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SOCIOECONOMIC DETERMINANTS OF CHOICES OF COPING STRATEGIES USED BY TOMATO WHOLESALERS DURING COVID-19 MOVEMENT RESTRICTIONS IN KAMPALA CITY, UGANDA

DÉTERMINANTS SOCIOÉCONOMIQUES DES CHOIX DE STRATÉGIES D'ADAPTATION UTILISÉES PAR LES GROSSISTES DE TOMATES PENDANT LES RESTRICTIONS DE DÉPLACEMENT LIÉES À LA COVID-19 DANS LA VILLE DE KAMPALA, EN OUGANDA

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ABSTRACT

The Corona Virus Disease 2019 (COVID-19) pandemic disrupted global agricultural value chains, more prominently, of the perishable commodities such as tomatoes (*Solanum lycopersicum* L.), whose market viability depends on timely transportation and continuous trader-buyer interactions. In Uganda, Government-imposed movement-related restrictions, including curfews and strict movement regulations on vehicle use, exacerbated the logistical challenges for wholesalers operating in major markets of Kampala city. These restrictions limited access to production zones, reduced labour mobility, increased transportation costs and delayed market deliveries; ultimately threatening the profitability and resilience of tomato trade systems. In order to continue operating amidst restricted use of trucks and selling amidst curfew, traders employed a number of strategies including intensified use of phone calls and whatsapp, use of alternative rural routes, collective transportation, purchase from nearby areas, hiring purchase agents, and intermittent bulk purchases. The objective of this study was to interrogate socio-economic characteristics influence on the choice of coping strategies adopted by tomato wholesalers in Kampala city's main markets, in response to COVID-19 caused restricted truck use and curfew regimes. Using an exploratory sequential mixed- design, data were collected from 120 tomato wholesale trader surveys, 15 key informant interviews (KIIs) and three focus group discussions (FGDs) conducted in the city's three major markets of Nakawa, Kalerwe and St. Balikudembe (Owino). The main tomato wholesaler socioeconomic variables considered included gender, age, education level, market of operation, business duration and purchase volumes. Key findings reveal that gender, age, education and market of operation significantly shaped strategy adoption during both curfew and restricted use of trucks, which included preferences for collective transportation, use of alternative routes and hiring purchasing agents. From the results obtained, it is clear that coping was not a one-

size-fits-all process; rather, it was shaped by traders' individual and market characteristics. Recognising this diversity is essential for designing more inclusive support mechanisms and policy frameworks for similar emergence movement restrictions or future perishable market produce movement disruptions.

Key Words: Curfew, gender, *Solanum lycopersicum,* trucks

RÉSUMÉ

La pandémie de COVID-19 a perturbé les chaînes de valeur agricoles mondiales, notamment celles des denrées périssables comme la tomate (*Solanum lycopersicum* L.), dont la commercialisation repose sur un transport rapide et des échanges continus entre négociants et acheteurs. En Ouganda, les restrictions de déplacement imposées par le gouvernement, telles que les couvre-feux et la réglementation stricte de la circulation des véhicules, ont aggravé les difficultés logistiques des grossistes opérant sur les principaux marchés de Kampala. Ces restrictions ont limité l'accès aux zones de production, réduit la mobilité de la main-d'œuvre, augmenté les coûts de transport et retardé les livraisons, menaçant ainsi la rentabilité et la pérennité du commerce de la tomate. Pour poursuivre leurs activités malgré la circulation restreinte des camions et le couvre-feu, les négociants ont mis en œuvre diverses stratégies: utilisation accrue du téléphone et de WhatsApp, recours à des itinéraires ruraux alternatifs, transport collectif, approvisionnement des zones voisines, recours à des intermédiaires et achats groupés ponctuels. Cette étude visait à examiner l'influence des caractéristiques socio-économiques sur le choix des stratégies d'adaptation adoptées par les grossistes de tomates sur les principaux marchés de Kampala, en réponse aux restrictions de circulation des camions et aux couvre-feux induits par la COVID-19. Une méthodologie mixte séquentielle exploratoire a été utilisée pour collecter de données: 120 questionnaires auprès de grossistes de tomates, 15 entretiens avec des informateurs clés et trois groupes de discussion menés sur les trois principaux marchés de la ville (Nakawa, Kalerwe et St. Balikudembe [Owino]). Les principales variables socio-économiques étudiées étaient le sexe, l'âge, le niveau d'éducation, le marché d'activité, l'ancienneté de l'entreprise et les volumes d'achat. Les principaux résultats montrent que le sexe, l'âge, le niveau d'éducation et le marché d'activité ont influencé de manière significative le choix des stratégies adoptées pendant le couvre-feu et les restrictions de circulation des camions. Ces stratégies se traduisaient notamment par une préférence pour le transport collectif, l'utilisation d'itinéraires alternatifs et le recours à des agents d'achat. Il ressort clairement de ces résultats que les stratégies d'adaptation n'étaient pas uniformes et dépendaient des caractéristiques individuelles des commerçants et de leurs marchés. La reconnaissance de cette diversité est essentielle à la conception de mécanismes de soutien et de cadres politiques plus inclusifs pour faire face à des restrictions de déplacement similaires ou à de futures perturbations de la circulation des produits périssables sur les marchés.

Mots Clés: Couvre-feu, genre, *Solanum lycopersicum*, camions

INTRODUCTION

The COVID-19 pandemic presented an unprecedented global shocks, with wide-ranging effects on public health, economies and overall livelihoods (Poudel *et al*., 2020). Among the sectors most affected was agriculture, particularly those involved in perishable value chains that rely heavily on physical proximity of stakeholders, timely transportation and active market access (Yazdanpanah *et al*., 2021).

In developing countries like Uganda, where agriculture forms the backbone of the economy and is predominantly informal, the disruptions caused by the pandemic, severely destabilised agricultural production and trade systems (Workie *et al*., 2020). Perishable commodities such as tomatoes (*Solanum lycopersicum* L.), which require efficient

logistics and swift turnover to minimise spoilage (Cherono and Workneh, 2018), faced a crisis of survival during the pandemic.

To curb the spread of COVID-19, the Government of Uganda implemented a series of movement-related restrictions included curfews, limitations on the use of trucks and passenger vehicles, and inter-district travel bans (Nakazi *et al*., 2023). While these measures were necessary for ensuring public health conservation (Sid *et al*., 2021), they disproportionately affected sectors that depended on mobility, agricultural produce markets being among the most affected (Kayiira, 2021). Agricultural produce wholesalers, who form the link between rural production zones and urban consumer markets, were by far the most vulnerable to this development (Mwesigye *et al*., 2021). Use of trucks for produce transportation to markets is their popular means to the markets (Dijkxhoorn *et al.*, 2019).

The restriction of truck occupancy to only two individuals (the driver and turn boy) (Omondi and Barack, 2021), coupled with increased checkpoints along the road and the enforcement of a 7:00 pm to 6:30 a.m. curfew, severely disrupted the purchase and traditional night-time sale of tomatoes (Middendorf *et al*., 2022). Moreover, this period was preferred by traders as it allowed them to use daytime for procurement, enabled retail vendors to have ample time to sell to consumers, and accommodated early-morning food preparation by hospitality establishments such as restaurants (Bairagi *et al*., 2022).

In Kampala city, Uganda's largest urban and trading hub, the enforcement of COVID-19 induced restrictions was particularly stringent (MoH, 2020). Wholesalers operating in central markets faced compounded difficulties, including delays in procurement, increased transportation costs, reduced labour availability, loss of produce due to spoilage; and declining customer turnout due to limited consumer movement and closure of institutional buyers such as restaurants and schools (Kiaka *et al*., 2021). As a result, traders were compelled to adopt various coping strategies to continue their trade operations and sustain livelihoods (Nakazi *et al*., 2023). A total of nine strategie,s including intensified use of phone calls and Whatsapp, use of alternative rural routes, collective transportation, purchase from nearby areas, hiring purchase agents, use of smaller trucks, truck hawking, diversification of the business, and intermittent bulk purchases were used by traders to continue purchasing amidst restricted use of trucks and selling amidst curfew. The objective of this study was to interrogate the socio-economic characteristics' influence on the choice of coping strategies adopted by tomato wholesalers in response to COVID-19 caused restricted truck use and curfew regimes in the main markets in and around Kampala city in Uganda.

METHODOLOGY

Study area. The study was conducted during January and March 2023 in Kampala City, Uganda's largest urban centre and principal tomato produce market hub. Situated in the Central Region at latitude 0.3476° N and longitude 32.5825° E, Kampala city was designated a Category 1 high-risk district during the COVID-19 pandemic, due to its high population density, business activities and elevated corona virus transmission rates. As a result, it experienced the most stringent movement restrictions and market disruptions in the country (MoH, 2020).

The study focused on three major wholesale markets within the city; namely, Kalerwe, Nakawa, and St. Balikudembe (commonly known as Owino). These markets function as key aggregation and distribution centres for tomatoes and other fresh produce, supplying retailers and wholesalers who, in turn, serve consumers across the city and its suburbs (Dijkxhoorn *et al*., 2019).

Study design and target population. An exploratory sequential mixed-methods design was employed in this study, following the approach outlined by Creswell (2016). The study specifically targeted wholesalers who procured fresh tomatoes directly from farmers, transport them using mainly trucks and sold them to retailers or large-scale consumers associated with the three selected markets. Particular emphasis was placed on engaging wholesalers who had been actively involved in the tomato trade before, during and after the COVID-19 pandemic. These individuals were considered "information-rich" respondents, possessing valuable first-hand knowledge, experiences and insights into the coping strategies adopted in response to both curfew and restricted use of trucks

COVID 19 restriction regimes

The COVID-19 induced movement restrictions were imposed under two main environmental regimes, namely curfew and restricted use of trucks.

Curfew restrictions. Curfew restrictions refer to government-imposed limitations on the movement of people and vehicles during specified hours of the day as a public health measure to reduce human contact and slow the transmission of COVID-19. In Uganda, the COVID-19 curfew prohibited the movement of people, motorcycles, private vehicles and public service vehicles between 7:00 p.m. and 6:30 a.m., while motorcycles had an even earlier curfew beginning at 2:00 p.m. These temporal limits directly affected the operating hours of wholesale tomato markets, whose normal selling period (3:00 a.m. - 7:00 a.m.) fell entirely within curfew time.

Curfew created a distinct operational environment that warranted separate investigation because it altered traders' ability to conduct the early-morning bulk selling that characterises urban tomato markets. Curfew restrictions mainly disrupted selling by limiting access of retailers and institutional buyers to markets, reducing customer turnout, shortening trading hours, and increasing the risk of spoilage due to delayed disposal of highly perishable tomatoes. Curfew therefore posed a unique set of constraints that required traders to adopt specific coping strategies such as intensified phone coordination with buyers, adjusting selling schedules, among others

To analyse the influence of socio-economic characteristics on coping strategy adoption under this curfew environment, the logistic regression procedure was applied. Socio-economic variables; age, gender, level of education, market of operation, duration in business and quantities purchased were entered as predictors, while each coping strategy employed during curfew was treated as a binary outcome (1 = used, 0 = not used). This approach allowed us to determine how traders' demographic and economic attributes shaped the likelihood of adopting specific strategies to sustain selling activities during restricted time of movement.

Restricted use of trucks. Restricted use of trucks refers to government-mandated controls on the operation and occupancy of cargo vehicles during the COVID-19 lockdown, aimed at reducing human mobility and limiting contact during long-distance travel. In Uganda, these regulations allowed trucks to operate only as cargo carriers and prohibited them from transporting passengers, including traders and their porters. Each truck was restricted to a maximum of two occupants the driver and a turn-boy while the number of checkpoints along major highways increased markedly. These controls constrained the ability of tomato wholesalers to travel to production zones, supervise harvesting, sort tomatoes for quality, and accompany their consignments to urban markets.

This regulatory environment created a unique set of logistical challenges distinct from those posed by curfew restrictions. While curfew primarily affected selling by limiting

market operating hours, restricted truck use specifically disrupted purchasing by limiting traders' physical presence in production areas, increasing transit time due to repeated stops at checkpoints, and reducing real-time quality control during loading. The absence of traders and porters on trucks also meant that selection, packing, and loading decisions were delegated to farmers or hired intermediaries, raising the risk of spoilage, bruising, and quality variation. These distinctive constraints required wholesalers to adopt specialised coping mechanisms such as hiring purchasing agents, using alternative rural routes, intensifying phone-based coordination, purchasing from nearer regions, or increasing intermittent bulk purchases.

To examine how socio-economic characteristics shaped the adoption of these purchasing-related coping strategies, a logistic regression model was applied with each strategy coded as a binary outcome (1 = used, 0 = not used). Traders' socio-economic attributes including age, gender, education level, duration in business, market of operation and quantities purchased were used as predictor variables. Analysing these characteristics under the specific context of truck-use restrictions enabled us to determine which groups of traders were more likely to adopt particular strategies in response to the purchasing constraints generated by this regulatory environment.

Sampling and data collection

Sampling design and size. A multi-stage purposive sampling technique was employed at two levels (market and wholesale trader), followed by random sampling to select respondents from the target population, as recommended by (Rai and Thapa, 2019). Guided by the Israel (2012) sample size determination approach, a total of 165 participants were selected from a population of 270 registered tomato wholesalers across the three main study markets. Of these, 30 respondents took part in focus group discussions (FGDs), 15 participated in key informant interviews (KIIs), and 120 traders (40 from each market) were engaged in face-to-face survey interviews.

Key informant interviews (KIIs). A total of 15 Key Informant Interviews (KIIs) were held to generate a broader understanding of coping strategies the wholesale tomato traders used to continue purchasing and selling amidst restricted use of trucks and restricted time of movement (e,g. curfew) in Kampala main markets. Several technical persons highly knowledgeable in agricultural produce marketing, in Kampala city markets in particular, were identified for participation in the KIIs teams. These included Resident City Commissioner (RCC) who was the head of district COVID-19 task force, district police commander (DPC) who was in charge of implementing COVID-19 induced restrictions, and city marketing officer (CMO) who is the supervisor markets under Kampala Capital City Authority (KCCA).

Others included market chairperson of each market, tomato trader's associations' leader of each market, *boda boda* stage chairperson at each market; and truck driver chairpersons at each market. Key Informant Interview checklists were used. These consisted of items that explored how COVID-19 movement restrictions were implemented and enforced, the specific ways in which curfew and truck-use regulations affected tomato purchasing and selling activities, the coping strategies traders adopted in response to these disruptions, the coordination and support provided by market authorities and enforcement agencies, the challenges encountered during restriction implementation, and the key lessons and recommendations emerging from stakeholders' experiences.

Focus group discussions (FGDs). A total of three Focus Group Discussions (FGD) were held, one in each market. Each FGD consisted

of 10 participants of varying age, sex and level of education to collect information about the COVID-19 movement restrictions implementation and enforcement, the specific ways in which curfew and truck-use regulations affected tomato purchasing and selling activities, the coping strategies traders adopted in response to these disruptions, the coordination and support provided by market authorities and enforcement agencies, the challenges encountered during restriction implementation, and the key lessons and recommendations emerging from stakeholders' experiences.

Face-to-face interview. Data were collected through face-to-face interviews, using a semi-structured questionnaire. The questionnaire was designed to elicit comprehensive information on coping strategies employed by wholesalers to sustain their businesses under movement-related restrictions, and the socio-economic characteristics that pertained to the tomato wholesalers in Kampla city markets. Key areas of inquiry included the types and frequency of coping strategies adopted during the COVID-19 crisis; the regulatory measures imposed during the pandemic; the coordination and support provided by market authorities and enforcement agencies; the challenges encountered during restriction implementation; and the key lessons and recommendations emerging from stakeholders' experiences.. In addition, the questionnaire captured the socio-demographic and economic profiles of respondents, as summarised in (Mufuruki *et al*., 2025).

According to Mufuruki *et al*. (2025), most tomato wholesalers (65%) had attained a post-primary level of education; while the average age of the traders was 34.5 years. The average duration of the tomato business was 8.4 years. The majority of tomato wholesalers (67%) were male and the average quantity purchased was 34.3 boxes per purchase turn.

To determine the influence of the tomato wholesale traders' socio-economic characteristics on their choice of using a given coping strategy to remain in business amidst restricted trucks use and restricted time of movement (curfew), a discrete choice logistic regression model using STATA was used (Equation 1).

$P(Y = 1) = 1/(1+\exp^{\wedge}-(B_0 + B_1\text{Sex} + B_2\text{Education level} + B_3\text{Age} + B_4\text{Market of operation} + B_5\text{Duration in business} + B_6\text{Quantities purchased})$ ……..…….. Equation 1

Where:

P(Y=1) represented the response variable (strategies) categorised as 1, if the strategy was used and 0, if the strategy was not used. Each strategy was analysed separately for all the six socio-economic characteristics. The variables and predictors were operationalised as defined below.

Dependent variables. The dependent variable (purchasing and selling), that is the variables influenced by the adoption of a specific coping strategy; were operationalised as a binary variable for each strategy: 1: If the trader used the strategy (alternative rural routes, collective transportation, etc.) and 0: If the trader did not use the strategy. These two variables represented the core commercial activities that define the continuity and resilience of the tomato trade amidst external shocks such as restricted truck use and curfew regulations.

Purchasing of stock referred to the actions and decisions made by wholesale traders to acquire fresh tomatoes from production areas during periods of limited mobility. This process involved identifying suppliers, negotiating prices, organising transportation, and ensuring timely delivery of tomatoes from rural sources to urban markets despite logistical challenges. The purchasing process was particularly

constrained during the COVID-19 lockdown, when the number of people allowed on trucks was limited.

Selling of stock, on the other hand, referred to the ability of wholesalers to distribute and dispose of their tomato inventories to retailers and consumers amidst curfews and reduced market hours.

Independent variables. There were the predictors and included socioeconomic factors, and included age, gender, level of education, quantities purchased, market of operation and business lifespan. They were operationalised as follows:

Age: Continuous variable measured in years.

Gender: Categorical variable, coded as 0: Male and 1: Female.

Education level: Categorical variable, coded as 0: Primary level or below and 1: Post-primary level.

Business lifespan: Continuous variable measured in years.

Market of operation: Categorical variable indicating the market where the trader operates, coded as 0: Kalerwe market, 1: Nakawa market, 2: Owino (St. Balikudembe) market.

Quantities purchased: Continuous variable measured in the number of boxes of tomatoes purchased per transaction.

The dependent variable (coping strategies) and the predictors (socioeconomic factors) were analysed using STATA to establish their relationships.

Key Informant Interviews (KIIs). The Key Informant Interviews (KIIs) were conducted to obtain in-depth insights from individuals who held specialised knowledge, authority or experience regarding the operation and regulation of tomato trade during the COVID-19 movement restrictions in Kampala city. A total of 15 key informants participated in the interviews, purposively selected based on their institutional roles and direct involvement in the management or coordination of market activities during the pandemic. These included the Resident City Commissioner (RCC), who chaired the city COVID-19 task force; the District Police Commander (DPC), responsible for enforcing movement restrictions; the City Marketing Officer (CMO) from Kampala Capital City Authority (KCCA); and market leaders, including chairpersons of the three main study markets (Kalerwe, Nakawa, and St. Balikudembe/Owino). Additional participants included leaders of tomato trader associations, truck drivers' union chairpersons, and boda-boda stage leaders who were directly engaged in the transport and delivery of tomato consignments.

Focus Group Discussions (FGDs). The Focus Group Discussions (FGDs) were designed to capture collective perceptions, shared experiences, and social dynamics among tomato wholesalers regarding how they coped with COVID-19 movement restrictions. A total of three FGDs were conducted, one in each of the three study tomato markets (Nakawa, Kalerwe, and St. Balikudembe/Owino). Each group comprised 10 participants, selected purposively to ensure diversity in age, sex, education level, and business experience. This composition allowed for a balanced representation of perspectives across different demographic categories and business profiles within the tomato wholesale community.

The FGDs were moderated using a structured discussion guide that contained thematic questions focusing on:

(i) the impact of curfews and restricted truck use on tomato purchasing and selling,
(ii) coping strategies employed to sustain trade,

(iii) challenges encountered in implementation of these strategies,
(iv) forms of assistance received from government or market authorities, and
(v) lessons and recommendations for improving resilience in future disruptions.

RESULTS AND DISCUSSION

This section presents the study findings by illustrating how the socio-economic characteristics of tomato wholesalers shaped their choice of coping strategies under the two distinct COVID-19 movement-restriction environments; restricted truck use and curfew. The results are organised to show, first, the relationship with strategies employed to maintain tomato purchasing activities when truck movement was regulated, and second, the relationship with strategies adopted to sustain selling during restricted market operating hours imposed by the curfew. For each strategy examined, the analysis highlights the extent to which trader attributes including age, gender, level of education, duration in business, purchase volumes and market of operation influenced the likelihood of adopting particular coping mechanisms..

Truck restricted movements

Age of wholesaler. The age of the tomato wholesalers was significantly associated with the distance from where the tomatoes were purchased (Table 1). Old adult tomato whole traders (50+ years) were more likely to purchase from tomatoes from nearby areas due to the fact that they found it challenging to continue purchasing from distant areas owing many traffic check points along the roads used. This was reported by one of the participants in a FGD as follows:

> "On approaching different check points, we would get off board and walk a given portion of the distance to cross the checkpoints on foot and later get onboard past the check points. This practice became hectic for us the aged but the young ones could handle" (FGD-N-05Male).

Table 1 shows how socio-economic factors influenced traders' choice of the coping strategies under these conditions

This coping strategy required stamina to travel through a number of check points, which were hectic to tomato wholesalers; prompting them to opt for nearby sourcing, which required less travel, fewer checkpoints, and lower physical strain. The findings corroborate with those of Paul *et al.* (2021), who reported that the magnitude of effect of COVID-19 on Bangladeshi lower income people, varied with age of respondents where those aged above 50 years were mostly affected by the energy required to deal with productive livelihood challenges. Elsewhere in North-western Nigeria, Yegbemey *et al.* (2021) reported similar finding that older farmers had less physical capacity to cope with COVID-19 associated challenges in vegetable farming.

Younger tomato wholesalers' stamina and familiarity with mobile technology enabled them to explore longer routes and real-time coordination *via* phones or WhatsApp. In contrast, old adult tomato wholesalers preferred strategies that minimised movement and physical effort, such as delegation and trust-based transactions.

This finding underscores the heightened vulnerability of old adult tomato wholesalers to mobility disruptions and highlights age-related constraints that affect their business resilience. To leverage this finding, age-responsive interventions such as decentralised aggregation centres, digital procurement tools, and targeted mobility support should be integrated into emergency market-management plans. Therefore, this finding has demonstrated that age is an important socio-economic determinant of coping strategy choice and should inform future policy design.

TABLE 1. Socio-economic determinants that influenced choice of coping strategies for continued purchase amidst restricted truck use

Strategies	Alternative rural routes		Collective transportation		Phone calls and whatsapp		Purchasing from nearby areas		Intermittent bulk purchase	
Predictors	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value
Market										
Nakawa	0.431	0.188	0.402	0.167	0.768	0.693	0.29	0.135	2.365	0.36
Owino	0.903	0.855	0.918	0.879	0.243	0.102	0.394	0.244	0.303	0.322
Age_ year	0.9679	0.323	1.0005	0.98	0.998	0.961	1.127	0.022*	1.484	0.577
Gender										
Female	0.884	0.834	1.175	0.767	1.102	0.892	1.022	0.977	8.206	0.039*
Education										
Post-primary	0.405	0.343	2.91	0.153	0.487	0.479	2.701	0.392	0.055	0.142
Duration in business	0.964	0.534	0.968	0.603	0.935	0.39	0.911	0.241	0.97	0.754
Quantities purchased	1.003	0.316	0.998	0.578	1.002	0.477	0.994	0.411	1.005	0.449

Kalerwe market was used as a reference category for market of operation, Male was used as a reference category for sex, while primary level of education was used as a reference category for education

Gender of wholesaler. Gender of wholesalers was significantly associated (P=0.039*) with the mode of purchase of tomatoes from producers (Table 1). For instance, intermittent bulk purchase was significantly associated with the gender of respondents (P = 0.039), with female traders being more likely to engage in intermittent bulk purchase compared to their male counterparts. Female wholesalers were more likely to use intermittent bulk purchase, compared to their male counterparts (Table 1). This rather unexpected finding was attributed to the fact that female traders, during COVID-19 lockdown, had their domestic chores at peak. Female traders revealed that, during this period when all schools and non-essential businesses were closed, children and spouses were at home; thus increasing their (women) availability to attend to their family chores, which forced them to cut down the amount of time they were supposed to go to the fields to purchase the tomato fruits.

Anecdotal evidence showed, for instance that Uganda registered more pregnancies during COVID-19 lockdown than any other period since it became a nation. Some findings from the focus group discussion are presented herein:

> "We had to balance between running business errant and taking care of our families. All children and husbands were at home and they needed our services. We had to cut down the number of days we go to the field to purchase so that we create time to care after family members" (FGD-K-09 Female).

Following the closure of schools, workplaces, and social institutions, these responsibilities reduced women's ability to travel frequently to distant production zones, thereby making intermittent bulk purchase a more feasible strategy. This reflected gender-based differential vulnerability and adaptive behavior, whereby women adopt strategies that minimise travel time, reduce exposure to enforcement checkpoints, and accommodate household obligations. The finding also illustrates the structural constraints that limit women's mobility and underscores the gendered nature of market participation during crises.

To leverage this finding, gender-responsive mobility support such as aggregation points, digital trading platforms, and transport cooperatives should be strengthened to enhance women's resilience during future disruptions. This finding coloborate with those in Kiaka *et al*. (2021) and Yegbemey *et al*. (2021) who's studies documented that women traders faced higher domestic workloads and more restrictive mobility conditions during COVID-19 and, therefore, gravitated toward low-mobility coping strategies. Correspondingly, the study's finding supports demonstrates that gender is a critical determinant of coping strategy choice and should be integrated into policy frameworks aimed at strengthening trader resilience during shocks.

Education level. Education level of tomato wholesalers did not significantly influence (P>0.05) the adoption of coping strategies to deal with restricted truck use (Table 1). This implies that formal schooling had limited effect on how traders navigated the movement restrictions. In Kampala city markets' tomato trade, most coping responses such as collective transportation or distance to tomato purchasing points, and experience-based decisions were most important, rather than knowledge-intensive ones.

Regardless of their educational background, tomato wholesalers relied more on peer networks, personal experience, and resource availability to act quickly under the movement restriction pressures. Similar findings were reported by Bairagi *et al*. (2022), who observed that coping with COVID-19-related disruptions among small traders depended more on social capital and adaptability than on formal education. Hence, education does not confer a distinct advantage in responding to immediate logistical barriers like restricted truck movement

Duration in business. Experience in the tomato business had no significant influence on the choice of coping strategies adopted by tomato wholesalers to continue purchasing amidst restricted truck use (Table 1). This suggests that, regardless of the number of years a trader had spent in the tomato business, the decision to adopt specific strategies such as collective transportation, alternative rural routes, or intermittent bulk purchasing was more strongly shaped by other factors. The lack of statistical significance could be attributed to the fact that both new and experienced traders were equally exposed to the same external stressor (the COVID-19 movement restrictions) which created uniform operational challenges for the first time and across all experience levels. Even those with long-term experience in the tomato trade had limited control over transport regulations, thereby minimising the advantage that business experience could have provided.

Similar observations have been reported by Bairagi *et al*. (2022), who found that during the pandemic, business experience alone did not buffer traders against mobility restrictions, as adaptive capacity was largely determined by access to networks and logistical resources rather than years of market participation. This finding, therefore, highlights that exposure to prolonged experience did not necessarily translate into greater resilience or adaptive advantage when faced with externally imposed mobility shocks such as COVID-19 restrictions.

Market of operation. The market operations showed no significant effect (P>0.05) on the coping strategies adopted for restricted use of trucks for tomato transportation (Table 1). This suggests that, although the markets vary in size and clientele, traders across Kampala city markets experienced similar transport bottlenecks and enforcement conditions during the COVID 19 lockdown. The uniformity of government-imposed truck-use restrictions meant that tomato wholesalers from all markets faced comparable constraints, leading to relatively homogeneous coping responses. This finding reinforces the view that external policy restrictions created a shared vulnerability across markets (Mufuruki *et al*., 2025), overriding localised differences in infrastructure or market governance. Comparable outcomes were observed by Bairagi *et al*. (2022), who found that coping patterns among urban food traders were broadly similar across market types under nationwide lockdown measures.

Quantities purchased. The quantities of tomatoes purchased per transaction were also not significantly (P>0.05) associated with the choice of coping strategies (Table 1). This indicates that tomato wholesalers encountered the same degree of transport limitation, irrespective of volume of tomatoes handled, and were compelled to adopt similar coping tactics irrespective of their trading scale.

The COVID 19 lockdown created logistical challenges such as restricted truck occupancy and curfew schedules that affected all traders equally, regardless of transaction size. According to Bairagi *et al*. (2022), during COVID-19-related movement restrictions, the scale of operation did not guarantee mobility privileges or special access to transport, thereby neutralising the potential advantages of higher trading volumes

Curfew restriction regime

Age of wholesalers. Age of a tomato wholesaler was significantly associated (P=0.003**) with hiring of purchasing agents (Table 2). Old adult tomato wholesalers were more likely to hire purchasing agents than the young traders. This was attributed to the fact that traders aged 50+ (old adults) found it challenging to continue purchase from distant areas given very many traffic check points they had to face along with different restriction. On approaching different check points, most traders would get off board and

TABLE 2. Socio-economic determinants that influenced traders' choice of coping strategies for continued selling amidst Curfew restriction

Strategies	Purchasing from nearby areas		Phone calls and Whatsapp		Collective transportation		Alternative rural routes		Hiring purchase agents	
Predictors	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value	Exp(B)	P-value
Market										
Nakawa	0.804	0.783	1.187	0.763	0.564	0.483	1.598	0.446	0.092	0.021*
Owino	0.431	0.353	2.347	0.111	1.492	0.549	1.609	0.436	0.16	0.059
Age	1.777	0.253	0.997	0.198	1.025	0.525	1.013	0.667	1.231	0.003**
Sex										
Female	1.684	0.942	0.507	0.188	2.447	0.179	0.718	0.552	1.06	0.948
Education										
Post-primary	1.317	0.984	0.513	0.379	7.169	0.037*	0.701	0.668	2.654	0.519
Duration in business	0.483	0.383	0.964	0.492	1.127	0.103	0.969	0.601	0.876	0.129
Quantities purchased	0.994	0.496	1.002	0.349	1.004	0.284	0.999	0.986	0.991	0.291

Kalerwe market was used as a reference category for market of operation; male was used as a reference category for sex; while primary was used as a reference category for level of education.

walk a given portion of the distance to cross the checkpoints on foot and later get onboard of trucks past the check points.

Old adult traders found this very demanding as it required much physical energy to walk along a number of check points. One older male participant in the focus group discussion had this to say.

> "On approaching different check points, we would get off board and walk a given portion of the distance to cross the checkpoints on foot and later get onboard past the check points. This practice became hectic for us the old adults but the young ones could handle" (FGD-N-05Male).

On the other hand, it is likely that older wholesalers were financially more capacitated to be able to engage third parties in the trade spectrum. Poudel *et al*., (2020), in their study of psychological and livelihood impacts of COVID-19 on Bangladeshi lower-income groups, reported that the magnitude of the pandemic's effects varied with age, with those above 50 years being most affected due to limited physical capacity to manage livelihood challenges. Older traders were less able to endure long travel distances or walk through multiple checkpoints, leading them to adopt coping mechanisms such as purchasing from nearby areas or hiring purchasing agents. This demonstrates how age, as a socioeconomic determinant, shaped the capacity of stakeholders to choose suitable strategies to sustain their trade during COVID-19 restrictions.

Elsewhere, Yegbemey *et al*. (2021) reported that older vegetable farmers in north-western Nigeria were less resilient to COVID-19 lockdowns because they had limited physical capacity to navigate livelihood challenges.

Similarly, in the present study, older tomato wholesalers in Kampala city markets faced comparable constraints. This underscores how age, as a socioeconomic factor, influenced the ability of traders to select practical coping mechanisms under movement restrictions. The finding confirms that age is an important socio-economic determinant of coping strategy choice and should inform emergency planning in perishable value chains.

Gender of wholesalers. The gender of tomato wholesalers had no significant influence on the choice of coping strategies used to deal with curfew restrictions (Table 2). This suggests that both male and female traders faced similar curfew-related constraints and, therefore, adopted comparable coping tactics. During the COVID-19 lockdown, enforcement of curfew hours and checkpoint operations were non-uniformly applied, leaving little room for gender-based differences in business response. Both men and women relied heavily on the same strategies to maintain continuity of trade. Since purchasing and selling in the tomato wholesale trade are undertaken individually, each trader regardless of gender made independent decisions about how to cope with the restrictions. Comparable results were observed by Bairagi *et al*. (2022), who noted that under uniformly imposed movement restrictions, gender differences in coping capacity become minimal since structural limitations affect all traders equally.

Education level. Level of education was also significantly associated ($P=0.037^{*}$) with collective tomato fruit transportation as a coping strategy for movement in the city (Table 2). Wholesalers who had attained post primary level of education were more likely to use collective transportation than to those with lower or no formal education at all. Collective transportation meant traders teaming up to jointly to transport their tomato stocks to the market. Dinh and Salas (2017) underscored the importance of collective teamwork in business efficiency, while Skerlic (2020), in his study of factors influencing logistics decision making in the supply chain of the automotive industry, opined that that individuals with fairly-higher levels of education tend to possess stronger analytical

skills and a better understanding of economic principles, which can thus influence their operational decisions in logistics and supply chain management.

Mankiw (2020), in his comparison of primary and secondary education on understanding economic principles and policy, opined that secondary education plays a more influential role in fostering cost-saving decisions in business. This is due to the advanced understanding of in-depth economic principles, the practical application of these principles, and the development of critical thinking and analytical skills that it offers compared to lower levels of education. He further asserted that these attributes are essential for comprehending complex economic phenomena, such as economies of scale, and for making informed, strategic cost-saving decisions. Under Kampala city markets circumstances, strengthening cooperative transport groups, offering simple training in cost-sharing coordination, and using more educated traders as facilitators to support inclusive participation would likely improve collective transportation efficiency, reduce individual costs, and enhance equitable access to market opportunities during similar restrictions.

Duration in business. Experience in tomato business was not significantly associated with any coping strategies adopted to manage curfew limitations (Table 2). This indicates that the number of years spent in tomato trading did not provide a distinct adaptive advantage when confronting sudden, externally imposed restrictions. Both new entrants and long-term traders had to make spontaneous adjustments such as rescheduling buying and selling times or depending on intermediaries. The unprecedented nature of the curfew nullified the benefits of accumulated experience, as even seasoned traders lacked prior exposure to such prolonged, government-enforced movement controls. Similar findings by (Bairagi *et al.*, 2022) reveal that business longevity alone does not guarantee resilience under systemic crises, since adaptive success depends more on access to logistics and networks than on experience length**.**

Market of operation. Traders 'market of operation was significantly associated with hiring of tomato perchasing agents (Table 2). Tomato wholesale traders from Nakawa market were more likely to hire purchasing agents (P=0.021*) due to the fact that; Nakawa market changed tomato-market time from night to day, which eventually affected the purchase schedule. Due to adjustments made by market management to meet standard operating procedures (SOPs) space requirement, the fresh tomato selling time had to be re-scheduled from early morning (3:00 am - 5:00 am) to afternoon time (3:00 pm – 6:00 pm). Given the fact that purchase is done during day, traders found it hard to attend to the market and carry out purchase at the same time. It was, thus more strategic to employ purchasing agents who resided in villages, to help with purchase of tomatoes. This decision was made clearer from the focus group discussions as exemplified by the following excerpts from FGDs:

> "Buyers were not able to enter the market before end of curfew. This meant a shift from the usual tomato selling time stating at 3:00am-6:00am to afternoon. This affected our purchasing schedule and therefore we had to use brokers (agents) to purchase for us" (FGD-N-11, Female)

> "When we changed the selling time from morning (3:00am-6:00am) to afternoon (4:00pm-7:00pm), traders had to adjust many things including the time of traveling back to where they purchase tomatoes. This caused a lot of inconveniences where traders had to use agents in rural areas to purchase on their behalf" (KII-N-08, Male).

Coping strategies during curfew restrictions were strongly influenced by market-level governance and internal rule-setting, rather than physical location. This conforms to recent literature (Middendorf *et al*., 2022) which highlighte the role of market governance in determining trader adaptation during mobility restrictions. These findings show that institutional factors within markets significantly shape coping strategy choice, and they underscore the need for harmonised and trader-responsive market-management frameworks during emergencies.

Quantities purchased. The quantities of tomatoes purchased per transaction also had no significant (P>0.05) relationship with the coping strategies used during curfew restrictions (Table 2). This outcome implies that traders handling both large and small volumes were equally constrained by restricted movement hours. The curfew affected all wholesale operations uniformly, as tomato markets typically function at night and early morning periods that were entirely prohibited. Consequently, traders of all scales resorted to similar responses such as collective transportation or using purchasing agents. These findings are in line with those of Middendorf *et al*. (2022), who reported that business scale did not confer operational advantage under lockdowns because mobility restrictions were uniformly enforced regardless of enterprise size.

CONCLUSION

This study shows that tomato wholesalers in Kampala City responded to the purchasing and selling constraints created by restricted truck use and curfew hours with a diverse portfolio of coping strategies aimed at maintaining operational continuity. These strategies included:

(i) the use of alternative rural routes to bypass checkpoints;
(ii) collective transportation to share rising fuel and truck-hire costs;
(iii) intensified coordination through phone calls and WhatsApp;
(iv) sourcing tomatoes from nearby areas to minimise travel, and
(v) nintermittent bulk purchasing to reduce trip frequency.

Under curfew restriction regime, traders further adapted by relying more heavily on pre-arranged orders, hiring purchasing agents in rural areas, and using discrete routes or group logistics to ensure timely deliveries.

Importantly, these strategies were not uniformly applied; their adoption differed significantly according to traders' socio-economic characteristics. Old adult tomato wholesalers (50+ years) preferred nearby sourcing and the use of purchasing agents due to the physical demands of long-distance travel; female traders gravitated toward intermittent bulk purchasing to balance heightened domestic responsibilities; traders with post-primary education were more likely to organise collective transport; and market-specific conditions, such as stringent SOPs in Nakawa, influenced reliance on hired agents. These findings highlight that resilience within perishable-produce markets is shaped not only by external shocks but also by the varied capacities and constraints of trader groups.

The study concludes that strengthening resilience in perishable value chains requires emergency policies that recognise this diversity and support context-appropriate adaptive mechanisms. Movement-related restrictions should be implemented in consultation with trader associations and accompanied by mobility facilitation for essential food transporters. Investment in digital communication tools, targeted support for women traders, enhanced local sourcing infrastructure, and formal recognition of cooperative market institutions would further reinforce market stability during crises. By integrating socio-economic differences into

emergency planning and supporting the adaptive strategies already used by traders, Uganda can build a more inclusive and shock-responsive agri-food trading system capable of withstanding future disruptions.

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