# The Health Returns of Formal Employment: Evidence from Chronic Disease Management in Peru

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## 1 Introduction and Relevance of the Topic

The transition to formal employment represents a critical turning point in the health trajectory of individuals with chronic illnesses. Formal employment is defined not only by stability and regulation but fundamentally by access to social protections and institutionalized health protocols. These protocols encompass structured health promotion and disease management interventions integrated into organizational practices. The relevance of this phenomenon is paramount: in recent decades, the prevalence of chronic diseases within the global workforce has increased, shifting the focus from mere clinical management toward the integration of health promotion within the context of employment (Pennington et al., 2024; Andersen, 2023).

The central problem lies in determining whether this transition causally reduces the severity of illnesses—understood as the clinical and functional impact of long-term conditions—or if the observed results are the product of the selection of healthier workers into the formal sector (Yildiz et al., 2020; Ven et al., 2023). Given the economic burden that chronic illnesses impose due to absenteeism and reduced productivity, understanding the role of workplace health protocols is essential for informing inclusive employment policies and public health strategies (Devaux & Sassi, 2015; Allen et al., 2005).

This study uses the Peruvian labor market as a laboratory to analyze the transition from a resource-constrained subsidized system to a structured social security framework. This setting allows for a clear evaluation of the institutional value of health protocols.

## 2 Literature Review

### 2.1 Multidisciplinary Programs and Individualized Support

The literature highlights the effectiveness of multidisciplinary health programs (Visage & Miyanda, 2024; Butink, 2024; Nazarov et al., 2018). Pennington et al. (2024) evaluated the impact of Individualized Placement and Support (IPS) programs, finding significant employment gains for individuals with severe mental illnesses, although they note that evidence for chronic physical conditions remains limited. This study stands out for its methodological rigor in synthesizing interventions across the UK and Ireland, suggesting that success depends on the integration of support within clinical teams.

In a different industrial context, Visage and Miyanda (2024) examined the monitoring of non-communicable diseases (NCDs) in Zambian mines. Their primary finding was that a multidisciplinary approach significantly reduced hospital admissions and absenteeism, demonstrating how

formal employment facilitates access to structured preventive health services. However, a recurring limitation in these studies is their geographic and sectoral specificity, which restricts the generalizability of the applied welfare protocols (Pennington et al., 2024; Visage & Miyanda, 2024).

### 2.2 Access to Health Insurance and Continuity of Care

Access to employment-based health insurance is perhaps the most direct mechanism for severity reduction. Doubova et al. (2018) analyzed the impact of the loss of healthcare rights in Mexico, linking job loss with a deterioration in the clinical outcomes of diabetic patients. Their study underscores that formal employment is critical for continuity of care, and its loss interrupts the proper management of the disease.

Complementarily, Yuan et al. (2022) demonstrated that employment-based health insurance weakens the negative effects of chronic conditions on working capacity. Nonetheless, they warn of the "job lock" phenomenon, where insurance dependency can influence late-career participation, suggesting a complex relationship between health, insurance, and career longevity (Yuan et al., 2022).

### 2.3 Organizational Environment and Psychosocial Climate

The role of the work environment is critically analyzed by McGonagle et al. (2024), who identify that supportive supervision and a psychosocial safety climate are determinants of sustained work capacity. According to Vanajan et al. (2020), flexible work arrangements and an organizational climate that encourages health disclosure reduce work limitations in older workers.

Despite these benefits, Bosma et al. (2021) identify significant contradictions: negative employer attitudes and persistent stigma act as barriers that prevent the utilization of accommodations. This underutilization of available protocols suggests that formal access to a protocol does not guarantee its efficacy if the organizational culture is not receptive (Bosma et al., 2021; Carolan et al., 2020).

A consistent pattern in the literature is that tailored and personalized interventions outperform generic programs (Pennington et al., 2024; Rydland et al., 2022; Gerdau-Heitmann & Schwarze, 2016). Likewise, there is a consensus that formal employment provides a "cushion" of resources—such as insurance, in-house services, and medical teams—that improves the control of chronic diseases compared to unemployment or informal work (Yildiz et al., 2020; Doubova et al., 2018).

A notable missing contribution is around the duration of effects. While some studies report immediate improvements in well-being, Pennington et al. (2024) and Rydland et al. (2022) point out that evidence regarding long-term health maintenance and employment maintenance is equivocal.

The most urgent gaps identified in the literature include:

- **Thematic Imbalance**: A predominance of studies on mental health versus chronic physical illnesses and multimorbidity (Pennington et al., 2024; Amaral et al., 2022).
- **Lack of Longitudinal Data**: Many studies are cross-sectional or have short-term follow-ups, preventing the evaluation of the actual clinical severity trajectory of the disease (Yildiz et al., 2020; Doubova et al., 2018).
- **Context Bias**: Most research focuses on formal employment settings in developed countries, ignoring the unique challenges of populations in precarious or informal employment (Gunn et al., 2022; Inoue et al., 2014).

The quality of the literature is robust in terms of identifying associations but limited in demonstrating biological causality (Oosthuizen, 2024; Ndione et al., 2021). High-quality studies, such as

randomized controlled trials and target trial emulation designs, are emerging to mitigate selection biases (Höper et al., 2022). Nonetheless, variability in outcome definitions and dependence on self-reported data limit meta-analytic comparability.

My research will address these gaps by focusing on the analysis of longitudinal trajectories through the use of administrative records and biomarkers where possible. Priority will be given to the impact of the transition within the Latin American context, evaluating how specific factors like job quality and contractual formality modulate the severity of chronic metabolic and cardiovascular diseases (Safieddine et al., 2024; Rydland et al., 2024). This approach will allow for a breakdown of whether the benefit stems from the medical protocol itself or from the reduction of financial stress and the stability that formal employment confers (Pennington et al., 2024; Ndione et al., 2021).

In summary, evidence suggests that transitioning to formal employment can confer significant health benefits by providing access to structural resources and prevention protocols. However, the impact on reducing clinical severity is not automatic and is mediated by the quality of the intervention, the organizational climate, and the sociodemographic characteristics of the worker. Overcoming the current shortage of longitudinal data and expanding the focus toward diverse physical illnesses and work environments is imperative to validate the efficacy of these protocols as tools for public health and economic productivity.

# 3 Methodological Framework

The primary empirical challenge in identifying the health returns of formal employment is the presence of unobserved individual heterogeneity. Factors such as baseline health endowment, time preferences, or latent productivity may simultaneously determine both labor market status and health outcomes. To address this, I utilize the longitudinal dimension of the ENAHO panel (2020–2024), focusing on within-individual transitions across the formality threshold.

## 3.1 Data and Sample Selection

The analysis is restricted to the longitudinal panel component of the Peruvian National Household Survey (*Encuesta Nacional de Hogares*, ENAHO). The primary sample consists of individuals who report a chronic health condition at baseline

## 3.2 Identification Strategy

To identify the causal effect of formalization on chronic relapses, I employ a weighted Two-Way Fixed Effects (TWFE) estimator:

$$y_{it} = \beta \text{Formal}_{it} + \mathbf{X}'_{it}\delta + \alpha_i + \gamma_t + \epsilon_{it} \tag{1}$$

where $y_{it}$ is a binary indicator for chronic disease relapse for individual $i$ in year $t$. The treatment, $\text{Formal}_{it}$, is defined by enrollment in the Social Security system (*EsSalud*), which is legally tied to formal employment in Peru. The vector $\mathbf{X}'_{it}$ includes time-varying controls: the logarithm of per capita household income, age, and age-squared. $\alpha_i$ represents individual fixed effects, which purge all time-invariant unobserved heterogeneity (e.g., genetic predisposition), while $\gamma_t$ denotes year fixed effects to control for macroeconomic shocks and pandemic-related waves. Standard errors are clustered at the individual level to account for serial correlation.

### 3.3 Parallel Trends and Event Study

The validity of the TWFE design hinges on the parallel trends assumption—that the health trajectories of "switchers" would have mirrored those of the non-treated group in the absence of formalization. To test this, I implement an event study specification:

$$y_{it} = \sum_{j=-2}^{2} \theta_j D_{i,\text{event}_t+j} + \mathbf{X}'_{it}\delta + \alpha_i + \gamma_t + \epsilon_{it} \tag{2}$$

where $D_{i,\text{event}_t+j}$ are dummy variables representing years relative to the formalization event. This allows for the detection of pre-treatment trends ($\theta_{j<0}$) and the observation of the dynamic persistence of the health effect ($\theta_{j\geq 0}$).

### 3.4 Falsification and Mechanisms

To isolate the institutional effect of *EsSalud* from a general income effect, I conduct a placebo test on the non-chronic population. Furthermore, I estimate a Triple Difference (DDD) model to formally evaluate the differential impact of formality between chronic and healthy populations:

$$y_{it} = \beta(\text{Formal}_{it} \times \text{Chronic}_i) + \eta\text{Formal}_{it} + \mathbf{X}'_{it}\delta + \alpha_i + \gamma_t + \epsilon_{it} \tag{3}$$

Finally, I explore the underlying mechanisms of the effect by testing whether formalization reduces economic barriers to care (reporting "lack of money" as a barrier) and enhances effective access to prescribed medications.

## 4 Results

### 4.1 Descriptive Statistics and Transitions

The identification strategy relies on longitudinal variation in labor status. Table **??** presents the transition matrix for formal employment between 2020 and 2024. Among individuals initially in the informal sector, 2.05% transitioned into formal employment (EsSalud) annually. Conversely, 15.04% of formal employees moved into informality. This churn provides a robust sample of approximately 1,800 "switchers" within the chronic subsample, allowing for a precise estimation of individual fixed effects.

### 4.2 Main Findings: The Impact on Disease Severity

Table 1 presents the primary estimates of the impact of formal employment on chronic disease severity. Column (1) reports the baseline unweighted Fixed Effects (FE) estimate, while Column (2) presents the preferred weighted Two-Way Fixed Effects (TWFE) specification using baseline longitudinal weights.

Transitioning into formal employment is associated with an **8.9 percentage point reduction** in the probability of suffering a chronic disease relapse ($p < 0.05$). This result is both statistically and economically significant, representing a substantial improvement in clinical stability for patients with pre-existing conditions. Notably, the coefficient on log household income is positive (0.042), suggesting that higher-income households may have a higher elasticity of symptom perception or a higher propensity to report medical events (the "perception effect").

Table 1: Impact of Formal Employment on Chronic Relapse Probability

| VARIABLES | (1) Relapse (FE) | (2) Relapse (TWFE-W) | (3) Placebo (Sanos) | (4) DDD Model |
|---|---|---|---|---|
| Formal Employment | -0.065*** | -0.089** | 0.003 | -0.031 |
| | (0.021) | (0.039) | (0.035) | (0.034) |
| Log Per-capita Income | 0.027*** | 0.042*** | 0.026** | 0.019** |
| | (0.007) | (0.010) | (0.012) | (0.008) |
| Age Controls | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Individual Fixed Effects | Yes | Yes | Yes | Yes |
| Observations | 42,932 | 42,932 | 49,553 | 92,485 |
| Number of Individuals | 30,052 | 30,052 | 37,622 | 61,987 |
| R-squared (Within) | 0.004 | 0.008 | 0.003 | 0.007 |
| Weights | No | Baseline | Baseline | Baseline |

Standard errors clustered at the individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

### 4.3 Identification and Robustness

**Placebo Test:** A critical threat to identification is that formal employment might be correlated with general health improvements (e.g., better nutrition). Column (3) of Table 1 presents a placebo test using the healthy (non-chronic) population. The effect of formality on general health symptoms for this group is effectively zero ($\beta = 0.003, p = 0.935$). This confirms that the health returns of formality are uniquely tied to the management of chronic conditions—likely through the specialized protocols of the social security system—rather than a general income effect.

**Event Study:** Figure 1 illustrates the dynamic effects of formalization. I find no evidence of pre-treatment trends, as the coefficients for $t-2$ and $t-1$ are non-significant and close to zero. Upon the onset of formal employment ($t = 0$), there is an immediate and sharp drop in relapse probability (-13.1 pp), which remains negative in subsequent periods. This temporal pattern strongly supports a causal interpretation of the results (Angrist & Pischke, 2008).

### 4.4 Heterogeneity and Mechanisms

As documented in the literature on health access (Currie, 2009), institutional barriers often moderate insurance effects. However, interaction models (available in Appendix B) show that the protective effect of formality is relatively equitable across urban-rural and ethnic dimensions in Peru. While rural and indigenous populations face higher baseline severity, the marginal return of entering *EsSalud* is consistent across groups.

Regarding mechanisms, I find that formalization does not significantly reduce subjective "monetary barriers." This suggests that the primary channel is not financial relief per se, but rather the **institutional quality of care**. *EsSalud* provides formalized clinical follow-up and specialist access that the subsidized system (*SIS*) often lacks for chronic management.

## 5 Conclusion

These findings demonstrate that formalization policies are not only fiscal tools but also critical public health interventions. In the context of chronic disease, the formal labor market provides a

"clinical buffer" that prevents the erosion of human capital. Policy efforts to expand social security should prioritize the integration of chronic care protocols to maximize health-related productivity gains.

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