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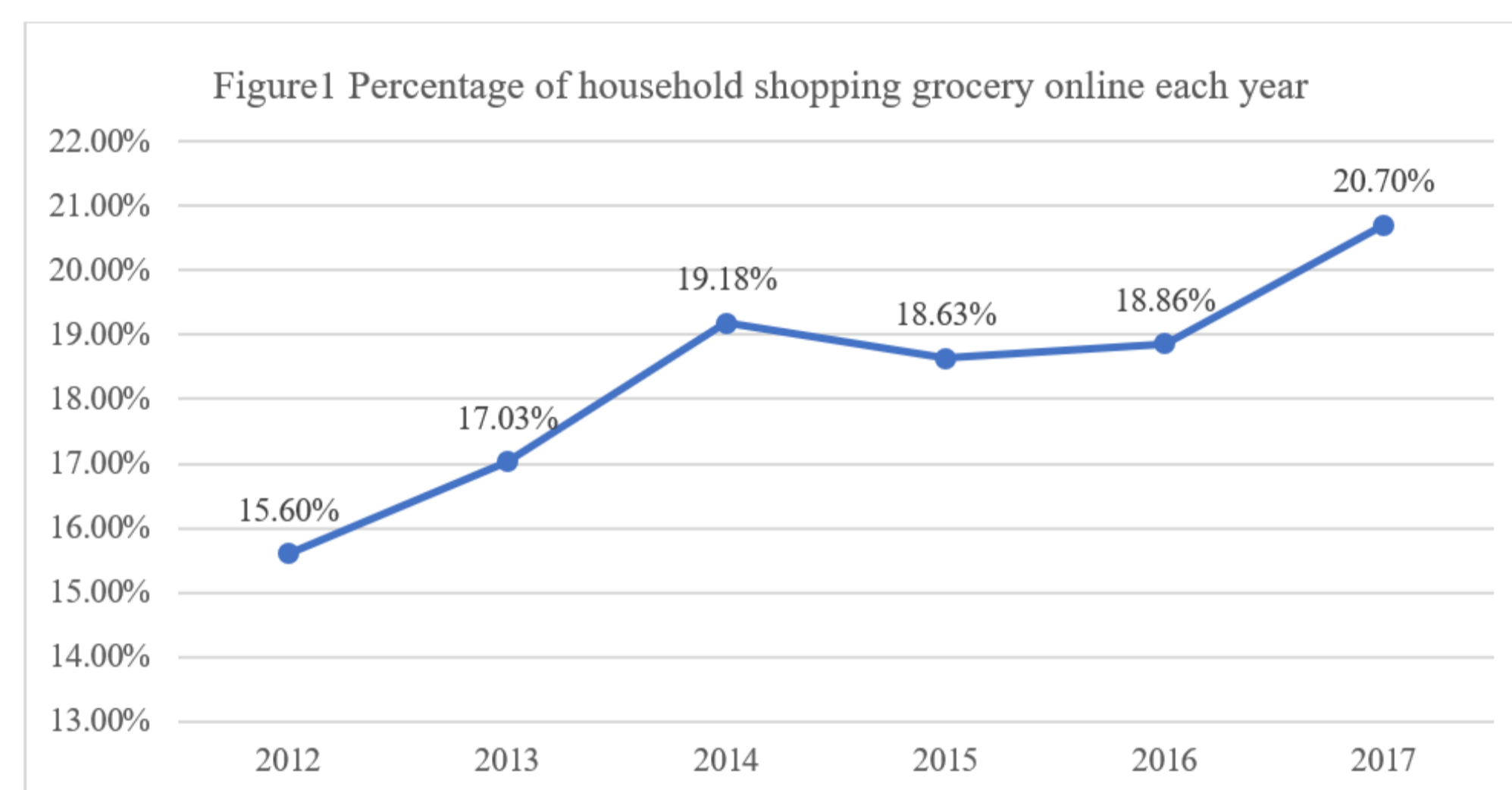
Food Environment, Diet Quality and Online Grocery Shopping

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Background

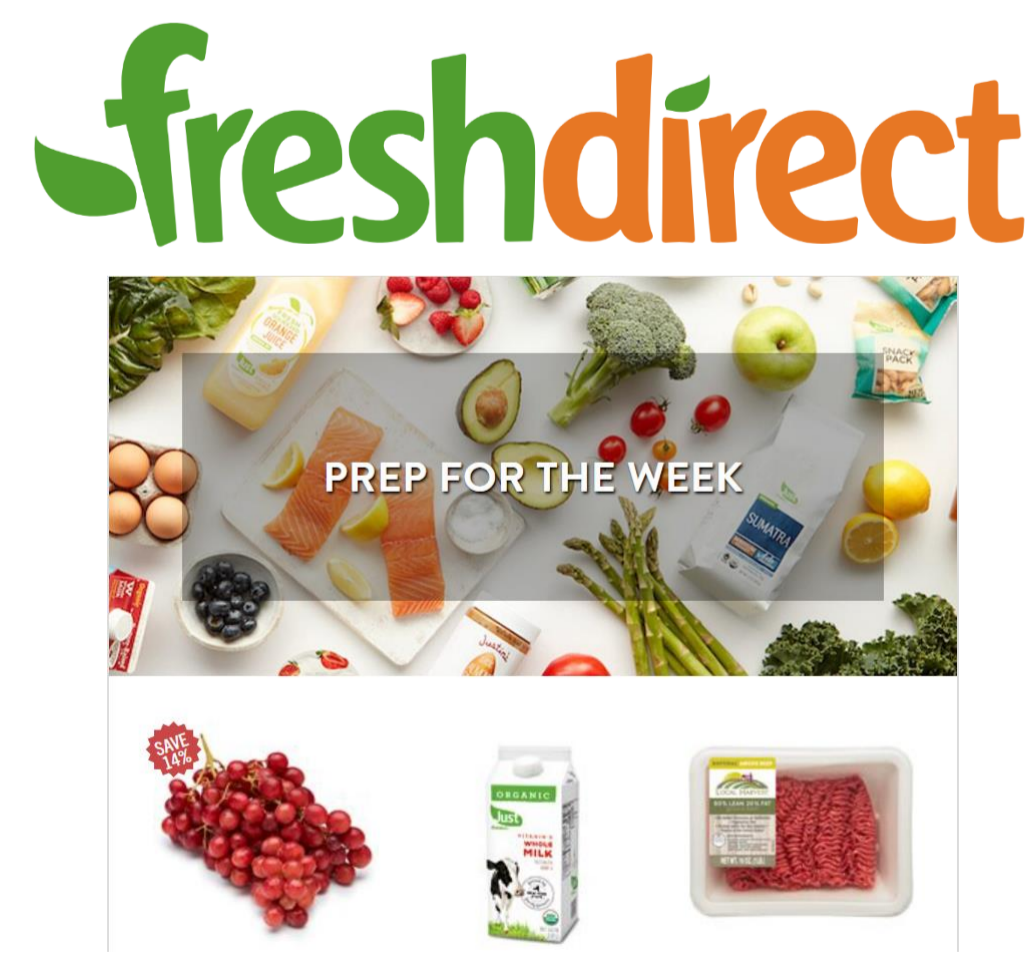
- Food environment plays an important role in diet quality, and limited access to fresh food might cause health related issues.
- Many people in the U.S. live in neighborhoods with limited access to fresh food.
- Many proposed to policy to address the issue, and Online grocery shopping may offer a new alternative.



Data source: Nielsen Consumer Panel Data

Research Question

- What's the impact of food environment on online grocery shopping decision?
- What's the effect of food environment on overall diet quality? Does online grocery shopping help mitigate the impacts caused by the differences in healthy food supply?



- Understanding the relationship between food environment and online grocery shopping and the cross influence on diet quality sheds light on the policy aimed to mitigate nutrition inequality.

Methodology

We first estimate the logit model (1) and then use the subsample of households that have shopped grocery online in model (2):

$$onl = \alpha ENV + \beta X + \varepsilon \quad (1)$$

$$freq = \alpha ENV + \beta X + \varepsilon \quad (2)$$

We then use conditional quantile regression to estimate the effect of online Grocery frequency on total grocery expenditure share of each category.

$$Q_q(Share_{tt}) = \alpha_q ENV + \lambda_q ENV * freq + \theta_q X + \varepsilon \quad (3)$$

Where *onl* is binary variable indicating if a household purchased grocery online in a year. *freq* is the frequency of online grocery shopping. *ENV* includes Total store number and Food Store Share. *Q_q* indicates the quantile *q* from 10%, 20%... to 90%. *Share_{tt}* is the expenditure share for each food category over total grocery expenditure.

Data

Table 1 Summary Statistics of Main Variables

Variable	Mean	Std. Dev.
Online shopping behavior		
Online shopping	0.4470	0.4972
Online shopping Frequency	3.3611	9.4972
Total Expenditure	7362	4337
Online Shopping Expenditure	225	737
Online Grocery shopping	0.1885	0.3911
Online Grocery shopping Frequency	0.7338	3.3893
Total Grocery Expenditure	3243	1831
Online Grocery Shopping Expenditure	27	183
Food environment		
Food Store Number	26.8283	49.1611
Total Store Number	91.1729	129.0221
Food Store Share	25.5395	17.5456

Results

Table 2 Effects of Food Environment on Online Grocery Shopping Behavior

VARIABLES	online grocery shopping decision	online grocery shopping frequency
Total store number	0.0005*** (0.0001)	0.0011 (0.0007)
Food Store Share	-0.0019** (0.0008)	-0.0062 (0.0056)
Inincome	0.0202 (0.0158)	-0.2804*** (0.1064)
marry	-0.0928*** (0.0198)	-0.4410*** (0.1264)
have children under 18	-0.2918*** (0.0211)	-0.6565*** (0.1230)
college	0.1513*** (0.0208)	-0.0579 (0.1391)
Black/African American	0.0642** (0.0285)	-0.1533 (0.2044)
Asian	0.1338*** (0.0459)	-0.5518** (0.2387)
Other races	0.0452 (0.0427)	-0.1389 (0.2918)
hispanic_origin	-0.0443 (0.0381)	-0.2461 (0.2597)
internet access	0.3748*** (0.0435)	0.5270* (0.2711)
Constant	-2.2152*** (0.2188)	7.0975*** (1.3284)
Observations	118,449	22,268
R-squared		0.0257
DMA FE	YES	YES
Year FE	YES	YES

Table 3 Online Grocery Shopping Frequency on Impact of Food Environment on Household Total Diet Basket

		OLS	q10	q20	q30	q40	q50	q60	q70	q80	q90
VEGETABLE	Food Store Share	0.0043* (0.0023)	0.0021* (0.0012)	0.0038** (0.0016)	0.0051*** (0.0017)	0.0064*** (0.0020)	0.0070*** (0.0022)	0.0055** (0.0025)	0.0053* (0.0029)	0.0034 (0.0037)	0.0086* (0.0052)
	Food Store Share # online grocery shopping frequency	-0.0003** (0.0001)	-0.0002*** (0.0001)	-0.0004*** (0.0001)	-0.0003*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0002 (0.0001)	-0.0003* (0.0002)	-0.0002 (0.0002)	-0.0003 (0.0003)
FRUIT	Food Store Share	0.0061** (0.0027)	0.0030** (0.0013)	0.0050*** (0.0016)	0.0059*** (0.0018)	0.0077*** (0.0023)	0.0064** (0.0025)	0.0061** (0.0030)	0.0061 (0.0038)	0.0070* (0.0042)	0.0020 (0.0063)
	Food Store Share # online grocery shopping frequency	-0.0003* (0.0002)	-0.0001 (0.0001)	-0.0003*** (0.0001)	-0.0004*** (0.0001)	-0.0005*** (0.0001)	-0.0004*** (0.0001)	-0.0003 (0.0002)	-0.0003 (0.0002)	-0.0002 (0.0002)	-0.0002 (0.0004)
SNACKS	Food Store Share	-0.0033 (0.0041)	-0.0018 (0.0034)	0.0013 (0.0032)	0.0027 (0.0034)	0.0025 (0.0036)	0.0009 (0.0038)	0.0004 (0.0042)	-0.0045 (0.0050)	-0.0103* (0.0062)	-0.0105 (0.0093)
	Food Store Share # online grocery shopping frequency	0.0003 (0.0003)	-0.0004** (0.0002)	-0.0005** (0.0002)	-0.0003* (0.0002)	-0.0000 (0.0002)	-0.0002 (0.0002)	-0.0000 (0.0002)	0.0000 (0.0003)	0.0004 (0.0004)	0.0012** (0.0005)
	Observations	22,268	22,268	22,268	22,268	22,268	22,268	22,268	22,268	22,268	22,268
	Demographic FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	DMA FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Discussion and Conclusion

- Household are more likely to purchase grocery online with larger number of total stores. In the areas with more food stores, households are less likely to substitute from shopping grocery offline to online.
- Food environment have different effects on total diet basket for different quantiles.
- The online grocery shopping help mitigate the nutrition inequality caused by the food environment. The mitigation effects only works for lower quantile household.

Future Plan

- Identifying the mover sample to eliminate at least some endogeneity issues of food environment.
- Including households' heterogeneity into the model.

Statements:

- Researcher(s) own analyses calculated (or derived) based in part on data from The Nielsen Company (US), LLC and marketing databases provided through the Nielsen Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business.
- The conclusions drawn from the Nielsen data are those of the researcher(s) and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.
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