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# Consumer Knowledge of Non-nutritive Sweeteners



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## Introduction

Non-nutritive sweeteners (NNS) are artificially produced sweeteners that offer little to no calories and have no nutritional value (Fitch 2008). The American Diabetes Association (ADA) and the American Heart Association (AHA) recommend using NNS use to reduce dietary carbohydrate intake (Gardner et al 2012). NNS can be identified by chemical name or trade name. Chemical names describe organic structure while trade names are used for NNS marketing (Fitch 2008). The chemical names of several NNS are aspartame, acesulfame-K, saccharin, cyclamate, sucralose, Rebaudioside A, and Mogroside, their respective trade names are NutraSweet™, SweetOne™, Sweet'N Low™, Equal™, Splenda™, Stevia™, and Nectresse™. Because food ingredients on food label include only the NNS chemical name, consumers may not know what NNS they actually consume or if they consume NNS.

Consumption of NNS tends increase when people seek to reduced calorie and added sugars products (Gardner 2012). Nutrient labeling allows for consumers to make informed decisions about their diet, but may be counterproductive if the information is not correctly interpreted (Mattes and Popkin 2008). It is important to understand the success of current food nutrition label information, before the success of proposed label changes can be interpreted (International Food Information Council Foundation 2012). In a recent survey of why people consume NNS, 31% of respondents suggested that they did not know enough about NNS to complete the survey (Gardner et al 2012). General information about baseline consumer knowledge of NNS is important for understanding changes in NNS use.

Although marketing by the NNS industry seeks to help consumers identify sweeteners by their trade name, the respective chemical names may not be known by consumers. Knowledge of NNS by chemical name is critical for the consumer to understand what NNS they actually consume, presuming they take the time to read the ingredients listed on a food label. The present study surveyed university science students (n=720) with respect to their knowledge of NNS by chemical and trade name. The present study also examined factors that could influence NNS knowledge such as age, sex, ACT score and grade point.

## Methods:

Study was approved by the WSU Human Subjects Committee (#515558-1). Study population consisted of students taking freshman and sophomore health science courses and were notified of the survey with a standardized 60 second poll description in each class, but not given details to bias study outcomes. Participants were sent a single email with a link to the online Qualtrics pole. Investigators gave a single reminder in each lecture 2 days later and the pole was closed that night at 1am after a single email reminder to complete the poll, 720 of 1,630 invitees completed the poll.

Using a Qualtrics based online survey tool, respondents were asked to type a definition of the term Non-nutritive (Artificial) sweetener (NNS). Written definitions were graded on a scale of 0-4 in order to convert the qualitative definition responses in to a quantitative value. The value was intended to determine if the respondent had partly included any one or all four parts of a definition in their response. This definition was based on common elements identified in prior NNS definitions (Pereira, 2012, Ng et al, 2012, Gardner et al, 2013) including caloric content, taste, chemical nature, and nutritive value. Respondents were asked to type "I don't know" if they were unable to provide a definition. Respondent definitions were quantified on a 0-4 scale, with a score of 4 being a definition that correctly identified each definition component and 0-points for "I don't know". A group of four researchers evaluated the definition quantifying each using the definition components.

Survey was distributed by Qualtrics, Provo, UT to the students. Statistical analysis was performed using JMP Pro 10 (SAS Institute Inc., Cary, NC, 2012). Numerical variables were described with the mean, standard deviation, and median. Categorical variables were described in terms of their relative frequency. To compare definition scores across groups, the Kruskal-Wallis test (a nonparametric procedure which does not require the assumption of normality) was used. For each of the seven NNS, McNemar's test was used to determine whether subjects were more likely to correctly identify the substance as a NNS with its trade name as opposed to its chemical name. A paired t-test was also used to test whether subjects could identify significantly more NNS by trade name as opposed to chemical name.

## Results:

Figure 1: Non-nutritive (artificial) sweeteners (NNS) are substances that are artificially created to have a sweet taste with no nutritive or caloric value. Qualtrics survey subjects were asked to write a NNS definition that was graded for inclusion of four elements (caloric content, taste, chemical nature, and nutritive value).

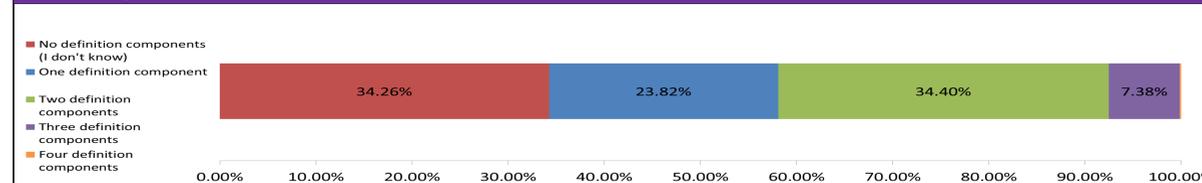


Figure 2: Correlation of prior use of food nutrition labels with NNS definition score.

	Count	Percent	Average Definition Score	SD	Median	IQR	Kruskal-Wallis p-value
Yes	374	52.0%	1.36	0.96	2.00	1.00	<0.0001
No	345	48.0%	0.92	0.96	1.00	2.00	<0.0001

Figure 3: Correlation of prior nutrition education (university classes) with NNS definition score.

	n	Percent	Average Definition Score	SD	Median	IQR	Kruskal-Wallis p-value
None	343	47.63	1.02	0.97	1.00	2.00	0.0014
1-3 Cr	333	46.25	1.24	0.98	1.00	2.00	
4+ Cr	44	6.11	1.47	0.98	2.00	1.00	

Figure 4: Subject ability to name as many NNS as possible irrespective of trade or chemical name.

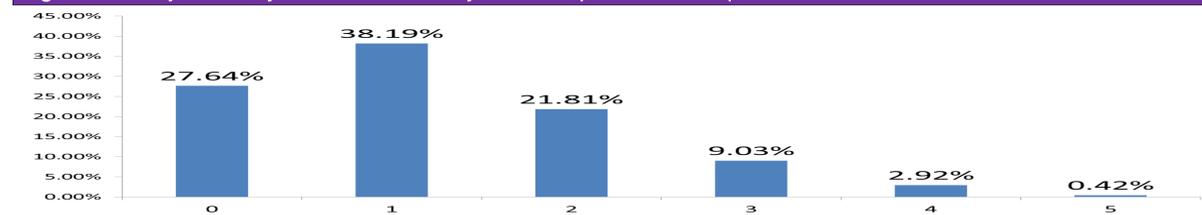


Figure 5: Subjects were generally able to sort nutritive sweeteners correctly using a click-drag-box in the Qualtrics survey tool.

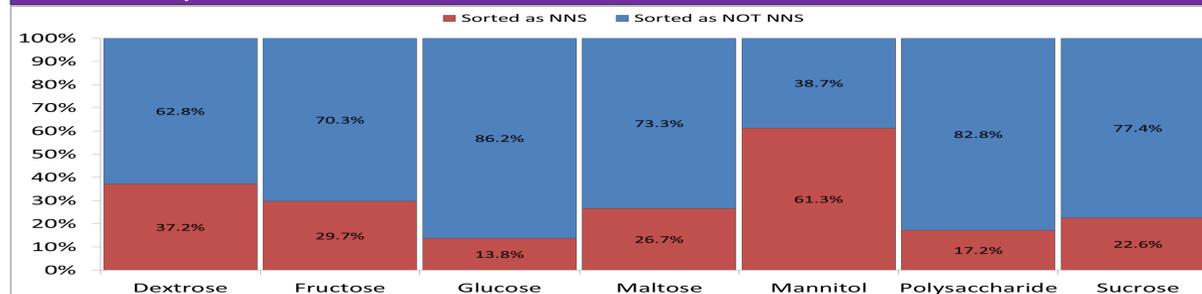


Figure 6: Subjects were better able to correctly sort NNS based upon trade name, and less efficient at correctly sorting NNS by chemical name using a click-drag-box in Qualtrics.

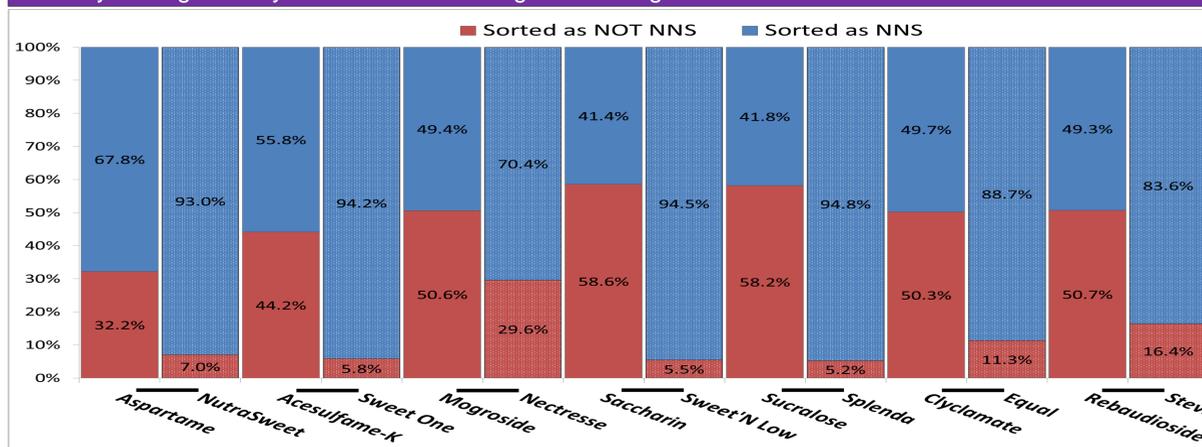


Figure 7: Ability to identify NNS in the click-drag-box by trade name was better than by chemical name and highly significant (P < 0.0001).

	N	Mean of Correctly Identified NNS	SD
By Trade Name	720	5.53	1.89
By Chemical Name	720	2.92	2.27

## Main Points:

- 1) 1/3 of subjects were unable to provide a NNS definition without prompting and 1/2 were able identify 1 or 2 elements in the NNS definition used for this study.
- 2) Definition score was correlated with prior nutrient label (P<0.0001), nutrition education (P<0.0001) and less correlated with subject age and grade point average (data not shown).
- 3) Approximately 1/3 of subjects could only name one NNS and only 1/5 could name two NNS by memory.
- 4) Ability to identify nutritive sweetener using a click-drag-box was relatively good.
- 5) Respondent ability to use a click-drag-box to identify NNS (with prompting) by trade name was better than chemical name.

## Conclusion:

It was expected that subjects would identify more trade than chemical. Using multiple ways of assessing the subjects knowledge, it was show that the sample population did know more trade than chemical names when asked to recite them by memory and when given examples to sort. When asked to provide a definition for NNS it was shown that most of the sample population couldn't adequately show their knowledge of what a NNS was. Based off of the survey, subjects sampled could not identify what a qualifies a substance as NNS or what a NNS is.

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## References:

1. Fitch C, Keim KS. Use of Nutritive and Nonnutritive Sweeteners. The Academy of Nutrition and Dietetics. 2008; 112:739.
2. Gardner C., Wylie-Rosett J., Gidding SS, Steffen LM, Johnson RK, Reader D, Lichtenstein AH. Nonnutritive Sweeteners: Current Use and Health Perspectives. Circulation. 2012; 126:509.
3. International Food Information Council Foundation. 2012 Food & Health Survey: Consumer Attitudes toward Food Safety, Nutrition, and Health. [http://www.foodinsight.org/Resources/Detail.aspx?topic52012\\_Food\\_Health\\_Survey\\_Consumer\\_Attitudes\\_toward\\_Food\\_Safety\\_Nutrition\\_and\\_Health](http://www.foodinsight.org/Resources/Detail.aspx?topic52012_Food_Health_Survey_Consumer_Attitudes_toward_Food_Safety_Nutrition_and_Health).
4. Mattes RD, Popkin BM. Nonnutritive sweetener consumption in humans: effects on appetite and food intake and their putative mechanisms. American Journal of Clinical Nutrition. 2009;89:1-14.
5. Ng, SW, Slining, MM, Popkin, BM. Use of caloric and non-caloric sweeteners in US consumer packaged foods, 2005-9. Journal Academy of Nutrition and Dietetics. 2012; 112:1828.
6. Pereira, MA. Diet beverages and the risk of obesity, diabetes, and cardiovascular disease: a review of evidence. Nutrition Reviews. 2013;71:433-440