How Does Media Influence Consumption for Processed Meat?

By

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Abstract

The International Agency for Research on Cancer (IARC), World Health Organization's (WHO) specialized cancer agency, has recently classified consumption of processed meat "carcinogenic to human." I explore this health advisory effect on consumer learning from different media outlets and its impact on processed meat consumption. Using a difference-in-difference estimation technique and a detailed panel of household data from IRI, I find that this health advisory only impacts short-term consumption. The impact is heterogeneous by education level and gender within that subgroup, region of residency, and age group in the households. However, there is no long-term causal impact of this health advisory.

KEYWORDS: health advisory, information process, consumers' demand, processed meat

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1. Introduction

Non-communicable diseases (NCDs), including diabetes, cancers, cardiovascular, and chronic respiratory diseases, are the leading causes of death globally (about 71% of total deaths in 2016). Obesity and an unhealthy lifestyle, insufficient physical activity, poor dietary habits, cigarette smoking, and alcohol consumption result in these detrimental effects on individual Ill-being. Recognizing the devastating social, economic, and public health impact of NCDs, in September 2011, WHO members agreed on ten global targets and increased the volume of information about the consequences of alcohol and tobacco, insufficient physical activity, salt/sodium intake[3]. Mass media has been a vital platform for this type of health information dissemination. Using sources as TV, newspapers, and social media plays an essential role in influencing consumers' perception about quality, taste, credibility, and subsequently on the consumption frequency and demand pattern (Verbeke et al., 2000; Uddin et al., 2020). Although this kind of information is readily available to consumers, the method and pace of this information processing are complex and heterogeneous. This heterogeneity can be due to various factors, including consumption habits as demographic predictors in general, socio-economic reasons, and non-demographic ones as product attributes, quality attributes, production methods, the nature of information, and reliability in acquiring information (McCluskey and Swinnen, 2005). Information from media can be both bad and good. The time and length of processes this type of information also varies (McCluskey et al., 2015).

The main objective of this paper investigates the causal effect of health warnings on consumption. According to a report published in 2015, WHO International Agency for Research on Cancer (IARC) classified processed meat as Group 1 carcinogen, the same category as tobacco smoking. The report stated that the risk generally increases with the amount of meat consumed and estimated that every 50-gram portion of processed meat eaten daily increases the risk of colorectal cancer by about 18%. This health advisory report received extensive media attention as the conclusions drawn from evaluating over 800 studies conducted on ten countries. This WHO report received massive media attention both in mass media and social media. "WHO meat

[3] World Health Organization. (2014). Global status report on noncommunicable diseases 2014 (No. WHO/NMH/NVI/15.1). World Health Organization.

causes cancer" became top trending for the month of October 2015. Three thousand forty retweets and 1,000 favorites on a single on October 25, 2015, in Twitter. However, negative tweets about the report outnumbered positive tweets by a ratio of almost 7 to 1 the day of the report and 6.5 to 1 the following day.[4]

Several studies have analyzed how the quantity and quality of health advisory affect consumers' consumption patterns. The seminal papers (Hamilton 1972; Warner 1989) started focusing on the smoking hazard campaigns. However, the research has expanded to many other issues, and several papers investigated the effect of health advisory on food and have found mixed results on consumption. Several studies (Oken et al., 2003; Shimshacka et al., 2007; Shimshacka and Ward 2010) document strong evidence of the effects of the 2001 FDA advisory on mercury-related fish risk consumption. Using experimental design to assess health information's impact, Rousu et al. (2007) find a positive attitude and strong willingness to pay towards genetically modified countries like China and Japan but not in the USA (McCluskey et al., 2005). Schlenker and Villas-Boas (2009) find that health warnings about mad cow disease significantly reduced beef sales in the USA. Cholesterol information disseminated through print media decreases pork consumption and increases milk, poultry, fish, and egg consumption (Capps and Schmitz, 1991; Brown and Schrader; Peng et al., 2015) for both individual-level and aggregate data. Consumers are willing to change their purchasing behaviors to avoid products that are not safe, as learned from the news report (Napolitano et al., 2009; Dillaway et al.,2011). Several studies in the USA, UK, and other European counties find that calorie information on labels reduces the selection and consumption of energy-dense snacks and drinks. Still, their additive impact on health advisory is unknown (Clark et al., 2020).

This paper contributes to the food safety and health economics literature. Experimental work by Viscusi et al. (1986) shows that, given information about product hazards, subjects undertake precautionary behavior generally consistent with basic economic theory. This paper investigates WHO health warnings in the USA using IRI Household scanner data using the difference-in-difference framework. The scope of this data setting and identification strategy allows us to

[4] Twitter Sentiment Analysis on WHO Report by The Thomas Reuters Corporations: https://www.reuters.com/article/us-health-meat-socialmedia/freebacon-topic-sizzles-on-social-media-after-who-meat-report-idUSKCN0SL2UJ20151028

disentangle health information-related response determinants at the household level, both in the short-run and long-run. The control variables' analysis coefficients, both with respect to the sign and the magnitude, are substantially in line with health advisory and warnings literature. This research's findings can help policymakers better predict how warning labels might influence decision-making and design effective communication strategies. The paper's layout is as follows - Section 2 depicts the media coverage of WHO warning and its impact at the aggregate level. Section 3 describes data and methodology. Section 4 elaborates on the analysis from estimation, and section 5 concludes.

2. Media Report and Impact on Meat and Processed Meat Industry

To see whether the WHO 2015 report impacted the consumers' processed meat consumption, I first examine this news on the internet from traditional sources as news portals and social media. Relevant information related using keywords "processed meat" and "cancer" is collected from Nexis Uni Academic Search tool and web search for these words from Google trend to show the interest in this topic over time. Then these kinds of relevant news are collected from Twitter. The graph shows the number of articles published in the news portals and their Twitter accounts and how many people have retweeted that news. (See figure 01 in Appendix). Interest over time represents search interest relative to the highest point on the chart for a time in the USA. A value over 100 is the peak popularity for the term. A value of 50 means that the word is half as popular. A score of 0 means there was not enough data for this term. The newspaper articles are linearly summed with the equal weight each year. Overall, WHO reports considerable attention during the year when it was published in the media, and so did people's interest in the topic. However, this report received lesser attention in the latter years with the much less public interest. Hence, this health-related information did not create much concern for the consumer as the impact was short-lived.

According to the USDA 2025 projection, the demand for total meat, both red meat and dairy products, is strong in both the domestic and export market. The USA is the second-largest per capita consumer of meat in general, followed by Germany. Although the rising trend for white meat, organic food, and plant-based protein is a growing trend, red meat as a protein source

is a popular choice, and the total red meat consumption continues to rise in the USA (See Figure 3 in Appendix). The average monthly purchase trend at the household level does not show any declining state. Suppose I look at segregation by meat category. In that case, there is an increasing trend for per capita chicken consumption but a relatively stagnant trend of per capita consumption for beef, pork, and turkey. Many factors contribute to this stable consumption trend, such as increased production in the overall meat industry. The feed cost fell due to bumper production of corn and soybean, two of the significant feed ingredients. From the data for wholesale prices, it is evident that consumers are paying less for poultry, beef, pork, and other processed meat products. Also, meat products' convenience is an important factor in the processed meat industry's growth as part of consumer's interest in ready-to-eat and ready-to-cook meat products in recent times. According to Statista 2018 industry report, the average revenue growth in the total meat industry in the last seven years is 5% and is projected to continue in the next decade despite health concerns raised by various health organizations. Although media information matters at the aggregate level, there is no significant impact of the WHO 2015 report in the aggregate level by trend analysis. Therefore, it is justifying to get a deeper understanding into a disaggregated level and identify this advisory's heterogeneous effect.

3. Data and Methodology

The data for this research comes from two sources. The household information comes from the household-level consumer panel data from IRI's InfoScan Consumer Network database. Our sample consists of purchase information for a panel of 30,1372 households for the period 2014 to 2017. It gives us the flexibility to both short-term and long-term effects from health advisory. Processed meat (hamburgers, sausages, nuggets, hotdogs, mortadella, bacon, salami, ham, and beef jerky) consists of many products that differ from meat-type salt, and fat content, the processing method. There are 252 cold cuts and lunch meat categories reported in the dataset. The timeframe allows for possible observation of consumption patterns before and after the health advisory. IRI households are geographically diverse, which allows the dataset to

approximate a nationally representative sample. The analysis considers the potential purchase of total ounces of processed meat expressed in dollars as the dependent variable. This will account for the consumption of processed meat by households. I control for a large number of socio-economic variables as household size, the number of household members, presence of children, age and gender of household head, and their occupation. The education level of the household head is used to capture the ability to process information. To account for short -and long-term effects, I construct purchase variables by weeks, months, and years. Households included in the IRI survey use scanner or mobile to record detailed food purchases. To account for the heterogeneity of effect, I use the region of residency and education level of household head and occupation. Data on media coverage about WHO advisory on processed meat is obtained by web scarping keywords "WHO report," "processed meat," "carcinogen" from Twitter. These keywords were also used in the Nexis Uni Academic Search tool to collect and analyze the media coverage in this traditional news platform. This information is then used to construct a media coverage dummy variable. The variable is assigned value one if the news is circulated in traditional and social media and 0 if the news is only presented in social media.

Table A1 summarizes the descriptive statistics used for all variables used in the analysis. The average expenditure on processed meat is $4.77 per week, with the minimum expenditure being $0.01 and the maximum being $478.86. Several households are making a lot of processed meat purchases, and hence, I take the log transformation of weekly expenditure while using it as the dependent variable. The purchase of meat remained relatively stable during 2013-2018, although a dip around October 2015 (Figure A4). About 16% of the household did not report purchase information for processed meat, justifying the need for TOBIT estimation analysis (Figure A5). This justifies a log transformation of the dependent variable. About 32.57% of the total sample consists of households with older couples, while the rest are above 18 years of age and younger couples. South is the most consumption-heavy region, followed by the mid-west when it comes to processed meat consumption.

The paper's objective is to assess the net causal effect of processed meat health advisory from the media coverage. For this, I start by estimating an OLS regression to see if there is any correlation between processed meat consumption and socio-economics variables. Then to

capture the causal inference, I deploy the Difference-in-Difference estimation technique. To isolate the causal effects of the health advisory media coverage, I control for different confounding factors and examine differential consumption to respond to the advisory. I estimate the impact of processed meat health advisory using the following regression:

$$Y_{it} = \beta_1 + \beta_2 T_t + \beta_3 G_i + \beta_4 D_{it} + \beta_5 X_{it} + \varepsilon_{it}$$

Y_{it} - log of weekly purchase of "deli meat." I have more than 100 categories of "lunchmeat" termed as processed meat based on these products' processing and content. T_t is a dummy variable equal to one for the post-advisory period, after the WHO advisory on October 25, 2015. G_i is a dummy variable equal to one for the treatment group. The control and the treatment group are defined according to the WHO advisory. The IARC report states that more than 50 grams of daily consumption of processed meat cause cancer. Therefore, the treatment group comprises households who consume more than 50 grams of processed meat in a week. And the control group Households are not the target group or at risk as they consume less than 50 gm of processed meat in a week. The assumption here is that a USA household on average makes 1.6 trips in a week[5]. D_{it} - treatment variable, i.e., the interaction of time and group at risk. X_{it} includes Household member's ages, dummies for gender, categories for education level, occupation. Also, household income types, presence of children, awareness of health consciousness and owner of exercise devices/machineries, and a full set of regional dummies.

The fundamental identifying assumption for DiD estimation technique is that in the absence of the health advisory, the difference in processed meat consumption between the control and treatment groups of households is not statistically significant from zero and follows a common trend. This is evident from a t-test, and a graphical visualization shows a stable trend of consumption between the groups. To account for the possible presence of a long-term in processed meat consumption, I compare expenditure variations over a short duration. The weekly purchase data allows us to capture this and account for overestimating or

[5]Statista Report on Grocery Shopping: https://www.statista.com/statistics/251728/Iekly-number-of-us-grocery-shopping-trips-per-household/

underestimating the impact of health advisory.

4. Results

Table A1 reports the results from Ordinary Least Square Estimation. The standard errors are clustered at the household level. I find that price of processed meat, Household income level, education level of household head, living in South and Midwest regions, and households with young children between 13 to 18 years of age, younger couples have a statistically significant association with consumption of processed meat.

Table A2 presents the results from media impact of WHO advisory using Difference-in-Difference estimation after controlling for confounding factors that may influence the causal effect[6]. The average treatment effect is accounted for in both the short-run and long-run. Hence, columns 1, 2, 3 refer to the impact of media exposure to the warning in one month, six months, and one year[7]. The results indicate that WHO's advisory had a significant impact in the shortest period, i.e., just within a month of the advisory. In the first month, consumers responded to the warning by reducing the weekly purchase of processed meat by 0.7%, and the treatment variable is statistically significant at a 10% level of significance. However, the impact of advisory does not affect in the long run. Weekly purchase of processed meat increased by 10% and 7% within six months to a year of the post-treatment period. The average treatment effects are positive statistically significant at a 1% level. This change in the average treatment can be linked to media exposure. Although WHO health advisory received massive media attention, there were lots of negative tweets as well. This influx of misinformation can create a delay in processing information that affects consumers' perception and behavior. This is precisely what may have happened from the media exposure of WHO advisory, and I see a positive average treatment effect when estimating the net causal effect. With respect to controlling for other confounding factors, I see that middle to higher-income households are associated with a positive and significant increase in processed meat's weekly purchase in the post-treatment period, both short-run and long-run

[6] The average treatment effect without controlling for covariates remain the same as adding them to the estimation.

[7] The results accounted for post treatment 3 months are same as to 6 months to a year.

compared to the low-to-middle income group. Processed meat is deli food and not essential daily necessary and sensitive to price.

Therefore, the low to middle-income group would have red meat and uncooked meat as part of their consumption basket than ultra-processed ready-to-eat food. WHO's warning is a striking heterogeneous effect by education level, household type, and geographical location. Households with high school and college graduates spend more on processed meat. They have a more stable response pattern during the post advisory period than families with at least one college graduate. This impact differs by gender within this education level of heterogeneous effect. Male-headed households with high school and college graduates' response to the advisory are 6%-8% positive increase in processed meat consumption and statistically significant at 5% level of significance compared to their male household counterparts with a graduate degree. This implies that the information processing varies by education and gender within the subgroup. The advisory has a profound impact on households with older couples by decreasing consumption by 8%-11% and is statistically significant at 1% level compared to households with young children aged less than 13 years of age. The advisory also has no impact on young singles and couples' families. Considering geographical regions, I see that households in the most meat-producing region, South and Midwest, significantly impact the advisory compared to the USA's northeast region. The results show a stable consumption of processed meat over the post advisory period. This can be region-specific media bias may have played a substantial role in influencing consumer's learning, risk perception, and ultimately consumption behavior. Table A3 shows the average treatment effect after including the media variables. The learning from both mainstream and social media had a negative but not statistically significant impact on processed meat consumers.

5. Robustness Check

In this section, I perform tests to maintain the validity of the identification strategy. The most important assumption that should for the Difference-in-Difference framework is the parrel trend or common trend assumption. Graphing the weekly purchase data for the target and treatment group reveals that the parallel trend holds no confounding factors that influenced consumption for processed meat during January-September 2015. To see the heterogeneity by time, I also

estimated the three-month post advisory effect. I found a positive and not statistically significant impact of WHO advisory on processed meat consumption by the treatment group. About 17% of the sample households did not report any purchase information for processed meat (see Appendix Figure 4). This is not a small number and outlays the justification to do a Tobit analysis. Table A3 present the results from the TOBIT analysis. This estimation technique allows us the address the problem of zero purchase, and the results are in line with the causal effect findings from the DiD estimations. The main findings indicate that post advisory consumption reduction by 0 .10 ounces can be attributed to the media effect of the target group.

6. Conclusion

This paper focuses on the causal effect of 2015 WHO health advisory on processed meat consumption. I investigate this using IRI Consumer Scanner data on the USA. The USA is one of the top countries of meat production and consumption. The availability of detailed data on food purchase data and household characteristics justifies measuring the effect of health advisory on this setting. The findings show that processed meat consumption fell by only 0.07% in response to the advisory within the 1st month. But the response effect does not affect just within six months. Also, the impact from advisory is heterogeneous by education level and household age group. This interprets that the WHO advisory has only a very short-term immediate effect and effectively reduces consumption and probably prevention several life-threatening diseases for a particular group. The nature of the message itself plays an essential role in translating to public perception formation. Our findings align with the literature suggesting that health advisory's policy design should be target-oriented by education and region. Also, there should be a constant flow of clear articulation of the message for mass adaptation and to tackle media bias and the spread of misinformation.

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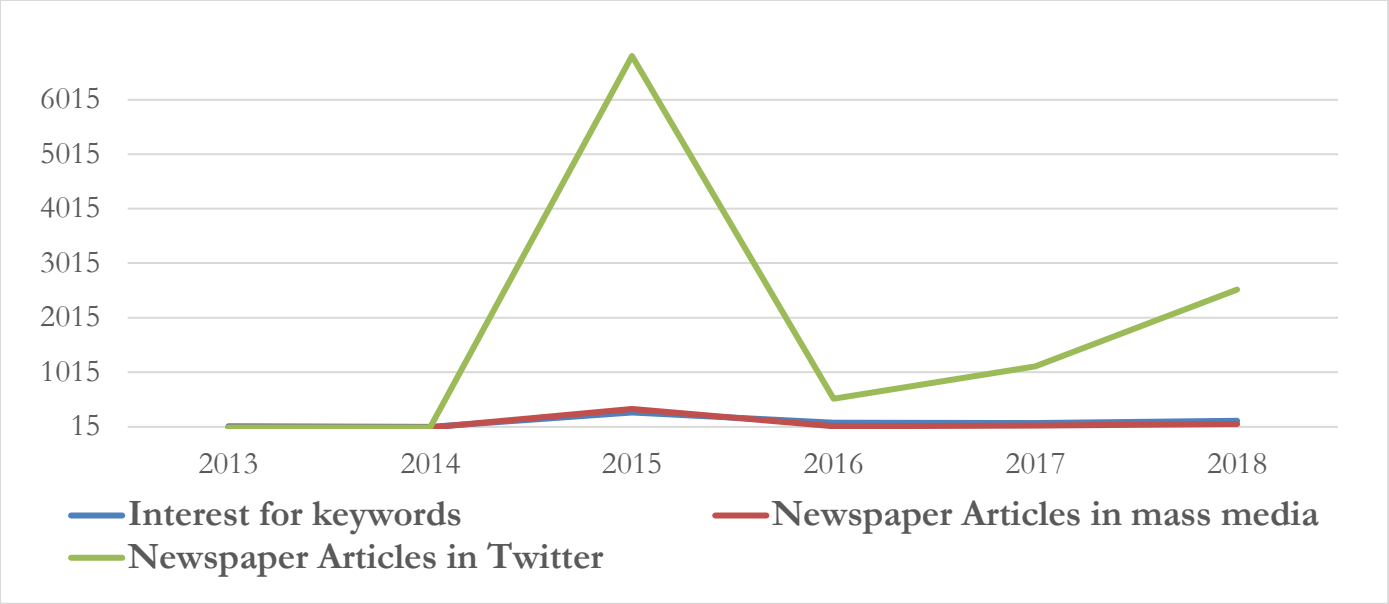
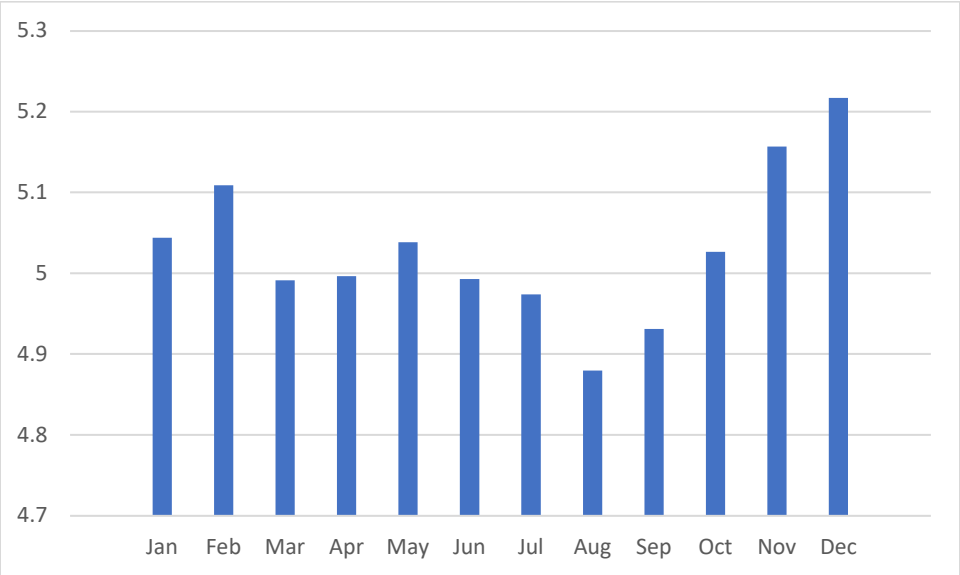
Appendix

Figure A1: web search and News Articles in Mass & Social Media



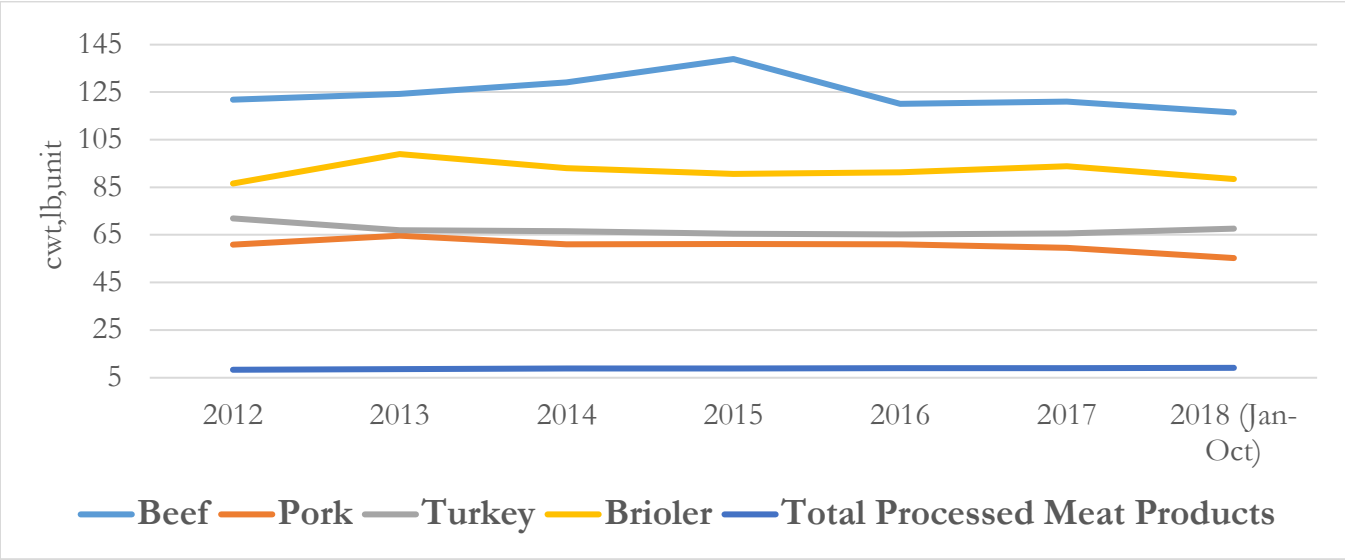
Source: Google Trend, Nexis Uni, Twitter

Figure A2: Average monthly purchase of Processed Meat during 2013-2018 checking for seasonality



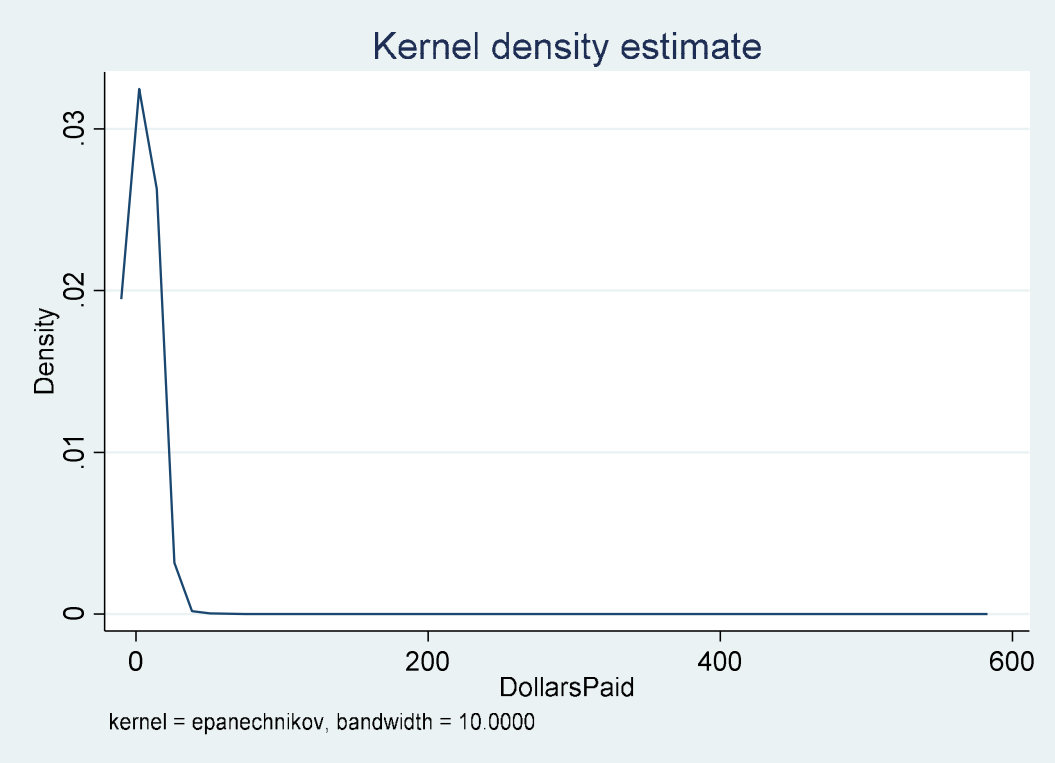
Source: IRI Consumer panel Household scanner data

Table A3: Wholesale prices for meat in the USA during 2012-2018



Source: *USDA, National Agricultural Statistics Service, Agricultural Marketing Service, and Economic Research Service, Statista Estimates*

Figure 4: Non-parametric distribution of households' weekly expenditures on processed meat



Source: IRI Consumer panel Household scanner data

Table A1: Summary Statistics

Variables	Mean				Min	Max
Weekly expenditure in total ounces of processed meat purchased	4.733				0.01	478.86
Quantity purchase per week in total ounces						
Price per ounce						
Household size (in numbers)	3.20				2	8
Household Income (yearly in dollars)	50,000 – 59,000				< 9,000	>100,00
Hours of work for pay (weekly by each working member)	35				0	>40
Household lifecycle (%)	Older couples (32.57)	HH with older children (21.38)			HH with older children (18.74)	Young Couples (15.78)
Race (%)	White (79.67)	Black (10.63)			Asian (2.93)	
Ethnicity (%)	Hispanic (6.75)	Non-Hispanic (93.25)				
Processed meat expenditure by region (%)	South (42.58)	Midwest (28.55)			west (17.64)	Northeast (11.23)
Processed meat expenditure by race (%)	White (84.37)	Black (8.54)			Asian (2.31)	
Household head characteristics						
Gender (%)	Female (77.00)				Male (22.00)	
Education level – Female (%)	Some College Degree (32.40)	Graduate (28.51)	High School (19.06)		Post-Graduation (9.63)	
Education level – Male (%)	Some College Degree (23.46)	Graduate (20.72)	High School (20.34)		Post-Graduation (7.55)	
Year	2013	2014	2015	2016	2017	2018
Weekly average expenditure (dollars) on processed meat (ounces)	4.55	4.83	4.93	4.73	4.70	4.53
	26.7	27.3	28.1	28.8	29.9	30.9
Number of Households	36,528	40,711	46,818	51,257	55,571	55868
Observations	301,344	343,41 6	385,624	428,535	130,244	129,865

Table A1: OLS estimation results of health advisory media effect

	Total Sample	HH at risk	HH not at risk
Female	0.006	-0.002	0.007
	(0.006)	(0.011)	(0.006)
Price	-0.021***	-0.018	-0.027**
	(0.007)	(0.007)	(0.013)
Middle Income group	0.098***	0.121***	0.091***
	(0.024)	(0.030)	(0.027)
High Income Group	0.145***	0.176***	0.135***
	(0.024)	(0.030)	(0.027)
White	0.021**	0.001	0.028***
	(0.010)	(0.018)	(0.011)
Black	-0.080***	-0.108	-0.069***
	(0.008)	(0.014)	(0.009)
F-High School	0.045	0.016	0.054
	(0.059)	(0.088)	(0.064)
F-College	0.025	-0.013	0.037
	(0.059)	(0.088	(0.064)
F-Post Graduate	0.081	0.071	0.084
	(0.059)	(0.071)	(0.064)
F-Occupation	0.014*	-0.002	0.020***
	(0.008)	(0.014)	(0.008)
M-High School	0.067**	0.073*	0.067**
	(0.028)	(0.041)	(0.028)
M-College	0.083***	0.093**	0.083**
	(0.028)	(0.041)	(0.029)
M-Post Graduate	0.109***	0.118***	0.110***
	(0.29)	(0.043)	(0.029)
M-Occupation	0.007	0.006	0.008
	(0.008)	(0.014)	(0.064)
HH with old child	0.044***	0.076***	0.034***
	(0.011)	(0.017)	(0.012)
Young Singles	0.078***	0.127***	0.063***
	(0.011)	(0.017)	(0.126)
Older Singles	-0.079***	-0.042**	-0.098***
	(0.011)	(0.016)	(0.012)
Young Couple	0.044***	0.076***	0.034***
	(0.011)	(0.017)	(0.012)
Older couple	-0.099***	-0.080***	-0.112***
	(0.013)	(0.019)	(0.014)
Midwest	0.092***	0.123***	0.085***
	(0.007)	(0.012)	(0.007)
South	0.063***	0.114***	0.047***
	(0.007)	(0.012)	(0.007)
west	0.014*	0.036**	0.031***
	(0.008)	(0.014)	(0.008)

Constant	0.961***	1.170***	1.028***
	(0.064)	(0.094)	(0.069)
R-squared	0.09	0.08	0.24
Number of Observations	1,770,456	462,052	1,308,404

*Note: Log expenditure on processed meat as outcome variable; Standard errors in parenthesis. Clustered at household level *** p<0.01, ** p<0.05, * p<0.10 respectively.*

Table A2: Difference-in-Difference estimates of health advisory media effect

	Short Term Effect (Post 1 months)	Long Term Effect (Post 6 months)	Long Term Effect (Post 1 year)
Female	0.011**	0.008***	-0.007
	(.003)	(.001)	(.006)
Price	-0.027***	-0.030***	-0.030***
	(.002)	(.001)	(.001)
Middle Income HH	-0.036*	-0.029***	-0.41***
	(.017)	(.007)	(.004)
High Income HH	0.126***	0.122***	0.110***
	(0.021)	(0.020)	(0.019)
White	-0.061*	-0.058***	-0.060***
	(.006)	(.002)	(.001)
Black	0.013	0.005	0.006**
	(.009)	(.004)	(.002)
Young couples	0.120***	0.143***	0.135***
	(.007)	(.003)	(.002)
Young Singles	0.030**	0.032**	0.047***
	(0.013)	(0.013)	(0.011)
Older couples	-0.110***	-0.110***	-0.107***
	(.005)	(.002)	(.001)
Female Occupation	-0.012	-0.013	-0.014
	(0.010)	(0.010)	(0.008)
Male Occupation	- 0.010	-0.016*	-0.020**
	(0.080)	(0.009)	(0.008)
Midwest	-0.068***	-0.067***	-0.070***
	(.007)	(.007)	(.007)
West	0.039***	0.039***	0.030***
	(0.008)	(0.008)	(0.007)
South	-0.038***	-0.037***	-0.040***

	(0.007)	(0.007)	(0.006)
F-Highschool	-0.059**	0.049***	0.026***
	(0.029)	(0.012)	(0.006)
F-College	-0.061*	0.044***	0.037***
	(0.031)	(0.012)	(0.006)
M-High School	0.057***	0.093***	0.080***
	(0.017)	(0.007)	(0.004)
M-College	0.091***	0.107***	0.019***
	(0.017)	(0.007)	(0.004)
DiD	-0.007*	0.102***	0.078***
	(0.003)	(0.007)	(0.006)
Constant	1.165***	1.048***	1.075***
	(0.034)	(0.014)	(0.008)
Number of Observations	801,087	969,063	1,181,106

*Note: Log expenditure on processed meat as outcome variable; Standard errors in parenthesis. Clustered at household level *** p<0.01, ** p<0.05, * p<0.10 respectively.*

Table A3: Difference-in-Difference estimates including media intensity

	Short Term Effect (Post 1 months)	Long Term Effect (Post 1 year)
Female	0.011**	-0.007
	(.003)	(.006)
Price	-0.027***	-0.030***
	(.002)	(.001)
Middle Income HH	-0.007	-0.005
	(.055)	(.008)
High Income HH	0.040	0.001
	(0.042)	(0.005)
White	0.061	0.061
	(.048)	(.048)
Black	0.013	0.006**
	(.009)	(.002)
Young couples	0.170	0.184
	(.166)	(.168)
Older couples	0.165	0.163
	(.169)	(.177)
Media	-0.061	-0.051
	(0.048)	(0.094)
F-Highschool	-0.059**	0.026***
	(0.029)	(0.006)
F-College	-0.061*	0.037***
	(0.031)	(0.006)

M-High School	0.057***	0.080***
	(0.017)	(0.004)
M-College	0.091***	0.019***
	(0.017)	(0.004)
DiD	-0.072*	0.192***
	(0.019)	(0.041)
Number of Observations	801,087	1,181,106

*Note: Log monthly expenditure on processed meat as outcome variable; Full set of controls not included. Standard errors in parenthesis. Clustered at household level *** p<0.01, ** p<0.05, * p<0.10 respectively.*

Table A4: Tobit Regression Estimates: Short term Effect (1-month post advisory)

Price	-0.026***
	(.005)
Female	0.261***
	(.018)
Middle Income HH	-0.116***
	(.022)
White	0.164***
	(.008)
Black	0.158***
	(.009)
Young couples	0.688***
	(.010)
Older couples	0.599***
	(.007)
Midwest	0.189***
	(.008)
South	0.229***
	(.0.007)
F-Highschool	-0.420*
	(0.173)
F-College	-0.188
	(0.182)
M-High School	0.245*
	(0.103)
M-College	-0.181
	(0.107)
DiD	-0.103***
	(0.018)
Constant	4.057***
	(0.208)

Number of Observations	842529

*Note: Weekly expenditure on processed meat as outcome variable; Standard errors in parenthesis. Clustered at household level *** p<0.01, ** p<0.05, * p<0.10 respectively.*