

Exploring barriers and facilitators to direct-to-retail sales channels: Farmers' perspectives on wholesaling produce to small food retailers in Charles County, Maryland

Audrey E. Thomas,^{a*} Emma C. Lewis,^b Lisa Poirier,^c Stacey Williamson,^d
Yutong Xie,^e Alexis Lightner,^f and Joel Gittelsohn^g
Johns Hopkins Bloomberg School of Public Health

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Abstract


In 2020, a mobile application (app) was developed to connect small food retailers with local producers, recognizing the underutilization of direct-

to-retail sales channels. Before piloting the app, formative research was conducted in Charles County, Maryland, to gain an understanding of existing direct-to-retail sales channels for locally grown produce. Seven stores were surveyed to explore current local produce stocking, and four farmers participated in in-depth interviews to provide insights into their experiences with direct-to-retail marketing channels. The results indicate a


^{a*} Audrey E. Thomas, MSPH, Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; 615 N. Wolfe Street, Baltimore, MD 21205 USA; athom203@jh.edu;
 <https://orcid.org/0009-0000-5972-305X>


^b Emma C. Lewis, MS, Human Nutrition, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; elewis40@jh.edu;
 <https://orcid.org/0000-0001-7360-396X>

^c Lisa Poirier, MHS, Human Nutrition, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; lpoirie4@jh.edu;
 <https://orcid.org/0000-0003-4180-0357>

^d Stacey Williamson, BS, Human Nutrition, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; swill363@jh.edu;
 <https://orcid.org/0009-0007-6681-8349>

^e Yutong Xie, MHS, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; yxie62@jh.edu

^f Alexis Lightner, MSPH, Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; alightn3@jh.edu;
 <https://orcid.org/0009-0001-6796-0079>

^g Joel Gittelsohn, PhD, Human Nutrition, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University; jgittel1@jh.edu;
 <https://orcid.org/0000-0003-2761-3280>

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limited stocking of local produce in the small food stores, some of which was self-procured to obtain adequate quantities. Farmers expressed a passion for contributing to food security in their community and a willingness to collaborate with store owners to strengthen their direct sales; however, they cited barriers such as the impact of the COVID-19 pandemic, competition with large distributors, and logistical challenges. Considering these existing barriers and facilitators, small food stores may still possess a unique potential to establish direct sale relationships with local farms. Such relationships could be effectively facilitated through the implementation of a digital strategy.

Keywords

direct-to-retail, direct marketing, mobile app, food retail, distribution networks, food access, food system, farmers, COVID-19, pandemic

Introduction

At present, the United States convenience store industry includes 152,396 stores, marking a 1.5% increase from 2023 (National Association of Convenience Stores, 2024a). Within that same year, the industry reported US\$859.8 billion in sales, with over one quarter (26.9%) of sales attributed to food (National Association of Convenience Stores, 2024b). Given many communities' reliance on small stores for food purchases and small stores' tendency to lack healthy options, the U.S. Department of Agriculture (USDA) published its *Healthy Corner Stores Guide for Communities* (USDA Food and Nutrition Service [USDA FNS], 2016) featuring case studies of successful programs and interventions to improve store offerings. However, the guide solely focuses on urban settings, failing to address that these issues exist in non-urban settings of the country as well.

Since the 1990s, the food retail industry's increased market concentration has disproportionately affected non-urban areas by reducing access to independent supermarkets and concentrating stores in larger towns. This movement has increased the distance and resources required for residents, especially in lower-income rural neighborhoods, to obtain nutritious food (Blanchard & Matthews, 2008; Paruchuri et al., 2009; Ver Ploeg

et al., 2012; Pinard et al., 2016). Consequently, residents in many rural towns rely on convenience stores as their main food sources (Liese et al., 2007; Sharkey et al., 2009). Despite being more accessible than larger supermarkets, these establishments face limitations in stocking fresh produce and tend to offer highly processed, less nutritious items. In their assessment of nutrition environments in rural stores in the Deep South, Shikany and colleagues (2018) found that healthy choices are available in a significantly higher proportion of grocery stores than convenience stores (Shikany et al., 2018). Another study in upstate New York revealed that rural residents are situated up to 68% further from fresh foods than from processed foods given the presence of nearby convenience stores (Ganter et al., 2011). Similarly, researchers studying small grocers and convenience stores in three rural North Carolina counties found that only 2% of the 55 surveyed stores stocked at least three fruits and three vegetables (D'Angelo et al., 2017).

Small stores' inability to stock fresh produce is largely attributed to gaps in the food distribution system. Due to their restricted space and refrigeration capabilities (Haboush-Deloye et al., 2023), these stores require smaller, more frequent deliveries—a demand that many suppliers are unable or unwilling to accommodate. In a study evaluating rural corner store owners' perspectives on stocking fresh foods, issues related to supply chain distribution was a primary barrier, including higher unit prices and delivery fees for smaller orders (Haynes-Maslow, 2018). Further studies examining distributor perspectives found that regional produce wholesalers tend not to view small stores as viable business opportunities due to their low order volume and irregular purchasing patterns (O'Malley et al., 2013). On the other hand, many processed food manufacturers offer incentives to small stores for promotion of their products (Ayala et al., 2017).

One potential solution to these identified barriers is to reduce the number of intermediaries (e.g., wholesalers and distributors) between small stores and producers, and instead utilize direct sales channels. There has been previous interest in the economic and health benefits of direct sales, including direct-to-consumer sales through farmers

markets (Warsaw et al., 2021), farm stands (Evans et al., 2012), and community supported agriculture operations (CSAs) (Paul, 2019). However, engagement in direct-to-retail sales among farmers has historically been low. According to the USDA's 2020 Local Food Marketing Practices Survey, only 8% of farms participated in direct sales to retailers, while 77% sold directly to consumers (USDA National Agricultural Statistics Service [USDA NASS], 2022). Researchers propose that the low engagement in direct-to-retail channels is due to the typically smaller scale of farms engaged in direct marketing, which may not produce enough to meet the demands of larger grocery stores (Plakias et al., 2020). Concurring authors have found that as retailers expand, their distribution channels tend to become more "concentrated, formalized, and vertically integrated" (Clark & Inwood, 2016, p. 16). This situation eliminates the prospects of direct-to-retail sales for small farmers and suggests that these growers are better situated to form mutually beneficial relationships with small retailers.

Given these circumstances, an intervention to establish direct-to-retail sales channels between farmers and convenience stores could benefit both parties. Farmers with smaller quantities of produce have the opportunity to gain a new market for their goods, while convenience stores could more easily procure fresh foods, thus increasing the availability of healthy food options for customers. To help facilitate these relationships, the *Baltimore Urban food Distribution* (BUD) study was funded in 2020 to design and develop the BUD mobile application (app) for improved procurement and distribution of healthier foods to small stores in Baltimore (Gittelsohn et al., 2022). The app serves as a digital interface to connect store owners with local producers and suppliers, allowing for direct purchasing and delivery of fresh produce and other healthy food and beverage items (Lewis et al., 2024). Features of the app address specific needs identified by both parties, such as collective purchasing and shared delivery to offset the aforementioned distribution challenges (Ross et al., 2018; Schwendler et al., 2017).

Given interest in adaptation of the app for non-urban regions surrounding Baltimore, this

study was expanded to Charles County, Maryland. Formative research was conducted to document small stores' (1) current stocking of local produce and (2) the extent of their involvement in direct purchasing; and (3) farmers' perspectives regarding current direct-to-retail sales.

Methods

Study Setting: Charles County, Maryland

Charles County is located two hours south of Baltimore (where the app was developed), and is an area familiar to the research team from prior research (Campbell et al., 2017). In 2022, the county had 371 farms, with 85% of them categorized as small (Garner and Yewell, 2024; USDA NASS, 2022). These farms were leaders in Maryland fruit and vegetable production, with almost one in five (17.92%) farms cultivating produce (Johns Hopkins Center for a Livable Future, 2023). The majority of Charles County residents are Black/African American, composing 53% of the population (U.S. Census, 2022). Notably, Charles County residents have a slightly higher morbidity rate than the state average, particularly in diet-related diseases such as diabetes (27.5 per 100,000) and heart disease (167.2 per 100,000) (U.S. Census, 2022). In 2019, Charles County had 112 food stores, with supermarkets accounting for 17% (19), and the rest comprising convenience stores (73) and small grocers (20) (Johns Hopkins Center for a Livable Future, 2023).

Small Food Stores

Sampling and recruitment

We used purposive sampling, defined as the non-random selection of cases within a sampling frame (Robinson, 2014), to identify small food stores in Charles County that fulfilled specific criteria. These criteria included: (1) having a store owner or manager who was willing and able to undergo training in using the BUD app and placing food orders through a smartphone or other internet-enabled device, (2) being classified as an independently owned small food store (with fewer than four aisles or two cash registers, excluding lottery registers),

and (3) being located more than 1 mile (1.6 km) away from a supermarket, defined as “large-format grocery stores with all food departments present, including produce, meats, seafood, canned goods, and packaged foods” (Johns Hopkins Center for a Livable Future, 2012, para. 10). Eligible stores were identified using a datasheet of small stores in Charles County created for a previous study (Campbell et al., 2017). A supplemental Google search provided updated information regarding store closures and changes in store ownership. Participant contact occurred through in-person recruitment. During recruitment, the research team approached stores to assess their eligibility and distributed flyers containing frequently asked questions (FAQs) about the trial. Flyers were written in English and outlined the benefits and potential risks of participation. Store owners continued communication with the research team in person and via email as they considered their willingness to participate. Of the 14 stores the research team attempted to recruit, eight agreed to participate, one of which was a farmstand and therefore excluded from the present sample.

Data collection

Store-level data were collected by the lead author, following training in observational data collection and survey administration. Two instruments were used across the seven participating stores to collect information to inform the future intervention. Both instruments were adapted from the B'more Healthy Communities for Kids (BHCK) trial (Gittelsohn et al., 2014). The Store Impact Questionnaire (SIQ) is a structured survey, consisting of 89 questions, designed to evaluate store characteristics, supplier types, and the prices of promoted foods and beverages. The SIQ was verbally read to

the store owner by the data collector and took an average of 25 minutes to complete. In addition to the SIQ, the lead author completed the Store Environmental Checklist (SEC), a structured observational tool based on the validated Nutrition Environment Measures Survey-Corner Stores (NEMS-CS) tool (Cavanaugh et al., 2013), to document the current stocking and promotion of selected foods in the participating stores. The completion time for the SEC depended on the store size and ranged from 15 to 30 minutes. Combined, these instruments took a total completion time of 45 to 60 minutes. Both tools are located in the Appendix for further reference.

Farmers

Sampling and recruitment

Farmers (see Table 1) in Charles County were also purposively sampled and contacted if they were identified as having cultivated produce that they had wholesaled to a local retailer within the past year. Four farmers were identified and contacted via a mutual connection at the Southern Maryland Agricultural Development Commission. The initial message outlined the project's scope and shared a research team member's contact information through a weekly informational email sent to farmers in their network. To complement this outreach, a Google search was conducted to identify three additional farmers operating in Charles County who met the criteria, determined by a review of their websites. Farmers identified through the web search were subsequently contacted using their listed email addresses. Six out of the seven farmers we contacted replied to our initial interview request, for a response rate of 86 percent. Of those six, one declined the invitation to

Table 1. Farm Characteristics of Farmer Participants

Farmer #	Years in operation	Scale of operation	Growing method	Main product(s)
1	>100	150 acres	Conventional	Produce
2	< 5	0.75 acre	Organic, non-certified	Produce, value-added products
3	< 25	350 acres	Pasture-raised	Livestock
4	< 25	130 acres	Organic, certified	Produce

interview and one did not respond to subsequent follow up, resulting in a total of four farmers.

Data collection

Semi-structured, in-depth interviews were conducted with four farmers by the lead author, who received graduate-level training in qualitative research methods. The interview guide was designed to capture insight into the farmers' (1) background and experience in farming, (2) preferred growing practices and produce seasonality, (3) existing direct-to-retail sales practices, and (4) efficacy for using smartphone and app-based technology. Three interviews were carried out at the respondents' farms, and one interview was conducted over the telephone. All research participants provided oral informed consent before any data collection, and interviews were recorded with the respondents' permission. Recordings were transcribed verbatim by the researcher who administered the interviews.

Data Analysis

Data analysis followed a concurrent triangulation design (Creswell & Plano Clark, 2017). This method involved separate analyses of the SIQ, SEC, and in-depth interviews, followed by subsequent comparison. Frequencies were first generated from the produce stocking data obtained from the SEC. Then, qualitative responses from the SIQ concerning stores' current wholesalers were analyzed to explore the extent to which store owners engage in local purchasing and produce stocking, as well as observational data regarding visible local food promotion. The farmer in-depth interviews were analyzed using ATLAS.ti (Version 23), employing a hybrid inductive/deductive thematic analysis approach. The process was conducted by a single coder (the lead author) and adhered to Braun and Clarke's iterative thematic analysis process. This process involves familiarization with the data, code generation, theme generation, theme review, definition and naming of themes, and identification of exemplars (Braun & Clarke, 2006). To ensure that interviews were accurately transcribed, transcripts were re-read and memoed before coding. Block

coding was applied to the transcripts, and coded segments were organized to establish subthemes within the predefined categories of barriers and facilitators. The codebook underwent analytic triangulation with another trained researcher, who aided in the review and provided comments to enhance reliability before final application to the data.

IRB Approvals and Ethics

All research activities were approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health (approved April 28, 2023, IRB00024770). To ensure anonymity, both farmers and stores are de-identified throughout the paper.

Results

Stocking of Local Produce at Small Rural Retail Food Stores

Table 2 provides characteristics and produce stocking information for the sampled stores. All of the stores we surveyed had limited space for produce stocking and consisted of five or fewer aisles. Additionally, we found that only one store participated in the Special Supplemental Program for Women, Infants, and Children (WIC), and less than half participated in the Supplemental Nutrition Assistance Program (SNAP), both of which require stores to meet minimum stocking requirements for produce (USDA FNS, 2022, 2023).

Only a minority of the small food stores ($n = 2$) surveyed offered fresh vegetables, whereas a larger proportion ($n = 4$) sold fresh fruit. While only two stores offered fresh vegetables, one stocked a diverse array, including 11–20 different varieties. Most stores stocking fruit had 1–2 varieties, with bananas and limes being the commonly stocked items. When asked to list the highest-selling foods at their establishments, none of the owners listed produce among the top five items. However, many owners listed staple grocery items such as bread, eggs, and milk.

Only two store owners relied on wholesalers for produce procurement. One of them, the largest store with the most extensive variety of produce,

Table 2. Sampled Store Characteristics (N = 7)

Store #	Number of aisles	Fresh produce supplier type	Accepts WIC	Accepts SNAP	Local food promotion	Most popular food items
1	3	Supermarket	No	No	None	1. Potato chips 2. Candy 3. Dairy products 4. Bread 5. Miscellaneous groceries
2	4	None	No	Yes	None	1. Canned sausage 2. Bread 3. Potato chips 4. Soda 5. Candy
3	4	None	No	No	None	1. Bread 2. Eggs 3. Milk 4. Soda 5. Alcohol
4	4	None	No	Yes	None	1. Prepared pizzas 2. Prepared cheesesteaks 3. Milk 4. Bread 5. Eggs
5	4	Supermarket	No	No	Hand-written sign advertising local eggs	1. Potato chips 2. Snack cakes 3. Canned sausage 4. Lunch meat 5. Cheese
6	5	Regional produce distributor National food distributor	Yes	Yes	None	1. Prepared burgers 2. Bacon 3. Chicken breast 4. Sliced cheeses 5. Sliced lunch meats
7	0	National food distributor Local producer	No	No	Hand written signs advertising local blackberries, tomatoes, and corn	1. Honey 2. Meat sticks 3. Frozen steaks 4. Chicken breast 5. Eggs

used a small regional wholesaler as the main supplier of fresh produce, supplemented by a large national supplier for bananas. The remaining stores reported independently shopping at supermarkets or big-box stores (e.g., Wal-Mart, Sam's Club, and Food Lion) to acquire quantities of produce they believed could be feasibly stocked within their limited space. One store, a centennial establishment whose owner had strong ties with local producers, intermittently stocked its produce based on seasonal availability. During the observation period (summer of 2023), local blackberries, tomatoes, and corn were displayed and promoted through point-of-sale signage at that store.

Facilitators and Barriers to Wholesaling Produce Identified by Farmers

The participating farmers varied in terms of their growing methods, goods produced, operational scale, offering diverse perspectives that contributed to our formative understanding. All farmers interviewed expressed general support for the BUD app, and three out of the four commented that the technology could support their existing direct-to-retail models. Interestingly, when asked questions about their existing direct-to-retail sales, the farmers provided in-depth explanations of the macro-level forces shaping direct-to-retail marketing channels in their county, which are pre-

sented in Figure 1 as market-driven factors., They also discussed the significant care and effort required to maintain these channels, presented in the same figure as farmer-driven factors. These insights, presented in the following section under the a priori themes of barriers and facilitators to direct-to-retail sales in Charles County, provided us with a better understanding of the environment in which the BUD app will be acting. These findings confirm the usefulness of the intervention and help us identify leverage points for future use.

Facilitators to wholesaling at small food retailers

1. Participating farmers expressed that Charles County is part of a national local food movement

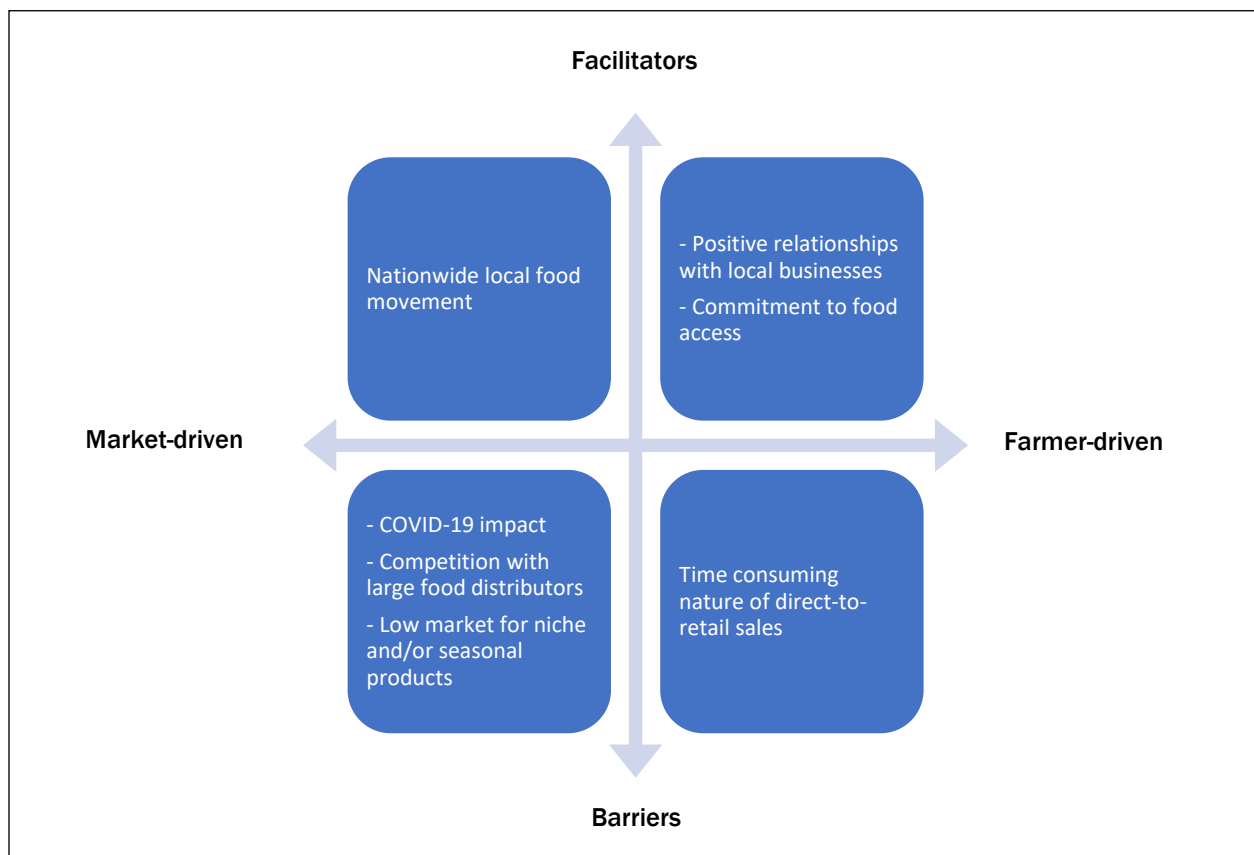
Farmers engaged in extensive discussions regarding the “local food movement”—a concerted effort by consumers to prioritize locally grown

foods in resistance to the prevailing consolidated, commodity-based food system. According to the farmers, residents of Charles County are participating in this movement and have demonstrated a higher demand for Southern Maryland–produced foods in recent years. One farmer described the lengths to which wholesale buyers will go to meet consumers’ demand for locally sourced food, stating:

It’s really the push of the local economy and this boom that has been local, and this whole local food movement that has helped guys like us, where these [distributors] are working with us, they’re giving us the time of day.
[Farmer #1]

In addition to intermediary sales, the farmers described establishing direct-to-consumer channels through avenues like farmers markets, CSA sub-

Figure 1. Farmer-Identified Barriers and Facilitators to Wholesaling Produce to Small Stores



scriptions, and on-farm sales. They highlighted the potential impact of this on building direct-to-retail sales channels, envisioning that the surge in consumer demand could manifest in their purchasing habits at nearby small food retailers. One farmer recounted a past endeavor by a convenience store to stock local foods:

Would the people in this area support direct produce? Yes. Because the owners who had [our local convenience] store prior to that, they bought local produce ... because when people were running in and they're like, 'oh yeah I could use some tomatoes,' they knew it was there and that you can stop in and get it. [Farmer #3]

2. Participating farmers have existing and positive relationships with local businesses in the area

The farmers portrayed Southern Maryland as a region rich in small businesses, a number of which already purchase directly from local farms. In describing their relationships with these businesses, the farmers suggested that the connections between farmers and local businesses in Charles County span beyond transactional exchanges and are instead rooted in civic engagement. Describing this collaborative environment, one farmer noted,

I started getting in with a lot of local business in the community. We've built so far—in the last six years—we've built this really tight-knit local, all of us local small businesses are very tight-knit and friends. And we all support each other. [Farmer #2]

Due to their existing direct-to-retail participation, the farmers were confident about maintaining and expanding these sales channels through the use of a mobile application. Reflecting on the long-term direct-to-retail relationship with one of the stores recruited to participate in the BUD trial, one farmer expressed:

With her, she buys, we do some value-added products, like we do nitrate-free beef jerky and beef sticks. ... And we've been working

with them for a very long time. And she likes to work with local people, bringing in local products. [Farmer #3]

3. Participating farmers are generally willing to work with store owners to make stocking their products easier

Several of the farmers were eager to embrace collaborative partnerships with small stores and described the many communication channels they use with local businesses, underscoring their dedication to being accessible to business owners. Alongside formal approaches like online ordering systems, farmers highlighted the significance of informal channels such as texting, which they found to be both easy and effective for maintaining communication with small businesses:

Oh ... we text. That's all we have. You know, whatever, 50 figs, and ... we have a big yield of whatever, corno di toros, would you like them? Like, Sunday morning, [we] texted him, hey, we got ... 40 pints of figs, would you like them? As simple as that, right? [Farmer #4]

Additionally, the farmers underscored their willingness to participate in efforts to address the distinct needs of small stores and businesses, acknowledging the challenges these establishments face in stocking substantial quantities of products. One farmer mentioned his cooperative relationship with a small business, wherein both parties collaborated on supply coordination. In this arrangement, the business specified the quantity of product needed, and the farmer cultivated it accordingly:

And actually, a lot of it, the ideal situation is the farmer grows on request. That's still my ideal situation. Like [one restaurant] used to, you know, you met in January, says, hey, grow us whatever, 50 corno di toro peppers, grow us 200 tomato plants. ... That would be the ideal situation. You really could grow into a known market. [Farmer #4]

The farmers also recognized that pricing could be a limiting factor for small businesses seeking to purchase local foods, and some expressed a willing-

ness to engage in negotiations to address this concern. One farmer recounted a partnership with a restaurant where he offered unsold produce from direct-to-consumer channels at a discounted price:

And I had to deal with him where, when Saturday I would just text him and say, hey, we got 50 extra bags of lettuce. Normally we would sell our lettuce for [US]\$5 a bag for a half pound. And for him I'd do half price. [Farmer #2]

4. Participating farmers have a commitment to food access and healthy eating

The farmers demonstrated support for the BUD app's overarching goal of enhancing accessibility to healthy foods in small retailers, with their endorsement rooted in shared values for health promotion and community food security. One farmer detailed how his path into farming evolved as he prioritized consuming fresher foods during his personal wellness journey, a passion he later sought to share with others:

I went from kind of eating whatever I wanted to, to eating more whole foods and more natural foods and things like that. ... Yeah, so when I changed my lifestyle, then I started growing. And then when my wife got pregnant, I was all about, like, 'we're gonna have a homestead, we're gonna grow all of our food. ...' Then I realized that we can grow a lot of food here, not just for us, but for the community too. [Farmer #2]

Another farmer spoke about his commitment to food security, saying:

And, you know, food security is something that I'm very passionate about. It's something that we are very passionate about as a family and how access is so, so important. And people, they think of access, they only think of 'well, the food's not there.' Well, it's more than that. It's the food being there. It's the ability of the consumer to get to the food, as well as for them to be able to get it home. [Farmer #1]

Taking these considerations into account, the farmers reiterated their broad endorsement of an intervention seeking to enhance consumer access to fresh produce. One farmer poignantly summarized this sentiment:

I don't care your economic means, I don't care your color, I don't care your gender identity, I just want to feed people. I want to put food in people's hands and eat it. It's all I care about. That's why I do what I do. [Farmer #1]

Barriers to wholesaling at small grocers

1. The COVID-19 pandemic had a disproportionate impact on many small grocers and businesses in Charles County

Multiple farmers highlighted the enduring challenges posed by the COVID-19 pandemic on both the supply chain and consumer demand in Charles County. One farmer recounted the significant setback of losing the majority of his customer base amid the pandemic's disruptions and expressed a persistent sense of risk aversion in future marketing efforts, emphasizing low expectations for future direct sales:

Like when COVID started, 80% of my income was restaurants. Eighty percent! Gone with no warning. And it has never recovered. It has not come back. So, it's just like it used to be every seven years you needed to reinvent, and now it seems to be every couple years, and it's not going to get easier. [Farmer #4]

Furthermore, farmers highlighted the substantial and disproportionate impact of the COVID-19 pandemic on small, family-owned retailers that had previously demonstrated a commitment to local food procurement. According to the farmers, the post-COVID retail landscape is marked by the gradual displacement of these businesses by larger retailers in urban centers. One farmer lamented:

That was a shame because there were stores and families that I've known that these businesses have been in for 150, 200 years, and ended up getting shut down during COVID.

And couldn't bounce back from it. [Farmer #3]

According to this farmer, the disproportionate impact on small businesses may have stemmed from COVID-relief policies that favored larger retailers and overlooked businesses operated entirely by families. Expressing her frustrations with the system in relation to her own business, she noted:

The whole COVID relief thing, if you didn't have, I don't have a payroll here. We're a family. I don't cut anybody a paycheck. Well, if you didn't have that, you couldn't get access to money. So, they never thought about family-owned businesses that just file a Schedule F or a Schedule C because it all gets filed at the end of the year on our taxes. ... They don't really think about family-based businesses and how things are run. [Farmer #3]

2. Participating farmers are unable to compete with the price and convenience of large food distributors

The farmers also emphasized the tendency of food retailers to choose products from large intermediaries that streamline food procurement for business owners by offering products aggregated from multiple producers and manufacturers. They explained that this tendency made it hard for them to sell to retailers directly in the past, and while they recognized their potential to complement this supply chain, they acknowledged the existing loyalties that food retailers may maintain with their current suppliers and expressed concerns about competing with well-established suppliers who have garnered brand loyalty:

And you probably know this, but like a lot of those country stores, I mean they have one supplier. Pretty much. You know, one truck comes and then it's kind of like when you go to a restaurant and say, do you have Coke products or Pepsi products? You have Coke products, then you have all their sodas. ... That's the problem you kind of run into. [Farmer #2]

Although most farmers were willing to augment the products provided by larger intermediaries, they expressed uncertainty about whether these retailers would actively seek additional food sources. One farmer recounted a conversation with a local restaurant owner who consistently ordered from a large distributor:

One of the local restaurants I was dealing with said, 'I only want to make one phone call and get my order. That's all I want to do. ... I want to make one phone call, this is what I need this week, and it gets dropped off.' So ... if they want the convenience of making one phone call, unless you have everything that they want, that one phone call is not going to be used. [Farmer #3]

Farmers also highlighted that large distributors, benefiting from economies of scale, have the capacity to provide lower prices to small food retailers, sometimes at the expense of quality.

With these competing distribution networks in mind, farmers emphasized the price point small stores are willing to pay as one of the primary obstacles to selling to these outlets. One farmer expressed hesitation to compromise on pricing while establishing relationships with new customers:

The average Maryland farmer, southern Maryland farmer, makes [US]\$7,000, you can't pay bills with that. Or you can't make a living. If the average U.S. farmer makes negative [US]\$1,400, why are you gonna squeeze the same guy over and over again? You can't get water out of a rock. It's just ... there's nothing to squeeze there. [Farmer #4]

3. Direct-to-retail sales can be time consuming for both store owners and farmers

The farmers speculated that a key reason food retailers favor the convenience provided by large distributors is the inherently time-consuming nature of the food retail industry. Drawing from a conversation with a food retailer, one farmer suggested that for direct transactions with local farms to gain traction, the intrinsic values linked to

promoting and selling local foods must outweigh the significance attributed to time efficiency by retailers:

They have the buyers out there buying from all the different people and they're condensing it into one place, and then you as a store owner or a restaurateur, you can call up and give your order: 'I need so many pounds of tomatoes, peppers, basil.' You know? ... He made it very clear he wasn't interested because he was like, time is money, I don't have the time to go do that. So that is one barrier I think, because people need to be willing to do it. [Farmer #3]

While acknowledging it as a barrier, the farmers empathized with the time-intensive demands of the food retail sector, drawing parallels to the time-consuming nature of their own profession. Many farmers recounted the early stages of their farming endeavors, highlighting the need for supplementary off-farm income sources, which, in turn, necessitated farming during nontraditional hours. Furthermore, farmers detailed the rigor of their planting schedules, emphasizing the highly systematic upkeep required for successful cultivation:

Everything is successive planting. We don't plant squash once. We plant squash about 15 times. We don't plant greens once. We plant it about 10 times. Peppers, half a dozen times. Eggplant, four times. ... We've got a system, I've got spreadsheets and documents and target dates where I want to be starting this by this day and this by this day so that I can turn the greenhouses over because space is always a concern so that the plants have to keep flowing. [Farmer #1]

Due to the time-intensive nature of farming, one farmer underscored the time-saving advantages associated with large distributors for both farmers and retailers, pointing out that there are inherent limitations to the extent a farmer can participate in direct sales to small retailers:

I can't just—so from my standpoint—I can't justify driving 10 different places to sell 10

boxes. Because your small store is only going to buy one box of this or one box of that. I mean, I know guys that work with restaurants and do all this stuff. You know, it doesn't fit our model. The amount of money we'd have to charge and the expenses with everything in between, because transportation, delivery, fuel, time. ... [Farmer #1]

4. Participating farmers grow products that are niche or seasonal in nature, which may not have a market at small stores where many people shop for staples

Appropriately named, convenience stores earn their title by stocking staple foods for American households. While certain farmers spoke about cultivating these essentials, like greens and potatoes, they also discussed growing produce for specific recipes or cuisines, recognizing that such items might not have a market in conventional convenience stores. Less conventional offerings described by farmers included intensely hot peppers like Carolina Reapers and Sichuan peppers, a variety of herbs such as Thai and Genovese basil, along with Asian persimmons, kiwis, and unique value-added products like kimchi and honey sticks. One farmer spoke of the challenges selling his products through conventional food retail channels:

Like, I do all those experiments, like will I find a market for figs, for saffron peppers, for sesame, for rice, for molasses? Will I find a market for it? But if I do the research, can I do it? At what price? I don't have those answers. So I'm sort of sticking my neck out over and over again. [Farmer #4]

The farmers also underscored the limitation of only providing stores with seasonal produce grown in Southern Maryland's climate. They voiced concerns about being unable to supply small retailers with high-demand items like oranges and bananas, which thrive in more tropical climates. Moreover, they believed that consumers, accustomed to the convenience of year-round availability of produce in large-scale markets, might express disappointment to food retailers if certain products are not

stocked during specific months. One farmer shared a conversation with a consumer at their local farmers market, emphasizing consumers' preference for consistent year-round access to produce facilitated by global trade networks:

And it makes it tough on us because everyone was like, well, why don't you have tomatoes in April? I'm like, well, because they don't grow in April. They just started two weeks ago coming out, you know? [Farmer #2]

Generally, farmers believed that to incorporate seasonal produce into small food retailers, intervention at both the individual consumer level and the retail level is warranted.

It takes more work. It takes more dedication. Yeah, and people going in need to know that they're not going to get asparagus in August. You know, they're not going to get strawberries in August, you know, so it takes a commitment from everybody to want to eat that way and run a business that way. [Farmer #3]

Discussion

This study marks the first exploration of the availability of local produce in small, non-urban food stores in Charles County, Maryland, and provides regional farmers' perspectives on the barriers and facilitators to wholesaling to those stores. We found that direct purchasing from local producers was uncommon among our sample of small food stores, which did not stock a wide variety of produce in general. Farmers in this study speculated that business challenges exacerbated by the COVID-19 pandemic, competition with large wholesalers, inability to locally wholesale out-of-season or non-native produce, and the substantial time investment required for direct-to-retail sales all contributed to the lack of direct purchasing from local producers. Nevertheless, farmers demonstrated a dedication to supplying fresh food to their community, a readiness to engage personally with suppliers, and had established relationships within a network of small businesses in Charles County, all factors that could enhance the feasibility of direct-to-retail sales to small food

retailers.

USDA data suggest that a recent surge in direct sales in the U.S. is due to increased direct sales to stores and intermediaries. However, a review of these data show that this trend does not apply to small, low-income farms, which rely more on direct-to-consumer sales (USDA Economic Research Service [USDA ERS], 2022). This could position small food retailers, such as convenience stores, as a better direct-to-retail market for these farms. When discussing the direct-to-retail sales environment in Charles County, farmers foresaw several challenges related to this approach. One of the most cited barriers affecting farmers' ability to sell directly to small food stores was pricing, and farmers speculated that most small stores source their inventory from large distributors who do not prioritize local produce, both out of convenience and aiming to minimize costs. They also expressed concerns that stores may not be able to afford a premium to cover the inputs required for producing higher-quality produce, compared to what is cultivated for large intermediary channels. Additionally, one farmer expressed concern about the financial feasibility of diverting time away from the farm to deliver relatively small quantities of produce to retailers. Prior literature confirms that large distributors are less inclined to sell local produce due to their focus on lower price points (Clark & Inwood, 2016), and that price significantly influences decisions regarding the procurement of local, organic produce in U.S. retailers (Oberholtzer et al., 2014) and fresh foods in small convenience stores (Caspi et al., 2016). However, we observed that small food stores also source their produce from supermarkets, where produce prices have been steadily increasing (USDA ERS, 2024) and are either comparable to local produce sold directly to consumers or more expensive (McGuirt et al., 2011).

Another frequently mentioned barrier to selling directly to small food stores was seasonality. Since the 1990s, the United States market has witnessed rapid growth in fresh fruit imports, which help offset seasonal shortages in domestic fruit production, granting consumers year-round access to produce while stabilizing prices (Huang, 2013). Farmers observed that, because consumers

have grown accustomed to this accessibility, they may express dissatisfaction with the produce available from retailers who source directly from them. In a 2017 survey, 78% of respondents identified seasonality as a hurdle to participating in direct-to-retail sales (Hughes et al., 2022), echoing the concerns voiced by farmers in our study who suggested that consumer education is needed to address this hurdle. This finding highlights a gap in the current development of the BUD app, which has no consumer-facing features such as education modules. This challenge presents an opportunity for stores to offer consumer education during the BUD trial regarding the advantages of seasonal eating, including sustainability (Vargas et al., 2021) and nutrient retention in produce (Wunderlich et al., 2008). Additionally, several interventions in small food stores have successfully employed taste tests as a strategy for promoting produce purchases (Curran et al., 2005; Gittelsohn, 2010). This method could be adapted using local, seasonal foods.

While many of the barriers cited by farmers were driven by market forces outside of their control, the primary facilitators of engaging in direct-to-retail sales stemmed from the individual-level characteristics of the farmers we spoke with. These characteristics include a commitment to making healthy food available in the community and a willingness to work personally with buyers. Although most farmers discussed price as a barrier, one farmer mentioned that one of the ways he had worked personally with retailers in the past was by providing a discount for produce that remained unsold through the direct-to-consumer market. This approach mirrors findings by Dunning (2016), who investigated direct-to-retail buyer/supplier dynamics in North Carolina and observed a conditional relationship between producers and buyers. In this dynamic, producers contacted retail stores with excess products and sold them for approximately half the price they would receive in a direct-to-consumer market. This finding could potentially steer the use of the BUD app in a compelling new direction, serving as a platform for local farmers to sell surplus produce to retailers at reduced prices, thus alleviating the price barrier for retailers. While farmers may earn less from this surplus produce,

they would still generate revenue, offering a preferable alternative to wasting or donating surplus (Ceryes et al., 2023).

Lastly, our findings revealed that less than half of the surveyed stores were authorized WIC or SNAP vendors. This is noteworthy given the critical role of independent grocers in mitigating barriers to adequate SNAP benefits (USDA FNS, 2021). To become SNAP authorized, retailers must offer a range of foods across four staple categories: (1) vegetables and fruits, (2) dairy products, (3) meat, poultry, or fish, and (4) breads or cereals, with at least one perishable item in two of these categories (USDA FNS, 2023). Similarly, WIC authorization requires retailers to stock specific food items that meet nutritional guidelines to support the health of low-income women, infants, and children (USDA FNS, 2022). Enhancing direct-to-retail marketing channels through interventions like the BUD trial could enable small stores to meet these criteria more effectively, and address the critical need for SNAP and WIC retailers in non-urban areas. Investigating the impact of the BUD app on facilitating WIC and SNAP authorization thus emerges as a promising direction for future research. Such research should examine not only how direct sourcing from farmers impacts stores' ability to meet SNAP and WIC authorization criteria, but also the economic impact on farmers as more independent retailers become SNAP- and WIC-authorized.

This study has several limitations. First, our sample of both stores and farmers was small due to the geographical limitation to Charles County and our inclusion criteria requiring farmers to market at least some of their produce through a direct-to-retail sales channel. However, of the 371 farms operating in Charles County in 2022, only 7% (26 farms) participated in direct sales (USDA NASS, 2022). Thus, our small sample size accurately reflects the marketing practices in Charles County and was appropriate for informing the BUD trial rather than answering a specific research question. Despite the limited sample size, the study successfully provided an understanding of direct-to-retail sales in Charles County, and offered insights for future directions in direct marketing through a mobile application. To gain a broader understand-

ing of direct-to-retail sales to small food stores throughout the United States, additional research is needed to gather insights of additional stakeholders, including store owners. Lastly, it is worth noting that all interviews, coding, and analyses were performed by a single researcher with an agrarian background, raised in a farming community with a strong emphasis on local marketing channels. While involving additional coders could have provided differing perspectives, resource constraints prohibited this approach. To enhance qualitative rigor, the researcher practiced bracketing and reflected on their positionality throughout the analysis and interpretation of data.

Conclusions

In many non-urban areas where supermarkets are scarce, small food stores are important sources of food for local consumers (Sharkey, 2009). However, these stores often struggle to offer fresh, healthy options due to distribution challenges, despite having the potential to source directly from local farmers. While direct sales between small stores and small farms are uncommon, direct-to-retail sales hold significant economic promise and have been increasingly adopted by larger farms (USDA ERS, 2022). In our formative research, which sought to understand this dynamic in preparation for an upcoming intervention, we observed

that the small stores in our sample rarely stocked local produce. Farmers cited several barriers to wholesaling to these stores, including challenges posed by the COVID-19 pandemic, limited consumer acceptance of seasonal produce, and competition from larger distributors. Nevertheless, some stores reported prior experience with direct-to-retail sales and acknowledged the potential of this marketing channel to expand fresh food access for county residents. They also highlighted the strong demand for local food in Charles County, suggesting a viable market for it in small stores. This research has deepened our understanding of both sides of the food supply chain and will guide our forthcoming digital intervention aimed at enhancing the efficiency and equity of food distribution.

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Appendix A.

Baltimore Urban food Distribution Store Impact Questionnaire (Baseline)

Section A: About Your Store

Store Classification

1. Respondent Ethnicity: _____
2. How many years have you been operating this store? _____
3. How many years have you been operating food stores in general?

4. Do you currently operate any other food stores or operations? Yes No
 - a. If YES, how many other food stores? _____
5. Normal days and hours of current store:

6. What days/times **you** are usually at the store:

7. What days/times is the store **busiest**?

8. What days/times is the store **slowest**?

9. What is your store called by community members (in addition to official store name):

10. Number of cash registers: _____
11. Number of aisles: _____
12. Estimated number of customers in the last: Day _____ Week _____
13. Number of "regular customers" (i.e., regularly shop in the store at least 1+ times per week, usually more)

14. Off the top of your head, what are the top 5 foods that you sold in the last 7 days? (probe: specify – if frozen meat, what kind?)
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____

SECTION B: Storeowner Psychosocial Factors

Stocking and Sales of Promoted Foods

I am now going to ask you about stocking and sales of certain foods in your store. For each of the foods listed below, please (1) Tell me if the sales of each food increased, decreased or did not change, (2) Estimate of the number of units (i.e. cans, boxes, packages) sold in the store **in the last 7 days**, from (date) to (today's date), (3) Give the current price of that unit, (4) List places you get that particular item, and (5) List who delivers that particular item. We just need your best guess.

Food	Standard Unit	Price of Unit	In the past 30 days, have sales: 1) Increased 2) Decreased 3) Not changed	How was the unit purchased? 1) online 2) bought at wholesaler/ supermarket 3) delivered	Where was the unit purchased?	Who delivered the unit?	Number of units sold in the past 7 days.
Stage 1: Low-sugar beverages							
Flavored water	1 bottle/can						
Bottled water	1 bottle						
Stage 2: Fruits and vegetables							
Collard greens	1 piece						
Kale	1 piece						
Mustard greens	1 piece						
Green beans	1 can/pack						
Apples	1 piece						
Bananas	1 piece						
Limes	1 piece						
Oranges	1 piece						
Potatoes	1 piece/bag						
Onions	1 piece						
Peppers	1 piece/bag						
Stage 3: Low-fat whole grain							
High-fiber bread	1 pack						
Brown rice	1 box/pack						
Oatmeal	1 box						
Whole-grain pasta	1 box						
High-fiber cereal	1 box						
Other							
Low-fat milk	1 container (pint, gallon)						

Outcome Expectations: Promoted Food Sales

I am now going to read you a series of statements about how well you think certain foods would sell in your store. For example, "BAKED CHIPS WILL SELL WELL IN MY STORE." Please keep in mind that your answers will not hurt my feelings; I want to know what you *really* think will happen. Please indicate how strongly you agree or disagree with each statement by choosing one of the following responses: strongly disagree, disagree, undecided, agree or strongly agree.

Food (— will sell in my store)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Flavored water					
Bottled water					
Collard greens					
Kale					
Mustard greens					
Green beans					
Apples					
Bananas					
Limes					
Oranges					
Potatoes					
Onions					
Peppers					
High-fiber bread					
Brown rice					
Oatmeal					
Whole-grain pasta					
High-fiber cereal					
Low-fat milk					

Self-efficacy for stocking of foods

The next set of questions asks you how sure you are that you can stock a particular food in your store. By this, I mean how sure are you that you can order food from vendors, make time to go buy the food and stock it, order the food and put it on the shelves (and make space for it). Please indicate how strongly you agree or disagree with each statement by choosing one of the following responses: strongly disagree, disagree, undecided, agree or strongly agree. [For example, "I CAN STOCK frozen vegetables IN MY STORE.]

Food (— I can stock)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
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Flavored water					
Bottled water					
Collard greens					
Kale					
Mustard greens					
Green beans					
Apples					
Bananas					
Limes					
Oranges					
Potatoes					
Onions					
Peppers					
High-fiber bread					
Brown rice					
Oatmeal					
Whole-grain pasta					
High-fiber cereal					
Low-fat milk					

Outcome Expectations: Impact of BUD

I am now going to read you statements about what you feel will be the effect of the BUD App on overall and promoted food sales. Your answers will not hurt my feelings; I want to know what you really think will happen. Please choose: strongly disagree, disagree, undecided, agree or strongly agree.

Outcome Expectations	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Not Applicable
Group purchasing with other corner stores will increase overall sales of promoted food.						
If the prices of promoted foods are reduced, overall food sales will increase.						
If shelf labels, and handouts are distributed for promoted foods/beverages, overall food/beverage sales will increase.						
If I stock BUD promoted food items, my customer base will increase.						
Using the chat feature to coordinate group purchasing with other corner stores will reduce the cost of promoted food.						
The BUD program will give me a competitive advantage over other small food stores in the surrounding area.						

Additional Comments:

Smart Phone/WiFi Access**A) Smart Phone**

Do you have your own smart phone? Yes No

Do you have an unlimited data plan on your phone? Yes No

B) WiFi Access

Do you have a device for accessing WiFi other than a smart phone (iPad, tablet, laptop, etc.)? Yes No

Do you have unlimited WiFi access in the store? Yes No

Payment Methods (yes/no box)

Do you accept any of the following payment methods?

PayPal Yes No

Venmo Yes No

Cash App Yes No

Zelle Yes No

Facebook Pay Yes No

WIC Yes No

SNAP Yes No

Other Yes No

Time Interview Ended: _____:_____ AM/PM

“Thank you, we are VERY grateful for your help!”