Food Quality and Preference 143 (2026) 105931

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Effects of adding plant-based menu options on meat selection frequency: A randomized controlled experiment

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ARTICLE INFO

Keywords:
Meat analogue
Chicken
Plant-based
Menu
Hypothetical choice
Choice architecture

ABSTRACT

Decreasing meat consumption is a critical element of the EAT-Lancet directive to improve human and planetary health, but scalable, effective solutions remain elusive. Plant-based meat analogues are lauded as a promising approach, but their impact on meat demand remains unknown. We tested whether increasing the number of meat analogues on a restaurant menu would decrease meat selection, as well as whether offering a novel chicken-like meat analogue would specifically decrease chicken selection. In a preregistered, randomized, controlled experiment, 4431 English-fluent adults in the U.S. viewed different versions of the menu from Chipotle. Participants in the three arms were shown a Chipotle menu with the pre-existing meat analogue option, "sofritas", removed (0 meat analogues); the standard Chipotle menu (1 meat analogue); or the menu with an added, fictitious, meat analogue, "chick'nitas" (2 meat analogues). Adding one or two meat analogues to the menu did not meaningfully reduce the proportion of participants selecting animal-based meat. Offering one meat analogue versus none produced only a 1.14 percentage point (pp) decrease in meat selection (95% CI [−1.02, 3.30], $P = .30$). For two meat analogues versus none, the estimated decrease was a negligible 2.14 pp. (95% CI [−0.08, 4.36], $P = .06$). However, availability of a chicken meat analogue slightly reduced demand for chicken specifically by −3.65 pp. (95% CI [−7.16, −0.15], $P = .04$). Our findings do not support the hypothesis that expanding meat analogue offerings alone can meaningfully shift consumer choices away from meat.

1. Introduction

Human consumption of animal meat is directly related to air and water pollution, global pandemic risk, reduced antimicrobial efficacy, chronic disease, climate change, and animal suffering (Poore & Nemecek, 2018; Scherer, Behrens, & Tukker, 2019; Willett et al., 2019). Plant-based meat analogues are defined here as plant-based foods introduced over the past few decades that are designed to closely mimic meat. Examples include Impossible Burgers and Field Roast sausages. Meat analogues are distinct from tofu, tempeh, mushrooms, and other vegan foods that have been eaten globally for millennia. Developing and promoting meat analogues is widely considered to be a promising avenue of behavioral change (Szenderák, Fróna, & Rákos, 2022). For example, the United Nations encourages governments to invest public money in the production of meat analogues as a solution to hunger and climate change (United Nations Environment Programme, 2024). In the past decade, private investors have invested $10.5 billion in meat analogue development (Good Food Institute, 2025). This study then aims to test the impact of adding meat analogues to restaurant menus.

While extant meat analogue research has focused on beef (Carlsson, Kataria, & Lampi, 2022; Jahn, Guhl, & Erhard, 2024; Van Loo, Caputo, & Lusk, 2020), our study includes a chicken-like meat analogue designed to reduce chicken consumption specifically. The vast majority of terrestrial animals eaten by humans are chickens (Striffler, 2005): by weight, chicken is the most popular meat of a terrestrial animal, and by headcount, farmed chickens vastly outnumber cows, about 76 billion compared to 300 million (Food and Agriculture Organization of the United Nations, 2024). Although chicken meat is often considered more environmentally sustainable than beef (Clark & Tilman, 2017), its climate impact still significantly exceeds plant-based options. Moreover, industrial scale chicken farming creates significant physical, chemical, and microbial contamination of local water, air, and soil (Gržinić et al., 2023); expedites our global antimicrobial resistance crisis (Kousar et al., 2021); and elevates risks of zoonotic outbreaks due to the cramped conditions under which chickens are typically raised (Jones et al., 2013).

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https://doi.org/10.1016/j.foodqual.2026.105931
Received 9 December 2025; Received in revised form 13 March 2026; Accepted 3 April 2026
Available online 12 April 2026

1.1. Background

Commercial meat analogue introductions have not always been successful. On multiple occasions over the past 15 years, Chipotle briefly offered and then discontinued a plant-based chorizo (Shah, 2015; Rich, 2021; Dawn, 2017; Chipotle, 2022; Flink, 2025); KFC experimented with Beyond Fried Chicken (Luna, 2020); and McDonald's withdrew their McPlant Burger less than a year after it began testing its market viability in the United States (Ruggless, 2022). However, McDonald's has kept the McPlant Burger on the menu in multiple cities in Europe, and in 2024 introduced a chicken-like meat analogue called Veggie McPlant (chicken) Nuggets in Germany and France (Beyond., 2024; Darmiento., 2024).

The evidence from the literature is similarly mixed. Most generally, quasi-experiments increasing the availability of *any* plant-based or meatless option—rather than meat analogues specifically—in restaurant or dining hall settings have found decreases in meat selection (Garnett, Balmford, Sandbrook, Pilling, & Marteau, 2019; Parkin & Attwood, 2021; Pechey, Bateman, Cook, & Jebb, 2022), which are corroborated in observational studies (Brachem, Krüdewagen, & Hagmayer, 2019; Edwards, Ondish, & Neff, 2025). Focusing on the introduction of meat analogues specifically, observational and semi-experimental studies have found limited or no impact on meat purchase in grocery stores (Neuhofer & Lusk, 2022; Cuffey, Chenarides, Li, & Zhao, 2022; Tonsor, Lusk, & Schroeder, 2023; Meyer, Freitas-Groff, & Woolley, 2024). Further focusing on studies of the availability of meat analogues that emulate the taste and match the price of animal-based meat, one quasi-experiment in a college dining hall found modest reductions in meat consumption (Malan et al., 2022), which are again corroborated by observational studies finding that well under half of current consumers would choose such a meat analogue (Peacock, 2026). Finally, a few studies test the effects of providing meat analogues at home at no cost to the consumer, finding small but enduring changes to consumer diets (Bianchi et al., 2022; Maya, Wilderspin, Costa, Cunha, & Roos, 2024). However, these interventions are inherently costly to scale and do not directly address whether consumers will opt to try meat analogues when made available for purchase.

In summary, increasing the number of plant-based options generally on menus tends to reduce meat consumption, although the effects are relatively small. This small effect may be replicated when adding meat analogues specifically to a menu and when provisioning them directly to consumers. Meanwhile, meat analogue availability in grocery store settings does not seem effective thus far. We aim to extend the current literature to test a novel chicken-specific meat analogue as well as a non-specific meat analogue that is already familiar to consumers in a restaurant setting. Methodologically, we aim to improve on previous work by using randomization, blinding to reduce demand effects, a large sample to detect expected small effects, and emulating an existing restaurant's online ordering experience to maximize external validity.

1.2. Putative mechanisms

Increased availability of meat analogues on a menu might reduce meat consumption through several mechanisms. First, under a rational choice model of behavior, additional options may simply provide a preferable plant-based option (Bernard & Schulze, 2005); possibly, some consumers do not care for currently available meat analogues and are interested in trying novel options for their own sake. Second, consumers might be attracted to a meat analogue option specifically because it matches an animal product in price and sensory experience, while offering perceived health or environmental benefits (Andreani et al., 2023; Szenderák et al., 2022). Third, increasing the amount of visual space occupied by plant-based options could make them more salient to consumers (Bordalo, Gennaioli, & Shleifer, 2022), leading to further attention and more likely selection. Fourth, consumers may infer some degree of social normativity and social proof from availability (Raghoebar, Van Kleef, & De Vet, 2020), thus encouraging further selection of meat analogues. While our experiment does not distinguish between these potential mechanisms, they collectively suggest many plausible reasons to expect increased meat analogue availability to decrease meat consumption.

2. Methods

2.1. Participants and recruitment

Adults fluent in English and residing in the U.S. were recruited, enrolled immediately, and compensated via the online research platform Prolific (Peer, 2024) between January 24th and 30th, 2025. To reduce participant awareness of the study's purpose, which can contribute to social desirability bias, eligible participants were told the study was about "consumer choices," rather than meat consumption. Subjects participated in informed consent and were instructed to make purchasing decisions as if they would immediately receive the products they selected. There was no direct communication between study staff and participants until study completion; anonymity was maintained throughout.

2.2. Experimental procedure

In each arm of this between-subjects, three-armed, randomized, controlled experiment, participants were asked to place an online taco order. The menu was familiar to many participants: we duplicated the menu used by Chipotle, the third largest restaurant chain in the world (Reiff, Rasure, & Schmitt, 2025). Neither the public nor the participants were involved in designing or reporting the study, as there was negligible risk of harm.

Participants were randomly assigned to one of three arms (Fig. 1), which differed only in the number of vegetarian menu options. Participants had equal probability of being assigned to each treatment arm; assignment was executed by REDCap (Harris et al., 2009). The Status Quo Arm duplicated Chipotle's menu (Supplemental Fig. 1), which included their proprietary meat analogue "sofritas", a tofu-based dish with a texture somewhere between chorizo, scrambled eggs, and ground meat (Reddit contributors, 2022); as well as a filling choice which they describe only as "veggie (includes guacamole)". Thus, participants in this arm had the same two non-meat options available to real Chipotle diners. The No-MA Arm kept the veggie option but removed sofritas, which mimicked the conditions at many restaurants where the vegetarian options contain less protein than the meat options. The Chick'nitas Arm kept the sofritas and veggie options, and added a fictional meat analogue designated "chick'nitas", giving participants three nonmeat options including two meat analogues (Fig. 2).[1] We created this fictional meat analogue, rather than existing options such as Impossible or Beyond Meat, to better approximate the effects of introducing a novel product unfamiliar to consumers, and to test whether specific substitution for chicken would occur.

Chick'nitas was assigned 150 cal to conform to the modal caloric total listed on Chipotle's actual menu (Chipotle, 2025).[1c] Similarly, we maintained price parity between chicken and chick'nitas, and achieved appearance parity by utilizing a photograph of chicken meat for the chick'nitas image.

The experiment included four modules. The first was a set of online shopping tasks, each involving multiple decisions about product attributes: purchasing shirts (size, fabric, and color), pens (color, point size, and paper), and tacos (filling, tortilla, toppings, and beverage). The non-tacos tasks were decoys intended to further reduce participant

[1] Careful readers of Figure 2, or of Chipotle's online taco menu, will note a surprising anomaly: it states that their "Veggie: Includes Guacamole" tacos contain zero calories (Chipotle, 2025).

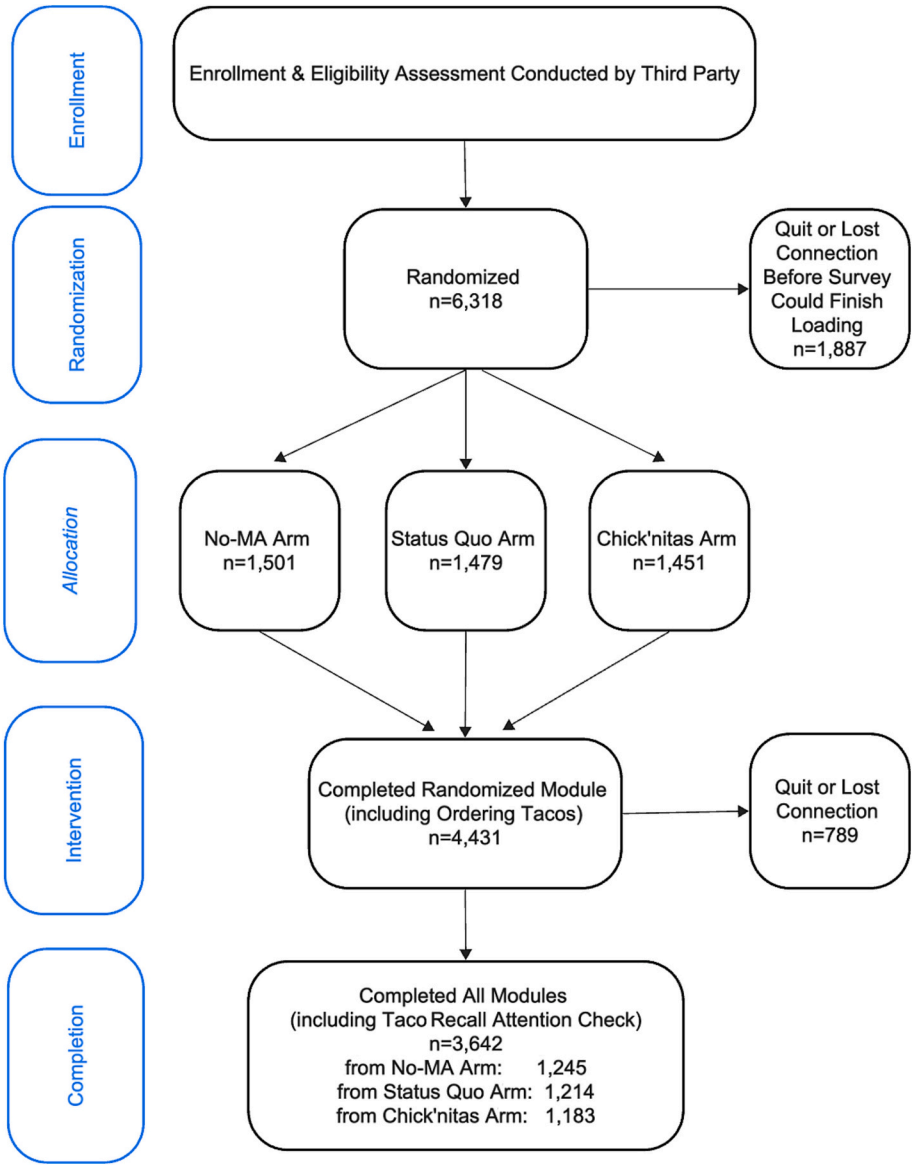

Fig. 1. Participant flow.

awareness of the experiment's purpose. The order of these three tasks was randomized.

The second module asked participants to answer an awareness check and provide their birth year, state of residence, and gender. The awareness check asked "What's your best guess as to the purpose of this study?" and offered 8 choices in an order randomized for each participant. For example, a participant might be assigned to see the modules in the following order: 1) Learning whether older people are more likely to select high calorie toppings, 2) Learning how color preference relates to food preference, 3) Learning how plant-based protein options affect the foods people choose, 4) Learning whether people's shirt preferences are related to their food preferences, 5) Learning how solid color options affect the shirts people choose, 6) Learning how fine-point pen options affect the type of paper people choose, 7) Learning how many color options to provide across different products, or 8) Learning how t-shirt size is related to beverage preference. This awareness check permitted us to assess the efficacy of blinding the participants to the study's purpose; if successful, this would presumably mitigate demand effect.

The third module solicited county of residence, highest education level, ethnicity, political party, frequency of Chipotle restaurant patronage, and answers to standard food frequency questions. The first attention check was embedded within the food frequency questionnaire, where participants were directed to select a specific response instead of answering a question normally. The fourth module served as a second attention check: it asked participants to recall what kind of taco filling they ordered in the first module. Participants could not navigate back to previous modules.

Our experiment was designed to build upon past work in four ways. First, we recruited participants without screening for existing dietary habits, from across the U.S., and of all ages, education levels, and political affiliations. Second, we randomly assigned participants to treatment groups. Third, the large sample size (4431 people) resulted in narrow confidence intervals for our main effects. Fourth, achieving price- and appearance-parity allowed us to reduce the number of intervening variables in testing consumer interest in a chicken meat analogue.

2.3. Hypotheses

Our primary hypothesis (H1) was that more plant-based options would lead to decreased meat selection and that this relationship would be monotonic (i.e. that having three plant-based options would reduce

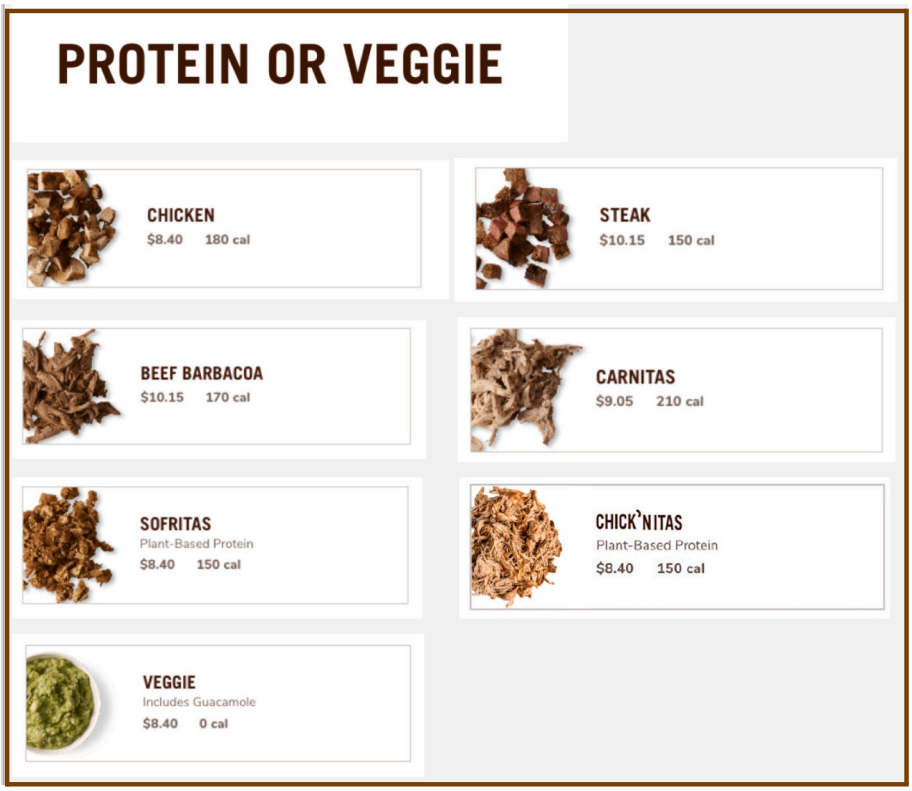

Fig. 2. Menu used in the chick'nitas arm.

meat selection more than having two plant-based options). Our second hypothesis (H2) was that a chicken meat analogue would displace chicken meat specifically. Additionally, we preregistered sub-hypotheses of these, as well as exploratory hypotheses about underlying propensities for choosing meat or chicken meat and about heterogeneous treatment effects (see Supplement).

2.4. Measures

Our primary dependent variable was taco filling selection: chicken, steak, beef barbacoa, carnitas, vegetables and guacamole, sofritas, chick'nitas, no protein, or no taco at all. By design, not all meat analogue options were available to all participants. For H1, we collapsed these into a binary outcome of either meat or plant-based taco filling. For H2, we broke the meat category down further to compare chicken to all other categories of meat.

See our codebook in the supplementary materials for a full list of demographic, preference, and habit questions included in the survey. These items were included for secondary analyses that attempted to replicate preponderant results, investigated effect moderation by participant characteristics, and provided robustness checks.

2.5. Sample size determination

To determine our sample size, we first decided that our smallest effect size of interest (Anvari & Lakens, 2021) is a 5 percentage point (pp) reduction in selection of animal-based meats between arms. One industry calculation states that, in the case of adding a seventh item to a menu, reaching at least 10% of total sales in that item's category would be considered market success (BC Cook Articulation Committee, 2015). We started with this figure and then adjusted downward to be more conservative. Second, we aimed to power our study appropriately for our lowest-powered tests (those involving comparisons between two arms rather than three). We then simulated five scenarios that modeled a 5 pp. shift from chicken to plant-based options (treatment 2 compared to treatment 1), with each scenario reflecting different assumptions about participants' choice distributions. After iteratively testing the power of various scenarios and sample sizes at the 5 pp. change threshold, we determined that a sample size of 1300 subjects per treatment arm (3900 total) would provide an estimated power of 87.72% across all simulations. Specifically, 87.72% of the simulated 95% confidence intervals excluded 0 when centered on an effect size of a 5% change, with an average confidence interval width of 0.0698 pp. This sample size was also feasible for our research budget.

2.6. Statistical analysis

We used two-sided hypothesis tests, which is conservative given that our hypotheses were directional. Our models were linear probability models fit via ordinary least squares (OLS) with heteroskedasticity-consistent robust standard errors (HC0) to account for the binary outcome. To test whether adding chick'nitas would have a stronger effect on reducing chicken meat selection than on reducing other meat selections (H2b), we calculated bias-corrected and accelerated bootstrapped confidence intervals (Wicklin, 2017) to conduct precision-based sampling (Ford, 2023). This was because that hypothesis tests a difference between two coefficients estimated from separate statistical models, where the standard error of the difference does not have a known closed-form solution.

3. Results

3.1. Primary analyses

Sample sizes and participant characteristics were balanced across study arms, as described in Table 1.

Demand for meat analogues drew primarily from demand for other plant-based options. In the No-MA Arm, 90.65% of participants selected

Table 1
Participant characteristics.

	TOTAL[a] (n = 3642)	No-MA Arm (n = 1245)	Status Quo Arm (n = 1214)	Chick'nitas Arm (n = 1183)
Gender				
Female	2092 (57%)	719 (58%)	676 (56%)	697 (59%)
Male	1506 (41%)	511 (41%)	526 (43%)	469 (40%)
Other	44(1%)	15(1%)	12(1%)	17(1%)
Age (years)				
18–34	1483 (41%)	507 (41%)	494 (41%)	482 (41%)
35–49	1262 (35%)	428 (34%)	420 (35%)	414 (35%)
50–64	695 (19%)	233 (19%)	232 (19%)	230 (19%)
>64	202 (6%)	77 (6%)	68 (6%)	57 (5%)
Ethnicities[b]				
Caucasian	2484 (68%)	849 (68%)	829 (68%)	806 (68%)
Black/African American	629 (17%)	225 (18%)	201 (17%)	203 (17%)
Hispanic	316 (9%)	104 (8%)	113(9%)	99(8%)
East/South/S.E. Asian	275 (8%)	92 (7%)	91 (7%)	92(8%)
Native American	82 (2%)	29 (2%)	25 (2%)	28(2%)
Other	93 (3%)	28 (2%)	31 (3%)	34(3%)
Political Party				
Democrat	1250 (34%)	423 (34%)	420 (35%)	407 (34%)
Independent	1105 (30%)	353 (28%)	392 (32%)	360 (30%)
Republican	1058 (29%)	381 (31%)	332 (27%)	345 (29%)
Other/Decline to Answer	229(6%)	88(7%)	70(6%)	71(6%)
MA/Tofu Consumption Frequency in Past Week				
Zero	2393 (66%)	805 (65%)	817 (67%)	771 (65%)
Once or twice	808 (22%)	282 (23%)	266 (22%)	260 (22%)
3–4 times	204(6%)	70(6%)	58(5%)	76(6%)
5–6 times	142(4%)	50(4%)	44(4%)	48(4%)
>6 times	95(3%)	38(3%)	29(2%)	28(2%)
Education				
High school or less	493 (14%)	144 (12%)	187 (15%)	162 (14%)
Some college/2 yr degree	1071 (29%)	361 (29%)	362 (30%)	348 (29%)
4 years of college	1416 (39%)	513 (41%)	453 (37%)	450 (38%)
>4 years of college	662 (18%)	227 (18%)	212 (17%)	223 (19%)

[a] Table 1 describes the participants who answered every question in the experiment, including all demographic and food frequency questions. As preregistered, our main hypothesis tests are run on the group who completed the first module (n = 4431), to maximize statistical power. (For details, see Secondary Analyses below, and Appendix.)
[b] Participants could select multiple ethnicities.

Table 2
Taco Filling Choice by Treatment Arm (n = 4431).

	No Meat Analogue Arm (n = 1501)	Status Quo Arm (n = 1479)	Chick'nitas Arm (n = 1451)
Chicken	613 (40.8%)	580 (39.2%)	516 (35.6%)
Steak	412 (27.4%)	411 (27.8%)	434 (29.9%)
Beef Barbacoa	184 (12.3%)	185 (12.5%)	182 (12.5%)
Carnitas	129 (8.6%)	138 (9.3%)	139 (9.6%)
Veggie	138 (9.2%)	98 (6.6%)	83 (5.7%)
Sofritas	NA	56 (3.8%)	40 (2.8%)
Chick'nitas	NA	NA	42 (2.9%)
Declined to order	25(1.7%)	11 (0.7%)	15 (1.0%)
Aggregated			
Meat	1338 (89.1%)	1314 (88.8%)	1271 (87.6%)
Non-meat	138 (9.2%)	154 (10.4%)	165 (11.4%)

Note: The sample for this table is all participants who completed the taco question (not only those who filled out all demographic information).

meat, and this percentage did not drop dramatically as meat analogues were added (see Table 2 and Fig. 3).

Recall that our primary hypothesis held that adding more plant-based options will lead to more plant-based choices. This comprised 4 sub-hypotheses H1a-H1d (Supplement), none of which our data supported. When we tested the hypothesis that the proportion of participants selecting any animal-based meat will decrease when presented with one meat analogue versus none, we did not detect a meaningful difference in meat selection (−1.14 pp., 95% CI [−3.30, 1.02], P = .30). Two meat analogues versus none also did not meaningfully change meat selection (−2.14 pp., 95% CI [−4.36, 0.08], P = .06).

Each additional meat analogue did not meaningfully affect demand for meat (−1.07 pp., 95% CI [−2.18, 0.04], P = .06). There was a statistically significant but substantively small reduction in selection of the non-MA plant-based options (−1.74 pp., 95% CI [−2.69, −0.80], P = .0003). Finally, when comparing the two meat analogue arms combined to the No-MA Arm, we found that participants offered meat analogues did not choose meat meaningfully less often than those who were not (−1.64 pp., 95% CI [−3.50, 0.24], P = .09).

We find mixed support for our secondary hypothesis, which states that a chicken meat analogue will be most effective at reducing demand for chicken versus other meats. We find that offering chick'nitas as a second meat analogue slightly reduced demand for chicken by −3.65 pp. (95% CI [−7.16, −0.15], P = .04) relative to offering sofritas as the only meat analogue. This was not significant after correcting for multiple comparisons.

Additionally, we subtracted the difference in selection of all other meats (carnitas, steak, and beef barbacoa) from the difference in selection of chicken between the Chick'nitas Arm and the Status Quo Arm. This difference-in-difference estimate was a − 6.05 pp. shift in consumption (95% CI [−12.58, 0.73]). This modest, nonsignificant effect was driven by an increase in demand for non-chicken meat options between the Status Quo and Chick'nitas Arms (see Supplement Table 1).

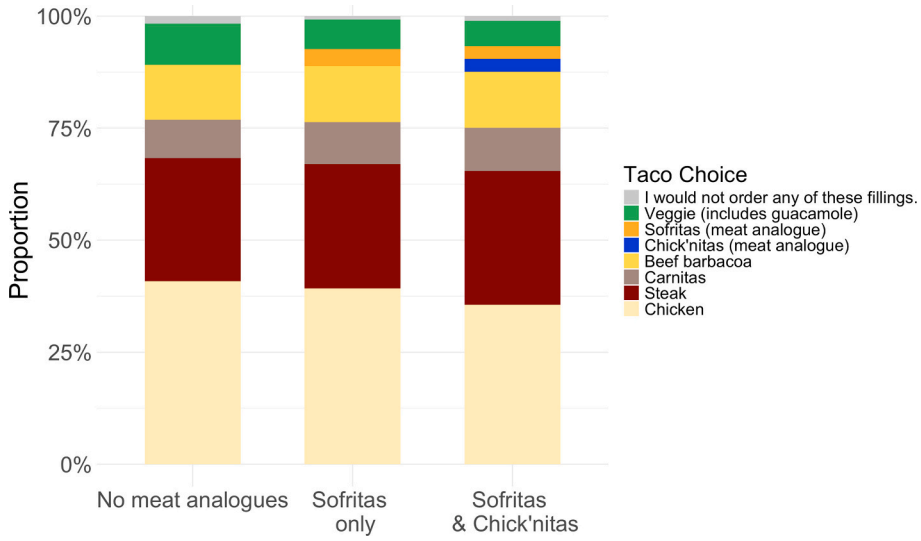

Fig. 3. Taco filling choice by treatment arm.

3.2. Secondary analyses

3.2.1. Replicating canonical associations

Our preregistered secondary analyses checked for strong predictors of meat selection, regardless of treatment assignment. We found that males, Republicans, people without a four-year college degree, and people who ate more than nine servings of meat per week were all more likely to select a meat-based taco filling compared to the specified baseline categories (see Supplement Table 3).

Also as expected, there was a strong relationship between self-reported ordering of meat analogues in the past week with not choosing a meat-based taco filling ($\beta = -0.046$, $P < .001$). One surprising finding was that each additional decade of reported age was associated with a − 1.5 pp. change in meat selection (95% CI [−2.2, −0.76]).

Of participants who selected a meat analogue, 65% reported having eaten beef, poultry, or fish in the past week, i.e. do not appear to eat vegetarian.

3.2.2. Missing data and attrition

Before the outcome variable was measured, many participants were disconnected from the server due to a university-wide REDCap server glitch. After the outcome variable was measured, there was limited attrition, although some participants did drop out of the study while loading or completing the demographic and food frequency questionnaire page. Attrition by people who completed the first module but not all of the modules was virtually equivalent across all three arms (17.1% in No-MA Arm, 17.9% in Status Quo Arm, and 18.5% in Chick'nitas Arm). See Supplement, especially Table 4, for further discussion, including sensitivity analyses and attention checks (Supplement Table 2).

3.2.3. Block order

The order in which the blocks of decoy questions and the taco questions appeared was randomized for each study participant. We found no effect of block order on purchasing decisions: no effect sizes met our pre-specified threshold of 5 pp. change (see Supplement).

3.2.4. Heterogeneity of dietary patterns

In response to a helpful comment from a reviewer, we looked for heterogeneous effect sizes based on self-reported consumption in the past week. We classified participants into three groups using food frequency questionnaire responses: regular meat eaters (7 or more combined weekly servings of beef, pork, chicken, and fish, i.e. those who eat meat on average once a day more; $n = 2907$, 65.6%), less frequent meat eaters (1–6 combined weekly servings; $n = 1338$, 30.2%), and those reporting zero servings of beef, pork, and chicken in the past week, including people who never eat meat ($n = 186$, 4.2%). Baseline meat selection rates confirmed the classification captured meaningful behavioral variation: 94.9% of regular meat eaters selected a meat option, versus 10.7% of those reporting no recent meat consumption.

Treatment effects were small and in the expected direction across all three groups. Among regular meat eaters, each additional meat analogue reduced meat selection by 1.0 percentage points (95% CI: [−2.00, −0.01], $p = .047$); among less frequent meat eaters the effect was 1.1 pp. (95% CI: [−3.22, 0.96], $p = .29$); and among those reporting no recent meat consumption it was 0.1 pp. (95% CI: [−6.04, 5.86], $p = .98$).

4. Discussion

4.1. Main findings

Adding one or more plant-based meat analogues to a Chipotle menu did not meaningfully decrease the proportion of consumers choosing meat. Even when a chicken meat analogue was added to a menu that already offered a non-specific meat analogue, reduction in chicken selection was not statistically significant after correction for multiple comparisons and was offset by increases in selection of other meats. Total meat consumption remained unchanged; meat analogues primarily replaced demand for other plant-based options.

4.2. Methodological strengths and limitations

Unlike many previous studies (Bianchi, Garnett, Dorsel, Aveyard, & Jebb, 2018; Green, Smith, & Mathur, 2026), ours attempted to minimize social desirability bias and demand effects by blinding participants to the study's purpose. This attempt appears to have been successful, since only 6.6% of participants (6.0% in No-MA Arm, 5.8% in Status Quo Arm, 8.2% in Chick'nitas Arm) correctly identified the purpose of the study as "how plant-based protein options affect the foods people choose" among 8 choices. Thus, participants performed worse than would be expected by randomly guessing the study purpose (12.5%). The three most common responses were "how color preference relates to food preference" (30%), "whether people's shirt preferences are related to their food preferences" (28%), and "how many color options to provide across

different products" (21%).

Our study focused on effects on the general population rather than on consumers who might be most responsive to meat analog availability, such as self-identified flexitarians or reducetarians (Dagevos, 2021). However, consistent with our primary analyses, the intervention also had little effect within any stratum of meat consumption frequency in the past week.

Our experiment estimates only the immediate effect of introducing a plant-based chicken analogue; it does not estimate the long-term dynamics of habituation or dietary transition. However, the dietary impact of an initial, unprompted choice is an important estimand in its own right, as these products are often introduced without special promotion or targeted outreach. The choice to try a novel meat analogue is a valuable precursor to studying long-term dietary shifts.

A strength of our work is that we visually and contextually integrated the chicken meat analogue into the actual menu of a ubiquitous chain restaurant. We examined online ordering behavior instead of live restaurant experiences because of its increasing popularity among consumers (Balagtas, Bryant, & Kilders, 2024) and for budgetary reasons. However, some evidence does suggest that estimates of meat selection from similar study designs coincide with actual meat selection (Brachem et al., 2019). Since attention checks indicated high participant engagement (see Supplement), we conclude that an online survey was a sufficiently robust method of investigation in this case.

Although the external validity of hypothetical food-choice experiments is debatable (Hensher, 2010), our study replicated established findings from the literature, such as women and college-educated people being more likely to select non-meat options (Allès et al., 2017; Hansen, Schilling, & Malthesen, 2021; Rosenfeld & Tomiyama, 2021). This suggests our hypothetical selections may reflect real-world behaviors. Additionally, 3.8% of participants selected sofritas from the status quo Chipotle menu, which is close to the reported 3% of sofritas selections reported in 2015 (Quealy, Cox, & Katz, 2015).

Attrition is presumed to be primarily due to a university-wide server malfunction. Attrition was non-differential across arms, and sensitivity analyses suggested that bias due to missing data would be unlikely to overturn the primary results. However, generalizability may be limited. We used a fictional chicken meat analogue to simulate the introduction of an unfamiliar product, but long-term results could vary based on consumer preference for novelty or familiarity. Also, restaurants often advertise their new menu items, which might influence consumers' selections initially. Meat analogues might also perform differently geographically, e.g. McDonald's McPlant Burger's persistence in Europe.

4.3. Comparison to prior literature and possible mechanisms

Some recent studies have suggested that introducing meat analogues – or more generally increasing the number of vegetarian options – may reduce meat demand (Bianchi et al., 2018; Edwards et al., 2025; Malan et al., 2022; Tonsor et al., 2023). Our contrasting results might reflect our intentionally testing small menu changes typical of restaurant practices, rather than large overhauls. Also, our study concealed the experiment's purpose, mitigating social desirability bias and demand effects, facilitated by avoiding introducing an educational component. Additionally, some studies that increased the number of vegetarian options also decreased the number of meat options, and the latter may be critical to reducing meat demand (Arrazat, Cambriels, Le Noan, Nicklaus, & Marty, 2024; Garnett et al., 2019).

More generally, adding meat analogues may not reduce meat demand for several reasons. Consumers may harbor negative expectations about meat analogues' taste or texture; and individuals not already motivated to avoid meat may find little reason to change, especially if meat analogues are seen as overly processed or misaligned with personal values (Andreani et al., 2023; Jahn et al., 2024). Customers could also be "satisficing" – simply picking the first acceptable or familiar menu item in the face of choice overload (Schwartz, 2004).

4.4. Conclusion and future directions

Despite widespread optimism, simply adding plant-based meat analogues to restaurant menus may not consistently reduce meat selection. Meat analogues remain a potentially valuable tool for transitioning from animal to plant protein in human diets, but our results highlight the need for further research on how to implement this tool – potentially via educational, narrative, or taste-test interventions. Future studies should also examine whether meat analogues should be positioned as replacements for, rather than supplements to, existing meat entrées. To enhance external validity, future research should use non-hypothetical food selection behavior and track downstream compensatory effects such as meat consumption at other meals. Such studies are logistically and financially demanding but would significantly strengthen the evidence base and further our understanding of consumer uptake of meat analogues.

CRediT authorship contribution statement

Jessica E. Hope: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Seth A. Green:** Writing – review & editing, Visualization, Formal analysis, Data curation. **Jacob R. Peacock:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Maya B. Mathur:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization.

Ethical statement

The authors affirm that this research was conducted subsequent to approval by Stanford University's Institutional Review Board, as protocol IRB-75857. Generative artificial intelligence was not utilized in any manner in this work.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Maya B. Mathur reports financial support was provided by Open Philanthropy Project. Maya B. Mathur reports financial support was provided by Plant Based Diet Initiative at Stanford University. Jacob R. Peacock reports a relationship with Food Systems Research Fund that includes: non-financial support. Jacob R. Peacock reports a relationship with New Roots Institute that includes: non-financial support. Jacob R. Peacock reports a relationship with Animal Charity Evaluators that includes: board membership. Maya B. Mathur reports a relationship with Better Food Foundation that includes: non-financial support. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

All persons who have made substantial contributions to the work reported in the manuscript (e.g., technical help, writing and editing assistance, general support), but who do not meet the criteria for authorship, are named in the Acknowledgements and have given us their written permission to be named. If we have not included an Acknowledgements, then that indicates that we have not received substantial contributions from non-authors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2026.105931.

Data availability

Data and code are available at https://github.com/hsflabstanford/tacos-rct.

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