.80	NA	100.00%	NA
Don't know	8	9.64	22.85%	NA	NA
Blank	4	3.74	8.86%	NA	NA
Total	41	42.18	100.00%	NA	NA

Question 11. Please estimate the total capacity of this thermoelectric or absorption cooling refrigerator **[Responses not shown, due to incorrect metric conversions]**

Question 12. Does this refrigerator contain a separate freezer section? **[Filtered on those responding "Yes" to Question 5]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	172	160.52	85.15%	85.49%	5.76%
No	21	27.24	14.45%	14.51%	5.76%
Total of known responses	193	187.76	NA	100.00%	NA
Don't know	1	0.36	0.19%	NA	NA
Blank	1	0.39	0.21%	NA	NA
Total	195	188.51	100.00%	NA	NA

Question 13. Please estimate the capacity of the freezer section of this refrigerator **[Responses not shown, due to incorrect metric conversions]**

Question 14. Does this thermoelectric or absorption cooling refrigerator have a separate section or compartment designed specifically for storing wine at a warmer temperature? **[Filtered on those responding "Yes" to Question 5]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	31	33.76	17.91%	18.44%	6.42%
No	156	149.37	79.24%	81.56%	6.42%
Total of known responses	187	183.13	NA	100.00%	NA
Don't know	7	4.54	2.41%	NA	NA
Blank	1	0.83	0.44%	NA	NA
Total	195	188.51	100.00%	NA	NA

Question 15. How many full-sized (750 mL) bottles of wine is this refrigerator's wine storage section able to hold? **[Filtered on those responding "Yes" to Question 14]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to 5 bottles	9	13.40	39.70%	47.47%	25.28%
Between 6 and 10 bottles	5	2.96	8.78%	10.50%	15.52%
Between 11 and 15 bottles	10	9.86	29.21%	34.93%	24.14%

Between 16 and 20 bottles	3	2.01	5.94%	7.10%	13.00%
Between 21 and 25 bottles	0	0.00	0.00%	0.00%	0.00%
Between 26 and 30 bottles	0	0.00	0.00%	0.00%	0.00%
31 or more bottles	0	0.00	0.00%	0.00%	0.00%
Total of known responses	27	28.23	NA	100.00%	NA
Don't know	2	4.41	13.08%	NA	NA
Blank	2	1.11	3.30%	NA	NA
Total	31	33.76	100.00%	NA	NA

Question 16. What material are wine bottles typically made from? **[Cheater question; responses not shown because only correct responses were retained for analysis]**

Question 17. How many stand-alone freezers are plugged in at your home right now?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
None	1992	2067.02	68.67%	68.69%	2.23%
1	924	845.81	28.10%	28.11%	2.16%
2	79	86.35	2.87%	2.87%	0.80%
3	11	10.10	0.34%	0.34%	0.28%
4	0	0.00	0.00%	0.00%	0.00%
5 or more	1	0.06	0.00%	0.00%	0.02%
Total of known responses	3007	3009.35	NA	100.00%	NA
Don't know	1	0.24	0.01%	NA	NA
Blank	2	0.41	0.01%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 18. Do you have a freezer with a separate section or compartment designed specifically for storing wine at a temperature higher than 39°F (4°C)? **[Filtered on those not responding "None" or Blank to Question 17]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	31	22.38	2.37%	2.42%	1.13%
No	956	900.85	95.57%	97.58%	1.13%
Total of known responses	987	923.24	NA	100.00%	NA
Don't know	25	14.14	1.50%	NA	NA

Blank	4	5.19	0.55%	NA	NA
Total	1016	942.57	100.00%	NA	NA

Question 19. How many full-sized (750 mL) bottles of wine is this freezer's wine storage section able to hold? **[Filtered on those responding "Yes" to Question 18]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to 5 bottles	5	1.60	7.16%	7.87%	16.05%
Between 6 and 10 bottles	10	8.30	37.09%	40.75%	29.28%
Between 11 and 15 bottles	6	3.66	16.36%	17.97%	22.88%
Between 16 and 20 bottles	5	4.65	20.77%	22.82%	25.01%
Between 21 and 25 bottles	1	1.55	6.92%	7.60%	15.79%
Between 26 and 30 bottles	1	0.12	0.52%	0.57%	4.49%
31 or more bottles	1	0.49	2.20%	2.42%	9.16%
Total of known responses	29	20.37	NA	100.00%	NA
Don't know	1	1.40	6.27%	NA	NA
Blank	1	0.61	2.71%	NA	NA
Total	31	22.38	100.00%	NA	NA

Question 20. Do you have a freezer that can operate on either AC or DC electricity? **[Filtered on those not responding "None" or Blank to Question 17]**

	Total responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
Yes	167	143.20	15.19%	2.81%
No	597	587.63	62.34%	3.80%
Don't know	246	204.66	21.71%	3.23%
Blank	6	7.08	0.75%	0.68%
Total	1016	942.57	100.00%	

Question 21. Do you have a freezer that uses thermoelectric or absorption cooling technology to provide cooling? **[Filtered on those not responding "None" or Blank to Question 17]**

Response	**Total responses**	**Known responses**

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	47	44.11	4.68%	6.50%	2.12%
No	628	634.03	67.27%	93.50%	2.12%
Total of known responses	675	678.13	NA	100.00%	NA
Don't know	339	263.57	27.96%	NA	NA
Blank	2	0.86	0.09%	NA	NA
Total	1016	942.57	100.00%	NA	NA

Question 22. What is the brand of this freezer? **[Responses not shown; see Section 3.3.2 for validation of brand/model numbers]**

Question 23. Please enter the brand name of this freezer **[Responses not shown; see Section 3.3.2 for validation of brand/model numbers]**

Question 24. What is the full model number of this freezer? **[Responses not shown; see Section 3.3.2 for validation of brand/model numbers]**

Question 25. Please indicate which cooling technology this freezer uses **[Filtered on those responding "Yes" to Question 21]**

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Thermoelectric	24	27.19	61.64%	71.63%	16.40%
Absorption cooling	13	10.77	24.41%	28.37%	16.40%
Total of known responses	37	37.96	NA	100.00%	NA
Don't know	9	5.52	12.51%	NA	NA
Blank	1	0.63	1.44%	NA	NA
Total	47	44.11	100.00%	NA	NA

Question 26. Can your absorption cooling freezer operate with propane as well as electricity? **[Filtered on those responding "Absorption cooling" to Question 25]**

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	2	6.15	57.14%	70.15%	34.63%
No	7	2.62	24.32%	29.85%	34.63%
Total of known responses	9	8.77	NA	100.00%	NA
Don't know	4	2.00	18.54%	NA	NA
Blank	0	0.00	0.00%	NA	NA

Total	13	10.77	100.00%	NA	NA

Question 27. Please estimate the total capacity of this thermoelectric or absorption cooling freezer **[Responses not shown, due to incorrect metric conversions]**

Question 28. Does this thermoelectric or absorption cooling freezer have a separate section or compartment designed specifically for storing wine at a warmer temperature? **[Filtered on those responding "Yes" to Question 21]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	8	1.88	4.27%	5.28%	8.40%
No	34	33.78	76.59%	94.72%	8.40%
Total of known responses	42	35.67	NA	100.00%	NA
Don't know	4	4.15	9.42%	NA	NA
Blank	1	4.29	9.72%	NA	NA
Total	47	44.11	100.00%	NA	NA

Question 29. How many full-sized (750 mL) bottles of wine is this freezer's wine storage section able to hold? **[Filtered on those answering "Yes" to Question 28. Responses not shown, due to insufficient number of responses (<10)]**

Question 30. How many bottles of wine are there in a dozen? [**Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 31. How many stand-alone, wine/beverage coolers are plugged in at your home right now?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
None	2623	2673.16	88.81%	88.86%	1.51%
1	365	323.44	10.75%	10.75%	1.49%
2	15	9.87	0.33%	0.33%	0.28%
3	2	1.24	0.04%	0.04%	0.10%
4	0	0.00	0.00%	0.00%	0.00%
5 or more	1	0.60	0.02%	0.02%	0.07%
Total of known responses	3006	3008.30	NA	100.00%	NA
Don't know	3	1.46	0.05%	NA	NA
Blank	1	0.23	0.01%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 32. Do you have a wine/beverage cooler that can operate on either AC or DC electricity? **[Filtered on those not answering "None" or Blank to Question 31]**

Response	Total responses			
	Unweighted counts	Weighted counts	Weighted proportion	Confidence interval
Yes	99	70.25	20.87%	5.17%
No	192	192.89	57.30%	6.29%
Don't know	91	70.74	21.01%	5.18%
Blank	4	2.74	0.81%	1.14%
Total	386	336.61	100.00%	

Question 33. Do you have a wine/beverage cooler that uses thermoelectric or absorption cooling technology to provide cooling? **[Filtered on those not answering "None" or Blank to Question 31]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	88	88.70	26.35%	37.37%	7.04%
No	166	148.63	44.16%	62.63%	7.04%
Total of known responses	254	237.33	NA	100.00%	NA
Don't know	129	96.15	28.56%	NA	NA
Blank	3	3.13	0.93%	NA	NA
Total	386	336.61	100.00%	NA	NA

Question 34. Please indicate which cooling technology this wine/beverage cooler uses **[Filtered on those answering "Yes" to Question 33]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Thermoelectric	63	70.31	79.27%	85.76%	8.65%
Absorption cooling	19	11.67	13.16%	14.24%	8.65%
Total of known responses	82	81.99	NA	100.00%	NA
Don't know	5	6.36	7.17%	NA	NA
Blank	1	0.36	0.40%	NA	NA
Total	88	88.70	100.00%	NA	NA

Question 35. Can your absorption cooling wine/beverage cooler operate with propane as well as electricity? **[Filtered on those answering "Absorption cooling" to Question 34]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval

Yes	5	5.33	45.66%	49.00%	33.97%
No	13	5.55	47.52%	51.00%	33.97%
Total of known responses	18	10.88	NA	100.00%	NA
Don't know	1	0.80	6.82%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	19	11.67	100.00%	NA	NA

Question 36. How many stand-alone icemakers are plugged in at your home right now?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
None	2896	2927.89	97.27%	97.53%	0.75%
1	98	73.16	2.43%	2.44%	0.74%
2	4	0.68	0.02%	0.02%	0.07%
3	2	0.34	0.01%	0.01%	0.05%
4	0	0.00	0.00%	0.00%	0.00%
5 or more	1	0.06	0.00%	0.00%	0.02%
Total of known responses	3001	3002.14	NA	100.00%	NA
Don't know	3	0.85	0.03%	NA	NA
Blank	6	7.02	0.23%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 37. How many pounds of ice can your stand-alone icemaker make per day?
[Filtered on those not answering "None" or Blank to Question 36]

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 10 pounds per day	42	29.61	39.43%	45.11%	16.21%
Between 10 and 19 pounds per day	30	21.98	29.27%	33.49%	15.37%
Between 20 and 29 pounds per day	11	10.89	14.50%	16.59%	12.11%
Between 30 and 49 pounds per day	4	3.06	4.08%	4.66%	6.87%
Between 50 and 79 pounds per day	1	0.10	0.13%	0.15%	1.26%
At least 80 pounds per day	0	0.00	0.00%	0.00%	0.00%
Total of known	88	65.63	NA	100.00%	NA

responses					
Don't know	18	9.17	12.22%	NA	NA
Blank	2	0.29	0.39%	NA	NA
Total	108	75.09	100.00%	NA	NA

Question 38. Who is the current president of the U.S.? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 39. What is your zip code? **[Responses have been binned by U.S. Census region to simplify analysis]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
New England	169	146.00	4.85%	4.85%	1.10%
Middle Atlantic	395	403.64	13.41%	13.41%	1.74%
East North Central	484	472.99	15.71%	15.72%	1.86%
West North Central	201	213.64	7.10%	7.10%	1.31%
South Atlantic	623	634.04	21.06%	21.07%	2.09%
East South Central	152	187.68	6.24%	6.24%	1.24%
West South Central	286	338.34	11.24%	11.24%	1.62%
Mountain North	113	103.87	3.45%	3.45%	0.93%
Mountain South	96	60.32	2.00%	2.00%	0.72%
Pacific	490	448.86	14.91%	14.92%	1.82%
Total of known responses	3009	3009.38	NA	100.00%	NA
Don't know	1	0.62	0.02%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 40. What is your gender?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Female	1638	1725.04	57.31%	57.91%	2.03%
Male	1337	1253.67	41.65%	42.09%	2.03%
Total of known responses	2975	2978.72	NA	100.00%	NA
Decline to state	23	24.89	0.83%	NA	NA
Blank	12	6.39	0.21%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 41. Are you Hispanic or Latino?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	178	349.76	11.62%	11.81%	1.33%
No	2781	2611.75	86.77%	88.19%	1.33%
Total of known responses	2959	2961.51	NA	100.00%	NA
Decline to state	37	33.48	1.11%	NA	NA
Blank	14	15.02	0.50%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 42. What is your race? **[Responses have been binned to simplify analysis]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
White or Caucasian	2291	2237.46	74.33%	75.87%	1.97%
Black or African American	332	401.97	13.35%	13.63%	1.58%
Asian	111	91.01	3.02%	3.09%	0.80%
Other	221	218.68	7.27%	7.42%	1.21%
Total of known responses	2955	2949.12	NA	100.00%	NA
Decline to state	47	51.89	1.72%	NA	NA
Blank	8	8.99	0.30%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 43. What is your highest education level?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
No Education	36	41.62	1.38%	1.39%	0.58%
High school diploma or GED	518	727.08	24.16%	24.37%	2.11%
Some college, no degree	966	824.08	27.38%	27.62%	2.20%
Associate Degree	270	278.40	9.25%	9.33%	1.43%
Bachelor Degree	849	758.98	25.22%	25.44%	2.14%
Master Degree	271	267.17	8.88%	8.95%	1.41%
PhD or Professional Degree	75	86.51	2.87%	2.90%	0.83%
Total of known responses	2985	2983.85	NA	100.00%	NA
Decline to state	19	19.62	0.65%	NA	NA
Blank	6	6.53	0.22%	NA	NA

Total	3010	3010.00	100.00%	NA	NA

Question 44. How many people live in your home for most of the year (including you)?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
0	1	2.29	0.08%	0.08%	0.14%
1	302	819.29	27.22%	27.29%	2.31%
2	848	948.35	31.51%	31.58%	2.41%
3	716	478.96	15.91%	15.95%	1.90%
4	604	416.70	13.84%	13.88%	1.79%
5	345	212.45	7.06%	7.08%	1.33%
6	131	91.57	3.04%	3.05%	0.89%
7	37	23.90	0.79%	0.80%	0.46%
8	20	7.71	0.26%	0.26%	0.26%
9	4	1.33	0.04%	0.04%	0.11%
10 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	3008	3002.55	NA	100.00%	NA
Blank	2	7.45	0.25%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 45. Of the people you included in the total for Question 44, how many people are in the following age categories? **[Responses have been binned to simplify analysis. Note that sum of responses is greater than the total number of responses, because each responses may indicate more than one age category applies.]**

	Total responses		Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
19 and under	1385	1150.12	38.21%	2.21%
20 to 29	1735	734.03	24.39%	1.95%
30 to 59	2053	2324.22	77.22%	1.91%
60 and over	736	793.89	26.38%	2.01%

Question 46. What is your combined annual household income?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
$0-$19,999	336	459.64	15.27%	16.24%	1.83%
$20,000-$39,999	672	688.11	22.86%	24.31%	2.13%
$40,000-$59,999	629	645.49	21.44%	22.80%	2.08%
$60,000-$79,999	444	407.59	13.54%	14.40%	1.74%

$80,000-$99,999	287	244.11	8.11%	8.62%	1.39%
$100,000 and more	459	386.15	12.83%	13.64%	1.70%
Total of known responses	2827	2831.08	NA	100.00%	NA
Don't know/Decline to state	183	178.92	5.94%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

Question 47. What type of home do you live in most of the year?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
dormitory	57	56.80	1.89%	1.89%	0.66%
multi-family apartment building	658	659.49	21.91%	21.98%	1.99%
mobile or manufactured home	100	146.45	4.87%	4.88%	1.04%
single-family house	2090	2024.87	67.27%	67.49%	2.26%
something else	94	110.76	3.68%	3.69%	0.91%
don't know	2	2.06	0.07%	0.07%	0.13%
Total of known responses	3001	3000.42	NA	100.00%	NA
Blank	9	9.58	0.32%	NA	NA
Total	3010	3010.00	100.00%	NA	NA

A.1.2 RP3 survey

Question 1. How many refrigerators are plugged in at your home right now?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
None	14	18.93	0.49%	0.49%	0.30%
1	2826	3067.83	79.68%	79.83%	1.71%
2	864	667.29	17.33%	17.36%	1.61%
3	116	75.38	1.96%	1.96%	0.59%
4	20	9.98	0.26%	0.26%	0.22%
5 or more	3	3.70	0.10%	0.10%	0.13%
Total of known responses	3843	3843.12	NA	100.00%	NA
Don't know	1	0.65	0.02%	NA	NA
Blank	6	6.23	0.16%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 2. How many freezers are plugged in at your home right now?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
None	2056	2249.95	58.44%	58.56%	2.10%
1	1545	1405.70	36.51%	36.59%	2.05%
2	211	164.31	4.27%	4.28%	0.86%
3	23	18.16	0.47%	0.47%	0.29%
4	3	2.10	0.05%	0.05%	0.10%
5 or more	2	1.93	0.05%	0.05%	0.10%
Total of known responses	3840	3842.16	NA	100.00%	NA
Don't know	5	4.54	0.12%	NA	NA
Blank	5	3.30	0.09%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 3. How many stand-alone icemakers are plugged in at your home right now?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
None	3446	3538.85	91.92%	92.37%	1.13%
1	379	284.11	7.38%	7.42%	1.12%
2	15	5.95	0.15%	0.16%	0.17%
3	2	1.41	0.04%	0.04%	0.08%
4	1	0.54	0.01%	0.01%	0.05%
5 or more	1	0.25	0.01%	0.01%	0.03%
Total of known responses	3844	3831.11	NA	100.00%	NA
Don't know	2	11.69	0.30%	NA	NA
Blank	4	7.20	0.19%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 4. How many wine/beverage coolers are plugged in at your home right now?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
None	3346	3489.60	90.64%	90.92%	1.22%
1	475	325.07	8.44%	8.47%	1.19%
2	21	20.17	0.52%	0.53%	0.31%
3	3	2.29	0.06%	0.06%	0.10%
4	2	0.59	0.02%	0.02%	0.05%
5 or more	1	0.58	0.02%	0.02%	0.05%
Total of known responses	3848	3838.31	NA	100.00%	NA
Don't know	2	11.69	0.30%	NA	NA
Blank	0	0.00	0.00%	NA	NA

Total	3850	3850.00	100.00%	NA	NA

Question 5. How many refrigerators are plugged in at your home right now that use thermoelectric or absorption cooling technology to provide cooling?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
None	2537	2790.69	72.49%	80.05%	1.79%
1	782	605.31	15.72%	17.36%	1.69%
2	106	75.23	1.95%	2.16%	0.65%
3	13	11.34	0.29%	0.33%	0.25%
4	1	2.06	0.05%	0.06%	0.11%
5 or more	2	1.67	0.04%	0.05%	0.10%
Total of known responses	3441	3486.30	NA	100.00%	NA
Don't know	404	359.77	9.34%	NA	NA
Blank	5	3.93	0.10%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 6. How many freezers are plugged in at your home right now that use thermoelectric or absorption cooling technology to provide cooling?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
None	3125	3251.29	84.45%	90.59%	1.29%
1	383	291.77	7.58%	8.13%	1.20%
2	45	41.61	1.08%	1.16%	0.47%
3	5	4.35	0.11%	0.12%	0.15%
4	0	0.00	0.00%	0.00%	0.00%
5 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	3558	3589.03	NA	100.00%	NA
Don't know	279	253.12	6.57%	NA	NA
Blank	13	7.85	0.20%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 7. What are ice cubes typically made from? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 8. What is your five-digit ZIP code? **[Responses have been binned by U.S. Census region]**

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**

New England	187	180.15	4.68%	4.71%	0.96%
Middle Atlantic	530	515.82	13.40%	13.47%	1.55%
East North Central	683	604.60	15.70%	15.79%	1.65%
West North Central	253	273.26	7.10%	7.14%	1.17%
South Atlantic	792	810.98	21.06%	21.18%	1.85%
East South Central	193	240.06	6.24%	6.27%	1.10%
West South Central	307	432.16	11.22%	11.29%	1.44%
Mountain North	128	132.68	3.45%	3.47%	0.83%
Mountain South	119	77.15	2.00%	2.02%	0.64%
Pacific	625	561.58	14.59%	14.67%	1.61%
Total of known responses	3817	3828.45	NA	100.00%	NA
Don't know	33	21.55	0.56%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 9. What is your gender?

	Total responses		**Weighted proportion of total**	**Known responses**	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Female	1830	2032.07	52.78%	53.10%	1.81%
Male	1994	1795.14	46.63%	46.90%	1.81%
Total of known responses	3824	3827.21	NA	100.00%	NA
Decline to state	19	15.69	0.41%	NA	NA
Blank	7	7.10	0.18%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 10. Are you Hispanic or Latino?

	Total responses		**Weighted proportion of total**	**Known responses**	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Yes	222	458.46	11.91%	12.07%	1.18%
No	3568	3340.50	86.77%	87.93%	1.18%
Total of known responses	3790	3798.95	NA	100.00%	NA
Decline to state	53	46.83	1.22%	NA	NA
Blank	7	4.22	0.11%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 11. What is your race? **[Responses have been binned to simplify analysis]**

	Total responses		**Weighted proportion of total**	**Known responses**	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
White or Caucasian	2804	2785.65	72.35%	73.28%	1.79%

Black/African-American	516	530.74	13.79%	13.96%	1.40%
Asian	233	133.10	3.46%	3.50%	0.74%
Other	244	352.04	9.14%	9.26%	1.17%
Total of known responses	3797	3801.53	NA	100.00%	NA
Decline to state	47	42.47	1.10%	NA	NA
Blank	6	6.00	0.16%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 12. What is your highest education level?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
No Education	54	61.40	1.59%	1.61%	0.55%
High school diploma or GED	864	1125.71	29.24%	29.54%	1.99%
Some college, no degree	1094	1020.52	26.51%	26.78%	1.93%
Associate Degree	351	330.56	8.59%	8.67%	1.23%
Bachelor Degree	1069	886.97	23.04%	23.27%	1.84%
Master Degree	288	289.36	7.52%	7.59%	1.15%
PhD or Professional Degree	102	96.70	2.51%	2.54%	0.69%
Total of known responses	3822	3811.23	NA	100.00%	NA
Decline to state	16	20.74	0.54%	NA	NA
Blank	12	18.03	0.47%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 13. How many people live in your home for most of the year (including you)?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
1	482	1060.01	27.53%	27.54%	2.02%
2	1043	1213.00	31.51%	31.51%	2.10%
3	897	612.62	15.91%	15.91%	1.65%
4	773	532.99	13.84%	13.85%	1.56%
5	412	273.90	7.11%	7.12%	1.16%
6	164	106.93	2.78%	2.78%	0.74%
7	46	32.69	0.85%	0.85%	0.42%
8	23	11.57	0.30%	0.30%	0.25%
9	9	5.91	0.15%	0.15%	0.18%
10 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	3849	3849.61	NA	100.00%	NA
Doesn't apply	0	0.00	0.00%	NA	NA
Don't know/Decline to state	0	0.00	0.00%	NA	NA
Blank	1	0.39	0.01%	NA	NA

Total	3850	3850.00	100.00%	NA	NA

Question 14. Of the people you included in the total for Question 13, how many are in the following age categories (please fill in the number of people for all applicable categories)
[Responses have been binned to simplify analysis]

	Total responses		Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion**	**Confidence interval**
19 and under	1730	1511.63	39.26%	1.97%
20 to 29	2202	980.02	25.46%	1.75%
30 to 59	2450	2887.75	75.01%	1.74%
60 and over	916	910.55	23.65%	1.71%

Question 15. What is your combined annual household income?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
$0-$19,999	441	631.14	16.39%	17.31%	1.65%
$20,000-$39,999	851	958.40	24.89%	26.29%	1.92%
$40,000-$59,000	895	786.10	20.42%	21.56%	1.80%
$60,000-$79,999	568	499.78	12.98%	13.71%	1.50%
$80,000-$99,999	349	305.32	7.93%	8.38%	1.21%
$100,000 and more	540	464.85	12.07%	12.75%	1.46%
Total of known responses	3644	3645.61	NA	100.00%	NA
Don't know/Decline to state	204	202.33	5.26%	NA	NA
Blank	2	2.06	0.05%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 16. What type of home do you live in most of the year?

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
a Dormitory	33	43.19	1.12%	1.13%	0.46%
an Apartment building with 5 or more units	593	678.54	17.62%	17.69%	1.66%
an Apartment building with 2-4 units	315	311.34	8.09%	8.12%	1.19%
a Mobile home	110	151.63	3.94%	3.95%	0.85%
a Single-family attached house (a house attached to one or more houses)	470	413.17	10.73%	10.77%	1.35%
a Single-family detached house (a	2258	2152.46	55.91%	56.11%	2.16%

house detached from any other house)					
Something else	58	86.05	2.23%	2.24%	0.64%
Total of known responses	3837	3836.39	NA	100.00%	NA
Don't know	5	3.95	0.10%	NA	NA
Blank	8	9.66	0.25%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

Question 17. Is this home owned or rented?

	Total responses		**Weighted proportion of total**	**Known responses**	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Owned or being bought by someone in your household	2191	2210.28	57.41%	57.61%	1.91%
Rented	1611	1584.79	41.16%	41.31%	1.90%
Occupied without payment of rent	37	41.69	1.08%	1.09%	0.40%
Total of known responses	3839	3836.77	NA	100.00%	NA
Don't know	8	9.19	0.24%	NA	NA
Blank	3	4.04	0.10%	NA	NA
Total	3850	3850.00	100.00%	NA	NA

A.1.3 WC1 survey

Question 1. How many wine/beverage coolers do you have plugged in at your home right now?

Response	Total responses*			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
None	0	0.00	0.00%	0.00%	0.00%
1	1924	1950.02	90.74%	90.74%	1.61%
2	174	156.89	7.30%	7.30%	1.45%
3	25	18.21	0.85%	0.85%	0.51%
4 or more	26	23.88	1.11%	1.11%	0.58%
Total of known responses	2149	2149.00	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

* Eleven responses were removed from consideration in the survey: six "None," two "Don't know," and three Blank.

Question 2. What do you primarily use this largest capacity wine/beverage cooler for?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Wine	1194	1276.28	59.39%	59.55%	2.54%
Beer or soda	913	814.26	37.89%	37.99%	2.51%
Something else	39	52.62	2.45%	2.46%	0.80%
Total of known responses	2146	2143.15	NA	100.00%	NA
Don't know	1	0.67	0.03%	NA	NA
Blank	2	5.18	0.24%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 3. What is the maximum number of full-sized (750 mL) bottles of wine that this wine/beverage cooler can hold? **[Filtered on those responding "Wine" to Question 2]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
1-11 bottles	420	431.96	33.85%	34.95%	3.71%
12-19 bottles	377	425.35	33.33%	34.42%	3.70%
20-29 bottles	218	226.56	17.75%	18.33%	3.01%
30-39 bottles	74	81.16	6.36%	6.57%	1.93%

40-49 bottles	31	31.68	2.48%	2.56%	1.23%
50-59 bottles	20	25.29	1.98%	2.05%	1.10%
60-89 bottles	4	2.23	0.17%	0.18%	0.33%
90+ bottles	10	11.60	0.91%	0.94%	0.75%
Total of known responses	1154	1235.84	NA	100.00%	NA
Don't know	7	5.24	0.41%	NA	NA
Blank	33	35.20	2.76%	NA	NA
Total	1194	1276.28	100.00%	NA	NA

Question 4. What is the maximum number of 12 oz. cans or bottles of beer or soda that this wine/beverage cooler can hold? **[Filtered on those responding "Beer or soda" to Question 3]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
1-11 bottles	52	58.33	7.16%	7.71%	2.65%
12-19 bottles	184	161.28	19.81%	21.32%	4.07%
20-29 bottles	234	184.19	22.62%	24.34%	4.27%
30-39 bottles	131	114.72	14.09%	15.16%	3.57%
40-49 bottles	92	93.70	11.51%	12.38%	3.27%
50-59 bottles	48	37.32	4.58%	4.93%	2.15%
60-89 bottles	45	53.01	6.51%	7.01%	2.54%
90+ bottles	45	54.05	6.64%	7.14%	2.56%
Total of known responses	831	756.60	NA	100.00%	NA
Don't know	21	15.07	1.85%	NA	NA
Blank	61	42.59	5.23%	NA	NA
Total	913	814.26	100.00%	NA	NA

Question 5. How frequently do you open the door to this wine/beverage cooler?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
10 or more times per day	56	43.23	2.01%	2.05%	0.87%
5-9 times per day	147	142.76	6.64%	6.77%	1.54%
3-4 times per day	357	336.66	15.67%	15.96%	2.24%
Twice per day	296	269.18	12.53%	12.76%	2.04%
Once per day	202	257.01	11.96%	12.19%	2.00%
4-6 times per week	293	278.42	12.96%	13.20%	2.07%
2-3 times per week	397	402.75	18.74%	19.10%	2.40%

Once per week	180	177.75	8.27%	8.43%	1.70%
2-3 times per month	127	121.37	5.65%	5.76%	1.42%
Once per month or less	60	79.70	3.71%	3.78%	1.17%
Total of known responses	2115	2108.84	NA	100.00%	NA
Don't know	8	4.89	0.23%	NA	NA
Blank	26	35.27	1.64%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 6. How many separate temperature zones does this wine/beverage cooler have?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
One temperature zone	1146	1134.70	52.80%	57.27%	2.78%
Two temperature zones	613	638.40	29.71%	32.22%	2.62%
Three temperature zones	155	138.92	6.46%	7.01%	1.43%
Four or more temperature zones	63	69.42	3.23%	3.50%	1.03%
Total of known responses	1977	1981.44	NA	100.00%	NA
Don't know	165	162.14	7.54%	NA	NA
Blank	7	5.42	0.25%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 7. Is the door of this wine/beverage cooler transparent, or solid/opaque?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Transparent	1329	1394.30	64.88%	65.13%	2.31%
Solid/opaque	806	746.46	34.74%	34.87%	2.31%
Total of known responses	2135	2140.75	NA	100.00%	NA
Don't know	7	2.49	0.12%	NA	NA
Blank	7	5.76	0.27%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 8. What material are wine bottles typically made from? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 9. Is this wine/beverage cooler built into cabinetry, or is it freestanding?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**

Built-in	302	327.29	15.23%	15.41%	1.76%
Freestanding	1828	1796.93	83.62%	84.59%	1.76%
Total of known responses	2130	2124.23	NA	100.00%	NA
Don't know	7	3.73	0.17%	NA	NA
Blank	12	21.04	0.98%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 10. Does this wine/beverage cooler fit under a standard counter height of 36 inches?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	1633	1641.93	76.40%	83.35%	1.88%
No	345	327.92	15.26%	16.65%	1.88%
Total of known responses	1978	1969.85	NA	100.00%	NA
Don't know	163	169.32	7.88%	NA	NA
Blank	8	9.84	0.46%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 11. What type of cooling technology does this wine/beverage cooler use?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Vapor compression	459	441.83	20.56%	38.55%	3.44%
Thermoelectric cooling	583	646.81	30.10%	56.43%	3.51%
Absorption cooling	75	57.49	2.68%	5.02%	1.54%
Total of known responses	1117	1146.13	NA	100.00%	NA
Don't know	1027	996.42	46.37%	NA	NA
Blank	5	6.46	0.30%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 12. In which room is this wine/beverage cooler located?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Kitchen/pantry	956	932.32	43.38%	43.62%	2.89%
Dining room	237	231.74	10.78%	10.84%	1.81%
Home bar/entertainment room	581	586.52	27.29%	27.44%	2.60%

Climate-controlled garage, basement or storage space	207	217.31	10.11%	10.17%	1.76%
Another climate-controlled room in your home	66	56.14	2.61%	2.63%	0.93%
Enclosed space that is not climate-controlled (such as an unheated basement or storage shed)	67	77.90	3.63%	3.65%	1.09%
Outside location	30	35.32	1.64%	1.65%	0.74%
Total of known responses	2144	2137.24	NA	100.00%	NA
Don't know	1	0.15	0.01%	NA	NA
Blank	4	11.61	0.54%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 13. Did you (or the homeowner) purchase this wine/beverage cooler new?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	1281	1354.94	63.05%	65.75%	2.34%
No	755	705.90	32.85%	34.25%	2.34%
Total of known responses	2036	2060.84	NA	100.00%	NA
Don't know	105	75.11	3.50%	NA	NA
Blank	8	13.05	0.61%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 14. How much did you (or the homeowner) pay for this new wine/beverage cooler (not including tax or rebates)? **[Filtered on those responding "Yes" to Question 13]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to $25	3	12.63	0.93%	0.99%	0.86%
Between $26 and $50	19	20.32	1.50%	1.59%	1.08%
Between $51 and $75	57	51.02	3.77%	4.00%	1.69%
Between $76 and $100	105	119.92	8.85%	9.40%	2.52%
Between $101 and $125	151	138.36	10.21%	10.84%	2.69%
Between $126 and $150	121	127.41	9.40%	9.98%	2.59%
Between $151 and $200	161	142.74	10.53%	11.18%	2.73%
Between $201 and $250	126	140.35	10.36%	11.00%	2.71%
Between $251 and $300	102	110.13	8.13%	8.63%	2.43%
Between $301 and $350	87	103.60	7.65%	8.12%	2.36%

Between $351 and $400	41	46.59	3.44%	3.65%	1.62%
Between $401 and $500	50	49.93	3.68%	3.91%	1.68%
Between $501 and $600	33	38.43	2.84%	3.01%	1.48%
Between $601 and $700	28	31.54	2.33%	2.47%	1.34%
Between $701 and $800	16	24.57	1.81%	1.92%	1.19%
Between $801 and $1,000	26	36.25	2.68%	2.84%	1.44%
Between $1,001 and $1,200	21	36.84	2.72%	2.89%	1.45%
Between $1,201 and $1,400	9	5.19	0.38%	0.41%	0.55%
Between $1,601 and $1,800	12	9.63	0.71%	0.75%	0.75%
Between $1,801 and $2,000	4	5.21	0.38%	0.41%	0.55%
Between $2,001 and $2,500	12	14.32	1.06%	1.12%	0.91%
Between $2,501 and $3,000	4	2.23	0.16%	0.17%	0.36%
Between $3,001 and $3,500	3	3.43	0.25%	0.27%	0.45%
Between $3,501 and $4,000	2	0.37	0.03%	0.03%	0.15%
$4001 or more	5	5.42	0.40%	0.42%	0.56%
Total of known responses	1198	1276.43	NA	100.00%	NA
Don't know	72	63.29	4.67%	NA	NA
Blank	11	15.22	1.12%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

Question 15. If you (or the homeowner) received any kind of rebate, how much was it?
[Filtered on those responding "Yes" to Question 13]

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
No rebate	1105	1166.23	86.07%	91.95%	2.27%
Up to $10	12	14.49	1.07%	1.14%	0.89%
Between $11 and $20	14	10.41	0.77%	0.82%	0.75%
Between $21 and $30	11	8.26	0.61%	0.65%	0.67%
Between $31 and $40	6	3.59	0.27%	0.28%	0.44%
Between $41 and $50	20	33.60	2.48%	2.65%	1.34%
Between $51 and $60	6	4.27	0.32%	0.34%	0.48%
Between $61 and $80	3	2.25	0.17%	0.18%	0.35%

Between $81 and $100	5	7.52	0.55%	0.59%	0.64%
Between $101 and $125	7	4.85	0.36%	0.38%	0.52%
Between $126 and $150	1	5.73	0.42%	0.45%	0.56%
Between $151 and $200	1	0.54	0.04%	0.04%	0.17%
Between $201 and $250	4	6.11	0.45%	0.48%	0.58%
Between $251 and $300	1	0.30	0.02%	0.02%	0.13%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	1	0.14	0.01%	0.01%	0.09%
Total of known responses	1197	1268.29	NA	100.00%	NA
Don't know	67	68.77	5.08%	NA	NA
Blank	17	17.88	1.32%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

Question 16. How long ago did you (or the homeowner) purchase this new wine/beverage cooler? **[Filtered on those responding "Yes" to Question 13]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 1 year ago	288	300.82	22.20%	22.44%	3.20%
At least 1 but less than 2 years ago	335	330.03	24.36%	24.62%	3.30%
At least 2 but less than 3 years ago	313	311.04	22.96%	23.20%	3.24%
At least 3 but less than 4 years ago	142	168.50	12.44%	12.57%	2.54%
At least 4 but less than 5 years ago	75	103.24	7.62%	7.70%	2.04%
At least 5 but less than 6 years ago	48	47.87	3.53%	3.57%	1.42%
At least 6 but less than 8 years ago	32	45.83	3.38%	3.42%	1.39%
At least 8 but less than 10 years ago	15	13.52	1.00%	1.01%	0.77%
At least 10 but less than 15	13	13.03	0.96%	0.97%	0.75%

years ago					
At least 15 years ago or more	4	6.78	0.50%	0.51%	0.54%
Total of known responses	1265	1340.66	NA	100.00%	NA
Don't know	10	7.61	0.56%	NA	NA
Blank	6	6.66	0.49%	NA	NA
Total	1281	1354.94	100.00%	NA	NA

Question 16 again **[Filtered on those not responding "The first one you (or the homeowner) have owned?" to Question 18]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 1 year ago	23	31.20	17.88%	18.06%	8.21%
At least 1 but less than 2 years ago	33	29.02	16.63%	16.80%	7.98%
At least 2 but less than 3 years ago	49	49.80	28.54%	28.82%	9.67%
At least 3 but less than 4 years ago	20	20.65	11.84%	11.95%	6.93%
At least 4 but less than 5 years ago	13	26.00	14.90%	15.04%	7.63%
At least 5 but less than 6 years ago	5	5.76	3.30%	3.33%	3.83%
At least 6 but less than 8 years ago	6	4.76	2.73%	2.76%	3.50%
At least 8 but less than 10 years ago	1	0.60	0.35%	0.35%	1.26%
At least 10 but less than 15 years ago	4	4.98	2.85%	2.88%	3.57%
At least 15 years ago or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	154	172.79	NA	100.00%	NA
Don't know	2	1.70	0.97%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	156	174.49	100.00%	NA	NA

Question 17. How many bottles of wine are there in a dozen? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 18. Was this wine/beverage cooler…

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
The first one you (or the	1880	1853.19	86.24%	87.56%	1.79%

homeowner) have owned?					
A replacement of the same type of wine/beverage cooler that you (or the homeowner) owned before?	84	91.71	4.27%	4.33%	1.11%
An upgrade to the wine/beverage cooler you (or the homeowner) owned before?	115	126.20	5.87%	5.96%	1.29%
An additional wine/beverage cooler to the one you (or the homeowner) still own?	39	45.42	2.11%	2.15%	0.79%
Total of known responses	2118	2116.53	NA	100.00%	NA
Don't know	25	23.70	1.10%	NA	NA
Blank	6	8.77	0.41%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 19. Does this wine/beverage cooler have internal lights?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	1311	1322.09	61.52%	62.75%	2.36%
No	806	784.97	36.53%	37.25%	2.36%
Total of known responses	2117	2107.06	NA	100.00%	NA
Don't know	29	35.61	1.66%	NA	NA
Blank	3	6.33	0.29%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 20. Are the lights operated automatically, or by a manual switch? **[Filtered on those responding "Yes" to Question 19]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Automatic	1082	1016.27	76.87%	78.17%	2.57%
Manual switch	202	283.82	21.47%	21.83%	2.57%
Total of known responses	1284	1300.08	NA	100.00%	NA
Don't know	15	12.68	0.96%	NA	NA
Blank	12	9.32	0.71%	NA	NA
Total	1311	1322.09	100.00%	NA	NA

Question 21. When the door is closed, are the lights usually…? **[Filtered on those responding "Yes" to Question 19]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Off	1170	1168.46	88.38%	89.88%	1.87%
On	114	131.55	9.95%	10.12%	1.87%
Total of known responses	1284	1300.01	NA	100.00%	NA
Don't know	18	17.33	1.31%	NA	NA
Blank	9	4.75	0.36%	NA	NA
Total	1311	1322.09	100.00%	NA	NA

Question 22. When you (or the homeowner) acquired this wine/beverage cooler, how much did it cost to have it installed?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I installed it myself or someone installed it for free	1774	1808.12	84.14%	90.83%	1.92%
Up to $10	8	6.74	0.31%	0.34%	0.39%
Between $11 and $20	11	20.07	0.93%	1.01%	0.67%
Between $21 and $30	8	4.39	0.20%	0.22%	0.31%
Between $31 and $40	11	4.86	0.23%	0.24%	0.33%
Between $41 and $50	13	5.71	0.27%	0.29%	0.36%
Between $51 and $60	9	15.68	0.73%	0.79%	0.59%
Between $61 and $80	7	3.48	0.16%	0.18%	0.28%
Between $81 and $100	30	33.26	1.55%	1.67%	0.85%
Between $101 and $125	23	24.19	1.13%	1.22%	0.73%
Between $126 and $150	11	7.00	0.33%	0.35%	0.39%
Between $151 and $200	10	9.60	0.45%	0.48%	0.46%
Between $201 and $250	15	22.92	1.07%	1.15%	0.71%
Between $251 and $300	8	5.91	0.28%	0.30%	0.36%
Between $301 and $400	5	6.76	0.31%	0.34%	0.39%
Between $401 and $500	3	4.30	0.20%	0.22%	0.31%
$501 or more	8	7.61	0.35%	0.38%	0.41%
Total of known responses	1954	1990.60	NA	100.00%	NA
Don't know	187	154.09	7.17%	NA	NA
Blank	8	4.31	0.20%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 23. Has this wine/beverage cooler ever been repaired?

Response	Total responses	Known responses

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	36	28.35	1.32%	1.38%	0.58%
No	2002	2026.55	94.30%	98.62%	0.58%
Total of known responses	2038	2054.90	NA	100.00%	NA
Don't know	102	76.46	3.56%	NA	NA
Blank	9	17.64	0.82%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 24. How much did it cost to repair? **[Filtered on those responding "Yes" to Question 23]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Nothing; repaired for free or under warranty	13	9.27	32.69%	33.76%	26.85%
Up to $10	3	4.45	15.70%	16.22%	20.93%
Between $11 and $20	0	0.00	0.00%	0.00%	0.00%
Between $21 and $30	4	5.97	21.05%	21.74%	23.41%
Between $31 and $40	3	0.71	2.51%	2.60%	9.03%
Between $41 and $50	1	1.51	5.34%	5.52%	12.96%
Between $51 and $60	2	0.81	2.84%	2.93%	9.58%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	1	0.38	1.34%	1.39%	6.64%
Between $101 and $125	3	1.25	4.42%	4.57%	11.85%
Between $126 and $150	1	2.56	9.05%	9.35%	16.52%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	1	0.30	1.07%	1.10%	5.93%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	1	0.23	0.80%	0.83%	5.15%
Total of known responses	33	27.44	NA	100.00%	NA
Don't know	2	0.59	2.07%	NA	NA
Blank	1	0.32	1.11%	NA	NA
Total	36	28.35	100.00%	NA	NA

Question 25. How long after you (or the homeowner) purchased it was it repaired? **[Filtered on those responding "Yes" to Question 23]**

Response	Total responses	Known responses

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Less than 1 year	12	14.16	49.96%	51.23%	26.69%
At least 1 but less than 2 years	8	7.16	25.26%	25.91%	23.39%
At least 2 but less than 3 years	4	1.07	3.78%	3.88%	10.31%
At least 3 but less than 4 years	4	3.21	11.33%	11.62%	17.11%
At least 4 but less than 5 years	3	0.97	3.41%	3.50%	9.81%
At least 5 but less than 6 years	0	0.00	0.00%	0.00%	0.00%
At least 6 but less than 8 years	0	0.00	0.00%	0.00%	0.00%
At least 8 but less than 10 years	1	0.37	1.31%	1.34%	6.14%
At least 10 but less than 15 years	0	0.00	0.00%	0.00%	0.00%
At least 15 years or more	1	0.70	2.47%	2.53%	8.39%
Total of known responses	33	27.64	NA	100.00%	NA
Don't know	2	0.39	1.36%	NA	NA
Blank	1	0.32	1.11%	NA	NA
Total	36	28.35	100.00%	NA	NA

Question 26. Which component was repaired? Please check all that apply **[Filtered on those responding "Yes" to Question 23]**

	Known responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
Compressor	4	6.87	19.09%	14.70%
Evaporator	6	3.12	8.68%	17.44%
Condenser	3	2.30	6.40%	12.93%
Evaporator or condenser fan	4	2.74	7.62%	14.70%
Door gasket	8	6.92	19.22%	19.45%
Other door component	2	1.21	3.36%	10.72%
Insulation	4	3.96	11.00%	14.70%
Electronics	7	7.77	21.58%	18.52%
Lighting	9	10.01	27.81%	20.26%
Something else	3	0.53	1.46%	12.93%

Question 27. Do you (or the homeowner) ever perform routine maintenance on this wine/beverage cooler?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Yes	251	263.85	12.28%	12.56%	1.62%
No	1838	1837.02	85.48%	87.44%	1.62%
Total of known responses	2089	2100.87	NA	100.00%	NA
Don't know	38	26.43	1.23%	NA	NA
Blank	22	21.70	1.01%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 28. How much is spent each year on routine maintenance of this wine/beverage cooler? **[Filtered on those responding "Yes" to Question 27]**

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I perform the maintenance myself or someone does it for free.	149	150.46	57.03%	57.27%	8.57%
Up to $10 per year	19	9.96	3.78%	3.79%	3.31%
Between $11 and $20 per year	27	31.67	12.00%	12.05%	5.64%
Between $21 and $30 per year	21	21.78	8.26%	8.29%	4.78%
Between $31 and $40 per year	3	20.17	7.64%	7.68%	4.61%
Between $41 and $50 per year	11	11.36	4.31%	4.32%	3.52%
Between $51 and $60 per year	7	10.11	3.83%	3.85%	3.33%
Between $61 and $80 per year	6	3.78	1.43%	1.44%	2.06%
Between $81 and $100 per year	2	2.66	1.01%	1.01%	1.73%
$101 or more per year	2	0.75	0.28%	0.28%	0.92%
Total of known responses	247	262.71	NA	100.00%	NA
Don't know	4	1.14	0.43%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	251	263.85	100.00%	NA	NA

Question 29. When do you (or the homeowner) plan to replace this wine/beverage cooler?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Do not plan to replace	1024	1021.19	47.52%	61.46%	3.39%
Less than 1 year from now	43	39.79	1.85%	2.40%	1.06%
At least 1 but less than 2 years from now	111	109.08	5.08%	6.57%	1.72%

At least 2 but less than 3 years from now	129	134.86	6.28%	8.12%	1.90%
At least 3 but less than 4 years from now	114	101.17	4.71%	6.09%	1.66%
At least 4 but less than 5 years from now	89	91.19	4.24%	5.49%	1.59%
At least 5 but less than 6 years from now	87	105.95	4.93%	6.38%	1.70%
At least 6 but less than 8 years from now	24	19.09	0.89%	1.15%	0.74%
At least 8 but less than 10 years from now	9	8.61	0.40%	0.52%	0.50%
At least 10 but less than 15 years from now	16	16.19	0.75%	0.97%	0.68%
At least 15 years from now or more	16	14.33	0.67%	0.86%	0.64%
Total of known responses	1662	1661.45	NA	100.00%	NA
Don't know	397	399.66	18.60%	NA	NA
Blank	90	87.88	4.09%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 30. What is the brand of this wine/beverage cooler? **[Responses not shown; see Section 3.1.4 on validation]**

Question 31. Please enter the brand name of this wine/beverage cooler **[Responses not shown; see Section 3.1.4 on validation]**

Question 32. What is the full model number of this wine/beverage cooler? **[Responses not shown; see Section 3.1.4 on validation]**

Question 33. Who is the current president of the U.S.? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 34. What is your five digit zip code? **[Responses have been binned by U.S. Census region to simplify analysis]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
New England	108	168.41	7.84%	7.91%	1.64%
Middle Atlantic	311	319.20	14.85%	14.99%	2.17%
East North Central	320	375.50	17.47%	17.63%	2.32%
West North Central	142	92.77	4.32%	4.36%	1.24%
South Atlantic	464	454.59	21.15%	21.34%	2.49%

East South Central	95	146.02	6.79%	6.86%	1.54%
West South Central	188	157.41	7.32%	7.39%	1.59%
Mountain North	67	94.17	4.38%	4.42%	1.25%
Mountain South	72	56.60	2.63%	2.66%	0.98%
Pacific	357	265.08	12.33%	12.45%	2.01%
Total of known responses	2124	2129.76	NA	100.00%	NA
Don't know	25	19.24	0.90%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 35. What is your gender?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Female	921	905.06	42.12%	42.90%	2.42%
Male	1200	1204.56	56.05%	57.10%	2.42%
Total of known responses	2121	2109.62	NA	100.00%	NA
Decline to state	21	18.59	0.87%	NA	NA
Blank	7	20.79	0.97%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 36. Are you Hispanic or Latino?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	127	216.72	10.08%	10.35%	1.49%
No	1959	1876.89	87.34%	89.65%	1.49%
Total of known responses	2086	2093.61	NA	100.00%	NA
Decline to state	50	42.52	1.98%	NA	NA
Blank	13	12.87	0.60%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 37. What is your race? **[Responses have been binned to simplify analysis]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
White or Caucasian	1600	1472.46	68.52%	70.30%	2.49%
Black or African American	223	418.05	19.45%	19.96%	2.18%

Asian	97	66.25	3.08%	3.16%	0.96%
Other	163	137.70	6.41%	6.57%	1.35%
Total of known responses	2083	2094.45	NA	100.00%	NA
Decline to state	56	47.07	2.19%	NA	NA
Blank	10	7.47	0.35%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 38. What is your highest education level?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
No Education	28	33.83	1.57%	1.58%	0.73%
High school diploma or GED	370	582.20	27.09%	27.24%	2.59%
Some college, no degree	619	438.98	20.43%	20.54%	2.35%
Associate Degree	198	154.42	7.19%	7.22%	1.51%
Bachelor Degree	639	607.94	28.29%	28.44%	2.62%
Master Degree	212	235.27	10.95%	11.01%	1.82%
PhD or Professional Degree	62	84.87	3.95%	3.97%	1.14%
Total of known responses	2128	2137.51	NA	100.00%	NA
Decline to state	18	10.84	0.50%	NA	NA
Blank	3	0.65	0.03%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 39. How many people live in your home for most of the year (including you)?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
1	155	326.94	15.21%	15.23%	2.15%
2	649	671.63	31.25%	31.29%	2.78%
3	555	428.33	19.93%	19.96%	2.39%
4	467	453.83	21.12%	21.14%	2.44%
5	211	162.46	7.56%	7.57%	1.58%
6	74	72.89	3.39%	3.40%	1.08%
7	20	14.54	0.68%	0.68%	0.49%
8	11	11.46	0.53%	0.53%	0.44%
9	6	4.32	0.20%	0.20%	0.27%
Total of known responses	2148	2146.40	NA	100.00%	NA
Don't know/Decline to state	0	0.00	0.00%	NA	NA

Blank	1	2.60	0.12%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

Question 40. Of the people you included in the total for Question 39, how many people are in the following age categories **[Responses have been binned to simplify analysis]**

	Total responses		Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
19 and under	952	935.41	43.53%	2.67%
20 to 29	1400	575.60	26.78%	2.39%
30 to 59	1355	1613.30	75.07%	2.33%
60 and over	351	676.80	31.49%	2.50%

Question 41. What is your combined annual household income?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
$0-$19,999	134	154.97	7.21%	7.62%	1.55%
$20,000-$39,999	370	426.35	19.84%	20.97%	2.38%
$40,000-$59,999	459	490.82	22.84%	24.14%	2.50%
$60,000-$79,999	328	251.14	11.69%	12.35%	1.93%
$80,000-$99,999	250	185.96	8.65%	9.15%	1.69%
$100,000 and more	460	523.70	24.37%	25.76%	2.56%
Total of known responses	2001	2032.93	NA	100.00%	NA
Don't know/Decline to state	147	115.26	5.36%	NA	NA
Blank	1	0.81	0.04%	NA	NA
Total	2149	2149.00	100.00%	NA	NA

A.1.4 RI1 survey

Question 1. How many stand-alone icemakers are plugged in at your home right now?

Response	Total responses*			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
None	0	0.00	0.00%	0.00%	0.00%
1	797	792.86	97.76%	97.76%	1.37%
2	12	13.78	1.70%	1.70%	1.20%
3	1	1.82	0.22%	0.22%	0.44%
4	1	2.54	0.31%	0.31%	0.52%
5 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	811	811.00	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

* Responses of "None," "Don't know" and Blank were removed prior to analysis.

Question 2. What is the brand of this stand-alone icemaker? **[Responses not shown; see Section 3.2.2 on validation]**

Question 3. Please enter the brand of the stand-alone icemaker **[Responses not shown; see Section 3.2.2 on validation]**

Question 4. What is the full model number of this icemaker? **[Responses not shown; see Section 3.2.2 on validation]**

Question 5. How many pounds of ice can your stand-alone icemaker make per day?

Response	Total responses			Known responses	
	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Less than 5 pounds per day	173	195.01	24.05%	24.93%	4.23%
Between 5 and 9 pounds per day	42	50.24	6.19%	6.42%	2.40%
Between 10 and 14 pounds per day	66	75.53	9.31%	9.66%	2.89%
Between 15 and 19 pounds per day	20	13.29	1.64%	1.70%	1.26%
Between 20 and 29 pounds per day	266	260.21	32.08%	33.27%	4.61%
Between 30 and 49 pounds per day	132	121.96	15.04%	15.59%	3.55%
Between 50 and 79 pounds per day	68	65.27	8.05%	8.35%	2.70%

At least 80 pounds per day	1	0.59	0.07%	0.08%	0.27%
Total of known responses	768	782.10	NA	100.00%	NA
Don't know	43	28.90	3.56%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 6. Did you (or the homeowner) purchase this stand-alone icemaker new?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	445	452.67	55.82%	57.59%	3.95%
No	334	333.36	41.10%	42.41%	3.95%
Total of known responses	779	786.03	NA	100.00%	NA
Don't know	31	23.73	2.93%	NA	NA
Blank	1	1.23	0.15%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 7. How much did you (or the homeowner) pay for this new icemaker (not including tax or rebates)? **[Filtered on those responding "Yes" to Question 6]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Up to $25	1	0.39	0.09%	0.09%	0.43%
Between $26 and $50	3	5.62	1.24%	1.26%	1.64%
Between $51 and $75	0	0.00	0.00%	0.00%	0.00%
Between $76 and $100	21	16.82	3.71%	3.76%	2.79%
Between $101 and $125	44	42.54	9.40%	9.52%	4.31%
Between $126 and $150	54	52.96	11.70%	11.85%	4.74%
Between $151 and $200	95	94.44	20.86%	21.13%	5.99%
Between $201 and $250	36	46.38	10.25%	10.38%	4.48%
Between $251 and $300	27	25.71	5.68%	5.75%	3.42%
Between $301 and $350	24	23.94	5.29%	5.36%	3.30%
Between $351 and $400	26	31.31	6.92%	7.01%	3.75%
Between $401 and $500	8	7.77	1.72%	1.74%	1.92%
Between $501 and $600	2	2.50	0.55%	0.56%	1.09%
Between $601 and $700	6	4.00	0.88%	0.89%	1.38%
Between $701 and $800	12	8.57	1.89%	1.92%	2.01%
Between $801 and $1,000	14	15.58	3.44%	3.49%	2.69%
Between $1,001 and $1,200	15	18.40	4.06%	4.12%	2.92%
Between $1,201 and $1,400	7	3.18	0.70%	0.71%	1.23%
Between $1,401 and $1,600	14	8.23	1.82%	1.84%	1.97%
Between $1,601 and $1,800	10	7.03	1.55%	1.57%	1.83%

Between $1,801 and $2,000	5	21.72	4.80%	4.86%	3.16%
Between $2,001 and $2,500	8	6.26	1.38%	1.40%	1.73%
Between $2,501 and $3,000	5	3.47	0.77%	0.78%	1.29%
Between $3,001 and $3,500	0	0.00	0.00%	0.00%	0.00%
Between $3,501 and $4,000	0	0.00	0.00%	0.00%	0.00%
$4001 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	437	446.83	NA	100.00%	NA
Don't know	8	5.85	1.29%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	445	452.67	100.00%	NA	NA

Question 8. If you (or the homeowner) received any kind of rebate, how much was it?
[Filtered on those responding "Yes" to Question 6]

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
No rebate	372	364.31	80.48%	83.28%	5.31%
Up to $10	8	8.66	1.91%	1.98%	1.98%
Between $11 and $20	6	13.54	2.99%	3.09%	2.46%
Between $21 and $30	4	1.67	0.37%	0.38%	0.88%
Between $31 and $40	2	0.81	0.18%	0.18%	0.61%
Between $41 and $50	6	8.62	1.90%	1.97%	1.98%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	3	1.33	0.29%	0.30%	0.78%
Between $81 and $100	11	24.29	5.37%	5.55%	3.26%
Between $101 and $125	2	0.68	0.15%	0.16%	0.56%
Between $126 and $150	2	0.78	0.17%	0.18%	0.60%
Between $151 and $200	3	10.07	2.22%	2.30%	2.13%
Between $201 and $250	2	1.11	0.24%	0.25%	0.71%
Between $251 and $300	1	0.18	0.04%	0.04%	0.29%
Between $301 and $400	1	0.67	0.15%	0.15%	0.56%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	2	0.75	0.17%	0.17%	0.59%
Total of known responses	425	437.46	NA	100.00%	NA
Don't know	18	13.85	3.06%	NA	NA
Blank	2	1.36	0.30%	NA	NA
Total	445	452.67	100.00%	NA	NA

Question 9. How long ago did you (or the homeowner) purchase this new icemaker?
[Filtered on those responding "Yes" to Question 6]

Response	**Total responses**	**Known responses**

	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Less than 12 months ago	273	256.71	56.71%	57.46%	6.64%
At least 1 year but less than 2 years ago	116	138.94	30.69%	31.10%	6.21%
At least 2 year but less than 3 years ago	32	37.93	8.38%	8.49%	3.74%
At least 3 year but less than 4 years ago	12	8.95	1.98%	2.00%	1.88%
At least 4 year but less than 5 years ago	2	1.84	0.41%	0.41%	0.86%
At least 5 year but less than 6 years ago	0	0.00	0.00%	0.00%	0.00%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	2	1.79	0.40%	0.40%	0.85%
At least 10 year but less than 12 years ago	1	0.65	0.14%	0.14%	0.51%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	438	446.80	NA	100.00%	NA
Don't know	6	5.30	1.17%	NA	NA
Blank	1	0.57	0.13%	NA	NA
Total	445	452.67	100.00%	NA	NA

Question 10. What are ice cubes typically made from? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 11. When you (or the homeowner) acquired this icemaker, how much did it cost to have it installed?

	Total responses			Known responses	
Response	Unweighted counts	Weighted counts	Weighted proportion	Weighted proportion	Confidence interval
Nothing; I installed it myself or someone installed it for free	667	682.33	84.13%	89.81%	3.26%
Up to $10	7	8.28	1.02%	1.09%	1.12%
Between $11 and $20	7	5.41	0.67%	0.71%	0.91%
Between $21 and $30	6	12.02	1.48%	1.58%	1.35%
Between $31 and $40	6	4.78	0.59%	0.63%	0.85%
Between $41 and $50	15	15.39	1.90%	2.03%	1.52%
Between $51 and $60	9	7.83	0.97%	1.03%	1.09%

Between $61 and $80	7	4.04	0.50%	0.53%	0.78%
Between $81 and $100	10	6.47	0.80%	0.85%	0.99%
Between $101 and $125	3	0.97	0.12%	0.13%	0.38%
Between $126 and $150	6	3.04	0.37%	0.40%	0.68%
Between $151 and $200	4	7.52	0.93%	0.99%	1.07%
Between $201 and $250	1	0.48	0.06%	0.06%	0.27%
Between $251 and $300	1	1.21	0.15%	0.16%	0.43%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	749	759.78	NA	100.00%	NA
Don't know	59	49.36	6.09%	NA	NA
Blank	3	1.86	0.23%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 12. Has this icemaker ever been repaired?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	27	26.09	3.22%	3.38%	1.46%
No	745	746.11	92.00%	96.62%	1.46%
Total of known responses	772	772.20	NA	100.00%	NA
Don't know	39	38.80	4.78%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 13. How much did it cost to repair? **[Filtered on those responding "Yes" to Question 12]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Nothing; repaired for free or under warranty	6	3.89	14.89%	15.12%	21.02%
Up to $10	0	0.00	0.00%	0.00%	0.00%
Between $11 and $20	1	0.37	1.43%	1.45%	7.01%
Between $21 and $30	0	0.00	0.00%	0.00%	0.00%
Between $31 and $40	1	8.92	34.19%	34.72%	27.93%
Between $41 and $50	7	4.19	16.07%	16.31%	21.68%
Between $51 and $60	3	1.93	7.40%	7.51%	15.47%
Between $61 and $80	1	3.19	12.22%	12.41%	19.34%
Between $81 and $100	4	1.69	6.47%	6.57%	14.53%
Between $101 and $125	1	0.63	2.42%	2.45%	9.08%

Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	1	0.48	1.84%	1.87%	7.95%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	1	0.41	1.56%	1.58%	7.32%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	26	25.70	NA	100.00%	NA
Don't know	1	0.40	1.52%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	27	26.09	100.00%	NA	NA

Question 14. How long after you (or the homeowner) purchased it was it repaired?
[Filtered on those responding "Yes" to Question 12. Note: response choices created an ambiguity as to whether the question was in fact asking HOW LONG AGO the unit was repaired. Therefore, we present both the data as recorded, as well as the difference in age between the response to this question and Question 9 (How long ago did you (or the homeowner) purchase this new icemaker?). See second table below.]

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Less than 12 months ago	11	13.40	51.37%	53.66%	28.31%
At least 1 year but less than 2 years ago	10	9.77	37.45%	39.13%	27.71%
At least 2 year but less than 3 years ago	1	0.46	1.75%	1.83%	7.61%
At least 3 year but less than 4 years ago	1	0.86	3.31%	3.45%	10.37%
At least 4 year but less than 5 years ago	1	0.48	1.84%	1.92%	7.80%
At least 5 year but less than 6 years ago	0	0.00	0.00%	0.00%	0.00%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	0	0.00	0.00%	0.00%	0.00%
At least 10 year but less than 12 years ago	0	0.00	0.00%	0.00%	0.00%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	24	24.98	NA	100.00%	NA

Don't know	2	0.44	1.68%	NA	NA
Blank	1	0.68	2.60%	NA	NA
Total	27	26.09	100.00%	NA	NA

Difference between response to Question 14 (How long after you (or the homeowner) purchased it was it repaired?) and Question 9 (How long ago did you (or the homeowner) purchase this new icemaker?) **[Filtered on those responding "Yes" to Question 12].**

	Total responses		
Difference in age	**Unweighted counts**	**Unweighted proportion**	**Confidence interval**
0	3	25.00%	31.22%
1	5	41.67%	35.55%
2	3	25.00%	31.22%
4.5	1	8.33%	19.93%
Total	12	100.00%	NA

Question 15. Which component was repaired? Please check all that apply **[Filtered on those responding "Yes" to Question 12]**

	Known responses			
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
Compressor	7	12.10	44.82%	23.67%
Evaporator	0	0.00	0.00%	0.00%
Condenser	3	1.91	7.06%	16.98%
Fan	7	5.64	20.90%	23.67%
Door gasket	3	1.74	6.43%	16.98%
Other door component	2	1.23	4.55%	14.15%
Insulation	2	1.07	3.98%	14.15%
Electronics	2	1.65	6.12%	14.15%
Lighting	5	2.77	10.25%	20.98%
Something else	3	1.23	4.55%	16.98%

Question 16. Do you (or the homeowner) ever perform routine maintenance on this icemaker?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	257	270.13	33.31%	34.33%	3.79%
No	528	516.68	63.71%	65.67%	3.79%
Total of known responses	785	786.81	NA	100.00%	NA
Don't know	24	22.89	2.82%	NA	NA
Blank	2	1.30	0.16%	NA	NA

Total	811	811.00	100.00%	NA	NA

Question 17. How much is spent each year on routine maintenance of this icemaker? **[Filtered on those responding "Yes" to Question 16]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Nothing; I perform the maintenance myself or someone does it for free	160	178.88	66.22%	66.66%	8.56%
Up to $10	13	9.13	3.38%	3.40%	3.29%
Between $11 and $20	30	28.25	10.46%	10.53%	5.57%
Between $21 and $30	15	17.59	6.51%	6.56%	4.49%
Between $31 and $40	6	4.30	1.59%	1.60%	2.28%
Between $41 and $50	8	7.94	2.94%	2.96%	3.08%
Between $51 and $60	7	4.74	1.76%	1.77%	2.39%
Between $61 and $80	5	4.71	1.74%	1.75%	2.38%
Between $81 and $100	3	1.74	0.64%	0.65%	1.46%
Between $101 and $125	3	1.19	0.44%	0.44%	1.20%
Between $126 and $150	1	1.33	0.49%	0.49%	1.27%
Between $151 and $200	2	6.57	2.43%	2.45%	2.81%
Between $201 and $250	1	0.50	0.18%	0.18%	0.78%
Between $251 and $300	1	1.47	0.54%	0.55%	1.34%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	255	268.34	NA	100.00%	NA
Don't know	2	1.79	0.66%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	257	270.13	100.00%	NA	NA

Question 18. Who is the current president of the U.S.? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 19. What is your five-digit ZIP code? **[Responses have been binned by U.S. Census region to simplify analysis]**

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
New England	37	28.65	3.53%	3.54%	1.82%
Middle Atlantic	119	93.28	11.50%	11.53%	3.15%
East North Central	238	243.33	30.00%	30.07%	4.53%

West North Central	37	12.42	1.53%	1.54%	1.21%
South Atlantic	138	139.74	17.23%	17.27%	3.73%
East South Central	25	21.50	2.65%	2.66%	1.59%
West South Central	55	93.19	11.49%	11.52%	3.15%
Mountain North	18	38.94	4.80%	4.81%	2.11%
Mountain South	17	12.81	1.58%	1.58%	1.23%
Pacific	125	125.21	15.44%	15.48%	3.57%
Total of known responses	809	809.08	NA	100.00%	NA
Don't know	2	1.92	0.24%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 20. What is your gender?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Female	281	302.38	37.29%	37.33%	3.81%
Male	527	507.55	62.58%	62.67%	3.81%
Total of known responses	808	809.94	NA	100.00%	NA
Decline to state	3	1.06	0.13%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 21. Are you Hispanic or Latino?

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	48	132.88	16.38%	16.64%	2.95%
No	744	665.52	82.06%	83.36%	2.95%
Total of known responses	792	798.40	NA	100.00%	NA
Decline to state	15	9.43	1.16%	NA	NA
Blank	4	3.17	0.39%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 22. What is your race? **[Responses have been binned to simplify analysis]**

	Total responses			**Known responses**	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
White or Caucasian	479	437.41	53.93%	54.77%	4.40%
Black/African-American	218	207.11	25.54%	25.93%	3.87%
Asian	46	42.07	5.19%	5.27%	1.97%
Other	51	112.03	13.81%	14.03%	3.07%

Total of known responses	794	798.61	NA	100.00%	NA
Decline to state	14	9.19	1.13%	NA	NA
Blank	3	3.20	0.39%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 23. What is your highest education level?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
No Education	20	22.57	2.78%	2.80%	1.56%
High school diploma or GED	299	330.88	40.80%	41.07%	4.66%
Some college, no degree	169	153.26	18.90%	19.02%	3.72%
Associate Degree	60	59.83	7.38%	7.43%	2.49%
Bachelor Degree	193	165.82	20.45%	20.58%	3.83%
Master Degree	45	59.89	7.38%	7.43%	2.49%
PhD or Professional Degree	18	13.37	1.65%	1.66%	1.21%
Total of known responses	804	805.62	NA	100.00%	NA
Decline to state	2	1.32	0.16%	NA	NA
Blank	5	4.07	0.50%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 24. How many people live in your home for most of the year (including you)?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
1	134	179.61	22.15%	22.15%	4.09%
2	207	243.86	30.07%	30.07%	4.52%
3	154	138.15	17.03%	17.03%	3.71%
4	170	146.29	18.04%	18.04%	3.79%
5	95	68.15	8.40%	8.40%	2.73%
6	30	20.75	2.56%	2.56%	1.56%
7	15	8.87	1.09%	1.09%	1.03%
8	5	5.07	0.62%	0.62%	0.78%
9	1	0.26	0.03%	0.03%	0.18%
10 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	811	811.00	NA	100.00%	NA
Don't know/Decline to state	0	0.00	0.00%	NA	NA
Doesn't apply	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 25. Of the people you included in the total for Question 24, how many people are in the following age categories **[Responses have been binned to simplify analysis]**

	Total responses		Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Confidence interval**
19 and under	346	334.65	41.26%	4.32%
20 to 29	452	265.09	32.69%	4.11%
30 to 59	444	499.19	61.55%	4.27%
60 and over	258	318.52	39.27%	4.28%

Question 26. What is your combined annual household income?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
$0-$19,999	49	50.77	6.26%	6.51%	2.33%
$20,000-$39,999	151	193.77	23.89%	24.84%	4.08%
$40,000-$59,999	251	190.68	23.51%	24.44%	4.06%
$60,000-$79,999	128	133.36	16.44%	17.10%	3.56%
$80,000-$99,999	75	78.94	9.73%	10.12%	2.85%
$100,000 and more	122	132.58	16.35%	16.99%	3.55%
Total of known responses	776	780.09	NA	100.00%	NA
Don't know/Decline to state	34	27.16	3.35%	NA	NA
Blank	1	3.75	0.46%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 27. What type of home do you live in most of the year?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
a Dormitory	4	5.34	0.66%	0.66%	0.77%
an Apartment building 5 or more units	70	56.02	6.91%	6.92%	2.40%
an Apartment building with 2-4 units	69	47.41	5.85%	5.86%	2.22%
a Mobile home	16	17.54	2.16%	2.17%	1.38%
a Single-family attached house (a house attached to one or more houses)	171	192.98	23.80%	23.84%	4.03%
a Single-family detached house (a house detached from any other house)	466	479.04	59.07%	59.17%	4.65%
Something else	12	11.28	1.39%	1.39%	1.11%

Total of known responses	808	809.60	NA	100.00%	NA
Don't know	1	0.23	0.03%	NA	NA
Blank	2	1.17	0.14%	NA	NA
Total	811	811.00	100.00%	NA	NA

Question 28. Is this home owned or rented?

	Total responses			Known responses	
Response	**Unweighted counts**	**Weighted counts**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Owned or being bought by someone in your household	448	465.54	57.40%	57.81%	4.17%
Rented	351	334.30	41.22%	41.51%	4.16%
Occupied without payment of rent	8	5.42	0.67%	0.67%	0.69%
Total of known responses	807	805.26	NA	100.00%	NA
Don't know	1	0.20	0.02%	NA	NA
Blank	3	5.53	0.68%	NA	NA
Total	811	811.00	100.00%	NA	NA

A.1.5 NV1 survey

Question 1. Indicate how many refrigerators in your home use thermoelectric or absorption cooling.

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
None	0	0.00	0.00%	0.00%	0.00%
1	158	157.54	97.85%	97.85%	2.94%
2	3	3.46	2.15%	2.15%	2.94%
3	0	0.00	0.00%	0.00%	0.00%
4 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	161	161.00	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 2. What is the brand of this refrigerator? **[Responses not listed; see Section 3.3.2 on validation]**

Question 3. Please enter the brand of the refrigerator **[Responses not listed; see Section 3.3.2 on validation]**

Question 4. What is the full model number of this refrigerator? **[Responses not listed; see Section 3.3.2 on validation]**

Question 5. Please estimate the total capacity of this refrigerator **[Filtered on those not answering "None" to Question 1]**

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Small compact = less than 4 cubic feet (113 liters)	131	116.76	72.52%	77.72%	9.13%
Large compact = at least 4 but less than 7.75 cubic feet (113 to 219 liters)	11	13.15	8.16%	8.75%	6.20%
Very small = at least 7.75 but less than 12 cubic feet (220 to 340 liters)	3	5.61	3.49%	3.74%	4.16%
Small = at least 12 but less than 16 cubic feet (340 to 453 liters)	6	10.72	6.66%	7.14%	5.65%
Medium = at least 16 but less than 20 cubic feet (453 to 566 liters)	3	3.98	2.47%	2.65%	3.53%
Large = at least 20 but less than 24 cubic feet (566 to 680 liters)	0	0.00	0.00%	0.00%	0.00%
Very large = at least 24 cubic feet (680 liters)	0	0.00	0.00%	0.00%	0.00%
Total of known responses	154	150.22	NA	100.00%	NA
Don't know	7	10.78	6.70%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 6. If this refrigerator has a separate freezer compartment, what is the estimated size of this compartment? **[Filtered on those not answering "None" to Question 1]**

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Does not have a separate freezer compartment	130	124.50	77.33%	84.63%	7.12%
Less than 0.5 cubic feet (14 liters), enough for ice trays but little else	16	19.46	12.09%	13.23%	6.69%
More than 0.5 cubic feet (14 liters)	4	3.14	1.95%	2.13%	2.85%
Total of known responses	150	147.10	NA	100.00%	NA

Don't know	10	12.86	7.99%	NA	NA
Blank	1	1.03	0.64%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 7. Did you (or the homeowner) purchase this refrigerator new? **[Filtered on those not answering "None" to Question 1]**

	Total responses			Known responses	
Response	**Unweighted**	**Weighted**	**Weighted proportion**	**Weighted proportion**	**Confidence interval**
Yes	100	97.79	60.74%	63.41%	8.69%
No	53	56.43	35.05%	36.59%	8.69%
Total of known responses	153	154.21	NA	100.00%	NA
Don't know	8	6.79	4.22%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 8. How much did you (or the homeowner) pay for this new refrigerator (not including tax or rebates)? **[Filtered on those answering "Yes" to Question 7]**

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Up to $25	0	0.00	0.00%	0.00%	0.00%
Between $26 and $50	0	0.00	0.00%	0.00%	0.00%
Between $51 and $75	2	2.37	2.43%	2.44%	4.85%
Between $76 and $100	34	26.55	27.15%	27.27%	14.00%
Between $101 and $125	35	47.26	48.32%	48.53%	15.71%
Between $126 and $150	10	5.59	5.71%	5.74%	7.31%
Between $151 and $200	5	4.06	4.16%	4.17%	6.29%
Between $201 and $250	8	6.49	6.64%	6.67%	7.84%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $350	2	1.52	1.55%	1.56%	3.90%
Between $351 and $400	1	0.65	0.66%	0.66%	2.55%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
Between $501 and $600	0	0.00	0.00%	0.00%	0.00%
Between $601 and $700	0	0.00	0.00%	0.00%	0.00%
Between $701 and $800	0	0.00	0.00%	0.00%	0.00%
Between $801 and $1,000	0	0.00	0.00%	0.00%	0.00%
Between $1,001 and $1,200	1	1.86	1.90%	1.91%	4.30%
Between $1,201 and $1,400	1	1.04	1.06%	1.06%	3.22%
Between $1,401 and $1,600	0	0.00	0.00%	0.00%	0.00%
Between $1,601 and $1,800	0	0.00	0.00%	0.00%	0.00%
Between $1,801 and $2,000	0	0.00	0.00%	0.00%	0.00%

Between $2,001 and $2,500	0	0.00	0.00%	0.00%	0.00%
Between $2,501 and $3,000	0	0.00	0.00%	0.00%	0.00%
Between $3,001 and $3,500	0	0.00	0.00%	0.00%	0.00%
Between $3,501 and $4,000	0	0.00	0.00%	0.00%	0.00%
$4001 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	99	97.37	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	1	0.41	0.42%	NA	NA
Total	100	97.79	100.00%	NA	NA

Question 9. If you (or the homeowner) received any kind of rebate, how much was it?
[Filtered on those answering "Yes" to Question 7]

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
No rebate	87	77.35	79.10%	83.39%	11.49%
Up to $10	2	11.55	11.81%	12.45%	10.20%
Between $11 and $20	2	0.65	0.66%	0.70%	2.57%
Between $21 and $30	1	0.56	0.57%	0.60%	2.39%
Between $31 and $40	0	0.00	0.00%	0.00%	0.00%
Between $41 and $50	1	0.32	0.32%	0.34%	1.80%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	1	1.73	1.77%	1.86%	4.18%
Between $101 and $125	1	0.60	0.62%	0.65%	2.48%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	95	92.75	NA	100.00%	NA
Don't know	4	4.62	4.73%	NA	NA
Blank	1	0.41	0.42%	NA	NA
Total	100	97.79	100.00%	NA	NA

Question 10. How long ago did you (or the homeowner) purchase this new refrigerator?
[Filtered on those answering "Yes" to Question 7]

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**

Less than 12 months ago	71	71.73	73.36%	75.99%	12.47%
At least 1 year but less than 2 years ago	18	14.41	14.74%	15.27%	10.50%
At least 2 year but less than 3 years ago	6	5.49	5.61%	5.81%	6.83%
At least 3 year but less than 4 years ago	1	1.04	1.06%	1.10%	3.04%
At least 4 year but less than 5 years ago	0	0.00	0.00%	0.00%	0.00%
At least 5 year but less than 6 years ago	1	1.73	1.77%	1.83%	3.92%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	0	0.00	0.00%	0.00%	0.00%
At least 10 year but less than 12 years ago	0	0.00	0.00%	0.00%	0.00%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	97	94.39	NA	100.00%	NA
Don't know	1	1.74	1.78%	NA	NA
Blank	2	1.66	1.69%	NA	NA
Total	100	97.79	100.00%	NA	NA

Question 11. What material are wine bottles typically made from? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 12. When you (or the homeowner) acquired this refrigerator, how much did it cost to have it installed?

	Total responses		**Weighted proportion of total**	**Known responses**	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Nothing; I installed it myself or someone installed it for free	147	149.68	92.97%	95.60%	4.88%
Up to $10	1	0.51	0.31%	0.32%	1.35%
Between $11 and $20	0	0.00	0.00%	0.00%	0.00%
Between $21 and $30	2	1.93	1.20%	1.23%	2.62%
Between $31 and $40	1	0.44	0.27%	0.28%	1.25%
Between $41 and $50	4	2.69	1.67%	1.72%	3.09%
Between $51 and $60	0	0.00	0.00%	0.00%	0.00%
Between $61 and $80	1	0.42	0.26%	0.27%	1.24%

Between $81 and $100	1	0.91	0.57%	0.58%	1.81%
Between $101 and $125	0	0.00	0.00%	0.00%	0.00%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	157	156.58	NA	100.00%	NA
Don't know	4	4.42	2.75%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 13. Has this refrigerator ever been repaired? **[Filtered on those not answering "None" to Question 1]**

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Yes	2	1.82	1.13%	1.18%	1.95%
No	152	152.75	94.88%	98.82%	1.95%
Total of known responses	154	154.58	NA	100.00%	NA
Don't know	7	6.42	3.99%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 14. How much did it cost to repair? **[Filtered on those answering "Yes" to Question 13]**

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Nothing; repaired for free or under warranty	0	0.00	0.00%	0.00%	0.00%
Up to $10	0	0.00	0.00%	0.00%	0.00%
Between $11 and $20	1	0.09	5.13%	5.13%	48.59%
Between $21 and $30	0	0.00	0.00%	0.00%	0.00%
Between $31 and $40	0	0.00	0.00%	0.00%	0.00%
Between $41 and $50	0	0.00	0.00%	0.00%	0.00%
Between $51 and $60	1	1.73	94.87%	94.87%	48.59%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	0	0.00	0.00%	0.00%	0.00%
Between $101 and $125	0	0.00	0.00%	0.00%	0.00%

Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	2	1.82	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	2	1.82	100.00%	NA	NA

Question 15. How long after you (or the homeowner) purchased it was it repaired?
[Filtered on those answering "Yes" to Question 13]

	Total responses		Weighted proportion of total	Known responses	
Response	**Unweighted**	**Weighted**		**Weighted proportion**	**Confidence interval**
Less than 12 months ago	1	0.09	5.13%	5.13%	46.37%
At least 1 year but less than 2 years ago	0	0.00	0.00%	0.00%	0.00%
At least 2 year but less than 3 years ago	0	0.00	0.00%	0.00%	0.00%
At least 3 year but less than 4 years ago	0	0.00	0.00%	0.00%	0.00%
At least 4 year but less than 5 years ago	1	1.73	94.87%	94.87%	46.37%
At least 5 year but less than 6 years ago	0	0.00	0.00%	0.00%	0.00%
At least 6 year but less than 8 years ago	0	0.00	0.00%	0.00%	0.00%
At least 8 year but less than 10 years ago	0	0.00	0.00%	0.00%	0.00%
At least 10 year but less than 12 years ago	0	0.00	0.00%	0.00%	0.00%
At least 12 year but less than 15 years ago	0	0.00	0.00%	0.00%	0.00%
At least 15 years ago	0	0.00	0.00%	0.00%	0.00%
Total of known responses	2	1.82	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	2	1.82	100.00%	NA	NA

Question 16. Which component was repaired? **[Results not listed due to too few responses]**

Question 17. Do you (or the homeowner) ever perform routine maintenance on this refrigerator? **[Filtered on those not answering "None" to Question 1]**

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Yes	30	35.63	22.13%	23.20%	7.63%
No	126	117.97	73.27%	76.80%	7.63%
Total of known responses	156	153.60	NA	100.00%	NA
Don't know	4	3.62	2.25%	NA	NA
Blank	1	3.78	2.35%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 18. How much is spent each year on routine maintenance of this refrigerator? **[Filtered on those answering "Yes" to Question 17]**

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Nothing; I perform the maintenance myself or someone does it for free	21	19.94	55.98%	55.98%	24.73%
Up to $10	1	0.70	1.95%	1.95%	6.89%
Between $11 and $20	5	12.12	34.01%	34.01%	23.60%
Between $21 and $30	0	0.00	0.00%	0.00%	0.00%
Between $31 and $40	0	0.00	0.00%	0.00%	0.00%
Between $41 and $50	1	0.70	1.95%	1.95%	6.89%
Between $51 and $60	2	2.18	6.11%	6.11%	11.93%
Between $61 and $80	0	0.00	0.00%	0.00%	0.00%
Between $81 and $100	0	0.00	0.00%	0.00%	0.00%
Between $101 and $125	0	0.00	0.00%	0.00%	0.00%
Between $126 and $150	0	0.00	0.00%	0.00%	0.00%
Between $151 and $200	0	0.00	0.00%	0.00%	0.00%
Between $201 and $250	0	0.00	0.00%	0.00%	0.00%
Between $251 and $300	0	0.00	0.00%	0.00%	0.00%
Between $301 and $400	0	0.00	0.00%	0.00%	0.00%
Between $401 and $500	0	0.00	0.00%	0.00%	0.00%
$501 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	30	35.63	NA	100.00%	NA
Don't know	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA

Total	30	35.63	100.00%	NA	NA

Question 19. Indicate how many freezers in your home use thermoelectric or absorption cooling.

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
None	124	113.55	70.53%	71.61%	9.22%
1	35	45.02	27.97%	28.39%	9.22%
2	0	0.00	0.00%	0.00%	0.00%
3	0	0.00	0.00%	0.00%	0.00%
4 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	159	158.57	NA	100.00%	NA
Don't know	2	2.43	1.51%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 20. What is the brand of this freezer? **[Responses not listed; see Section 3.3.2 on validation]**

Question 21. Please enter the brand name of this freezer **[Responses not listed; see Section 3.3.2 on validation]**

Question 22. What is the full model number of this freezer? **[Responses not listed; see Section 3.3.2 on validation]**

Question 23. Who is the current president of the U.S.? **[Cheater question; responses not shown because only correct responses were retained in the analysis]**

Question 24. What is your five-digit ZIP code? **[Responses have been binned by U.S. Census region]**

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
New England	9	8.02	4.98%	4.98%	4.81%
Middle Atlantic	28	29.96	18.61%	18.61%	8.61%
East North Central	31	18.07	11.22%	11.22%	6.98%
West North Central	8	9.27	5.76%	5.76%	5.15%
South Atlantic	34	33.00	20.50%	20.50%	8.93%
East South Central	4	14.87	9.24%	9.24%	6.41%
West South Central	12	16.31	10.13%	10.13%	6.68%
Mountain North	3	1.84	1.14%	1.14%	2.35%

Mountain South	2	2.78	1.72%	1.72%	2.88%
Pacific	30	26.88	16.70%	16.70%	8.25%
Total of known responses	161	161.00	NA	100.00%	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 25. What is your gender?

	Total responses		Weighted	Known responses	
Response	**Unweighted**	**Weighted**	**proportion of total**	**Weighted proportion**	**Confidence interval**
Female	60	68.94	42.82%	43.71%	8.85%
Male	97	88.77	55.13%	56.29%	8.85%
Total of known responses	157	157.71	NA	100.00%	NA
Decline to state	3	2.34	1.45%	NA	NA
Blank	1	0.96	0.59%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 26. Are you Hispanic or Latino?

	Total responses		Weighted	Known responses	
Response	**Unweighted**	**Weighted**	**proportion of total**	**Weighted proportion**	**Confidence interval**
Yes	17	50.96	31.65%	32.60%	8.40%
No	137	105.36	65.44%	67.40%	8.40%
Total of known responses	154	156.32	NA	100.00%	NA
Decline to state	5	3.12	1.94%	NA	NA
Blank	2	1.56	0.97%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 27. What is your race? **[Responses have been binned to simplify analysis]**

	Total responses		Weighted	Known responses	
Response	**Unweighted**	**Weighted**	**proportion of total**	**Weighted proportion**	**Confidence interval**
White or Caucasian	105	93.40	58.01%	60.17%	9.81%
Black/African-American	18	10.01	6.22%	6.45%	4.93%
Asian	17	16.10	10.00%	10.37%	6.11%
Other	12	35.70	22.18%	23.00%	8.44%
Total of known responses	152	155.22	NA	100.00%	NA
Decline to state	8	4.98	3.09%	NA	NA
Blank	1	0.81	0.50%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 28. What is your highest education level?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
No Education	5	11.04	6.86%	6.95%	5.43%
High school diploma or GED	33	58.15	36.12%	36.59%	10.28%
Some college, no degree	31	24.25	15.07%	15.26%	7.67%
Associate Degree	14	15.27	9.48%	9.61%	6.29%
Bachelor Degree	57	32.20	20.00%	20.26%	8.58%
Master Degree	15	15.68	9.74%	9.87%	6.36%
PhD or Professional Degree	4	2.34	1.45%	1.47%	2.57%
Total of known responses	159	158.93	NA	100.00%	NA
Decline to state	1	1.74	1.08%	NA	NA
Blank	1	0.33	0.21%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 29. How many people live in your home for most of the year (including you)?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
1	16	22.42	13.93%	13.93%	7.66%
2	45	57.15	35.49%	35.49%	10.59%
3	33	22.13	13.74%	13.74%	7.62%
4	38	42.00	26.09%	26.09%	9.71%
5	21	12.24	7.60%	7.60%	5.86%
6	5	3.28	2.04%	2.04%	3.12%
7	0	0.00	0.00%	0.00%	0.00%
8	3	1.79	1.11%	1.11%	2.32%
9	0	0.00	0.00%	0.00%	0.00%
10 or more	0	0.00	0.00%	0.00%	0.00%
Total of known responses	161	161.00	NA	100.00%	NA
Doesn't apply	0	0.00	0.00%	NA	NA
Don't know/Decline to state	0	0.00	0.00%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 30. Of the people you included in the total for Question 29, how many people are in the following age categories (please fill in the number of people for all applicable categories) **[Responses have been binned to simplify analysis]**

Response	Total responses		Known responses	
	Unweighted	Weighted	Weighted proportion	Confidence interval
19 and under	67	77.45	48.11%	9.84%

20 to 29	113	67.05	41.65%	9.70%
30 to 59	88	103.58	64.34%	9.43%
60 and over	55	38.87	24.14%	8.42%

Question 31. What is your combined annual household income?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
$0-$19,999	19	18.88	11.72%	12.58%	7.14%
$20,000-$39,999	22	35.80	22.24%	23.85%	9.18%
$40,000-$59,999	29	14.95	9.29%	9.96%	6.45%
$60,000-$79,999	42	46.75	29.04%	31.15%	9.97%
$80,000-$99,999	14	10.73	6.67%	7.15%	5.55%
$100,000 and more	29	22.99	14.28%	15.31%	7.75%
Total of known responses	155	150.10	NA	100.00%	NA
Don't know/Decline to state	6	10.90	6.77%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 32. What type of home do you live in most of the year?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
a Dormitory	3	3.69	2.29%	2.32%	3.21%
an Apartment building 5 or more units	21	18.32	11.38%	11.52%	6.81%
an Apartment building with 2-4 units	18	17.80	11.06%	11.20%	6.73%
a Mobile home	2	3.19	1.98%	2.01%	2.99%
a Single-family detached house (a house detached from any other house)	104	99.05	61.52%	62.31%	10.34%
a Single-family attached house (a house attached to one or more houses)	10	11.66	7.24%	7.34%	5.56%
Something else	1	5.25	3.26%	3.30%	3.81%
Total of known responses	159	158.97	NA	100.00%	NA
Don't know	1	1.74	1.08%	NA	NA
Blank	1	0.30	0.18%	NA	NA
Total	161	161.00	100.00%	NA	NA

Question 33. Is this home owned or rented?

Response	Total responses		Weighted proportion of total	Known responses	
	Unweighted	Weighted		Weighted proportion	Confidence interval
Owned or being bought by someone in your household	90	73.62	45.72%	46.35%	9.47%
Rented	68	84.19	52.29%	53.00%	9.48%
Occupied without payment of rent	1	1.04	0.64%	0.65%	1.53%
Total of known responses	159	158.84	NA	100.00%	NA
Don't know	2	2.16	1.34%	NA	NA
Blank	0	0.00	0.00%	NA	NA
Total	161	161.00	100.00%	NA	NA

A.2 NPD wine/beverage cooler price distributions

A.2.1 Cumulative price distributions for all years by bottle capacity

All figures use a logarithmic price axis. Prices have been inflation-adjusted to 2011 dollars, and cumulative shipments are normalized in each year to sum to 1.

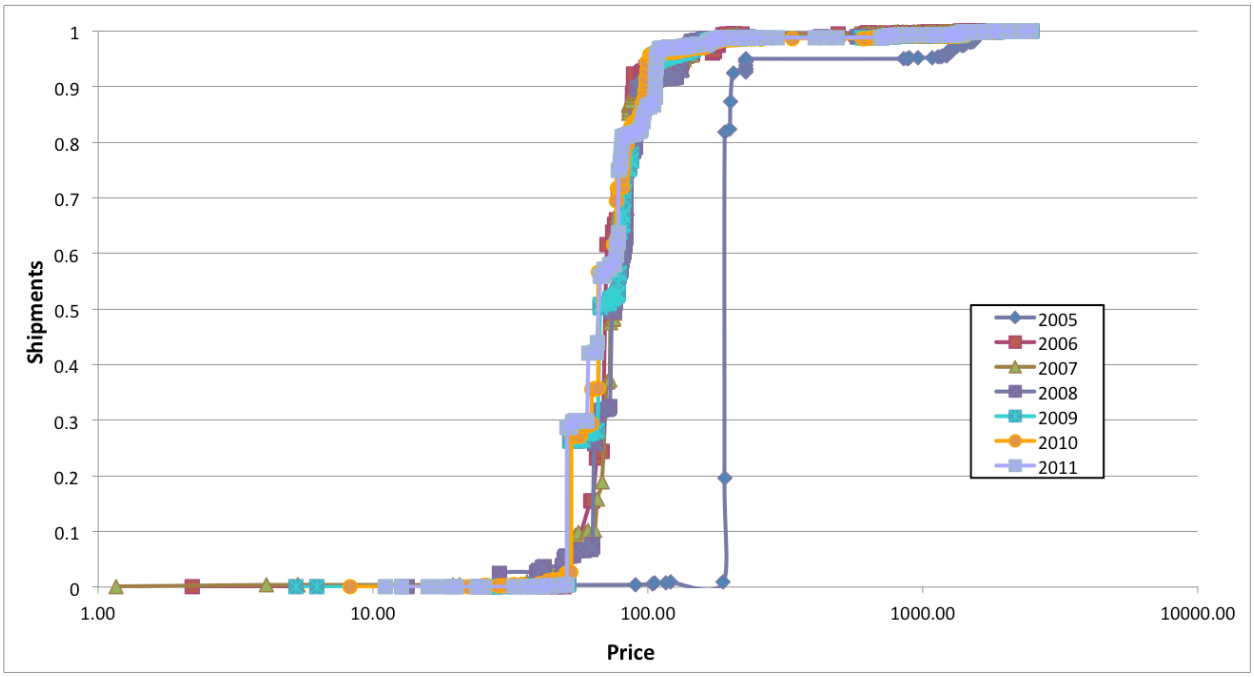

Figure A.2.1. NPD cumulative prices for 1-11 bottle capacity wine/beverage coolers by year

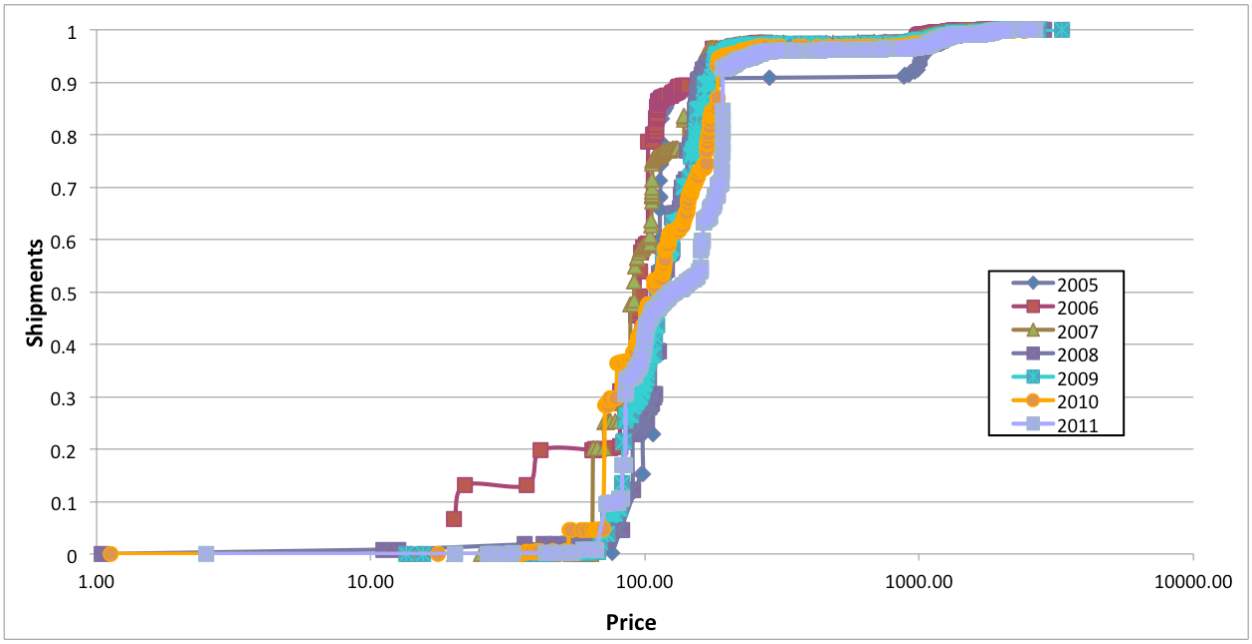

Figure A.2.2. NPD cumulative prices for 12-19 bottle capacity wine/beverage coolers by year

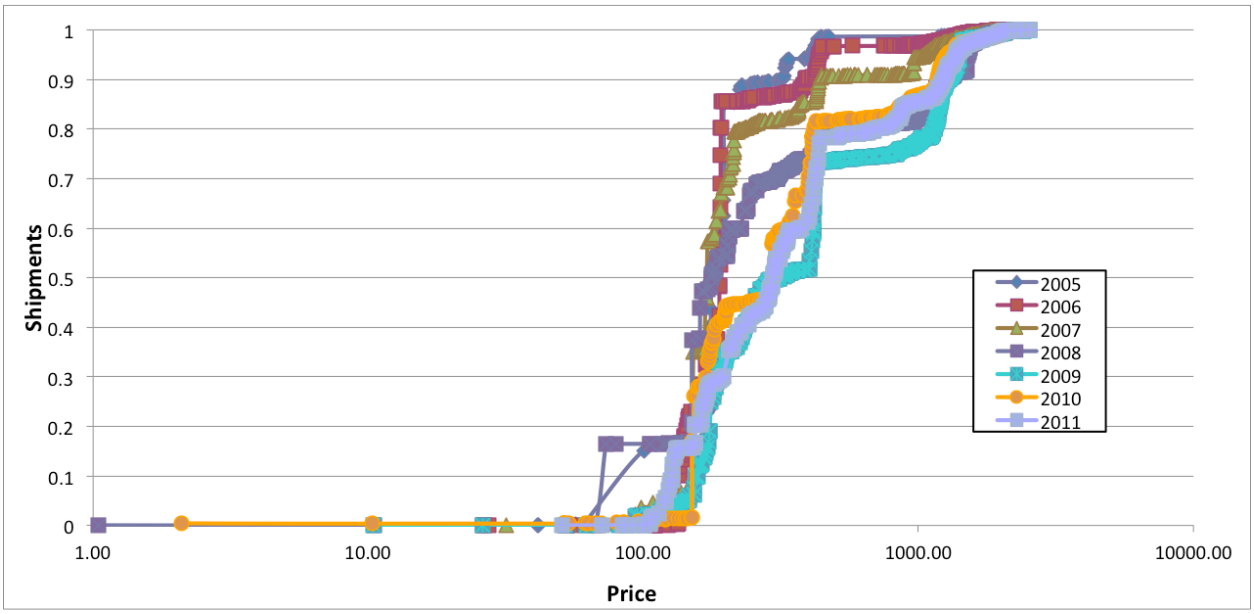

Figure A.2.3. NPD cumulative prices for 20-29 bottle capacity wine/beverage coolers by year

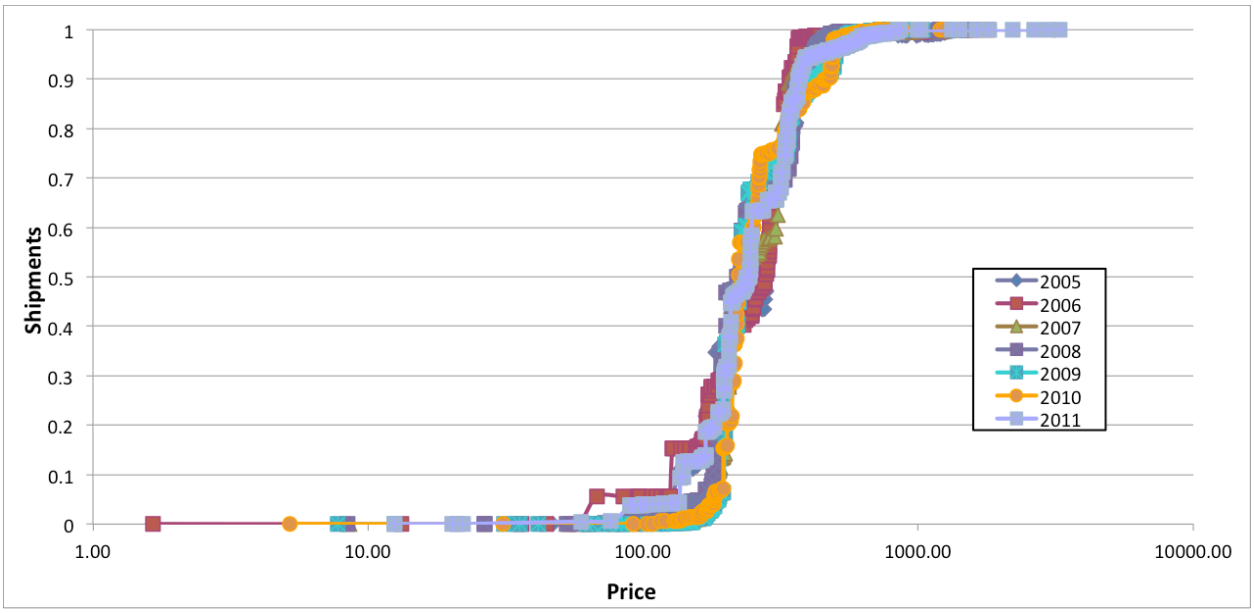

Figure A.2.4. NPD cumulative prices for 30-39 bottle capacity wine/beverage coolers by year

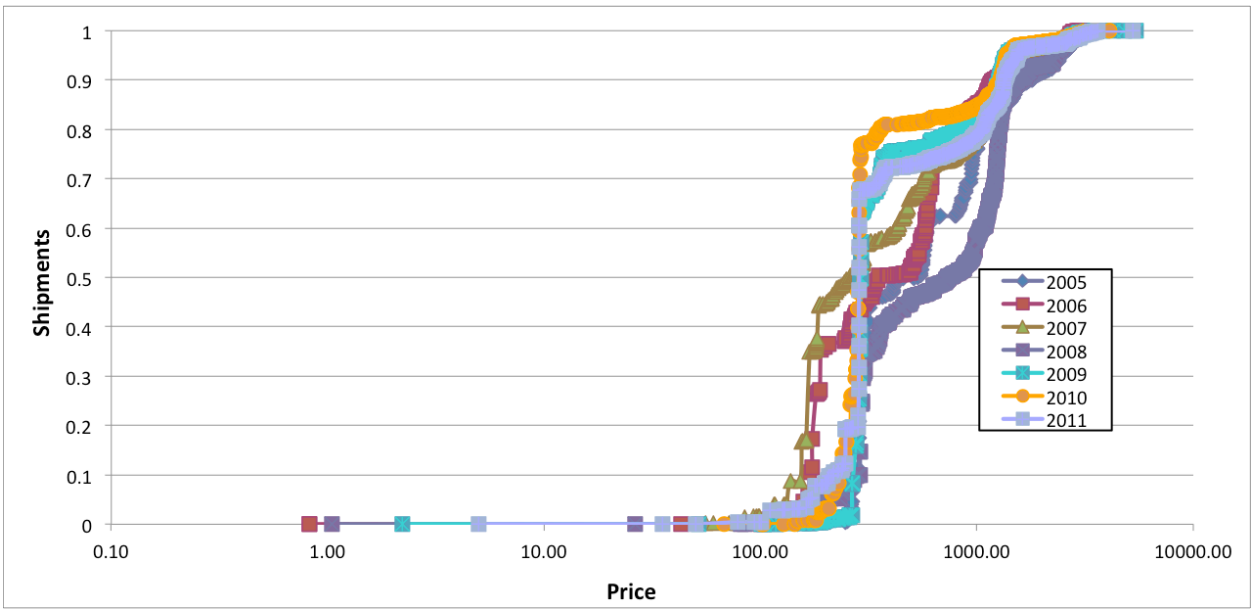

Figure A.2.5. NPD cumulative prices for 40-59 bottle capacity wine/beverage coolers by year

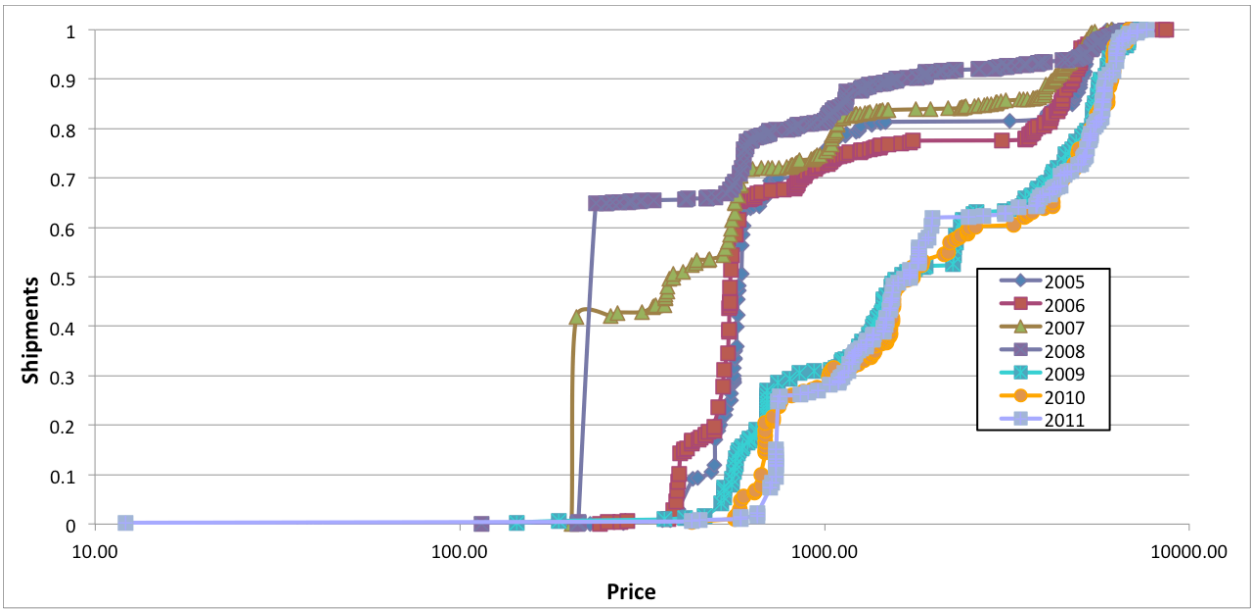

Figure A.2.6. NPD cumulative prices for 60+ bottle capacity wine/beverage coolers by year

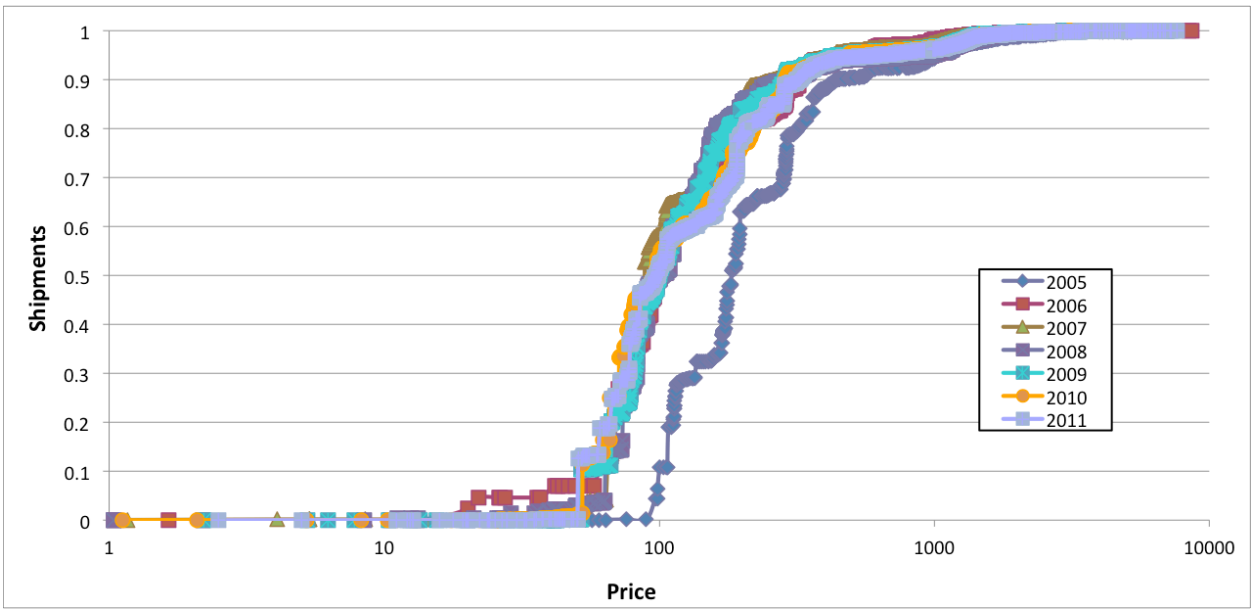

Figure A.2.7. NPD cumulative prices for all capacities of wine/beverage coolers by year

A.2.2 Average 2009-2011 price histograms by bottle capacity

Table A.2.1. NPD average 2009-2011 prices for 1-11 bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 3	0.0%
4 to 6	0.0%
7 to 9	0.0%
10 to 12	0.0%

13 to 15	0.0%
16 to 18	0.0%
19 to 21	0.0%
22 to 24	0.1%
25 to 27	0.0%
28 to 30	0.0%
31 to 33	0.1%
34 to 36	0.0%
37 to 39	0.0%
40 to 42	0.2%
43 to 45	0.2%
46 to 48	0.1%
49 to 51	9.8%
52 to 54	17.2%
55 to 57	0.4%
58 to 60	4.8%
61 to 63	2.4%
64 to 66	15.1%
67 to 69	4.5%
70 to 72	0.9%
73 to 75	1.7%
76 to 78	12.8%
79 to 81	7.0%
82 to 84	2.0%
85 to 87	2.8%
88 to 90	0.7%
91 to 93	0.8%
94 to 96	2.9%
97 to 99	5.2%
100 to 102	0.6%
103 to 105	0.7%
106 to 108	2.6%
109 to 111	0.5%
112 to 114	0.1%
115 to 117	0.1%
118 to 120	0.1%
121 to 123	0.0%
124 to 126	0.1%
127 to 129	0.1%
130 to 132	0.1%
133 to 135	0.1%
136 to 138	0.0%

139 to 141	0.2%
142 to 144	0.1%
145 to 147	0.2%
148 to 150	0.2%
>150	2.6%

Table A.2.2. NPD average 2009-2011 prices for 12-19 bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 5	0.0%
6 to 10	0.0%
11 to 15	0.0%
16 to 20	0.0%
21 to 25	0.0%
26 to 30	0.0%
31 to 35	0.0%
36 to 40	0.2%
41 to 45	0.0%
46 to 50	0.1%
51 to 55	1.3%
56 to 60	0.2%
61 to 65	0.1%
66 to 70	1.5%
71 to 75	12.3%
76 to 80	2.9%
81 to 85	13.9%
86 to 90	1.9%
91 to 95	2.2%
96 to 100	5.2%
101 to 105	2.8%
106 to 110	7.3%
111 to 115	0.9%
116 to 120	4.4%
121 to 125	1.7%
126 to 130	2.2%
131 to 135	0.5%
136 to 140	3.5%
141 to 145	1.6%
146 to 150	3.9%
151 to 155	3.8%
156 to 160	1.9%
161 to 165	3.9%

166 to 170	2.1%
171 to 175	2.4%
176 to 180	2.3%
181 to 185	4.1%
186 to 190	1.4%
191 to 195	5.3%
196 to 200	0.3%
201 to 205	0.2%
206 to 210	0.1%
211 to 215	0.3%
216 to 220	0.2%
221 to 225	0.2%
226 to 230	0.1%
231 to 235	0.1%
236 to 240	0.1%
241 to 245	0.1%
246 to 250	0.1%
>250	0.5%

Table A.2.3. NPD average 2009-2011 prices for 20-29 bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 25	0.1%
26 to 50	0.0%
51 to 75	0.1%
76 to 100	0.7%
101 to 125	3.7%
126 to 150	9.0%
151 to 175	14.9%
176 to 200	8.4%
201 to 225	3.9%
226 to 250	3.1%
251 to 275	1.9%
276 to 300	7.6%
301 to 325	2.8%
326 to 350	2.2%
351 to 375	1.8%
376 to 400	2.2%
401 to 425	13.5%
426 to 450	2.4%
451 to 475	0.1%
476 to 500	0.1%

501 to 525	0.3%
526 to 550	0.1%
551 to 575	0.1%
576 to 600	0.0%
601 to 625	0.1%
626 to 650	0.1%
651 to 675	0.1%
676 to 700	0.2%
701 to 725	0.1%
726 to 750	0.1%
751 to 775	0.2%
776 to 800	0.3%
801 to 825	0.3%
826 to 850	0.7%
851 to 875	1.0%
876 to 900	0.4%
901 to 925	0.3%
926 to 950	0.5%
951 to 975	0.3%
976 to 1000	0.2%
1001 to 1025	0.3%
1026 to 1050	0.2%
1051 to 1075	0.1%
1076 to 1100	0.1%
1101 to 1125	0.4%
1126 to 1150	0.9%
1151 to 1175	1.3%
1176 to 1200	2.1%
1201 to 1225	1.3%
1226 to 1250	1.0%
1251 to 1275	1.0%
1276 to 1300	0.6%
1301 to 1325	0.3%
1326 to 1350	0.6%
1351 to 1375	1.0%
1376 to 1400	0.7%
1401 to 1425	1.1%
1426 to 1450	0.4%
1451 to 1475	0.2%
1476 to 1500	0.1%
>1500	2.5%

Table A.2.4. NPD average 2009-2011 prices for 30-39 bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 15	0.01%
16 to 30	0.01%
31 to 45	0.01%
46 to 60	0.19%
61 to 75	0.01%
76 to 90	1.26%
91 to 105	0.07%
106 to 120	0.27%
121 to 135	0.20%
136 to 150	3.46%
151 to 165	0.90%
166 to 180	3.74%
181 to 195	5.93%
196 to 210	18.39%
211 to 225	16.90%
226 to 240	5.42%
241 to 255	7.28%
256 to 270	5.02%
271 to 285	1.71%
286 to 300	0.58%
301 to 315	1.18%
316 to 330	5.19%
331 to 345	5.46%
346 to 360	2.30%
361 to 375	2.59%
376 to 390	2.00%
391 to 405	0.62%
406 to 420	0.38%
421 to 435	0.51%
436 to 450	0.31%
451 to 465	0.76%
466 to 480	0.59%
481 to 495	2.64%
496 to 510	1.43%
511 to 525	0.33%
526 to 540	0.26%
541 to 555	0.34%
556 to 570	0.15%
571 to 585	0.19%

586 to 600	0.18%
601 to 615	0.20%
616 to 630	0.30%
631 to 645	0.06%
646 to 660	0.02%
661 to 675	0.08%
676 to 690	0.07%
691 to 705	0.05%
706 to 720	0.11%
721 to 735	0.03%
736 to 750	0.01%
>750	0.29%

Table A.2.5. NPD average 2009-2011 prices for 40-59 bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 35	0.01%
36 to 70	0.01%
71 to 105	0.17%
106 to 140	0.75%
141 to 175	1.04%
176 to 210	2.47%
211 to 245	5.43%
246 to 280	17.95%
281 to 315	43.52%
316 to 350	1.79%
351 to 385	3.39%
386 to 420	0.44%
421 to 455	0.04%
456 to 490	0.23%
491 to 525	0.25%
526 to 560	0.18%
561 to 595	0.29%
596 to 630	0.78%
631 to 665	0.15%
666 to 700	0.27%
701 to 735	0.21%
736 to 770	0.30%
771 to 805	0.33%
806 to 840	0.36%
841 to 875	0.65%
876 to 910	0.34%

911 to 945	0.20%
946 to 980	0.58%
981 to 1015	0.42%
1016 to 1050	0.31%
1051 to 1085	0.73%
1086 to 1120	1.17%
1121 to 1155	1.11%
1156 to 1190	0.43%
1191 to 1225	0.79%
1226 to 1260	1.03%
1261 to 1295	1.54%
1296 to 1330	2.05%
1331 to 1365	1.83%
1366 to 1400	1.10%
1401 to 1435	0.38%
1436 to 1470	0.58%
1471 to 1505	0.42%
1506 to 1540	0.39%
1541 to 1575	0.32%
1576 to 1610	0.08%
1611 to 1645	0.08%
1646 to 1680	0.07%
1681 to 1715	0.04%
1716 to 1750	0.08%
1751 to 1785	0.09%
1786 to 1820	0.04%
1821 to 1855	0.06%
1856 to 1890	0.01%
1891 to 1925	0.06%
1926 to 1960	0.04%
1961 to 1995	0.04%
>1995	2.60%

Table A.2.6. NPD average 2009-2011 prices for 60+ bottle capacity wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 150	0.21%
151 to 300	0.10%
301 to 450	0.42%
451 to 600	6.26%
601 to 750	18.16%
751 to 900	2.61%
901 to 1050	2.30%

1051 to 1200	3.13%
1201 to 1350	3.55%
1351 to 1500	5.22%
1501 to 1650	7.52%
1651 to 1800	2.71%
1801 to 1950	2.51%
1951 to 2100	1.57%
2101 to 2250	1.04%
2251 to 2400	3.44%
2401 to 2550	0.52%
2551 to 2700	0.63%
2701 to 2850	0.10%
2851 to 3000	0.00%
3001 to 3150	0.31%
3151 to 3300	0.10%
3301 to 3450	0.52%
3451 to 3600	1.15%
3601 to 3750	0.52%
3751 to 3900	1.25%
3901 to 4050	0.52%
4051 to 4200	0.73%
4201 to 4350	1.98%
4351 to 4500	1.46%
4501 to 4650	1.57%
4651 to 4800	0.63%
4801 to 4950	1.04%
4951 to 5100	1.67%
5101 to 5250	1.98%
5251 to 5400	1.98%
5401 to 5550	2.71%
5551 to 5700	2.51%
5701 to 5850	2.71%
5851 to 6000	2.51%
6001 to 6150	1.88%
6151 to 6300	2.51%
6301 to 6450	2.71%
6451 to 6600	0.21%
6601 to 6750	0.94%
6751 to 6900	1.36%
6901 to 7050	0.10%
7051 to 7200	0.10%
7201 to 7350	0.10%

7351 to 7500	0.10%
>7500	0.10%

Table A.2.7. NPD average 2009-2011 prices for all wine/beverage coolers

Price range (2011$)	Fraction of total shipments
0 to 25	0.05%
26 to 50	4.43%
51 to 75	25.00%
76 to 100	23.48%
101 to 125	8.23%
126 to 150	5.24%
151 to 175	6.48%
176 to 200	7.04%
201 to 225	3.17%
226 to 250	2.00%
251 to 275	1.64%
276 to 300	4.36%
301 to 325	0.50%
326 to 350	1.19%
351 to 375	0.75%
376 to 400	0.36%
401 to 425	0.69%
426 to 450	0.19%
451 to 475	0.11%
476 to 500	0.44%
501 to 525	0.11%
526 to 550	0.06%
551 to 575	0.07%
576 to 600	0.05%
601 to 625	0.12%
626 to 650	0.03%
651 to 675	0.05%
676 to 700	0.06%
701 to 725	0.06%
726 to 750	0.10%
751 to 775	0.05%
776 to 800	0.06%
801 to 825	0.04%
826 to 850	0.08%
851 to 875	0.10%
876 to 900	0.05%
901 to 925	0.05%

926 to 950	0.08%
951 to 975	0.12%
976 to 1000	0.07%
>1000	3.27%

A.3 Deployed survey instruments

Although each survey group consisted of more than one actual deployed survey (since all included demographic subgroup surveys, and often multiple launches of the same subgroup to increase the total number of responses), the content of each survey within a group remained identical with the exception of the header information. Below we present the identical content common to all deployed surveys within each group.

A.3.1 RP2 survey

Refrigeration Products Survey

Qualifications: U.S. residents at least 18 years old.

Please answer honestly and accurately! We have provided plenty of time for you to answer every question carefully.

NOTE: You will NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

Refrigerators

If you live in more than one home, please restrict your responses to the home you use the most.

1. A ***refrigerator*** cools items such as food to a temperature below 39°F (4°C). It may include a separate freezer or wine/beverage cooler compartment.

How many refrigerators are plugged in at your home right now?

DO NOT INCLUDE:

- stand-alone freezers
- stand-alone wine/beverage coolers

INCLUDE:

- **full-size refrigerators (example)**

- **compact refrigerators (example)**
- **refrigerators with separate freezers or wine/beverage cooler compartments (example)**

Check the number of refrigerators

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

If you answered "None" to the above question, please skip to Question 16.

2. Some refrigerators have a special section or compartment specifically designed to store wine at a temperature warmer than 39°F (4°C). This is different than a wine shelf or rack that comes with some standard refrigerators that is maintained at the same temperature as the rest of the compartment.

Do you have a refrigerator with a SPECIAL SECTION OR COMPARTMENT designed specifically for storing wine at a warmer temperature?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 4.

3. How many full-sized (750 mL) bottles of wine is this refrigerator's wine storage section able to hold? [Drop-down menu]

- Up to 5 bottles
- Between 6 and 10 bottles
- Between 11 and 15 bottles
- Between 16 and 20 bottles
- Between 21 and 25 bottles

- Between 26 and 30 bottles
- 31 or more bottles
- Don’t know

4. Most refrigeration products found in homes operate only on alternating current (AC) electricity, which is the normal type of 120-volt power found in standard electrical outlets. However, some refrigeration products can operate on either AC electricity or direct current (DC) electricity, which is the type of power that can be supplied by a battery.

Do you have a refrigerator that can operate on either AC or DC electricity?

- Yes
- No
- Don’t know

5. Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products are cooled with other types of technologies. One technology is called thermoelectric cooling and another is called absorption cooling . Both are quieter than regular refrigeration technology and produce little vibration. Also, absorption cooling can be powered by propane or some other fuel as well as by electricity. Common brands featuring these technologies include EdgeStar and Dometic.

Do you have a *refrigerator* that uses THERMOELECTRIC or ABSORPTION COOLING technology to provide cooling?

DO NOT INCLUDE:

- stand-alone freezers
- stand-alone wine/beverage coolers

INCLUDE:

- **Refrigerators**
- **Refrigerators with freezer compartments**
- **Refrigerators with wine/beverage cooler section or compartment**

Indicate if you have any refrigerators that use thermoelectric or absorption cooling.

- Yes
- No
- Don’t know

If you answered "No" or "Don't know" to the above question, please skip to Question 16.

If you have more than one thermoelectric or absorption cooling refrigerator in your home, please restrict your answers below to the ***largest-capacity*** *unit.*

The next three questions ask for the brand and model number of this refrigerator. You can often find this information on the product "nameplate," which is a small rectangular label usually located inside or on the back of the refrigerator. Your owner's manual will also provide you with the brand and model number.

6. What is the brand of this refrigerator? [Drop-down menu]

- Amana
- Avanti Pro
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux
- Emerson
- Franklin
- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- KitchenAid
- Liebherr
- Magic Chef
- Marvel

- Miele
- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don’t know/Decline to state

If you answered “Other” to the above question, please answer Question 7. Otherwise, please skip to Question 8.

7. Please enter the brand name of this refrigerator:

8. What is the full model number of this refrigerator? If you don't know, please skip this question.

Please enter model number:

9. Please indicate which cooling technology this refrigerator uses:

- Thermoelectric
- Absorption cooling
- Don’t know

If you answered “Thermoelectric” or “Don’t know” to the above question, please skip to Question 11.

10. Can your ABSORPTION COOLING refrigerator operate with propane as well as electricity?

- Yes
- No
- Don't know

11. The capacity of a refrigerator is normally listed on the "nameplate," which as mentioned above is a small rectangular label usually located inside or on the back of the unit. You can also find this information in the owner's manual.

Please estimate the total capacity of this THERMOELECTRIC or ABSORPTION COOLING refrigerator: [Drop-down menu; *note that the metric conversions were incorrect in this question*]

- Up to 7.75 cubic feet (30 liters, sometimes called "compact")
- More than 7.75 but less than 12 cubic feet (31 to 46 liters)
- More than 12 but less than 16 cubic feet (47 to 61 liters)
- More than 16 but less than 20 cubic feet (62 to 77 liters)
- More than 20 but less than 24 cubic feet (78 to 92 liters)
- More than 24 but less than 28 cubic feet (93 to 108 liters)
- More than 28 cubic feet (109 or more liters)
- Don't know

12. Does this refrigerator contain a SEPARATE freezer section?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 14.

13. Please estimate the capacity of the freezer section of this refrigerator: [Drop-down menu; *note that the metric conversions were incorrect in this question*]

- Less than half of a cubic foot (enough for ice trays only)
- At least half of a cubic foot but less than 2 cubic feet (2 to 7 liters)

- At least 2 cubic feet but less than 4 cubic feet (8 to 15 liters)
- At least 4 cubic feet but less than 8 cubic feet (16 to 30 liters)
- At least 8 cubic feet but less than 12 cubic feet (31 to 46 liters)
- At least 12 cubic feet but less than 16 cubic feet (47 to 61 liters)
- At least 16 cubic feet (62 or more liters)
- Don't know

14. Does this THERMOELECTRIC or ABSORPTION COOLING refrigerator have a separate section or compartment designed specifically for storing wine at a warmer temperature?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 16.

15. How many full-sized (750 mL) bottles of wine is this refrigerator's wine storage section able to hold? [Drop-down menu]

- Up to 5 bottles
- Between 6 and 10 bottles
- Between 11 and 15 bottles
- Between 16 and 20 bottles
- Between 21 and 25 bottles
- Between 26 and 30 bottles
- 31 or more bottles
- Don't know

16. What material are wine bottles typically made from?

- Fabric
- Glass
- Rubber
- Tile

- Wood
- Don't know

Freezers

17. A ***freezer*** freezes and stores items such as food at 0°F (–18°C) or below. It may include a separate wine/beverage cooler compartment.

How many stand-alone freezers are plugged in at your home right now?

DO NOT INCLUDE:

- freezers that are part of refrigerators
- stand-alone wine/beverage coolers
- stand-alone refrigerators

INCLUDE:

- **stand-alone, full-size freezers (example)**
- **stand-alone, compact freezers (example)**
- **freezers with separate wine/beverage cooler section or compartment**

Check the number of stand-alone freezers

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

If you answered "None" to the above question, please skip to Question 30.

18. Do you have a freezer with a SEPARATE SECTION OR COMPARTMENT designed specifically for storing wine at a temperature higher than 39°F (4°C)?

- Yes
- No

- Don’t know

If you answered “No” or “Don't’ know” to the above question, please skip to Question 20.

19. How many full-sized (750 mL) bottles of wine is this freezer’s wine storage section able to hold? [Drop-down menu]

- Up to 5 bottles
- Between 6 and 10 bottles
- Between 11 and 15 bottles
- Between 16 and 20 bottles
- Between 21 and 25 bottles
- Between 26 and 30 bottles
- 31 or more bottles
- Don’t know

20. Most refrigeration products found in homes operate only on alternating current (AC) electricity, which is the normal type of 120-volt power found in standard electrical outlets. However, some refrigeration products can operate on either AC electricity or direct current (DC) electricity, which is the type of power that can be supplied by a battery.

Do you have a freezer that can operate on either AC or DC electricity?

- Yes
- No
- Don’t know

21. Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products are cooled with other types of technologies. One technology is called thermoelectric cooling and another is called absorption cooling. Both are quieter than regular refrigeration technology and produce little vibration. Also, absorption cooling can be powered by propane or some other fuel as well as by electricity. Common brands featuring these technologies include EdgeStar and Dometic.

Do you have a <u>freezer</u> that uses THERMOELECTRIC or ABSORPTION COOLING technology to provide cooling?

DO <u>NOT</u> INCLUDE:

- Refrigerators

- Refrigerators with a separate freezer compartment
- Stand-alone wine/beverage coolers

INCLUDE:

- **Stand-alone freezers**
- **Freezers with a wine/beverage cooler section or compartment**

Indicate if you have any <u>freezers</u> that use thermoelectric or absorption cooling.

- Yes
- No
- Don't know

If you answered "No" or "Don't' know" to the above question, please skip to Question 30.

*If you have more than one thermoelectric or absorption cooling freezer in your home, please restrict your answers below to your **largest-capacity** unit.*

The next three questions ask for the brand and model number of this freezer. You can often find this information on the product "nameplate," which is a small rectangular label usually located inside or on the back of the freezer. Your owner's manual will also provide you with the brand and model number.

22. What is the brand of this freezer? [Drop-down menu]

- Amana
- Avanti Pro
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux
- Emerson
- Franklin

- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- KitchenAid
- Liebherr
- Magic Chef
- Marvel
- Miele
- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don't know/Decline to state

If you answered "Other" to the above question, please answer Question 23. Otherwise, please skip to Question 24.

23. Please enter the brand name of this freezer: _____

24. What is the full model number of this freezer? If you don't know, please skip this question.

Please enter model number: [ ]

25. Please indicate which cooling technology this freezer uses:

- Thermoelectric
- Absorption cooling
- Don't know

If you answered "Thermoelectric" or "Don't know" to the above question, please skip to question 27.

26. Can your ABSORPTION COOLING freezer operate with propane as well as electricity?

- Yes
- No
- Don't know

27. The capacity of a freezer is normally listed on the "nameplate," which as mentioned above is a small rectangular label usually located inside or on the back of the unit. You can also find this information in the owner's manual.

Please estimate the total capacity of this THERMOELECTRIC or ABSORPTION COOLING freezer: [Drop-down menu; *note that the metric conversions were incorrect in this question*]

- Up to 7.75 cubic feet (30 liters, sometimes called "compact")
- More than 7.75 but less than 12 cubic feet (31 to 46 liters)
- More than 12 but less than 16 cubic feet (47 to 61 liters)
- More than 16 but less than 20 cubic feet (62 to 77 liters)
- More than 20 but less than 24 cubic feet (78 to 92 liters)
- More than 24 but less than 28 cubic feet (93 to 108 liters)
- More than 28 cubic feet (109 or more liters)
- Don't know

28. Does this THERMOELECTRIC or ABSORPTION COOLING freezer have a separate section or compartment designed specifically for storing wine at a warmer temperature?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 30.

29. How many full-sized (750 mL) bottles of wine is this freezer's wine storage section able to hold? [Drop-down menu]

- Up to 5 bottles
- Between 6 and 10 bottles
- Between 11 and 15 bottles
- Between 16 and 20 bottles
- Between 21 and 25 bottles
- Between 26 and 30 bottles
- 31 or more bottles
- Don't know

Wine/beverage coolers

30. How many bottles of wine are there in a dozen? [Drop-down menu]

- 1
- 2
- 6
- 12
- 24
- 50 or more
- Don't know

31. A ***wine chiller, wine cooler, beverage cooler or beverage center*** are special types of appliances used mainly for cooling liquids such as wine, at 39° to 65°F (4° to 18°C). We say "wine/beverage cooler" to describe these appliances.

How many stand-alone, wine/beverage coolers are plugged in at your home right now?

DO NOT INCLUDE:

- refrigerators
- freezers
- refrigerators or freezers with a wine/beverage cooler section or compartment

INCLUDE:

- **stand-alone, full-size wine/beverage coolers (example)**
- **stand-alone, compact wine/beverage coolers (example)**

Check the number of stand-alone wine/beverage coolers

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

If you answered "None" to the above question, please skip to Question 36.

32. Most refrigeration products found in homes operate only on alternating current (AC) electricity, which is the normal type of 120-volt power found in standard electrical outlets. However, some refrigeration products can operate on either AC electricity or direct current (DC) electricity, which is the type of power that can be supplied by a battery.

Do you have a wine/beverage cooler that can operate on either AC or DC electricity?

- Yes
- No
- Don't know

33. Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products are cooled with other types of technologies. One technology is called thermoelectric cooling and another is called absorption cooling. Both are quieter than regular refrigeration technology and produce little vibration. Also, absorption

cooling can be powered by propane or some other fuel as well as by electricity. Common brands featuring these technologies include EdgeStar and Dometic.

Do you have a *wine/beverage cooler* that uses THERMOELECTRIC or ABSORPTION COOLING technology to provide cooling?

DO NOT INCLUDE:

- Refrigerators
- Freezers
- Refrigerators or freezers with a wine/beverage cooler section or compartment"

INCLUDE:

- **Stand-alone wine/beverage coolers**

Indicate if you have any wine/beverage coolers that use thermoelectric or absorption cooling.

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 36.

*If you have more than one thermoelectric or absorption cooling wine/beverage cooler in your home, please restrict your answers below to your **largest-capacity** unit.*

34. Please indicate which cooling technology this wine/beverage cooler uses:

- Thermoelectric
- Absorption cooling
- Don't know

If you answered "Thermoelectric" or "Don't know" to the above question, please skip to Question 36.

35. Can your ABSORPTION COOLING wine/beverage cooler operate with propane as well as electricity?

- Yes
- No

- Don't know

Icemakers

36. An icemaker automatically produces ice (usually in small cubes) and keeps them frozen for later use. It is often included in a refrigerator or freezer, but some icemakers are completely separate from a standard refrigerator or freezer and are called "stand-alone icemakers."

How many stand-alone icemakers are plugged in at your home right now?

DO NOT INCLUDE:

- refrigerators
- freezers
- wine/beverage coolers
- icemakers that are part of a refrigerator or freezer

INCLUDE:

- **stand-alone icemakers (example)**

Check the number of stand-alone icemakers

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

If you answered "None" to the above question, please skip to Question 38.

37. How many pounds of ice can your stand-alone icemaker make per day?

- Less than 10 pounds per day
- Between 10 and 19 pounds per day
- Between 20 and 29 pounds per day
- Between 30 and 49 pounds per day

- Between 50 and 79 pounds per day
- At least 80 pounds per day
- Don’t know

38. Who is the current president of the U.S.? [Drop-down menu]

- Amana
- Bosch
- Emerson
- Franklin
- GE
- KitchenAid
- Obama
- Scotsman
- Tresanti
- Don’t know

Demographics

39. What is your zip code?

40. What is your gender?

- Female
- Male
- Decline to state

41. Are you Hispanic or Latino?

- Yes
- No
- Decline to state

42. What is your race? Please check all that apply:

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White or Caucasian
- ☐ other
- ☐ Decline to state

43. What is your highest education level?

- ● No schooling completed
- ● Kindergarten to grade 12 (No Diploma)
- ● High school diploma or GED
- ● Some college, no degree
- ● Associate's degree (for example: AA, AS)
- ● Bachelor's degree (for example: BA, BS)
- ● Master's degree (for example: MA, MS, MBA)
- ● Professional degree (for example: MD, JD)
- ● Doctorate degree (for example: PhD, EdD)
- ● Decline to state

44. How many people live in your home for most of the year (including you)?

Number of people

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

45. Of the people you included in the total for Question 44, how many people are in the following age categories (please fill in the number of people for all applicable categories)

Younger than 20

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

20 to 29 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

30 to 39 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

40 to 49 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

50 to 59 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

60 to 69 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

70 or older

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

Age unknown

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

46. What is your combined annual household income?

- $0-$19,999 per year
- $20,000-$39,999 per year
- $40,000-$59,999 per year
- $60,000-$79,999 per year
- $80,000-$99,999 per year
- $100,000-$119,999 per year
- $120,000-$149,999 per year
- $150,000-$199,999 per year
- $200,000 or more per year
- Don’t know/Decline to state

47. What type of home do you live in most of the year?

- single-family house
- multi-family apartment building
- mobile or manufactured home
- dormitory
- something else
- don't know

Due to the size of our research study, we may take up to 21 DAYS to pay you.

A.3.2 RP3 survey

Refrigeration Products Survey

This survey is to learn about the refrigeration products in your home.

Qualifications: U.S. residents at least 18 years old.

Please answer honestly and accurately! We have provided plenty of time for you to upload photographs, and answer every question carefully.

NOTE: You may NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

Refrigeration products

If you live in more than one home, please restrict your responses to the home you use the most.

Definitions:

A REFRIGERATOR cools items such as food to a temperature below 39°F (4°C). It may include a separate freezer, icemaker or wine/beverage cooler compartment.

A FREEZER freezes and stores items such as food at 0°F (–18°C) or below. It may include a separate icemaker or wine/beverage cooler compartment.

An ICEMAKER automatically produces ice (usually in small cubes) and keeps them frozen for later use. It is often included in a refrigerator or freezer, but some icemakers are completely separate from a standard refrigerator or freezer and are called STAND-ALONE ICEMAKERS.

A WINE/BEVERAGE COOLER (sometimes called a wine cooler, wine chiller, beverage center or beverage cooler) is a special type of appliance used mainly for cooling liquids such as wine or beer, at 39° to 65°F (4° to 18°C). It is NOT designed for the safe preservation of food.

1. How many refrigerators are plugged in at your home right now?

DO NOT INCLUDE:

- Stand-alone freezers (example)
- Stand-alone icemakers (example)
- Stand-alone wine/beverage coolers (example)

INCLUDE:

- **Full-size refrigerators (example)**
- **Compact refrigerators (example)**
- **Refrigerators with separate freezers (example), automatic icemakers (example), or wine/beverage cooler compartments (example)**

Check the number of refrigerators

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

2. How many freezers are plugged in at your home right now?

DO NOT INCLUDE:

- Stand-alone refrigerators
- Stand-alone icemakers
- Stand-alone wine/beverage coolers
- Freezers that are part of a refrigerator

INCLUDE:

- **Stand-alone chest freezers (example)**
- **Stand-alone upright freezers (example)**
- **Freezers with automatic icemakers (example) or wine/beverage cooler compartments**

Check the number of freezers

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

3. How many stand-alone icemakers are plugged in at your home right now?

DO NOT INCLUDE:

- Refrigerators
- Freezers
- Wine/beverage coolers
- Icemakers that are part of a refrigerator, freezer or wine/beverage cooler

INCLUDE:

- **Stand-alone icemakers (example)**

Check the number of stand-alone icemakers

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

4. How many wine/beverage coolers are plugged in at your home right now?

DO NOT INCLUDE:

- Stand-alone refrigerators
- Stand-alone freezers
- Stand-alone icemakers
- Wine/beverage coolers that are part of a refrigerator or freezer

INCLUDE:

- **Stand-alone wine/beverage coolers (example)**

Check the number of wine/beverage coolers

- None
- 1
- 2
- 3
- 4

- 5 or more
- Don't know

Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products are cooled with other types of technologies. One technology is called THERMOELECTRIC cooling and another is called ABSORPTION cooling. Both are quieter than regular refrigeration technology and produce little vibration. Also, absorption cooling can be powered by propane or some other fuel as well as by electricity. Common brands featuring these technologies include EdgeStar and Dometic.

5. How many refrigerators are plugged in at your home right now that use THERMOELECTRIC or ABSORPTION cooling technology to provide cooling?

DO NOT INCLUDE:

- Refrigerators that use vapor compression technology
- Stand-alone freezers
- Stand-alone icemakers
- Stand-alone wine/beverage coolers

INCLUDE:

- **Thermoelectric or absorption cooling refrigerators (example)**

Check the number of refrigerators with THERMOELECTRIC or ABSORPTION cooling technology

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

6. How many freezers are plugged in at your home right now that use THERMOELECTRIC or ABSORPTION cooling technology to provide cooling?

DO NOT INCLUDE:

- Freezers that use vapor compression technology

- Stand-alone refrigerators
- Stand-alone wine/beverage coolers
- Stand-alone icemakers
- Freezers that are part of a refrigerator

INCLUDE:

- **Thermoelectric or absorption cooling freezers**

Check the number of freezers with THERMOELECTRIC or ABSORPTION cooling technology

- None
- 1
- 2
- 3
- 4
- 5 or more
- Don't know

7. What are ice cubes typically made from?

- Air
- Glass
- Steel
- Water
- Oil
- Don't know

Demographics

We want to make sure that our survey reflects the make-up of the US population, so we need to ask you a few questions about you and your household.

8. What is your five-digit ZIP code?

9. What is your gender?

- Male

- Female
- Decline to state

10. Are you Hispanic or Latino?

- Yes
- No
- Decline to state

11. What is your race?

- American Indian/Alaska Native
- Asian
- Black/African-American
- Native Hawaiian/Other Pacific Islander
- White or Caucasian
- Two or more races
- Other
- Decline to state

12. What is your highest education level? [Drop-down menu]

- No schooling completed
- Kindergarten to grade 12 (No Diploma)
- High school diploma or GED
- Some college, no degree
- Associate's degree (for example: AA, AS)
- Bachelor's degree (for example: BA, BS)
- Master's degree (for example: MA, MS, MBA)
- Professional degree (for example: MD, JD)
- Doctorate degree (for example: PhD, EdD
- Decline to state

13. How many people live in your home for most of the year (including you)?

Number of people

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

14. Of the people you included in the total for Question 13, how many are in the following age categories (please fill in the number of people for all applicable categories)

Younger than 20

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

20 to 29 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

30 to 39 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

40 to 49 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

50 to 59 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

60 to 69 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

70 or older

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

Age unknown or Prefer not to say

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

15. What is your combined annual household income?

- ● $0-$19,999 per year
- ● $20,000-$39,999 per year
- ● $40,000-$59,000 per year
- ● $60,000-$79,999 per year
- ● $80,000-$99,999 per year
- ● $100,000-$119,999 per year
- ● $120,000-$149,999 per year
- ● 150,000-$199,999 per year
- ● $200,000 or more per year
- ● Don't know/Decline to state

16. What type of home do you live in most of the year?

- ● a Single-family detached house (a house detached from any other house)
- ● a Single-family attached house (a house attached to one or more houses)
- ● an Apartment building with 2-4 units
- ● an Apartment building with 5 or more units
- ● a Mobile home
- ● a Dormitory
- ● Something else
- ● Don't know

17. Is this home owned or rented?

- Owned or being bought by someone in your household
- Rented
- Occupied without payment of rent
- Don't know

Due to the size of our research study, we may take up to 21 DAYS to pay you.

A.3.3 WC1 survey

Wine/Beverage Cooler Household Survey

This survey is for people who have at least one wine chiller, sometimes also referred to as wine coolers, wine refrigerators, wine cabinets, beverage coolers, or beverage centers. We refer to these products collectively as "wine/beverage coolers." These devices are powered by electricity like normal refrigerators, but are distinct in that they are not designed to reach temperatures below 39°F (4°C), which is required for the safe preservation of food. Portable units intended for cooling a single bottle of wine are NOT considered to be wine/beverage coolers.

Qualifications: U.S. residents at least 18 years old.

You must have a wine/beverage cooler to take this survey!

NOTE: You will NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

General questions

If you live in more than one home that has a wine/beverage cooler, please restrict your responses to the home you use the most.

1. How many wine/beverage coolers do you have plugged in at your home right now?

- None
- 1
- 2
- 3

- 4 or more
- Don’t know

If you answered “None” to the above question, YOU CANNOT PROCEED WITH THE SURVEY! PLEASE STOP AND EXIT.

If you have more than one wine/beverage cooler, please restrict your responses below to the LARGEST CAPACITY unit.

2. What do you primarily use this LARGEST CAPACITY wine/beverage cooler for?

- Wine
- Beer or soda
- Something else
- Don't know

If you answered “Beer or soda” to the above question, please skip to Question 4.

3. What is the maximum number of full-sized (750 mL) bottles of wine that this wine/beverage cooler can hold? [Drop-down menu]

- 1-11 bottles
- 12-19 bottles
- 20-29 bottles
- 30-39 bottles
- 40-49 bottles
- 50-59 bottles
- 60-89 bottles
- 90+ bottles
- Don’t know

If you answered question 3, please skip to Question 5.

4. What is the maximum number of 12 oz. cans or bottles of beer or soda that this wine/beverage cooler can hold? [Drop-down menu]

- 1-11 bottles

- 12-19 bottles
- 20-29 bottles
- 30-39 bottles
- 40-49 bottles
- 50-59 bottles
- 60-89 bottles
- 90+ bottles
- Don’t know

5. How frequently do you open the door to this wine/beverage cooler? [Drop-down menu]

- 10 or more times per day
- 5-9 times per day
- 3-4 times per day
- Twice per day
- Once per day
- 4-6 times per week
- 2-3 times per week
- Once per week
- 2-3 times per month
- Once per month or less
- Don’t know

6. How many separate temperature zones does this wine/beverage cooler have?

- One temperature zone
- Two temperature zones
- Three temperature zones
- Four or more temperature zones
- Don’t know

7. Is the door of this wine/beverage cooler transparent, or solid/opaque?

- Transparent (e.g., made of glass or clear plastic)
- Solid/opaque (e.g., made of metal or opaque plastic)
- Don't know

8. What material are wine bottles typically made from?

- Plastic
- Metal
- Glass
- Wood
- Don't know

9. Is this wine/beverage cooler built into cabinetry, or is it freestanding?

- Built-in
- Freestanding
- Don't know

10. Does this wine/beverage cooler fit under a standard counter height of 36 inches?

- Yes
- No
- Don't know

Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products, especially wine/beverage coolers, sometimes use other types of technologies. One technology is called thermoelectric cooling and another is called absorption cooling. Both are quieter than regular refrigeration technology and produce little vibration.

11. What type of cooling technology does this wine/beverage cooler use?

- Vapor compression
- Thermoelectric cooling
- Absorption cooling
- Don't know

12. In which room is this wine/beverage cooler located? [Drop-down menu]

- Kitchen/pantry
- Dining room
- Home bar/entertainment room
- Climate-controlled garage, basement or storage space
- Another climate-controlled room in your home
- Enclosed space that is not climate-controlled (such as an unheated basement or storage shed)
- Outside location
- Don't know

13. Did you (or the homeowner) purchase this wine/beverage cooler new?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 17.

14. How much did you (or the homeowner) pay for this new wine/beverage cooler (not including tax or rebates)? [Drop-down menu]

- Up to $25
- Between $26 and $50
- Between $51 and $75
- Between $76 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $350
- Between $351 and $400
- Between $401 and $500

- Between $501 and $600
- Between $601 and $700
- Between $701 and $800
- Between $801 and $1,000
- Between $1,001 and $1,200
- Between $1,201 and $1,400
- Between $1,401 and $1,600
- Between $1,601 and $1,800
- Between $1,801 and $2,000
- Between $2,001 and $2,500
- Between $2,501 and $3,000
- Between $3,001 and $3,500
- Between $3,501 and $4,000
- $4,001 or more
- Don't know

15. If you (or the homeowner) received any kind of rebate, how much was it? [Drop-down menu]

- No rebate
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250

- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

16. How long ago did you (or the homeowner) purchase this new wine/beverage cooler? [Drop-down menu]

- Less than 1 year ago
- At least 1 but less than 2 years ago
- At least 2 but less than 3 years ago
- At least 3 but less than 4 years ago
- At least 4 but less than 5 years ago
- At least 5 but less than 6 years ago
- At least 6 but less than 8 years ago
- At least 8 but less than 10 years ago
- At least 10 years but less than 15 years ago
- At least 15 years ago or more
- Don’t know

17. How many bottles of wine are there in a dozen? [Drop-down menu]

- 1
- 2
- 6
- 12
- 24
- 50 or more
- Don’t know

18. Was this wine/beverage cooler…

- The first one you (or the homeowner) have owned?
- A replacement of the same type of wine/beverage cooler that you (or the homeowner) owned before?
- An upgrade to the wine/beverage cooler you (or the homeowner) owned before?
- An additional wine/beverage cooler to the one you (or the homeowner) still own?
- Don't know

19. Does this wine/beverage cooler have internal lights?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 22.

20. Are the lights operated automatically, or by a manual switch?

- Automatic
- Manual switch
- Don't know

21. When the door is closed, are the lights usually…?

- Off
- On
- Don't know

Installation, repair and maintenance

22. When you (or the homeowner) acquired this wine/beverage cooler, how much did it cost to have it installed? [Drop-down menu]

- Nothing: I installed it myself or someone installed it for free
- Up to $10
- Between $11 and $20
- Between $21 and $30

- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don't know

23. Has this wine/beverage cooler ever been repaired?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 27.

24. How much did it cost to repair? [Drop-down menu]

- Nothing: repaired for free or under warranty
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80

- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

25. How long after you (or the homeowner) purchased it was it repaired? [Drop-down menu]

- Less than 1 year ago
- At least 1 but less than 2 years ago
- At least 2 but less than 3 years ago
- At least 3 but less than 4 years ago
- At least 4 but less than 5 years ago
- At least 5 but less than 6 years ago
- At least 6 but less than 8 years ago
- At least 8 but less than 10 years ago
- At least 10 but less than 115 years ago
- At least 15 years or more
- Don’t know

26. Which component was repaired? Please check all that apply:

- ☐ Compressor
- ☐ Evaporator
- ☐ Condenser
- ☐ Evaporator or condenser fan

- ☐ Door gasket
- ☐ Other door component
- ☐ Insulation
- ☐ Electronics
- ☐ Lighting
- ☐ Something else
- ☐ Don't know

27. Do you (or the homeowner) ever perform routine maintenance on this wine/beverage cooler?

- Yes
- No
- Don't know

If you answered "No" or "Don't know" to the above question, please skip to Question 29.

28. How much is spent each year on routine maintenance of this wine/beverage cooler? [Drop-down menu]

- Nothing: I perform the maintenance myself or someone does it for free
- Up to $10 per year
- Between $11 and $20 per year
- Between $21 and $30 per year
- Between $31 and $40 per year
- Between $41 and $50 per year
- Between $51 and $60 per year
- Between $61 and $80 per year
- Between $81 and $100 per year
- $101 or more per year
- Don't know

29. When do you (or the homeowner) plan to replace this wine/beverage cooler? [Drop-down menu]

- Do not plan to replace
- Less than 1 year from now
- At least 1 but less than 2 years from now
- At least 2 but less than 3 years from now
- At least 3 but less than 4 years from now
- At least 4 but less than 5 years from now
- At least 5 but less than 6 years from now
- At least 6 but less than 8 years from now
- At least 8 but less than 10 years from now
- At least 10 but less than 15 years from now
- At least 15 years from now or more
- Don't know

The next three questions ask for the brand and model number of this wine/beverage cooler. You can often find this information on the product "nameplate," which is a small rectangular label usually located inside or on the back of the wine/beverage cooler. Your owner's manual will also provide you with the brand and model number.

30. What is the brand of this wine/beverage cooler? If the brand doesn't appear on this list, please select "Other" at the bottom of the drop-down menu. [Drop-down menu]

- Amana
- Avanti Pro
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux

- Emerson
- Franklin
- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- KitchenAid
- Liebherr
- Magic Chef
- Marvel
- Miele
- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don’t know/Decline to state

If you answered “Other” to question 30, please answer question 31. Otherwise, please skip to Question 32.

31. Please enter the brand name of this wine/beverage cooler:

32. What is the full model number of this wine/beverage cooler? If you don't know, please skip this question.

Please enter model number:

33. Who is the current president of the U.S.? [Drop-down menu]

- Amana
- Bosch
- Emerson
- Franklin
- GE
- KitchenAid
- Obama
- Scotsman
- Tresanti
- Don't know

DEMOGRAPHICS

34. What is your five digit zip code?

35. What is your gender?

- Female
- Male
- Decline to state

36. Are you Hispanic or Latino?

- Yes
- No
- Decline to state

37. What is your race? Please check all that apply:

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White or Caucasian
- ☐ other
- ☐ Decline to state

38. What is your highest education level?

- ● No schooling completed
- ● Kindergarten to grade 12 (No Diploma)
- ● High school diploma or GED
- ● Some college, no degree
- ● Associate's degree (for example: AA, AS)
- ● Bachelor's degree (for example: BA, BS)
- ● Master's degree (for example: MA, MS, MBA)
- ● Professional degree (for example: MD, JD)
- ● Doctorate degree (for example: PhD, EdD)
- ● Decline to state

39. How many people live in your home for most of the year (including you)?

Number of people

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state

40. Of the people you included in the total for Question 39, how many people are in the following age categories (please fill in the number of people for all applicable categories)

Younger than 20

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

20 to 29 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

30 to 39 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

40 to 49 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

50 to 59 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

60 to 69 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

70 or older

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Doesn't apply

Age unknown

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more
- Doesn't apply

41. What is your combined annual household income?

- $0-$19,999 per year
- $20,000-$39,999 per year
- $40,000-$59,999 per year
- $60,000-$79,999 per year
- $80,000-$99,999 per year
- $100,000-$119,999 per year
- $120,000-$149,999 per year
- $150,000-$199,999 per year
- $200,000 or more per year
- Don't know/Decline to state

A.3.4 RI1 survey

Residential Icemaker Products Survey

This survey is for people who have at least one stand-alone icemaker in their home. An icemaker automatically produces ice (usually in small cubes) and keeps them frozen for later use. It is often included in a refrigerator or freezer, but some icemakers are completely separate from a standard refrigerator or freezer and are called "stand-alone icemakers." WE ARE ONLY INTERESTED IN HOMES WITH STAND-ALONE ICEMAKERS.

Qualifications: U.S. residents at least 18 years old.

You must have at least one STAND-ALONE ICEMAKER in your home to take this survey.

Please answer honestly and accurately! We have provided plenty of time for you to answer every question carefully.

NOTE: You may NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

General questions

If you live in more than one home, please restrict your responses to the home you use the most that has a stand-alone icemaker.

Definitions:

A REFRIGERATOR cools items such as food to a temperature below 39°F (4°C). It may include a separate freezer, icemaker or wine/beverage cooler compartment.

A FREEZER freezes and stores items such as food at 0°F (–18°C) or below. It may include a separate icemaker or wine/beverage cooler compartment.

A WINE/BEVERAGE COOLER (sometimes called a wine cooler, wine chiller, beverage center or beverage cooler) is a special type of appliance used mainly for cooling liquids such as wine or beer, at 39° to 65°F (4° to 18°C). It is NOT designed for the safe preservation of food.

1. How many stand-alone icemakers are plugged in at your home right now?

DO NOT INCLUDE:

- Refrigerators
- Freezers
- Wine/beverage coolers
- Icemakers that are part of a refrigerator or freezer

INCLUDE:

- **Stand-alone icemakers (example)**

Check the number of stand-alone icemakers

- None
- 1
- 2
- 3
- 4
- 5 or more

- Don't know

If you answered "None" to the above question, YOU CANNOT GET PAID FOR THIS SURVEY. PLEASE STOP AND EXIT. THANK YOU.

*If you have more than one stand-alone icemaker in your home, please restrict your answers below to the **largest-capacity** unit.*

The next few questions ask for the brand and model number of this icemaker. You can often find this information on the product "nameplate," which is a small rectangular label usually located inside or on the back of the refrigerator. Your owner's manual may also provide you with the brand and model number.

2. What is the brand of this stand-alone icemaker? [Drop-down menu]

- Amana
- Avanti
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux
- Emerson
- Franklin
- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- Kenmore
- KitchenAid

- Koldfront
- Koolatron
- Liebherr
- Magic Chef
- Marvel
- Miele
- New Air
- Norcold
- Oster
- Samsung
- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Sunpentown
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Vissani
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don’t know/Decline to state

If you answered “Other” to the above question, please answer the next question. Otherwise, please skip to Question 4.

3. Please enter the brand of the stand-alone icemaker: _____

4. What is the full model number of this icemaker?

Please enter model number: [ ]

5. How many pounds of ice can your stand-alone icemaker make per day?

DO NOT indicate how much ice YOU use, but rather how much ice your MACHINE can make.

Indicate how much ice your stand-alone icemaker can make per day:

- Less than 5 pounds per day
- Between 5 and 9 pounds per day
- Between 10 and 14 pounds per day
- Between 15 and 19 pounds per day
- Between 20 and 29 pounds per day
- Between 30 and 49 pounds per day
- Between 50 and 79 pounds per day
- At least 80 pounds per day
- Don't know

6. Did you (or the homeowner) purchase this stand-alone icemaker new?

- Yes
- No
- Don't know

If you answered "Yes" to the above question, please answer the next question. Otherwise, please skip to Question 10.

7. How much did you (or the homeowner) pay for this new icemaker (not including tax or rebates)? [Drop-down menu]

- Up to $25
- Between $26 and $50
- Between $51 and $75
- Between $76 and $100

- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $350
- Between $351 and $400
- Between $401 and $500
- Between $501 and $600
- Between $601 and $700
- Between $701 and $800
- Between $801 and $1,000
- Between $1,001 and $1,200
- Between $1,201 and $1,400
- Between $1,401 and $1,600
- Between $1,601 and $1,800
- Between $1,801 and $2,000
- Between $2,001 and $2,500
- Between $2,501 and $3,000
- Between $3,001 and $3,500
- Between $3,501 and $4,000
- $4,001 or more
- Don't know

8. If you (or the homeowner) received any kind of rebate, how much was it? [Drop-down menu]

- No rebate
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40

- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

9. How long ago did you (or the homeowner) purchase this new icemaker? [Drop-down menu]

- Less than 12 months ago
- At least 1 year but less than 2 years ago
- At least 2 years but less than 3 years ago
- At least 3 years but less than 4 years ago
- At least 4 years but less than 5 years ago
- At least 5 years but less than 6 years ago
- At least 6 years but less than 8 years ago
- At least 8 years but less than 10 years ago
- At least 10 years but less than 12 years ago
- At least 12 years but less than 15 years ago
- At least 15 years ago
- Don’t know

10. What are ice cubes typically made from?

- Air

- Glass
- Steel
- Water
- Oil
- Don't know

11. When you (or the homeowner) acquired this icemaker, how much did it cost to have it installed? [Drop-down menu]

- Nothing: I installed it myself or someone installed it for free
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

12. Has this icemaker ever been repaired?

- Yes
- No

- Don't know

If you answered "Yes" to the above question, please answer the next question. Otherwise, please skip to Question 16.

If the icemaker was repaired more than once, please restrict your answer to the repair you are most familiar with.

13. How much did it cost to repair? [Drop-down menu]

- Nothing: repaired for free or under warranty
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don't know

14. How long after you (or the homeowner) purchased it was it repaired? [Drop-down menu]

- Less than 12 months ago
- At least 1 year but less than 2 years ago
- At least 2 years but less than 3 years ago

- At least 3 years but less than 4 years ago
- At least 4 years but less than 5 years ago
- At least 5 years but less than 6 years ago
- At least 6 years but less than 8 years ago
- At least 8 years but less than 10 years ago
- At least 10 years but less than 12 years ago
- At least 12 years but less than 15 years ago
- At least 15 years ago
- Don’t know

15. Which component was repaired? Please check all that apply:

- ☐ Compressor
- ☐ Evaporator
- ☐ Condenser
- ☐ Fan
- ☐ Door gasket
- ☐ Other door component
- ☐ Insulation
- ☐ Electronics
- ☐ Lighting
- ☐ Something else
- ☐ Don't know

16. Do you (or the homeowner) ever perform routine maintenance on this icemaker?

- Yes
- No
- Don't know

17. How much is spent each year on routine maintenance of this icemaker? [Drop-down menu]

- Nothing: I perform the maintenance myself or someone does it for free
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don't know

18. Who is the current president of the U.S.? [Drop-down menu]

- Amana
- Bosch
- Danby
- Emerson
- Frigidaire
- GE
- Haier
- JennAir
- Kenmore
- Miele

- Obama
- Sanyo
- Tresanti
- Uline
- Viking
- Whirlpool
- Don't know

Demographics

We want to make sure that our survey reflects the make-up of the US population, so we need to ask you a few questions about you and your household.

19. What is your five-digit ZIP code?

20. What is your gender?

- Male
- Female
- Decline to state

21. Are you Hispanic or Latino?

- Yes
- No
- Decline to state

22. What is your race?

- American Indian/Alaska Native
- Asian
- Black/African-American
- Native Hawaiian/Other Pacific Islander
- White or Caucasian
- Two or more races

- Other
- Decline to state

23. What is your highest education level? [Drop-down menu]

- No schooling completed
- Kindergarten to grade 12 (No Diploma)
- High school diploma or GED
- Some college, no degree
- Associate's degree (for example: AA, AS)
- Bachelor's degree (for example: BA, BS)
- Master's degree (for example: MA, MS, MBA)
- Professional degree (for example: MD, JD)
- Doctorate degree (for example: PhD, EdD
- Decline to state

24. How many people live in your home for most of the year (including you)?

Number of people

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don't know/Decline to state ● Doesn't apply

25. Of the people you included in the total for Question 24, how many people are in the following age categories (please fill in the number of people for all applicable categories)

Younger than 20

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don't know/Decline to state ● Doesn't apply

20 to 29 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

30 to 39 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

40 to 49 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

50 to 59 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

60 to 69 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

70 or older

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn’t apply

Age unknown or Prefer not to say

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9 ● 10 or more

● Don’t know/Decline to state ● Doesn't apply

26. What is your combined annual household income?

- $0-$19,999 per year
- $20,000-$39,999 per year
- $40,000-$59,999 per year
- $60,000-$79,999 per year
- $80,000-$99,999 per year
- $100,000-$119,999 per year
- $120,000-$149,999 per year
- $150,000-$199,999 per year
- $200,000 or more per year
- Don't know/Decline to state

27. What type of home do you live in most of the year?

- a Single-family detached house (a house detached from any other house)
- a Single-family attached house (a house attached to one or more houses)
- an Apartment building with 2-4 units
- an Apartment building 5 or more units
- a Mobile home
- a Dormitory
- Something else
- Don't know

28. Is this home owned or rented?

- Owned or being bought by someone in your household
- Rented
- Occupied without payment of rent
- Don't know

Due to the size of our research study, we may take up to 21 DAYS to pay you.

A.3.5 NV1 survey

Thermoelectric and Absorption Cooling Refrigeration Products Survey

This survey is for people who have at least one refrigerator or freezer that runs on THERMOELECTRIC or ABSORPTION COOLING technology. Most refrigeration products use vapor compression technology to keep foods and beverages cold. But some refrigeration products use other types of technologies. One technology is called thermoelectric cooling and another is called absorption cooling. Both are quieter than regular refrigeration technology and produce little vibration. Also, absorption cooling can be powered by propane or some other fuel as well as by electricity. WE ARE ONLY INTERESTED IN HOMES WITH THERMOELECTRIC OR ABSORPTION COOLING REFRIGERATORS OR FREEZERS.

Qualifications: U.S. residents at least 18 years old.

You must have at least one THERMOELECTRIC OR ABSORPTION COOLING REFRIGERATOR OR FREEZER in your home to take this survey.

Please answer honestly and accurately! We have provided plenty of time for you to upload photographs, and answer every question carefully.

NOTE: You may NOT GET PAID if you do not qualify for this survey or answer all questions that you are NOT asked to skip. Also, due to the size of our research study, we may take up to 21 DAYS to pay you.

If you live in more than one home, please restrict your responses to the home you use the most that has a thermoelectric or absorption cooling refrigeration product.

Definitions:

A REFRIGERATOR cools items such as food to a temperature below 39°F (4°C). It may include a separate freezer, icemaker or wine/beverage cooler compartment.

A FREEZER freezes and stores items such as food at 0°F (–18°C) or below. It may include a separate icemaker or wine/beverage cooler compartment.

An ICEMAKER automatically produces ice (usually in small cubes) and keeps them frozen for later use. It is often included in a refrigerator or freezer, but some icemakers are completely separate from a standard refrigerator or freezer and are called STAND-ALONE ICEMAKERS.

A WINE/BEVERAGE COOLER (sometimes called a wine cooler, wine chiller, beverage center or beverage cooler) is a special type of appliance used mainly for cooling liquids such as wine or beer, at 39° to 65°F (4° to 18°C). It is NOT designed for the safe preservation of food.

Refrigerators

1. Do you have a refrigerator that uses THERMOELECTRIC or ABSORPTION COOLING technology to provide cooling?

DO NOT INCLUDE:

- Refrigerators that use vapor compression technology
- Stand-alone freezers
- Stand-alone icemakers
- Stand-alone wine/beverage coolers (devices not designed to reach temperatures below 39°F (4°C), which is required for the safe preservation of food)

INCLUDE:

- **Thermoelectric or absorption cooling refrigerators**
- **Thermoelectric or absorption cooling refrigerators with freezer compartments**
- **Thermoelectric or absorption cooling refrigerators with an automatic icemaker**
- **Thermoelectric or absorption cooling refrigerators with wine/beverage cooler section or compartment**

Indicate the number refrigerators in your home that use THERMOELECTRIC or ABSORPTION COOLING technology.

- None
- 1
- 2
- 3
- 4 or more
- Don't know

If you answered "None" to the above question, please skip to Question 19. Otherwise, please answer the next question.

*If you have more than one thermoelectric or absorption cooling refrigerator in your home, please restrict your answers below to the **largest-capacity** unit.*

The next few questions ask for the brand and model number of this refrigerator. You can often find this information on the product "nameplate," which is a small rectangular label usually located inside or on the back of the refrigerator. Your owner's manual may also provide you with the brand and model number.

2. What is the brand of this refrigerator? [Drop-down menu]

- Amana
- Avanti
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux
- Emerson
- Franklin
- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- Kenmore
- KitchenAid
- Koldfront
- Koolatron
- Liebherr
- Magic Chef
- Marvel
- Miele
- New Air
- Norcold
- Oster
- Samsung

- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Sunpentown
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Vissani
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don't know/Decline to state

If you answered "Other" to the above question, please answer the next question. Otherwise, please skip to Question 4.

3. Please enter the brand of the refrigerator: [ ]

4. What is the full model number of this refrigerator?

Please enter model number: [ ]

5. The capacity of a refrigerator is normally listed on the "nameplate," which as mentioned above is a small rectangular label usually located inside or on the back of the unit. You can also find this information in the owner's manual.

Please estimate the total capacity of this refrigerator:

- Small compact = less than 4 cubic feet (113 liters)
- Large compact =at least 4 but less than 7.75 cubic feet (113 to 219 liters)

- Very small = at least 7.75 but less than 12 cubic feet (220 to 340 liters)
- Small =at least 12 but less than 16 cubic feet (340 to 453 liters)
- Medium = at least 16 but less than 20 cubic feet (453 to 566 liters)
- Large = at least 20 but less than 24 cubic feet (566 to 680 liters)
- Very large = at least 24 cubic feet (680 liters)
- Don't know

6. If this refrigerator has a separate freezer compartment, what is the estimated size of this compartment?

- Does not have a separate freezer compartment
- Less than 0.5 cubic feet (14 liters), enough for ice trays but little else
- More than 0.5 cubic feet (14 liters)
- Don’t know

7. Did you (or the homeowner) purchase this refrigerator new?

- Yes
- No
- Don't know

If you answered “Yes” to the above question, please answer the next question. Otherwise, please skip to Question 11.

8. How much did you (or the homeowner) pay for this new refrigerator (not including tax or rebates)? [Drop-down menu]

- Up to $25
- Between $26 and $50
- Between $51 and $75
- Between $76 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250

- Between $251 and $300
- Between $301 and $350
- Between $351 and $400
- Between $401 and $500
- Between $501 and $600
- Between $601 and $700
- Between $701 and $800
- Between $801 and $1,000
- Between $1,001 and $1,200
- Between $1,201 and $1,400
- Between $1,401 and $1,600
- Between $1,601 and $1,800
- Between $1,801 and $2,000
- Between $2,001 and $2,500
- Between $2,501 and $3,000
- Between $3,001 and $3,500
- Between $3,501 and $4,000
- $4,001 or more
- Don't know

9. If you (or the homeowner) received any kind of rebate, how much was it? [Drop-down menu]

- No rebate
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100

- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

10. How long ago did you (or the homeowner) purchase this new refrigerator? [Drop-down menu]

- Less than 12 months ago
- At least 1 year but less than 2 years ago
- At least 2 years but less than 3 years ago
- At least 3 years but less than 4 years ago
- At least 4 years but less than 5 years ago
- At least 5 years but less than 6 years ago
- At least 6 years but less than 8 years ago
- At least 8 years but less than 10 years ago
- At least 10 years but less than 12 years ago
- At least 12 years but less than 15 years ago
- At least 15 years ago
- Don’t know

11. What material are wine bottles typically made from?

- Fabric
- Glass
- Rubber
- Tile
- Wood

- Don't know

12. When you (or the homeowner) acquired this refrigerator, how much did it cost to have it installed? [Drop-down menu]

- Nothing: I installed it myself or someone installed it for free
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don’t know

13. Has this refrigerator ever been repaired?

- Yes
- No
- Don't know

If you answered “Yes” to the above question, please answer the next question. Otherwise, please skip to Question 17.

If the refrigerator was repaired more than once, please restrict your answer to the repair you are most familiar with.

14. How much did it cost to repair? [Drop-down menu]

- Nothing: repaired for free or under warranty
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60
- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don't know

15. How long after you (or the homeowner) purchased it was it repaired? [Drop-down menu]

- Less than 12 months ago
- At least 1 year but less than 2 years ago
- At least 2 years but less than 3 years ago
- At least 3 years but less than 4 years ago
- At least 4 years but less than 5 years ago
- At least 5 years but less than 6 years ago
- At least 6 years but less than 8 years ago
- At least 8 years but less than 10 years ago

- At least 10 years but less than 12 years ago
- At least 12 years but less than 15 years ago
- At least 15 years ago
- Don’t know

16. Which component was repaired? Please check all that apply :

- ☐ Door gasket
- ☐ Other door component
- ☐ Insulation
- ☐ Electronics
- ☐ Lighting
- ☐ Something else
- ☐ Don't know

17. Do you (or the homeowner) ever perform routine maintenance on this refrigerator?

- Yes
- No
- Don't know

If you answered “Yes” to the above question, please answer the next question. Otherwise, please skip to Question 19.

18. How much is spent each year on routine maintenance of this refrigerator? [Drop-down menu]

- Nothing: I perform the maintenance myself or someone does it for free
- Up to $10
- Between $11 and $20
- Between $21 and $30
- Between $31 and $40
- Between $41 and $50
- Between $51 and $60

- Between $61 and $80
- Between $81 and $100
- Between $101 and $125
- Between $126 and $150
- Between $151 and $200
- Between $201 and $250
- Between $251 and $300
- Between $301 and $400
- Between $401 and $500
- $501 or more
- Don't know

Freezers

19. Do you have a <u>freezer</u> that uses THERMOELECTRIC or ABSORPTION COOLING technology to provide cooling?

DO <u>NOT</u> INCLUDE:

- Freezers that use vapor compression technology
- Refrigerators
- Refrigerators with a separate freezer compartment
- Stand-alone wine/beverage coolers
- Stand-alone residential icemakers

INCLUDE:

- **Stand-alone thermoelectric or absorption cooling freezers**
- **Thermoelectric or absorption cooling freezers with an automatic icemaker**
- **Thermoelectric or absorption cooling freezers with a wine/beverage cooler section or compartment**

Indicate how many <u>freezers</u> in your home use thermoelectric or absorption cooling.

- None
- 1
- 2
- 3

- 4 or more
- Don't know

20. What is the brand of this freezer? [Drop-down menu]

- Amana
- Avanti
- Bon Jour
- Bosch
- Cuisinart
- Dacor
- Danby
- Dometic
- EdgeStar
- Electrolux
- Emerson
- Franklin
- Frigidaire
- GE
- Haier
- Igloo
- JennAir
- Kalorik
- Kenmore
- KitchenAid
- Koldfront
- Koolatron
- Liebherr
- Magic Chef
- Marvel
- Miele

- New Air
- Norcold
- Oster
- Samsung
- Sanyo
- Scotsman
- Sub-Zero
- Summit
- Sunbeam
- Sunpentown
- Thermador
- Tresanti
- Uline
- Viking
- Vinotemp
- Vissani
- Whirlpool
- Whynter
- Wine Enthusiast
- Other
- Don't know/Decline to state

If you answered "Other" to the above question, please answer the next question. Otherwise, please skip to question 22.

21. Please enter the brand name of this freezer: [ ]

22. What is the full model number of this freezer? [ ]

23. Who is the current president of the U.S.? [Drop-down menu]

- Amana
- Bosch

- Danby
- Emerson
- Frigidaire
- GE
- Haier
- JennAir
- Kenmore
- Miele
- Obama
- Sanyo
- Tresanti
- Uline
- Viking
- Whirlpool
- Don't know

Demographics

We want to make sure that our survey reflects the make-up of the US population, so we need to ask you a few questions about you and your household.

24. What is your five-digit ZIP code?

25. What is your gender?

- Male
- Female
- Decline to state

26. Are you Hispanic or Latino?

- Yes
- No
- Decline to state

27. What is your race?

- American Indian/Alaska Native
- Asian
- Black/African-American
- Native Hawaiian/Other Pacific Islander
- White or Caucasian
- Two or more races
- Other
- Decline to state

28. What is your highest education level? [Drop-down menu]

- No schooling completed
- Kindergarten to grade 12 (No Diploma)
- High school diploma or GED
- Some college, no degree
- Associate's degree (for example: AA, AS)
- Bachelor's degree (for example: BA, BS)
- Master's degree (for example: MA, MS, MBA)
- Professional degree (for example: MD, JD)
- Doctorate degree (for example: PhD, EdD
- Decline to state

29. How many people live in your home for most of the year (including you)?

Number of people

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

30. Of the people you included in the total for Question 29, how many people are in the following age categories (please fill in the number of people for all applicable categories)

Younger than 20

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

20 to 29 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

30 to 39 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

40 to 49 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

50 to 59 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

60 to 69 years old

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

70 or older

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don't know/Decline to state ● Doesn't apply

Age unknown or Prefer not to say

● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7 ● 8 ● 9

● 10 or more ● Don’t know/Decline to state ● Doesn't apply

31. What is your combined annual household income?

- $0-$19,999 per year
- $20,000-$39,999 per year
- $40,000-$59,999 per year
- $60,000-$79,999 per year
- $80,000-$99,999 per year
- $100,000-$119,999 per year
- $120,000-$149,999 per year
- $150,000-$199,999 per year
- $200,000 or more per year
- Don't know/Decline to state

32. What type of home do you live in most of the year?

- a Single-family detached house (a house detached from any other house)
- a Single-family attached house (a house attached to one or more houses)
- an Apartment building with 2-4 units
- an Apartment building 5 or more units
- a Mobile home
- a Dormitory
- Something else
- Don't know

33. Is this home owned or rented?

- Owned or being bought by someone in your household
- Rented

- Occupied without payment of rent
- Don't know

Due to the size of our research study, we may take up to 21 DAYS to pay you.