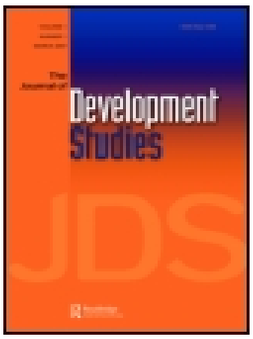

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# COVID Policy and Urban Food Markets in Peru: Governance and Compliance

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ABSTRACT *Urban food markets are essential channels of food distribution and spaces of social interaction where COVID-19 could be easily transmitted. The Peruvian government used budget incentives to motivate local governments to implement social distancing and food safety measures in these markets. Two surveys, in May and November 2020, show that municipality-owned markets had better compliance than privately or vendor-owned markets, especially with vendor protection measures and common space adaptations. Qualitative interviews helped to identify plausible causal mechanisms that explain this finding. Local governments perceived legal restrictions to investing public funds in privately owned markets, while vendor-owned markets faced agency dilemmas and opportunistic behaviour in decision-making about the required collective investments. We argue that a small-grants or loan facility specifically targeted at vendor-owned markets could have reduced these governance challenges and improved compliance. Peru's budget incentive policy to support food market governance could inspire other countries to design appropriate policy instruments for food safety and public health.*

**KEYWORDS:** Market places; collective action; food safety governance; food environment; COVID-19; co-regulation

## 1. Introduction

Urban food markets are the dominant food distribution networks in developing countries. In Peru, such markets account for more than half of the value of food acquired by urban households (INEI-Peru, 2020). The COVID-19 pandemic has drawn public and scholarly attention to the role of these markets in urban food systems. Initially, the focus was on the likely origin of zoonotic viruses after the wet market in China's Wuhan province was identified as the first human-to-human COVID-19 super-spread event. Later, attention shifted to the disruptive effects of lockdown on food markets and their key role in household food security (Laborde, Martin, Swinnen, & Vos, 2020; Naguib et al., 2021; Resnick, 2020).

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COVID-19 required governments to balance the need to reduce virus transmission with the need to safeguard food provisioning and prevent supply chain disruption (Leach, MacGregor, Scoones, & Wilkinson, 2021; Pu & Zhong, 2020; Quak, Saha, & Thorpe, 2022). Badly designed policies do more harm than good, especially for informal vendors whose livelihoods depend directly on food trading and who lack the resources to invest in adaptation measures (Kiaka, Chikulo, Slootheer, & Hebinck, 2021; Mutua, Kang'ethe, & Grace, 2021; Young & Crush, 2020). Garcia Martinez, Fearne, Caswell, and Henson (2007) suggest the need to develop forms of cost-effective food safety governance that combine the advantages of the predictability and binding nature of legislation with the flexibility of self-regulation. This 'co-regulation' requires coordination and consultations between local authorities and (informally) organised vendors (Battersby & Haysom, 2018; Brown, Lyons, & Dankoco, 2010).

There are still major literature gaps on how governments could operationalise this collaboration, although there is guidance on how markets should protect public health and food safety. The World Health Organization (WHO) developed general guidelines for food safety in food markets, including protecting workers from contracting infections (WHO, 2006). The Food and Agriculture Organization of the United Nations (FAO) published guidance to reduce the spread of COVID-19 in food markets, suggesting appropriate social distancing measures, opening hours and logistics (FAO, 2020). However, ensuring that food market vendors apply these measures is challenging because vendors and local governments have different risk perspectives that may be different to align in collective action (Barnett & Fournié, 2021; Wertheim-Heck, Vellema, & Spaargaren, 2014). Previous experiences with zoonosis outbreaks suggest that public health regulations should refrain from one-size-fits-all measures but empower local stakeholders to design appropriate solutions that build on existing positive solidarities (Leach, Meeker, MacGregor, Schmidt-Sane, & Wilkinson, 2020) aligned through coordination and collective action (Ostrom, 2015).

Though the functional and legal forms of urban food markets may vary between countries, most markets have an (informal) internal governance structure with leaders that are supposed to represent the vendors' interests (Argandoña & Silva, 2015; Grossman, 2020; Lyon, 2003; Porter, Lyon, & Potts, 2007; Resnick, Sivasubramanian, Idiong, Ojo, & Tanko, 2019; Roesel & Grace, 2014). These organisations often emerge where vendors need to negotiate their operating licenses or develop forms of self-regulation to keep the local authorities at arm's length (Grossman, 2020; Holland, 2016; Hummel, 2017; Reed, Bird, & WIEGO, 2019; Resnick, 2021).

All urban food markets, even the smallest and the most informal, have some basic rules and regulations that shape coordination and decision-making about practices and logistics (Battersby & Watson, 2018; Hummel, 2017). These rules govern social interactions between stakeholders and keep the market functioning.

Even in normal times, urban food markets must maintain basic levels of hygiene, with regular cleaning and waste disposal. Moreover, several basic services are needed if a marketplace is to stay attractive for vendors and consumers alike, including a basic level of physical security (for example, control of pickpocketing); respect for vendors' property rights; and safe overnight storage. Collective action research (Ostrom & Ahn, 2008; Shapiro, 2005; Ton, 2015) has shown that effective internal governance of membership groups requires opportunistic behaviour to be contained by smart internal rules and regulations. These need to fit the local cultural and socio-economic conditions and trajectories and combine formal and informal norms and rules (Fafchamps, 2004; Keefer, Espinoza, Espinoza, & Fort, 2019; Ménard & Shirley, 2022).

To enforce the internal rules and regulations within and around the marketplace, most urban food markets have a coordinating body (Grace, Roesel, & Lore, 2014; Grossman, 2020; Keefer et al., 2019) that also liaises with external governance institutions, such as the local government, the police and the food safety authorities. The power invested in these coordinating bodies carries the risk of abuse. Sometimes, stallholders will consider the fees and enforcement by the market leaders as too high in relation to the collective services provided (Grossman, 2020). The COVID-19 pandemic provided a context in which an external threat – closing food markets

due to public health concerns – helped these coordinating bodies enforce regulations that their members would otherwise have resisted.

This paper discusses Peru's budget incentive policy to support local governments in improving food safety and public health in urban food markets, requiring twenty specific social distancing and food safety measures (MEF-Peru, 2020a). Peru is an exception; most COVID-19-related measures in urban food markets have been implemented without specific national policy support (Quak et al., 2022). The rest of the paper is structured as follows. First, we describe how the policy emerged and its intended impact pathways. Second, we describe how we used two rounds of survey data that checked markets' compliance with food safety and public health measures to explore why some food markets complied better than others and on what type of measure. We show that the internal market governance system matters, with municipality-owned markets demonstrating better compliance than vendor-owned markets. Third, we provide evidence from interviews with vendors and local governments in three cities (Huancayo, Huaral, and Tumbes) to understand the causal mechanisms that explain these results. We conclude by suggesting how our findings may help shape future policies to improve food safety in urban food markets.

### *1.1. Peru's policy for COVID prevention in urban food markets*

In Peru, local food markets (*mercados de abasto*) are the main outlet for food in urban areas. They typically consist of a defined space with a perimeter wall and one or more passageways along which vendors sell their products in individual sub-units (CENAMA, 2016). According to the latest national household survey (INEI-Peru, 2020), 51 per cent of the total value of food items purchased by consumers is bought in these markets, 40 per cent in shops, and only 6 per cent in supermarkets.

Urban food markets are potential 'super-spread' sites for COVID-19. Therefore, the Peruvian government quickly introduced a policy to support urban food markets to adopt social distancing and other measures in response to the pandemic. On 8 May 2020, it enacted the 'Regulation on the functioning of food markets to prevent and contain COVID-19' (MEF-Peru, 2020a), which we refer to in this paper as the RFMC policy. It offered funds to local authorities if they met certain pre-defined targets (*metas*) of compliance with COVID-19 measures in urban food markets.

The high priority given to this policy and its rapid implementation was due to the close interaction between Peruvian ministries and research institutes that collaborated on the 2016 national food markets census (INEI-Peru, 2017a). As soon as Peru's first COVID-19 case was confirmed in early March 2020, researchers at *Grupo de Análisis para el Desarrollo* (GRADE) started to analyse possible hotspots of vulnerability to the virus using geospatial data and socio-economic indicators. In April 2020, combining information on population density, home overcrowding, age groups, and access to water, they identified several transmission hotspots in the city of Lima (Fort & Espinoza, 2020). They warned that without control measures, the food markets would become centres of contagion (Bambarén, 2020). The *Comando COVID* – the COVID task force coordinated by the Ministry of Health – instructed the police and armed forces to develop protocols to reduce public gatherings and instigate social distancing. Testing of vendors showed alarming COVID prevalence, with infection rates between 30 per cent and 80 per cent. Several markets were forced to close for a few days to introduce basic controls and hygiene measures.

Since its introduction in 2007, results-based budgeting has become the core mechanism for funding local governments (Armijo et al., 2015; Dale et al., 2020). In May 2020, the Ministry of Economy and Finance announced a special budget incentive for local governments to promote COVID-19 control measures in food markets. The policy had several components. It required municipalities to register all stallholders, establish an internal food safety control committee (*Comité de Autocontrol Sanitario*), and control social distance measures in all local food

markets. It also required the opening of temporary markets to relocate ambulant traders. The RFMC policy included 20 measures for which compliance had to be verified. In June 2020, the Ministry of Production verified the results (MEF-Peru, 2020a) – a task transferred to the Ministry of Health in December 2020 (MEF-Peru, 2020b). The RFMC policy continued in 2021 with no substantial changes in the measures (MEF-Peru, 2021).

### 1.2. Rationale for the policy

The rationale behind the RFMC policy component on social distancing measures is schematised in Figure 1. The budget incentive aimed to trigger local government support for and supervision of urban food markets to reduce COVID-19 transmission and improve food safety. The policy required food markets to organise and communicate social distancing measures, invest in social distancing and food safety measures, and ensure compliance by individual stallholders.

The causal relationships are not as linear and straightforward as the theory of change chart suggests. The public health outcomes result from a process in which many other factors and actors are involved. Social distancing in urban food markets is just one of many factors that affect COVID-19 transmission rates. Other factors – such as adherence to social distancing in people's homes, schools, public transport, or workplaces – may well be more instrumental. These higher-level outcomes are beyond the sphere of influence of the policy intervention (Earl, Carden, & Smutylo, 2001). Considering the lack of fine-grained data and the diversity of other intervening variables, it is impossible to empirically test the assumption that the RFMC policy led directly to improved public health outcomes. Fortunately, however, the positive causal link between better-managed markets and improved public health is not contested. There is general agreement that social distancing and better hygiene in such busy public spaces would help to reduce COVID-19 transmission and improve food safety to some extent. Therefore, our research focuses only on the causal links between the support provided and the presence of social distancing measures, cleaning practices, and food safety measures in the markets.

### 1.3. Critical assumptions

As with all theories of change, the causal arrows in Figure 1 rest on various assumptions about the conditions needed for the causal process to work (Funnell & Rogers, 2011). We focus on the governance-related ones.

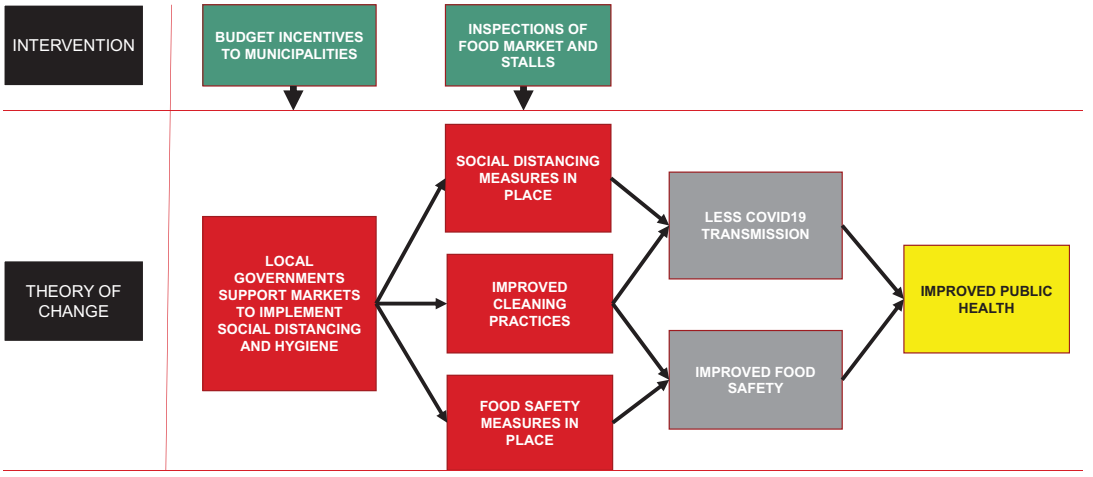


**Figure 1.** Theory of change for the RFMC policy.
*Source:* Authors' own.

One crucial assumption is that the local government will be motivated to act in response to the budget offer. In Peru, available local budgets are not always completely used (Loayza, Rigolini, & Calvo-González, 2011), so the additional budget alone may not trigger sufficient interest and political will to start working with stallholders and conduct inspections. Obviously, the RFMC policy had a more conducive context than previous policies. Some cities were facing an acute public health emergency, with extensive media coverage of busy markets, in a context where local hospitals became overwhelmed with COVID patients. Also, when the policy was announced (May 2020), Peru had already entered its first lockdown, and some of the required measures (such as mask-wearing) could be legally enforced.

Another critical assumption behind the theory of change was the expectation that compliance would be influenced by how well the market was governed. Earlier research in Peru had highlighted the importance of social ties for the quality of the internal governance of food markets, especially for maintaining and improving market infrastructure (Keefer et al., 2019). That study showed that markets that are more likely to take disciplinary action against vendors who disregard market rules make larger collective investments, provide more collective services, exhibit more regular payment of dues, and grow faster.

Though substantial heterogeneity remains, the type of ownership of the market premises provides a useful proxy to differentiate markets according to their capacity to enforce regulations among stallholders (Grossman, 2020). There are three broad forms of market ownership in Peru. Before 2000, most urban food markets were owned and managed as a public service by local municipalities. The municipality appointed the manager and could impose its decisions on stallholders. In 1996, in response to threats by the guerrilla group Sendero Luminoso (Shining Path) to bomb public buildings, the government privatised many of these municipal markets, giving vendors' associations (and occasionally private investors) preferential rights to buy the premises (García Molina, 2018). Many markets became vendor-owned as a result. Between 1996 and 2016, the number of food markets in Peru roughly doubled (INEI-Peru, 2017a). Many of these new markets emerged as vendor-owned associations – for example, in new urban settlements (*pueblos jóvenes*). Others started as private investments and were managed as normal commercial businesses.

The 2016 census of food markets (INEI-Peru, 2017a) identified 2,568 *minorista* food markets in Peru that together represented 250,000 vendor stalls. The Ministry of Production estimates that 35 per cent of the markets were created by vendors' associations or cooperatives, 30 per cent by municipal authorities, 15 per cent by private individuals, 14 per cent were illegally occupied, and 6 per cent resulted from hybrid initiatives such as relocation of street vendors (PRODUCE, 2017). In 2016, 54 per cent were vendor-owned, 29 per cent were municipality-owned, 15 per cent privately owned, and 2 per cent had other forms of ownership.

Vendor-owned markets have a more complex decision-making process than privately owned or municipality-owned markets. The latter two types rent out individual stalls to vendors, and the market owner is responsible for investing in shared infrastructure. There are also differences in access to funding for investments. For municipality-owned markets, investments are made with public funds, and additional funding became available through the RFMC policy. Markets run by vendors' associations need to convince the membership to invest individually in collectively owned premises and infrastructure. Also, the leadership needs to be strong enough to make members comply with group decisions, such as food safety and public health practices (Keefer et al., 2019). Fortunately, not all costs need to be shouldered directly by stallholders; many markets get additional income from services provided to vendors and consumers on the premises, such as public toilets, storage facilities or parking fees. According to the 2016 national food markets census (INEI-Peru, 2017a), on average, 35 per cent of the income of these markets is rent, 33 per cent from regular member contributions, and 16 per cent from providing hygienic services. The remaining 15 per cent is raised as one-off contributions for infrastructural investments. The census also shows that only 4 per cent of markets have a credit line with a bank.

## 2. Research hypotheses

This research explores the influence of governance-related factors on compliance with the RFMC policy's social distancing and food safety measures. We expected that the speed of decision-making on necessary market adaptations in communal areas would vary according to the type of internal governance system of each market and that this would affect compliance levels. We use the type of ownership as a proxy for the different governance contexts in which the required measures are implemented. First, we hypothesise that the type of ownership affects the speed of decision-making and the capacity to enforce COVID-related measures on vendors. Privately owned and municipality-owned markets, where vendors rent their stalls, are expected to make quicker decisions due to their more hierarchical decision-making processes. Moreover, municipality-owned markets have better access to funding to make the required adaptations, especially in this case where the RFMC policy channelled the additional earmarked funds through the local government. Vendor-owned markets need to mobilise resources internally among members. They rarely have access to credit (INEI-Peru, 2017a). Therefore, privately owned markets are also expected to have better access to finance than vendor-owned markets but less so than municipality-owned markets. Second, we hypothesise that the external governance context will influence compliance levels. Regular local inspections are expected to increase compliance, and local governments with greater technical capacity are expected to respond faster to the RFMC earmarked budget incentive. Governments with ample budgets available to invest are expected to be less incentivised by the additional results based RFMC funds.

## 3. Materials and methods

We used a mixed-methods research design. As Brady, Collier, and Seawright (2006) argue, strong causal inferences need evidence from dataset observations and causal process observations. We used regressions to explore the effects of the internal and external governance-related variables on the rate of compliance with the RFMC policy's social distancing and food safety measures. We used qualitative interviews with stallholders and local government officials to understand the causal mechanisms that might explain these patterns.

### *3.1. Explorative data analyses*

To establish compliance with COVID-19 measures in June 2020 during the first lockdown, we contracted the marketing company ECB to mobilise its network of enumerators as 'civil inspectors'. Research ethics and lockdown regulations precluded face-to-face interviews with market vendors. However, enumerators were allowed to buy food for themselves in the markets and could make observations in the stalls (vendors) and passageways (consumers) while maintaining social distance. They visited 378 food markets in 51 districts randomly selected from the 2016 census (INEI-Peru, 2017a). Due to project-specific budget policies (a focus on food safety in intermediate cities), the Lima Metropolitan area was excluded from the sampling frame. Some adjustments were made for logistical reasons (for example, not including the Amazonian area).

Lacking the formal authority to inspect, the enumerators could only access and observe the public areas of the market, not the private areas in the stalls or the loading and unloading areas. They obtained data on 17 of the 20 policy measures (Table 1). Moreover, we gained access to comparable disaggregated data from the Peruvian Ombudsman (*Defensoría del Pueblo*), which checked compliance in 358 markets in November 2020 (Bocanegra Carrión, García López, & Mejía Mendoza, 2021) using the same indicators and grading categories that we had developed for data collection in June. The two samples overlapped partly and resulted in a panel of 153 food markets that is representative of Peru's cities outside the Lima Metropolitan area. Of these markets, 46 per cent were municipality-owned, 42 per cent vendor-owned and 12 per cent privately-owned. The names of the markets are anonymised for ethical reasons.

**Table 1.** The 20 COVID measures required by the RFMC policy

| | COVID measures and categories |
|---|---|
| | Social distancing (1–7) |
| 1 | Signs with the maximum number of clients allowed in the market |
| 2 | Appropriate number of clients and control measures in place |
| 3 | Different entrance and exit doors, with signs and control person |
| 4 | Presence of control staff within and outside the market |
| 5 | Information on social distancing while queuing at entrance |
| 6 | Cleared hallways appropriately signalled to allow free circulation |
| 7 | Preferential access for vulnerable people |
| | Personal protection equipment (8–10) |
| 8 | Mandatory wearing of mask, apron, and gloves by stallholders |
| 9 | Mandatory wearing of masks by consumers |
| 10 | Protective shields at each stall |
| | Cleaning and disinfection (11–14) |
| 11 | Features for disinfection of hands and shoe soles at the entrances |
| 12 | Mechanisms for hand disinfection inside the market |
| 13 | Hand cleaning and disinfection stations |
| 14 | Cleaning and disinfection of the market at least once a week |
| | Solid waste management (15–16) |
| 15 | Stainless steel waste containers in each stall |
| 16 | Waste containers for solid residues inside the market |
| | Market organisation (17–20) |
| 17 | Clean and disinfected areas for unloading products |
| 18 | Designated person for transport and storage wears a mask |
| 19 | Posters with opening and closing times to the public |
| 20 | Posters or public announcements with safe shopping advice |

*Source:* MEF-Peru (2020a).

For data analysis, we created an index of the 17 measures (indicators) by computing the overall compliance rate, dividing the number of measures complied with by the total number of measures. For some measures, such as mask-wearing, we needed to convert the ordinal values asked in the survey questionnaire into a bivariate yes/no compliance variable. For example, we classified a market as compliant when the enumerators estimated that at least 80 per cent of the relevant persons wore masks. To search for predictors of higher or lower compliance, we ran a regression with overall compliance as the dependent variable and included multiple independent variables. Aware that the RFMC budget was assigned to municipalities, we added city fixed effects to the regression model and clustered the standard errors at the district level.

Second, we wanted to find underlying characteristics of the measures that could explain relatively high or low compliance. We used Principal Component Analysis (PCA) to make groups of measures with a similar compliance pattern. We selected the components with an Eigenvalue $>1.0$. To facilitate interpretation of the components, we used the results of the varimax rotation. We interpreted the components considering the variables with a loading higher than 0.30 and considering the proportion of unexplained variance and the Kaiser-Meyer-Olkin measure (KMO $> 6$). The June 2020 data was used to compute the vectors of variables of each component and the respective factor scores. The same vector was subsequently used to compute the factor scores for the observations in November 2020. We checked the consistency of the components by comparing the PCA results derived from the full sample and the panel sample (see Supplementary Materials).

Third, we used a regression to verify our hypotheses that internal and external governance partly explained the difference in compliance between markets. The 2016 census of food markets (INEI-Peru, 2017a) provided the data on three of the governance-related variables. It registered the ownership of the market and asked for previous experience with public inspections by the local environmental health and food safety authority (*Dirección General de Salud Ambiental*,

DIGESA) and the national food safety authority (*Servicio Nacional de Sanidad Agraria del Perú*, SENASA). The fourth governance-related variable, a proxy for the technical capacity of municipalities to use the earmarked funding, is derived from the annual ranking of municipalities according to their capacity to invest their assigned budgets in previous years (MEF-Peru, 2020c). As these rankings vary across years, we used their average ranking over three years (2017 to 2019). Finally, we added a fifth variable that captures the mining royalties as a percentage of the total municipal budget as a proxy for ease of mobilising funds for the market improvements.

To control for other factors that could affect the comparison between markets, we added covariates from Peru's Population and Housing Census (INEI-Peru, 2017b), public health data on COVID-19 (MINSA, 2020) and several variables from the 2016 census of food markets (INEI-Peru, 2017a). That census provided covariates for the age and size of the market and the state of its infrastructure. We also used the presence of street vendors as an instrument to control for unobserved factors. Note that the actual situation of street vendors in June and November 2020 could have been substantially different from 2016 due to COVID lockdowns and related measures.

We used a linear ordinary least squares model (OLS) with fixed effects at the city level as controls. We clustered standard errors at district level because we include as regressors some variables that are only available at that level. We used the *areg* command in Stata, which is the recommended procedure when the regression includes multiple dummy variables (McCaffrey, Lockwood, Mihaly, & Sass, 2012).

### 3.2. *Qualitative stakeholder interviews*

Alongside the surveys, we organised interviews with stakeholders in three cities (Huancayo, Huaral, and Tumbes) to understand the causal mechanisms for the statistical patterns discovered through the regressions. In January 2021, ECB used a structured interview to ask 48 stallholders in 6 food markets for examples of investments, changes in handling practices, and collective actions, and discussed the role of COVID-19 and food safety concerns in their decision-making process. The interviewees were purposefully selected and consisted of a mix of vendors of meat products with varying food safety conditions and meat types sold. The sample (eight in each market) consisted of four vendors of chicken and four vendors of other meat types; at least one with relatively well-developed food safety practices (for example, refrigerated display) and one with less well-developed practices; at least one with a role in managing the market (for example, board member); at least one man and one woman; and at least one younger and one older vendor. The authors also interviewed six local government officials (in February 2020, February 2021, and June 2021). All interviews were transcribed. Ethical approval for the research was granted by the ethics committee of the Peruvian University Cayetano Heredia (Certificate 516-22-19).

## 4. Results

### 4.1. *Data patterns*

According to the results-based monitoring framework compliance with the RFMC policy was measured using the 20 indicators (MEF-Peru, 2020b). However, as explained in the Materials and methods section, ECB's civil inspectors could not observe compliance with all measures, notably indicator 15 (presence of stainless-steel waste containers at each stall), indicator 17 (clean and disinfected areas for unloading products), and indicator 18 (a designated person for transport and storage wears a mask). Table A1 in the Appendix presents descriptives for all the variables included in the regressions. Some variables with a high skewness have been transformed to their natural log (ln).

There was a higher compliance rate for most measures in November 2020 compared to June 2020. Overall compliance rose only slightly from 72 per cent in June 2020 to 75 per cent in November, but the variance in the sample is such that the difference is not statistically significant ($t = 1.41$; $p = .162$). Table 2 presents the regression results with the overall compliance score in June and November 2020 as the dependent variable. We see that municipality-owned markets perform consistently better compared with vendor-owned markets. They had a slightly faster compliance in June ($t = 1{,}74$; $p < .10$) and a far better compliance in November ($t = 2.61$; $p < .05$). In June, the vendor-owned markets did slightly better than privately owned markets ($t = -1.89$, $p < .10$), but this advantage had disappeared five months later. Markets with a higher percentage of stalls that sell dry products tended to have faster compliance than those that function more as 'wet markets', selling perishable products like fruit, vegetables, meat, and fish ($t = 2.16$; $p < .05$). The municipality's technical capacity in executing previous budgets appears as a critical enabling condition for compliance six months later, in November ($t = 2.46$; $p < .05$). Previous experience with supervision by DIGESA appeared to have some influence on early compliance in June ($t = 2.15$; $p < .05$) and the markets with better initial infrastructure (adequate walls) and higher gross earnings adopted the measures earlier ($t = 2.24$; $p < .05$). However, these differences had evaporated six months later.

To explore whether there are other underlying factors that could explain the level of compliance with the measures, we used PCA to disaggregate the measures into principal components that could elicit specific attributes of each measure. We applied PCA separately on the 377 markets that had been sampled in June and the panel of 153 markets that were sampled both in June and November 2020 (see Supplementary Materials). In both analyses, PCA identified five components with an Eigenvalue >1. The components were labelled deductively, searching a common denominator for the type of measures that have a loading of at least 0.3. The two analyses yielded similar results for four of the five components, with the PCA components of the panel analysis somewhat easier to interpret because each measure only loads on one of the components (see Supplementary Materials). Table A2 in the Appendix shows the five principal components resulting from the panel sample with the main measures loaded on each. Component 1 loads the measures related to 'signage'. Component 2 loads measures that need 'control and cleaning staff'. Component 3 loads several measures that imply cash expenses for 'common space adaptation'. Component 4 is dominated by the two measures related to measures for 'vendor protection'. Component 5 is less clear-cut but includes mandatory mask-wearing by consumers and offering preferential access to vulnerable people, which we labelled 'consumer protection'. We used the resulting vectors to compute predicted factor scores for these components in November 2020.

We used regressions with each of the components as the dependent variable and the same set of covariates. The results (Table 3) show that municipality-owned markets have a higher compliance rate compared to vendor-owned markets on common space adaptations ($t = 2.80$; $p < .01$) and vendor protection measures ($t = 2.44$; $p < .05$). Access to mining royalties as additional income also affected the compliance rate on common space adaptations ($t = 2.71$; $p = .01$). Experience with DIGESA inspections was weakly correlated with speedier uptake of control and cleaning measures ($t = 1.84$; $p < .10$), while previous experience with the food safety authority (SENASA) was reflected in higher compliance with vendor personal protection equipment (PPE) in November ($t = 2.54$; $p < .05$). We also see that the vendor-owned markets were quicker to comply than privately owned markets, except for the measures that required control and cleaning staff. However, they lost their advantage on this measure six months later.

### *4.2. Plausible causal mechanisms*

The qualitative interviews with stallholders and government officials in three cities helped explain the statistical associations, especially why municipality-owned markets had consistently higher compliance rates than vendor-owned markets.

**Table 2.** Regression results with overall compliance as the dependent variable

| Explanatory variables: overall compliance score | | | | | | |
|---|---|---|---|---|---|---|
| | June 2020 | | | Nov 2020 | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Internal governance system (base = vendor-owned) | | | | | | |
| Municipality-owned | 0.056 | 0.057* | 0.067* | 0.135*** | 0.114** | 0.133 ** |
| Privately owned | −0.086 | −0.084* | −0.080* | −0.027 | −0.034 | −0.017 |
| External governance context | | | | | | |
| Municipal management capacity (2017–2019) | | | 0.038 | | | 0.364** |
| Mining royalties % of total budget (2017–2018) | | | 0.166 | | | 0.418* |
| Supervision DIGESA (2016) | | | 0.105** | | | 0.079 |
| Supervision SENASA (2016) | | | 0.019 | | | 0.033 |
| Type of market | | | | | | |
| % 'dry' stalls (2016) | | 0.241** | 0.248** | | −0.087 | −0.073 |
| Other controls | | | | | | |
| COVID cases per 100k (15 May) | | −0.000* | −0.000 | | 0.000 | 0.000 |
| Log district population (2017) | | 0.031 | 0.026 | | −0.033 | −0.069 |
| District poverty level (2018) | | −0.083 | −0.179 | | 0.457 | 0.371 |
| District population density (2017) | | 0.054 | 0.052 | | −0.097 | −0.085 |
| Markets' age | | 0.000 | 0.000 | | −0.000 | 0.000 |
| Log markets' # stalls (2016) | | 0.022 | 0.013 | | −0.005 | −0.020 |
| Market electricity (2016) | | 0.103 | 0.097 | | −0.001 | −0.016 |
| Market adequate walls 2016) | | 0.078** | 0.078** | | −0.018 | −0.010 |
| Market log gross-earnings (2016) | | 0.024 | 0.023* | | 0.002 | 0.003 |
| Presence of street vendors (2016) | | −0.034 | −0.027 | | 0.064* | 0.062* |
| Constant | | −0.203 | −0.157 | | 1.012* | 1.075** |
| Observations | 153 | 153 | 153 | 153 | 153 | 153 |
| R-squared | 0.26 | 0.39 | 0.40 | 0.46 | 0.49 | 0.53 |
| $F(x,38)$= | 1.79 | 4.93 | 7.37 | 5.62 | 1.89 | 2.91 |

*Source:* Own data.

*Notes:* The fixed-effects areg command in Stata was used. The regressions include city fixed effects to account for unobserved heterogeneity between cities, and the robust standard errors are clustered at the district level. ***$p < .01$, **$p < .05$, *$p < .10$. Models (1), (2), (4), and (5) are robustness checks for regression (3) and (6), which results are used in the paper. See Supplementary Material for the full results.

**Table 3.** Regression results for compliance per factor component

| | Signage measures | | Control and cleaning measures | | Common space adaptation measures | | Vendor protection measures | | Customer protection measures | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Component 1 | | Component 2 | | Component 3 | | Component 4 | | Component 5 | |
| Explanatory variables | June 2020 | Nov 2020 | June 2020 | Nov 2020 | June 2020 | Nov 2020 | June 2020 | Nov 2020 | June 2020 | Nov 2020 |
| Internal governance system (base = vendor-owned) | | | | | | | | | | |
| Municipality-owned | 0.514 | 0.569 | 0.285 | 0.484 | 0.124 | 0.729*** | 0.019 | 0.433** | 0.172 | 0.170 |
| Private-owned | −0.986** | −0.187 | −0.313 | −0.110 | −0.523* | −0.044 | −0.059 | −0.185 | −0.964** | 0.263 |
| External governance context | | | | | | | | | | |
| Municipal management capacity (2017–2019) | 0.122 | 1.607** | 0.147 | 0.747 | −1.083 | 2.141** | −0.022 | 1.417 | 1.371* | 1.432 |
| Mining income as % of total budget (2017–2018) | 1.502 | 0.305 | −1.701 | 1.781* | 2.748*** | 3.071** | 2.124** | 1.702 | 0.971 | 0.772 |
| Supervision DIGESA (2016) | 0.337 | 0.479 | 1.137* | 0.613 | 0.488 | 0.600 | 0.634 | −0.511 | −0.271 | 0.037 |
| Supervision SENASA (2016) | 0.150 | 0.090 | −0.056 | −0.246 | −0.071 | 0.297 | 0.278 | 0.405** | 0.340 | 0.207 |
| Type of market | | | | | | | | | | |
| % 'dry' stalls (2016) | 2.114* | −0.608 | 1.564 | −0.157 | 0.945 | −0.331 | 0.426 | −0.631 | 0.979 | −0.339 |
| Other controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| City FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 153 | 153 | 153 | 153 | 153 | 153 | 153 | 153 | 153 | 153 |
| R-squared | 0.400 | 0.355 | 0.377 | 0.475 | 0.545 | 0.503 | 0.581 | 0.866 | 0.412 | 0.512 |
| $F(17,38)$ | 6.836 | 1.981 | 5072 | 2.162 | 10.900 | 4.848 | 3.504 | 4.875 | 4.953 | 1.665 |

*Source:* Own data.
*Notes:* The fixed-affect areg command in Stata was used. The regressions include city fixed effects to account for unobserved heterogeneity between cities, and the robust standard errors are clustered at the district level. ***$p < .01$, **$p < .05$, *$p < .10$. See Supplementary Material for the full results.

Municipal authorities could threaten vendors who failed to comply with closing their market. However, they explained that there are limits to what that could achieve, as well as the associated risk of more unregulated street vending in that situation. Instead of closing markets or fining market owners, they would sanction individual stallholders.

> The [recent] market closure? (.) When we closed the market for COVID, the vendors went to sell on the streets. (.) Last year, in October, we passed the regulation that made the measures mandatory [for individual vendors]. First, we only gave them a preventive notification, but now we have started to sanction. The sanction is directly on the stalls. (Huaral, municipal officer, 2 February 2021)

Compliance was speeded up by the pressure put on market boards by municipal inspectors (DIGESA) or the Health Department, enforcing COVID-related measures. The president of a vendor-managed market in Huaral explained that the greater presence of municipal staff with powers to sanction members aided their internal governance. The combination of external and internal governance mechanisms created an incentive structure that motivated members to align their individual and collective interests and comply with the COVID measures:

> Almost daily, the supervisor [of the municipality] makes his round, also on food safety. We are in constant communication with them, foremost with the Health Department because of COVID. Due to my work, I cannot always be present in the market. But [I am] with my mobile. And I take some time to go to the market to consult other board members who are vendors. (.) We formed a committee that makes daily rounds to verify compliance with one [representative] of the plastic stalls, five from vegetables. (.) Right now, because of the heat, many take off or lower their mask. This is the type of issue the committee is working on. (Huaral, vendor-owned market, president of board, 26 January 2021)

The inspections by the Ministry of Health not only affected the behaviour of stallholders but also motivated other local municipal officers (DIGESA), as in the case of Tumbes.

> When we don't act in our functions, the Health Department indicated that we would face the consequences. They can fine us [as municipal officers]. Therefore, we keep pressing the private market to implement the measures. (Tumbes, municipal officer, 17 June 2021)

Some vendor-owned markets use the income from services to make the adaptations and organise the control measures. For example, in one vendor-owned market in Huancayo, vendors indicated that:

> (.) [most of] the money comes from the toilets and [levies on] ambulant traders. (.) We decided in the general assembly a fee of 5 soles [per day] per stall for improvements. So, at the end of the year, we had 70,000 soles. (Huancayo, vendor-owned market, stallholder OM, 11 January 2021)

> The fees are working well. Now we have someone at the gate to take [people's] temperature and apply [hand sanitizer] alcohol. We counted how many vendors we are and thus how much we need to pay each. (Huancayo, vendor-owned market, stallholder MS, 12 January 2021)

Interviewees suggested that managing a vendors' association is a constant struggle and that compliance results from a combination of internal and external governance mechanisms.

> With 3 soles, 90 a month, we pay for the night watch, who does the cleaning and now the daily disinfection. We bought a spraying kit, and we have a girl who collects the fees, another one that cleans the toilets, and some guys are in the entrances (.) Everything is paid with the 3 soles [per day]. (.) But several [stallholders] don't pay (.) According to the statute, the treasurer needs to sanction them to avoid the problem, But he is scared – some [non-payers] are quite aggressive – he doesn't dare to. (.) For my part, it would be excellent when the municipality would administer the market. Because it is quite an issue (.) take care of

> service payments, the workers, resolve all those issues [such as] repair of electricity, etc. (Huaral, vendor-owned market, president of board, 26 January 2021)

> Of course, we have people that don't agree 'I am not doing this'. Or when we need to buy some material, 'no, I don't want that [quality]' (.) We know each other, we are not friends. In all meetings, in all markets, there are different types of people (.) So that they don't close the market, it's for that pressure, not because I suddenly agreed with my friend. (Tumbes, vendor-owned market, stallholder JP, 5 February 2021)

These quotes illustrate that, especially in vendor-owned markets, introducing new practices successfully depends partly on the ability of the internal governance system to sanction non-compliance. The board's powers in this respect are limited, especially when compared to municipality-owned and privately owned markets.

The interviews showed that their early uptake of some of the measures can be explained by the municipality's more ready access to funds for making posters, signs, and installing cleaning equipment. For example, in Tumbes, the municipal officer highlighted the perceived legal constraints on using public money to improve privately or vendor-owned markets:

> In the public markets, there are no problems. We could make many improvements. That was easy. We even have a budget approved to build a new, larger municipal market. But we can't invest in [remodeling] the private market. We are not allowed to do so. They need to arrange and pay for it themselves. (.) In that [vendor-owned] private market, it is much more difficult to change things. I have a good relationship with them, but it is really complicated. We support them with people [to control COVID], and we do the daily cleaning. We [even] invested already 40,000 soles in that private business! We gave them aprons, waste containers for all stalls. (.) But they don't use them! (Tumbes, municipal officer, 17 June 2021)

The additional investments triggered by the RFMC policy may have longer-term effects on food safety practices in urban food markets. Stallholders mentioned several improvements that have taken place.

> Because of COVID, they asked all of us to install drains and to have water. Before, there was none. Bit by bit [it improved], but the pandemic made them [the board] accelerate. (Huancayo, vendor-owned market, stallholder CA, 15 January 2021)

> Now, (.) you must have noticed that the stalls have improved with their baskets [with products], everything well ordered. (.) In the past, it wasn't like this. There were some tables and several heaps where waste was thrown away. (Tumbes, municipality-owned market, stallholder AEC, 5 February 2021)

> In the past, [the clients] said I want this, and this, not this. (.) 'Miss', I say now, 'when you buy, you can touch. But when you don't, you can't.' (.) I can say so now because we are not in the times of hand-picking anymore. (Tumbes, municipality-owned market, stallholder LP, 5 February 2021)

> It has improved, (.) there is more pavement, there are product sections, signage. (.) There wasn't. With the virus they tried to arrange it better. Not sufficient [though] to make it a worthy market. (Tumbes, vendor-owned market, stallholder JP, 5 February 2021)

Most vendors said they expected some of the improvements to continue, but others were sceptical and expected a return to pre-COVID standards once the pandemic had faded.

> Some measures may continue after COVID. We are now used to it and we will not go back to zero. (Huancayo, vendor-owned market, stallholder GG, 15 January 2021)

> Will it last? Little by little it will decrease. (.) The signage is clearly only for the pandemic. Improvements [in practices] are because of the pandemic. Not because it comes from inside… because people really want it. (Tumbes, municipality-owned market, stallholder CA, 5 February 2021)

## 5. Discussion

Combining our quantitative and qualitative research methods, we can conclude that there is evidence for our first hypothesis – that the type of governance of the market, proxied by ownership category, matters for the level of compliance with the COVID-19 measures. The data shows that municipality-owned markets performed better than vendor-owned and privately owned markets. The interviews also provide clear examples of the challenges faced by vendor-owned markets in persuading stallholders to pay for the necessary improvements. However, caution is needed when interpreting these results. We used the construct 'ownership' as a proxy indicator for the type of governance associated with these ownership modalities in Peru. The legal difference in ownership status of the market premises is not the only nor necessarily the most important attribute of this construct. Other potentially important attributes are the use rights of stalls within the premises (for example, irregular or fixed monthly payments), the financial instruments available for investments, and the channels and power to influence local politics. These differences are associated with the ownership modalities but could potentially be levelled with institutional arrangements that do not necessarily include a shift in the formal ownership of the premises.

The interviews provide support for our second hypothesis – that the internal governance system benefits from a degree of pressure applied by the external governance context. Regular inspections by local authorities during COVID clearly helped vendor association boards in their internal governance and decision-making processes. The threat of closure and the regular presence of inspectors helped boards to convince members to comply with better food safety practices and invest in common space adaptations.

There is less evidence that the RFMC earmarked funding offer has motivated municipalities to act. The regression results suggest that *ceteris paribus* municipalities with mining royalties have a higher compliance rate than those without this additional funding source. Thus, constraints to local funding seem to matter for compliance. However, we cannot infer from the evidence that the earmarked funds provided by the RFMC policy speeded up the response and actions of those municipalities. The interviewees highlighted the leading role of the Ministry of Health in inter-institutional coordination at the local level, which did not rely on the local budget and did not benefit directly from the RFMC policy incentives. Municipalities with more technical capacity, reflected in a higher ranking according to their use of previous budget incentives, have a higher compliance rate. Therefore, it seems that the funding aspect of the policy is less important for incentivising local governments than the technical support offered to them, such as control points suggested for local inspection

The data did not allow us to consider differences within vendor-owned markets related to their governance capacities. Future research could develop appropriate indicators of organisational strength to compare the quality of the internal governance systems across markets. Moreover, separating ownership categories is not always as straightforward as our analysis suggests. Our interviews revealed examples of hybrid ownership. One of the markets had a change in ownership that was never properly formalised. Another market was in the process of being relocated, which affected their sense of ownership. Future research could also explore heterogeneity among vendors in each market (some were informally sub-letting their stall to a third party). Also, some markets allowed street vendors to operate within the premises, while others did not.

## 6. Conclusion

Even before COVID-19, food safety had become increasingly important in government regulations for urban food markets (MINSA-Peru, 2003). Since 2017, SENASA and the Ministry of Economy and Finance have used annual earmarked funds for municipalities to improve stallholders' food safety practices (MEF-Peru, 2019). Food safety policies for urban food markets

are an important component of a food system transition (FAO, IFAD, UNICEF, WFP, & WHO, 2021). Our findings indicate that COVID-19 provided an unplanned lever to improve food safety in markets. While some of these measures may cease when the emergency phase of the pandemic ends, many vendors indicated that they expect part of them to continue.

Our research shows that in Peru municipal ownership of urban food markets has advantages for implementing food safety and public health measures. The ownership status comes with several attributes that make it easier to make the required investments and enforce vendors' compliance with several food safety practices. Moreover, we find that some pressure and support from local government can strengthen the internal governance of vendor-owned markets. We suggest that the RFMC policy ('Regulation on the functioning of food markets to prevent and contain COVID-19') could be fine-tuned by providing additional financial incentives for vendor-owned markets to ease their decision-making on necessary adaptions and investments.

The high proportion of vendor-owned markets in Peru may be quite unique in the world. However, in many countries, markets experience similar problems in making members comply with good handling practices and low-cost food safety measures. More context-specific research on how internal and external governance systems combine may help design appropriate food safety policies for urban food markets. The national prioritising of this policy and the technical orientation to check compliance with a defined set of food safety practices clearly stimulated local governments to act and strengthen processes of food safety co-regulation. We hope that Peru's RFMC policy may inspire other countries to incentivise improvements in food safety and public health.

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**Author contributions**

GT: Conceptualisation, Methodology, Investigation, Writing – Original draft, Writing – Review & Editing
ME: Methodology, Investigation, Writing – Review & Editing
RF: Investigation, Writing – Review & Editing

**Disclosure statement**

The authors declare the following personal relationships which may be considered as potential competing interests: Co-author RF participated in the COVID-task force that designed the policy that is discussed in this paper.

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## Data availability statement

The data and analyses are available as supplementary material on Figshare: https://figshare.com/account/projects/139450/articles/19802026.

## References

Argandoña, B. E., & Silva, H. C. (2015). *Ferias, mercados y qhatu: dinámicas de los circuitos de comercialización campesina* [Fairs, markets and qhatu: Dynamics in peasant marketing circuits]. La Paz: La Fundación Para la Investigación Estratégica en Bolivia (PIEB).

Armijo, M., Cuesta, J. P., Feinstein, O. N., López, R. G., Moreno, M. G., Kaufmann, J., … Ángel, H. S. (2015). *Building effective governments: Achievements and challenges for results-based public management in Latin America and the Caribbean*. Washington, DC: Inter-American Development Bank.

Bambarén, R. (2020, April 7). *Identifican 235 mercados en Lima como potenciales focos de contagio de Covid-19* [235 markets are identified as potential focal points of Covid-19 transmission]. Lima: Newspaper Gestión.

Barnett, T., & Fournié, G. (2021). Zoonoses and wet markets: Beyond technical interventions. *The Lancet. Planetary Health*, *5*(1), e2–e3. doi:10.1016/S2542-5196(20)30294-1

Battersby, J., & Haysom, G. (2018). Linking urban food security, urban food systems, poverty, and urbanization. In J. Batterby & V. Watson (Eds.), *Urban food systems governance and poverty in African cities* (pp. 56–67). Abingdon, England: Routledge.

Battersby, J., & Watson, V. (2018). *Urban food systems governance and poverty in African cities*. Abingdon, England: Routledge.

Bocanegra Carrión, K., García López, T., & Mejía Mendoza, D. (2021). *Situación de los mercados de abastos durante la emergencia sanitaria por COVID-19* [Situation of food markets during the health emergency COVID-19]. Retrieved from https://www.defensoria.gob.pe/wp-content/uploads/2021/04/Informe-Especial-N%C2%B0-004-2021-DP.pdf

Brady, H. E., Collier, D., & Seawright, J. (2006). Toward a pluralistic vision of methodology. *Political Analysis*, *14*(3), 353–368. doi:10.1093/pan/mpj021

Brown, A., Lyons, M., & Dankoco, I. (2010). Street traders and the emerging spaces for urban voice and citizenship in African cities. *Urban Studies*, *47*(3), 666–683. doi:10.1177/0042098009351187

CENAMA. (2016). *Manual del empadronador* [Enumerator manual]. Lima, Peru: Instituto Nacional de Estadística e Informática.

Dale, E., Prieto, L., Seinfeld, J., Pescetto, C., Barroy, H., Montañez, V., & Cid, C. (2020). *Budgeting for results in health: Key features, achievements and challenges in Peru (9240004432)*. Geneva, Switzerland: World Health Organization.

Earl, S., Carden, F., & Smutylo, T. (2001). *Outcome mapping: Building learning and reflection into development programs*. Ottawa, Canada: International Development Research Centre.

Fafchamps, M. (2004). *Market institutions in sub-Saharan Africa: Theory and evidence*. Cambridge, MA: MIT Press.

FAO. (2020). *Policy brief: The impact of COVID-19 on food security and nutrition*. Retrieved from http://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1287907/

FAO, IFAD, UNICEF, WFP, & WHO. (2021). *The state of food security and nutrition in the world 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all*. Rome, Italy, : Food and Agriculture Organization of the United Nations.

Fort, R., & Espinoza, A. (2020). COVID-19: Luchando contra el virus desde el territorio [Fighting the virus teritorially]. *El Comercio*. Retrieved from https://tinyurl.com/bdde4yj6

Funnell, S. C., & Rogers, P. J. (2011). *Purposeful program theory: Effective use of theories of change and logic models* (Vol. 31). Hoboken, NJ: John Wiley & Sons.

Garcia Martinez, M., Fearne, A., Caswell, J. A., & Henson, S. (2007). Co-regulation as a possible model for food safety governance: Opportunities for public–private partnerships. *Food Policy.*, *32*(3), 299–314.

García Molina, J. T. (2018). *Delito de abuso de autoridad en la privatización de mercados municipales del Perú. Un análisis a partir de la Ley N° 26569*. [Authority abuse in the privatizacion of municipal markets in Peru: An analysis of Law N°.26569] (Master thesis). Lima, Peru: Universidad César Vallejo.

Grace, D., Roesel, K., & Lore, T. (2014). *Food safety in informal markets in developing countries: Lessons from research by the International Livestock Research Institute* (ILRI Research Brief 20). Nairobi, Kenya: ILRI

Grossman, S. (2020). The politics of order in informal markets: Evidence from Lagos. *World Politics*, *72*(1), 47–79.
Holland, A. C. (2016). Forbearance. *The American Political Science Review*, *110*(2), 232–246. doi:10.1017/S0003055416000083
Hummel, C. (2017). Disobedient markets: Street vendors, enforcement, and state intervention in collective action. *Comparative Political Studies*, *50*(11), 1524–1555. doi:10.1177/0010414016679177
INEI-Peru. (2017a). *Censo nacional de mercados de abasto. 2016: resultados a nivel nacional* [National census of food markets 2016: national-level results]. Lima, Peru: Instituto Nacional de Estadística e Informática.
INEI-Peru. (2017b). *Censos nacionales 2017: XII de población, VII de vivienda y III de comunidades indígenas* [National census 2017: XII Population, VII Housing and III Indigenous communities]. Lima, Peru: Instituto Nacional de Estadística e Informática.
INEI-Peru. (2020). *Encuesta nacional de hogares 2018* [National household survey 2018]. Lima, Peru: Instituto Nacional de Estadística e Informática.
Keefer, P., Espinoza, M., Espinoza, Á., & Fort, R. (2019). *Rule enforcement, collective action, and growth: Micro evidence and mechanisms from Peru* (Working Paper IDB-DP-702). Washington, DC: Inter-American Development Bank.
Kiaka, R., Chikulo, S., Slootheer, S., & Hebinck, P. (2021). "The street is ours." A comparative analysis of street trading, Covid-19 and new street geographies in Harare, Zimbabwe and Kisumu, Kenya. *Food Security*, *13*(5), 1263–1281. doi:10.1007/s12571-021-01162-y
Laborde, D., Martin, W., Swinnen, J., & Vos, R. (2020). COVID-19 risks to global food security. *Science (New York, N.Y.)*, *369*(6503), 500–502. doi:10.1126/science.abc4765
Leach, M., MacGregor, H., Scoones, I., & Wilkinson, A. (2021). Post-pandemic transformations: How and why COVID-19 requires us to rethink development. *World Development*, *138*, 105233. doi:10.1016/j.worlddev.2020.105233
Leach, M., Meeker, J., MacGregor, H., Schmidt-Sane, M., & Wilkinson, A. (2020). *COVID-19: Key considerations for a public health response. Briefing*. Brighton, England: Institute of Development Studies.
Loayza, N. V., Rigolini, J., & Calvo-González, O. (2011). *More than you can handle: Decentralization and spending ability of Peruvian municipalities*. Washington, DC: The World Bank.
Lyon, F. (2003). Trader associations and urban food systems in Ghana: Institutionalist approaches to understanding urban collective action. *International Journal of Urban and Regional Research*, *27*(1), 11–23.
McCaffrey, D. F., Lockwood, J. R., Mihaly, K., & Sass, T. R. (2012). A review of Stata commands for fixed-effects estimation in normal linear models. *The Stata Journal*, *12*(3), 406–432.
MEF-Peru. (2019). *Meta 6: Mejora de la vigilancia sanitaria municipal de puestos de venta saludables de alimentos agropecuarios primarios y piensos* [Target 6: Improvement of municipal health surveillance of healthy stalls that sell primary agricultural products and animal feed]. Lima, Peru: Ministerio de Economía y Finanzas.
MEF-Peru. (2020a). *Meta 1: Regulación del funcionamiento de los mercados de abastos para la prevención y contención del COVID-19* [Target 1: Regulation on the functioning of food markets to prevent and contain COVID-19]. Lima, Peru: Ministerio de Economía & Ministerio de Producción.
MEF-Peru. (2020b). *Meta 6: Regulación del funcionamiento de los mercados de abastos para la prevención y contención del COVID-19* [Target 6: Regulation on the functioning of food markets to prevent and contain COVID-19]. Lima, Peru: Ministerio de Economía y Finanzas & Ministerio de Salud.
MEF-Peru. (2020c). *Ranking de cumplimiento de metas* [Ranking of target completion]. Lima, Peru: Ministerio de Economía y Finanzas.
MEF-Peru. (2021). *Meta 6: Regulación del funcionamiento de los mercados de abastos para la prevención y contención del COVID-19* [Target 6: Regulation on the functioning of food markets to prevent and contain COVID-19]. Lima, Peru: Ministerio de Economía & Ministerio de Salud.
Ménard, C., & Shirley, M. M. (2022). *Advanced introduction to new institutional economics*. Cheltenham, England: Edward Elgar.
MINSA. (2020). *COVIDATOS: Datos a nivel distrital de Perú* [COVIDATOS: Peru district-level data]. Retrieved from https://covidatos.pe/
MINSA-Peru. (2003). Reglamento Sanitario de Funcionamiento de Mercados de Abasto. N° 282-2003-SA/DM [*Sanitary food market regulation*]. Lima, Peru: El Peruano.
Mutua, F., Kang'ethe, E., & Grace, D. (2021). The COVID-19 pandemic and its implications for food safety in East Africa (ILRI Discussion Paper 40). Nairobi, Kenya: ILRI.
Naguib, M. M., Li, R., Ling, J., Grace, D., Nguyen-Viet, H., & Lindahl, J. F. (2021). Live and wet markets: Food access versus the risk of disease emergence. *Trends in Microbiology*, *29*(7), 573–581. doi:10.1016/j.tim.2021.02.007
Ostrom, E. (2015). *Governing the commons: The evolution of institutions for collective action (canto classics)*. Cambridge, England: Cambridge University Press. doi:10.1017/CBO9781316423936
Ostrom, E., & Ahn, T. (2008). The meaning of social capital and its link to collective action. In G. T. Svendsen & G. L. H. Svendsen (Eds.), *Handbook of social capital: The troika of sociology, political science and economics* (pp. 17–35). Cheltenham, England: Edward Elgar.
Porter, G., Lyon, F., & Potts, D. (2007). Market institutions and urban food supply in West and Southern Africa: A review. *Progress in Development Studies*, *7*(2), 115–134.
PRODUCE. (2017). *Censo nacional de mercados de abastos 2016: principales resultados* [National census of food markets 2016: main results]. Lima, Peru: Instituto Nacional de Estadistica e Informacion.

Pu, M., & Zhong, Y. (2020). Rising concerns over agricultural production as COVID-19 spreads: Lessons from China. *Global Food Security*, *26*, 100409. doi:10.1016/j.gfs.2020.100409

Quak, E-J., Saha, A., & Thorpe, J. (2022). *National governments' support measures for small businesses during the COVID-19 pandemic. How these measures have affected the resilience of firms and the broader food system* (Working Paper #24). Geneva, Switzerland: Global Alliance for Improved Nutrition (GAIN) & Institute of Development Studies (IDS). doi:10.36072/wp.24

Reed, S., Bird, M., & WIEGO. (2019). *Liberia's street vendors pioneer new approach with city officials*. Retrieved from Women in Informal Employment: Globalizing and Organizing (WIEGO): https://www.wiego.org/blog/liberia's-street-vendors-pioneer-new-approach-city-officials

Resnick, D. (2020). COVID-19 lockdowns threaten Africa's vital informal urban food trade. In J. Swinnen & J. McDermott (Eds.), *COVID-19 and global food security. Part four: Food trade* (pp. 73–74). Washington, DC: International Food Policy Research Institute.

Resnick, D. (2021). Taxing informality: Compliance and policy preferences in urban Zambia. *The Journal of Development Studies*, *57*(7), 1063–1085.

Resnick, D., Sivasubramanian, B., Idiong, I. C., Ojo, M. A., & Tanko, L. (2019). The enabling environment for informal food traders in Nigeria's secondary cities. *Urban Forum*, *34*(4), 385–405. doi:10.1007/s12132-019-09371-7

Roesel, K., & Grace, D. (2014). *Food safety and informal markets: Animal products in sub-Saharan Africa*. Abingdon, England: Routledge.

Shapiro, S. P. (2005). Agency theory. *Annual Review of Sociology*, *31*, 263–284. doi:10.1146/annurev.soc.31.041304.122159

Ton, G. (2015). Tension containment capacities: Towards a measure of organizational social capital in economic farmer organizations. In G. Ton (Ed.), *Measuring tensions and intentions: Mixing methods in the impact evaluation of development support to farmer organizations* (pp. 107–132). Wageningen, the Netherlands: Wageningen University.

Wertheim-Heck, S. C. O., Vellema, S., & Spaargaren, G. (2014). Constrained consumer practices and food safety concerns in Hanoi. *International Journal of Consumer Studies*, *38*(4), 326–336. doi:10.1111/ijcs.12093

World Health Organization. (2006). *Guide to healthy food markets*. Geneva, Switzerland: Author.

Young, G., & Crush, J. (2020). The urban informal food sector in the Global South. In J. Crush, B. Frayne & G. Haysom (Eds.), *Handbook on urban food security in the Global South* (pp. 198–217). Cheltenham, England: Edward Elgar.

## Appendix

**Table A1.** Descriptive statistics of the variables used in the regressions (N = 153)

| | Mean | Std. dev. | Median | Skewness | Min | Max |
|---|---|---|---|---|---|---|
| Dependent variables used | | | | | | |
| Overall score June | 0.72 | 0.20 | 0.75 | −1.18 | 0.06 | 1.00 |
| Overall score Nov | 0.75 | 0.23 | 0.79 | −1.06 | 0.11 | 1.00 |
| Independent variables used | | | | | | |
| Municipality-owned | 0.46 | 0.50 | 0.00 | 0.17 | 0.00 | 1.00 |
| Vendor-owned | 0.42 | 0.50 | 0.00 | 0.33 | 0.00 | 1.00 |
| Privately-owned | 0.12 | 0.33 | 0.00 | 2.28 | 0.00 | 1.00 |
| Municipal management capacity (2017–2019) | 0.86 | 0.15 | 0.81 | 0.86 | 0.56 | 1.32 |
| Mining royalties as share of total budget (2017–2018), in % | 0.12 | 0.18 | 0.03 | 1.81 | 0.00 | 0.66 |
| Supervision DIGESA (2016) | 0.05 | 0.21 | 0.00 | 4.35 | 0.00 | 1.00 |
| Supervision SENASA (2016) | 0.23 | 0.42 | 0.00 | 1.29 | 0.00 | 1.00 |
| Share of 'dry' stalls (2016), in % | 0.16 | 0.13 | 0.13 | 1.56 | 0.00 | 0.77 |
| Positive cases per 100k (15 may) | 276.73 | 247.92 | 158.43 | 1.44 | 24.67 | 1191.11 |
| District population (2017), in 1000 hab. | 11.82 | 0.61 | 11.95 | −0.57 | 9.97 | 12.70 |
| District poverty level (2018), in % | 0.11 | 0.06 | 0.10 | 0.53 | 0.01 | 0.27 |
| District Population density (2017), in 10,000 hab/km$^2$ | 0.27 | 0.35 | 0.10 | 1.29 | 0.00 | 1.22 |
| Markets' age, in years | 32.36 | 22.19 | 26.00 | 1.71 | 2.00 | 135.00 |
| # markets' stalls (2016), ln | 4.65 | 1.25 | 4.68 | 0.09 | 1.61 | 8.20 |
| Market electricity (2016) | 0.92 | 0.27 | 1.00 | −3.14 | 0.00 | 1.00 |
| Market adequate walls 2016) | 0.68 | 0.40 | 1.00 | −0.75 | 0.00 | 1.00 |
| Market gross-earnings (2016), in Soles, ln | 10.20 | 2.13 | 10.47 | −2.21 | 0.00 | 14.47 |
| Presence of street vendors (2016) | 0.41 | 0.49 | 0.00 | 0.39 | 0.00 | 1.00 |

*Note:* Ln means that a natural log transformation was used to address skewness. Variables without unit are binominal conditions (present = 1; absent = 0).

**Table A2.** Rotated components of the principal component analysis (varimax)

| Explained variance by component | Signage measures 17% | Control and cleaning staff 16% | Common space adaptation 12% | Vendor protection measures 9% | Customer protection measures 8% | | |
|---|---|---|---|---|---|---|---|
| Measure | Component 1 | Component 2 | Component 3 | Component 4 | Component 5 | Unexplained variance | KMO |
| 1 Signs with maximum number of clients allowed | 0.484 | | | | | 0.294 | 0.858 |
| 2 Appropriate number of clients and control measures in place | | 0.467 | | | | 0.288 | 0.778 |
| 3 Different entrance and exit doors, with signs and control person | 0.314 | | | | | 0.454 | 0.883 |
| 4 Presence of control staff within and outside the market | | 0.484 | | | | 0.230 | 0.779 |
| 5 Information on social distancing while queuing at the entrance | | | 0.352 | | | 0.520 | 0.853 |
| 6 Cleared hallways appropriately signalled to allow free circulation | | | 0.425 | | | 0.421 | 0.863 |
| 7 Preferential access for vulnerable people | | | | | 0.705 | 0.319 | 0.497 |
| 8 Mandatory wearing of mask, apron, and gloves by stallholders | | | | 0.711 | | 0.254 | 0.743 |
| 9 Mandatory wearing of masks by consumers | | | | | 0.513 | 0.449 | 0.665 |
| 10 Protective shields at each stall | | | | 0.521 | | 0.385 | 0.853 |
| 11 Features for disinfection of hands and shoe soles at the entrance | | 0.458 | | | | 0.361 | 0.868 |
| 12 Mechanisms for hand disinfection inside the market | | | 0.573 | | | 0.451 | 0.754 |
| 13 Hand cleaning and disinfection stations | | | 0.523 | | | 0.349 | 0.827 |
| 14 Cleaning and disinfection of the market at least once a week | −0.341 | 0.455 | | | | 0.449 | 0.660 |
| 16 Waste containers for solid residues inside the market | | | | | | 0.554 | 0.916 |
| 19 Posters with opening and closing times to the public | 0.505 | | | | | 0.289 | 0.847 |
| 20 Posters or public announcements with safe shopping advice | 0.478 | | | | | 0.249 | 0.868 |

*Source:* Own data.
*Notes:* Principal component analysis with varimax rotation, with loadings >0.3 and < −0.3. KMO means the Kaiser–Meyer–Olkin measure of sampling adequacy. KMO values >.60 are considered as satisfactory. See Supplementary Material for more details..