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ADDRESSING THE PENSION NEEDS OF THE INFORMAL SECTOR WORKER: THE CASE OF GHANA

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Abstract

The informal sector in Ghana has been steadily expanding since the colonial era, currently encompassing approximately 90 percent of the country's workforce. Despite its substantial labor force, this sector grapples with numerous challenges. Foremost among these challenges is the absence of a pension system for its workers. In this study, we propose an inclusive pension scheme designed not only to be appealing to those in the informal sector but also to encompass all its workers. The core concept of this model hinges on the cooperative contributions of both the government and the sector's workforce. Government involvement is envisioned to serve as both an incentive and a means to ensure robust participation from the sector employees. Additionally, our proposal advocates for the engagement of religious institutions, given the deeply ingrained religiosity of Ghanaians. This approach capitalizes on the likelihood that people are more inclined to heed the counsel of their religious leaders than directives from the government or its agencies. Under the framework we've put forward, our calculations indicate that the annual cost to the government for implementing this scheme, assuming that workers in the sector are compensated at the minimum wage, would be GHS17, 323,713,655.92 (\$1,506,409,883.12) . Alternatively, if we assume that all workers in the informal sector receive the average wage, the projected cost would be GHS17, 999,536,054.12 (\$1,565,177,048.18). These financial figures should not place an insurmountable burden on the government's finances, especially when considering the vital role that a pension system plays in alleviating old-age poverty. Furthermore, our findings reveal that older workers require larger contributions to adequately fund their retirement benefits due to the shorter period available for accruing savings. Additionally, the study identifies a positive

correlation between interest rates and retirement benefits. While an inverse relationship between retirement benefits and mortality rates was detected, it is important to note that this influence is relatively weak, with mortality having a less significant impact on retirement benefits.

INTRODUCTION

In Ghana, a series of pension reforms have been undertaken since gaining independence. The most recent reform occurred in 2009, prompted by concerns and demands for improvements in the existing pension systems in the country. Of particular concern to various worker groups were the disparities in benefits across different pension schemes in Ghana and the exclusion of informal sector workers, who comprise about 90% of the workforce, from these schemes.

Recognizing the pressing need for reform, then-President J. A. Kufuor established a Presidential Commission on Pensions (PCP) to assess the existing pension schemes and recommend sustainable solutions that would guarantee retirement income security for all workers in the nation. The PCP submitted its recommendations to the Government in March 2006, which were subsequently accepted and endorsed through a government-issued white paper. This led to the creation of the three-tier pension scheme in 2009.

The transformation in Ghana's pension system involved the introduction of two private pension schemes to complement the existing Pay- As- You- Go scheme and to encompass informal sector workers. As the name suggests, this new pension scheme comprises three tiers.

The first tier, known as the Basic National Social Security Pension, is mandatory for all formal sector workers. Under this tier, workers contribute 11% of their monthly salary to the scheme and receive benefits in the form of a defined benefit.

The second tier is also compulsory for formal sector workers, requiring a mandatory 5% contribution from them, with benefits paid as a lump sum. Regrettably, informal sector workers are not part of this tier.

The third tier is a voluntary pension scheme for formal sector workers who may contribute up to a maximum tax-free rate of 6.5% of their salary. It is also open to informal sector workers, who can contribute at a maximum tax-free rate of 25%. Contribution to this tier is purely voluntary.

Under the three-tier pension scheme, formal sector workers make a total compulsory contribution of 18.5% of their salary towards their pension. Out of this sum, the worker pays 5.5% while the employer, often the government, covers the rest. Additionally, they may contribute a voluntary tax-free contribution of 6.5%. In contrast, informal sector workers may contribute a tax-free rate of 25% without any assistance, as they typically serve as their own employers.

However, nearly 14 years after the pension reforms, approximately 90% of informal sector workers still lack any form of pension coverage, even though the third tier was designed to include them. The low adoption of tier three by these workers can be attributed to several factors.

Firstly, many informal sector workers have limited education and income levels. Consequently, they may not perceive the importance of setting aside money for the future when immediate financial needs are pressing. Given their modest incomes, it is often challenging for these workers to meet their current expenses, let alone save for retirement.

Secondly, there is little incentive for informal sector workers to participate in the scheme. Unlike the formal sector workers, where the government employs roughly 85% of them and contributes 11% of their total contributions, informal sector workers receive no such assistance, as they are predominantly self-employed. Furthermore, many informal sector workers operate in small groups with unpredictable and modest earnings.

Moreover, the voluntary nature of the scheme presents another hurdle. Saving for retirement is generally a challenging task, one that most individuals wouldn't undertake if not mandated. This challenge is exacerbated for the informal sector workers, whose incomes may be insufficient to cover basic needs, let alone allocate funds for a pension. However, if the scheme were made compulsory or highly enticing, workers might be compelled or motivated to allocate a portion of their income, regardless of its size, toward their pension.

As a result of these and other factors, the reform has fallen short of its goal to ensure that informal sector workers possess a dependable pension. Yet, these workers constitute the majority of the workforce and are among the most vulnerable, given their typically low incomes and self-employment in small enterprise. Consequently, around 70% of the Ghanaian workforce currently lacks any form of pension coverage. This presents a troubling scenario as it not only increases the risk of elderly poverty but also reflects poorly on the nation's social and economic development.

Given this backdrop, this work aims to propose a pension model that not only appeals to informal sector workers but also guarantees some form of pension coverage for the entire workforce in the country.

THE GHANAIAN INFORMAL SECTOR

The informal sector, while well-recognized in many developing countries, remains less prominent in the lexicon of most developed nations. According to International Labor Organization (ILO) in 2015, the informal sector encompasses all economic activities carried out by workers and economic entities that, in practice or by law, lack adequate coverage by formal arrangements.

The Seventeenth International Conference of Labor Statisticians (17th ICLS) held in Geneva, from 24th November to 3rd December 2003 defined "informal employment" as the total number of informal jobs conducted during a given reference period. These jobs could be situated within formal sector enterprises, informal sector entities, or households. In essence, informal employment refers to work that lacks sufficient coverage by formal arrangements, such as contributions to pensions, medical insurance, or other entitlements.

In the context of Ghana, the origins of the informal sector can be traced back to the early days of colonial capitalism in the then Gold Coast. Since those formative years, this sector has experienced

remarkable growth and currently provides employment for approximately 90% of the country's workforce, with women constituting 54.9% and men comprising 45.1% (Ghana Statistical Service, 2015). The expansion of the informal sector can be attributed to the significant labor retrenchments over the years and the incapacity of the country to create adequate employment opportunities for the burgeoning workforce, which has naturally gravitated towards the informal sector. The government's recurrent bans on employment, often mandated through IMF programs, along with sluggish growth in the private sector, have further fueled the sector's expansion.

The Ghanaian informal sector can be broadly categorized into two segments: the rural informal sector and the urban informal sector (Adu-Amankwaah, 1999). The rural workforce primarily engages in agricultural activities, predominantly consisting of small farming units in rural and semi-urban areas. Many of these farmers have illiterate or semi-literate backgrounds and typically acquire their skills through apprenticeships.

Fishing and fish processing are other activities closely associated with the Ghanaian rural informal sector, mainly concentrated along the country's coastline. These tasks are often performed by individuals with limited literacy levels who acquire their skills through apprenticeships. Fish processing, which includes smoking and marketing fish, is predominantly undertaken by women, often the wives or family members of fishermen.

Rural agro-based processing is yet another facet of the Ghanaian rural informal sector. It encompasses traditional soap-making, cassava processing into gari and cassava dough, local pito brewing, local gin distillation, palm kernel processing, groundnut processing, and copra oil extraction. The workforce in this domain is primarily composed of married women who typically lack formal education and acquire their skills within the family. A common characteristic among these rural workers is their absence of social security protection.

The Ghanaian urban informal sector, in contrast, exhibits a notable degree of heterogeneity. Notwithstanding this diversity, the sector's activities can be categorized into three main clusters: services, construction, and manufacturing.

The services sector comprises urban food traders and processors, including market food vendors, bakers, and cooked food sellers, among others. Additionally, health and sanitation workers, domestic staff, garages, graphic designers, audio-visual professionals, and hairdressers/barbers operate within this sector. Workers in the services sector generally possess limited education, lack adequate resources, face job insecurity, and are devoid of social security.

The construction sector encompasses masons, carpenters, steel benders, small-scale plumbers, and house-wiring electricians. Typically, this sector is dominated by young males and school dropouts who acquire their skills through apprenticeships or training.

The manufacturing sector represents the final category within the service sector. This domain includes activities such as food processing, textiles and garment production, wood processing, and metalworking. Women are predominant workforce in the food processing and textiles, while men dominate wood processing and metal work. Similar to other sectors, apprenticeships are the primary mode of skill acquisition (Osei-Boateng et al. 2011).

Collectively, it is evident that the Ghanaian informal sector is characterized by low levels of education, modest income levels, an absence of social security, limited access to healthcare facilities, inadequate job security, lack of official recognition and protection, and prevalence of self-employment, typically at small-scale levels. Fortunately, the introduction of a national health insurance scheme has improved access to healthcare. However, the lack of reliable social security, particularly pensions, remains a pressing issue in this sector. Although the introduction of the new pension scheme aimed to address this problem, it has fallen short, leaving most informal sector workers without any form of social security. Consequently, many who retirees in this sector rely on their children and other family members for financial support. Unfortunately, a significant portion of these dependents also find themselves in the informal sector, grappling with low incomes.

Dealing with the contribution Challenge by the Informal Worker

The primary reason behind the failure of the pension reform to achieve its goal of encompassing informal sector workers lies in their reluctance to contribute to the scheme, stemming from a lack of adequate education and motivation. It's crucial to recognize that, despite their limited income, these can still make contributions if they are sufficiently motivated and understand the importance of doing so.

An illustrative example of this potential lies in the fact that Ghana has a population where approximately 70% are Christians who adhere to the practice of tithing, where they contribute 10% of their income to their respective churches. Even though their incomes may be meager, they consistently tithe because they have been effectively educated about the benefits of this practice. of tithing. Therefore, the issue is not solely rooted in low-income level but also in the absence of proper education and motivation.

To tackle the motivation challenge, we propose government participation in the scheme, whereby the government contributes a certain amount on behalf of these workers towards their pensions. This contribution should be sufficiently attractive to motivate the workers to actively participate in the scheme.

Regarding education, we suggest that the government collaborates with religious institutions to enlighten their members on the importance of contributing a portion of their earnings towards their pensions. Workers in the informal sector are more likely to heed the guidance of their religious leaders than directives from the government or its agencies. Moreover, these religious organizations can offer direct support to their members by covering the contributions of those who are unable to afford them.

Over time, religious institutions have received substantial contributions from their members, often promising spiritual blessings in return. By allocating a portion of the tithes, such as 5% to pension funds, these institutions can incentivize more members to contribute, knowing that they will

receive both spiritual and tangible benefits from their tithes. For those religious groups that do not practice tithing, establishing a welfare fund to support vulnerable members who cannot contribute to their pensions is a viable solution. When combined with government contributions, these efforts will substantially enhance old-age income security for informal sector workers. We firmly believe that the involvement of religious bodies, coupled with government contributions, will inspire informal sector workers to actively participate in the scheme, ultimately ensuring its success.

THE MODEL

In this section, we present a model for estimating the cost of implementing such a pension scheme, considering both the contributions made by informal sector workers and the potential support from the government, which could also extend to their dependents, such as parents.

Let's consider an informal sector worker currently aged x who intends to work for a period of n years before reaching retirement age. At retirement, this individual will be $x + n$ years old. If this individual allocates a certain percentage, denoted as K , of their annual income toward their pension during their working years, they will accumulate a total pension fund of CK .

To further incentivize and augment the individual's retirement income, we propose that the government contributes a specific percentage, denoted as $1 - K$, toward the individual's pension. Additionally, the government should provide a minimum payment, denoted as Q , for workers who, due to ill health or disability, are unable to engage in gainful employment throughout their lives.

Now, let's denote the annual retirement benefit received by the individual as B . The relationship between contributions and benefits can be expressed through the following equation:

$$C * K * (1 + v p_x + v^2 {}_2 p_x + \dots + v^{n-1} {}_{n-1} p_x) + C * (1 - K) * (1 + v + v^2 + \dots + v^{n-1}) = B * \ddot{a}_{x+n} * v^n \quad (1)$$

From the above relation, we could determine the expected retirement benefit given the worker's annual income. We could also work the other way around. That is, for a given desired benefit, how much should the individual contribute in order to achieve that goal? Again, given the informal sector data, we could estimate from the model how much it will cost the government to run such a scheme.

From equation 1, the expected benefit may be determined by solving for B as:

$$C * K * (1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x) + C * (1 - K) * (1 + v + v^2 + \dots + v^{n-1}) = B * \ddot{a}_{x+n} * v^n * {}_n p_x$$

solving for B

$$B = \frac{CK * (1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x) + C(1 - K) * (1 + v + v^2 + \dots + v^{n-1})}{\ddot{a}_{x+n} * v^n * {}_n p_x} \quad (2)$$

but

$$B * \ddot{a}_{x+n} * v^n * {}_n p_x = B * {}_n \ddot{a}_x$$

$$\ddot{a}_{x+n} = 1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x \quad \text{and}$$

$$\ddot{a}_n = (1 + v + v^2 + \dots + v^{n-1})$$

$$B = \frac{CK * \ddot{a}_{x+n} + C(1 - K)\ddot{a}_n}{{}_n \ddot{a}_x} \quad (3)$$

Also, for a given benefit, we can determine the needed contribution for the individual as:

$$C * K * (1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x) + C * (1 - K) * (1 + v + v^2 + \dots + v^{n-1}) = B * \ddot{a}_{x+n} * v^n$$

solving for C

$$C \{K(1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x) + (1 - K)(1 + v + v^2 + \dots + v^{n-1})\} = B * \ddot{a}_{x+n} * v^n$$

$$C = \frac{B * \ddot{a}_{x+n} * v^n}{K(1 + vp_x + v^2 {}_2p_x + \dots + v^{n-1} {}_{n-1}p_x) + (1 - K)(1 + v + v^2 + \dots + v^{n-1})}$$

$$C = \frac{B {}_n \ddot{a}_x}{K(\ddot{a}_{x+n}) + (1 - k)\ddot{a}_n} \quad (4)$$

From this, we can determine the contribution needed for a given benefit for an individual worker and the workforce.

Next, we address the important issue of informal sector pensioners who often rely on their children or family members for financial support during retirement. Given that many of these dependents also work in the informal sector, where incomes are generally low and irregular, the quality of care and support provided to these elderly individuals can be compromised, potentially affecting their life expectancy and well-being.

To alleviate the burden on the children or relatives and ensure sustainable income for these pensioners, we suggest that the responsibility for their care should be shared between the government and their family members, with each contributing agreed-upon percentages.

To this end, we can use a similar model as in equation (1) to estimate the required annual benefit or contribution.

Consider an informal sector pensioner currently aged y ($y \geq 60$) and assume that the children of this pensioner contribute annually towards his/her care. Denote the annual contribution made by the dependent family which is a percentage of their income by j . Again, government also contributes to augment the pensioner's income and also as a motivation for the relatives to also contribute. Denote government contribution by $S(1 - j)$. If D represents the annual benefit paid to the pensioner, then S and D are such that.

$$S * j * (1 + vp_x + v^2 {}_2p_x + \dots + v^{m-1} {}_{m-1}p_x) + S * (1 - j) * (1 + v + v^2 + \dots + v^{m-1}) = D * \ddot{a}_{x+m} * {}_m p_x$$

From this, we could determine the benefit as

$$D = \frac{S * j * (1 + vp_x + v^2 {}_2p_x + \dots + v^{m-1} {}_{m-1}p_x) + S * (1 - j) * (1 + v + v^2 + \dots + v^{m-1})}{\ddot{a}_{x+m}}$$

$$D = \frac{S j \ddot{a}_{x:n} + S * (1 - j) \ddot{a}_n}{\ddot{a}_{x+m}} \quad (4)$$

Note m is the remaining years of the pensioner and we assume $x + m \leq$ their life expectancy.

From this, we can also estimate the total amount needed by the government to pay these dependents.

Again, for a given desired benefit, we determine the annual contribution that must be made by the dependent's family and the government in order to achieve such benefit. To do that we make S the subject from the equation to obtain.

$$S * j * (1 + vp_x + v^2 {}_2p_x + \dots + v^{m-1} {}_{m-1}p_x) + S * (1 - j) * (1 + v + v^2 + \dots + v^{m-1}) = D * \ddot{a}_{x+m} * {}_m p_y$$

$$S = \frac{D \ddot{a}_{x+m}}{j * (1 + vp_x + v^2 {}_2p_x + \dots + v^{m-1} {}_{m-1}p_x) + (1 - j) * (1 + v + v^2 + \dots + v^{m-1})}$$

$$S = \frac{D \ddot{a}_{x+m}}{j \ddot{a}_{x:n} + (1 - j) * \ddot{a}_n} \quad (5)$$

Mortality assumptions

To apply our model effectively, we recognized the importance of having accurate mortality data specific to the Ghanaian informal sectors. However, in the absence of such data, we have chosen to leverage the Social Security and National Insurance Trust (SSNIT) mortality table. SSNIT

serves as the institution responsible for managing retirement income for formal sector workers, ensuring they have pensions upon retirement. Notably, under the new three-tier pension scheme, SSNIT manages the first tier, which operates as a form of defined benefit. It is important to acknowledge that SSNIT mortality table is based on mortality experience of formal sector workers. These workers tend to have somewhat better mortality rates compared to most informal sector workers. Furthermore, the SSNIT mortality table has not undergone adjustments for an extended period to account for current improvements in mortality trends.

To address this discrepancy and make the SSNIT mortality table more applicable to the informal sector workforce, we propose an adjustment. Specifically, we recommend applying an adjustment factor of 10% to SSNIT mortality table. This adjustment serves the dual purpose of aligning the mortality data more closely with the characteristics of informal sector workers and accounting for current improvements in mortality rates.

By applying this adjustment factor, we aim to provide a more accurate estimate of mortality rates for the Ghanaian informal sector workers, enhancing the precision and reliability of our model in assessing the proposed pension scheme's viability and impact on this specific demographic.

RESULTS

The proposed models were put into practice using data from Ghana's informal sector workforce, which boasts a total population of 8,345,636 individuals. In our initial analysis, we assumed that all workers in this sector earn the minimum wage. This assumption serves to establish the baseline for calculating the minimum cost of the pension scheme to the government.

Our model also posits that workers allocate 10% of their income towards pension contributions, and, crucially, the government matches this contribution on a one-to-one basis. It's important to note that the ultimate determination of contribution rates-how much should be paid by the government and by each worker- is intended to be based on worker's income level and their financial capacity to contribute. However, for the purposes of this study, we maintain a simplified scenario where both the worker and the government contribute at an equal rate of 10%. This contribution rate extends to the dependents of the workers as well.

Currently, the national daily minimum wage in Ghana, applicable to all forms of employment across the country, stands at GHC 14.88. This translates to an annual wage of GHC 5,357 for each worker. Applying an interest rate of 8%, the results of this analysis are presented in Table 1.

Table 1: Contributions and Expected Benefit for selected ages based on minimum wage.

| Age Category | Age Midpoint | Individual Contribution | Government Contribution | Total Contribution | Expected Benefit |
|--------------|--------------|-------------------------|-------------------------|--------------------|------------------|
| 15-19 | 17 | 587.70 | 587.70 | 1,175.4 | 1264.34 |

| | | | | | |
|-------|----|----------|----------|-----------|-----------|
| 20-24 | 22 | 587.70 | 587.70 | 1,175.4 | 1265.88 |
| 25-29 | 27 | 587.70 | 587.70 | 1,175.4 | 1266.09 |
| 30-34 | 32 | 587.70 | 587.70 | 1,175.4 | 1266.38 |
| 35-39 | 37 | 587.70 | 587.70 | 1,175.4 | 1266.75 |
| 40-44 | 42 | 587.70 | 587.70 | 1,175.4 | 1267.24 |
| 45-49 | 47 | 587.70 | 587.70 | 1,175.4 | 1268.09 |
| 50-54 | 52 | 587.70 | 587.70 | 1,175.4 | 1269.37 |
| 55-59 | 57 | 587.70 | 587.70 | 1,175.4 | 1271.15 |
| Total | | 5,289.30 | 5,289.30 | 10,578.60 | 11,405.29 |

Table 1 provides a breakdown of the informal sector working class into various age categories, including the midpoint age, individual annual contributions, government contributions and the expected retirement benefits. We selected an individual from each age category and calculated their anticipated benefit based on their contributions. The results highlight how the expected benefits evolve with age.

For instance, a 17-year-old informal worker earning GHC 5,357(\$465.83) and contributing 20% of their income toward their pension can expect to receive GHC1264.34 annually upon retirement. As the worker's age increases, so does the expected benefit. A 22-year-old worker would anticipate GHC 1265.88 while a 27-year -old worker could expect GHC 1266.09. This trend continues, with a 32-year-old worker anticipating GHS 1,266.38 as their annual retirement benefit.

This progression in annual expected retirement benefits with age is influenced by several factors. Firstly, the deferred factor plays a role, as the model discounts contributions based on the deferred period. Older individuals benefit from a smaller discounting factor compared to younger individuals. Additionally, older individuals have a shorter de-accumulation period, which contributes to higher annual income in retirement.

In the case of our sampled workers, encompassing nine individuals from each age category, the total cost of implementing such a pension scheme would amount to GHC10,578.6(\$919.88). However, the government's share of this total cost is half, as contributions are evenly split between the government and workers. Furthermore, the expected annual benefit for our sampled workers is projected to be GHC11,405.29 (\$991.76).

Next, we look at running the scheme for the entire informal sector workforce using the minimum wage level. The results are shown in Table 2.

Table 2: Contributions and Benefits for the entire workforce based on minimum wage.

| Age Category | Age Midpoint | Exposures | Individual Contribution | Government Contribution per person | Total Contribution by Individual | Total Contribution by government | Total Expected Benefit |
|--------------|--------------|-----------|-------------------------|------------------------------------|----------------------------------|----------------------------------|------------------------|
| 15-19 | 17 | 383,899 | 587.70 | 587.70 | 225,617,442.30 | 225,617,442.30 | 1,774,811,144.88 |
| 20-24 | 22 | 817,872 | 587.70 | 587.70 | 480,663,374.40 | 480,663,374.40 | 1,035,327,807.36 |
| 25-29 | 27 | 1,126,661 | 587.70 | 587.70 | 662,138,669.70 | 662,138,669.70 | 1,426,454,225.49 |
| 30-34 | 32 | 1,168,389 | 587.70 | 587.70 | 686,662,215.30 | 686,662,215.30 | 1,479,624,461.82 |
| 35-39 | 37 | 1,201,772 | 587.70 | 587.70 | 706,281,404.40 | 706,281,404.40 | 1,522,344,681 |
| 40-44 | 42 | 859,601 | 587.70 | 587.70 | 505,187,507.70 | 505,187,507.70 | 1,089,320,771.24 |
| 45-49 | 47 | 776,144 | 587.70 | 587.70 | 456,139,828.80 | 456,139,828.80 | 984,220,444.96 |
| 50-54 | 52 | 675,997 | 587.70 | 587.70 | 397,283,436.90 | 397,283,436.90 | 858,090,311.89 |
| 55-59 | 57 | 484,047 | 587.70 | 587.70 | 284,474,421.90 | 284,474,421.90 | 615,296,344.05 |
| 60-64 | 62 | 317,134 | 535.70 | 535.70 | 186,379,651.80 | 186,379,651.80 | 404,862,778.42 |
| 65+ | 67 | 534,121 | 535.70 | 535.70 | 313,902,911.70 | 313,902,911.70 | 683,290,312.88 |
| Total | | 8,345,637 | 20,804.04 | 20,804.04 | 17,323,713,655.92 | 17,323,713,655.92 | 35,607,439,451.94 |

The results presented in Table 2 encompass two distinct segments: the workforce, covering individuals aged 15 to 59, and pensioners, encompassing those aged 60 and above. These results reveal that to sustain the entire informal sector pension scheme, an annual expenditure of GHC 35,607,439,451.94 (\$3,096,299,082.78) is required. Of this total, the government contributes GHC 17,323,713,655.92 (\$1,506,409,883.12) annually, while the workers assume the remaining portion. It's worth noting that we have assumed an equal sharing of the scheme's operational costs amount between government and the workers.

If we focus solely on the working class (aged 15-59), the annual cost amount will be GHC 34,519,286,360.64 (\$3,001,677,074.84). In this scenario, the government covers half of the expenses, with the workers contributing the remaining half.

For those already on pension (age 60+), the annual cost is GHC 1,088,153,091.30 (\$94,622,007.94), with the government taking responsibility for half of the financial burden, while the dependent family members contribute to the rest.

Now, let's shift our perspective to consider the average monthly earnings of the informal sector worker rather than just the minimum wage. According to the Ghana Statistical Service (GSS) in 2022, the average earnings of the informal sector workers stand at GHC 898.65 per month, resulting in an annual income of GH10,783.80 for each worker. Table 3 presents the results following this adjustment.

Table 3: Contributions and Benefits for the entire workforce based on average wage

| Age Category | Age Midpoint | Exposures | Government Contribution per person | Total Contribution by government | Expected Benefit per individual | Total Expected Benefit |
|--------------|--------------|-----------|------------------------------------|----------------------------------|---------------------------------|------------------------|
| 15-19 | 17 | 383,899 | 1078.38 | 413,989,003.62 | 2330.62 | 894,722,687.38 |
| 20-24 | 22 | 817,872 | 1078.38 | 881,976,807.36 | 2331.10 | 1,906,541,419.20 |
| 25-29 | 27 | 1,126,661 | 1078.38 | 1,214,968,689.18 | 2331.50 | 2,626,810,121.50 |
| 30-34 | 32 | 1,168,389 | 1078.38 | 1,259,967,329.82 | 2332.14 | 2,724,846,722.46 |

| | | | | | | |
|--------------|-----------|----------------|----------------|-----------------------|----------------|-------------------------|
| 35-39 | 37 | 1,201,772 | 1078.38 | 1,295,966,889.36 | 2333.21 | 2,803,869,787.62 |
| 40-44 | 42 | 859,601 | 1078.38 | 926,976,526.38 | 2334.80 | 2,006,996,414.80 |
| 45-49 | 47 | 776,144 | 1078.38 | 836,978,166.72 | 2337.14 | 1,813,957,188.16 |
| 50-54 | 52 | 675,997 | 1078.38 | 728,981,644.86 | 2340.42 | 1,582,116,898.74 |
| 55-59 | 57 | 484,047 | 1078.38 | 521,986,603.86 | 2344.53 | 1,134,862,712.91 |
| 60-64 | 62 | 317,134 | 1078.38 | 341,990,962.92 | 2349.42 | 745,080,962.28 |
| 65+ | 67 | 534,121 | 1078.38 | 575,985,403.98 | 2355.40 | 1,258,068,603.40 |
| Total | | 8,345,637 | 11,862.18 | 8,999,768,027.06 | 25,720.28 | 19,497,873,518.45 |

The insights presented in Table 3 reveal that to sustain the entire informal sector pension scheme, encompassing both the working-age population and pensioners (dependents), an annual expenditure of GHC 19,497,873,518.45 (\$1,695,467,262.47) is required. This holistic approach ensures that both the current workforce and those already on retirement are adequately covered.

When we narrow our focus to consider only the working-age population, the annual cost amounts is GHC 17,494,723,952.77 (\$1,521,280,343.72), while the cost to dependents, those on retirement, is estimated at 2,003,149,565.68 (\$174,186,918.75). Notably, the relatively small value for dependents is influenced by Ghana's demographic profile, which predominately features a youthful population.

Assuming an equal sharing of costs between the government and informal sector workers, the government's annual financial commitment to run the scheme stands at 9,748,936,759.23

(equivalent to \$847,733,631.24). This allocation represents a balanced sharing arrangement, reflecting the responsibilities of both parties.

We also considered the expected contribution that must be set aside for a given benefit. And the results generally show that the older the age of the informal worker, the greater the annual contribution needed to fund the retirement benefit because of the shorter funding period.

Indeed, the analysis highlight a key observation: as the age of the informal worker increase, the required annual contribution to fund their retirement benefit also increases. This trend can be attributed to the concept of the funding period, which plays a pivotal role in pension planning.

The funding period is the duration over which a worker makes contributions to their pension before retiring and starts receiving benefits. For older workers, the funding period is inherently shorter than for younger workers, given that retirement is closer on the horizon. As a result, older workers have a limited timeframe within which to accumulate the necessary funds to secure their expected retirement benefits.

The shorter funding period necessitates a higher annual contribution rate to ensure that the retirement benefits are adequately funded. Essentially, older workers need to set aside a larger portion of their income annually to bridge the gap between their current contributions and the future benefits they anticipate.

This observation underscores the importance of early pension planning and saving for the informal sector worker, as younger workers have the advantage of a longer funding period, allowing them to accumulate the required funds more gradually. For older workers, the need for higher contributions underscores the urgency of taking proactive steps to their financial well-being in retirement.

The above findings shed light on the financial dynamics of the proposed pension scheme, offering valuable insights into the cost implications and anticipated benefits for workers across various age groups. Importantly, it's essential to recognize that these financial figures should not impose an overwhelming burden on the government's finances. Given the critical role that a pension system plays in addressing old-age poverty and ensuring the well-being of retired workers, these costs are a worthwhile investment in securing the financial future of Ghana's informal sector workers. Additionally, the government's contribution rate can be adjusted based on the country's economic conditions and evolving needs over time, with our proposal starting at a minimum contribution rate of 50%.

EFFECT OF INTEREST AND MORTALITY RATE

In a scheme of this nature, evaluating the impact of interest rates and mortality rates is of utmost importance. To guard the influence of interest rates on expected benefits, we have calculated the expected benefits using five distinct rate levels, and the results are presented below:

Table 4: The expected benefits under various interest levels

| Interest Rate Level | 6% | 9% | 12% | 15% | 18% |
|---------------------|---------|---------|---------|---------|---------|
| Expected Benefit | 4908.83 | 5042.95 | 5180.18 | 5318.34 | 5456.81 |

The findings reveal a clear association between interest rates and retirement benefits. Specifically, a 3% uptick in interest rates, transitioning from 6% to 9%, led to an upswing in individual retirement benefits from 4908.83 to 5042.95. Furthermore, as the interest rate surged from 9% to 12%, retirement benefits followed suit, increasing from 5042.95 to 5180.18. This pattern persists, as illustrated in the table. It is worth noting, however, that while a positive correlation exists between interest rates and retirement benefits, the percentage increase in retirement benefits resulting from a percentage change in interest rates remains modest. For instance, a 3% hike in interest rates corresponds to a mere 2.7% increase in retirement benefits, and similar trends are observed in other results.

Regarding mortality, our analysis uncovered a negative link between the mortality rate of informal workers and their retirement benefits. In other words, as workers mortality rates improve, their retirement benefits decline. Nonetheless, it is important to highlight that this relationship is relatively weak, suggesting that workers mortality rates do not exert a substantial impact on their retirement benefits, as evidenced in the table below.

Table 5: The expected benefit under various mortality levels

| Mortality Adjustment Factor | 5% | 10% | 15% | 20% | 25% |
|-----------------------------|---------|---------|---------|---------|---------|
| Expected Benefit | 5456.90 | 5456.81 | 5456.72 | 5456.64 | 5456.55 |

From Table 5, it can be seen that a 5% improvement in mortality led to just a 0.0016% reduction in retirement benefits and a similar trend continues for the others.

CONCLUSION AND RECOMMENDATIONS

The informal sector in Ghana has witnessed a sustained growth since colonial times, presently employing approximately 90 percent of the country's workforce. Despite its substantial workforce, this sector grapples with numerous challenges, with the absence of pension provisions for its workers being a foremost concern. In this study, we propose a comprehensive pension scheme aimed at not only enticing the workforce but also ensuring coverage for all informal sector workers. The foundation of this scheme rests on the promise that sector workers contribute a portion of their income annually towards their pensions, with government supplementing this contribution with its own share. Government involvement serves not only to augment income but also to motivate workers to actively participate in the scheme.

Our analysis of the proposed models reveals that if we assume all sector workers earn the minimum wage and the government matches the 10% contribution from workers, it will cost the government 17,803,719,725.97 (\$1,695,592,354.85) to operate the scheme for all workers. Alternatively, if we narrow our focus to the working class, the cost to the government would be 17,323,713,655.92 (\$1,649,877,491.04). Furthermore, assuming all sector workers are paid the 2022 average wage rate, the scheme would cost the government 19,497,873,518.45 (\$1,856,940,335.09).

These financial figures should not pose an insurmountable burden to the government's finances, particularly when considering the pivotal role of a pension system in mitigating old-age poverty.

Our findings also underscore that older workers require larger contributions to secure their retirement benefits due to their shorter funding period. While an inverse relationship exists between mortality rates and retirement benefits, it's worth noting that the relationship is not particularly strong. In contrast, our study reveals a positive correlation between interest rates and retirement benefits, indicating that as retirement benefits increase, so do interest rates.

Additionally, we propose the engagement of religious organizations in administering such schemes, as they are more likely to resonate with sector workers than government entities. These religious organizations can play a dual role by educating their members on the importance of contributing to their pensions and by contributing on behalf of the vulnerable individuals within their organizations.

In closing, absence of social security for informal sector worker is a pervasive issue in many developing countries, especially those in Sub-Saharan Africa. Our scheme offers a potential solution that these countries can consider addressing this critical problem within the informal sector.

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