

Original Article

Dynamics of employment and unemployment during Covid-19 in Cotonou

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Imourana SOUMANOU^{*4}, Alphonse Mingnimon AFFO^{1,2}, Justin DANSOU^{2,3}, Pa-côme Evènakpon ACOTCHEOU^{2,5}, Jacques Zinsou SAIZONOU^{2, 5}

¹ Centre de Formation et de Recherche en matière de Population (CEFOP), Université d'Abomey-Calavi (UAC), Bénin

² Groupe de Recherche en Population Santé et Développement (GRPSD)

³ Ecole Nationale de Statistique, de Planification et de Démographie (ENSPD), Université de Parakou, Bénin

⁴ Université d'Abomey-Calavi (UAC) and African School of Economics (ASE), Benin

⁵ Institut Régional de Santé Publique Comlan Alfred Quenum (IRSP/CAQ), Université d'Abomey-Calavi (UAC)

*Correspondence: imouranaabdoulaye@gmail.com ; Tel.: +229 6402 0274

Abstract: The Covid-19 disrupted economic activities worldwide, significantly impacting labor markets. This research aims to analyze the dynamics of employment and unemployment during Covid-19 in Cotonou, using data from the biographical survey of the Rise Benin project. The survey was conducted on a sample of 1172 individuals in Cotonou. Cox regression analysis was used to analyze the factors influencing employment and unemployment dynamics during the pandemic. Descriptive results reveal an inverse relationship between employment and unemployment during the Covid-19 pandemic, with employment levels struggling to cover the unemployment gap in an economy dominated by the non-formal sector and service activities. Econometric analyses identify gender, education level, marital status, sector of activity, socio-professional category and age as the main determinants influencing the duration of employment and unemployment. Women were more affected by unemployment and remained job less for longer compared to men, particularly in the service sector. Being female, single, working in the service sector and being under 30 years old increase the likelihood of unemployed during the health crisis. Post-pandemic recovery measures struggled to cushion the shock, as they predominantly focused on formally registered businesses rather than households. The Covid-19 pandemic highlighted the vulnerability of Benin's non-formal sector.

Keywords: Dynamics, Employment, Unemployment, Covid-19, Cotonou.

1. Introduction

The issue of employability, which is at the core of global development concerns, is embedded in the Sustainable Development Goals (SDGs). SDG 8, which focuses on decent work and economic growth, emphasizes the importance of promoting sustained, inclusive, and sustainable economic growth while promoting full and productive employment and decent work for all. This goal acknowledges that employability goes beyond job creation to include skills development, social inclusion, and the promotion of equitable working environments. In Africa, particularly in low-income countries such as Benin, the issue of employability is critical. Socio-economic dynamics require targeted policies that improve workers' skills, create sustainable employment opportunities, and strengthen communities' resilience to economic fluctuations and crisis situations [1]. Vulnerability to economic crises is particularly pronounced in precarious and non-formal sectors, where workers are disproportionately affected by the lack of social protection [2]. The emergence of the Coronavirus Disease 2019 (Covid-19) pandemic revealed pre-existing vulnerabilities and caused economic disruptions that profoundly altered employment and unemployment dynamics. According to the International Labor Organization (ILO), the global unemployment rate increased by 8.8% in 2020, representing the largest annual increase since the 2009 financial crisis [3]. The situation in Benin was similar to that in many countries where COVID-19 rapidly changed the economic landscape. Sectors that had previously demonstrated robust growth were significantly impacted, with notable consequences for the labor market. Firstly, the pandemic exacerbated pre-existing inequalities in labor and employment markets. Secondly, it has accelerated certain structural processes already underway, highlighting the incongruities and problems associated with the socio-economic transformations of the last thirty or forty years, such as globalization and the development model as it has been conceived and implemented to date [4]. As a result, the implementation of health measures, travel restrictions, and economic contraction has resulted in significant disruptions across various sectors, including tourism, hospitality, and trade. This has placed a considerable number of workers in a vulnerable and precarious situation. In this context, analyzing the dynamics of employment and unemployment during the pandemic period becomes imperative. Using retrospective data, this paper seeks to better understand the specific repercussions of the COVID-19 pandemic on the labor market in Cotonou, southern Benin. The paper is divided into three parts: a description of the socio-demographic characteristics of the target population, an analysis of employment and unemployment trends during the COVID-19 period, and an exploration of the main factors explaining transitions between different socio-professional states. The primary objective is to analyze how employment and unemployment dynamics evolved in Cotonou during the Covid-19 pandemic.

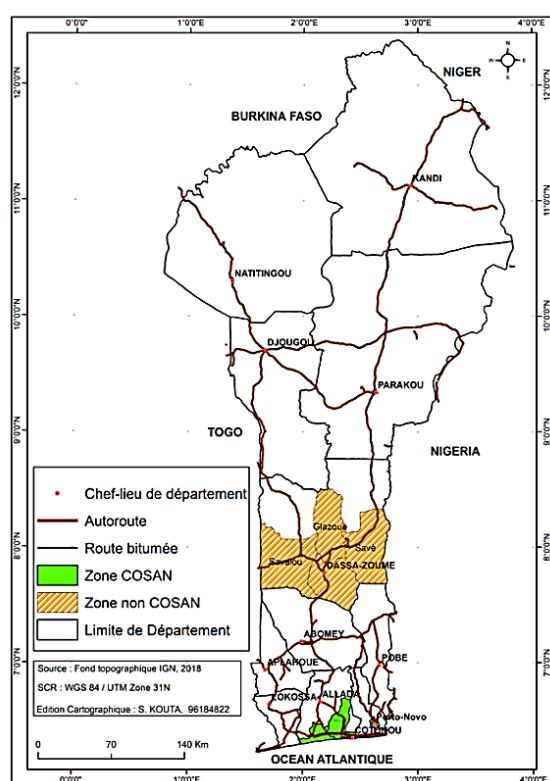
Background of the Study

The COVID-19 pandemic, which began in late 2019, caused unprecedented upheaval in the global economy, affecting all sectors and levels of development. The loss of human life was the most immediate consequence, as humanity scrambled to protect itself. However, the health crisis also had far-reaching effects beyond public health. The labor market was one of the sectors most affected by the global health crisis caused by Covid-19. One of the most visible consequences of this health crisis was the labor market, with the massive deterioration in employment and the increase in unemployment that affected millions of workers around the world. This situation has highlighted the structural vulnerabilities and social inequalities that characterize labour markets worldwide, underscoring the major challenges they face in ensuring a sustainable and inclusive recovery. According to the International Labour Office [3], the crisis led to increased unemployment, underemployment, and inactivity, resulting in income losses for workers, their families, and enterprises. In addition to the loss of working hours, COVID-19 disrupted the supply chain and triggered business bankruptcies. In its annual report, the ILO noted an 8.8 percent decline in working hours in 2020 compared to the fourth quarter of 2019, equivalent to the loss of 255 million full-time jobs [5]. During this period, the global unemployment rate increased by 1.1 percentage points to 6.5 percent, with an additional 33 million people unemployed. Additionally, some 81 million people left the labor market due to a lack of job opportunities, transitioning to inactive status. In total, 114 million people lost their jobs or livelihoods in 2020, and the number of poor or vulnerable workers increased by 108 million [3]. However, these global figures hide regional and national disparities that need to be highlighted. Indeed, the crisis has affected countries differently, depending on their level of development, economic structure, health and social response capacity, and degree of exposure to external shocks [6]. Africa has been severely affected, particularly in terms of employment, with a loss of 7.7 per cent of hours worked in 2020, equivalent to the loss of 29 million full-time jobs [5]. The continent's unemployment rate has risen from 6.9 percent in 2019 to 7.7 percent in 2020, an increase of 5 million people out of work. Additionally, the number of poor or vulnerable workers has also increased by 26 million, reaching 86 percent of the continent's working population [3]. Sub-Saharan Africa has been particularly hard hit, with a 9 percent decline in working hours and a 1 percentage point increase in the unemployment rate [5]. Previous research has demonstrated that global health crises tend to have profound and lasting effects on labor markets, often exacerbating existing

inequalities [7]. In particular, research by [8] on the impact of the H1N1 influenza pandemic found that the economic impact was particularly severe in regions with less robust health and social protection systems, especially in the least developed countries. Benin, a lower-middle-income country in southwestern sub-Saharan Africa, has not been immune to the labor market crisis. According to the Institut National de la Statistique et de la Démographie (INStAD), Benin's unemployment rate rose from 2.3 percent in 2019 to 2.6 percent in 2020, a 0.3 percentage point increase. The number of unemployed grew from 137,000 to 156,000 over the same period. Employment rate also declined from 69 percent to 67.8 percent [9]. The non-formal sector, which accounts for over 90 percent of employment in Benin, was severely affected by the restrictive measures taken to limit the spread of the virus. As a result, self-employed workers, micro-entrepreneurs, and family workers saw their incomes and working conditions gradually deteriorate. The formal sector was not spared either, with layoffs, reduced working hours, and wage cuts in certain sectors such as tourism, hotels, transport, and trade [10]. In southern Benin, where the pandemic appears to have had a more pronounced impact compared to other regions, activities in the non-formal sectors, which employ the majority of the working population, have been particularly hard hit. These activities, characterized by a high degree of precariousness and low capacity for economic resilience, have seen their working conditions deteriorate rapidly, leading to higher levels of unemployment and lower incomes. The implementation of social distancing measures and restrictions on movement and gatherings, while necessary to contain the virus, had immediate repercussions on employment, particularly for day laborers and those working in the informal economy [11]. These observations suggest that, beyond the tragic loss of human life, COVID-19 had a devastating impact on the world of work. In the light of this worrying situation, the present research explores the mechanisms underlying changes in the labor market during Covid-19 in southern Benin and the factors that explain the observed disparities. It aims to study transitions between different socio-professional states, analyzing entries and exits from the labor market, as well as changes in status between employment and unemployment. More specifically, it aims to explain how the Covid-19 pandemic has altered these dynamics. The research question guiding this study is: What are the dynamics of employment and unemployment in Cotonou during the COVID-19 pandemic, and what factors influence transitions between different socio-professional states? To answer this question, we will analyze employment and unemployment dynamics in Cotonou during the Covid-19 period using data from the Rise Benin project implemented in southern Benin. The goal is to enhance the understanding of the Covid-19 pandemic's impact on the local labor market and to identify potential pathways for a sustainable and inclusive recovery. In addition to studying the differential impact of Covid-19 and COSAN, the southern region of Benin presents unique features. These include its high concentration of the working population (nearly a third of the country's working population, approximately 1.8 million out of 6 million people) and the fact that it is home to Cotonou, the seat of government and the main city where Benin's economic activities, industrial centers and tourist attractions are concentrated. Considered one of the Covid-19 gateways to Benin (through the country's main airport that it hosts), the city of Cotonou also seems to be more exposed to external shocks related to the closure of borders with neighboring countries such as Nigeria and Togo [12].

2. Materials and Methods

Study area: The data used come from the study entitled "Influence de la Covid-19 sur les femmes du secteur non-formel au Sud-Bénin" [13] by the Rise Benin research project. In order to assess the effect of COVID-19 and the Cordon Sanitaire (COSAN) on women in the non-formal sector in southern Benin, the Rise Benin project collected data in communes covered by COSAN and in communes outside COSAN, specifically in the Collines department. The latter were chosen as the "control" zone, as this department is geographically far enough away (around 150 km) from COSAN to avoid or reduce the "contamination" effect of COSAN, while sharing socio-economic characteristics on average close to those of the COSAN communes. Within the COSAN zone, the sampled communes are: Abomey-Calavi, Cotonou, Ouidah, and Porto-Novo. Four other communes were sampled in the non-COSAN zone: Dassa-Zoumè, Glazoué, Savè, and Savalou. Map 1 below shows the location of the study area [13].



Map 1. Map of Benin highlighting areas of investigation.

Data

As mentioned above, the data used in this study come from the retrospective biographical survey of the “Rise Benin” project. This survey was conducted between July and September 2023 in four departments of Benin, on a representative sample of 5,040 households. The male and female databases from the survey’s male and female questionnaires, respectively, were used in the present study. These questionnaires provide information on respondents’ socio-demographic characteristics, economic activities, impacts of Covid-19, knowledge and opinions on Covid response measures, etc. More specifically, we are interested in module five of the questionnaires (male and female), which deals with the respondents’ economic activities, employment situation, and unemployment. The information in this module was collected retrospectively, from the most recent job to the least recent, in order to avoid bias due to memory effects and to guarantee the reliability of the information. Since the municipality of Cotonou is the geographical location of interest for the present study, we focused on information related to this municipality to conduct the analyses. The present analyses covered a sample of 1172 people (including 66.98% women) in the commune of Cotonou.

Study variables and covariates

To analyze the explanatory factors of the duration of employment and unemployment during the Covid-19 period in Cotonou, the variables of interest retained are: the duration (or time spent) in employment or unemployment during the COVID-19 period, defined between March 2020 and March 2022, within the framework of this study. The covariates used are individual characteristics (gender, age, level of education, marital status) and household characteristics (household standard of living), mainly derived from the literature review. The following paragraphs and Table 1 describe the covariates.

- Employment duration is the time (in number of months) spent in the main activity during the survey period (Covid-19 period: March 2020- March 2022).
- Unemployment duration is the number of months spent unemployed during the study period.
- The gender variable represents the respondent’s gender. Female and male are the modalities of this variable in the present study.
- The age variable designates the age in completed years of the respondents at the time of data collection. It is grouped into classes with the modalities 15-29 years, 30-49 years, and 50 and over.
- Level of education represents the highest level of education attained by respondents. This categorical variable includes modalities such as: no level, primary level, secondary level, and higher level.

- Marital status indicates the status of the interviewee at the time of collection, in terms of marital status. Single, married, and widowed are its modalities.
- The household standard of living variable represents the household's non-monetary poverty level category, based on assets owned and household characteristics. Its modalities are: poor, average, and rich.
- The field of activity corresponds to the field in which the respondent's main activity is identified. The fields of activity recorded are crafts/livestock breeding, commerce, and services.
- The socio-professional category is the professional class with which the respondent best identifies his/her main professional activity. Its modalities are: manager, worker/family helper, and self-employed.
- Sector of activity refers to whether the main activity declared is formally registered or not. Its modalities are non-formal and formal.

Table 1. Study covariates and their descriptive analyses (full sample, N = 1,172)

Variables	Categories	Frequency	Percentage (%)
Level of Education	None	226	19.28
	Primary	257	21.93
	Secondary	505	43.09
	Higher	184	15.70
Sex	Female	785	66.98
	Male	387	33.02
Marital Status	Single	343	29.27
	Married	704	60.07
	Separated/widowed	125	10.67
Household Wealth Level	Poor	224	19.60
	Average	364	31.85
	Rich	555	48.56
	Craft/Livestock	139	18.99
Activity Field	Trade	407	55.60
	Service	186	25.41
	Executive	43	5.87
Socio professional Category	Worker	113	15.44
	Family Aid	23	3.14
	Independent	553	75.55
Activity Sector	Non-formal	600	81.97
	Formal	132	18.03
Age Group	15-29	467	39.85
	30-49	507	43.26
	50+	198	16.89

Source: Rise Benin biographical survey data, 2023

Note: N = 1,172 refers to the full descriptive sample ; household wealth level is missing for 29 respondents (N=1,143); percentages for this variable are computed on non-missing observations only.

Analysis method

The present study is based on a quantitative approach involving two levels of analysis. The first level, which provides a portrait of the study sample, involves univariate and bivariate descriptive analyses. The second level involves explanatory analysis using an econometric model.

Univariate and bivariate descriptive analysis: Descriptive analysis involves analyzing the state of the study population, presenting its main socio-economic and demographic characteristics. Tables or graphs are used to better present or visualize these characteristics.

Explanatory analysis

To complement the descriptive analysis, this study uses an explanatory analysis to explain the relationships between the variables studied. Econometric analysis is performed using a Cox regression model. This type of model allows us

to take into account the nature of the variable of interest, which is “duration of employment or unemployment”. The aim of this econometric modeling or estimation is to quantify the effects of individual and household characteristics on the probability of leaving employment or unemployment respectively.

Analysis model and study covariables

In recent years, the social sciences have seen a resurgence in the use of survival models to analyze the duration of periods of employment, unemployment, strikes, and so on. The work of [14], [15], [16], and [17] Applied proportional hazards and duration models to the estimation and analysis of unemployment duration. In their studies, these authors discussed the impact of variables such as age, gender, education level, and region on the hazard ratio. According to [17] Women and older unemployed people take longer to find a job than their male and younger counterparts. Similarly, the duration of unemployment decreases with increasing levels of education. [18] and [19] have used the same models to analyze the impact of education on unemployment characteristics. Based on theoretical models, [19] used microeconomic data for an empirical study and concluded that, compared to the lowest levels, additional education increases the probability of re-employment, but that at the highest levels the relationship becomes negative. The results of this study suggest that education has a positive effect on the probability of re-employment up to about 13-14 years of study. However, the probability of receiving an acceptable offer decreases with higher levels of education. As a result, individuals with a Master’s or Ph.D. degree have difficulty finding acceptable offers.

The work of [20] focused on the study of the mixed effects of unemployment insurance on unemployment duration, using the survival duration model, taking into account the characteristics of the individual, the household (notably income), the job lost, and the economic situation. [21] tested the impact of education and training systems on young people’s participation in labor markets. In the same vein, the work of [22], and [23], compared unemployment in several European labor markets, based on the characteristics of education systems. [23] For example, focused on an in-depth analysis of the distribution of educational attainment and its impact on individual labor market outcomes in France and Germany. The conclusions drawn from this work are that, at the individual level, education largely determines employment prospects, even if it is supplemented by other skills acquired throughout life in the form of continuing education or non-formal learning. At the level of education systems, the relatively late age of enrollment in primary school and the half-day nature of German education, as opposed to the full day in countries such as France, are generally considered to explain the poor performance of German students [23].

In a study conducted in Luxembourg, [24] applied the Kaplan-Meier and Cox models to analyze exit times and the determinants of unemployment duration, based on the economic theory of job search. Most of the results of this study appear to be in line with those of empirical studies of labor markets, particularly in other industrialized countries. For example, the author finds that unemployment duration increases for older jobseekers and for those receiving unemployment benefits. Also, in line with the findings of comparable studies, unemployment duration decreases with the level of education and the number of previous unemployment spells experienced by the job seeker.

Furthermore, there do not appear to be any strategies for discriminating against job seekers on the grounds of nationality or gender. Furthermore, neither being married nor having children had any influence on unemployment duration [24]. These results seem to reflect specific characteristics of unemployment in the study environment, thus indicating the author’s image of the Luxembourg labor market. Like [25], who studied the determinants of unemployment duration using a competing risks model, [26] Also used a similar model in order to study the unemployment duration of graduate vocational training laureates in Morocco. According to the latter, this model specification has the advantage of taking into account not only the impact of observed individual characteristics, but also those of duration dependence and unobserved heterogeneity. The results of this study indicate that the transition to employment is less likely for women, while transitions to internship and inactivity are more likely for women, particularly to inactivity [26]. All of the above work illustrates the various forms of modelling using survival models in the social sciences, and more specifically, the analysis of unemployment duration. These studies highlight the importance of certain factors in the study of unemployment and employment duration at both micro and macro levels.

Presentation of the analysis model

Survival analysis and the Cox model: Survival models study the time elapsed before an event occurs. More specifically, the Cox regression model (proportional hazards model) is a class of survival models in statistics where the event studied is the death of the observed individual. For this reason, we generally speak of survival and death. Originally, survival analysis and duration models originated in medicine or biostatistics, where a subject’s survival time is therefore the time (duration) spent until death or the onset or reappearance (after recovery) of a disease. In recent years, the use of these techniques has become increasingly popular in the social sciences.

The event can therefore be of any nature: it can be a matter of modeling certain events, such as the duration of unemployment spells, the time required for admission, and so on. Theoretically, the nature of the event to be modeled is not so important, and the coefficients must be interpreted accordingly, using a contextualized analysis. Taking the example of a longitudinal study, it is often not possible to follow individuals over a long period or over their entire lifespan, and events are not necessarily observed over the entire population, so we speak of truncated or censored data. The advantage of using a regression model like Cox's is that we can take these data into account, even if they are not "complete".

Let T be a continuous non-negative random variable representing the survival time or the time elapsed before a specific event (for example, the time spent before finding a job). The distribution function of T is defined by equation (1):

$$F(t) = P(T < t) \quad (1)$$

and measures the probability of survival to time t .

Since time T is a continuous random variable, its density function $f(t)$ can be determined as the first derivative of the distribution function F . The survival function $S(t)$, which is the probability of surviving to time t or longer, is given by :

$$S(t) = P(T \geq t) = 1 - F(t) \quad (2)$$

The limit:

$$\lambda(t) = \lim_{\delta \rightarrow 0} \frac{P(t \leq T < t + \delta | T \geq t)}{\delta} \quad (3)$$

represents the risk or propensity to die at the given time t .

The function $\lambda(t)$ is generally called the hazard function (instantaneous) or the failure rate, and it measures the instantaneous mortality rate given survival to time t . Higher values of the hazard function can also be interpreted as a higher potential for the event to occur. By integrating the hazard function over the interval $(0, t)$, we obtain the following cumulative risk function:

$$\Lambda(t) = \int_0^t \lambda(u) du \quad (4)$$

Cox proportional hazards model

The Cox proportional hazards regression model is one of the survival models used to analyze the relationship between the time of the event under study and the explanatory variables known as covariates, by tackling good censoring [27]. It expresses the instantaneous death risk function (or risk function, failure rate, reliability rate, hazard rate, etc.) as a function of time t and covariates $X_1, \dots, X_n$. We then have :

$$\lambda(t, X_1, \dots, X_n) = \lambda_0(t) \exp \left(\sum_{i=1}^n \beta_i X_i \right) \quad (5)$$

Where:

- $X_i = (x_{i1}, x_{i2}, \dots, x_{ik})'$ is the vector of k covariate values for individual i ;
- $\beta = (\beta_1, \beta_2, \dots, \beta_k)$ is the vector of regression coefficients ;
- $\lambda_i(t)$ is the risk function of individual i , and
- $\lambda_0(t)$ is called the baseline risk, which corresponds to the instantaneous risk of death when all covariates are zero.

More formally, for an individual, the function $\lambda(t, X_1, \dots, X_n)$ corresponds to the instantaneous risk of death at time t , since he is alive just before t . It assumes that the effect of a unit increase in a covariate is multiplicative with respect to the hazard rate with a proportional hazard assumption. The effect of covariates on the hazard function in the Cox proportional hazards model is not time-dependent, as the ratio $\frac{\lambda_i(t)}{\lambda_0(t)}$ is equal to the constant c_i . Thus, the baseline risk determines the shape of the risk function.

The ratio of the hazard functions of individuals i and j , i.e. $\frac{\lambda_i(t)}{\lambda_j(t)}$ is called the hazard ratio. This quotient is equal to :

$$\frac{\lambda_i(t)}{\lambda_j(t)} = \frac{e^{x_i\beta} \cdot \lambda_0(t)}{e^{x_j\beta} \cdot \lambda_0(t)} = e^{(x_i - x_j)' \beta} \quad (6)$$

The hazard ratio is the ratio of the effects of the covariates for the two individuals and is therefore independent of time. This is known as the proportional hazards assumption. The interpretation of the hazard ratio is similar to the interpretation of the odds ratio in the case of logistic regression. An odds ratio less than one (01) indicates a decreased risk, while an odds ratio greater than one indicates an increased risk. Let's assume that the covariate vectors X_i and X_j differ only by the value of the p -th covariate and only by one unit. In this case, the hazard ratio

$$\frac{\lambda_i(t)}{\lambda_j(t)} = e^{\beta_p} \quad (7)$$

measures the change in the hazard function for a unit change in the p -th covariate (if the covariate is a numerical variable). The hazard ratio is said to be statistically significant at a given level when its confidence interval excludes 1. In this case, the null hypothesis that the variable is not related to survival can be rejected. This is the basis for interpreting Cox regression results. Using the Cox partial likelihood estimator, it is possible to estimate the parameter vector β without specifying or estimating the baseline risk [28].

Proportional risk assumption

In some cases, the assumption of proportional risk may seem unrealistic. For example, the hazard ratio may change over time. Furthermore, it follows from equation (7) that the hazard ratio must be the same for a unit change in the given covariate, regardless of the initial value of the covariate. The age variable, often used in Cox regression models, often violates the proportional hazards assumption. In other words, the ratio of risks must be the same for all age intervals (for example, the quotient of risk functions for 20- and 40-year-olds must be the same as the quotient for 40- and 60-year-olds). This is often not the case in reality. The proportional hazards hypothesis can be tested in several ways, either graphically or more formally with statistical tests. The graphical test can be done using the log-minus-log (LML) plot or using partial residuals. A commonly used statistical test for proportional hazards is performed in the context of time-dependent covariates. An auxiliary model is built, including an interaction term between time and the covariate under inspection (the product of the covariate and time). If the proportional hazards hypothesis is verified, the estimated coefficient of the interaction term in the model obtained with a time-dependent covariate should not be significantly different from zero. If a covariate fails a proportional hazards test, several approaches are possible. Non-proportional risks can be incorporated into the model by specifying interactions between covariates and time. One of the interactions most often used in practice is the product of a covariate and the time variable. Alternatively, a model with non-proportional risks for a categorical variable can be obtained by stratification. Such a model is called a Cox regression model with a time-dependent covariate.

3. Results

3.1. Empirical analysis

3.1.1. Profile of respondents according to socio-demographic characteristics

This section describes the socio-demographic characteristics of the study sample (Table A1, Appendix).

The breakdown by level of education shows that 22.6% of the study population has no education at all, with a higher proportion of women than men (28.57% vs. 9.12%). The majority of working people surveyed have secondary education (38.6%), followed by primary education (25.3%). In addition, around 13.5% of the study population has attained higher education.

The structure by age group indicates a population predominantly made up of adults, with a high proportion of young people (predominance of people aged between 15 and 49, with 30.9% and 50.1% respectively for the 15-29 and 30-49 age groups). The average age of the respondents was 34.67 (standard deviation ± 13.3). The age and gender structure

shows no statistically significant relationship at the 5% threshold (Pearson $\chi^2(2) = 2.9038$, $Pr = 0.234$), suggesting a similar age distribution between men and women.

In terms of main activity, overall, more than seven out of ten persons in employment have an income-generating activity (73.2%), compared to less than two out of ten who are unemployed (17.8%). However, 9% are learning (or studying). The Chi-square test at the 5% threshold indicates a significant relationship between the main activity status and the gender of respondents (Pearson $\chi^2(5) = 44.3945$, $Pr = 0.000$). In fact, the majority of both women (70.56%) and men (79.15%) work. However, a significant proportion of women (22.08%) were unemployed or homemakers, compared to only 8.1% of men, indicating that unemployment during the COVID-19 period affected women more than men.

Respondents' socio-professional categories

Among those working in Cotonou, trade and commerce occupy the first place (55.6%). This is followed by service activities (25.4%) and handicrafts and animal husbandry (18.99%). The Chi-2 test carried out between main activity and gender suggests a significant link at the 5% threshold between them (Pearson $\chi^2(2) = 140.8452$, $Pr = 0.000$). The majority of women work in trade/sales (70.35%), and fewer in crafts (15.34%) and services (14.11). On the other hand, a significant proportion of men (48.15%) work in the services sector.

Respondents' sector of activity

The breakdown of the sample by sector of activity shows that the majority of respondents are employed in the non-formal sector, representing 81.97% of the sample. Women are particularly present in this sector, with around nine out of ten working in a non-formally registered activity. In comparison, less than seven out of ten men work in the non-formal sector. The Chi-square test, significant at the 5% level (Pearson $\chi^2(1) = 74.1503$, $Pr = 0.000$), indicates a statistically significant association between gender and sector of activity. This suggests that women are much more likely than men to work in the non-formal sector, while a higher proportion of men work in the formal sector.

3.1.2. Employment and unemployment dynamics in Cotonou

Employment rate trends in Cotonou between 2017 and 2023

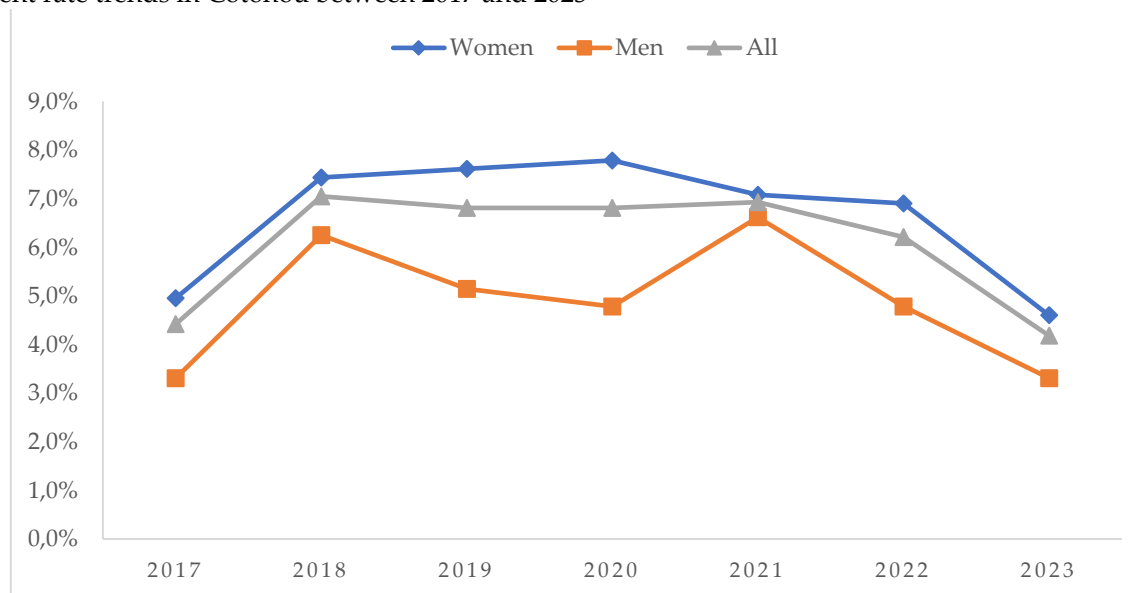


Figure 1: Employment rate curve for Cotonou, 2017-2023

Figure 1 shows the evolution of employment levels in the municipality of Cotonou over the last seven years, from 2017 to 2023. Three main trends emerge from this figure: an increase between 2017 and 2018, an almost constant evolution between 2018 and 2020, and a mixed, downward trend between 2020 and 2023. These general trends conceal significant disparities. Prior to the COVID-19 pandemic, employment levels among men fell from 6.3% to 4.8%, a difference of 1.5%. For women, however, the opposite was true, with employment levels increasing from 7.4% to 7.8%. The advent of Covid-19 seems to have reversed these trends. While men seem to have gained more jobs, women have mostly lost them. Regardless of gender, the period from 2021 to 2023 was marked by a concomitant fall in employment levels for both men and women. Since the beginning of the COVID-19 pandemic, employment levels among women have been falling steadily.

Trends in Cotonou's unemployment rate between 2017 and 2023

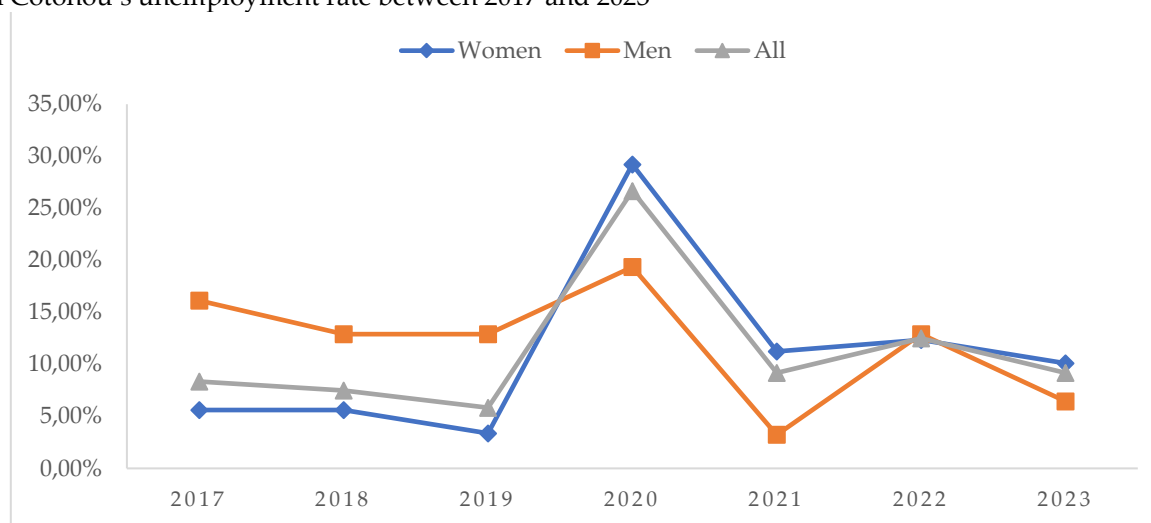


Figure 2: Unemployment rate curve for Cotonou, 2017-2023

Unemployment is often seen as a state of vulnerability, as the unemployed remain fragile in the face of shocks such as illness and other circumstances that may require more resources than they have. This vulnerability is exacerbated in times of health emergencies, such as the Covid-19 pandemic. Figure 2 illustrates the evolution of unemployment in the study population studied over the last seven years. Overall, it shows a much higher level of unemployment among men than women, with a similar temporal trend before the COVID-19 pandemic. However, the advent of Covid-19 seems to have caused upheaval, particularly between 2019 and 2022, with higher unemployment among women than among men. This finding suggests that the players in the economy, which is predominantly dominated by the non-formal sector, are made up of women who depend on daily income, and who, in the event of a shock, are likely to go from being employed to being unemployed or "jobless". In 2020, unemployment peaked at 26.7% (including 19.4% for men and 29.2% for women, with a gender gap of 10%).

3.1.3. Descriptive analysis of employment and unemployment spells in Cotonou

Total observation time (also known as total time at risk) is 20223 observation units. It represents the sum of the time during which each individual was followed (during Covid-19), whether before becoming employed/unemployed or before the end of the observation period. The maximum duration of employment and unemployment spells is 25 months, given the predefined Covid-19 period of March 2020 to March 2022 in this study. As a preliminary analysis, descriptive statistics of employment and unemployment spells were calculated. The mean, standard deviation and 95% confidence intervals of the mean (for the different factor levels) are presented in Tables A2 and A3 (Appendix).

Duration of periods of employment in Cotonou

The average duration of employment is 24.27 months. The fields of activity with the longest and shortest employment periods are crafts/livestock, with an average duration of 25 months, and service, with an average duration of 23 months. As for the sector of activity (formal or non-formal), employees in the formal sector have an average of 0.13 months more than their counterparts in the non-formal sector. Employees with primary education or no education stayed in employment for an average of 25.18 months and 24.69 months respectively, i.e. 2.33 months longer than employees with higher education, who had an average duration of 22.36 months.

Duration of periods of unemployment in Cotonou

The average duration of unemployment spells is 22.47 months. The unemployment spells of women are on average 1.08 months shorter than those of men. By age group, unemployment spells were longest for the 50+ age group, with an average duration of 23.55 months, and shortest for the 15-29 age group, with an average duration of 20.93 months. People with primary education were unemployed for 23.8 months on average, 2.16 months longer than those with higher education.

Variables	HR	St. Err.	t-value	p-value	95% CI	Sig
Sex (Base: Male)						
Female	1.068	0.047	1.51	0.132	0.98 – 1.165	
Education Level (Base: None)						
Primary	0.973	0.035	-0.76	0.45	0.907 – 1.044	
Secondary	1.021	0.042	0.51	0.607	0.942 – 1.107	
Higher	1.167	0.092	1.96	0.049	1.000 – 1.362	***
Household standard of living (Base: Poor)						
Average	0.951	0.045	-1.07	0.287	0.867 – 1.043	
Rich	0.979	0.045	-0.46	0.645	0.895 – 1.071	
Marital Status (Base: Single)						
Married	0.750	0.074	-2.90	0.004	0.617 – 0.911	***
Separated/widowed	0.733	0.079	-2.87	0.004	0.593 – 0.906	***
Field of Activity (Base: Craftsman- ship/Livestock)						
Commerce	1.018	0.038	0.49	0.624	0.947 – 1.096	
Service	1.157	0.073	2.30	0.021	1.022 – 1.309	***
Socio-professional Category (Base: Execu- tive)						
Worker/Family Helper	1.204	0.117	1.92	0.043	0.996 – 1.457	**
Independent	1.046	0.096	0.49	0.624	0.874 – 1.252	
Sector of Activity (Base: Formal)						

Non-formal	1.095	0.061	1.63	0.102	0.982 – 1.220	
Age Group (Base: 15-29)						
30-49 years	0.711	0.061	-3.95	0.000	0.600 – 0.842	***
50+ years	0.578	0.079	-4.00	0.000	0.441 – 0.756	***
Time-dependent covariates (TVC)						
Marital Status	1.04	0.16	2.86	0.004	1.01 – 1.07	***
Age	1.00	0.00	3.48	0.001	1.00 – 1.001	***
Model Summary: Mean dep. var = 24.283, SD dep. var = 5.193, Pseudo R2 = 0.42, Observations = 646, Chi-square = 48.291, Prob > chi2 = 0.000, AIC = 8219.178, BIC = 8290.711						

Source: Our analyses based on Rise Benin biographical survey data, 2023

Cox model with time-dependent covariates for unemployment

The results of the Cox model of unemployment duration during the Covid-19 period are overall more significant when time-dependent covariates are included. The regression results are shown in Table 3 below.

The results by gender show that the hazard ratio (HR) for women is 3.41 with a significant p-value at the 5% threshold ($p < 0.001$), indicating that the risk of unemployment is 3.4 times higher for women than for men. This suggests that gender is a determining factor for unemployment during the Covid-19 pandemic in Cotonou.

Taking education level into account, people with primary education had an HR of 0.618 (with $p = 0.048$), indicating that they were 0.6 times less likely to be unemployed than those with no education. This effect is statistically significant at the 5% level. The HR of people with secondary education is insignificant at the 5% threshold, indicating that there is no significant difference between this group and the reference group. The same applies to people with a higher level of education within the study population.

Comparing the different age groups, the HR for people aged 30-49 is 0.198 (with $p < 0.001$), indicating that people in this age bracket are 0.2 times less likely to be unemployed than their counterparts aged 15-29. The result is similar for people aged 50 and over, who are 0.18 times less likely to be unemployed than younger people aged 15-29.

Overall, the results show that the female gender is associated with an increased risk of unemployment during the study period. On the other hand, separated/divorced or widowed people appear to have a reduced risk of unemployment, as do those aged 30 and over. Other factors, such as household standard of living and marital status, show no significant effect.

Table 3 : Cox Regression with Time-Dependent Covariates on Unemployment Duration (during the Covid-19 period)

Variables	HR	St. Err.	t-value	p-value	95% CI	Sig
Sex (Base: Male)						
Female	3.41	0.99	4.23	0.000	1.931 – 6.025	***
Education Level (Base: None)						
Primary	0.618	0.152	-1.96	0.048	0.381 – 1.000	**
Secondary	1.004	0.211	0.02	0.984	0.666 – 1.515	
Higher	1.112	0.395	0.30	0.766	0.554 – 2.232	
Household standard of living (Base: Poor)						
Average	1.003	0.228	0.01	0.988	0.643 – 1.566	
Rich	0.821	0.189	-0.86	0.392	0.523 – 1.290	
Marital Status (Base: Single)						
In Union	1.555	0.488	1.41	0.160	0.840 – 2.878	
Separated/widowed	1.397	0.606	0.77	0.441	0.597 – 3.269	
Age Group (Base: 15-29)						

30-49 years	0.198	0.085	-3.77	0.000	0.600 – 0.842	***
50+ years	0.185	0.149	-2.09	0.037	0.038 – 0.900	***
Time-dependent covariates (TVC)						
Age	0.998	0.001	-2.04	0.041	0.997 – 1.000	***
Model Summary : Mean dep. var = 23.686, SD dep. var = 5.933, Pseudo R2 = 0.36 Observations = 834, Chi-square = 68.526, Prob > chi2 = 0.000, AIC = 1620.938, BIC = 1677.653						

Source: Our analyses based on Rise Benin biographical survey data, 2023

4. Discussion and Suggestions

4.1. Trend in employment rates

The trend in employment rates in Cotonou over the COVID-19 period indicates a gradual decline in female employment. This can be explained by two main factors. Firstly, the majority of women in Cotonou work in trade and sales, sectors that have been severely disrupted by the restrictive measures imposed by the public authorities, notably the closure of markets and restrictions on gatherings. These measures have had a direct impact on non-formal economic activities, where women are in the majority. Secondly, women's difficulties in re-establishing themselves in the labor market after the crisis may be due to their greater vulnerability to the effects of the pandemic. They were more affected by business closures and loss of income but received less institutional support. Indeed, most government aid was concentrated on the formal sector (officially registered businesses), rather than on the individuals and households directly affected by the health crisis. This has contributed to the precariousness of their economic situation.

These findings are corroborated by the results of [29], a complementary study conducted on the same Rise Benin dataset covering 3,580 women engaged in income-generating activities in southern Benin. Using a Seemingly Unrelated Bivariate Probit (SURE probit) model, this study established that 72.88% of women in the non-formal sector suffered an income loss and 28.69% lost their jobs during the pandemic. At the econometric level, being affected by the cordon sanitaire (COSAN) increased the probability of income loss by 4.5% and job loss by 8.4%, while the closure of entertainment venues increased the probability of income loss by 3.2% and job loss by 10.6%. These quantitative estimates, derived from the same study population, directly reinforce the descriptive findings presented in the present manuscript regarding the disproportionate impact of health restriction measures on women in Cotonou's non-formal sector.

4.2. Trends in the unemployment rate

The evolution of the unemployment rate in Cotonou during the Covid-19 period followed a fluctuating pattern, peaking at the beginning of the pandemic. Several factors explain this situation. Many companies, unable to bear the financial burdens associated with the crisis, were forced to downsize or close temporarily. International and national restrictions aimed at limiting the spread of COVID-19 also contributed to this situation. According to an INStAD report on the impact of Covid-19 in Benin, more than half of all companies recorded a drop in productivity, affecting both formal companies (51.6%) and non-formal production units (52.6%). In addition, the report reveals that between the beginning of the health crisis and July 2020, around 75% of households suffered a drop in income. This phenomenon was particularly marked in Cotonou, where up to 80% of households reported a drop in income, a higher percentage than observed in other regions of the country [10].

Furthermore, the results of the Cox survival analysis of the duration of employment and unemployment during the Covid-19 pandemic highlight several socio-economic and demographic factors that significantly influence these durations. These results are in line with existing literature, which highlights gender inequalities, education level, age, and marital status as determinants of the labor market.

4.3. Influence of gender on duration of employment and unemployment

The correlation between employment and gender seems to be confirmed by numerous studies. The results of this study indicate that women are three times more likely to be unemployed than men. Thus, during the Covid-19 period in Cotonou, women appear to have been three times more affected by unemployment than men. This difference can be explained by the fact that women tend to work in sectors and locations that were more vulnerable to closure at the start of Covid-19. These include markets, discotheques, restaurants and other public gathering places. These places were closed during the pandemic period to limit the risk of contamination among the population. Previous studies have also

shown that the Covid-19 pandemic has had a disproportionate impact on women's employment, not least because of their overrepresentation in the worst-hit sectors. For example, [30] reported that women were more likely to lose their jobs in sectors such as catering, hotels and retail. These results confirm those of [31], according to which there is a significant relationship at the 1% threshold between access to employment and gender, with a higher risk of unemployment among women. [32] have also shown that school closures have had a disproportionate impact on mothers' employment, exacerbating gender inequalities in paid work. Similarly, a study by [33] on the impact of COVID-19 in the US found that women experienced a greater decline in full-time employment rates than men. The authors attribute this in part to the over-representation of women in the sectors most affected by the pandemic, as well as to their increased family responsibilities during the crisis.

The role of marital status and mental health in shaping these gendered labor market outcomes is further substantiated by [29]. Their econometric analysis shows that women in common-law unions had a 7.2% higher probability of income loss and a 3.3% higher probability of job loss, while divorced or separated women faced a 6.9% higher probability of income loss compared to single women. Stress and anxiety were identified as among the strongest determinants, increasing the probability of income loss by 11.7% and job loss by 4.9%. These findings, grounded in the same geographic and sociocultural context as the present study, provide a complementary causal perspective that strengthens the interpretation of the Cox model results presented here. They underscore that the determinants of unemployment duration identified in our analysis—gender, marital status, sector of activity, and age—are structurally consistent with those driving income and employment loss more broadly in southern Benin during the COVID-19 crisis.

4.4. Influence of education level on duration of employment and unemployment

The results show that people with a primary level of education are 0.62 times less likely to remain unemployed than those with no education at all. This could be explained by the fact that jobs requiring a lower level of education were less affected by the crisis, and some of these jobs have been more in demand during this period. On the other hand, individuals with a higher level of education run a greater risk of job loss. This finding might seem counter-intuitive, i.e., one might expect people with higher levels of education to be better protected against unemployment or job loss. However, this trend can be interpreted in the light of the nature of the jobs available during the pandemic, where lower-skilled sectors such as agriculture, commerce (on a smaller scale) and delivery services were more resilient and offered more opportunities than higher-skilled sectors (such as tourism, finance or public administration), which were severely affected by the health restrictions. The work of [34] confirms these conclusions. In Côte d'Ivoire, long-term unemployment affects young graduates more than those with less education. As a result, uneducated youth are more likely to exit unemployment quickly than their better-educated counterparts, which contradicts some of the findings of other studies. A plausible explanation lies in the increase in precarious employment triggered by the crisis, which has led to the hiring of workers without expertise or professional training. Opportunities without diploma requirements in the non-formal sector, such as domestic work, predominantly held by young women, are a good illustration of this situation. This can also be explained by a mismatch between training and employment, or a lack of technical skills adapted to the needs of the job market [35]. It is therefore important to promote and motivate education policies that take into account the changing demands of the job market. Policies to support and monitor the long-term unemployed are also necessary. Civil society organizations can also undertake actions with a strong social impact by supporting vulnerable groups.

4.5. Influence of marital status on duration of employment and unemployment

Marital status also plays a significant role, with a significantly lower risk of job loss for those in a union or married. This trend may be explained by the social support that partners can provide for each other, which is essential in times of economic stress. Previous research has shown that social support is a protective factor for mental well-being and job stability, especially in times of crisis [36]. Also, family support contributes to job stability by providing emotional and practical support, which helps individuals cope with uncertainties caused by pandemic-related disruptions [37]. This stability is vital for maintaining productivity and reducing turnover. Similarly, the research by [38] highlights that being married or in a union provides not only emotional support but also practical resources like shared income, which buffers against financial stress during periods of unemployment.

4.6. Influence of age on duration of employment and unemployment

Overall, it appears that young people aged 15-29 appear to be at higher risk of job loss and unemployment. However, the composition of this age group needs to be qualified. Indeed, this group is mostly made up of young students or

people in vocational training who have recently completed their studies, and who are often in an internship period or on a trial contract before securing stable employment. With the Covid-19 crisis, many companies, faced with the need to cut costs, have been forced to retain more experienced employees, to the detriment of younger employees and recruits. According to data from [10] more than 60% of businesses in the restaurant and hotel sectors in Cotonou had to temporarily close or significantly reduce their activities during the pandemic, disproportionately affecting women employed in these sectors. This situation has contributed to an increase in youth unemployment, a phenomenon confirmed by the [3], which points out that young workers are particularly vulnerable due to their high incidence of precarious employment and unpaid internships.

When age groups are compared, the results show that people aged 30 and over run a significantly lower risk of unemployment than younger people aged 15-29. This can be attributed to their richer professional experience and stability, which offer them greater protection against job loss. In line with these findings, the ILO revealed that globally, youth employment fell by 8.7% in 2020, compared with only 3.7% among adults, with a steeper decline in middle-income countries [3]. Similarly, according to [34], unemployment durations for adults are generally shorter than those for young people. The authors explain that the longer duration of unemployment among young people could be linked to the age at which they leave the education system or the age at which they enter the labor market. Since the average school leaving age is generally around 24 (short vocational training cycle), it is plausible that young adults aged 25 to 35 are more employable during this period, corroborating the findings of [39] in a study carried out in Abidjan, Côte d'Ivoire. By combining the age criterion with that of gender, [39] manages to identify two groups of young people in relation to unemployment rates. The youngest group (aged 14 to 24), and particularly young women, represent the most vulnerable to unemployment, while the group of young men aged over 24 is significantly less exposed.

4.7. Suggestions

This study highlights some of the socio-economic inequalities exacerbated by the Covid-19 pandemic, paying particular attention to workers in the non-formal sector and populations dependent on daily income. Consequently, action needs to be taken at several levels. At the political level in particular, we need to:

- Give special attention to certain categories of people, including girls, women, young people under thirty and workers in the non-formal economic sector, in the development and implementation of post-Covid-19 policies. These categories of people were hardest hit by job loss and unemployment during the Covid-19 pandemic.
- Strengthen and diversify training programs for young people (regardless of gender) to enhance their skills, employability and professional integration.
- Encourage the adoption of integrated (culturally and mutually) and inclusive adaptation measures at all decision-making levels.
- Strengthen training and retraining projects/programs. To enable workers, particularly those in the non-formal sector and young people, to adapt to the new, evolving requirements of the post-pandemic labor market.
- Support women in the non-formal sector to strengthen their economic empowerment and the sustainability of their income-generating activities.

5. Conclusions

This study aimed to analyze the dynamics of employment and unemployment during the COVID-19 period in Cotonou, southern Benin. The results highlight several findings concerning the population studied, notably a predominance of women, a relatively very young population, and a mainly secondary level of education. An increase in unemployment is observed between 2019 and 2023, with a peak following the advent of the Covid-19 crisis. The results show an inverse situation between employment and unemployment dynamics during this Covid-19 period. While unemployment increased, employment fell, reflecting the challenges facing workers in a fragile economic context in the face of external shocks. In addition, the study highlights the socio-economic inequalities exacerbated by Covid-19, with a particular focus on workers in the non-formal sector and populations dependent on daily income. Women, young people, the less educated and those working in the service sector were particularly hard hit during this period of health crisis. Not only did these groups find it harder to keep a job, but they also spent more time unemployed compared to their older or better educated male counterparts. The explanatory analysis confirms that factors such as gender, education level, marital status, sector of activity, and age play a decisive role in the duration of employment and unemployment. In addition, post-pandemic recovery measures have proved insufficient. The fragility of the non-formal sector was particularly

highlighted, underlining the need for more inclusive and adaptive public policies. To respond effectively to these challenges, it is necessary to put in place education and training policies in line with the needs of the labor market, and to strengthen support mechanisms for vulnerable groups. This study underlines the importance of a holistic and inclusive approach to public policymaking to foster equitable and sustainable economic recovery. Particular attention must be paid to reducing inequalities in the labor market in order to build greater resilience to future crises.

These conclusions are reinforced by a complementary study using the same Rise Benin dataset. [29], applying a SURE probit model to 3,580 women in the non-formal sector in southern Benin found that 72.88% suffered income loss and 28.69% job loss during the pandemic. Their results confirm that the cordon sanitaire and closure of entertainment venues were the primary drivers of economic disruption for women, while stress, anxiety, urban residence, marital status, and sector of activity played significant moderating roles. The convergence of findings across these two methodologically distinct studies—Cox survival analysis and bivariate probit regression—applied to the same population provides robust, mutually reinforcing evidence of the structural vulnerabilities of women in Benin's non-formal economy and the urgent need for gender-sensitive recovery policies.

6. Patents

Author Contributions: "Conceptualization, Imourana Soumanou; methodology, Imourana Soumanou; software, Imourana Soumanou; validation, Justin Dansou and Pacome Acotcheou; formal analysis, Imourana Soumanou; investigation, Pacome Acotcheou; resources, Pacome Acotcheou and Justin Dansou; data curation, Imourana Soumanou and Pacome Acotcheou; writing—original draft preparation, Imourana Soumanou and Affo M. Alphonse; writing—review and editing, Affo M. Alphonse, Justin Dansou, and Pacome Acotcheou; supervision, Affo M. Alphonse and Jacques Saizonou; project administration, Affo M. Alphonse and Jacques Saizonou; funding acquisition, Affo M. Alphonse, Pacome Acotcheou, Justin Dansou and Jacques Saizonou. All authors have read and agreed to the published version of the manuscript."

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Institutional Review Board Statement: The retrospective biographical survey of the Rise Benin project obtained the opinion N°172 of July 20, 2023, issued by the Research Ethics Committee of the Institute of Biomedical Sciences (CER-ISBA) in Benin. The study also received the statistical visa n°26/2023/MEF/INStAD/DCSFM of July 03, 2023, issued by the Conseil National de la Statistique (CNS) of Benin. This endorsement of timeliness and compliance with research standards further enhances the value of the results of this investigation.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Appendix A

Table A1: Summary of Education Level, Age Group, Main Activity, Field of Activity, and Sector of Activity by Gender (analytic sample, N = 1,000)

Modalities	Women		Men		All	
	Number	Percentage	Number	Percentage	Number	Percentage
Level of education						
None	198	28.57	28	9.12	226	22.60
Primary	177	25.54	76	24.76	253	25.30
Secondary	251	36.22	135	43.97	386	38.60
High level	67	9.67	68	22.15	135	13.50
Total	693	100	307	100	1000	100
Pearson chi2(3) = 63.5341 ; Pr= 0.000						
Age group						
15 - 29 years	225	32.47	84	27.36	309	30.90
30 - 49 years	346	49.93	155	50.49	501	50.10
50 years & over	122	17.60	68	22.15	190	19.00
Total	693	100	307	100	1000	100
Pearson chi2(2) = 4.1217 ; Pr= 0.127						
Main activity						
Study/learning	51	7.4	39	12.7	90	9.0
Homemaker/unemployed	153	22.1	25	8.1	178	17.8
Work	489	70.6	243	79.1	732	73.2
Total	693	100.0	307	100.00	1000	100.0
Pearson chi2(5) = 44.3945 ; Pr= 0.000						
Field of activity						
Crafts/livestock	76	15.54	63	25.93	135	18.89
Trade/Sales	344	70.35	63	25.93	407	55.60
Service	69	14.11	117	48.15	186	25.41
Total	489	100.0	243	100.0	732	100.0
Pearson chi2(2)=140,8452 ; Pr=0,000						
Sector of activity						
Formal	46	9.41	86	35.39	132	18.03
Non formal	443	90.59	157	64.61	600	81.97
Total	489	100	243	100	732	100
Pearson chi2(1) = 74.1503 ; Pr= 0.000						

Source: Our analyses based on Rise Benin biographical survey data, 2023

Note: The analytic sample (N = 1,000) excludes 172 observations with missing values on the employment/un-employment status (duration) variables used in the regression and survival analyses.

Table A2: Summary of employment period duration by covariates

Variables	N. Observation	Mean	Std. Dev.	95% CI
Overall	659	24.27	5.18	23.883 – 24.675
Level of Education				
None	156	24.69	4.48	23.990 – 25.393
Primary	190	25.18	3.39	24.702 – 25.666
Secondary	237	23.89	5.72	23.167 – 24.621
Higher	76	22.36	7.48	20.697 – 24.039
Sex				
Female	430	24.31	5.01	23.838 – 24.784
Male	229	24.21	5.52	23.504 – 24.931
Marital Status				
Single	59	20.81	7.60	18.890 – 22.736
Married	507	24.58	4.81	24.169 – 25.006
Separated/widowed	93	24.79	4.51	23.883 – 25.708
Household standard of living				
Poor	124	24.12	5.12	23.223 – 25.018
Average	209	24.58	4.81	23.946 – 25.249
Rich	313	24.13	5.46	23.533 – 24.741
Field of Activity				
Craft/Livestock	130	25.18	3.51	24.583 – 25.785
Trade	369	24.48	4.89	23.986 – 24.983
Service	160	23.06	6.62	22.046 – 24.091
Socio-professional Category				
Executive	39	23.69	6.39	21.709 – 25.674
Worker/Family Aid	111	22.33	6.79	21.075 – 23.590
Independent	509	24.74	4.55	24.353 – 25.144
Sector of activity				
Non-formal	538	24.25	5.23	23.814 – 24.698
Formal	121	24.38	4.99	23.494 – 25.266
Age Group				
15-29	108	21.46	6.66	20.049 – 22.876
30-49	403	24.70	4.69	24.252 – 25.147
50+	148	25.19	5.21	24.577 – 25.801

Source: Rise Benin biographical survey data, 2023

Table A3: Summary of unemployment period duration by covariates

Variables	N. Observation	Mean	Std. Dev.	95% CI
Overall	131	22.47	6.56	21.3534 – 23.593
Level of Education				
None	38	22.26	6.44	20.240 – 24.285
Primary	25	23.80	4.93	21.905 – 25.694
Secondary	54	22.22	7.33	20.284 – 24.159
Higher	14	21.64	6.64	18.291 – 24.994
Sex				
Female	114	22.33	6.71	21.106 – 23.560
Male	17	23.41	5.56	20.849 – 25.974
Marital Status				
Single	17	20.94	8.10	17.203 – 24.678
Married	94	22.82	6.43	21.526 – 24.112
Separated/widowed	20	22.15	5.86	19.646 – 24.653
Household standard of living				
Poor	28	22.07	7.39	19.380 – 24.762
Average	46	22.60	6.58	20.725 – 24.491
Rich	52	22.23	6.41	20.503 – 23.958
Age Group				
15-29	45	20.93	7.69	18.709 – 23.157
30-49	52	23.09	6.42	21.367 – 24.824
50+	34	23.55	4.69	22.005 – 25.112

Source: Rise Benin biographical survey data, 2023

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