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Informal–formal workers’ transition in Nigeria

A livelihood analysis

Abiodun O. Folawewo and Olusegun A. Orija*

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Abstract: This study evaluates the effects of the informal sector on Nigerian workers' livelihoods and analyses workers' transitions within the informal sector and between informal and formal employment. A binary logit model is applied to General Household Survey panel data for the periods 2010/11, 2012/13, and 2015/16. We find that informal employment has the greatest impact on workers' livelihoods in terms of earnings. Results also indicate the existence of a high level of dynamic transition of workers within different types of informal employment. Our results further indicate that both self-employed and wage employed informal workers are likely to transit to formal employment, the likelihood being higher for the upper-tier informal wage employed. While informally employed workers have a very high chance of transiting to formal employment, formal workers have a much lower chance of transiting to informal employment. The policy implication of our results is the need to create better working conditions for informal workers.

Key words: binary logistic regression, employment, formal, informal, Nigeria, transition

JEL classification: E26, J43, J46

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* Department of Economics, University of Ibadan, Ibadan, Nigeria; corresponding author: ao.folawewo@mail.ui.edu.ng

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

In many African countries, especially in Nigeria, not only is the informal sector large, it is also a major absorber of labour (Folawewo 2013; Jerome 1996; Medina et al. 2017). The size of the sector is also growing across European countries (Adame and Tuesta 2017; Beręsewicz and Nikulin 2018). As indicated by the International Labour Organization (ILO 2018), on average about 60 per cent of informal employment in Africa is within the informal sector. Furthermore, the informal sector accounts for about 65 per cent of gross domestic product (GDP) in Nigeria (Medina et al. 2017; NBS 2010). Generally, the growth of the sector has been driven by slow economic development, poor economic performance, and shrinkage of formal sector jobs (Carr and Chen 2001; ILO 2004; Lapeyre 2017).

The informal sector in the Nigerian economy is spread across both rural and urban areas and covers several economic activities. Hence, the informal sector is a vital source of livelihood¹ for the vast majority of citizens. As in many other developing countries, the Nigerian informal sector is characterized by low productivity, low wages, absence of social security, low capital and inadequate finance, and a lack or inadequate coverage of official institutional regulations (ILO 2017, 2018). This has led to a situation where informal sector employment is precarious, and securing decent and sustainable jobs in the sector is not guaranteed. Similarly, while the informal sector cushions the unemployment effect for the majority of people that are either unable to secure jobs in or are laid off from the formal sector, several factors hinder the movement of workers from the informal sector back to the formal sector (Krstić and Sanfey 2006; Maloney 1999; Tansel and Kan 2012a).

Informal employment in Nigeria can be categorized as self-employment in agricultural and non-agricultural activities, as unpaid family business, and as salaried employment. This reflects the heterogeneous nature of the informal sector. In line with this heterogeneity, the ILO (2019) classifies employment by formality status, that is, whether formal or informal employment, and by work status in terms of wage-employment and self-employment. Each of these categories has peculiarities, but income and wage inequality is a common feature. Consequently, mobility across different jobs within the informal sector is often pronounced, albeit with some constraints. Given the significant employment role of the informal sector, we use a panel of national household survey data to conduct an empirical analysis of the relationship between the informal sector and livelihood, and of the dynamic movements into and out of various forms of informal employment. Specific attention is focused on the nature and factors affecting workers' transition between informal and formal employment.

We apply a binary logit model to a national General Household Survey (GHS) panel dataset for 2010/11, 2012/13, and 2015/16. We find that informal employment has a more positive impact on workers' livelihoods. Our results also show a very high dynamic of worker transition within the different types of informal employment, especially among the lower-tier segments. We further find a likelihood of workers' movement from informal to formal employment, this likelihood being higher among the upper-tier informal wage employed. Our findings also reveal a higher probability of workers' transition from informal employment to formal employment than from formal to informal.

¹ Generally, livelihood is defined as all forms of human strategies, capacities, resources, and activities involved in making a living (see e.g. Chambers and Conway 1992; Ellis 2000; UNDP-IRP 2011).

The rest of the paper is made up of six sections. Section 2 provides an overview of the Nigerian labour market, where the regulatory framework and wage and employment issues are discussed. In Section 3 a brief exploration of extant literature on informal–formal employment transition is made. Section 4 is devoted to a description of the methodological approach and sources of data used in the study. A descriptive data analysis is presented in Section 5, and a discussion of the regression results in Section 6. Finally, in Section 7 policy recommendations and concluding remarks are provided.

2 Overview of the Nigerian labour market

The Nigerian labour market is characterized by heterogeneity and dualism, which are the general features of most African and developing countries' labour markets (Aminu 2010; Fields 2011; Harris and Todaro 1970). Its dualistic nature is reflected in a rural–urban as well as a formal–informal dichotomy. The formal labour market comprises public sector organizations and large private firms, while the informal segment is made up of micro, small, and medium-scale enterprises, petty trades, and other forms of individual economic activity. Essentially, the formal and informal sectors differ in terms of governance and regulatory framework, employment process, employees' compensation (wage determination), and productivity.

The governance of labour matters in Nigeria follows a tripartite framework involving the government (the Federal Ministry of Labour and Employment (FMLE) and allied agencies), employers (represented by Nigeria's Employers Consultative Association (NECA)), and workers (represented by their umbrella unions, the Nigeria Labour Congress (NLC) and Trade Union Congress (TUC)). Labour market relations are controlled by a variety of regulations. The Labour Act (Decree) No. 21 of 1974 and its subsequent amendments, such as the Labour Act 1990 and Labour Act 2004, is complemented by the many international labour standards that Nigeria has ratified and domesticated, while the Trade Unions Act (Cap. T14 L.F.N 2004) provides guidelines for the formation of trade unions, which generally advocate workers' rights and welfare. Another form of regulation guiding interactions among players within the Nigerian labour market is the Trade Disputes Act 2004 (Cap. T8 L.F.N). In addition, several minimum wage laws have been implemented in the country in recent years, the latest being the National Minimum Wage (Amendment) Act 2011 and 2019. All these Acts and regulatory frameworks are set up to facilitate a smooth relationship, and to resolve conflicts that may arise, between employers and employees.

Rules and regulations emanating from the legislation governing operations within the labour market are, however, usually poorly implemented and most often ineffective. Moreover, they cover only part of the labour market, the large informal segment being uncovered. In the public sector rules and regulations are complied with, but in the private sector the compliance level is low, due to poor monitoring and implementation (Folawewo 2016). This has also allowed a lack of adherence to employment and compensation laws among employers across all market sectors. Workers are therefore subject to exploitation, casualization, lack of adequate protection, and job insecurity (Nwaka 2016).

In the informal sector, where adherence to official regulations is even poorer than in the formal sector, hiring (employment) procedures are often based on personal contact without any formal contractual agreement. This results in job insecurity, employers having the freedom to fire employees at will, and poor remuneration—usually below the national minimum wage. Similarly, inadequate health and safety measures and environmental hazards are more prevalent in the informal sector, where workers in all sectors are confronted with unsatisfactory welfare facilities, practically non-existent occupational health services, and other challenges (Forastieri 1999; Nwaka

2016). Because of the poor remuneration and working conditions in the informal sector, workers often transit from the informal to the formal sector, while there is little reverse transition—usually brought about by retirement or retrenchment from formal jobs (Nwaka 2016; Roberts 2016).

In recent times, the informal sector has witnessed rapid growth due to poor economic performance and lack of growth in the formal sector (Folawewo 2016; Medina et al. 2017). This shows that the informal sector serves as a reservoir of workers who are readily available for formal employment once the opportunity is provided. The transition of workers within informal activities is also common, especially among workers moving from informal salaried employment to self-employment, and between self-employment in agricultural activities and non-agricultural activities. Consequently, sectoral workers' transition predicated on differential working conditions is a regular feature of the Nigerian labour market.

3 Literature review

Theoretical distinctions between the formal and informal sectors and explanations for workers' transition between the two sectors can be found within market dualism (segmented labour market) and modernization theories (Harris and Todaro 1970; Perry et al. 2007). The dual labour market/segmented theory posits that the existence of minimum wages and other forms of compensation in the organized (formal) segment of the labour market attracts workers to it. However, due to limited space and job availability, workers that are unable to secure employment in the organized segment are pushed into the unorganized or informal sector, where they are forced to accept the prevailing working conditions. The modernization theory, on the other hand, argues that the dichotomy between the formal and informal sectors is brought about by the development process. In the early stage of development, informal activities usually surpass formal, but, as the economy develops, the formal or modern economic sector begins to grow and informal activities (production units) gradually fizzle out (Hillenkamp et al. 2013; Perry et al. 2007). The modernization theory therefore suggests that informality is a consequence of underdevelopment or a failure of modernization. Both the segmented labour market and modernization theories are regarded as orthodox.

A more recent view is based on institutional theory, which opines that existing institutional arrangements may affect livelihoods as well as labour transition. This view argues that the complex interactions between the formal and informal economy are affected by institutions and social norms (Hillenkamp et al. 2013; Perry et al. 2007). Institutional arrangements affect interaction and economic activity through their effects on contracts, property rights, and social networks. Institutional arrangements often lead to the formalization of economic activities, and subsequently cause movement of workers from the informal to the formal sector (Lapeyre 2017).

In all, the theoretical expositions on the formal–informal segmentation of the labour market are suggestive that the formal sector is preferable to the informal because of the perceived better working conditions such as higher compensation, job security, and availability of employment protection legislation (EPL). Consequently, informal employment is seen as a temporary expedient, and workers seek to transit from it to formal employment. Empirical literature on the informal–formal transition has, however, been polarized along two strands. On the one hand, informal employment is seen as voluntary and subject to workers' willingness and preference (Bosch and Maloney 2010; Fields 2019; Maloney 1999, 2004). On the other hand, informal employment is seen as involuntary, with workers being forced into it (de Soto 2000).

Recent literature has shown that both the orthodox and institutional theories fail to adequately capture the heterogeneity within job status; hence, the extent of dynamic mobility across different employment may not be fully measured. Thus, in line with the ILO's employment characterization (ILO 2019), formal employment cuts across both the formal and the informal sectors. In this regard, the formality status of employment is determined by the conditions surrounding different types of work, such as coverage of EPL and the availability of social and job security. With regard to work status, employment can also be classified into wage employment or self-employment. This view leads to six categories of employment: formal wage employment; formal self-employment; upper-tier informal wage employment; lower-tier informal wage employment; upper-tier self-employment; and lower-tier self-employment (Danquah et al. 2019; ILO 2019).

There is divergent empirical evidence in relation to the potential for and ability of workers to transit across the various job categories. This is due to differential country features, time periods, and methodological approaches. While showing that informality is a major source of livelihood for most Mexican workers, Biles (2008) argues that there is high mobility of workers both within informal activities and between informal and formal employment, with evidence of voluntary transition from the formal to the informal sector. In line with this, several other studies on workers' mobility have noticed high rates of mobility across formal and informal salaried jobs and a low rate between formal salaried jobs and self-employment (Bosch and Maloney 2010; IDB 2004; Mahmud 2017; Maloney 1999; Pagés and Stampini 2009). One common submission from all the studies is that voluntary transition from formal to informal is a possibility.

Some other studies have investigated the determinants of workers' transition across sectors. Several factors have been found to affect the probability of mobility and transitions both within and between sectors. Individual and household characteristics such as education and intrinsic demographics, experience and wage differential, and location are among the crucial factors influencing mobility (Bereşewicz and Nikulin 2018; Krstić and Sanfey 2006; Núñez 2017; Tansel and Ozdemir 2015). In terms of within-sector/employment type transition, the sector of economic activities has been shown to play a significant role. For example, there is a high probability of transition from informal employment to regular employment within the formal sector, and salaried employees are more likely to transit to self-employment in the informal sector (de la Parra 2017; Gutierrez et al. 2019; Tansel and Kan 2012b).

Other recent studies have shown comprehensive dynamism in formal–informal workers' transition between ILO employment classifications. Bosch and Maloney (2010) studied Latin American countries (Argentina, Brazil, and Mexico) and evidenced a high rate of transition among informal self- and wage-employed workers, and between upper-tier self-employed and formal self-employed workers. While confirming that workers transit from informal to formal employment, Danquah et al. (2019) also argued that gender plays a crucial role in the participation of workers in formal vs. informal employment. Specifically, they showed that on average women in three African countries—Ghana, South Africa, and Tanzania—prefer informal lower-tier self-employment and upper-tier informal wage employment.

The increasing extent of informal employment and its importance to livelihood has been the preoccupation of many studies in recent times. In particular, institutional and structural features, and the cyclical nature of the economy are found to affect the size and importance of the informal sector. In this connection, shrinkage in formal jobs and growing unemployment are major drivers of informal sector employment (Albertini et al. 2019; de la Parra 2017; Hovsha and Meyer 2015; ILO 2018; Ndiweni et al. 2014). Stringent labour regulations and restrictions are also argued to be major contributory factors to labour transition and the significant role of the informal sector in livelihood (Timalsina 2011; Tshuma and Jari 2013).

4 Methodology and data

The impact of the informal and formal sectors on livelihood is evaluated using descriptive analysis. This involves measuring the percentage of individuals engaged in various employment types, and analysing the characteristics of such individuals. The analysis of workers' transition within and between informal and formal employment is situated within the framework of a logistic probability model. Unlike Tansel and Kan (2012a, 2012b), we employed a standard binary logistic model to investigate the probability of workers' mobility across different informal employment types, and between informal and formal employment. This methodology is preferred as it enables us to evaluate the effect of individual workers' characteristics on their ability to transit from one form of employment to another over a given period. In this case, a worker's movement from one specific form of employment to another is treated as 1, and no movement as 0. The fact that the regressors are either categorical or continuous in nature further justifies the suitability of the binary logistic model.

If we assume the log-odds of a worker's transition as $l = \log_b \frac{P}{1-P}$, given the worker's characteristics, then the standard logistic model can be specified as:

$$l = \log_b \frac{P}{1-P} = \beta_0 + \beta_i Z_i \quad (1)$$

where b is the base of the logarithm and Z_i is vector of individual worker's characteristics. The odds of transition are recovered by expressing the log-odds in exponential form as follows:

$$\frac{P}{1-P} = b^{\beta_0 + \beta_i Z_i} \quad (2)$$

Consequently, results from the logistic model estimations are reported in odds ratios, unless otherwise indicated. The logit model is estimated in such a way that it comprehensively reflects workers' transition across different occupational positions and work statuses. Thus, the logit model is estimated for two forms of occupational position, that is, whether a worker is self-employed or engaged in wage employment. The occupational position is embedded in the formality status of the job—whether such a position is formal or informal employment. Informal employment is further classified into upper and lower tiers.

The dependent variable in each regression is measured as a categorical variable that assumes the value of 1 if an individual transits from a particular activity or employment in period t to a reference activity in the subsequent period, $t + 1$, and 0 if the individual does not transit to the reference employment. In the descriptive analysis it is also recognized that workers are not unlikely to engage in more than one economic activity, that is, more than one type of employment. However, for ease of analysis, in the logistic regression workers are restricted to a particular type of job at a given time. That is, the major form of employment (main economic activity and source of income) of an individual is used as the employment type for that individual in a particular wave. Workers' characteristics in the base period are also used in the regression analysis. For example, the age of a worker in Wave 1 is used for movement from Wave 1 to Wave 2, and the age in Wave 2 is used when analysing movement from Wave 2 to Wave 3.

In order to effectively capture workers' transition among jobs, the GHS dataset for 2010/11 (Wave 1), 2012/13 (Wave 2), and 2015/16 (Wave 3) is used. The GHS is a panel survey covering 5,000 households across all the geo-political zones of the country. The GHS is conducted over two different periods, post-planting and post-harvesting. The post-harvesting dataset is used in this

study as it contains information on both agricultural and non-agricultural activities, unlike the post-planting dataset, which concentrates on agricultural and farming activities.

Given the limitations of the dataset, which does not contain vital information such as business registration or workers' training other than formal education, clarification of the method of classification and measurement of different occupational positions and employment statuses is pertinent. All public sector (government) and large private firm/organization employment that is covered by official labour market regulations—such as recruitment and dismissal, compensation, and other EPL—is classified as formal and falls under 'wage employment'. Since the GHS data do not include information on business registration, participation in the National Health Insurance Scheme (NHIS) is used as an additional criterion for determination of the formality status of an employment. Thus, workers are also said to be in formal employment if they make NHIS contributions, whether they are self-employed or in wage employment. Forms of employment that are neither covered by any official regulations nor linked to NHIS contributions are regarded as informal, irrespective of whether they are self-employment or wage employment.

Within informal employment, the educational level of workers is used as the distinguishing factor for whether they belong to the upper or lower tier. As noted earlier and supported by the literature (e.g. Gutierrez et al. 2019), a majority of informal workers have little education; consequently, workers with secondary education and below are categorized as lower-tier informal workers, while those with post-secondary and tertiary education are classified as upper-tier.

5 Baseline descriptive data analysis

As a means of achieving the objectives of the study, empirical analysis is carried out in three stages. First, a descriptive analysis of unemployed and employed individuals across the three waves of the dataset is done. Second, a regression analysis of the impact of various work statuses on livelihood is performed using earnings as a key indicator of livelihood. The third phase of the analysis involves an examination of the dynamic movement of workers within the different informal jobs, and an evaluation of their ability to move from informal activities to formal employment.

Two sets of data are used: the number of individuals before data matching is used for the basic descriptive analysis (Appendix Table A1), while the number of individuals after data matching is used for both the transition and the regression analyses (Table A2). The matched dataset consists of household members that appear in all three waves of the GHS, as shown by the household roster identifiers in the dataset.

5.1 Workers' characteristics

We begin by looking at the characteristics of the unemployed, who account for 7.3 per cent of household members on average (Table A1). It is observed that more male household members were unemployed than females (50.3 per cent as against 49.7 per cent—Table A3). The percentage (62.0) of unemployed household members within the age bracket 18–30 was higher than that of those aged 31–60 (28.7), which confirms the generally high rate of youth unemployment in the country. On average, the percentage of unemployed household members across the dataset was highest among those with secondary education (42.4), followed by those with tertiary education (24.0), those without formal education (no schooling) having the least (3.4). This explains the high rate of joblessness among secondary school-leavers and post-secondary institution graduates in the country. The percentage of the unemployed was also higher for rural dwellers (56.3) than urban

(43.47), an indication of the higher rate of unemployment in the rural centres, which often leads to a high rate of rural–urban migration.

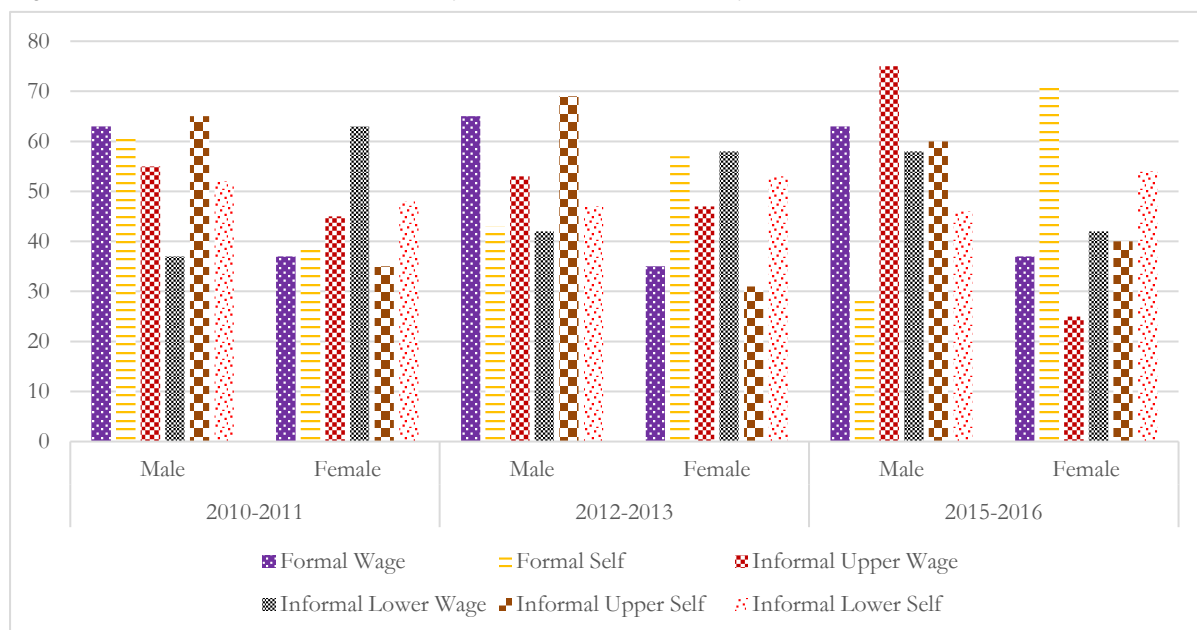
It is shown that in terms of the occupational position of household members, more individuals were engaged in self-employment (67.4 per cent on average) than were wage employed (32.6 per cent—Table A1). It can be seen that while self-employment rose throughout the period under study, the reverse is the case for wage employment. Within the self-employed, the average percentages for informal lower-tier, informal upper-tier, and formal employed were 95.6, 4.2, and 0.2, respectively. For wage-employed individuals, formal employment accounted for an average of 60.0 per cent, while the proportions of lower-tier and upper-tier informal workers were 37.2 and 2.8. This shows that the bulk of wage employed workers could be found in formal employment, while informally employed individuals dominated self-employment. Furthermore, lower-tier workers constituted the larger proportion of the informally employed (for both self- and wage employment) with an average of 93.9 per cent, the remaining 6.1 per cent being upper-tier. On the whole, in terms of formality status and irrespective of whether self-employed or wage employed, a majority of household members were engaged in informal employment: an average of 83.8 per cent compared with 16.2 per cent in formal employment. Thus, aggregately, in terms of employment opportunities, the informal sector provides a better livelihood than the formal sector for households in Nigeria.

The occupational position of workers reflects the fact that, on average across all waves, males were more engaged in wage employment (54.7 per cent) than their female counterparts (45.3 per cent—Table A4). A further disaggregation by work status indicates that formal wage employment was dominated by males: an average of 63.7 per cent as against 36.3 per cent for females (Tables A5–7). Females were more prevalent in informal self-employment (55.7 per cent) than males (44.3). Upper-tier informal wage employment was dominated by males (61 per cent compared with 39 per cent for females). Conversely, the lower-tier informal wage-employed were predominantly females, with an average of 54.3 per cent compared with 45.7 per cent for males across the three waves. In addition, there was a higher percentage of males (64.7) in upper-tier informal self-employment than females (35.3); on the other hand, informal lower-tier self-employment had a higher proportion of females (51.7) than males (48.3). Thus, in Nigeria’s setting male workers are more prominent in the upper tier of informal employment, whereas females are more prevalent in the lower tier, as depicted in Figure 1.

As shown in Figure 2, the educational distribution of workers reflects the fact that those without any formal education (no schooling) could mainly be found in self-employment (19.7 per cent of all workers on average), with relatively few in wage employment (6.7 per cent). The proportion of self-employed workers with primary education (39.0) was more than that of the wage employed (25.0). The average percentage of wage employed workers with secondary education was 32.2 as against 31.0 per cent for the self-employed. Workers with tertiary education were dominant in wage employment (36.0 per cent) as opposed to self-employment (10.3 per cent). This implies that workers with a low level of education are concentrated in self-employment; however, as workers move up the education ladder they become more engaged in wage employment.

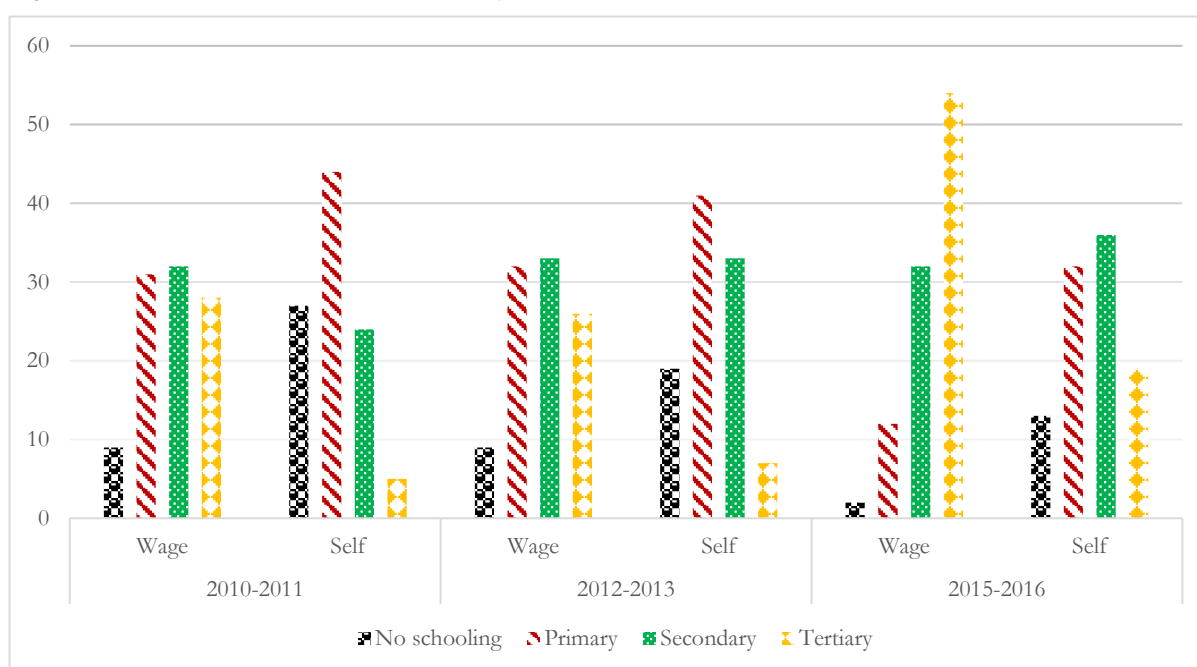
A further breakdown of the education distribution of workers by work status (Figure 3) reveals that on average, formal wage employment was dominated by workers with tertiary education (49.7 per cent), followed by secondary education (30.3 per cent) and primary education (16.3 per cent). Across all waves, formal self-employment was dominated by workers with secondary education (45.7 per cent), followed by those with primary education (33.3 per cent), tertiary education (11.7 per cent), and no education (9.3 per cent).

Figure 1: Gender distribution of workers by occupational and formality status



Source: authors' computation from NBS GHS datasets.

Figure 2: Educational distribution of workers by occupational position

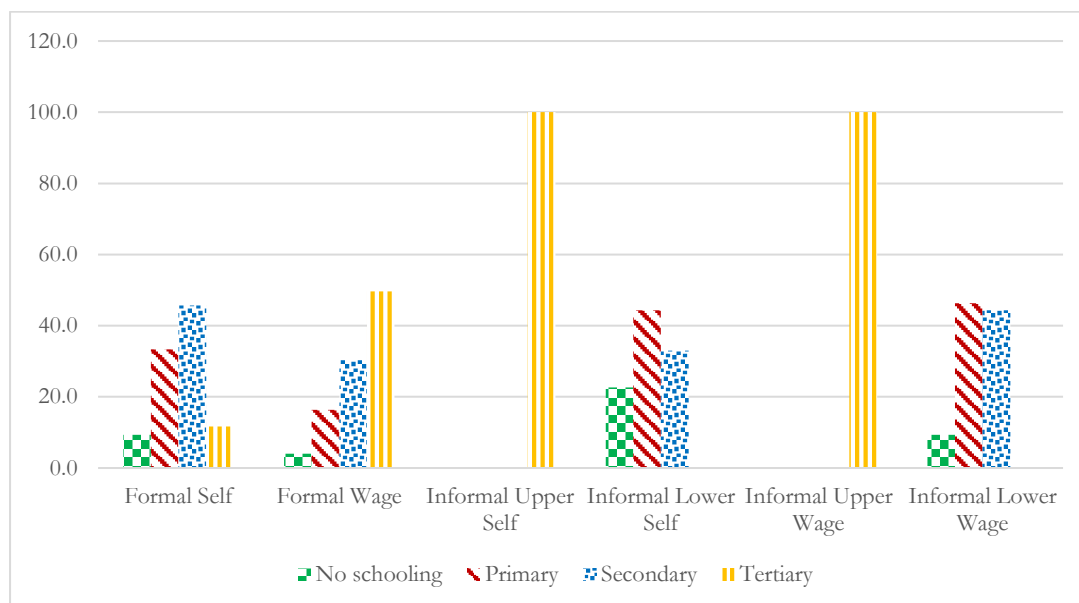


Note: wage = wage-employed and self = self-employed

Source: authors' computation from NBS GHS datasets.

Strikingly, workers in upper-tier informal wage employment and upper-tier informal self-employment all had tertiary education (100 per cent—Figure 3). The highest average percentage of workers in lower-tier informal wage employment had primary education (46.3 per cent), followed by secondary education (44.3 per cent), and no schooling (9.3 per cent). Workers with primary education dominated lower-tier informal self-employment (44.3 per cent), followed by secondary education (33.0 per cent), and those without education (22.7 per cent).

Figure 3: Average proportion of workers' education across occupational position and formality status



Source: authors' computation from NBS GHS datasets.

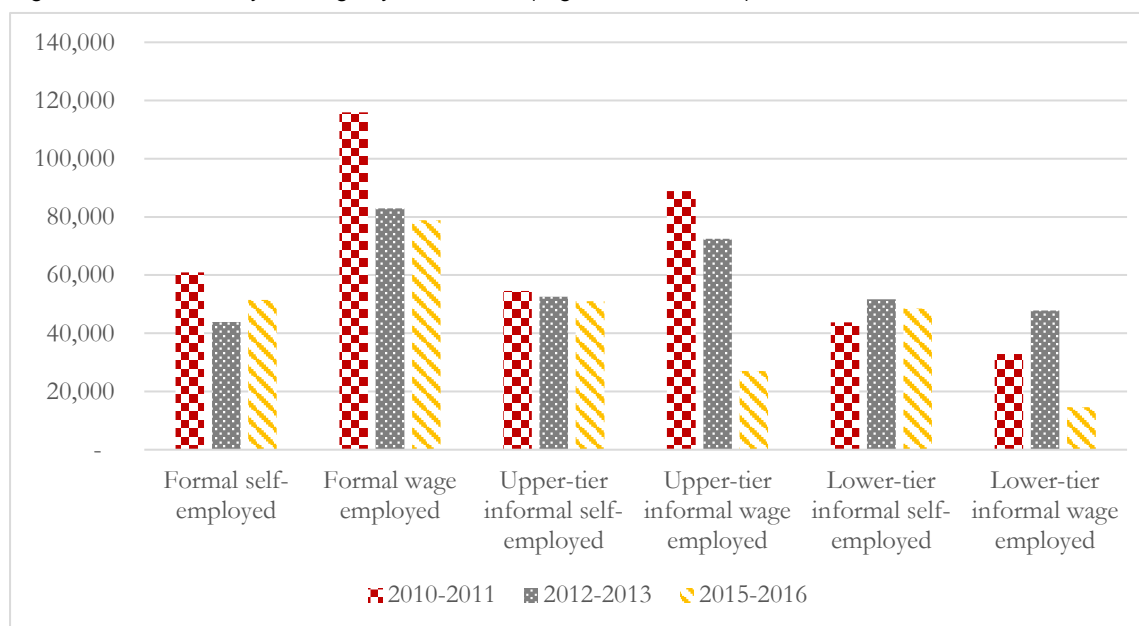
In terms of the earnings of workers across works statuses (Table 1), we found that formal wage employed workers received the highest average monthly earnings (NGN92,573; equivalent to US\$493.20). The second-highest average monthly earnings were received by the upper-tier informal wage employed (NGN62,782/US\$334.48), followed by the upper-tier informal self-employed (NGN52,735/US\$280.95) and the formal self-employed (NGN52,110/US\$277.50). The lowest monthly earnings were received by lower-tier informal wage employed workers, with an average of NGN31,761 (US\$169.21). Average workers' earnings are shown pictorially in Figure 4, from which it is obvious that while formal wage employment and upper-tier informal wage employment deliver better welfare and livelihood to workers in terms of income, both lower-tier informal self-employment and lower-tier informal wage employment have minimal impact on workers' livelihood.

Table 1: Mean workers' earnings by occupational position and formality status

	Average monthly earnings (Nigerian naira, NGN)			
	2010/11	2012/13	2015/16	Average
Formal self-employed	60,913	43,898	51,520	52,110
Formal wage employed	115,916	82,898	78,906	92,573
Upper-tier informal self-employed	54,598	52,574	51,033	52,735
Upper-tier informal wage employed	88,905	72,442	27,000	62,782
Lower-tier informal self-employed	43,761	51,700	48,486	47,983
Lower-tier informal wage employed	32,860	47,823	14,600	31,761

Source: authors' computation from NBS GHS datasets.

Figure 4: Mean monthly earnings by work status (Nigerian naira, NGN)



Source: authors' computation from NBS GHS datasets.

5.2 Transition of workers across work statuses

Before examining the nature of transition among workers across work statuses, we first describe their initial distribution across such statuses. Table 2 presents the proportions of individuals in the different employment statuses in the three survey waves. The lower-tier informal self-employed had the highest average proportion of 61.4, followed by the formal wage employed (17.4) and lower-tier informal wage employed (17.2).

Table 2: Proportion of workers by work status across waves

	2010/11	2012/13	2015/16
Self-employment			
Formal	0.2	0.1	0.2
Informal upper-tier	2.3	1.7	3.9
Informal lower-tier	59.7	45.7	78.9
Wage employment			
Formal	19.1	16.2	16.9
Informal upper-tier	1.3	2.4	0.04
Informal lower-tier	17.4	33.9	0.1
Total	4,384 (100.0)	4,436 (100.0)	4,450 (100.0)

Source: authors' computation from GHS dataset.

According to Table 3 (panel A), about 22.2 per cent of workers transitioned from formal self-employment in Wave 1 to lower-tier informal self-employment in Wave 2. Similarly, 22.2, 11.1, and 44.4 per cent of formal self-employed in Wave 1 transitioned to formal wage employed, informal upper-tier wage employed, and informal lower-tier wage employed status, respectively, in Wave 2. Consequently, no formal self-employed workers in Wave 1 maintained the same status in Wave 2, as they were all able to transition to other forms of employment. Of the upper-tier informal wage employed in Wave 1, the total proportion of those who were able to move to different employment types in Wave 2 was 46.5 per cent, a majority transitioning to upper-tier informal wage employment (28.3 per cent of the total). Thus, the share of stayers, that is, those who remained in their initial employment position—calculated as the product of the highlighted diagonals and initial

size²—in the first wave was 1.2. Out of the lower-tier informal self-employed in Wave 1, 0.1 per cent were able to move to formal self-employment, 0.8 per cent to upper-tier informal self-employment, and 2.8 per cent to formal wage employment, whilst 34.8 per cent transitioned to lower-tier informal self-employment by Wave 2. The share of stayers was 36.5 per cent, a reflection of the low probability of transition for that category of workers in Wave 1.

Table 3: Workers' transition matrices across work statuses and waves

Panel A				Wave t = 2						Share of stayers
				Self-employed			Wage employed			
				Formal	Informal		Formal	Informal		
					Upper	Lower		Upper	Lower	
Wave t = 1	Self-employed	Formal		0	0	22.2	22.2	11.1	44.4	0.0
		Informal	Upper	0	53.5	0	18.2	28.3	0	1.2
			Lower	0.1	0.8	61.2	2.8	0.34	34.8	36.5
	Wage employed	Formal		0	2.6	16.2	68.8	3.8	8.6	13.2
		Informal	Upper	1.8	10.7	0	53.6	33.9	0	0.4
			Lower	0.1	0	32.5	5.6	1.6	60.1	10.5
	Total		0.1	1.7	45.7	16.2	2.4	33.9	61.8	

Panel B				Wave t = 3						Share of stayers
				Self-employed			Wage employed			
				Formal	Informal		Formal	Informal		
					Upper	Lower		Upper	Lower	
Wave t = 2	Self-employed	Formal		50	0	0	50	0	0	0.05
		Informal	Upper	0	82.7	0	17.3	0	0	1.4
			Lower	0.2	0	97.4	2.4	0	0.05	44.5
	Wage employed	Formal		0.4	4	12.6	82.7	0.1	0.1	13.4
		Informal	Upper	0	32.7	0	27.1	40.2	0	1.0
			Lower	0.1	1.7	92.8	4.1	0.1	1.3	0.4
	Total		0.2	3.9	78.9	16.9	0.04	0.1	60.8	

Note: the sum of each row is 100% and each cell represents the distribution of workers at the row's wave. The share of stayers represents those who remained in their initial employment position, which is calculated as the product of the highlighted diagonals and initial size (the percentage of workers that moved from a particular work status in wave $t+1$ multiplied by the initial number of workers in that same work status in time t , divided by 100).

Source: authors' computation from GHS dataset.

With regard to the movement of workers away from wage employment between Waves 1 and 2, 16.2 per cent migrated to lower-tier informal self-employment and 2.6 per cent to upper-tier informal self-employment. The proportion of workers who maintained their Wave 1 status within formal wage employment was 68.8 per cent, while 8.6 per cent transitioned to lower-tier informal wage employment and 3.8 per cent migrated to upper-tier informal wage employment. Therefore, the proportion of those that stayed in formal wage employment was 13.2 per cent. Furthermore, 10.7 per cent of workers moved away from upper-tier informal wage employment to upper-tier informal self-employment, 1.8 per cent moved to formal self-employment, and 53.6 per cent transitioned to formal wage employment. A total of 33.9 per cent maintained their original work status, leading to a 0.4 per cent share of stayers. Table 3 (panel A) also indicates a low probability

² The percentage of workers that moved from a particular work status in wave $t+1$ multiplied by the initial number of workers in that same work status in time t , divided by 100.

of transition for lower-tier informal wage employed workers, as only 39.8 per cent of them were able to move to other employment by Wave 2, while 60.1 per cent remained in their initial work status, that is, 10.5 per cent being stayers.

As for the transition of workers across Waves 2–3, Table 3 (panel B) shows that 50 per cent of workers retained their Wave 2 job status within formal self-employment, while the remaining 50 per cent transited to formal wage employment. Consequently, the proportion of stayers in formal self-employment was 0.05. About 82.7 per cent of workers retained their Wave 2 upper-tier informal self-employment status as against the 17.3 per cent that moved to formal wage employment by Wave 3. That is, the share of stayers in upper-tier informal self-employment was 1.4 per cent. The percentage of workers who maintained their status as informal lower-tier self-employed was 97.4, as only 0.2, 2.4, and 0.05 per cent migrated to formal self-employment, formal wage employment, and lower-tier informal wage employment, respectively, by Wave 3. This gives a proportion of stayers of 44.5 per cent for self-employed informal lower-tier.

The transition of workers from wage employment shows that 0.4 per cent moved from formal wage employment to formal self-employment, 4.0 per cent migrated to upper-tier informal self-employment, and 12.6 per cent to lower-tier informal self-employment. The percentage of those that changed from formal wage employment to both upper- and lower-tier informal wage employment was 0.1. The percentage of formal wage employed in Wave 2 that remained was 82.7, which translates to 13.4 stayers. Furthermore, 32.7 and 27.1 per cent of upper-tier informal wage employed workers in Wave 2 migrated to upper-tier informal self-employment and formal wage employment, respectively, by Wave 3. The remaining 40.2 per cent upper-tier informal wage employed retained their status, yielding a proportion of 1.0 stayers. A very large percentage (92.8) of Wave 2 lower-tier informal wage employed workers transited to lower-tier informal self-employment by Wave 3, while 5.9 of the remainers moved into other forms of employment. Therefore, only 1.3 per cent of lower-tier informal wage employed individuals in Wave 2 stayed in that status in Wave 3, equivalent to a proportion of 0.4 per cent of stayers.

Overall, we found that on average and across all waves the probability of transiting from formal employment, whether self- or wage employment, to informal employment was low. Similarly, the probability of moving from informal to formal employment was very slim; and even slimmer (and minimal) for lower-tier workers. In addition, upper-tier informal wage employed workers appeared to have better chances of transiting to formal wage employment. Conversely, there was a high rate of workers' transition within informal employment, in particular from lower-tier wage employment to lower-tier self-employment. Observably, due to their low level of education, the bulk of lower-tier informal self-employed workers are locked down and unable to transit.

6 Regression results

6.1 Informal sector and livelihood

The descriptive analyses have shown that the informal sector accounts for the bulk of total employment in the country (about 80 per cent), as depicted by the GHS dataset. The importance and contribution of the sector to workers' livelihoods is further investigated with regression estimates using earnings as a measure of livelihood. Regression results on the impact of various characteristics and work statuses on workers' earnings are presented in Table 4. The results for Wave 1 (model 1) indicate that both age of worker and its squares have no significant effect on earnings. However, as we move from one wave to the next, age becomes more important in earnings determination. Gender and marital status of workers also have significant positive effects

on earnings, specifically when such workers are male and married. It is also found that all levels of education influence earnings significantly in positive ways. Of importance is that the more an individual climbs the education ladder, the higher their earnings rise. The results further indicate that urban residence is a crucial factor in the determination of earnings.

Turning to the impact of the different work statuses and employment categories on livelihood, results show that all have significant positive effects on earnings. With reference to self-employment, the impact of each of the two tiers of informal employment (upper and lower) outweigh that of formal employment, the lower tier having the most effect. Within wage employment, across the three waves, informal lower-tier has the most significant impact on earnings, but the impact of formal wage employment is greater than that of informal upper-tier. By implication, formal wage employment has more relevance to livelihood than formal self-employment. Not surprisingly, both lower-tier informal self-employment and wage employment have an overwhelmingly greater impact on livelihood than all other job categories. This is further confirmation of the importance to livelihood of the informal sector in Nigeria.

Table 4: Livelihood regression results

Variables	1	2	3
Age	0.001 (0.420)	0.021** (2.231)	0.058*** (7.281)
Age squared	-0.000 (-0.259)	-0.000 (-1.580)	-0.001*** (-6.248)
Male	0.446*** (8.662)	0.350*** (12.007)	0.206*** (8.489)
Married	0.984*** (13.095)	0.159*** (3.325)	0.333*** (8.238)
Education			
Primary	0.260*** (4.227)	0.139*** (3.808)	0.023 (0.735)
Secondary	0.644*** (9.093)	0.246*** (6.257)	0.247*** (7.492)
Tertiary	2.392*** (19.171)	0.769*** (10.977)	0.803*** (14.294)
Work status			
Formal self-employed	7.208*** (11.803)	10.391*** (22.134)	10.220*** (37.290)
Upper-tier informal self-employed	5.263*** (22.991)	9.849*** (77.849)	9.639*** (122.256)
Lower-tier informal self-employed	7.359*** (71.365)	10.585*** (168.709)	10.332*** (209.925)
Formal wage employed	4.219*** (35.641)	9.886*** (139.507)	9.757*** (178.219)
Upper-tier informal wage employed	4.968*** (16.907)	9.544*** (79.013)	4.242*** (8.343)
Lower-tier informal wage employed	6.310*** (52.907)	9.549*** (146.160)	2.313*** (9.796)
Urban	0.469*** (7.792)	0.092*** (2.832)	0.182*** (6.848)
Constant	1.530*** (13.939)	-0.775*** (-4.568)	-1.467*** (-10.362)
Observations	10,798	7,967	7,724
Adjusted R-squared	0.383	0.811	0.883
F-statistics	480.5***	2443***	4167***

Note: 1, 2, and 3 represent Wave 1 (2010/11), Wave 2 (2012/13), and Wave 3 (2015/16) models; *** p<0.01, ** p<0.05, * p<0.1. T-statistics in parentheses. Dependent variable is workers' earnings.

Source: authors' calculations based on NBS GHS survey datasets.

6.2 Dynamic transitions within informal employment

The dynamic movement of workers within informal employment is analysed by examining the probability of transiting from one form of informal activity to another across the different waves. Dynamic transitions within the informal sector are subject to many factors (Table A8). The probability of movement of workers between different forms of informal employment from Wave 1 to Wave 2 is given in models (1)–(3), while the likelihood regression results for transition from Wave 2 to Wave 3 are presented in models (4)–(7).

The results show that the likelihood of transition from lower-tier self-employment to lower-tier wage employment becomes higher as the age of a worker increases. In terms of gender, male workers are less likely to transit from lower-tier self-employment to lower-tier wage employment. Level of education is found to be an important factor that increases the chance of worker transition from lower-tier self-employment to lower-tier wage employment, workers with primary education having a better transition chance than those with secondary education. Marital status and geographical location are also important factors that influence the probability of transition from lower-tier self-employment to lower-tier wage employment, with a higher probability for married and urban dwellers. The likelihood of workers' movement from upper-tier self-employment to upper-tier wage employment is significantly influenced by age and geographical location. The transition of workers from lower-tier wage employment to lower-tier self-employment between two waves is determined by their gender, educational level, marital status, and geographical location. However, the more educated a worker is, the less likely they are to move from lower-tier wage employment to lower-tier self-employment.

The results of workers' transition within the various informal employment statuses from Wave 2 to Wave 3 indicate that education and marital status have important effects on the transition from lower-tier self-employment to upper-tier self-employment. The probability of transiting from lower-tier wage employment to lower-tier self-employment is significantly determined by gender, education, and marital status, the probability reducing for males and those with secondary education. Only secondary education and marital status appear to be important factors affecting the likelihood of transition from lower-tier wage employment to upper-tier self-employment. There is no factor that has a significant effect on workers' transition from upper-tier wage employment to upper-tier self-employment.

Overall, we find that workers are most likely to transit from an initial position of lower-tier self-employment to lower-tier wage employment, or from upper-tier self-employment to upper-tier wage employment, particularly from Wave 1 to Wave 2. We also see a very low probability of transition for lower-tier wage employed workers to lower-tier self-employed; there is a slight increase in the probability from Wave 2 to Wave 3, and this is significantly influenced by educational level, especially for females. There is also little likelihood of transition from both lower-tier and upper-tier wage employment to upper-tier self-employment. Consequently, we can say that there is a highly dynamic workers' transition movement within the different types of informal employment, especially among the lower-tier segments, which corroborates Bosch and Maloney's (2010) results.

6.3 Formal–informal employment transition

Analysis of transitions of workers between informal and formal employment is done at both aggregate and disaggregated data levels, by looking at the possibility of reverse transitions. That is, we examine the likelihood of transition from formal to informal employment, as well as from informal to formal. The results of the transition from informal to formal employment at aggregate data level show that age, gender, and education are significant factors in such a transition (Table

A9). Specifically, the results indicate that as workers grow older, their likelihood of transiting from informal to formal employment becomes higher between Wave 1 and Wave 2, but lower between Wave 2 and Wave 3. Male workers have higher odds of transiting from informal to formal employment than their female counterparts across all waves. This indicates that men have better access to formal employment than women. The likelihood of transition becomes higher as the level of education rises from primary to secondary and tertiary, suggesting education as a major constraint to movement from informal to formal employment. The likelihood of transition from formal to informal employment is affected by similar factors to that of movement from informal to formal, but it is slimmer.

The results of our analysis of the transition of workers from different forms of informal to formal employment across waves (disaggregated data analysis) are given in Table A10. It can be observed that across all waves, workers in the lower-tier segment of both informal self- and wage employment are likely to transit to formal wage employment, the likelihood being significant for male workers and those with secondary education. Obviously, there is also a likelihood of upper-tier informal wage employed workers transiting to formal wage employment from Wave 2 to Wave 3, this likelihood being higher than for lower-tier workers. This finding is consistent with Danquah et al.'s (2019) evidence from four Sub-Saharan African countries (Ghana, South Africa, Tanzania, and Uganda).

The logistic regression results for movement of workers from formal wage employment to different types of informal employment is affected by age, gender, education, and location (Table A11, model 1). The results suggest that there is a very low chance of transition for workers from formal wage employment to lower-tier informal self-employment across all waves. This chance is even lower for male workers and those with secondary and tertiary education. A higher chance of movement from formal wage employment to lower-tier informal wage employment can be observed between Wave 1 and Wave 2. Furthermore, the likelihood of workers transiting from formal wage employment to upper-tier informal formal wage employment is much lower than the movement to both lower-tier informal self-employment and lower-tier wage employment. Our results are similar to those of Danquah et al. (2019) but differ from Bosch and Maloney (2010) and Slonimczyk and Gimpelson (2015).

In general, our results reveal that while the likelihood of workers moving from informal to formal employment is high, the reverse is the case for movement from formal to informal employment. It is also found that both self-employed and wage employed informal workers have a good chance of transiting to formal wage employment, the upper-tier wage employed having a better chance. On the other hand, there is little or no likelihood of the formal wage employed transiting to upper-tier informal self-employment. We also find no likelihood of formal self-employed workers transiting to formal wage employment.

7 Conclusion

In this study, we examined the impact of informal and formal employment on livelihood in Nigeria. We also analysed the dynamic movements of workers across different employment types within the informal sector, as well as the factors that determine the probability of workers' transition from informal to formal employment and vice-versa. Three waves of the Nigerian GHS survey data were used, that is, 2010/11, 2012/13, and 2015/16. The data were analysed using binary logistic regression.

The descriptive analysis indicates that the informal sector plays a more significant role with respect to its impact on workers' livelihoods, as more workers are engaged in informal employment than in the formal sector. In addition, informal employment has assumed an upward trend over time, while there has been a continuous decline in formal employment. Furthermore, we find that self-employment is the dominant form of employment in Nigeria, the lower-tier informal segment providing the largest chunk of employment. We also find that, while highly educated individuals are concentrated in formal wage employment, relatively few of them are in upper-tier informal wage employment and formal self-employment. Of importance is the fact that a majority of the informal self-employed and informal wage employed lack social security coverage, which makes them vulnerable. This indicates the need for policy frameworks that ensure the provision of social security and a safety net for the large pool of workers found in informal employment, whether self- or wage employed.

Further analysis of the data reveals that formal wage employed and upper-tier informal wage employed workers are better off than workers in other forms of self- and wage employment, as they earn higher incomes. This suggests the imperative for policy-makers to design income support programmes for low-income workers, with particular reference to the lower-tier informal self- and wage employed. Another important finding of our study is the constraint imposed by a low level of education on lower-tier informal self-employed and lower-tier informal wage employed workers, which prevents them from transiting to formal employment. Consequently, an education upgrade becomes pertinent for this set of workers—through either continuous education or on-the-job training.

As expected, we find a high rate of dynamic movement of workers within the various forms of informal employment, particularly among lower-tier workers in both self- and wage employment. The study further shows that both self-employed and wage employed informal workers have the likelihood of transiting to formal employment. However, the chance of moving from informal to formal employment is much higher for upper-tier wage employed workers. More importantly, whereas there is a high chance of transition for workers from informal employment to formal, the chance is much lower for the reverse transition from formal to informal employment. An important policy implication of these findings is the need for the creation of better working conditions for informal workers. This would greatly enhance the welfare of informal workers and encourage them to stay within their employment given the limited employment opportunities in the formal sector.

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Appendix

Table A1: Number of individuals in the GHS dataset before data matching (% in brackets)

	2010/11	2012/13	2015/16
Employed	10,088 (92.8)	7,459 (92.8)	7,140 (92.4)
Unemployed	779 (7.2)	579 (7.2)	584 (7.6)
Total	10,867 (100.0)	8,038 (100.0)	7,724 (100.0)
Self-employment	6,885 (68.2)	3,803 (51.0)	5,930 (83.1)
Formal	18 (0.3)	7 (0.2)	14 (0.2)
Informal upper-tier	202 (2.9)	150 (3.9)	340 (5.7)
Informal lower-tier	6,665 (96.8)	3,646 (95.9)	5,576 (94.0)
Wage employment	3,203 (31.8)	3,656 (49.0)	1,210 (16.9)
Formal	1,618 (50.5)	1,150 (31.5)	1,187 (98.1)
Informal upper-tier	98 (3.1)	178 (4.9)	4 (0.3)
Informal lower-tier	1,487 (46.4)	2,328 (63.7)	19 (1.6)

Source: authors' calculations based on NBS GHS dataset.

Table A2: Number of individuals in the GHS dataset after data matching (% in brackets)

	2010/11	2012/13	2015/16
Employed	4,384 (96.0)	4,436 (97.2)	4,450 (97.5)
Unemployed	181 (4.0)	129 (2.8)	115 (2.5)
Total	4,565 (100.0)	4,565 (100.0)	4,565 (100.0)
Self-employment	2,724 (62.1)	2,106 (47.8)	3,693 (83.0)
Formal	9 (0.3)	4 (0.2)	10 (0.3)
Informal upper-tier	99 (3.6)	75 (3.6)	174 (4.7)
Informal lower-tier	2,616 (96.0)	2,027 (96.2)	3,509 (95.0)
Wage employment	1,660 (37.9)	2,330 (52.2)	757 (17.0)
Formal	839 (50.5)	717 (30.8)	752 (99.3)
Informal upper-tier	56 (3.4)	107 (4.6)	2 (0.3)
Informal lower-tier	765 (46.1)	1,506 (64.6)	3 (0.4)

Source: authors' calculations based on NBS GHS dataset.

Table A3: Characteristics of unemployed individuals across waves

	2010/11	2012/13	2015/16
Gender			
Male	48	51	52
Female	52	49	48
Age			
18–30	47	69	70
31–60	25	31	30
Education			
No schooling	15	4	6
Primary	26	25	14
Secondary	41	48	51
Tertiary	18	23	28
Marital status			
Married	34	29	27
Single	66	71	73
Location			
Urban	41	46	44
Rural	59	54	56
Total	779	579	584

Source: authors' calculations based on NBS GHS dataset.

Table A4: Characteristics of employed individuals by occupational position across waves

	2010/11		2012/13		2015/16	
	Self-employed	Wage employed	Self-employed	Wage employed	Self-employed	Wage employed
Gender						
Male	52	51	48	50	46	63
Female	48	49	52	50	54	37
Age						
18–30	24	30	36	22	30	24
31–60	46	60	64	78	70	76
Education						
No schooling	27	9	19	9	13	2
Primary	44	31	41	32	32	12
Secondary	24	32	33	33	36	32
Tertiary	5	28	7	26	19	54
Marital status						
Married	70	79	78	86	80	74
Single	30	21	22	14	20	26
Location						
Urban	16	48	17	42	25	52
Rural	84	52	83	58	75	48
Total	6,885	3,203	3,803	3,656	5,930	1,210

Source: authors' calculations based on NBS GHS dataset.

Table A5: Characteristics of employed individuals by formality status, 2010/11 (Wave 1)

	Formal wage	Formal self	Informal upper wage	Informal lower wage	Informal upper self	Informal lower self
Gender						
Male	63	61	55	37	65	52
Female	37	39	45	63	35	48
Age						
18–30	28	22	21	32	29	24
31–60	62	56	72	57	58	46
Education						
No schooling	7	6	0	13	0	29
Primary	22	47	0	47	0	46
Secondary	29	27	0	40	0	25
Tertiary	43	20	100	0	100	0
Marital status						
Married	73	72	81	86	72	70
Single	27	28	19	14	28	30
Location						
Urban	47	11	72	47	40	16
Rural	53	89	28	53	60	84
Total	1,618	18	98	1,487	202	6,665

Source: authors' calculations based on NBS GHS dataset.

Table A6: Characteristics of employed individuals by formality status 2012/13 (Wave 2)

	Formal wage	Formal self	Informal upper wage	Informal lower wage	Informal upper self	Informal lower self
Gender						
Male	65	43	53	42	69	47
Female	35	57	47	58	31	53
Age						
18–30	22	29	23	22	41	36
31–60	78	71	77	78	59	64
Education						
No schooling	3	14	0	15	0	20
Primary	15	14	0	47	0	44
Secondary	30	72	0	38	0	36
Tertiary	52	0	100	0	100	0
Marital status						
Married	78	71	84	90	63	79
Single	22	29	16	10	37	21
Location						
Urban	54	43	69	34	34	16
Rural	46	57	31	66	66	84
Total	1,150	7	178	2,328	150	3,646

Source: authors' calculations based on NBS GHS dataset.

Table A7: Characteristics of employed individuals by formality status, 2015/16 (Wave 3)

	Formal wage	Formal self	Informal upper wage	Informal lower wage	Informal upper self	Informal lower self
Gender						
Male	63	29	75	58	60	46
Female	37	71	25	42	40	54
Age						
18–30	24	21	25	47	36	29
31–60	76	79	75	53	64	71
Education						
No schooling	2	8	0	0	0	19
Primary	12	39	0	45	0	43
Secondary	32	38	0	55	0	38
Tertiary	54	15	100	0	100	0
Marital status						
Married	75	100	50	53	64	81
Single	25	0	50	47	36	19
Location						
Urban	52	43	0	32	45	24
Rural	48	57	100	68	55	76
Total	1,187	14	4	19	340	5,576

Source: authors' calculations based on NBS GHS dataset.

Table A8: Logistic estimates of workers' transition within informal employment Wave 1 to Wave 3

Variables	Movement from Wave 1 to Wave 2				Movement from Wave 2 to Wave 3		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	lwsf1 > lwwg2	upsf1>upwg2	lwwg1>lwsf2	lwsf2>upsf3	lwwg2>lwsf3	lwwg2>upsf3	upwg2>upsf3
Age	1.029*** (5.620)	2.231** (2.179)	0.994 (-0.152)	0.986 (-0.101)	0.980 (-0.206)	1.075 (0.407)	1.192 (0.921)
Age squared	1.000 (-1.552)	0.991** (-2.040)	1.000 (-0.341)	1.000 (0.095)	1.000 (0.112)	0.999 (-0.299)	0.998 (-0.875)
Male	0.800** (-2.533)	0.632 (-0.840)	1.580** (2.523)	1.160 (0.359)	0.444*** (-3.350)	1.227 (0.498)	0.736 (-0.697)
Primary	1.798*** (6.043)		0.490*** (-3.592)	2.753 (1.592)	0.921 (-0.242)	4.557 (1.376)	
Secondary	1.475*** (3.180)		0.256*** (-5.771)	10.632*** (4.141)	0.270*** (-4.253)	24.401*** (3.061)	
Married	2.137*** (3.850)	0.644 (-0.433)	1.951* (1.808)	0.214*** (-2.605)	2.219** (2.014)	0.333* (-1.847)	0.305 (-1.259)
Urban	1.649*** (4.467)	4.084*** (2.682)	0.421*** (-4.762)	0.948 (-0.112)	1.090 (0.355)	1.099 (0.230)	1.558 (0.972)
Constant	0.074*** (-11.196)	0.000** (-2.456)	0.962 (-0.050)	0.018* (-1.780)	36.716* (1.925)	0.001** (-2.026)	0.056 (-0.742)
Observations	2,529	93	739	1,912	1,448	1,448	97
Log likelihood	-1569	-46.79	-418	-135.4	-299.1	-112.8	-64.89
Pseudo R-squared	0.0467	0.165	0.105	0.167	0.0831	0.134	0.0288
LR chi2	153.9	18.47	98.59	54.37	54.22	34.97	3.849

Note: lwsf = lower-tier informal self-employment; upsf = upper-tier informal self-employment; lwwg = lower-tier informal wage employment; upwg = upper-tier informal wage employment; and > denotes movement from a specific employment to another; z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations.

Table A9: Logistic estimates of aggregate informal–formal workers' transition across waves

Variables	Transition from Informal to formal employment Waves 1 to 3		Transition from formal to informal employment Waves 1 to 3	
	(1)	(2)	(3)	(4)
	Infor1>Form2	Infor2>Form3	Form1>Infor2	Form2>Infor3
Age	1.237*** (2.901)	0.991 (-0.117)	0.929*** (-3.018)	0.879 (-1.232)
Age squared	0.997*** (-2.906)	1.000 (0.169)	1.000** (2.115)	1.001 (0.930)
Male	2.058*** (3.794)	2.940*** (5.145)	0.948 (-0.271)	1.398 (1.368)
Primary	1.676** (2.010)	1.277 (0.879)	0.366*** (-3.330)	0.739 (-0.831)
Secondary	3.265*** (4.655)	3.549*** (5.111)	0.138*** (-6.883)	0.289*** (-3.531)
Tertiary	10.067*** (7.615)	13.372*** (9.217)	0.046*** (-10.957)	0.123*** (-6.054)
Married	0.622 (-1.548)	1.014 (0.041)	1.157 (0.430)	1.009 (0.020)
Urban	1.070 (0.353)	0.980 (-0.102)	0.581*** (-2.973)	0.680* (-1.738)
Constant	0.000*** (-5.982)	0.011*** (-3.424)	31.783*** (5.342)	18.095 (1.486)
Observations	3,413	3,527	788	672
Log likelihood	-542.8	-529.2	-388.4	-274.3
Pseudo R-squared	0.0951	0.130	0.223	0.126
LR chi2	114.1	157.5	222.6	78.99

Note: infor = informal employment; form = formal employment; and > denotes movement from a specific employment in one period to another; z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations.

Table A10: Logistic estimates of workers' transition from informal to formal employment Wave 1 to Wave 3

Variables	Transition from Wave 1 to Wave 2		Transition from Wave 2 to Wave 3		
	(1) lwsf1>fwg2	(2) lwwg1>fwg2	(3) lwsf2>fwg3	(4) lwwg2>fwg3	(5) upwg2>fwg3
Age	1.257** (2.347)	1.233 (1.443)	0.932 (-0.521)	0.989 (-0.095)	0.824 (-1.014)
Age squared	0.997** (-2.153)	0.997 (-1.605)	1.001 (0.607)	1.000 (0.117)	1.002 (0.920)
Male	2.074*** (2.703)	3.994*** (3.711)	9.231*** (4.135)	3.203*** (3.747)	1.473 (0.761)
Primary	1.847** (1.992)	1.265 (0.460)	1.553 (0.987)	0.810 (-0.555)	
Secondary	3.136*** (3.565)	2.799** (2.135)	4.830*** (4.096)	2.037** (2.053)	
Married	0.521 (-1.413)	0.632 (-0.882)	1.158 (0.217)	0.559 (-1.160)	
Urban	1.130 (0.411)	0.678 (-1.111)	1.712 (1.506)	0.796 (-0.751)	0.507 (-1.379)
Constant	0.000*** (-4.971)	0.001*** (-2.720)	0.006** (-2.270)	0.037 (-1.508)	35.729 (0.920)
Observations	2,529	739	1,912	1,448	91
Log likelihood	-309.4	-140.7	-183.4	-224.8	-53.31
Pseudo R-squared	0.0546	0.112	0.139	0.0641	0.0366
LR chi2	35.71	35.44	59.47	30.81	4.045

Note: lwsf = lower-tier informal self-employment; lwwg = lower-tier informal wage employment; upwg = upper-tier informal wage employment; fwg = formal wage employment; and > denotes movement from a specific employment to another; z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations.

Table A11: Logistic estimates of workers' transition from formal to informal employment Wave 1 to Wave 3

Variables	Transition from Wave 1 to Wave 2			Transition from
	(1)	(2)	(3)	Wave 2 to Wave 3
	fwg1>lwsf2	fwg1>lwwg2	fwg1>upwg2	fwg2>lwsf3
Age	0.910*** (-2.743)	1.174 (1.460)	0.951 (-0.790)	1.000 (0.004)
Age squared	1.001* (1.839)	0.998 (-1.404)	1.000 (0.324)	0.999 (-0.448)
Male	0.540** (-2.491)	1.565 (1.415)	1.032 (0.080)	1.500 (1.326)
Primary	0.337*** (-3.601)	1.993* (1.818)	0.897 (-0.106)	0.601 (-1.337)
Secondary	0.117*** (-6.801)	1.007 (0.017)	1.737 (0.660)	0.219*** (-4.102)
Tertiary	0.012*** (-8.896)	0.097*** (-4.246)	2.814 (1.347)	0.013*** (-7.350)
Married	1.533 (0.944)	0.437* (-1.678)	4.948 (1.479)	0.761 (-0.537)
Urban	0.425*** (-3.354)	0.786 (-0.871)	1.366 (0.810)	0.632* (-1.674)
Constant	25.075*** (4.068)	0.010** (-2.351)	0.019** (-2.248)	3.252 (0.526)
Observations	788	788	788	672
Log likelihood	-234.9	-202.7	-122.6	-182.7
Pseudo R-squared	0.343	0.142	0.0385	0.295
LR chi2	245.6	67.23	9.821	152.6

Note: lwsf = lower-tier informal self-employment; lwwg = lower-tier informal wage employment; upwg = upper-tier informal wage employment; fwg = formal wage-employment; and > denotes movement from a specific employment to another; z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations.