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Quantifying turbulence: Introducing a multi-crises impact index for Lebanon[*]

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Abstract

This paper provides an in-depth analysis of Lebanon's severe economic crisis, a situation aggravated by the collapse of Banque du Liban's financial strategies, delayed reforms by the government, the COVID-19 pandemic, and the devastating Beirut Port explosion. These events have precipitated a sharp decline in disposable income, soaring inflation rates, and an alarming increase in unemployment and multidimensional poverty. Central to this study is a comprehensive field survey that examines eighteen coping mechanisms adopted by workers in various economic sectors of Lebanon. From this survey, we introduce a new index designed to systematically categorize and evaluate these coping strategies across four critical dimensions: nutrition, healthcare, education, and financial issues. We use this index to quantify and understand the extent to which workers have relied on these coping mechanisms, offering novel insights into the socio-economic repercussions of the crisis.

Keywords: *Multiple crises, Index, Lebanon.*

JEL Classification: D63, I31

1 Introduction

In the last five years, Lebanon's economy collapsed under a multi-pronged currency, debt, and banking crisis. The collapse of Banque du Liban's mismanaged *financial engineering* in support of the public debt (World Bank, 2020) precipitated systemic crises in banking, debt, and the exchange rate, as well as an economic crisis that the World Bank (2021a) classified as one of the ten, and possibly three, worst crises globally since 1850. Compounded with the outbreak of COVID-19 and the catastrophic Port of Beirut explosion, this economic crisis led to a sharp economic contraction.

The Lebanese have experienced a marked decline in disposable income. The World Bank's (2021b) projections point to a decrease in GDP per capita, a measure of average income, by about 40 percent between 2018 and 2021. The country's residents are also reeling under severe currency depreciation and triple-digit inflation, which have wiped out more than 90% of their purchasing power. In 2022, Lebanon recorded the second-highest inflation rate globally (Fitch Solutions, 2022), while topping the list for food price inflation at 352% year-on-year (World Bank, 2023). Food insecurity thus became a very likely threat (Abou Zaki et al., 2022).

Without a full-fledged official recovery plan by the government, the economic adjustment is highly regressive: the bulk of the adjustment weighs on the vulnerable segments of society (see Dagher and Nehme, 2021). The so-called middle class is almost disappearing. Indeed, the unprecedented crisis is impoverishing large swathes of society. Low-skilled labor, wage earners, and small depositors are particularly prone to the adjustment that occurs via currency depreciation and rampant inflation. Individuals and households are employing a host of livelihood-based coping strategies to mitigate the effects of the crisis.

To build a detailed picture of the erosion in the population's living standards, analysts usually rely on household surveys. Unfortunately, as Atamanov *et al.* (2020) mentioned,

the MENA region has an underdeveloped statistical capacity. Among the thirteen countries in the MENA region, Lebanon ranks ninth in terms of its statistical capacity.[1] Although the Central Administration of Statistics (CAS) of Lebanon has some household budget surveys, these surveys are not conducted regularly, and when available, they are not widely accessible to academic researchers despite the urgent need for evidence-based poverty-reducing interventions. Even before the crisis, researchers had to rely on alternative statistical sources to study the labor market in Lebanon (see Harb and Rouhana, 2020; Harb, 2022).

Given this context and the significant value and urgency of documenting the poverty situation in Lebanon, it is imperative to develop alternative approaches to monitor the situation. Abu-Ismail and Hlásny (2020) used a nowcasting approach with older data to offer preliminary numbers on the evolution of poverty in the country. Makdissi *et al.* (2023) used the partial income information available in the Arab Barometer, a regular opinion survey, to construct bounds on the value of poverty incidence and found out that the poverty rate should be in a window between 59% and 76% in 2022. A phone survey conducted by the Word Food Program (2020) revealed that 50% of the surveyed Lebanese expressed concerns over insufficient food intake. The latter statistic is even more astounding because, according to the same study, households have, as a coping mechanism, lowered expenditures on food. Dagher *et al.* (2022) used a Focus Group Discussion of 121 participants to uncover several coping mechanisms. The focus group participants also mentioned lowering food intake and reducing expenditures on prescribed medication as coping strategies. In this context, it is valuable to study quantitatively the impact of coping mechanisms in dimensions such as nutrition, healthcare, education, and financial issues.

This paper extends the qualitative work of Dagher *et al.* (2022) by offering a quantitative study of how workers of different economic sectors in Lebanon had to rely on several

[1] See https://www.worldbank.org/en/programs/statistical-performance-indicators.

coping mechanisms to face the multiple crises impacting the Lebanese economy. In doing so, we relied on a field survey to gather information on eighteen coping mechanisms. In addition, we propose a measurement approach that aggregates the information about these eighteen coping mechanisms into a single index decomposable into four dimensions: nutrition, healthcare, education, and financial issues.

The remainder of the paper is structured as follows. Section 2 presents our measurement approach and the multi-crises impact index we developed. Section 3 presents our empirical analysis of the crisis' impact on Lebanese workers. Section 4 concludes and presents future areas of investigation.

2 The multi-crises impact index

For effective policymaking, it is crucial to comprehensively understand the multifaceted impact of severe crises. An aggregated perspective aids in pinpointing priority areas for recovery investments. This section delineates the measurement framework for an index employed to encapsulate the effects of multiple crises on Lebanese workers. The index condenses responses to numerous binary questions, evaluating the crisis's impact on individuals or households.

In contexts involving binary variables, Makdissi and Yazbeck (2014) recommend the count measurement approach for multidimensional poverty, initially proposed by Alkire and Foster (2011), to monitor health inequalities with accessibility to multifaceted health data. Herein, the issue count is a ratio-scale indicator of the cumulative impact. Following this rationale, we adopt a counting approach as the foundational structure for our multi-crises impact index. We will follow Makdissi and Yazbeck (2014) and use this transformed ratio-scale indicator within a typical rank-dependent social choice function.

Consider a population of n individuals responding to m binary questions about post-

crises coping mechanisms. These data are represented as an $n \times m$ matrix $X = [x_{ij}]$, where $x_{ij} = 1$ if coping mechanism j is adopted by individual i, and $x_{ij} = 0$ otherwise. Each row vector in X presents the coping mechanisms adopted by an individual, and each column vector illustrates the adoption distribution of a particular mechanism across the population.

Addressing the varying severity of impacts from different coping mechanisms is paramount. For instance, frequent meal skipping has potentially graver future health implications than opting for cheaper food. To incorporate this disparity, we introduce a weight vector $w = (w_1, w_2, \ldots, w_m)$, normalized such that $\sum_{j=1}^{m} w_j = 1$, with w_j quantifying the severity of coping mechanism j. Subsequently, we define a weighted coping mechanism matrix $C = [c_{ij}]$, where $c_{ij} = w_j x_{ij}$. The impact on individual i is then given by $c_i = \sum_{j=1}^{m} w_j x_{ij}$.

To aggregate the individual impact, we use the social weights associated with the generalized Gini social welfare function. In our context, we order the observation into decreasing values of c_i. Let $r \in 1, 2, \ldots, n$ represents these reordered observations. In a continuous setting, the social weight associated with a social rank $p \in [0, 1]$ is given by $\phi_c(p) = \nu(1-p)^{\nu-1}$. In this social weight function, the parameter $\nu \geq 1$ represents the level of aversion to inequality. If $\nu = 1$, there is no inequality aversion, and our index will be equivalent to the population average. When $\nu > 1$, there is social aversion for inequality in the distribution of the individual impact of the crises. Note that when $\nu = 2$, we have social preferences underlying the canonical Gini inequality index. We will use $\nu = 2$ as the inequality aversion parameter for our main analysis. We will also perform a sensitivity analysis to this choice of ν.

In practice, we allocate all the social weights between $p = (r-1)/n$ and $p = r/n$ to observation r and the social weight associated with observation r is given by

$$\phi(r) = \int_{(r-1)/n}^{r/n} \nu(1-p)^{\nu-1} \mathrm{d}p = \left(\frac{n-r+1}{n}\right)^{\nu} - \left(\frac{n-r}{n}\right)^{\nu}. \tag{1}$$

The Multi-Crises Impact (MCI) index becomes a population-weighted average of the ele-

ments in C:

$$MCI = \sum_{r=1}^{n} \sum_{j=1}^{m} \left[\left(\frac{n-r+1}{n} \right)^{\nu} - \left(\frac{n-r}{n} \right)^{\nu} \right] \times c_{rj}. \tag{2}$$

The simplicity and additivity of the MCI index stand out as its primary virtues. Additivity permits disaggregation of the index into specific groups of coping mechanisms, facilitating nuanced analysis. Assume the m coping mechanisms belong to one of d dimensions. Under this assumption, we can decompose the MCI index into a sum of dimension concentration indices, CI_ℓ, $\ell \in \{1, \ldots, d\}$:

$$MCI = \sum_{\ell=1}^{d} W_\ell \times CI_\ell, \tag{3}$$

where

$$CI_\ell = \frac{1}{W_\ell} \sum_{r=1}^{n} \sum_{j=1}^{m} \left[\left(\frac{n-r+1}{n} \right)^{\nu} - \left(\frac{n-r}{n} \right)^{\nu} \right] \times c_{rj} \times \mathbb{1}\left(j \in \ell\right), \tag{4}$$

and $W_\ell = \sum_{j=1}^{m} \left[w_j \times \mathbb{1}\left(j \in \ell\right) \right]$.

For instance, in our empirical application, impacts are categorized into groups such as nutrition, healthcare, education, and financial issues. Additionally, the index is decomposable across population subgroups. This paper, however, refrains from presenting an aggregate value due to the survey's design, aiming for representativeness within each economic sector rather than across the entire population.

3 The impact of multiple crises in Lebanon

3.1 The Lebanese context

Since the Lebanese Civil War (1975-1990), militia leaders and entrenched political figures known for their corrupt practices have substantially influenced Lebanon's political environment. The Taëf Agreement, which concluded the war in 1990, solidified the power of this

political elite, effectively institutionalizing a system of *redistributive kleptocracy.*[2]. Characterized by rampant nepotism, this system allowed the political elite to siphon off significant state resources, while reallocating a small fraction to their political base, mainly through public sector employment. This system relies on a delicate balance wherein any individual deviation from loyalty to a political leader can result in considerable personal repercussions.

The post-war economic landscape was characterized by persistent twin - current account and fiscal - deficits. These deficits stemmed from an overvalued exchange rate, weak revenue mobilization, and collection, and lax fiscal discipline. On the expenditures side, the inertia in spending was driven primarily by (i) personnel costs, (ii) debt-servicing costs, and (iii) seizable transfer to Electricité du Liban, which accounted for, according to the World Bank (2016), 55.4% of GDP and 40% of the total debt stock.

By 2015, persistent and large current account deficits, fueled by a consumption boom that is due to an overvalued exchange rate (i.e., the peg) have resulted in about 5 billion US dollars net negative reserves at BdL. Reuters[3] reported that when the International Monetary Fund (IMF) expressed concerns in April 2016, the Lebanese government requested the omission of this information from the IMF's report, citing growing distrust in national institutions. It is noteworthy that Fakih *et al.* (2022) observed a substantial decrease in public confidence in these institutions from 2013 to 2016. Strategically, preceding the 2018 parliamentary elections, legislators have amplified macroeconomic imbalances by pursuing lax fiscal policy despite persistent fiscal deficits over the previous decade. Indeed, the fiscal deficit averaged about 8.3% of GDP over the period 2008 to 2018. This scheme included substantial salary increases in the public sector, funded through a system designed to draw USD deposits with exceptionally high-interest rates. This maneuver was presumably an

[2]The term *redistributive kleptocracy* was introduced in https://www.lorientlejour.com/article/1296329/ghassan-salame-le-liban-est-arrive-a-un-point-ou-un-regime-radicalement-different-doit-etre-envisage.html

[3]See: https://www.reuters.com/world/middle-east/before-lebanons-current-financial-crisis-central-bank-faced-47-billion-hole-2021-10-28/.

effort to placate the public and ensure electoral victory, especially considering that public sector employees represent a notable 14% of Lebanon's workforce.

The Lebanese economy's decline, evident from the later part of the decade, can be traced back to the strategic maneuvers ahead of the 2018 parliamentary elections and the subsequent aftermath. While Makdissi *et al.* (2023) noted a temporary improvement in poverty levels from 2016 to 2018, this period coincided with the government's amplified Ponzi-type financial strategies, including large-scale public sector salary hikes financed through high-interest USD deposits. While temporarily boosting the economy, these measures contributed to a precarious financial situation. The initial prosperity, possibly a byproduct of these election-driven financial maneuvers, proved ephemeral and seemingly served to bolster the incumbent political elite. As 2019 approached, the underlying weaknesses of this economic approach became apparent, leading to a significant financial disruption. This downturn, which emerged as more than just a banking crisis, evolved into a multifaceted economic predicament, disproportionately impacting those outside the circles of political influence.

In the latter half of 2019 and early 2020, Lebanon faced an unprecedented financial meltdown. A combination of currency devaluation, banking system failure, and soaring sovereign debt emerged in quick succession. Such a dire financial situation ranked as one of the gravest since the 19th century, according to World Bank (2021a). The nation's GDP per capita witnessed a dramatic fall within a few years, indicating a deepening of the economic woes.

Lebanon has been marred by a triple - systemic banking, currency and debt - crisis since the sudden stop of capital inflows on October 17, 2019. The quick succession of crises led to a protracted economic collapse. Indeed, according to World Bank estimates, the contraction in real GDP exceeded 37 percent over the period 2018 to 2021 (World Bank, 2023). Further,

real GDP per capita fell markedly, in current US dollars, from $9225.8 in 2018 to 4136.1$ in 2021 prompting the World Bank to reclassify Lebanon a as a lower-middle income country down from an upper-middle income country (Dagher, Jamali and Abi Younes, 2023).

The drop in real GDP per capita was driven by: (i) the severe contraction in real GDP, and (ii) a massive depreciation in the currency, the Lebanese Pound (LBP), which lost more than 98% of its value (World Bank, 2023). In an inadequate response to the crisis, the central bank, Banque du Liban, continued to monetize the debt and provided access to foreign currency deposits in the domestic currency (i.e., the LBP) at an unfavorable exchange rate thereby imposing losses (or a haircut) on depositors. The latter policy response also contributed to the creation of an inflation-spiral (World Bank, 2020). The currency depreciation and triple digit inflation since 2021 severely eroded the purchasing power of wage earners and pensioners. In tandem, the systemic banking crisis deprived the Lebanese from accessing their savings. These adverse macroeconomic dynamics also impoverished large segments of society and pushed them to adopt harsh livelihood-based coping strategies.

Recent studies have shed light on the gravity of the situation. For instance, Abu-Ismail and Hlásny (2020) nowcasted the poverty rate at 55.3% for 2020. Building on the income information from the Arab Barometer, Makdissi *et al.* (2023) highlighted an illusory drop in poverty from 18.2% in 2016 to 10.0% in 2018, which sharply rose to approximately 71% by 2022. Given these circumstances, understanding the coping mechanisms employed by households to navigate these multifaceted crises becomes paramount.

3.2 Field survey

Economists traditionally rely on nationally representative household surveys to investigate the redistributive impact of policy initiatives or economic shocks. However, the absence of current surveys necessitates alternative methodologies. Abu-Ismail and Hlásny (2020)

employed the most recent available household survey data, augmented with an economic model, to project poverty levels for 2020. Similarly, Makdissi *et al.* (2023) utilized partial income information from the nationally representative Arab Barometer to estimate the potential poverty incidence bounds. This study adopts a novel method, deploying an expedited emergency field survey developed by our research team.

Under typical circumstances, survey sampling in Lebanon would draw on the most recent Public Housing and Population Census, stratified by governorates and sects. Nevertheless, a representative sample risks including employees who may face conflict of interest due to their ties with political elites implicated in the current economic crisis and those employed in the banking and finance sectors. Given this institutional reality, instead of aiming at representativity at the country level, the survey team aimed at constructing a sample representative at the economic sector level for employed individuals across seven pivotal sectors of the Lebanese economy: agriculture, construction, education, food & beverage, health, manufacturing, and retail. To this end, the American University of Beirut (AUB) team conducted a comprehensive survey comprising 931 households distributed proportionately across the abovementioned sectors.

It warrants mention that the sample still does encompass some public sector employees within the education and health sectors. Notably, in education, the public sector workforce constitutes a minority presence; data from 2015 indicate that approximately 75% of primary school enrollments were in private institutions.[4] A similar trend is observable in healthcare, with private clinics serving as the primary care facility for 79% of outpatient services.[5] It is noteworthy that public sector salaries have been massively eroded by the currency depreciation thereby severely affecting purchasing power.

[4]For further details, refer to: Education in Lebanon - World Education News + Reviews(https://wenr.wes.org/2017/05/education-in-lebanon).

[5]For a comprehensive report, see: Rebuilding of the Lebanese health care system: health sector reforms(https://www.emro.who.int/emhj-volume-12-2006/volume-12-issue-3-4/report-rebuilding-of-the-lebanese-health-care-system-health-sector-reforms.html).

The principal aim of the field survey was to assess the immediate impact of the economic crisis on the livelihoods and well-being of respondents. The survey methodology entailed sampling 133 households per economic sector, resulting in a total of 931 observations. The AUB research team deployed a meticulously structured questionnaire comprising 52 questions, with data collection conducted over the last two weeks of March 2022. Specifically, this paper analyzes data pertaining to coping strategies, elucidated through a series of eighteen sub-questions regarding household coping mechanisms.

Several teams operating concurrently across different localisations carried out the interviews. Most sectors permitted on-site recruitment, such as hospitals or schools, where enumerators obtained permission to conduct surveys during breaks or at the end of the workday. Locating and engaging respondents in the construction and agricultural sectors proved more challenging. The health sector posed some response difficulty. Even within the American University Hospital in Beirut, obtaining administrative permission was a significant hurdle. These issues led the survey team to approach potential participants in less formal settings, such as cafeterias or designated smoking areas. All interviews were audio-recorded and archived on a secure, shared drive to maintain data integrity and accuracy.

Concurrent with the survey administration, data validation and cleaning processes were initiated, extending beyond the conclusion of data collection to ensure a robust dataset. The research team randomly selected a subset of recordings for review and rigorously verified the accuracy of the entered data against these recordings. After the data collection phase, the team thoroughly reviewed the dataset to identify and rectify any inconsistencies, anomalies, or outliers.

3.3 Coping mechanism

This paper focuses on coping mechanisms that households had already implemented during the interview. We focus on coping mechanisms within four categories: nutrition, healthcare,

Table 1: Questions on coping mechanisms

Since the start of the crisis in Lebanon, have you or any member of the household had to take any of the following measures as the result of the crisis in Lebanon?		
Dimension	Question	Variable
Nutrition	Is any adult in your household skipping meals more than once a week?	Skip_Meal_Child
	Is any adult in your household skipping meals more than once a week?	Skip_Meal_Adult
	Did you reduce the quantity that you purchase of food staples?	Reduced_BasidFood
	Did you reduce the quantity that you purchase of non-basic food items?	Reduced_NonBasicFood
	Did you switch to cheaper alternatives for basic food items?	Switch_BasicFood
	Did you switch to cheaper alternatives for non-basic food items?	Switch_NonBasicFood
Healthcare	Did you intentionally reduce or stop your prescribed medication?	Reduce_Stop_Medication
	Did you postponed or skipped visits to the doctor after falling ill?	Skip_Visit_MD
	Did you shifted from private to public healthcare?	Shift_Public
	Did you cancelled private health insurance?	Cancel_Insurance
Education	Postponed/withdrew from training course?	Postponed_Training
	Postponed/withdrew from university/school?	Postpone_Uni
	Moved to a more affordable university/school?	Changed_School
Financial	Delayed or defaulted on a loan installment?	Defaulted
	Negotiated a payment schedule?	Reschedule
	Obtained a loan (from friend, relative, or others)?	Loan
	Spent some or all of your savings?	Spent_Savings
	Sell an Asset Real Estate, Jewelry, Car, Others?	Sold_Asset

education, and financial impacts. The reason to focus on these four dimensions is their potential impact on human development. Table 1 gives the details on the eighteen questions.

Table 2: Proportion of observations not impacted at all in each sector.

Agriculture	0%
Construction	0%
Manufacturing	3.8%
Education sector	0.8%
Health sector	0.8%
Food & Beverages	1.5%
Retail	0%

The scale and scope of Lebanon's protracted economic crisis have led to a severe decline in income per capita. The World Bank (2021a) estimates that GDP per capita has decreased by 35.1% to 38.6% between 2017 and 2021. The immiseration caused by the crisis forced Lebanese households across the seven sectors to adopt harsh livelihood-based coping strategies that range from reducing the quantity (and quality) of staple foods to

skipping meals. Table 2 presents the proportion of observations per sector answering no to all coping mechanisms. There is not a single observation that has had no impact on the agriculture, construction, and retail sectors. The sector with the highest proportion of observations not impacted is the manufacturing sector, with 3.8% of observations reporting not having adopted any listed coping mechanisms.

Table 3: Proportion of yes for each coping mechanism

Dimension	Coping mechanism	S1	S2	S3	S4	S5	S6	S7
Nutrition	Skip_Meal_Child	22.6%	27.1%	15.0%	17.3%	12.8%	8.3%	15.0%
	Skip_Meal_Adult	38.3%	45.1%	21.8%	30.1%	30.8%	25.6%	38.3%
	Reduced_BasidFood	90.2%	92.5%	75.9%	84.2%	79.7%	79.7%	89.5%
	Reduced_NonBasicFood	95.5%	98.5%	82.7%	94.7%	90.2%	85.0%	91.7%
	Switch_BasicFood	91.0%	88.0%	69.2%	94.0%	89.5%	85.0%	91.0%
	Switch_NonBasicFood	89.5%	87.2%	69.2%	94.0%	84.2%	81.2%	83.5%
Healthcare	Reduce_Stop_Medication	36.1%	49.6%	24.8%	33.8%	18.8%	24.8%	28.6%
	Skip_Visit_MD	72.9%	80.5%	57.9%	66.2%	42.1%	57.1%	66.9%
	Shift_Public	67.7%	80.5%	39.1%	74.4%	39.8%	54.1%	54.9%
	Cancel_Insurance	16.5%	26.3%	19.5%	17.3%	9.8%	19.5%	21.8%
Education	Postponed_Training	5.3%	12.8%	12.8%	9.0%	14.3%	9.8%	16.5%
	Postpone_Uni	22.6%	22.6%	9.8%	11.3%	18.0%	18.8%	11.3%
	Changed_School	22.6%	30.8%	12.0%	18.8%	14.3%	21.1%	16.5%
Financial	Defaulted	21.1%	27.8%	10.5%	17.3%	11.3%	15.0%	16.5%
	Reschedule	10.5%	9.8%	15.0%	8.3%	9.8%	17.3%	11.3%
	Loan	10.5%	13.5%	9.0%	3.8%	9.8%	19.6%	12.8%
	Spent_Savings	77.4%	79.7%	65.4%	82.0%	73.7%	75.2%	76.7%
	Sold_Asset	51.1%	61.7%	42.9%	35.3%	43.6%	36.1%	45.1%

S1: Agriculture
S2: Construction
S3: Manufacturing
S4: Education sector
S5: Health Sector
S6: Food & Beverages
S7: Retail

Table 3 gives the proportion of workers answering yes to these questions per sector of economic activity. To begin with, the bulk of households across the seven sectors have reduced the quantity of basic food staples such as milk, fruits, vegetables, and bread, opting

for cheaper alternatives of lower quality. Respondents from the construction and agriculture sectors exhibit the highest proportion, with 90% or more having had to reduce the quantity purchased of basic food items. Except for manufacturing, 80% or more of the remaining sectors' respondents have had to adopt similar practices. Switching to cheaper alternatives for basic food items was another prevalent coping strategy among the respondents in the seven sectors. Excluding respondents from the manufacturing sector, more than 85 percent of the respondents across the sectors indicated having to employ this coping strategy.

Consistent with the earlier findings, the results in Table 3 suggest that the construction and agriculture sectors appear to have the most significant proportion of respondents who resorted to livelihood-based coping strategies that involve food intake. It should be highlighted, in this context, that, except for respondents from the manufacturing and food & beverages sectors, 30% or more of the respondents across sectors report having to skip a meal during the week. Usually, parents favor their offspring, and the results of the survey responses reflect this fact. The results show that the proportion of children having had to skip a meal at least once a week is lower than that of adults. Nonetheless, this proportion is still noticeable for the construction and agriculture sectors.

The increasing cost of healthcare in July 2021 and early 2022 forced respondents (or members of the household) across the sectors to resort to livelihood-based coping strategies that involve discontinuing (or reducing) prescribed medication, not visiting the doctor when falling ill, shifting from private to public healthcare and ceasing to use private health insurance. The results in Table 3 suggest again that, relative to the other sectors, a more significant proportion of the respondents from the construction and agriculture sectors have had to resort to negative coping strategies that involve reducing or stopping prescribed medication and not visiting the doctor when falling ill. Nonetheless, the proportion of respondents in the other sectors that have had to follow suit is also non-negligible. Except

for respondents in the healthcare sector, 25% or more of the respondents across sectors intentionally reduced or stopped prescribed medication, while more than 57% of respondents postponed or skipped visits to the doctor after falling ill.

The findings in Table 3 also show an increasing reliance on a largely dysfunctional public healthcare system. Indeed, an astounding 74.4%, 80.4%, and 67.6% of respondents from the education, construction, and agriculture sectors have had to shift from private to public healthcare, and over 54% of respondents from the food & beverages and retail sectors have had to do the same. The health and manufacturing sectors are the only two for which the proportion of respondents who switched from private to public healthcare falls below 40%. These percentages also include those who had private and public healthcare and had to let go of the private one.

The education dimension, notably impacted by the multiple crises, shows a trend toward adaptive coping strategies as evidenced in Table 3. Many respondents from various sectors reported postponing or altering their educational plans. Specifically, the postponement of training or higher education and changing schools were prevalent responses. This trend is particularly noticeable in the construction and retail sectors, where financial constraints likely influenced these decisions. The data reveal that more than 12% of respondents in the construction sector postponed training, more than 22% postponed university and over 30% changed schools, highlighting the significant impact on educational pursuits for this economic sector. Other sectors are also significantly impacted. These figures underscore the crisis's far-reaching effects on immediate health and nutrition and long-term educational goals and opportunities.

Financial resilience and coping strategies during these multiple crises varied across sectors, as depicted in Table 3. The most striking observation is the widespread reliance on depleting savings, with rates of respondents using this coping mechanism in each sector

being above 65%. This last result indicates a significant financial strain across all sectors. Additionally, asset liquidation was another common strategy, particularly in the agricultural and construction sectors, where over 51% and 61% of respondents respectively resorted to this measure. Defaulting on payments and rescheduling debts were less common but notable in the agriculture, construction, and food & beverages sectors. These financial coping mechanisms reflect the profound economic challenges individuals face in different sectors, highlighting the extensive impact of these multiple crises on personal finances.

3.4 Aggregating the impact of coping mechanism

Assume a policymaker aiming to allocate funds from a recovery policy to various economic sectors. To develop informed recovery policies, understanding the comprehensive impact of the crises on workers of each economic sector is imperative. We employ the MCI index discussed in Section 2 with an inequality aversion parameter $\nu = 2$ to elucidate this. The rationale for choosing $\nu = 2$ as the value for the principal empirical analysis relies on the fact that it represents the social preferences underlying the canonical Gini inequality index.

We group coping mechanisms into four key dimensions: nutrition, healthcare, education, and financial impacts. Given that nutrition's immediate effects are more pronounced, this dimension is assigned a higher weight. Within each dimension, coping mechanisms are hierarchically ranked based on their impact. We employ Borda weights both at the dimension and individual coping mechanism level. Table 4 details the weighting scheme applied to the index. For illustration, within the nutrition dimension, child meal-skipping is identified as the most detrimental coping mechanism. Given that six coping mechanisms are under this dimension, it attracts a weight of 6/21. The nutrition dimension, being of paramount importance, is weighted 4/10. Consequently, the weight for child meal-skipping within the overall MCI is $(6/21) \times (4/10) = 24/210$. To compute the indices and their

Table 4: Dimensions and coping mechanisms weights

Dimension	Coping mechanism	
Nutrition **4/10**	Skip_Meal_Child	**6/21**
	Skip_Meal_Adult	**5/21**
	Reduced_BasidFood	**4/21**
	Reduced_NonBasicFood	**3/21**
	Switch_BasicFood	**2/21**
	Switch_NonBasicFood	**1/21**
Healthcare **3/10**	Reduce_Stop_Medication	**4/10**
	Skip_Visit_MD	**3/10**
	Shift_Public	**2/10**
	Cancel_Insurance	**1/10**
Education **2/10**	Postponed_Training	**3/6**
	Postpone_Uni	**2/6**
	Changed_School	**1/6**
Financial impacts **1/10**	Defaulted	**5/15**
	Reschedule	**4/15**
	Loan	**3/15**
	Spent_Savings	**2/15**
	Sold_Asset	**1/15**

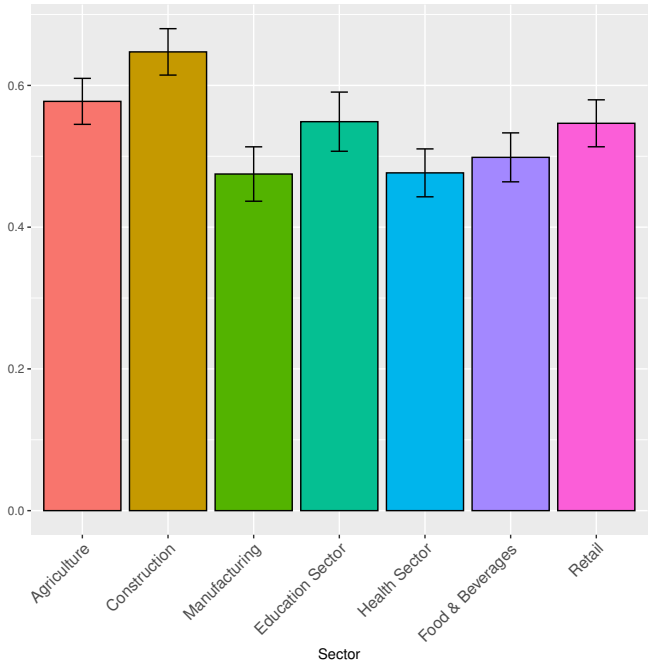
associated 95% confidence intervals, we employ 9,999 bootstrap iterations.[6]

Figure 1 delineates the MCI indices along with their 95% confidence intervals for each economic sector. As reflected by its index, the construction sector's pronounced impact surpasses all sectors except agriculture, where the confidence intervals overlap. In addition, the education, agriculture, and retail sectors demonstrate a significant adverse impact relative to the food & beverages, healthcare, and manufacturing sectors. The implications for the education sector are particularly stark from a policy perspective. Given that educators shape the nation's future human capital, ensuring good well-being for workers in this economic sector becomes a paramount policy objective, especially to attract top-tier talent.

This ranking of the agriculture sector is somewhat counterintuitive at first glance. Typically, sectors like agriculture, which have export potential, might be expected to benefit

[6]The index's asymptotic properties are dictated by a ten-dimensional cumulative distribution function. While inherently Gaussian, the associated complexity is computationally demanding, prompting us to utilize bootstrapping, a standard recourse in such scenarios. This is reminiscent of the so-called Durbin problem.

Figure 1: Overall impact



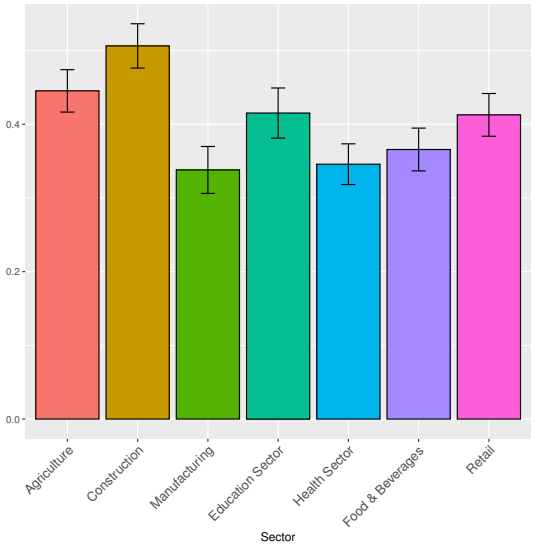
from currency devaluation, mirroring the relative resilience observed in the manufacturing sector. However, external factors such as the ban on Lebanese produce by Saudi Arabia may have impacted the agricultural sector's vulnerability in this context.[7] This external shock, in combination with internal challenges, could explain its disproportionate impact.

Overall, despite the massive depreciation in the currency, a broad-based increase in exports has not materialized owing to structural bottlenecks in the electricity and other sectors, weak pre-crisis macroeconomic fundamentals, weak political and institutional environments, a slowdown in demand for Lebanese exports, including tourism, in destination markets due to a slowdown in economic activity due to the outbreak of COVID-19 pandemic (World Bank, 2021b).

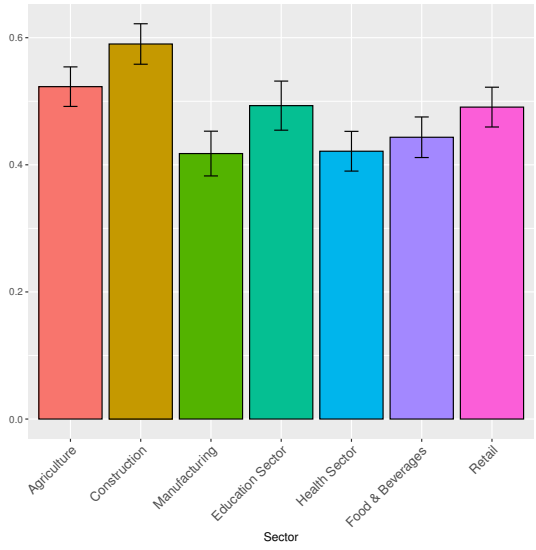
In Figure 2, we present analogous outcomes to those depicted in Figure 1, albeit with

[7]See https://apnews.com/article/lebanon-smuggling-financial-markets-business-middle-east-b012ed557365d98bd1c39d7aa57285ae.

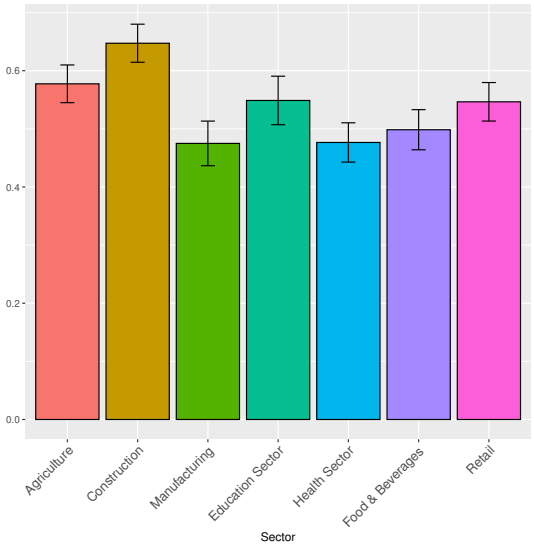
Figure 2: Impacts under different levels of inequality aversion



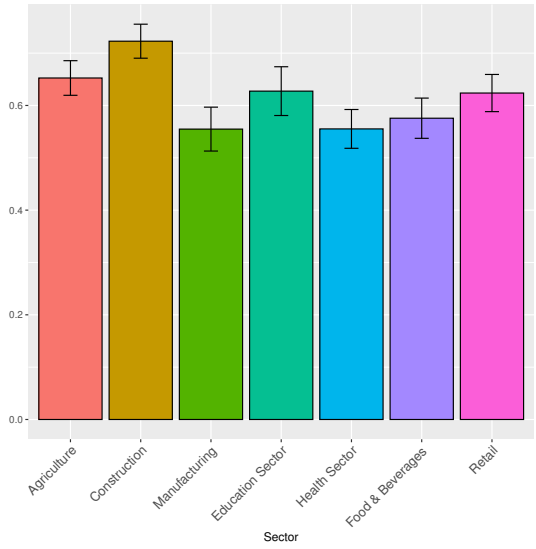
(a) $\nu = 1$



(b) $\nu = 1.5$



(c) $\nu = 2$

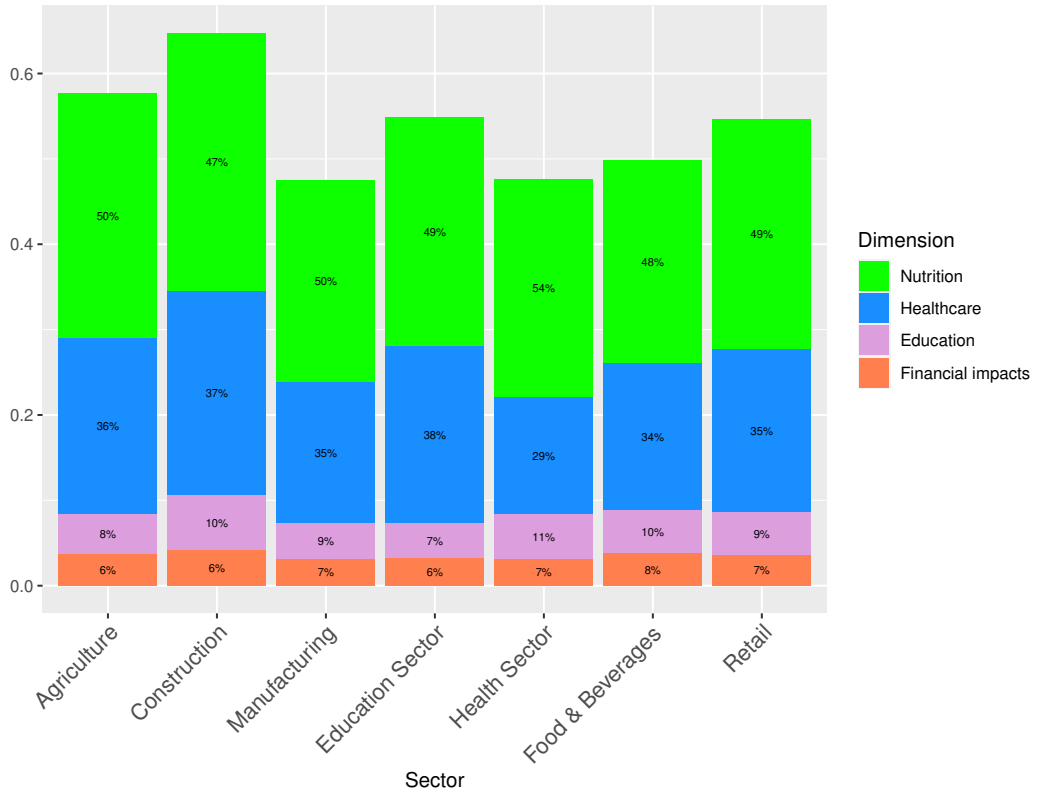


(d) $\nu = 3$

variations in the inequality aversion parameter set at $\nu = 1$, 1.5, 2, and 3. Specifically, panel 2a illustrates the average population impacts across different sectors. Subsequent panels incrementally integrate and increase inequality aversion, with panel 2c mirroring the outcomes of Figure 1. An increase in inequality aversion mechanically increases the overall index value, intensifying the social weighting assigned to disproportionately affected groups. Inherent to the measurement methodology, this increase renders direct comparisons in index values less meaningful. Nonetheless, it is instructive to examine whether variations in the inequality aversion parameter alter the rankings among the seven economic sectors. Observations from Figure 2 suggest that these rankings remain consistent across all levels of inequality aversion. This sensitivity analysis concerning the choice of the inequality aversion parameter indicates that the results of this empirical analysis are not an artifact linked with the particular choice of $\nu = 2$.

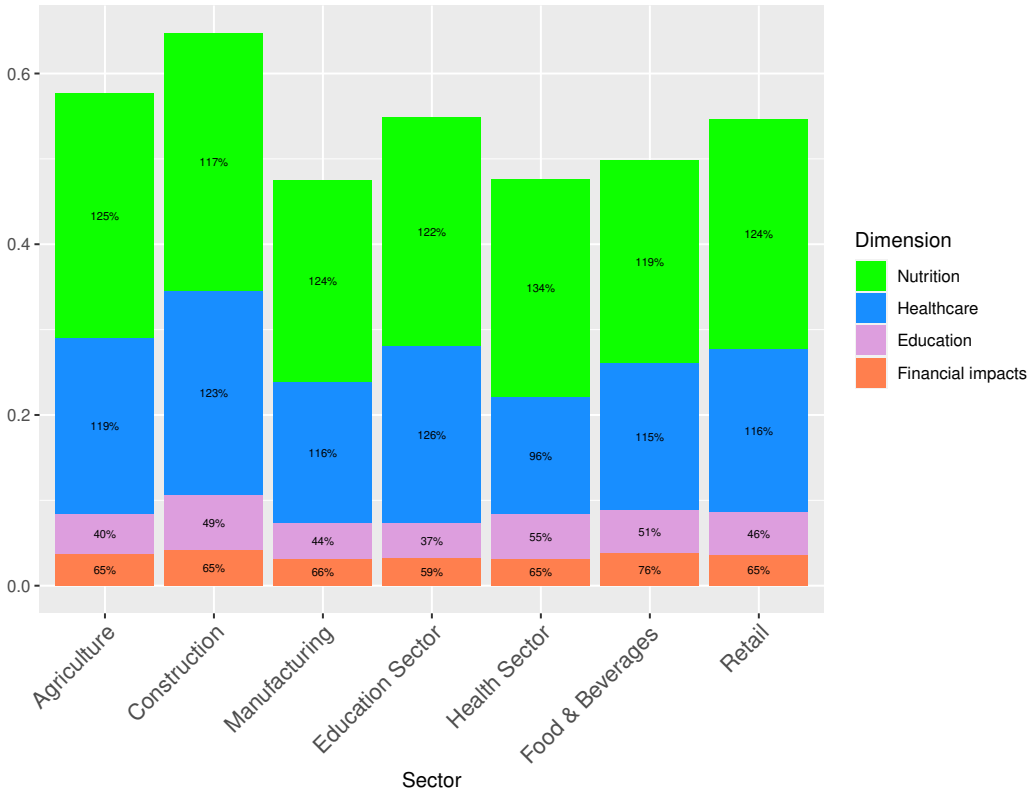
Figure 3 decomposes the index by dimension and displays the percentage contribution by dimension to the index's total value for each economic sector. Since, by construction, the index weighs different dimensions differently to highlight the differential social cost of different coping mechanisms, it is essential to compare the relative contribution of a dimension to its relative weight in the construction of the index. To facilitate this comparison, Figure 4 presents the same results as in Figure 3, except that the percentage of contribution displayed for each dimension is relative to its social weight in the index. For instance, while nutrition seems to dominate the index value across sectors, it is crucial to remember that our weighting decision naturally assigns a 40% contribution from nutrition to the index's total value if all mechanisms were identically distributed. A contribution surpassing this threshold across sectors suggests a gravitation towards nutrition-affecting coping mechanisms. This is evident in Figure 3, where the contribution of coping mechanisms from the nutrition dimensions is above 40% in each of the seven economic sectors. The relative

Figure 3: Decomposition of the overall impact



contributions in Figure 4 confirm this observation. For all economic sectors, the nutrition dimension's total contribution relative to the dimension's weights exceeds 100%. With the exception of the construction and education sectors, the nutrition dimension has the highest contribution relative to its social weight in the index. This inclination towards nutrition-oriented coping mechanisms indicates the immediate need to address basic survival needs, such as hunger, over other health requirements. This observation aligns with economic theory positing that, during financial distress, individuals prioritize primary needs, leading to potential long-term health repercussions. Policymakers must consider interventions that support immediate nutrition needs while building resilience for longer-term health outcomes.

Figure 4: Impact by dimension relative to the index dimension weight



For the construction and education sectors, the coping mechanisms from the health dimension have the highest contribution. For all other economic sectors, except for the health sector, the health dimension's contribution is also above 100% of the social weight of the health dimension in the index. This result again indicates a need for public intervention since these coping mechanisms may impact long-term health and have long-term consequences for human development. Finally, for health sector workers, coping mechanisms from the health dimension represent 96% of the value of this dimension's social weight in constructing the index. This lower contribution indicates that workers from this sector may benefit from their social network or employment fringe benefits to help them cope with their family healthcare needs. Nevertheless, it is essential to point out that despite

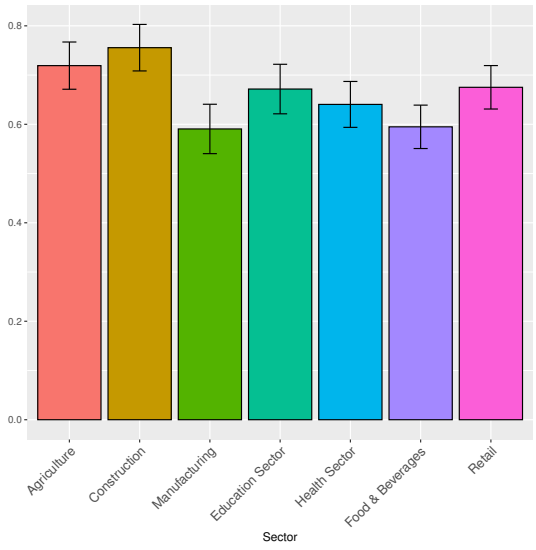
this, its contribution relative to its weight is still close to 100%, and it is the second highest relative importance among the four dimensions.

Figure 4 indicates that coping mechanisms from the education dimension rank third in terms of their contribution relative to the social weight of the dimension in the construction of the index. Their relative contributions range from 35% to 55% of the weight of the dimension. By impacting human capital accumulation, these mechanisms also impact long-term human development. A well-informed public recovery policy should aim to support human capital accumulation by improving the quality of the public education sector.

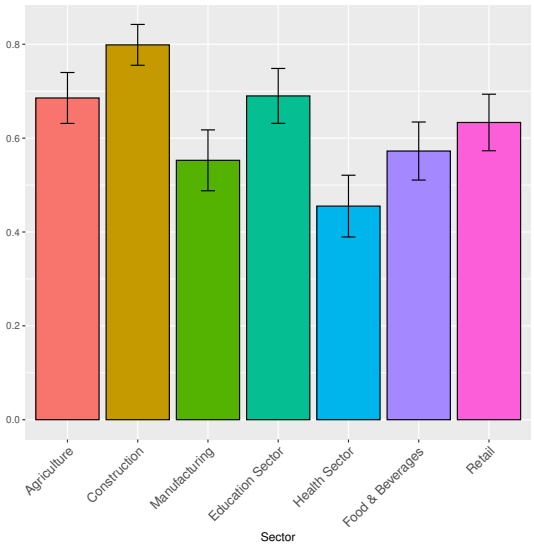
Finally, the findings illustrated in Figure 4 predominantly highlight the minimal contribution of financial coping mechanisms to the overall index. This observation does not align well with Alkire and Fang's (2019) findings on multidimensional poverty dynamics. They elucidate that shifts in multidimensional poverty typically occur more gradually than the income poverty dimension. This phenomenon primarily stems from the extended duration required to effectuate changes in certain aspects of well-being, notably health and education. Consequently, in adverse economic shocks, income is often the first dimension to bear the brunt. Ordinarily, one would anticipate a higher relative contribution from financial coping mechanisms in the index, given their pivotal role as the initial line of defense for workers during financial distress. However, the unique confluence of crises faced by Lebanese workers since 2019 has upended this norm. These unprecedented challenges compel workers to resort to coping strategies that, while providing immediate relief, potentially exert far-reaching and adverse effects on human development. This observation underscores the urgency of implementing an economic reform and recovery plan.

Figure 5 presents a comparative analysis of the indices across various economic sectors, focusing on distinct dimensions. A critical observation from this analysis is the lack of an explicit ordering of the different economic sectors within the education and financial

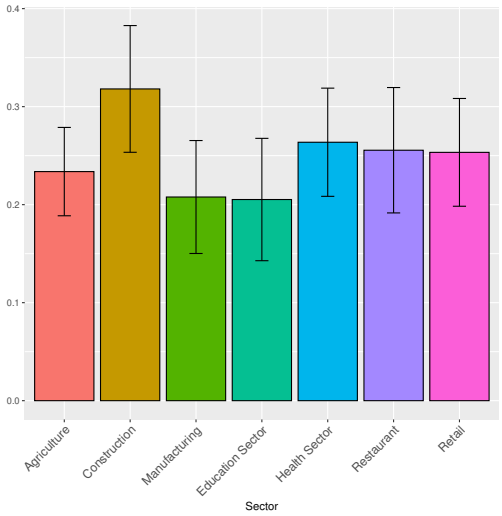
Figure 5: Summary of impacts in different dimensions



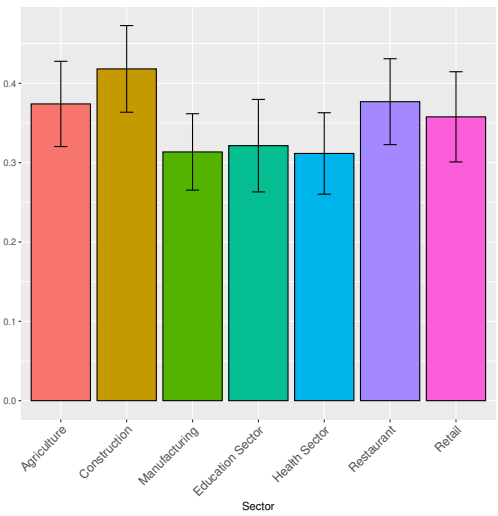
(a) Impacts in the nutrition dimension



(b) Impacts in the healthcare dimension



(c) Impacts in the education dimension



(d) Financial issues

domains, as evidenced by the overlapping confidence intervals in panels 5c and 5d. A noteworthy insight emerges when examining how workers from the health sector are impacted, mainly through panels 5a and 5b. Our previous discussion pointed out that health sector workers rely less on coping mechanisms within the healthcare dimension. At first glance, this trend is a positive indicator of human development among these workers. However, examining panel 5a reveals a different narrative. It becomes evident that workers in the health sector rely on coping strategies in the nutrition dimension to a similar extent as workers in other sectors. This reliance on nutritional coping mechanisms while addressing immediate needs raises concerns about their long-term impact on individual health. Though seemingly beneficial in the short term, such strategies may inadvertently contribute to dynamic challenges in human development for those in the health sector. This paradox underscores the complexity and multifaceted implications of coping mechanisms on human development, especially in sectors that analysts may consider more resilient.

4 Conclusion

This paper has analyzed the coping mechanisms employed by Lebanese workers in seven economic sectors in response to the multifaceted economic crisis engulfing the country. Our study demonstrates the significant impact of these mechanisms on various dimensions of human development, including nutrition, healthcare, education, and financial issues. The findings reveal the diverse and often detrimental strategies that individuals and households must adopt without a robust governmental recovery plan. This research not only sheds light on the severity of the crisis but also underscores the resilience and adaptability of the Lebanese workforce. Looking forward, it becomes imperative for policymakers and international agencies to consider these insights in their efforts to devise effective and sustainable recovery strategies.

Further research should focus on longitudinal studies to monitor the evolving nature of these coping mechanisms and their long-term implications on human development in Lebanon. It would also be essential to run surveys representative at the country level. These surveys should aim to study sources of income, detailed expenditures, and dimensions of human development at the individual level in detail. These surveys are essential to developing a sound, evidence-based economic policy for the country's future.

References

[1] Abou Zaki S., Dagher L., and Salam A. (2022), Addressing Food Insecurity in Crisis-Stricken Lebanon, LCPS Policy Brief number 69.

[2] Abu-Ismail, K., and V. Hlásny (2020). Wealth distribution and poverty impact of COVID-19 in Lebanon. ESCWA Technical Paper 8, E/ESCWA/CL3.SEP/2020/TP.8.

[3] Alkire, S. and J. Foster (2011), Counting and multidimensional poverty measurement, *Journal of Public Economics*, 95, 476-487.

[4] Alkire, S. and Y. Fang (2019), Dynamics of Multidimensional Poverty and Unidimensional Income Poverty: An Evidence of Stability Analysis from China, *Social Indicators Research*, 142, 25-64.

[5] Atamanov, A., S.A. Tandon, G.C. Lopez-Acevedo, and M.A. Vergara Bahena (2020), Measuring monetary poverty in the Middle East and North Africa (MENA) region: Data gaps and different options to address them, Policy Research Working Paper Series 9259, The World Bank.

[6] Claessens, M. S., and M.A. Kose (2013), Financial crises: Explanations, types, and implications. In Financial Crises: Causes, Consequences and Policy Responses, International Monetary Fund, Washington DC.

[7] Dagher, L., A. Abboud, O. Sidani, O. Abi Younes (2022), For Inclusive and Fair COVID-19 Socio-Economic Recovery Measures in Lebanon: Focus Group Discussions Report of Findings, Munich Personal RePec Archive Paper No. 116134.

[8] Dagher, L., I. Jamali, and O. Abi Younes (2023), Extreme energy poverty: The aftermath of Lebanon's economic collapse. *Energy Policy*, 183, 113783.

[9] Dagher, L. and Nehme, R. (2021), Can Lebanon's Economy Be Saved? A Plan for Revival, *Middle East Policy*, 28(1), 123-134.

[10] Eijffinger, S. C., and B. Karataş (2023), Three sisters: The interlinkage between sovereign debt, currency, and banking crises. *Journal of International Money and Finance*, 131, 102798.

[11] Fakih, A., P. Makdissi, W. Marrouch, R. Tabri and M. Yazbeck (2022), A stochastic dominance test under survey nonresponse with an application to comparing trust levels in Lebanese public institutions, *Journal of Econometrics*, 228, 342-358.

[12] Fitch Solutions (2022), Lebanon Set for Second Highest Inflation Rate Globally In 2022, retrieved from https://www.fitchsolutions.com/country-risk/lebanon-set-second-highest-inflation-rate-globally-2022-10-08-2022

[13] Harb, N. (2022), Earnings function in Lebanon: does religion matter?, *Applied Economics*, 54(7),821-840.

[14] Harb, N., and T. Rouhana (2020), Earnings and gender wage gap in Lebanon: the role of the human and social capital, *Applied Economics*, 52(44), 4834-4849.

[15] Laeven, M. L., and M.F. Valencia (2018), Systemic banking crises revisited. International Monetary Fund.

[16] Makdissi, P. and M. Yazbeck (2014), Measuring Socioeconomic Health Inequalities in Presence of Multiple Categorical Information, *Journal of Health Economics*, 34, 84-95.

[17] Makdissi, P., W. Marrouch, and M. Yazbeck (2023), Monitoring poverty in a data deprived environment: The case of Lebanon. Working Paper 2302E, Department of Economics, University of Ottawa.

[18] World Bank (2016), Lebanon Economic Monitor (Fall 2016): The Big Swap: Dollars for Trust. Washington DC.

[19] World Bank (2020), Lebanon Economic Monitor (Fall 2020): The Deliberate Depression, Washington DC.

[20] World Bank (2021a), Lebanon Economic Monitor (Spring 2021): Lebanon Sinking (to the Top Three), Washington DC.

[21] World Bank (2021b), Lebanon Economic Monitor (Spring 2021): The Great Denial, Washington DC.

[22] World Bank (2022). Lebanon Economic Monitor (Fall 2022): Time for an Equitable Banking Resolution, Washington DC.

[23] World Bank (2023). Food Security Update, May 4, 2023.