Published in final edited form as:

Nutr Today. 2015 ; 50(6): 294–300. doi:10.1097/NT.0000000000000129.

Use of Highly Fortified Products among US Adults

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Abstract

It is complicated to ascertain the composition and prevalence of the use of highly fortified food and supplement products (HFPs) because HFP foods and HFP supplements have different labeling requirements. However, HFPs (energy bars, energy drinks, sports drinks, protein bars, energy shots, and fortified foods/beverages) are popular in the United States. A web-based survey balanced to reflect US census data was used to describe their use in a sample of 2,355 US adults >18 yr in 2011 and trends in their use from 2005. In 2011, 33% of adults reported using HFP; use was significantly higher among males, African Americans, Hispanics, and more highly educated individuals (e.g. some college or more) and those <45 yr compared to non-users. Multiple product use was common. Of users, 46% consumed sports drinks, 37% fortified foods/beverages, 32% protein bars, 27% energy drinks, 24% energy bars, and 12% energy shots. For those HFP products as a group, prevalence of use was 36% (n=2039) in 2005, 35% in 2009 (n=2010), and 30% in 2011 (n=2355). Although use was significantly lower in 2011 than in 2005 especially among females, non-Hispanics, and those with high school education or less (P 0.05). HFP, particularly energy and sports drinks, continue to be widely used by many U.S. adults.

Keywords

fortified foods; dietary supplements; sports drinks; energy drinks; consumer survey; US Adults

INTRODUCTION

Many highly fortified food and beverage products (HFP) are sold in the USA. They are often advertised as performance enhancers in sports as well as for many other uses. There is no consistent definition for what products are classified as HFP. The nutrient composition of

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HFP is difficult to obtain because some are sold as foods and beverages while others are marketed as dietary supplements with different labeling requirements. The goal of this study was to explore trends in the prevalence of HFP use, and to describe the demographic characteristics of HFP users >18 yr of age in the USA in order to better understand how these products contributed to American diets. For our study, we included as HFP energy bars, energy drinks, sports drinks, protein bars, energy shots, and fortified foods/beverages and estimated their prevalence in 2011. We estimated the prevalence of use in 2005 and 2009 for energy bars, energy drinks, sports drinks and fortified foods/beverages and compared their use to prevalence estimates in 2011 (protein bars and energy shots were not surveyed in earlier years). In order to dispel the confusion about definitions of HFP, we also documented how individual HFP were described and categorized in two major population-based surveys; the National Health and Nutrition Examination Survey (NHANES)⁽¹⁾ and the National Health Interview Survey (NHIS)⁽²⁾ and also in the SORD Natural Marketing Institute's proprietary 2011 Supplement/OTCRx Survey Database (SORD) survey⁽³⁾ used in this study.

METHODOLOGY

Data on the prevalence of HFP use was collected in 2011 by the Natural Marketing Institute's (NMI) Supplement/OTC/Rx Survey Database (SORDTM) on a sample of 2,355 US adults >18 years using a web-based survey (English only) with an on-line methodology called "ZoomPanel". The sample is nationally projectable $\pm 1.2\%$ at the 95% confidence level to the U.S. adult population and balanced to U.S. Census data ascertained from the US Bureau of Labor Statistics Current Population Survey data. The NMI SORD database follows marketing trends over time for HFP in the United States. Survey field dates were July 25, 2011 – August 3, 2011. The US Census targets for adults >18 yr. are based on education, age by gender, income, race/ethnicity, and region of country. For weighting, monitor sampling was conducted so that weighting targets were tight (between 0.5 and 2) and based on the 2010 Control Population Survey targets. Respondents were sampled in small batches, each group being demographically representative. A 'soft launch' was conducted to check for data quality prior to the full scale launch, and then sampling was evenly distributed over the period that the survey was in the field. Emails were deployed to 149,875 with 4,261 individuals accessing the survey (2.84%). Of the 4,261 who did so, 2,355 provided completed surveys. In 2011 survey respondents replied to this question:

"Which of the following product categories do you use on a regular and consistent basis? 1) Energy bars 2) Energy drinks 3) Sports drinks 4) Fortified foods/beverages (with added vitamins minerals and nutrients) 5) Functional foods/beverages (foods and beverages that provide a specific health benefit beyond their traditional use, e.g., margarine that helps lower cholesterol) 6) Protein bars 7) Energy shots 8) None of the above."

The 2005 and 2009 surveys had a similar design and included a similar question on all of the HFP except item 6, protein bars, and item 7, energy shots (which were not widely marketed at that time) Since the focus of this study was solely on HFP, data on category 5, "functional" foods and beverages, was not included in this analysis The tables display the

prevalence of use, as well as the sample size, percentage of users, and standard errors ($\pm$ SEM). A two of proportions z-test was used to assess the differences between users and nonusers using a statistical significant, of $p = 0.05$.

RESULTS

Table 1 shows that in 2011, 33% (± 1.0 SE) of adults used HFP. Use was significantly higher among males, those <45 yr, African Americans, Hispanics, and more highly educated individuals (e.g. some college or above than among non-users ($P = 0.05$). Forty-six percent (± 1.8) of respondents used sports drinks, 32% (± 1.7) protein bars, 37% (± 1.7) fortified foods/beverages, 29% (± 1.6) energy drinks, and 24% (± 1.5) used energy bars and 12% (± 1.1) energy shots.

CALLOUT : HFP use is common.

Use of multiple products was common; 58% (± 1.8) of HFP users used only 1 product; 22% (± 1.5) used 2 HFP and 20% (± 1.1) used 3 or more HFP concurrently. Twenty-two percent (± 2.8) of energy drink users also consumed energy shots, and 14% (± 1.8) of sports drink users also consumed energy shots. The most common users of energy drinks were more likely to be male, aged 30–45 yrs, Caucasian, with higher family income, and who lived in the South and West of the country when compared to other adults. Sports drink users and energy shot users mirrored the demographics of energy drink users.

Trends in use of HFP appear to have leveled off or declined slightly from a decade ago. In the SORD, trends in use over time were available for all HFP with the exception of protein bars and energy shots, which were not surveyed in earlier times (Figure 1). In 2005, 36% (± 1.1) ($n=737$ of 2039 respondents) used HFP other than protein bars and energy shots), compared to 35% (± 1.1) in 2009 ($n=702$ of 2010 respondents), and 30% (± 0.9) in 2011 ($n=706$ of 2357 respondents ($p = 0.05$). Decreases in use between 2005 and 2011 were especially apparent among females, non-Hispanics, and those who had lower educational levels (e.g. high school or less) ($p = 0.05$)

Unfortunately, standard definitions for HFP do not exist, and therefore it was difficult to compare our results with other population-based surveys., The NHANES, and the NHIS I, two population-based surveys in the US have reported data on use of HFP; however, these surveys and the NMI SORD differed not only from each other but also over time in the definitions they used. Moreover, the survey questionnaires for each differed in what products were included in the HFP category and in each subcategory within HFP.

DISCUSSION

From the limited data available, we found as other surveys had reported, that males, non-Hispanics, and those with higher educational levels and higher household incomes were more frequent users of HFP than other adults. The NHANES, NHIS, and the NMI SORD surveys have all reported that energy and sports drinks are heavily consumed by younger adults and to a lesser extent by older persons. However, the NHANES survey could not separate out energy and sports drink use from sweetened fruit drinks. The 2010 NHIS⁽²⁾

found that 31% of U.S. adults consumed sports and energy drinks on a weekly basis, with more than 21% consuming them more than three times per week. Young adults (18–24 yr) were the highest users, with a prevalence of 58%; as did our survey of persons in the same age group. However, in our study, use of both energy drinks and sports drinks peaked in the 30–45 yr age group, which was somewhat later. User characteristics in our study were also similar to those in the NHIS survey, with the higher users of sports and energy drinks being males, non-Hispanics, those with higher family income and those living in the Southern and Western U.S. Taken together, these findings suggest that energy drink and sports drink users differ demographically from nonusers and those users of certain products are also demographically distinct. For example, White males, 30–45 yrs. were the highest users of energy shots in 2011, and they may represent yet another group with different demographics than energy drink and sports drink users, although time trend data were not available to ascertain that such characteristics were stable over time

CALL OUT Standard definitions for HFP do not exist, and they are needed for comparisons between surveys.

Neither the NHANES 2009–10⁽¹⁾ nor the NHIS 2010⁽²⁾ federal population-based surveys report prevalence data for energy drink separately from sports drinks users. NHANES collects data on use of products labeled as “dietary supplements” over the past month, but HFP that are *not* labeled as dietary supplements but as conventional foods (with a “Nutrition Facts panel”) and they are not counted as HFP. The NHANES also collects food; beverage and dietary supplements consumed using two 24-hour dietary recall interviews. Although use of HFP labeled in both ways *are* captured in this part of the interview, the short referent period may not accurately capture more episodic and infrequent usage of HFP products.] A dietary screener was also included in the 2009–2010 NHANES and 2010 NHIS surveys. The NHANES screener included the following question designed to specifically collect information on use of sugar-sweetened beverages as well as of added sugars, and other items:

“During the past month), how often did {you} drink sweetened fruit drinks, sports or energy drinks, such G/Q/U as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Do **not** include diet drinks or artificially sweetened drinks.”

CALL OUT: Questions on use of HFP need a longer reference period than a single day.

The NHANES item thus asked about sports drinks, energy drinks and sugar-sweetened beverages all together in a single item and so energy and sports drinks could not be separated from use of sugar sweetened beverages. The NHIS survey included an almost identical question as that on the NHANES dietary screener, but also asked a question about consumption of sports drinks and energy drinks:

“During the past month, how often did you drink sports and energy drinks such as Gatorade [Pepsi/Co], Red Bull [Red Bull GmbH], and Vitamin Water [Glacéau]?”

“During the past month, how often did you drink sweetened fruit drinks, such as Kool-aid, cranberry and lemonade? Include fruit drinks you made at home and added sugar to.”

The SORD included an additional category of energy shots in its survey question:

“Which of the following product categories do you use on a regular and consistent basis? (Question truncated) Energy drinks (Propel Zero Sport; Monster Rehab Tea, Red Bull, Rockstar) Sports drinks (Gatorade, Powerade), Energy shots (Red Bull, Full Throttle, 5-hour Energy Shot, Stacker 2).”

Because there were so many differences between survey questions and descriptions of products, comparisons between surveys were difficult.

Categories on national surveys are not constructed today in the same way for HFP products. In the future, it would be helpful if population-based surveys defined the terms for what products are to be considered HFP and used them in a consistent manner in analyses. Also, the best reference period for questions on HFP involving recall needs to be determined. Since HFP are not necessarily consumed every day, they may not be picked up on a 24-hour recall, and a longer reference period may be needed. For example, a question such as the following might be more helpful:

“Which of the following product categories have you used in the past 30 days? In the past week? Energy bars, Energy drinks, Sports drinks, Protein bars, Energy shots, Fortified foods and beverages with added minerals and vitamins and other nutrients.”

It would also be helpful to obtain more clarification on definitions of HFP from regulatory authorities.

Several limitations of this study should be noted. The NMI SORD data is timely but it consists only of a cross sectional survey with a small sample size, utilizing self-report, and administered via the internet. Clarifications of what respondents meant by their responses were not possible and this may have contributed to misclassification of responses. In contrast, the NHANES and NHIS are population based, they use cognitively pretested questionnaires that are administered in-person, and have larger sample sizes although there is a longer lag time between when data is collected and when data can be made public.

CONCLUSION

HFP have been, and continue to be, widely used by a substantial minority of U.S. adults. In the future, survey questionnaires should more clearly and consistently define the product categories and supplements constituting HFP to clarify prevalence estimates and facilitate comparisons across studies. Easily accessible tables that include the nutrient composition of HFP sold both as foods and as dietary supplements would also be helpful.

Acknowledgments

Sources of Support

This work was funded by the Office of Dietary Supplements of the National Institutes of Health, Department of Health and Human Services.

We are particularly grateful for editorial assistance by Jamie Gahche, MPH at the National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, MD.

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Biography

Rebecca Bortz Costello, PhD is a nutritionist and scientific consultant with the Office of Dietary Supplements, NIH and is a member on the NIH Dietary Supplement Label Database Committee.

Trends in Use of HFP 2005-2011

Figure 1.

SORD Database. Trends in percentage of use over time: 2005, 2009, and 2011. Energy drink consumption was not recorded in 2005. Protein and energy bar users were not recorded until 2011 survey. Trend over time shows a statistically significant decrease in use.

Percentage of Users of Highly Fortified Foods in 2011 by Demographics and Product Categories, SORD⁷

TABLE 1

		Energy bar	Energy drink	Sports drink	Protein bar	Energy shot	Fortified food/beverage	Total HFP users	Total Non-product users
Total Weighted									
%		24	29	46	32	12	37	33	67
N		188	224	362	251	90	290	782	1573
Demographic Categories									
Age, yr									
18–25									
%(SE)	18(2.8)	26(2.9)	25(2.3)	18(2.4)	27(4.7)	10(1.8)	20(1.4)	15(0.9)*	
n	33	59	89	46	25	28	154	241	
26–29									
%(SE)	7(1.9)	10(2.0)	8(1.4)	7(1.6)	11(3.3)	8(1.6)	7(0.9)	4(0.5)*	
n	14	22	29	17	10	23	57	68	
30–45									
%(SE)	40(3.6)	43(3.3)	39(2.6)	39(3.1)	46(5.3)	35(2.8)	37(1.7)	27(1.1)*	
n	76	95	140	98	41	100	288	427	
46–65									
%(SE)	26(3.2)	17(2.5)	26(2.3)	29(2.9)	15(3.8)	36(2.8)	28(1.6)	35(1.2)*	
n	48	39	93	72	14	104	220	543	
over 65									
%(SE)	9(2.1)	4(1.3)	3(0.9)	7(1.6)	1(1.0)	12(1.9)	8(1.0)	19 ^A (1.0)	
n	17	8	11	18	1	34	63	293	
Gender									
Male									
%(SE)	57(3.6)	62(3.2)	68(2.5)	52(3.2)	66(5.0)	43(2.9)	56(1.8)	45(1.3)	
n	106	138	245	130	60	125	437	705	
Female									
%(SE)	44(3.6)	38(3.2)	32(2.5)	48(3.2)	34(5.0)	57(2.9)	44(1.8)	55(1.3)	

Total Weighted		Energy bar	Energy drink	Sports drink	Protein bar	Energy shot	Fortified food/beverage	Total HFP users	Total Non-product users
%	24	29	46	32	12	37	33	67	
N	188	224	362	251	90	290	782	1573	
n	82	86	117	120	30	165	345	867	
Race									
White									
%(SE)	73(3.2)	64(3.2)	70(2.4)	72(2.8)	72(4.7)	75(2.5)	72(1.6)	79(1.0)	
n	137	143	253	180	65	217	565	1241	
African-Am/Black									
%(SE)	16(2.7)	19(2.6)	16(1.9)	15(2.3)	12(3.4)	15(2.1)	16(1.3)	11(0.8)*	
n	30	44	58	37	11	43	122	166	
Asian/PI									
%(SE)	5(1.6)	6(1.6)	4(1.0)	4(1.2)	5(2.3)	3(1.0)	4(0.7)	3(0.4)	
n	9	12	16	10	5	8	28	52	
Other									
%(SE)	5(1.6)	11(2.1)	8(1.4)	7(1.6)	10(3.2)	6(1.4)	7(0.9)	6(0.6)	
n	10	24	30	19	10	19	53	96	
Ethnicity									
Hispanic									
%(SE)	18(2.8)	23(2.8)	16(1.9)	19(2.5)	26(4.6)	17(2.2)	17(1.3)	12(0.8)*	
n	34	51	57	47	23	50	134	194	
Non-Hispanic									
%(SE)	82(2.8)	77(2.8)	84(1.9)	81(2.5)	74(4.6)	83(2.2)	83(1.3)	88(0.8)	
n	154	173	304	205	67	240	648	1379	
Region									
Northeast									
%(SE)	26(3.2)	17(2.5)	21(2.1)	20(2.5)	16(3.9)	23(2.5)	21(1.5)	22(1.0)	
n	49	38	75	50	15	66	154	340	

	Energy bar	Energy drink	Sports drink	Protein bar	Energy shot	Fortified food/beverage	Total HFP users	Total Non-product users
Total Weighted								
%	24	29	46	32	12	37	33	67
N	188	224	362	251	90	290	782	1573
Midwest								
%(SE)	21(3.0)	18(2.6)	22(2.2)	16(2.3)	21(4.3)	16(2.2)	18(1.4)	24(1.1)*
n	39	40	80	40	19	47	144	369
South								
%(SE)	30(3.3)	37(3.2)	34(2.5)	36(3.0)	30(4.8)	39(2.9)	35(1.7)	33(1.2)
n	56	82	123	89	27	112	272	521
West								
%(SE)	23(3.1)	29(3.0)	23(2.2)	29(2.9)	33(5.5.0)	23(2.5)	26(1.6)	22(1.0)
n	44	65	80	72	29	66	201	343
Education								
< High school								
%(SE)	2(1.0)	7(1.7)	5(1.1)	4(1.2)	8(2.9)	3(1.0)	5(0.8)	5(0.5)
n	3	15	18	10	7	8	42	74
HS grad or equiv								
%(SE)	30(3.3)	33(3.1)	30(2.4)	28(2.8)	31(4.9)	32(2.7)	31(1.7)	44(1.3)
n	57	75	110	69	28	93	244	695
Some college or grad								
%(SE)	51(3.6)	52(3.3)	50(2.6)	54(3.1)	43(5.2)	52(2.9)	50(1.8)	41(1.2)*
n	97	116	181	137	39	150	393	641
More than college or graduate degree								
%(SE)	17(2.7)	8(1.8)	15(1.9)	14(2.2)	19(4.1)	14(2.0)	13(1.2)	10(0.8)
n	31	18	52	36	17	39	104	162
Household income								
<\$15,000								
%(SE)	7(1.9)	8(1.8)	8(1.4)	6(1.5)	12(3.4)	7(1.5)	7(0.9)	10(0.8)
n	13	19	30	15	11	20	55	150

	Energy bar	Energy drink	Sports drink	Protein bar	Energy shot	Fortified food/beverage	Total HFP users	Total Non-product users
Total Weighted								
%	24	29	46	32	12	37	33	67
N	188	224	362	251	90	290	782	1573
\$15,000–\$49,999								
%(SE)	30(3.3)	31(3.1)	29(2.4)	25(2.7)	22(4.4)	37(2.8)	32(1.7)	32(1.2)
n	55	70	103	62	19	108	246	495
\$50,000 – \$74,999								
%(SE)	21(3.0)	21(2.7)	18(2.0)	21(2.6)	22(4.4)	18(2.3)	19(1.4)	18(1.0)
n	39	48	66	53	19	52	146	281
\$75,000+								
%(SE)	40(3.6)	35(3.2)	42(2.6)	45(3.1)	40(5.2)	36(2.8)	39(1.7)	35(1.2)
n	76	80	152	112	36	106	305	545

The NMI-SORD is nationally projectable $\pm 1.2\%$ at the 95% confidence level to the U.S. adult population and balanced to 2010 U.S. Census data. The SORD database follows marketing trends over time for HFP in the United States. Survey field dates were July 25, 2011–August 3, 2011. A two proportions z-test was used to assess the differences between users and nonusers with a statistical significance at p 0.05. The (*) denotes significant differences between user and non-user groups.