

# Applying Behavioral Science to Agriculture, Food, And Agri-Environmental Policymaking

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*October 17, 2023*

## *Abstract*

This special issue aims to extend the active discourse on applying behavioral science-based tools to policymaking in the fields of food, agriculture, and agri-environmental issues. Papers in this special issue evaluate the impact of behavioral science-based tools to understand their effectiveness and limitations. Additionally, for this introductory paper, we collected and analyzed data from the 91 submissions we received for this special issue to identify knowledge gaps and priorities for future policy research. Our findings show that behavioral interventions have small effect sizes but, when coupled with other policy tools, can have larger effects. We highlight that future research in these areas must aim to overcome the current shortcomings of the literature in terms of the use of hypothetical or low stakes in experiments, the focus on only measuring short-term behavior change, and the general lack of discussion on cost-effectiveness and mechanisms. Furthermore, we found that most behavioral science interventions in these submitted papers focused either on consumers or producers and thus offered little insight into other actors in the supply chain. We argue that a focus on better research practices is needed to improve policy-oriented behavioral science-based research in the future and note that accepted papers in this special issue were more likely to employ these practices. Finally, we offer six insights and recommendations for researchers and practitioners that arise from this special issue.

**Keywords:** Behavioral Science, Nudges, Credibility, Replicability, Food Policy

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## **I. Introduction**

Behavioral science-based tools are now a part of the lexicon of effective policymaking. Behavioral science interventions are generally viewed as less regressive and paternalistic than traditional price-based policies like taxation and may have more appeal to the public. In food policy, researchers have employed behavioral science-based tools to encourage healthier food choices (Zimmerman and Shimoga, 2014), use of sustainable agricultural technologies (Duflo et al., 2011; Shukla et al., 2021), and incentivize agricultural sustainability (Ferraro et al., 2022). Behavioral science-based tools have also been used to examine consumer responses to food policies (Biondi et al., 2020). The growing use and popularity of behavioral science-based tools call for an assessment of the state of their use in the fields of agriculture, food, and agri-environmental policymaking.

Our goal for this special issue on applying behavioral science to agriculture, food, and agri-environmental policy was twofold. First, we aimed to advance our understanding of behavioral tools as applied to actors across the food supply chain, including those that affect agri-environmental outcomes. Second, we wanted to identify the strengths and weaknesses of the literature and offer insights for researchers and practitioners who plan to use behavioral tools in policymaking. In addition to synthesizing results from selected papers, we collected data from all the submissions we received to identify knowledge gaps and priorities for future policy-oriented research.<sup>2</sup>

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<sup>2</sup> Our Pre-Analysis Plan for data collection and analysis is available here: <https://osf.io/audh2/>.

The process of creating this special issue commenced in February 2022 when we invited submissions from scholars who specialized in relevant domains (see Open Call for Papers in Appendix).<sup>3</sup> The scope of the Open Call for Papers was intentionally broad and inclusive. We encouraged the submission of original empirical research, synthesis reviews that brought strands of existing literature together in new ways, meta-analyses of existing published studies, and viewpoint essays that could provide broader views of the field. To highlight our inclusion and exclusion criteria for this special issue, we developed a matrix to clarify what we mean by behavioral science-based interventions in agriculture, food, and agri-environmental policy. The matrix identified the key actors in food systems – from producers to supply chain intermediaries to end consumers – and was designed to facilitate a conceptualization of how insights from various strands of behavioral science could affect each of the actors (see the matrix in the Open Call for Papers in Appendix).

In a testament to the burgeoning interest in this field, we analyzed 91 manuscripts from authors vying for a place in the special issue<sup>4</sup> covering topics related to 74 countries and 12 meta-studies and viewpoint essays on policy issues relevant to multiple countries (see Figure A9 in the Appendix for a map of countries studied in the papers submitted to this special issue). Eleven manuscripts were accepted into this special issue – a 12% acceptance rate, which is not substantially higher than the journal's overall 10.3% acceptance rate over the same January 1, 2022 to September 30,

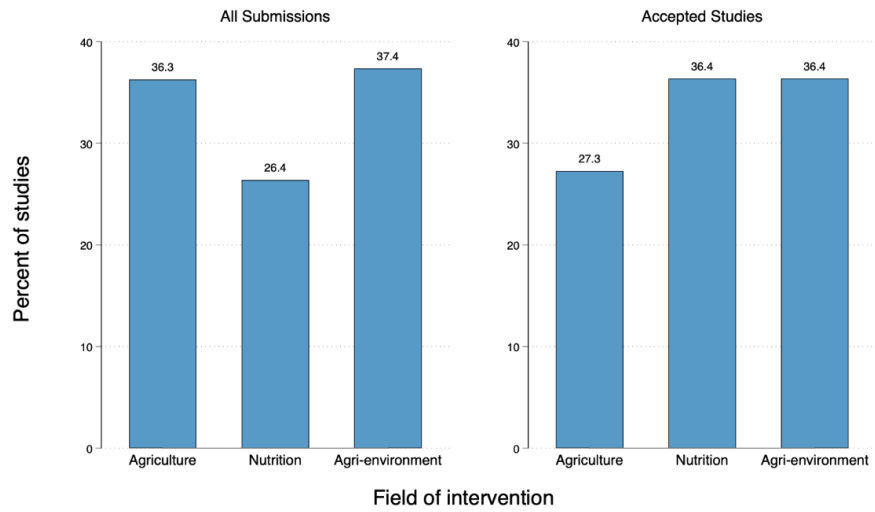
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<sup>3</sup> The initial submission deadline of August 31, 2022, was extended for everyone to September 15, 2022, to accommodate requests from several authors for more time.

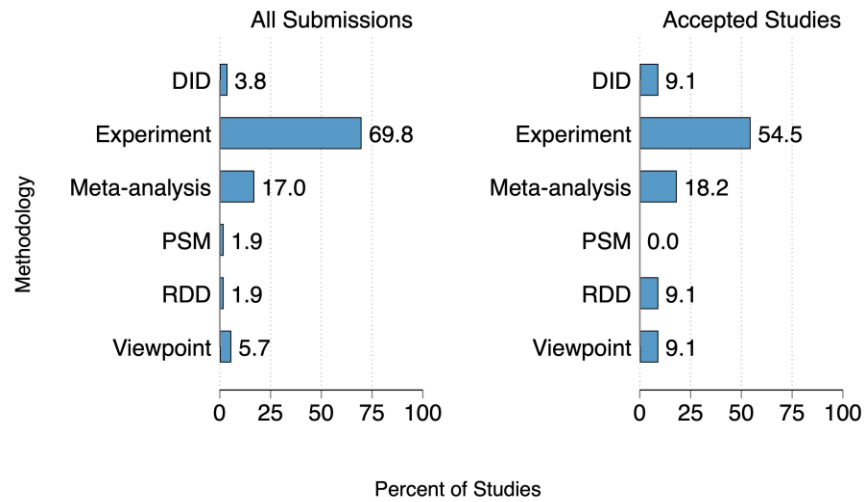
<sup>4</sup> This analysis was constrained to 91 manuscripts that we handled as guest editors or were accepted for this special issue and are now publicly accessible. Three submissions posed potential conflicts of interest for our editorial team. To maintain impartiality and uphold the standards of the review process, those manuscripts were separately managed by Chris Barrett, Co-Editor-in-Chief of *Food Policy*.

2023 period. Among the submitted and accepted papers, 46% report studies in high-income countries, whereas 42% of the submitted and 27% of the accepted papers report studies in low- or middle-income countries (see Figure A10 in the Appendix). Among studies in low- or middle-income countries, 81% of the submitted and 67% of the accepted papers had at least one author affiliated with an institution based in a low or middle-income country (see Figure A11 in the Appendix).

As shown in Figure 1 and in Table A1, the research topics represented in the submissions to this special issue had a balanced distribution across the pivotal areas of interest: agriculture, nutrition, and agri-environmental. As shown in Figure 2, experiment-based studies made up 70% of all submissions and more than half (55%) of the accepted submissions. These include both field experiments (Casati et al. (2023), Kee et al. (2023), Okello et al. (2023), and Raghunathan et al. (2023)) and lab-in-the-field experiments (Barreiro-Hurle et al. (2023), Villacis et al. (2023), and Wallander et al. (2023)). Meta-studies also comprised a considerable proportion of submitted (17%) and accepted papers (18%).



**Figure 1:** Field of Intervention in the Submitted and Accepted Papers for the Special Issue



**Figure 2:** Methodology Used in the Submitted and Accepted Papers of the Special Issue

## II. Insights for Researchers and Practitioners

As noted, our aim was to create a special issue that would equip both researchers and practitioners with an enhanced understanding of available behavioral science applications to devise more effective policies related to food, agriculture, and agri-environmental issues. Table 2 summarizes the findings and policy recommendations of each of the accepted papers. Drawing from our experience of editing this special issue, we offer the following four insights on the effectiveness and limitations of behavioral science-based tools, including knowledge gaps and priorities for future research.

***1. Behavioral science interventions have small effect sizes but, when coupled with other policy tools, can have more substantial effects.*** Benartzi et al. (2017) argue that behavioral science interventions are relatively more effective than traditional policy tools like financial incentives in increasing retirement savings, college enrollments, energy conservation, and vaccine uptake. While behavioral science interventions may be more palatable than traditional market-based policy tools like taxes, papers in this special issue suggest that they may not be more or even equally effective as traditional policy tools in the fields of agriculture, food, and agri-environmental policy. On the contrary, papers in this special issue support findings from recent research that behavioral science-based interventions have small effect sizes (DellaVigna and Linos, 2022) and combining them with traditional price-based tools may enhance their effectiveness (Loewenstein and Chater, 2017; Bhargava et al., 2015). As an example of modest effects of behavioral science tools, Okello et al. (2023) study the impact of social incentives on social learning and technology adoption among farmers in Uganda. They find that farmers' knowledge and uptake of new technology were unaffected by social incentives, and social incentives may have crowded out diffusion effort.

Similarly, Casati et al. (2023) study the effect of carbon labeling on consumer's food choices in Italy and find no immediate effect of exposure to carbon labels but offer evidence that repeated exposure has an effect. However, when combined with traditional policy tools like financial incentives, behavioral science-based interventions can have more substantial effects. For example, in a systematic review, Schruoff-Lim et al. (2023) found limited evidence for the effectiveness of front-of-package nutrition labeling. But the evidence for supporting nutrition labels with financial incentives is promising. Similarly, in a viewpoint essay, Chai et al. (2023) shows the benefits of coupling traditional policy insights with behavioral science tools. They show that insights from production economics can provide opportunities for effective behavioral science-based interventions to encourage optimal nitrogen fertilizer use.

Also of note are findings from Zhu et al. (2023) that show that not all behavioral science interventions are created equal, with some categories of interventions being more effective than others. Using a meta-analysis to study the effectiveness of behavioral science interventions in reducing food waste, they show that behavioral interventions that change the choice architecture (e.g., smaller servings, defaulting consumers to take leftovers, etc.) produce stronger effects than those that aim to reduce the psychic costs of decision making (reminders, information, etc.).

The evidence on the benefits of combining behavioral tools with traditional economic policy instruments suggests a new way forward. We need to move beyond the traditional assumption that economic problems require market interventions and behavioral problems require behavioral interventions. Researchers often assume that traditional economic issues (like market failures) need traditional market-based policy tools (like taxes or subsidies), and behavioral issues (like time

discounting or cultural differences) need behavioral science tools (Loewenstein and Chater, 2017). However, most policy problems are both economic and behavioral problems that require a hybrid intervention of behavioral and traditional economic policy tools. In such cases, traditional economic interventions that are informed by behavioral insights may often be the best policy tool to change behavior. For example, Wang et al. (2023) in this special issue, show that while culture drives systematic behavioral differences in biodiversity conservation among farmers in Switzerland, well-designed monetary incentives can help reduce these differences. In another example of the effectiveness of traditional economic tools like financial incentives to induce behavioral change, Barreiro-Hurle et al. (2023) look at the impact of changes in income support and mandatory agri-environmental contributions on altruistic contributions. They find that increasing mandatory contributions or decreasing unconditional income support reduces altruistic contributions to the environment, the former more than the latter. However, when mandatory contribution increases substantially, it more than offsets the reduction in altruistic contributions, leading to greater total contributions. All these findings point to the idea that the way forward for behavioral science interventions is a greater degree of integration with traditional economic policy tools.

***2. Most of the weaknesses of research on behavioral science-based interventions were also true for the submissions we received.*** Common weaknesses of research in the field of behavioral science include the use of hypothetical or low stakes in experiments, focus on measuring short-term behavior change, and lack of discussion on cost-effectiveness, mechanisms, and ethical issues (Palm-Forster and Messer, 2021). To assess whether these critiques apply to current behavioral

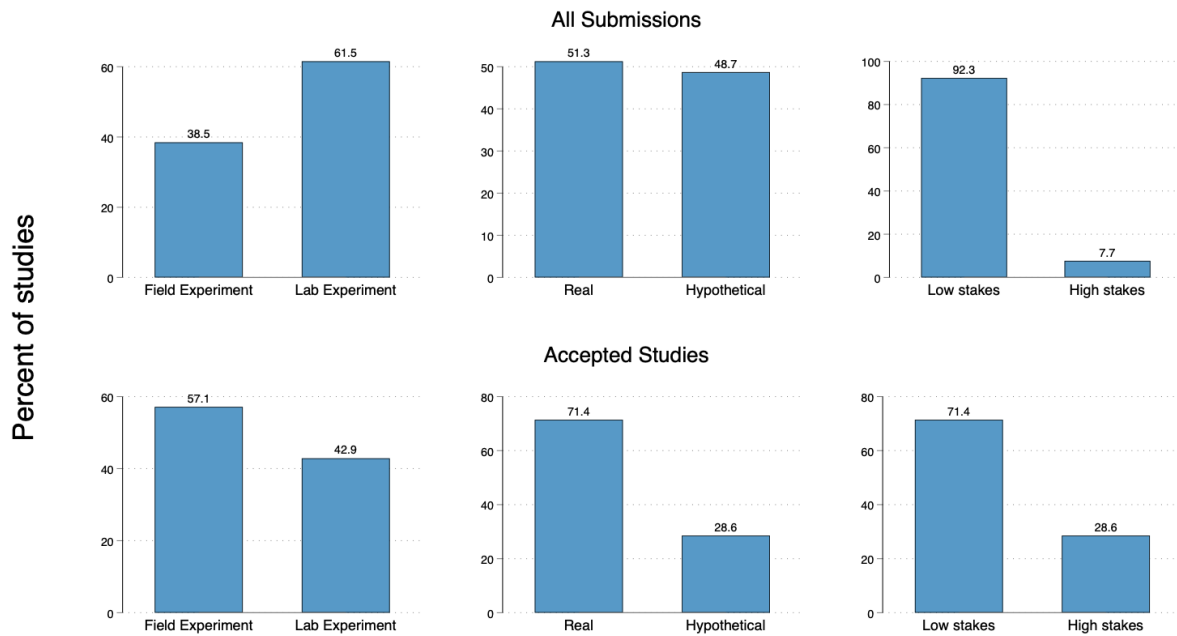


science research in the fields of agriculture, food, and agri-environmental policy, we collected data from all submissions on several attributes.

As shown in Figure 3 and Table A2, we find that nearly half of all experiments use hypothetical stakes, and over 92% use low stakes.<sup>5</sup> Critics argue that hypothetical or low-stakes experiments fail to elicit sufficient cognitive effort from the participants, thus offering limited validity to research findings, especially those applied to policy settings. While fewer field experiments were submitted (39%), more of those were accepted for publication (57%). While half of the submissions used real stakes, over 71% of the accepted submissions had real stakes. In line with the criticism of behavioral science research in other fields, only 9% of the submissions we received and 18% of the submissions we accepted included any discussion of long-term behavior change (Figure A1 in the Appendix). Similarly, less than 9% of the submissions we received and 18% of the submissions we accepted included any discussion of the mechanisms (Figure A2 in the Appendix). Around 18% of the submissions we received and accepted included any discussion of the cost-effectiveness of the intervention (Figure A3 in the Appendix). Finally, over 4% of the submissions we received and 27% of the submissions we accepted had any discussion of ethical issues related to the intervention beyond what is mandated by the Institutional Review Board (IRB) (Figure A4 and Table A3 in the Appendix).

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<sup>5</sup> Low stakes are defined as less than \$5 USD in developed countries and less than \$1.20 USD in developing countries.



**Figure 3:** Attributes of Submitted and Accepted Papers in the Special Issue (Field versus Lab Experiment, Real versus Hypothetical Stakes, and Low versus High Stakes)

**3. Behavioral science-based interventions are more focused on some actors in the supply chain and do not use the entire range of behavioral tools.** Over 40% of submitted and 36% of accepted papers centered on consumer behavior, and 36% of submitted and 55% of accepted papers addressed interventions targeting farmers and rural landowners (Figure A5 in the Appendix). Unfortunately, actors in the intermediate stages of the supply chain were notably absent from the submissions despite their integral role in shaping agricultural dynamics and influencing upstream and downstream actors. We cannot understand the dynamics of supply chains fully without understanding the influence of these critical actors. Thus, it is imperative that researchers find ways of rigorously studying these essential players.

We also note that some categories of behavior biases were more frequently studied than others in the submissions we received. We used the MINDSPACE categorization to classify the types of behavioral biases and their use in Table 1. From a behavioral science perspective, as depicted by Dolan (2012), the three most common interventions were related to Salience, Norms, and Incentives. However, based on these submissions, it seems that more work on Affect, Commitment, and Messengers would be warranted.

**Table 1:** Behavioral Biases Evaluated in the Submissions Received for the Special Issue

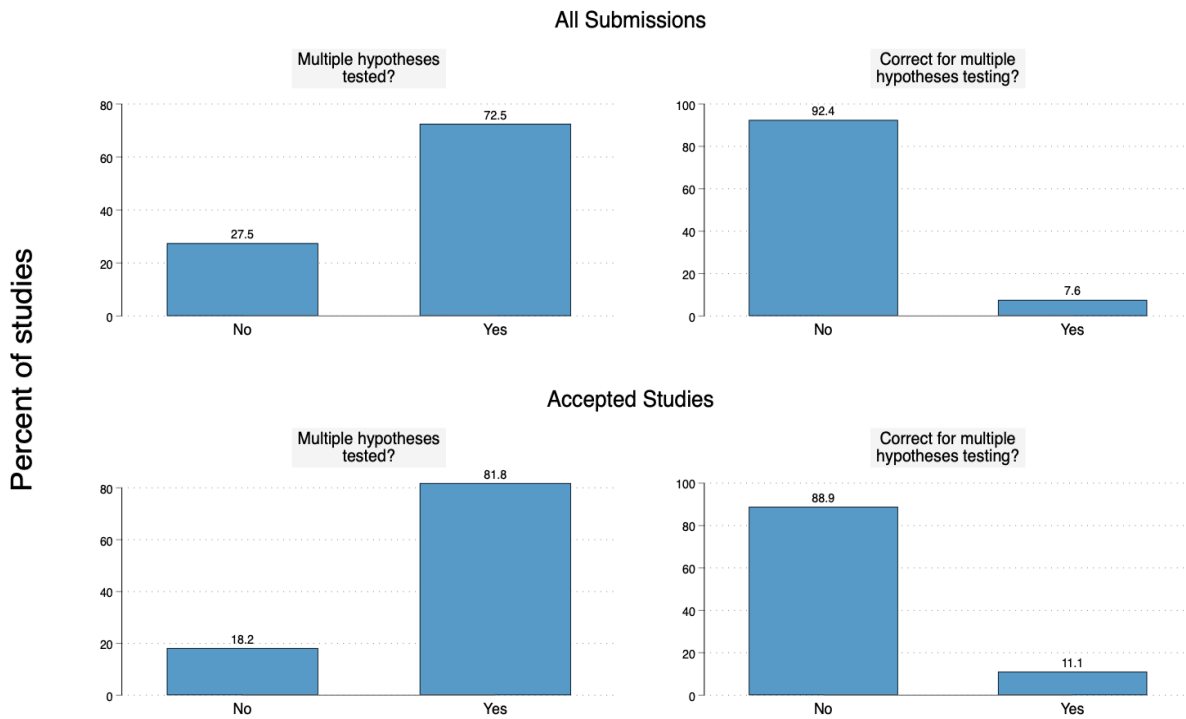
<b>Intervention</b>	<b>Count</b>
<b>M</b> (Messenger)	2
<b>I</b> (Incentives)	11
<b>N</b> (Norms)	16
<b>D</b> (Defaults)	2
<b>S</b> (Salience)	17
<b>P</b> (Priming)	4
<b>A</b> (Affect)	0
<b>C</b> (Commitment)	0
<b>E</b> (Ego)	5
Multiple	6
NA	35

*Notes:* NA means the paper was not related to any behavioral bias and was rejected. Multiple means a paper discusses more than one behavioral bias and, most likely, is a meta-analysis, systematic review, or viewpoint essay.

**4. Better research designs and practices are needed to improve the credibility of behavioral science-based research.** In recent years, academics have been increasingly calling for greater scientific rigor in social science research, including in the fields of agriculture and resource

economics (Ferraro and Shukla, 2023). Best practices such as pre-analysis plans, power analyses, and adjustments for multiple hypotheses testing are recognized as vital to enhancing the credibility and replicability of research. Yet, the rate of adoption of these methodological tools in the fields related to agriculture, food, and agri-environmental policy remains low. Using data collected from all the submissions received, we analyzed the use of best practices that advance the credibility of research findings. Regrettably, despite the rising chorus of academics pressing for more methodological rigor to mitigate pitfalls in statistical analyses, less than 9% of the submitted studies employed power analyses, and only 12% were pre-registered. More than 27% of the accepted submissions conducted power analysis, and 36% of the accepted submissions were pre-registered (Figures A6 and A7 and Table A4 in the Appendix).

Our findings also emphasize the need for researchers to apply corrections for multiple hypotheses testing to reduce the rate of false discovery. A substantial portion of the studies submitted (73%) ventured into testing multiple hypotheses, but less than 8% of those took requisite steps to make needed corrections to their tests. Interestingly, the disparity between accepted and rejected papers was less pronounced for this attribute than for the others. Few reviewers asked the authors to add corrections for multiple hypotheses testing during manuscript revisions. Another practice that undermines the credibility of social science research is the “file drawer problem,” particularly when research finds null results of an intervention. The file drawer problem highlights selective reporting, specifically, the lack of reporting of small or null results, which “end up in the researcher's drawer.” We believe that submissions in this special issue also suffer from the file drawer problem – less than 4% of the submissions reported null results. Interestingly, 9% of the accepted submissions report null effects of the interventions (Figure A8 in the Appendix).



**Figure 4:** Attributes of Submitted and Accepted Papers in the Special Issue (Multiple Comparisons and Correction for Multiple Comparisons)

While a variety of factors determine whether a paper is accepted for submission, it is noteworthy that the papers that were accepted for publication, on average, took additional steps to achieve greater scientific rigor by using real and relatively higher stakes in experimental settings, considering long-term effects and cost-effectiveness, grappling with ethical issues, scrutinizing underlying behavioral mechanisms, considered statistical power, and pre-registered the study.

### **III. Conclusion**

The papers published in this special issue highlight the use of behavioral science-based tools to address specific policy issues with generalizable policy insights for the readers. Our findings offer several key takeaways for academic communities and policymakers. However, we would caution that behavioral science-based interventions are not a silver bullet – they are not appropriate for all contexts and frequently have small to null effect sizes. When coupled with other traditional policy tools, they can deliver larger effects. This is good news because most policy problems are both economic and behavioral problems that require a hybrid intervention of behavioral and traditional economic policy tools. Thus, the next generation of behavioral science-based interventions may be a hybrid of traditional policy tools that use behavioral science insights in their design. The papers in this special issue and the recommendations from this introduction hopefully help move the dialogue further along in the context of food, agricultural, and agri-environmental policy.

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**Table 2:** Papers Accepted in the Special Issue with Research Question, Methodology, Findings, and Policy Recommendations (*Listed Alphabetically*)

Authors	Title	Country	Research Question	Methodology	Findings and Policy Recommendations
Barreiro-Hurle et al.	Willing or complying? The delicate interplay between voluntary and mandatory interventions to promote farmers' environmental behavior	Germany, Spain, Poland	Studying the impact of changes in income support and mandatory agri-environmental contributions on voluntary ones	Lab-in-the-field experiment	Increasing mandatory contributions or decreasing unconditional income support reduces voluntary contributions to the environment, but the reduction is greater when mandatory contributions increase than when income support decreases. When mandatory contribution increases substantially, it more than offsets the reduction in voluntary contributions, leading to greater total contributions.
Casati et al.	Please keep ordering! A natural field experiment assessing a carbon label introduction	Italy	Studying the effect of carbon labeling on consumer's food choices	Field experiment	No immediate effect of exposure to carbon labels, but repeated exposure has an effect.
Chai et al.	Nudging farmers to reduce water pollution from nitrogen fertilizer	Global	Highlighting opportunities for using behavioral science-based interventions to reduce nitrogen pollution from fertilizer use	Viewpoint Essay	Insights from production economics provide opportunities for effective behavioral-science-based interventions to encourage optimal nitrogen fertilizer use.

Kee et al.	Slim or plus-size burrito? A natural experiment of consumers' restaurant choice	United States of America	Do anthropomorphic food labels (e.g., "thin cookie" or "fat burger") influence the food choices of restaurant patrons with different weight status?	Field experiment	Using anthropomorphic terminology to refer to food affects portion size selections in a restaurant. Overweight individuals are more likely to choose smaller food portions when food labels portray a less ideal weight status.
Okello et al.	Social incentives as nudges for agricultural knowledge diffusion and willingness to pay for certified seeds: Experimental evidence from Uganda	Uganda	Studying the effect of social incentives on social learning and technology adoption among farmers	Field Experiment	Farmers' knowledge and uptake of new technology were unaffected by social incentives. Findings suggest social incentives crowded out diffusion effort
Raghunathan et al.	Ethnicity, information, and cooperation: Evidence from a group-based nutrition intervention	India	Do the ethnicities of beneficiaries or agents affect intervention effectiveness?	Field Experiment	Ethnicity matters for information retention and individual contributions to a club good.
Schruff-Lim et al.	Turning FOP nutrition labels into action: A systematic review of label + interventions	Global	Studying the effectiveness of nutrition labels in modifying dietary choices	Systematic Review	Evidence on the effectiveness of supporting nutrition labels is limited. However, the evidence for supporting nutrition labels with interactive digital interventions such as basket feedback and financial incentives is promising.
Villacis et al.	Aspirations, risk preferences, and investments in agricultural technologies	Ecuador	Investigate the relationship between aspirations, risk preferences, and investment in agricultural technologies	Lab-in-the-field experiment	An inverted U-shaped relationship between the income aspirations gap and investments in the long- but not short-term.
Wallander et al.	Informational nudges in conservation auctions: A field experiment with U.S. farmers	United States of America	Can small changes in the choice environment design impact farmers' adoption of conservation best practices?	Lab-in-the-field experiment	Farmers responded differently to two changes in the status quo: the quality of their cover practice and the amount of discounted payment received for enrolling in the program. Additionally, real-time updating of bids can help



					reduce transaction costs in this conservation auction.
Wang et al.	Culture and agricultural biodiversity conservation	Switzerland	Investigates how the interplay between culture and policy incentives affects farmers' biodiversity conservation behavior	Natural Experiment (Spatial difference-in-discontinuities design)	Cultural differences lead to systematic behavioral differences in biodiversity conservation among farmers. The culture-driven differences in biodiversity conservation decrease when monetary incentives increase.
Zhu et al.	A meta-analysis on the effectiveness of food-waste reducing nudges	Global	Studying the effectiveness of behavioral science-based interventions in reducing food waste	Meta-Analysis	The overall effect of behavioral science-based interventions on food waste reduction is 0.38 SD, with behaviorally oriented interventions (smaller servings, defaulting consumers to take leftovers, etc.) producing stronger effects than cognitively oriented interventions (reminders, information, etc.)

## References

- Barreiro-Hurle, J., F.J. Dessart, J. Rommel, M. Czajkowski, M. Espinosa-Goded, M. Rodriguez-Entrena, F. Thomas, and K. Zagorskaet. 2023. Willing or complying? The delicate interplay between voluntary and mandatory interventions to promote farmers' environmental behavior. *Food Policy*. 120: 102481.
- Benartzi, S., J. Beshears, K.L. Milkman, C.R. Sunstein, R.H. Thaler, M. Shankar, W. Tucker-Ray, W.J. Congdon, and S. Galing, "Should governments invest more in nudging?" *Psychological Science* 28.8 (2017): 1041-1055.
- Bhargava, S. and G. Loewenstein. 2015. Behavioral economics and public policy 102: Beyond nudging. *American Economic Review* 105(5): 396-401.
- Biondi, B., L. Cornelsen, M. Mazzocchi, and R. Smith. 2020. Between preferences and references: Asymmetric price elasticities and the simulation of fiscal policies. *Journal of Economic Behavior & Organization* 180: 108-128.
- Casati, M., C. Soregaroli, J. Rommel, G. Luzzani, and S. Stranieri,. 2023. Please keep ordering! A natural field experiment assessing a carbon label introduction. *Food Policy*. 120: 102523.
- Chai, Y., D.J. Pannell, and P.G. Pardey. 2023. Nudging farmers to reduce water pollution from nitrogen fertilizer. *Food Policy*. 120: 102525.
- DellaVigna, S. and E. Linos. 2022. "RCTs to scale: Comprehensive evidence from two nudge units." *Econometrica* 90(1): 81-116.
- Duflo, E., M. Kremer, and J. Robinson. 2011. Nudging farmers to use fertilizer: Theory and experimental evidence from Kenya. *American Economic Review* 101(6): 2350-2390.
- Dolan P., M. Hallsworth, D. Halpern, D. King, R. Metcalfe, and I. Vlaev. 2012. "Influencing Behaviour: the Mindspace Way. *Journal of Economic Psychology*." 33:264–277. <https://doi.org/10.1016/j.joep.2011.10.009>.
- Ferraro, P., K.D. Messer, P. Shukla, and C. Weigel. 2022. Behavioral biases among producers: Experimental evidence of anchoring in procurement auctions. *The Review of Economics and Statistics*. doi.org/10.1162/rest\_a\_01215.
- Ferraro, P.J. and P. Shukla. "Credibility crisis in agricultural economics." *Applied Economic Perspectives and Policy* 45.3 (2023): 1275-1291.
- Kee, J.Y. M.S. Segovia, and M.A. Palma. 2023. Slim or plus-size burrito? A natural experiment of consumers' restaurant choice. *Food Policy*. 120: 102483.
- Loewenstein, G. and N. Chater. "Putting nudges in perspective." *Behavioural Public Policy* 1.1 (2017): 26-53.
- Okello, J., K.M. Shikuku, C.J. Lagerkvist, J. Rommel, W. Jogo, S. Ojwang, S. Namanda, and J. Elungat. 2023. Social incentives as nudges for agricultural knowledge diffusion and willingness to pay for certified seeds: Experimental evidence from Uganda. *Food Policy*. 120: 102506.

- Palm-Forster, L.H. and K.D. Messer. 2021. Experimental and behavioral economics to inform agri-environmental programs and policies. *Handbook of Agricultural Economics*. Eds. D. Just and C. Barrett.
- Raghunathan, K., M. Alvi, and M. Sehgal. 2023. Ethnicity, information, and cooperation: Evidence from a group-based nutrition intervention. *Food Policy*. 120: 102478.
- Schruff-Lim, E., E.J. van Loo, E. van Kleef, and H.C.M. van Trijp. 2023. Turning FOP nutrition labels into action: A systematic review of label + interventions.” *Food Policy*. 120: 102479
- Shukla, P., H.K. Pullabhotla, and K. Baylis. 2021. Trouble with zero: The limits of subsidizing technology adoption. *Journal of Development Economics* 158, 102920.
- Villacis, A.H., J.R. Bloem, and A.K. Mishra. 2023. Aspirations, risk preferences, and investments in agricultural technologies.” *Food Policy*. 120: 102477.
- Wallander, S., L.A. Paul, P.J. Ferraro, K.D. Messer, and R. Iovanna. 2023. Informational nudges in conservation auctions: A field experiment with U.S. farmers. *Food Policy*. 120: 102504.
- Wang, Y., S. Schaub, D. Wuepper, and R. Finger. 2023. Culture and agricultural biodiversity conservation.” *Food Policy*. 120: 102482.
- Zhu, J., Y. Huang, J. Zhu, and L. Zhao. 2023. A meta-analysis of the effectiveness of food-waste reducing nudges. *Food Policy*. 120: 102480.
- Zimmerman, F.J., and S.V. Shimoga. 2014. The effects of food advertising and cognitive load on food choices. *BMC Public Health* 14(1): 1-10.

## APPENDIX

**Open Call for Papers:** FOOD POLICY SPECIAL ISSUE: APPLYING BEHAVIORAL SCIENCE TO AGRICULTURE, FOOD, AND AGRI-ENVIRONMENTAL POLICY

*Guest Editors: Kent D. Messer, Pallavi Shukla, and Paul J. Ferraro*



### Overview

Behavioral insights are increasingly being used as a cost-effective policy tool around the world. The goal of this special issue is to advance our understanding of behavioral tools as applied to actors across the entire agricultural supply chain on a diverse range of issues in both developed and developing countries. For this special issue, we take a broad definition of behavioral science-inspired policies to include not only traditional “nudges” but also potential agricultural, food, and agri-environmental policy interventions that use the full spectrum of behavioral policy toolkit.

### Submissions

We invite submissions of original research papers, synthesis reviews, meta-analysis studies, and perspective essays that would help both academics and policymakers understand the opportunities and limitations of behavioral science-inspired tools to design better agricultural, food, and agri-environmental policy. Consistent with the priority of *Food Policy*, we want all papers to make a clear connection to policy.

Actors in the Food System	Insights from Behavioral Science			
	Individual	Social	Material	Mixed Approaches
Producers	<ul style="list-style-type: none"> <li>Personalized messages</li> <li>Align message to values</li> <li>Tap cognitive biases</li> <li>Reference dependence</li> <li>Anchoring effect</li> <li>Set default choices</li> <li>Loss aversion</li> <li>Framing effect</li> <li>Present bias</li> <li>Motivated disbelief</li> <li>Confirmation bias</li> <li>Recognitions and ego boost</li> <li>Decision/cognitive fatigue</li> <li>Biased assessment of probabilities</li> </ul>	<ul style="list-style-type: none"> <li>Highlight desirable norms</li> <li>Peer comparisons</li> <li>Encourage public commitments, identify the right messenger</li> <li>Publicly recognize desired behaviors</li> </ul>	<ul style="list-style-type: none"> <li>Provide financial incentives</li> <li>Reduce learning costs</li> <li>Increase awareness of programs</li> <li>Reduce application costs</li> <li>Lower effort of decisions</li> <li>Reduce complexity of the decision environment</li> </ul>	<ul style="list-style-type: none"> <li>Combinations of individual, social, and/or material approaches</li> </ul>
Supply Chain Actors				
Consumers				

## Paper Review

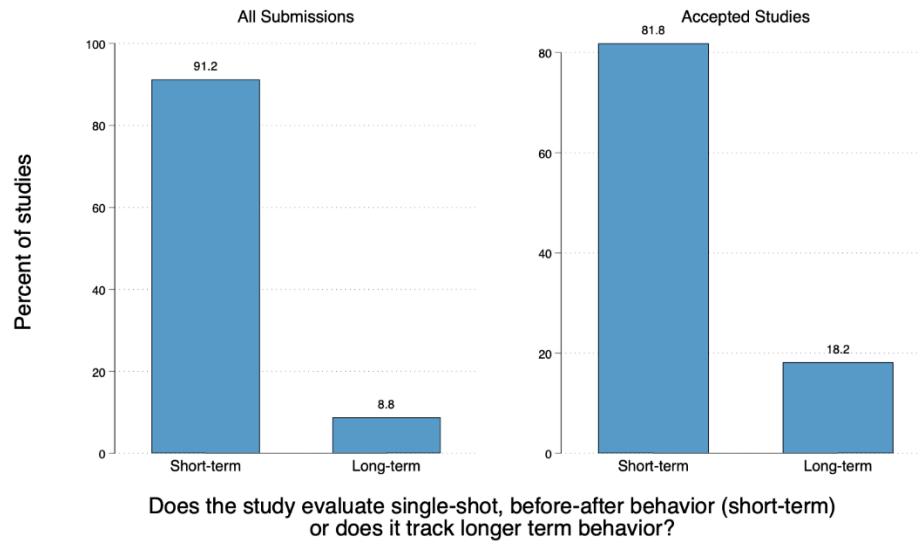
All papers will go through full peer review to ensure the coherence of the set of papers and the high quality expected of papers in *Food Policy*. The guest editors will prepare an introductory essay to tie together the key findings and recommendations from the set of accepted papers.

## Please Note:

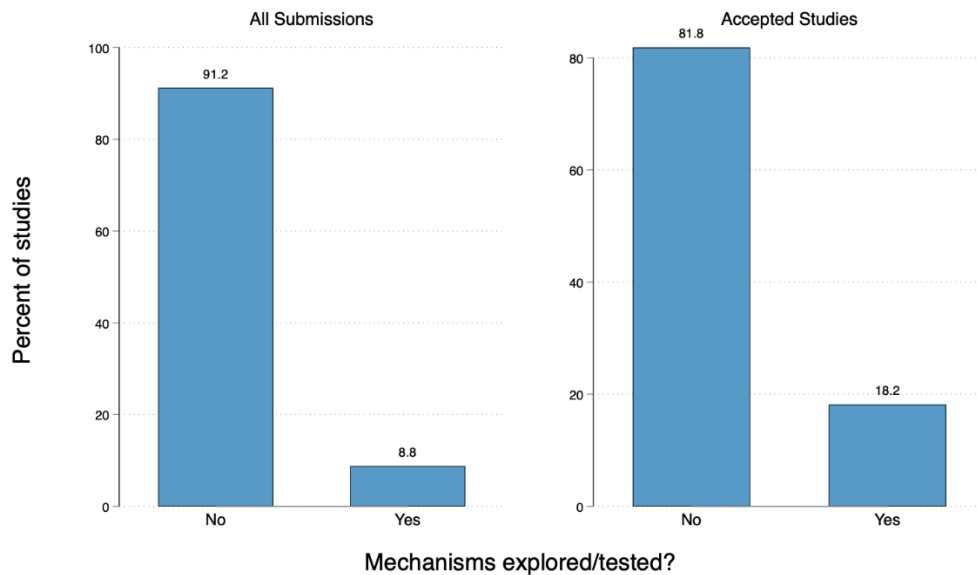
Papers should be between 5,000 and 12,000 words and submitted to the editorial manager by August 31, 2022. Please consult the *Food Policy* guide for authors for policies regarding making data and code available to ensure the reproducibility of empirical results and the requirement for explicit attention to policy implications.

Please be sure to select this special issue from the drop-down ‘Article Type’ menu that will appear in the submissions portal after you log in to the site. Ultimately, but not at the time of initial submission, authors must format papers selected for publication following the *Food Policy* guide for authors. We especially invite original papers authored by members of underrepresented groups and researchers based at institutions in developing countries.

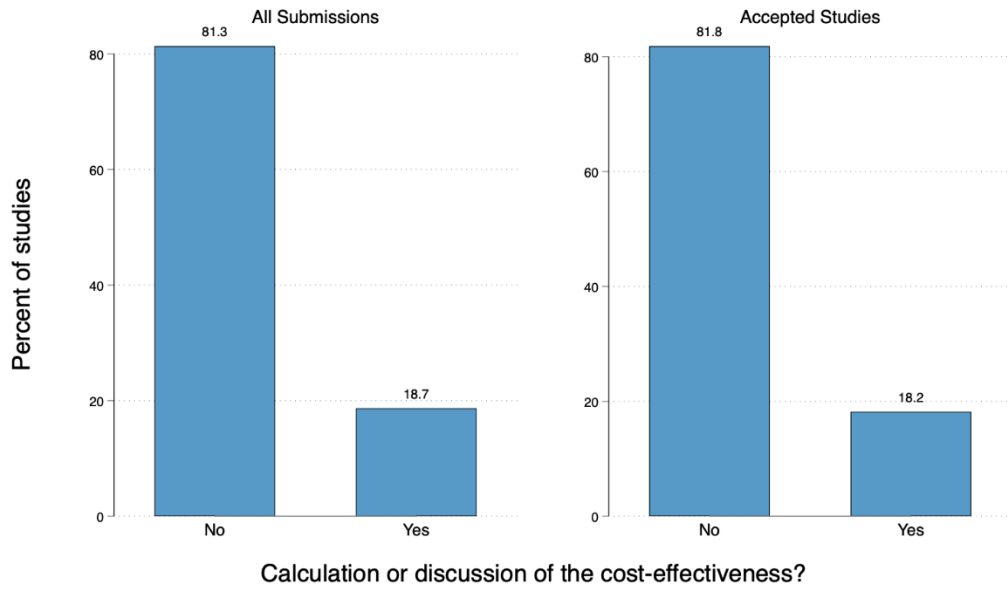
## Figures and Tables



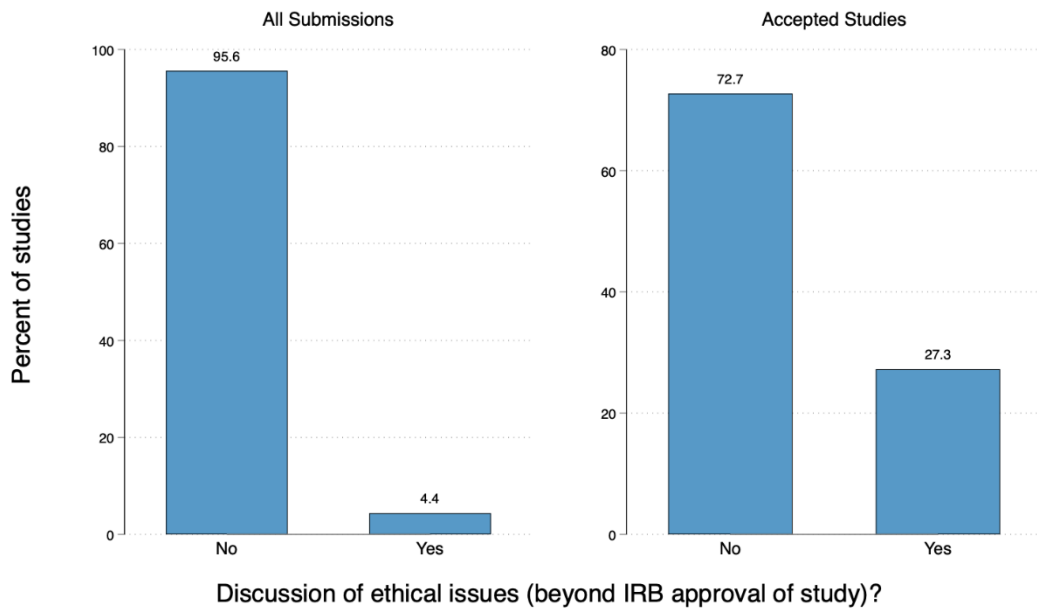
**Figure A1:** Attributes of Submitted and Accepted Papers in the Special Issue (Short- vs. Long-term Behavior Change)



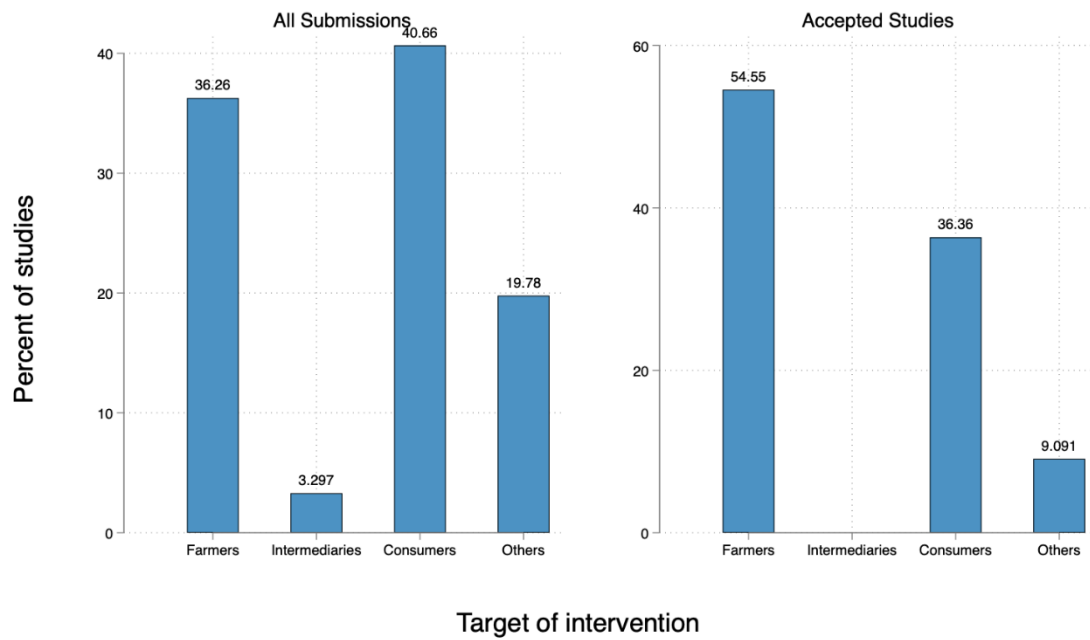
**Figure A2:** Attributes of Submitted and Accepted Papers in the Special Issue (Did the Paper Explore Mechanisms?)



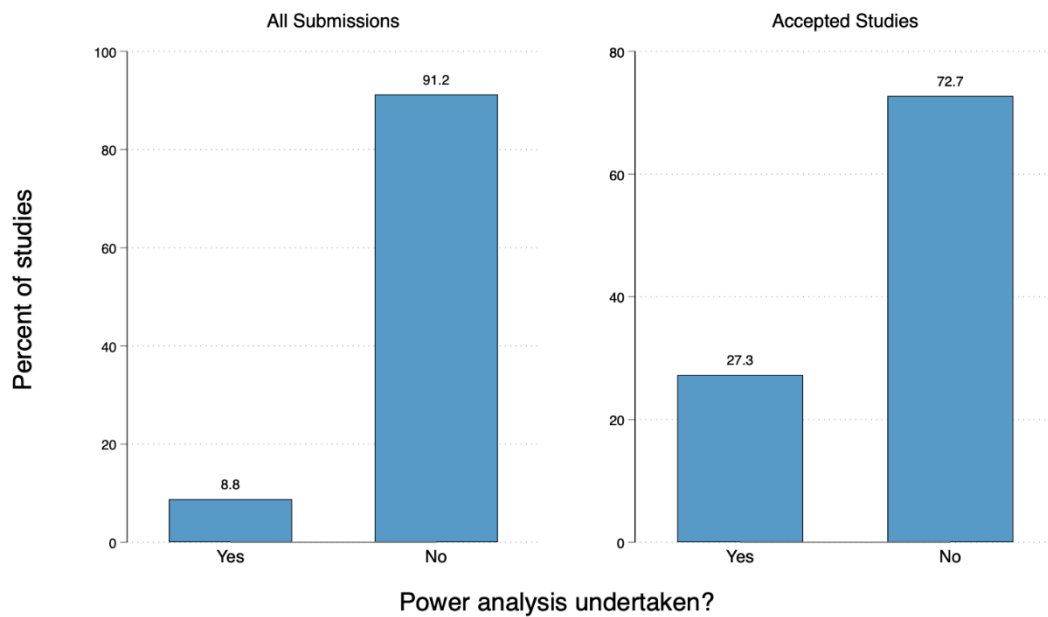
**Figure A3:** Attributes of Submitted and Accepted Papers in the Special Issue  
(Did the Paper Discuss the Cost-Effectiveness of the Intervention?)



**Figure A4:** Attributes of Submitted and Accepted Papers in the Special Issue  
(Did the Paper Discuss Potential Ethical Issues of the Intervention (Beyond the IRB Approval)?)

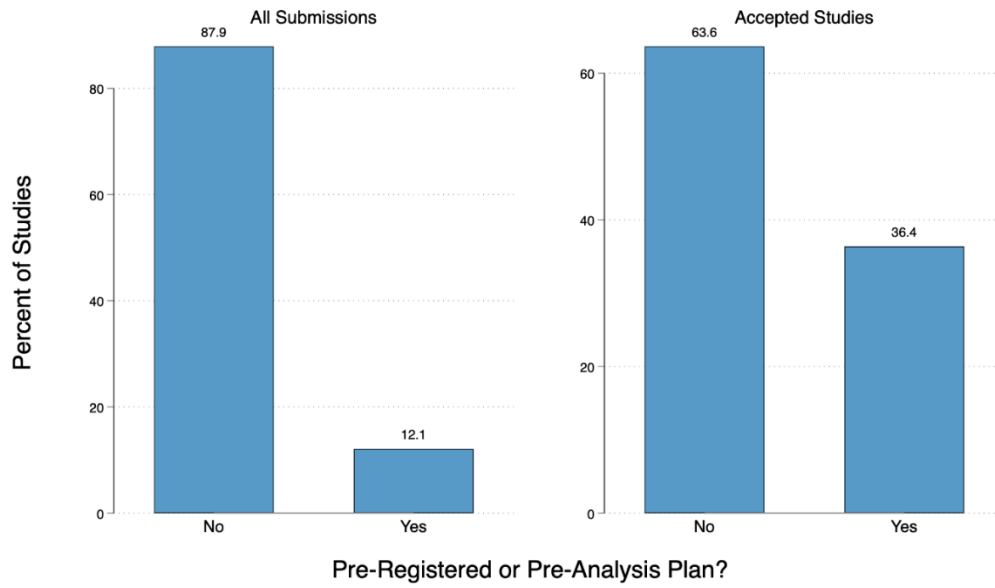


**Figure A5:** Target of Intervention Among Supply Chain Actors in Submitted and Accepted Paper in the Special Issue

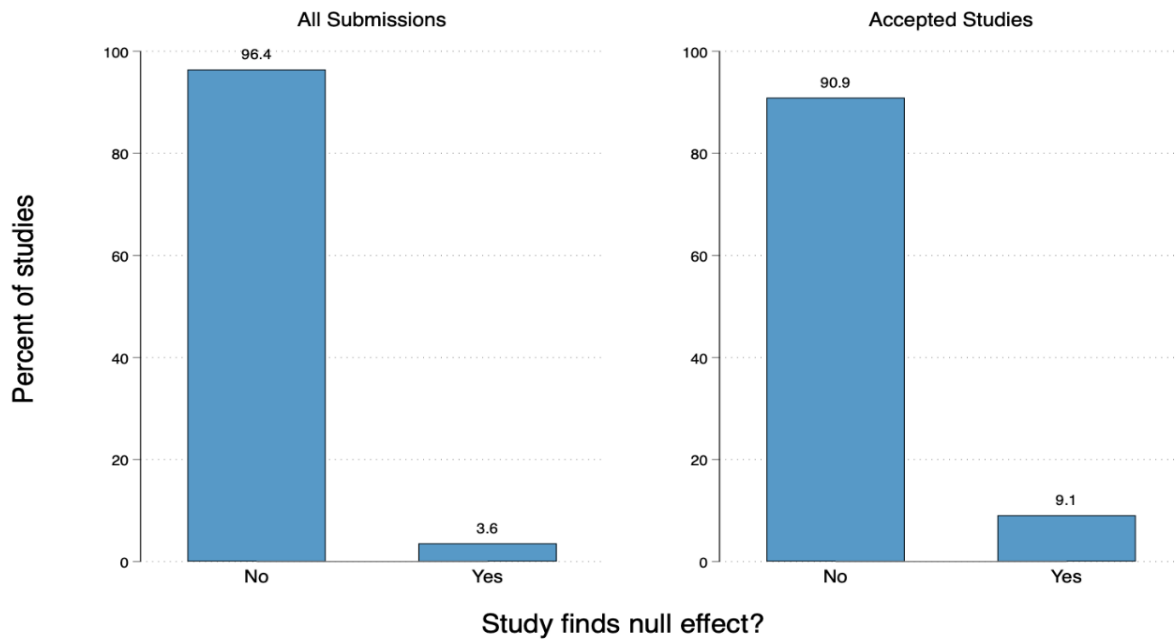


**Figure A6:** Attributes of Submitted and Accepted Papers in the Special Issue (Did the Study Undertake Power Analysis?)

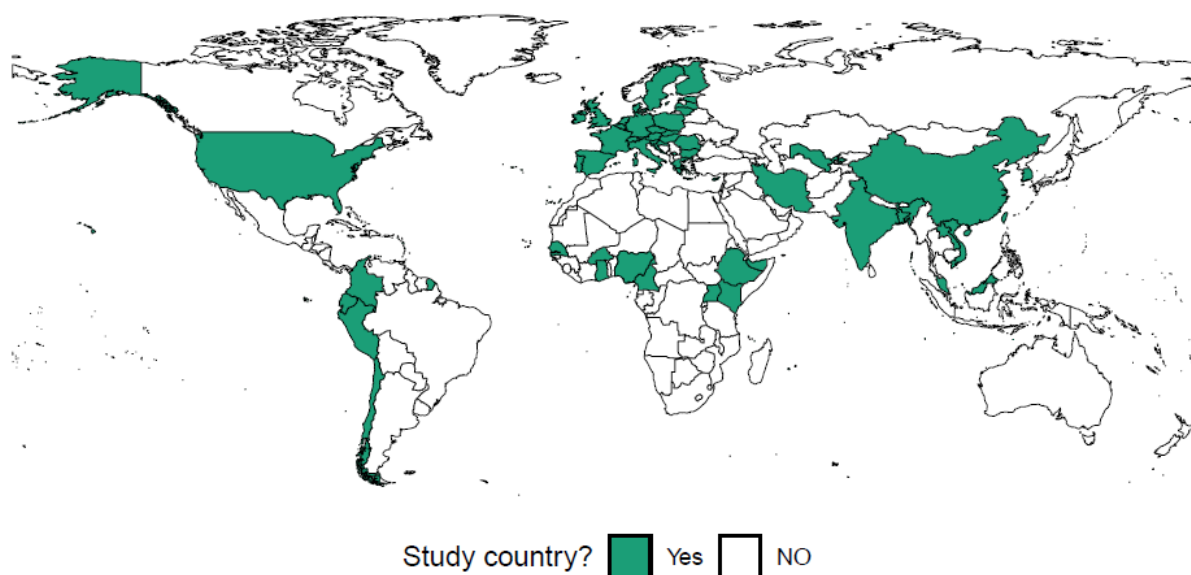




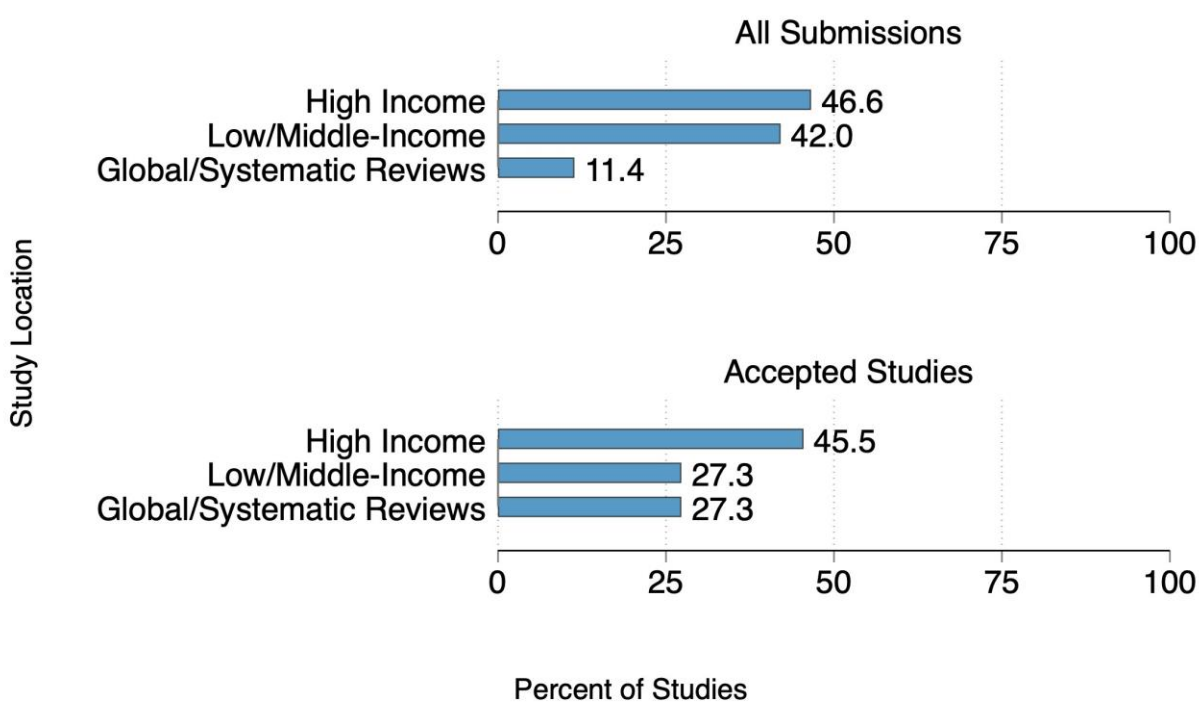
**Figure A7:** Attributes of Submitted and Accepted Papers in the Special Issue (Does the Study have a Pre-Registration or Pre-Analysis Plan?)



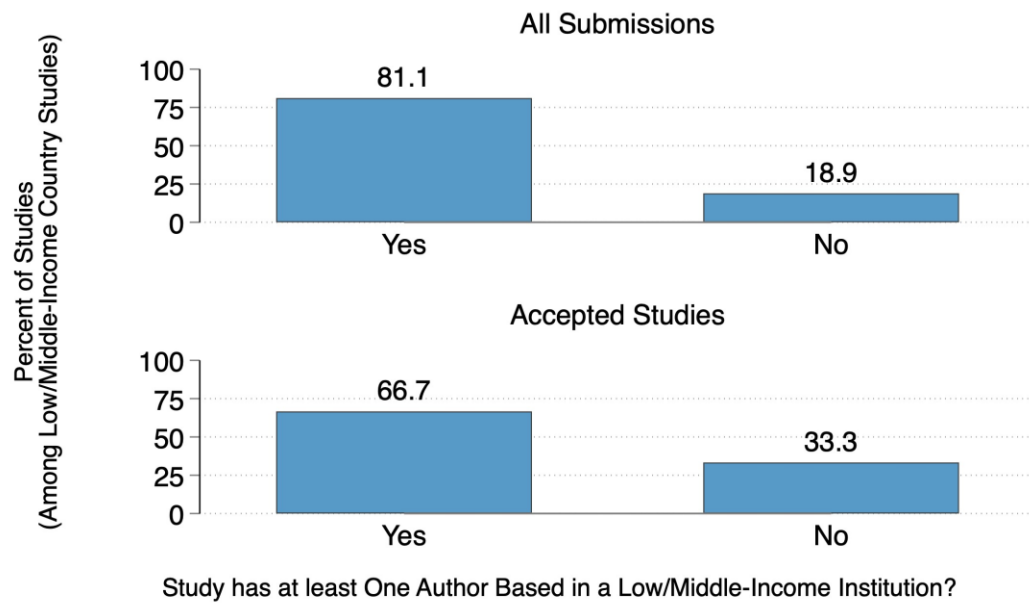
**Figure A8:** Attributes of Submitted and Accepted Papers in the Special Issue (Did the Study Find Null Effect of the Intervention?)



**Figure A9:** Map of Countries Studied in the Papers Submitted to this Special Issue



**Figure A10:** Countries Studied in the Papers Submitted to this Special



**Figure A11:** Percentage of Papers that Study a Low/Middle-Income Country and have at least one Author Affiliated with a Low/Middle-Income Country Institution

**Table A1:** Field and target group of intervention and methodology used.

	Not Accepted		Accepted		Total	
	No.	%	No.	%	No.	%
<i>Field of Intervention</i>						
Agriculture	30	37.5	3	27.3	33	36.3
Nutrition	20	25	4	36.4	24	26.4
Agri-environment	30	37.5	4	36.4	34	37.4
<i>Target of Intervention</i>						
Farmers	27	33.8	6	54.5	33	36.3
Intermediaries	3	3.8	0	0	3	3.3
Consumers	33	41.2	4	36.4	37	40.7
Others	17	21.2	1	9.1	18	19.8
<i>Methodology</i>						
DID	1	1.2	1	9.1	2	2.2
Experiment	31	38.8	6	54.5	37	40.7
Meta-analysis	7	8.8	2	18.2	9	9.9
Others	38	47.5	0	0	38	41.8
PSM	1	1.2	0	0	1	1.1
Viewpoint Essay	2	2.5	1	9.1	3	3.3
RDD	0	0	1	9.1	1	1.1
Total	80	100	11	100	91	100

**Table A2:** Characteristics of studies using experiments

	Not Accepted		Accepted		Total	
	No.	%	No.	%	No.	%
<i>Lab or Field?</i>						
Field Experiment	11	34.4	4	57.1	15	38.5
Lab Experiment	21	65.6	3	42.9	24	61.5
<i>Real of Hypothetical stakes?</i>						
Real	15	46.9	5	71.4	20	51.3
Hypothetical	17	53.1	2	28.6	19	48.7
<i>High or Low stakes?</i>						
Low	31	96.9	5	71.4	36	92.3
High	1	3.1	2	28.6	3	7.7

**Table A3:** Study attributes

	Not Accepted		Accepted		Total	
	No.	%	No.	%	No.	%
<i>Short- or long-term effects?</i>						
Short-term	74	92.5	9	81.8	83	91.2
Long-term	6	7.5	2	18.2	8	8.8
<i>Discussion of ethical issues?</i>						
No	79	98.8	8	72.7	87	95.6
Yes	1	1.2	3	27.3	4	4.4
<i>Discussion of cost-effectiveness?</i>						
No	65	81.2	9	81.8	74	81.3
Yes	15	18.8	2	18.2	17	18.7
<i>Mechanisms explored/tested?</i>						
No	74	92.5	9	81.8	83	91.2
Yes	6	7.5	2	18.2	8	8.8
Total	80	100	11	100	91	100
<i>Study finds null effect?</i>						
No	71	97.3	10	90.9	81	96.4
Yes	2	2.7	1	9.1	3	3.6

**Table A4:** Research practices that affect the credibility of research findings

	Not Accepted		Accepted		Total	
	No.	%	No.	%	No.	%
<i>Undertook power analysis?</i>						
Yes	5	6.2	3	27.3	8	8.8
No	75	93.8	8	72.7	83	91.2
<i>Pre-registered?</i>						
No	73	91.2	8	72.7	81	89
Yes	7	8.8	3	27.3	10	11
<i>Multiple hypotheses tested?</i>						
No	23	28.7	2	18.2	25	27.5
Yes	57	71.2	9	81.8	66	72.5
<i>If yes, any multiple testing correction?</i>						
No	53	93	8	88.9	61	92.4
Yes	4	7	1	11.1	5	7.6