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The Characteristics of the Informal Sector in Timor-Leste

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Abstract

This study analyzes the characteristics of people working in the informal sector in Timor-Leste. We use primary data, collected from the field between January and early May 2017. A stratified random sample was used to draw a sample of 349 households, with a total of 658 adult respondents, from 38 Census Enumeration Areas in Dili and surrounding districts. A logistic regression model was used to identify the factors associated with informal sector participation. The analysis shows that 65.8 percent (n = 405) of individuals in our sample were engaged in the informal sector, including a significantly higher proportion of women than men. Education was significantly lower among those employed in the informal sector than those not employed in the informal sector. Married people were more likely to engage in the informal sector, while having no education and living in an urban area were marginally significant. Gender disaggregation shows that the impact of no education and urban area are only statistically significant for women. Moreover, analysis of economic activities performed in the informal sector actors revealed a gender dimension in the specific informal sector activities that participants were involved in. Women play a major role in food and beverage retail, as well as weaving and plaiting activities. Males dominate in occupations such as construction and quarrying activities.

Keywords

informal sector
Timor-Leste

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1. Introduction

Sectors of a country's economic activity can be categorised as belonging to the formal sector or the informal sector. The formal sector includes both public and private sector economic activity. Information gathered from these three sectors (public, private, and informal) provides an understanding of a country's economy. The informal economy or informal sector, as it is referred to interchangeably, is regarded as a group of household enterprises or unincorporated firms owned by households that include informal own-account businesses (International Labour Organization/ILO 1972, Helen 1973, Anne 2005). These enterprises may use family workers and employees on an irregular basis, and informal sector employers may employ one or more employees on a continuous basis (Sookram and Watson, 2008; D'souza, 2013). Though the terms 'informal economy' and 'informal sector' are often used interchangeably, in this paper we will use the term 'informal sector' henceforth.

Rapid population growth in some developing countries has led to difficulty for the formal sector in providing full employment opportunities for the expanding labour force (ILO 2012). Thus, the informal sector is growing partly as a result of the slow pace of formal sector employment growth (Altman 2008). D'souza (2013) observed that as long as economic growth is not followed by an improvement in job levels and income, the informal sector will continue to grow. Although the growing informal sector creates employment and generates income, some people view these activities as irritants to development (Indira 2014a, 2014b). However, for many countries, the informal sector has the potential to make a positive contribution to the economy, provided the government has appropriate policies to deal with this sector (Indira 2014a).

In some cases, the development of the informal sector has not been accepted by either the government or the public. Many developing countries want to limit the growth of the informal sector, since it cannot be easily controlled or taxed (Bhowmik 2010, Kanbur 2017). However, optimists believe that the informal sector can partner effectively with the formal sector as an alternative option in generating job opportunities for the people, as a large number of people may depend on this sector for their livelihoods (Indira 2014a, D'souza 2013, Recio and Gomes Jr 2013). For example, the ILO recognizes that the dynamism and growth of the informal sector has the potential to boost economic growth and overall employment (ILO 2013). The opportunities that may arise from the informal sector could benefit communities and give people the chance to work according to their capabilities without having to depend on others.

Additionally, when looking at this from an economic, social, and political perspective, the informal sector has several advantages and disadvantages. People predominantly engage in the informal sector due to economic need (Portes, Castells and Benton 1989). In this regard, the informal sector provides a major source of income and employment in countries where formal job possibilities are inadequate, and social security is practically non-existent. When a

large proportion of the labour force is engaged in the informal sector, it has significant implications for public policy, especially policies related to issues such as safety and workers' rights (Spiegel 2012, Kanbur 2017). Due to these issues, developing countries are increasingly concerned with the informal sector.

Timor-Leste is an island located in Southeast Asia with an area of about 14,954.44 (km sq.) with a population of approximately 1.2 million based on the 2015 census. The island nation shares a land border with Indonesia. Most of the area is highlands, and the majority of the population is employed in agriculture, with 70% residing in rural areas (2015 Census).

Growth of the informal sector in Timor-Leste has followed a similar pattern to that in other developing countries. The Timor-Leste Labour Force Surveys (LFS) show a slightly increasing trend towards employment in the informal sector from about 70% in 2010 to 71% in 2013. However, there has been a change in the labour force framework based on 19th ILO conference in Geneva, as subsistence food producers are no longer considered part of the labour force. Based on the changed in the labour force framework, the informal sector seems increased in importance because 71% of labour force in 2013 (excluding subsistence agriculture) is likely to be much higher than 70% of labour force in 2010 (including subsistence agriculture). One consideration to note from the LFS 2010 and 2013 is that there is no specific definition of the informal sector in both surveys.

Few studies on enterprises and workers have been done on urban areas in Timor-Leste. For example, Inder, Brown, and Datt (2014) investigated poverty in Timor-Leste, but they concentrated on employers or managers of companies and did not specifically study informal sector employees. Their study merely provided information on operations at the firm level. As a whole, there is still a lack of information on informal sector economic activities both at the household and individual levels in Timor-Leste. The informal sector in Timor-Leste has increased largely in the recent years (World Bank, 2013). Banerjee and Duflo (2006, 2007) pointed out that in the past decade, the growth of the informal sector has increased, especially in Timor-Leste. Self-employment is among the largest growth area in Timor-Leste's economy. Given the limitations of the previous studies, the purpose of this paper is to identify the characteristics of the informal sector in Timor-Leste. Specifically, we address the following issues: who participates in the informal sector and in what activities are they engaged?

Overall, the remainder of the paper is organised as follows. Section 2 reviews the relevant literature. This section will also highlight the concepts and definitions of the informal sector, as well as the definition of the informal sector within the context of Timor-Leste. Section 3 discusses how the data were collected and the questions that were selected, and Section 4 explains the methodology used for the data analysis. Section 5 provides the results and discussion. Section 6 offers the conclusion, limitations, and suggestions for future study.

2. Literature Review

During the 1950s and 1960s, it was broadly assumed that poor traditional economies could be transformed into dynamic modern economies if there was a proper mix of economic policies and resources. Boeke (1953) argued that during this process, the traditional sector of small traders, small producers, and casual jobs would be absorbed into modern capitalism or the formal economy, meaning that traditional economic activity would disappear (Chen, Vanek and Carr 2004).

In the early 1970s, the poor economic growth prospects of developing countries began to cause concern about growing unemployment rates. The first comprehensive mission of the ILO was to Kenya in 1972 (Bangasser 2000, Chen *et al.* 2004). The ILO acknowledged that the traditional sector had not only survived but expanded. It had become a profitable and efficient business, even as a marginal activity (ILO 1972). To address this fact, the ILO chose to use the term 'informal sector' rather than 'traditional sector' for various small and unregistered economic activities. The term 'informal sector' was also used one year prior during the 'employment mission' by Keith Hart. He conducted research on economic activity in Ghana in 1971 and published his results in 1973 (Hart 1973, Chen *et al.* 2004). Hart's research was primarily focused on the people involved in economic activities who had small incomes, a lack of expertise and were illiterate. While Hart's (1973) research was able to attract the attention of academics after its publication, there has not been much attention from the labour observers. Yet, Hart's report has been recognized by a number of institutions as the foundation of the theory of the informal sector in an organized manner, and accordingly, Women in Informal Employment Globalizing and Organizing (WIEGO) and ILO produced several policies related to the informal sector (Chen 2012, ILO 2014).

However, there are pros and cons to the ideas and concepts identified by Hart and which the ILO developed from the Kenyan mission. Some people argue that the informal sector is merely marginal and peripheral to the growth of the formal sector or modern capitalism. With the development of modern industry and sufficient achievements in the economy of developing countries, the informal sector will automatically disappear. Nevertheless, other observers argue that the diversity of development in the industrial sector in developing countries could contribute to the potential growth of the informal sector rather than its disappearance (Chen *et al.* 2004). It is understandable that the informal sector could appear small, but expand rapidly due to the development of the global economy and the modernization that proliferates in all countries.

The long debate over the informal sector eventually crystallized into three dominant schools of thought. These groupings are based on the form of the informal sector, the characteristics of the informal sector, and its connection to the formal sector and related formal rules (Chen *et al.* 2004).

2.1. The Dualist School of Thought

The dualistic labour market approach divides the economy into two subdivisions: the industrial sector and the agricultural sector. The industrial sector refers to the capitalist approach to production, capital accumulation, and economic progression. The agricultural sector is based on subsistence agriculture, pre-capitalist and with a lack of economic growth. As the agricultural sector may be heavily relied upon by the subsistence economy, the hardships experienced by the population increase in proportion to the inefficiency of the sector. Poverty and a lack of job opportunities in rural areas force people to move from their villages to the cities to search for jobs. These migrants have a greater chance of joining the informal sector, due to lack of skills or education that would enable them to find a better job with secure employment in the formal sector. Thus, they are pushed towards the informal sector for their economic survival.

In the dualistic labour market approach, the informal sector should be understood as an involuntary solution to unemployment. The informal sector is perceived by rural migrants as a transitory survival strategy while awaiting formal sector employment opportunities to open. At this time, wages in the urban sector could even be lower than wages in the rural agricultural sector (Fields 1975, Lipton 1980, Kay 2011). It is true that rural migrants initially expect to get high-paying jobs while carrying out economic activities in the informal sector. However, this may not occur, so that these rural migrants may remain in the informal sector indefinitely.

2.2. The Legalist School of Thought

The legalist approach was initially proposed by Hart (1973) and was based on his ethnographic study of the informal sector in Accra, Ghana. Hart (1973) gave details of the formal and informal employment prospects in Accra and attributed the former to paid jobs and the latter to self-employment. The legalist approach looks to account for the contribution of employment creation, new businesses, and capital accumulation in urban informal economic activities. One reason for rural migrants to join the informal sector is because there are fewer barriers to entry into the informal sector. According to De Soto (1989), a general disregard for legal restrictions leads to deregulation of the economy. People have an urgency to find a livelihood in the absence of job creation. From this view, informal entrepreneurs are acknowledged as economic heroes because they manage to survive and therefore must not be perceived as low productivity marginal actors (Portes and Schauffler 1993, Kay 2011).

De Mel, McKenzie, and Woodruff (2013) highlighted that although reforms are being implemented, most businesses in developing countries remain informal. Small firms are usually not interested in becoming formal as they believe they will not benefit from these legal institutions (Maloney 2004, Ulyseas 2010). Chaudhuri and Mukhopadhyay (2009) highlight that long registration procedures, complex administrative steps and the costs involved in legalizing an enterprise discourage entrepreneurs from operating legally and

instead induce them to join the informal sector. For example, according to De Mel and McKenzie (2011), the majority of firms in Sri Lanka are not registered with any government agencies. Even businesses that employ paid workers may not be registered. An informal sector actor may be concerned about his or her ability to repay a loan if they want to borrow money from the bank. Likewise, they may worry that not being able to repay the bank loan may cause difficulties with other legal institutions. It is this kind of evaluation that will ultimately determine informal sector actors' decisions (Peatty 1987, Perry, Maloney, Arias, Fajnzylber, Mason and Saavedra-Chanduvi 2007, Babbitt, Brown Mazaheri 2015). This view is supported by De Soto (1989), who notes that there are burdensome entry regulations that affect small enterprises trying to become formal.

Given the role of the informal sector in an economy, the legalists also suggest that, instead of being seen as the second best choice compared to formal employment, it is better to recognize the informal sector as a partner in an economy. Chaudhuri and Mukhopadhyay (2009) and Kay (2011) further argue that the informal sector is better recognised as a voluntary strategy where entrepreneurs could initiate their businesses at low cost. As an example, data from Latin American countries such as Mexico show that over 60% of self-employed people decided to leave their previous jobs voluntarily and were happier with self-employment than with seeking a job in the formal sector. This implies that the vast majority of people entering the informal sector have a desire for greater independence or to earn more money (Maloney 2004, Kingdon and Knight 2005). The increase in the informal sector has some positive side. The positive contribution of the informal sector is that it provides employment and incomes and thereby alleviates poverty (Benjamin and Mbaye 2012).

2.3. The Structuralist School of Thought

Rural-urban migration causes growth in informal sector employment and excess potential labour supply in urban areas (Lewis, 1954). While both the dualistic approach and the legalist approach acknowledge population growth, neither approach addresses issues of production and distribution.

In contrast, the structuralist approach claims that the fundamental difference between formal and informal activities is based on the character of production and distribution processes. This approach recognizes that the condition of excess labour supply created by rural-to-urban migration has more complex consequences than acknowledged in either the dualistic or legalist perspective. It identifies that the informal sector is varied and that there are at least two distinct classifications that need to be defined. Informal micro-entrepreneurs with access to some capital and labour resources are contrasted with unprotected workers who involuntarily live on a subsistence wage.

Although the structuralist approach emphasises the difference between the formal and informal sectors in terms of character, processes of production and distribution, this approach does not perceive the informal sector as entirely separated from the formal sector. Instead, the informal sector is viewed as thoroughly related to the formal sector (Portes and Schauffler, 1993). The structuralist perspective claims that one of the main linkages between the informal and the formal sectors is the provision by the informal sector of low-cost goods and services to workers in the formal sector. This has several beneficial effects on the developing economy. First, it lowers the cost of consumption and increases the purchasing power of the urban middle class. Secondly, it allows poor households to make ends meet. Thirdly, it provides formal capitalist enterprises with a subsidy that allows them to keep wage costs lower than they would be if worker consumption occurred entirely within formal markets. Finally, the informal sector provides a supply of unprotected labour, through undeclared hiring and subcontracting, which allows formal sector firms to avoid costly labour regulation (Portes, Castells and Benton 1989, Portes and Schauffler 1993). This tends to suggest that both sectors (informal and formal) are complementary to one another.

2.4. Previous Studies of the Informal Sector

Considering the three school of thoughts associated with the informal sector and formal sector, what precisely is the difference between the informal and the formal sector? By its nature, the informal sector is excluded from state control or regulation (Week 1975, Kavan 2013). There are other substantial differences between the formal and the informal sector.

On the one hand, *the formal sector is where*: People are predominantly employed by formal sectors such as government or private sector. In some circumstances, people owned the company and employed other people for wages. Employees have a formal offer, both individuals and firms pay taxes on what they earn. Individuals are counted as part of the workforce. Individual and firm production included in national income (GDP). Workers time is well structured and individuals entitled to legal protection and rights (Kavan 2010, 2013).

On the other hand, *the informal sector is where*: People earn money or produced goods for their own consumption, even though people do not have a job. Employees do not have a formal contract with the employer. Both individuals and firms do not contribute to taxes. Individuals are not counted as labour force as they are regarded as self-employed or household-based activities. Individual and firm production excluded from national income (GDP). No time restriction because an individual can work when they like, and individual excluded from legal protections and rights (Kavan 2010, 2013).

It is evident from the discussion above that the informal sector is a sector that is neglected and is beyond the reach of the social security system. Most economic activities in the informal sector are found outside the non-agricultural sector. Chen, Jhabvhal, and Lund (2001) reported that the contribution of the informal, non-agricultural sector to the economy in Asia has ranged from 45% to 85% following the Asian economic crisis in 1997/1998.

Furthermore, Vanek, Chen, Carré, Heintz, and Hussmanns (2014) found the percentage of non-agricultural employment in Asia ranges from 62% in Eastern and South-eastern Asia to 82% in Southern Asia. The Asian Development Bank (ADB, 2010) reports that the growth of the informal non-agricultural sector has occurred in Africa and Asia, but the growth of the informal sector in Asia was more significant in 2010. For instance, in Indonesia, the informal non-agricultural sector was estimated to be more than 50% of the workforce (Asian Development Bank and Statistics Indonesia Country Report, 2010). Different sources indicate that the role of the informal sector outside agriculture shows similar trends among developing countries.

It is an important fact that most women in Asia and Africa work for themselves, work without being paid or work in a family business (IFC, 2010). Of those working outside the formal sector and not agricultural, the participants are mostly composed of women (Siggel 2010, Visaria 2012, Chant 2013, ILO 2013). Previous findings in a book entitled 'Invisible Work, Invisible Workers' (Leonard 1998), confirmed that women's involvement in the informal sector tends to be higher than that of men. Women generally become business owners due to having low levels of education and a lack of formal training to qualify for wage employment in the formal sector (Seturahman 1976, Perry *et al.* 2007, Vanek *et al.* 2014, Babbitt *et al.* 2015). While the International Finance Corporation (IFC 2010) reported that women in Timor-Leste are mostly absent from the formal sector, Timorese women are more actively in the agricultural sector at approximately 88% compared with men. However, women are also actively engaged in non-agricultural economic activities such as trading. Women in Timor-Leste are estimated to own over 40% of micro enterprises (IFC 2010).

Women may intentionally stay in the informal sector because at some level, it gives them the option to work autonomously and flexibly, so that they can balance work and family responsibilities (World Bank, 2011). Due to conflict between responsibilities and performing such economic activities among women, informal and formal activities should not be viewed as separations, but should instead have a close relationship with each other (Chant and Pedwell 2008).

Several studies have linked education levels with informal sector employment. The World Bank explicitly says that highly educated people tend to dominate formal employment, while people with low or uneducated backgrounds dominate work in the informal sector (The World Bank, 2011, Adams and Razmara 2013, Gillani and Naeem 2017).

2.5. Definition of the Informal Sector

There are various definitions of the informal sector, but in this paper, we will use the concept initially raised by Hart (1973). Hart defined the informal sector as an integral part of the urban labour force, outside of the formal labour market. He identified the informal sector as another word for small businesses run by the self-employed. Self-employed and casual labour

are two such activities in the informal sector. An example of the self-employed are street vendors. A street vendor is generally defined as an individual who provides goods for sale to the public at large from a temporarily built structure (Bhowmik 2010).

The following are common characteristics of the informal sector as defined by the ILO (1972; 2003):

- (a) *Easy of entry* in the sense that there are no particular qualifications, skills, or capital required to start the business. Entry to the informal sector is relatively easy due to the low skill requirements.
- (b) *Reliance on indigenous resources*. Most informal sector enterprises use locally available resources to produce and/or distribute goods and services.
- (c) *Family ownership*. Family members may help out with the family business without pay or without formal employment status.
- (d) *Small scale operations*. An enterprise is considered small when it has few permanent employees; for instance, not more than five employees.
- (e) *Labour intensive and adaptive technology*. In general, the business operates manually with simple technology. Most of the jobs in the informal sector are labour intensive, involving a low level of technology, and the skills required from workers are basic.
- (f) *Skills acquired outside of the formal sector*. No formal skills or school system required.
- (g) *Unregulated and competitive markets*. When businesses are not registered under national laws, for example, commercial, tax or social security laws, or professional associations' regulatory acts.

2.6. Definition of the Informal Sector in the Timor-Leste Context

In Timor-Leste, according to the Business Activity Survey (BAS, 2013), the formal sector is made up of firms that have registered with the Ministry of Commerce and which have formally obtained business licenses. The BAS does not include the informal sector. The survey scope excludes several types of businesses that are otherwise registered with the Ministry of Commerce. For example, petroleum producing firms that submit tax through the National Directorate of Petroleum Revenue, general government agencies (such as administration, education, and health), public trading enterprises where the majority of their income was received from government transfers or payments, and non-businesses or non-trading enterprises (such as embassies and missions).

Based on the classifications of the formal and informal sector used by the government in the BAS (2013), we adopt the following definition of the informal sector: ***'The informal sector includes all non-farm business activities that are not registered with the Ministry of Commerce and Industry Timor-Leste.'*** This definition of the informal sector excludes agricultural activities. Though subsistence agriculture may exhibit the characteristics of informality, it differs from activities related to manufacturing, trades, and services.

3. Data

To investigate the characteristics of the informal sector in Timor-Leste, we used primary data, directly collected in the field between January and early May 2017. The questions were adapted from the 2013 Timor-Leste Labour Force Survey (TL-LFS), or from the 2010 Census. Thus, all questions follow international standards on the statistics of work and labour issues that were adopted at the 19th International Conference of Labour Statisticians (ILO, 2013) and the UN Principle and Recommendations for Population and Housing Census (2010). The questionnaires were initially written in English and then translated by the first-named author into ‘Tetum’ (the second national official language of Timor-Leste). The translations were discussed with Timorese students at the University of Waikato to ensure content validity. Geographically, Dili (the capital and largest city of Timor-Leste) is surrounded by several sub-districts of four municipalities (municipality sometimes called district).

Data were collected from 12 sub-districts in and around Dili, from which it is expected that many people would commute for work to Dili. A sampling frame of census enumeration areas (CEAs) was derived from the Timor-Leste 2010 Census. A stratified random sampling approach was applied to ensure a representative sample of households. A total of 45 CEAs was selected with probability proportional to size prior to the field work. However, some selected CEAs could not feasibly be visited during fieldwork due to geographical remoteness, or adverse weather conditions. Of the 45 selected CEAs, seven were not included in the final sample.

Before commencing fieldwork, the first-named author made contact with local authorities to obtain authorization to carry out research in their respective areas. After receiving approval, each selected CEA was visited and every household in the CEA was enumerated. Ten households were then randomly selected from the enumeration list in each CEA. In the case of refusals, or where the household members were unavailable to answer the survey, a replacement household, being the next household on the enumeration list, was selected.

Table 1 summarises the numbers of households included and not included in the selected CEAs in Dili and the surrounded sub-districts. Figure 1 presents the locations of the selected CEAs, where the CEAs and households included in the final sample are shown in green, while CEAs that were not able to be included in the final sample are shown in pink. Figure 1 also shows the location of the study area, Dili, on the north coast of Timor.

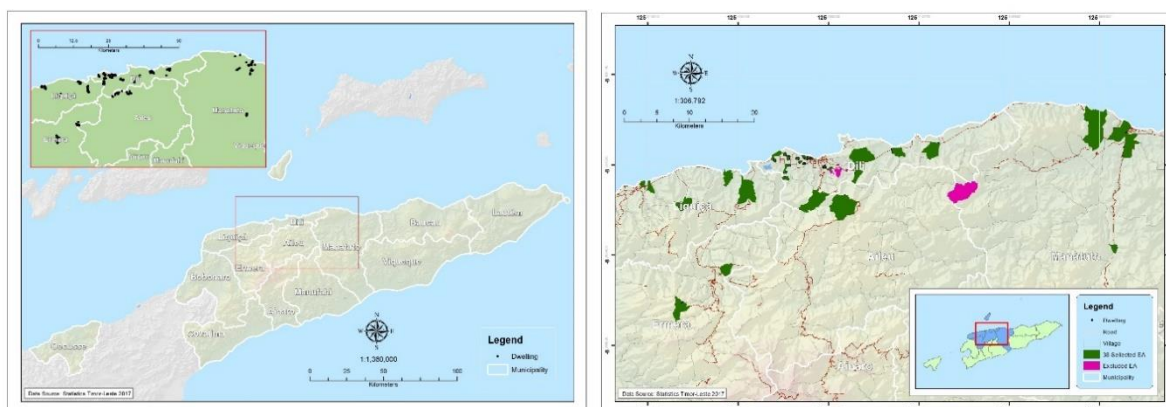
Subsequently, each selected household was visited for an interview. In general, the wife of the male head of the household provided general demographic data on all family members and identified all people who were members of the household, as well as answering household-level questions. Every person who lived and ate together from the same pot at any time during the last 12 months was recorded as a member of the household. After listing all

persons in the household, the next step was to identify individuals within each household to be interviewed. The individual interview was aimed at two people per household: one adult male (aged 18 or over); and one adult female. From the list of household members, the adult male and adult female with the next birthday were selected for inclusion in the sample, since this provided a plausibly random selection within each household. The research was approved by the Waikato Management School Human Research Ethics Committee. An informed consent form was signed by each selected respondent prior to the interview. In the case of some respondents who were not able to read the informed consent form, the interviewer read the details aloud and obtained verbal consent before the interview commenced.

Table 1: Total Sub-Districts and the Households of Each CEAs Covered

| Municipality | Sub-District | CEAs in Sub-district | CEAs Selected into the Sample | CEAs Included in Final Sample |
|--------------|----------------|----------------------|-------------------------------|-------------------------------|
| Dili | Dom Aleixo | 128 | 14 | 14 |
| | Vera Cruz | 45 | 2 | 2 |
| | Nain Feto | 28 | 2 | 2 |
| | Cristo Rei | 72 | 10 | 4 |
| | Metinaro | 8 | 1 | 1 |
| Aileu | Laulara | 12 | 1 | 1 |
| Liquica | Bazartete | 36 | 4 | 4 |
| | Liquica Villa | 36 | 1 | 1 |
| Ermera | Railaco | 19 | 1 | 1 |
| | Ermera Villa | 51 | 3 | 3 |
| Manatuto | Laclo | 18 | 2 | 1 |
| | Manatuto Villa | 20 | 4 | 4 |
| Total | 12 | 473 | 45 | 38 |

Figure 1: Present the CEAs Covered and CEAs Not Covered



Source: Statistics Timor-Leste.

A total of 349 households and 658 adult respondents were included in the final sample. Data were double-entered and subjected to cross-checking. The aim of the double-entry and cross-checking process was to minimize errors, maintain consistency, and guarantee data quality.

To arrive at a dummy variable indicator for whether a person in the sample was engaged in the informal sector or not, we made use of two questions that asked about each person’s primary and secondary economic activities. Specifically, the questions asked about: (1) the registered or unregistered status of the business where the person works; and (2) whether the economic activity (primary or secondary) was in the agricultural or non-agricultural sector. Table 2 presents these questions and coded responses.

Table 2: Questions of Economic Activities

| Primary (Secondary) Economic Activity | |
|--|---|
| Question 1 | Question 2 |
| Was your business (the business/farm where you worked) registered at the Ministry of Justice or the Ministry of Commerce and Industry? | Where do you usually work? |
| 1. Yes. | 1. In your home? |
| 2. Is in the process of being registered. | 2. Structure attached to your home? |
| 3. No. | 3. At the client's or employer's home? |
| 4. Do not know. | 4. Enterprise, plan, factory, office, shop, workshop, and so on. (separate from house)? |
| | 5. On a farm or agricultural plot? |
| | 6. Construction site? |
| | 7. Fixed stall in the market or on the street? |
| | 8. Without fixed location/mobile? |
| | 9. Other (specify)? |

Note: The same questions were also asked of the secondary economic activities.

From the above questions, we classified each worker into one of two categories: (1) informal sector, where *either* the primary or secondary activity was not registered *and* was not agricultural; or (2) not informal sector, where neither the primary nor secondary activity met those conditions. This resulted in an indicator variable that is equal to one if the individual was engaged in any non-registered, non-agricultural economic activity. Overall, 65.8% (unweighted $n = 405$) of individuals in our sample were engaged in the informal sector, while 34.2% (unweighted $n = 253$) were not engaged in the informal sector.

In addition, several open-ended questions were asked to identify which specific economic activities were performed by those people engaged in the informal sector ($n = 404$). Table 3 presents the questions that were used to identify economic activities based on occupation, industry, business, and the activity carried out, as well as the main functions of these activities.

Table 3: Questions of Occupation, Industry and Main activities

| Primary (Secondary) Economic Activity | | |
|---|--|---|
| Question 1 | Question 2 | Question 3 |
| What kind of work do you usually do in the job/activity that you had last week? 1. Occupation title: 2. Short description of the main task or duties: | What kind of industry, business service or activity is carried out at your place of work? | What are the main goods or services produced at your place of work or its main function? |

Note: The same questions were also asked of the secondary economic activities.

The above questions were then classified according to the main activities carried out by participants in the informal sector (Table 4). The 22 different activities initially categorized, were then grouped into eight categories based on its similarities. Eight comprehensive clusters of activities were identified and included in the logistic regression model. These classifications were made in accordance with the International Standard and Industry Classification of all economic activities (ISIC-Rev 4, 2008). The activities are classified as:

Food (all food and beverages);

Non-food (fuel and firewood);

Non-specialized retail (grocery or kiosk attached to house);

Trade (ambulant trader);

Construction and quarrying (includes cash-in-hand projects, water drillers and sand diggers);

Weaving and plaiting (includes traditional weaving ‘tais,’ sewing, stitching and also plaiting bamboo, rattan);

Transportation and its services (motorcycle taxi, workshop, tire repairs and tire air filler);

Domestic service (housemaid).

Table 4: Category of Economic Activity

| Economic Activity Categories | | | |
|------------------------------|---------------------------------------|--|-------------|
| No | Identification of Economic Activities | Economic Activity Classification based on ISIC-Rev.4 | |
| 1 | Sell fruits | | |
| 2 | Sell vegetables | | |
| 3 | Provide and sell food and beverage | | |
| 4 | Sell tofu | | |
| 5 | Sell fish (fresh and grilled) | 1. Food and beverage | |
| 6 | Sell ice and sweetness | | |
| 7 | Sell fresh coconut water | | |
| 8 | Sell hot drinks | | |
| 9 | Provide catering | | |
| 10 | Traditional wine (palm) | | |
| 11 | Sell firewood | | |
| 12 | Sell organic fertilizer | | 2. Non-food |
| 13 | Provide or run fuel retailer | | |
| 14 | Run small grocery shop (kiosk) | 3. Non-specialized retail | |
| 15 | Ambulant trader (three wheels) | 4. Trade | |
| 16 | Sands and water digger | 5. Construction and quarrying | |
| 17 | Motorcycle taxi service | 6. Transportation and services | |
| 18 | Workshop (bicycle and motorcycle) | | |
| 19 | Woven or weaving | | |
| 20 | Tailoring, sewing or stitching | 7. Weaving and plaiting | |
| 21 | Traditional weaver (tais) | | |
| 22 | Housemaid (paid) | 8. Domestic work (housemaid) | |

4. Method

Given the stratified nature of the sample, before analysis each observation requires appropriate weighting (Deaton 1997). Weighting procedures at the household level as well as individual weighting calculations are described in Appendix A. All analyses in this paper were conducted using both weighted and unweighted data, in Stata version 14. Only weighted results are reported in the paper. Unweighted results are available in Appendix B.

Given that the variable of interest (participation in the informal sector) is dichotomous, we use the logistic regression model to identify the factors associated with informal sector participation. The equation for a logistic model can be written as:

$$L_1 = \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 i + \dots + \beta_k - 1Xk - 1, i'$$

where the logit (L_i) is a linear function of the independent variables, k is the number of parameters in the model (the constant and all independent variables). The independent variables included gender, age, marital status, education, urban-rural location of the household, and the economic activity.

5. Results and Discussions

Table 5 presents the summary statistics for our sample, weighted to account for the stratified nature of the sample (unweighted results are provided in Appendix B). The sample is fairly evenly split by gender (almost by construction, since one male and one female from each household were selected into the sample), with a mean age of 39.7 years. Only 7.6 percent of the sample were unmarried, and 70.2 percent of the sample resided in urban areas, in households with an average of over seven household members. Economic activities performed by informal sector workers mainly consisted of food and beverage at 29 percent, followed by non-specialized retail (grocery or kiosk) at 23 percent and weaving and plaiting at around 13 percent.

Table 5: Descriptive Statistics of the Variables

| Variable | Mean | Linearized Standard Error |
|----------------------------------|-------|------------------------------|
| Informal sector | 0.658 | 0.028 |
| Gender | 0.502 | 0.014 |
| Age | 39.70 | 1.50 |
| Marital status | 0.076 | 0.017 |
| Household size | 7.78 | 0.318 |
| Rural-urban | 0.702 | 0.076 |
| M/F headed household | 0.921 | 0.018 |
| Age of household-head | 44.90 | 1.90 |
| <i>Economic activity:</i> | | |
| Food | 0.288 | 0.030 |
| Non food | 0.076 | 0.015 |
| Non-specialised retail (grocery) | 0.229 | 0.028 |
| Trade (ambulant trader) | 0.112 | 0.026 |
| Constructions and quarrying | 0.112 | 0.020 |
| Transportation and service | 0.044 | 0.014 |
| Weaving and plaiting | 0.130 | 0.024 |
| Domestic work (housemaid) | 0.006 | 0.006 |

Table 6 reports the characteristics of the sample, separating those individuals who engage in informal sector work from those who do not. Differences were examined by chi-square tests (for categorical variables) or *t*-tests (for continuous variables). There is a significant difference in gender between the informal sector and not informal sector, with a significantly higher proportion of women involved in the informal sector ($p < 0.001$). Education is significantly lower among those employed in the informal sector ($p = 0.003$). There are no statistically significant differences in other variables.

Table 6: Characteristics of the Sample

| Variable | Not Informal Sector | Informal Sector | <i>P</i> |
|-----------------------|---------------------|-----------------|----------|
| <i>Gender</i> | | | |
| Female | 0.213 | 0.646 | <0.001 |
| Male | 0.787 | 0.354 | |
| <i>Education</i> | | | |
| No education | 0.240 | 0.320 | 0.003 |
| Less than secondary | 0.192 | 0.329 | |
| Secondary | 0.394 | 0.274 | |
| Post-secondary | 0.174 | 0.078 | |
| <i>Marital Status</i> | | | |
| Married | 0.898 | 0.938 | 0.165 |
| Not married | 0.102 | 0.062 | |
| <i>Area of Living</i> | | | |
| Rural | 0.339 | 0.276 | 0.199 |
| Urban | 0.661 | 0.724 | |
| Age† | 40.41 | 39.31 | 0.461 |
| Household size† | 8.0 | 7.7 | 0.445 |

Note: † = *t*-test

Table 7 presents the logistic regression results, weighted to account for the stratified nature of the sample. The independent variables in this analysis are the same variables used for the descriptive analysis above, with education or lack of education included as a binary variable at this point.

The results show that gender has an extremely strong statistically significant relationship with informality status. Women are significantly more likely to be engaged in the informal sector than men, and the odds ratio suggests that the odds of male participation in the informal sector are 87.2 percent lower than for females, *ceteris paribus*. The final two columns disaggregate the result by gender. This analysis shows that both married women and men are less likely to engage in the informal sector, and this effect is larger for men. The effect of no education and urban location are only statistically significant for women.

The results on gender are in line with the literature that concludes that women in developing countries tend to have a greater level of involvement in the informal sector as compared with male involvement (Leonard 1998, IFC 2010, WB 201, Babbitt *et al.* 2015). Disaggregated data by sex from different countries in Asia generally shows the percentage of women in the non-agricultural informal sector is significantly higher than men. For example in Liberia, 72% of those in the informal sector are women (ILO and WIEGO, 2013).

The World Bank (2011) reported that people with high education tend to be involved in the formal sector rather than in the informal sector. Other reports have suggested that the informal sector is used by some people as a transition to the formal sector (ILO, 2010). Our results show that there is a significant association between education and engagement in the informal sector. This suggests that in some circumstances, the informal sector becomes an

alternative even for those with higher education while they await opportunities in the formal sector. Flexibility in working hours in the informal sector permits people with different educational backgrounds to continue looking for a job in the formal sector while performing informal economic activities (Fields 1975, World Bank, 2011).

Table 7. Logistic Regression Results

| The Informal Sector | Odds Ratio | Female Odds Ratio | Male Odds Ratio |
|-------------------------------|---------------------|---------------------|---------------------|
| Gender | 0.128*** (0.034) | | |
| Age | 1.004 (0.011) | 1.004 (0.017) | 1.003 (0.012) |
| Marital status | 0.258*** (0.087) | 0.329* (0.186) | 0.125*** (0.090) |
| No education | 1.639* (0.445) | 2.334* (0.984) | 1.354 (0.479) |
| Rural-urban | 1.649* (0.421) | 2.906*** (0.966) | 1.184 (0.390) |
| Constant | 3.766*** (1.661) | 2.348* (1.399) | 0.669 (0.359) |
| Number of Observations = 658 | | | |
| Population Size = 0.983301787 | | | |
| F (5, 34) = 14.30 | | | |
| Prob > F = 0.0000 | | | |

*p<0.1, **p<0.5, ***p<0.01. Standard error in parentheses.

Table 8 provides additional logistic regression results, where the dependent variables are whether the respondent engaged in various economic activities in the informal sector. Since these activities are not mutually exclusive, a separate logistic regression model was estimated for each activity. The sample size was limited to those engaged in informal sector work only. These results reveal a significant gender dimension to informal sector work. Women were significantly more likely to be engaged in food and beverage activities, and in non-specialized retail, for instance, grocery or kiosk work, and weaving and plaiting. These are activities that can easily take place in, or near, the home, which allows for the continuation of family and household responsibilities. In contrast, males were significantly more likely to be involved in construction and quarrying, which involves work outside of the home. Non-food activities, such as fuel retail, and collecting and selling firewood, and weaving and plaiting were significantly more prevalent in rural areas. The results also reveal that married people were significantly more likely to be involved in transportation and service activities, while activities such as an ambulant trader, and construction and quarrying, were significantly more prevalent among urban residents.

Table 8: Logistic Regression by Economic Activity

Weighted

| | Food | Non-Food | Non-Specialised Retail (Grocery) | Trade (Ambulant Trader) | Construction and Quarrying | Transportation and Service | Weaving and Plaiting | Domestic (Housemaid) |
|----------------|---------------------|---------------------|----------------------------------|-------------------------|----------------------------|----------------------------|----------------------|----------------------|
| | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio |
| Gender | 0.383*** (0.132) | 1.372 (0.560) | 0.437* (0.193) | 2.234 (1.700) | 65.792*** (43.944) | 1.977 (1.029) | 0.446* (0.211) | |
| Age | 0.985 (0.014) | 1.005 (0.018) | 0.995 (0.013) | 0.980 (0.017) | 1.026 (0.024) | 0.967 (0.024) | 1.043** (0.021) | 1.046 (0.082) |
| Marital status | 0.397* (0.210) | 0.159* (0.161) | 0.360* (0.264) | 0.424 (0.457) | 1.549 (1.647) | 15.156*** (12.558) | 1.548 (0.823) | |
| No-education | 1.425 (0.683) | 0.622 (0.312) | 0.642 (0.231) | 0.556 (0.383) | 1.465 (0.945) | 1.370 (0.993) | 1.249 (0.535) | |
| Urban-rural | 0.644 (0.198) | 0.495* (0.184) | 1.083 (0.322) | 4.374*** (2.166) | 9.242*** (5.747) | 0.873 (0.542) | 0.362*** (0.126) | |
| Constant | 1.301 (0.723) | 0.119*** (0.073) | 0.540 (0.338) | 0.065*** (0.035) | <0.001*** (<0.001) | 0.076*** (0.069) | 0.056*** (0.044) | 0.032 (0.120) |

*p<0.1, **p<0.05, ***p<0.01. Standard error in parentheses.

6. Conclusions

This paper analysed the characteristics associated with informal sector work in Timor-Leste. Women were significantly more likely to be involved in the informal sector than men, and there is a tendency for those in the informal sector to be less educated than those not in the informal sector. The type of the informal sector activities that people engage in are similar to those in other developing countries, categorized as small, unregistered, unprotected, and unsecured, non-agricultural activities. This research offers an understanding of the characteristics of the informal sector in Timor-Leste. There was a significant gender dimension to labour participation; however, this does not mean that males were not involved in the informal sector. The gender dimension was indicated in some specialized activities that were mostly female-dominated, while other activities were male-dominated. Males were more likely to be involved in construction and quarrying, while females were mostly engaged in food and beverage, retail activities, and weaving and plaiting. Weaving not only refers to traditional weaving *tais* and related handicrafts from palm leaves, which are commonly crafted by women, but also bamboo and rattan work.

Older people were more likely engaged in weaving and plaiting, while unmarried persons were more engaged in transportation and services. Also, rural people were more likely to be engaged in non-food activities such as fuel retail, and collecting and selling firewood, while urban people were more often involved in an ambulant trader and in construction and quarrying activities.

The results of this study are consistent with previous reports both globally and locally. Worldwide, the informal sector employs millions of people. In Timor-Leste, the number of people engaged in the informal sector is quite high. Over 71% of the employed population is engaged in the informal sector (LFS 2013). Correspondingly, this study reported 65.8% of people in Dili and surrounding sub-districts are in the informal sector.

This study offers us information on the extent of people's participation in the informal sector in Timor-Leste, but we know very little about the wellbeing of informal sector workers, and that further research in this area is needed.

References

- Adams, A. V., de Silva, S. J., and Razmara, S. (2013). *Improving skills development in the informal sector: Strategies for Sub-Saharan Africa*. Washington, DC: World Bank.
- Altman, M. (2008). *Formal-informal economy linkages*. Employment Growth and Development Initiative. Human Sciences Research Council. Retrieved from: http://ecommons.hsrc.ac.za/bitstream/handle/20.500.11910/5420/5263_Altman_Formalinformaleconomylinkages.pdf?sequence=1&disAllowed=y
- Anne, T. (2005). Decent work and informal economy. *WIDER Discussion Paper, No. 2005/04*, ISBN 9291906824, The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki. Retrieved from: <https://www.econstor.eu/bitstream/10419/52876/1/48045437X.pdf>
- Babbitt, L.G., Brown, D., and Mazaheri, N. (2015). Gender, entrepreneurship, and the formal–informal dilemma: evidence from Indonesia. *World Development*, 72. 163-174.
- Banerjee, A. V., and Duflo, E. (2007). The economic lives of the poor. *Journal of Economic Perspectives*, 21(1).
- Banerjee, A. V., and Duflo, E. (2006). The economic lives of the poor. Massachusetts Institute of Technology, Cambridge, Massachusetts. Retrieved from: <https://economics.mit.edu/files/530>
- Bangasser, P. E. (2000). The ILO and the informal sector: An institutional history. International Labour Organization. *Employment Paper 2000/9*. Retrieved from: http://www.ilo.int/wcmsp5/groups/public/@ed_emp/documents/publication/wcms_142295.pdf
- Benjamin, N. and Mbaye, A., A. (2012). *The informal sector in francophone Africa. Firm size, productivity, and institutions*. World Bank.
- Bhowmik, S. K. (2010). *Street vendors in the global urban economy: Street vendors in Asia: Survey of research*. Routledge. London - United Kingdom.
- Boeke, J., H. (1953). Economics and economic policy of dual societies as exemplified by Indonesia. New York. International Secretariat of Pacific Relations.
- Bromley, R. (1978). Introduction-the urban informal sector: why is it worth discussing? *World Development*, 6 (9/10).
- Cameron, M., P. (2007). The relationship between poverty and HIV/AIDS in rural Thailand. PhD Thesis. The University of Waikato, New Zealand.
- Chant, S. and Pedwell, C. (2008). Women, gender and the informal economy: An assessment of ILO research and suggested ways forward. ILO - Geneva. Retrieved from: <http://www.cpahq.org/cpahq/cpadocs/wcms091228.pdf>
- Chant, S. (2013). Cities through a ‘gender lens’: A golden ‘urban age’ for women in the global south. *International Institute for Environment and Development (IIED)*, 25(1).
- Chaudhuri, S., and Mukhopadhyay, U. (2009). Revisiting the informal sector: a general equilibrium approach. MPRA Paper No. 52135. Retrieved from: https://mpa.ub.uni-muenchen.de/52135/1/MPRA_paper_52135.pdf
- Chen, M. A., Jhabvala, and Lund, F. (2001). Supporting workers the informal economy: A policy framework. *Paper prepared for ILO Task Force on the International Economy*. Retrieved from: <http://www.wiego.org/sites/default/files/publications/files/Chen-Jhabvala-Lund-Supporting-Workers-policypaper.pdf>
- Chen, M. A., Vanek, J., and Carr, M. (2004). *Mainstreaming informal employment and gender in poverty reduction: A handbook for policy-makers and other stakeholders*. The Commonwealth Secretariat. International Development Research Centre.
- Chen, M., A. (2012). The informal economy: Definitions, theories and policies. Women in informal employment globalizing and organizing. *WIEGO working paper 1*.

- D'souza, A., P. (2013). Unorganized sectors: Role of an entrepreneur and challenges in self-employment. *International Journal of Scientific and Research Publications*, 3(6).
- Deaton, A. (1997). *The analysis of household surveys: A micro econometric approach to development policy*. The World Bank.
- De Mel, S. and McKenzie, D. (2011). What is the cost of formality? Experimentally estimating the demand for formalization. World Bank. Retrieved from: https://assets.publishing.service.gov.uk/media/57a08ac640f0b64974000780/EFO_PSD_Impact_WP2.pdf
- De Mel, S., McKenzie, D., and Woodruff, C. (2013). The demand for, and consequences of, formalization among informal firms in Sri Lanka. *American Economic Journal: Applied Economics*, 5(2).
- De Soto, H. (1989). *The other path. The invisible revolution in the Third World*. Harper and Row. New York.
- Fields, G. S. (1975). Rural-urban migration, urban unemployment and urban underemployment, and job search activity in LDC's. *Journal of Development Economics*, 2, 1165-188.
- Gillani, D. Q., and Naeem, M. Z. (2017). Employment status and workforce in the formal and informal sector: A case study of district Lahore. *Journal of Political Studies*, 24 (1).
- Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The Journal of Modern African Studies*. 11(1), 61-89.
- Helen, G. (1973). Employment, incomes and equality: A strategy for increasing productive employment in Kenya. *Monthly Labour Review*, 96.
- Inder, B., Brown, A., and Datt, G. (2014). Poverty and agricultural household in Timor-Leste; Some patterns and puzzles. Monash University, Australia. Retrieved from: <http://laohamutuk.org/econ/Monash/MonashdraftMay2014en.pdf>
- Indira, D. (2014a). A study on the organizing of street hawking business. *International Journal of Management and Commerce Innovations*, 2(1), 280-288.
- Indira, D. (2014b). A study of street vending across the globe. *International Journal of Advanced Research in Computer Science and Software Engineering*, 4(9).
- International Finance Corporation (2010). *Timor-Leste: Gender and investment climate reform assessment*. Timor-Leste.
- International Labour Organization (2014). *Transitioning from the informal to the formal economy*. ILO Office in Geneva.
- International Labour Organization, (2013). *Measurement of the Informal Economy*. ILO Office in Geneva. Retrieved from: http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_policy/documents/publication/wcms_210443.pdf
- International Labour Organization and Women in Informal Employment Globalizing and Organizing, (2013). *Women and Men in the Informal Economy: A Statistical Picture*. ILO Office in Geneva.
- International Labour Organization (2012). *Macroeconomic stability, inclusive growth and employment*. UN system task team on the post-2015 UN development agenda.
- International Labour Organization (2010). *A skilled workforce for strong, sustainable and balanced growth. A G20 Training Strategy*. ILO, Geneva.
- International Labour Organization (2003). *The Seventh International Conference of Labour Statisticians*. ILO Office, Geneva-Switzerland.
- International Labour Organization (1972). *Employment, income and equality: A strategy for increasing productive employment in Kenya*. International Labour Office, Geneva-Switzerland.
- International Standard and Industry Classification (2008). *ISIC, Rev 4*.
- Kanbur, R. (2017). Informality: Causes, Consequences and Policy Responses. *Rev Dev Econ*, 21.

- Kavan, P. S. (2010). Informal sector in Port Moresby and Lae, Papua New Guinea: Activities and government response. *The International Journal of Interdisciplinary Social Sciences*, 5(8).
- Kavan, P. S. (2013). Informal sector in Port Moresby and Lae, Papua New Guinea: Activities and government response (Doctoral thesis, University of Canberra, Australia). Retrieved from: http://www.canberra.edu.au/researchrepository/file/06ea5bc5-2c0f-6448-bfc5-1c3a9fc69227/1/full_text.pdf
- Kay, D. D. (2011). *The relationship between formal and informal employment in South Africa* (Master's thesis, University of Illinois). Retrieved from: https://www.ideals.illinois.edu/bitstream/handle/2142/24306/Kay_David.pdf
- Kingdom, G. and Knight, J. (2005). Unemployment in South Africa, 1995-2003: Causes, problems and policies. *Global Poverty Research Group*, 010.
- Leonard, M. (1998). *Invisible work, invisible workers: The informal economy in Europe and the US*. Basingstoke, United Kingdom: Macmillan Press.
- Lewis, W.A. (1954). Economic development with unlimited supplies of labour. *The Manchester School of economic and Social Studies*, 22, 139-191.
- Lipton, M. (1980). Migration from rural areas of poor countries: The impact of rural productivity and income distribution. *World Development*, 8, 1-24.
- Maloney, W., F. (2004). Informality revisited. *World Development*, 32 (7).
- Peattie, L. (1987). An idea in good currency and how it grew: The informal sector. *World Development*, 15(7). 851-860.
- Perry, G. E., Maloney, W. F., Arias, O. S., Fajnzylber, P., Mason, A. D., and Saavedra-Chanduvi, J. (2007). *Informality: Exit and exclusion*. The World Bank, Washington DC.
- Portes, A., and Schauffler, R. (1993). Competing perspectives on the Latin American informal sector. *Population and Development Review*, 19(1), 33-60.
- Portes, A., Castells, M. and Beton, L. A. (1989). *The informal economy: Studies in advanced and less developed countries*, Baltimore, Johns Hopkins University Press.
- Recio, R. B., and Gomer Jr, J. E., A. (2013). Street vendors, their contested spaces, and policy environment: A view from Caloócan, Metro Manila. *Environment and Urbanization Asia*, 4(1), 173-190.
- Sethuraman, S. V. (1976). The urban informal sector: concept, measurement, and policy. *International Labour Review*, 114(1).
- Siggel, E. (2010). The Indian informal sector: The impact of globalization and reform. *International Labour Review*, 149(1).
- Sookram, S., and Watson, P. K. (2008). Small-business participation in the informal sector of an emerging economy. *Journal of Development Studies*, 44(10), 1531-1553.
- Spiegel, S. J. (2012). Governance institution, resource right regimes, and the informal mining sector: Regulatory complexities in Indonesia. *World Development*, 40(1), 189-205.
- The Asian Development Bank and BPS-Statistics Indonesia, (2010). The informal sector and informal employment in Indonesia: *Country report*. Retrieved from: <https://www.adb.org/sites/default/files/publication/28438/informal-sector-indonesia.pdf>
- The World Bank (2013). Labour market issues in Timor-Leste: Current state, prospects and challenges. The World Bank.
- The World Bank (2011). The scope and main characteristics of informal sector employment in Ukraine. Technical note for the Government of Ukraine. Retrieved from: <http://siteresources.worldbank.org/UKRAINE/INUKRAINIANEXTN/Resources/455680-1310372404373/InformalEmploymentinUkraineEng.pdf>

- Timor-Leste, Business Activity Survey (2013). General Directorate of Statistics, Ministry of Finance Timor-Leste.
- Timor-Leste, General Directorate of Statistics: Ministry of Finance, (2015). Population and housing census.
- Timor-Leste, General Directorate of Statistics: Ministry of Finance, (2010). Population and housing census.
- Timor-Leste, Labour Force Survey (2013). State Secretariat for the Policy of Vocational Training and Employment and General Directorate of Statistics.
- Timor-Leste, Labour Force Survey (2010). State Secretariat for the Policy of Vocational Training and Employment and General Directorate of Statistics.
- Ulyssea, G. (2010). Regulation of entry, labour market institutions and the informal sector. *Journal of Development Economics*, 91. 87-99.
- United Nations, Department of Economic and Social Affairs (2008). International standard industrial classification of all economic activities, 4/Rev.4.
- Vanek, J., Chen, M.A., Carré, F., Heintz, J., and Hussmanns, R. (2014). Statistics on the informal economy: Definitions, regional estimates, and challenges. *WIEGO Working Paper* (2).
- Visaria, L. (2012). Empowerment of women and its impact on population. *Asia Pacific Population Journal*, 27 (1).
- Week, J. (1975). Policies for expanding employment in the informal urban sector of developing economies. *International Labour Review*, 1.

Appendix A

Following Deaton (1997), the weighting for each household in sample was calculated first:

$$W_i^h = \frac{W_i^v}{S_i^v \sum_{k=1}^n W_k^v} \quad (1)$$

$$\text{where } W_i^v = \gamma_v Y \quad (2)$$

$$\gamma_v = \frac{H_i^v}{S_i^v} \quad (3)$$

$$\gamma_s = \frac{\sum_{j=1}^n H_j^v}{\sum_{i=1}^n S_i^v} \quad (4)$$

In the above equations, W_i^h is the weighting of each household in CEA i , W_i^v is the gross weighting for the CEA, S_i^v is the number of households surveyed in CEA i , and H_i^v is the total number of households in CEA i . The gross weightings W_i^v were summed, and each household was weighted by the proportion of the total gross weighting from its CEA, divided by the number of households surveyed in the CEA. The total of the weightings of all households were standardised to sum to one.

After calculating household weights, those weights were used to calculate individual weights for each survey respondent, to account for the different probabilities of selection into the sample for individuals from households of different sizes. Weighting at the individual level therefore needs to consider the number of adult males and females in each household (Deaton, 1997; Cameron, 2003). As noted earlier, individuals aged 18 and above are considered as an adult. The individual weights were calculated as:

$$w_j^f = w_i^h f_j^h \quad (5)$$

where w_j^f is the weighting of each adult female respondent in household j of CEA i , w_i^h is the weighting of each household in CEA i , and f_j^h is the number of adult females (aged 18 or over) in household j . An equivalent formula was used for male respondents:

$$w_j^m = w_i^h m_j^h \quad (6)$$

where w_j^m is the weighting of each adult male respondent in household j of CEA i , w_i^h is the weighting of each household in CEA i , and m_j^h is the number of adult males (aged 18 or over) in household j .

Appendix B

Table B1: Descriptive Statistics of the Variables
Unweighted

| Variable | Mean | Std. Dev. | Min | Max |
|----------------------------------|-------|-----------|-----|-----|
| Informal sector | 0.616 | 0.487 | 0 | 1 |
| Gender | 0.485 | 0.500 | 0 | 1 |
| Age | 40.60 | 12.40 | 18 | 80 |
| Marital status | 0.079 | 0.270 | 0 | 1 |
| Household size | 7.14 | 3.15 | 1 | 20 |
| Rural-urban | 0.505 | 0.500 | 0 | 1 |
| M/F headed household | 0.918 | 0.275 | 0 | 1 |
| Age of household-head | 45.50 | 12.90 | 20 | 80 |
| <i>Economic Activity</i> | | | | |
| Food | 0.328 | 0.470 | 0 | 1 |
| Non food | 0.093 | 0.291 | 0 | 1 |
| Non-specialised retail (grocery) | 0.210 | 0.408 | 0 | 1 |
| Trade (ambulant trader) | 0.064 | 0.245 | 0 | 1 |
| Constructions and quarrying | 0.095 | 0.293 | 0 | 1 |
| Transportation and service | 0.044 | 0.205 | 0 | 1 |
| Weaving and plaiting | 0.158 | 0.365 | 0 | 1 |
| Domestic work (housemaid) | 0.002 | 0.047 | 0 | 1 |

Table B2: Characteristics of the Sample
Unweighted

| Variable | Not informal sector | Informal sector | P |
|------------------------|---------------------|-----------------|--------|
| <i>Gender:</i> | | | |
| Female | 30.43 | 64.69 | <0.001 |
| Male | 69.57 | 35.31 | |
| <i>Education:</i> | | | |
| No education | 28.06 | 33.33 | 0.028 |
| Less than secondary | 23.32 | 28.89 | |
| Secondary | 33.99 | 28.89 | |
| Post-secondary | 14.62 | 8.89 | |
| <i>Marital status:</i> | | | |
| Married | 90.12 | 93.33 | 0.137 |
| Not married | 9.88 | 6.67 | |
| <i>Area of living:</i> | | | |
| Rural | 54.15 | 46.67 | 0.062 |
| Urban | 45.85 | 53.33 | |
| Age† | 40.66 | 40.61 | 0.957 |
| Household size† | 6.99 | 7.23 | 0.334 |

Note: † = t-test

Table B3: Logistic Regression Results
Unweighted

| The Informal Sector | Odds Ratio | Female Odds Ratio | Male Odds Ratio |
|---------------------|---------------------|-------------------|-------------------|
| Gender | 0.214*** (0.039) | | |
| Age | 1.009 (0.008) | 1.013 (0.013) | 1.006 (0.010) |
| Marital status | 0.432*** (0.138) | 0.471* (0.187) | 0.340* (0.203) |
| No education | 1.277 (0.261) | 1.233 (0.387) | 1.319 (0.358) |
| Rural-urban | 1.489** (0.260) | 1.603* (0.428) | 1.414 (0.326) |
| Constant | 2.024** (0.646) | 1.721 (0.824) | 0.502* (0.222) |

Log likelihood = -393.74924

Pseudo R2 = 0.1018

LR chi2(5) = 89.25

Prob > chi2 = 0.0000

*p<0.1, **p<0.5, ***p<0.01. Standard error in parentheses.

Table B4: Logistic Regression by Economic Activity
Unweighted

| Variable | Food | Non-Food | Non-Specialised Retail (Grocery) | Trade (Ambulant Trader) | Construction and Quarrying | Transportation and Service | Weaving and Plaiting | Domestic (Housemaid) |
|----------------|---------------------|---------------------|----------------------------------|-------------------------|----------------------------|----------------------------|----------------------|----------------------|
| | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio | Odds Ratio |
| Gender | 0.403*** (0.090) | 1.701 (0.570) | 0.356*** (0.097) | 4.695*** (2.069) | 12.770*** (5.946) | 2.678** (1.276) | 0.949 (0.263) | |
| Age | 0.997 (0.009) | 0.991 (0.015) | 1.012 (0.011) | 0.985 (0.018) | 1.005 (0.015) | 0.982 (0.019) | 1.008 (0.011) | 1.018 (0.107) |
| Marital status | 0.719 (0.290) | 0.330 (0.341) | 0.524 (0.270) | 0.578 (0.614) | 1.897 (1.223) | 4.045** (2.499) | 1.503 (0.660) | |
| No-education | 0.876 (0.209) | 0.647 (0.263) | 0.648 (0.185) | 0.679 (0.347) | 1.412 (0.565) | 1.105 (0.582) | 2.138*** (0.623) | |
| Rural-urban | 0.751 (0.155) | 0.784 (0.259) | 1.113 (0.265) | 3.193** (1.453) | 3.909*** (1.515) | 1.200 (0.564) | 0.361*** (0.102) | |
| Constant | 0.956 (0.364) | 0.156*** (0.096) | 0.261*** (0.118) | 0.028*** (0.023) | 0.006*** (0.005) | 0.043*** (0.037) | 0.146*** (0.069) | 0.108 (0.568) |

*p<0.1, **p<0.05, ***p<0.01. Std error in parentheses.