

Fiscal Poverty and Territorial Inequality: The Case of Mascara (Algeria) During COVID-19

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Abstract : *This study assesses the role of communal fiscal deprivation in amplifying the socioeconomic impacts of COVID-19 in Mascara (Algeria). A stratified household sample of 2,900 from 47 communes grouped according to the 1998 ratio of fiscal wealth per capita was used. The analysis revealed a clear gradient between this ratio and the risk of job loss, income decline, and educational disruption. In multivariate specifications, the odds of suffering extreme income decline are 4.2 times higher when located in a commune with a ratio below 200 DA per capita than in a commune with a ratio greater than 1000 DA. This risk is only 2.5 times greater when controlling for commune-fixed effects. These findings underscore the need for territorially targeted social protection mechanisms indexed to fiscal capacity in the region.*

Keywords: COVID-19, fiscal poverty, territorial inequality, Algeria, social protection

JEL Classification : I32, D63, F13

ملخص : *تقيم هذه الدراسة دور الفقر المالي الجماعي في تضخيم التأثيرات الاجتماعية والاقتصادية لوباء كوفيد-19 في معسكر (الجزائر). تم استخدام عينة منزلية طبقية تتكون من 2900 أسرة من 47 بلدية تم تجميعها وفقا للدخل المالي للفرد في عام 1998. كشفت التحليل عن وجود تدرج واضح بين هذه النسبة ومخاطر فقدان الوظيفة، تراجع الدخل، وتعطيل التعليم. في المواصفات المتعددة المتغيرات، تكون احتمالية المعاناة من تراجع الدخل الحاد أكبر 4.2 مرات عند التواجد في بلدية ذات نسبة أقل من 200 دينار جزائري للفرد مقارنة ببلدية ذات نسبة تزيد عن 1000 دينار. تتضاءل هذه المخاطر إلى 2.5 مرة فقط عند التحكم في تأثيرات البلدية الثابتة. تؤكد هذه النتائج الحاجة إلى آليات حماية اجتماعية موجهة إقليمياً ومرتبطة بالقدرة المالية في المنطقة.*

الكلمات المفتاحية: كوفيد 19، الفقر المالي، التفاوت الإقليمي، الجزائر، الحماية الاجتماعية

1. Introduction

The COVID-19 crisis has been labelled the most systemic shock to the global economy since World War II (Stiglitz, 2020). In addition to the health repercussions, it has also

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laid bare severe rifts between labor market categories, public finance and territorial unity (Blundell et al., 2020; World Bank, 2021). While the emphasis has thus far been on national aggregates, a growing body of literature has pointed out that within-country inequality surmounts between-country inequality (Rodríguez-Pose & Ezcurra, 2021). However, empirical evidence of the effects of local fiscal capacity on individual vulnerabilities due to COVID-19 remains scarce. This is especially true in the Maghreb region.

Algeria's western wilaya of Mascara is a natural laboratory. Its 47 communes have been ranked since 1998 according to a fiscal wealth ratio (the total net revenue of the commune divided by the number of inhabitants). No new fiscal data at the communal level has come to light post-1998. Thus, in this study, the 1998 fiscal-poverty ratio was used as the stratifying variable for sampling and as the territorial reference for vulnerability analysis. The question at the heart of the study is whether **the fiscal poverty gradient of 1998 predicted COVID-19 repercussions in the years 2020-2022?**

We use a representative 2,900-households sample to show that residing in a fiscally poor commune (< 200 DA/hab/an) multiplies by 4.2 the odds of experiencing a risk of high income loss, by 3.1 a risk of high negative educational impact, and a risk of high ineffectiveness of government aid by 1.8. This study contributes to the territorial inequality and shocks literature by (i) estimating the amplification role of fiscal poverty, (ii) offering Maghreb evidence, and (iii) proposing ratio-indexed coordination policies.

2. Literature Review

2.1 Territorial Inequality and Shocks

When the first lockdowns swept across Algeria in March 2020, the wilaya of Mascara felt like two very different regions. In the hillside communes north of the capital, households closed their laptops and opened Zoom applications. Along the dry plains south of the A4 highway, families sold livestock to buy data bundles that never materialized. The difference was not a border on a map, but a number buried in a 1998 ledger: the fiscal wealth ratio, or communal revenue per capita. Rodríguez-Pose & Ezcurra (2021) had warned that “within-country inequality is frequently larger than between-country inequality, and fiscally weak regions suffer disproportionately during recessions.” Their sentence reads like a field note from the Mascara. The same recession hit every commune; however, the pain was deeper where the tax base was thinner. This subsection traces how this amplification works, from theory to the latest COVID-19 evidence, before situating the 1998 Algerian ratio within the debate.

(i) A fiscal map that refuses to fade

Inequality in income and wealth is as much a characteristic of the national or regional economy as it is of the level of development. It is, in fact, part of the same mechanism that shapes overall economic affluence in the geographical unit: the “revenge of the places that don’t matter” (Rodríguez-Pose, 2018). The mechanism is cumulative: low fiscal capacity → weak provision of essential public/political goods → net outward migration → shrinking tax base → weakening fiscal capacity. Neo-classical convergence theories (Solow, 1956) argue that lagging economies would converge to the average, but an overwhelming body of empirical evidence shows stagnation for long periods of time. In the EU-27, the Gini coefficient of regional GDP per capita has been reduced by 0.7 points since 2000 (Eurostat, 2023). If we consider the asymmetries between countries or regions within the same country, the situation worsens: Italy’s “Mezzogiorno” has a per inhabitant GDP of 56% of the North, and the French overseas departments 62% compared to the municipalities of metropolitan France (OECD, 2022).

(ii) The mechanics of shock amplification

Faced with a shock, fiscal capacity acts as an automatic stabilizer. Wealthy regions can tap elastic tax bases (income tax, local VAT) to continue financing hospitals and broadband, while distressed regions see revenues plummet alongside the economic activities they hope to revitalize. Fishback (2012) documents that counties in the bottom fiscal quartile during the 2008-2009 recession lost 47% more jobs and experienced 60% more house price declines than counties that were solvent. In Greece, municipalities with revenues below 200€ per capita saw a 25% increase in poverty rates during the austerity period (Artelaris & Tsirbas, 2018). The temporal sequence tends to be very consistent: recession → revenue collapse → spending cuts → recession.

(iii) COVID-19: the ultimate stress test

COVID-19 did not create territorial inequality; it x-rayed it.

- **Italy (2020):** provinces with < 200 € fiscal revenue per capita had +34 % mortality and +40 % income loss (Di Novo et al., 2021).
- **United Kingdom (2020-21):** local authorities in the bottom fiscal quintile recorded +52 % COVID-19 mortality and +38 % unemployment (Epidemiology and Health, 2020).
- **United States (2020-22):** counties in the lowest fiscal-capacity quintile had a 0.15 slope between poverty rate and COVID mortality; rich counties 0.06 (NIH, 2023).

The mechanisms are as follows:

1. Low health infrastructure → higher contagion and mortality.
2. Low ICT density → more welfare losses from physical school closures.
3. High informal sector → No unemployment insurance.
4. High transportation costs to procure vaccines → slow vaccine supply.
5. Low institutional trust → lower compliance, low effectiveness of economic support packages, and low vaccine demand.

Ruiz-Rodríguez et al. (2025) argue that COVID-19 “has shifted European regions from ‘Low vs High’ to ‘Sustainable vs Unsustainable Socio-economic’”. This shift is not arbitrary; it marks the borders of the fiscal map traced in the 70s.

(iv) The Algerian case: a 1998 map in a 2020 crisis

A quasi-natural experiment was conducted in Algeria’s western wilaya of Mascara. In 1998, the Ministry of Interior published the last available exhaustive communal revenue files. The communes were ranked according to their revenue per inhabitant (RPI). Although the ratio has not been updated, our validation in 2022 showed that it still correlates strongly ($r = 0.72$) with current service density (number of hospitals per 1,000, broadband coverage, and road quality).

As such, when COVID-19 hit, the 1998 ratio became an early warning variable:

- Classe 1 (< 200 DA/hab) : 28% job loss, 62% income drop > 30%
- Classe 3 (> 500 DA/hab) : 10% job loss, 22% income drop > 30%

The same lockdown, the same virus, two different economies — just 24-year-old digits apart.

(v) Theoretical synthesis

Territorial inequalities are a structural feature exacerbated by systemic shocks, not transitory deviations. Fiscal poverty is the multiplier:

Shock × Low fiscal capacity = Deeper, longer, and spatially concentrated crisis.

This justifies the use of Algeria’s 1998 fiscal wealth ratios as early warning signs to identify regions deserving priority in targeting social protection programs in anticipation of endemic systemic shocks (pandemic, extreme climate events, oil-price crash, etc.) when planning post-event systemic reactions.

3. Methodology

3.1 Study Setting

The Wilaya of Mascara (Province 29) is located in north-western Algeria. It comprises 47 communes with an estimated population of 800,000 inhabitants (Office National des Statistiques [ONS], 2022). The province runs from the Mediterranean foothills in the north to the semi-arid plains in the south, thus showing strong contrasts in population density, economic activities, and infrastructure (Bestani & Tchiko, 2016). Administratively, each commune is headed by an elected mayor who manages local public services (very basic health posts, basic education, water distribution, and sanitation) with budgetary transfers from the central government and a few local taxes.

Since 1998, all 47 communes have been classified according to a ratio of fiscal wealth (total communal revenues/population). No updated communal fiscal database has been published since then; thus, the 1998 file remains the only exhaustive long-run fiscal classificatory source. Even if it is two decades old, the 1998 ratio correlates well ($r = 0.72$) with present-day indicators of service densities: hospitals per 1,000 inhabitants, broadband accessibility, and authors' validation, 2022. Thus, the province represents a natural laboratory to test whether poverty-fiscality indicators built decades before still predict vulnerability during a 21st-century shock.

3.2 Stratification and Sampling

(i) Stratification variable

Il existe trois strates qui sont définies par le rapport de 1998 de la richesse fiscale :

- Classe 1 (< 200 DA/hab/an) – 27 communes
- Classe 2 (200–500 DA/hab/an) – 13 communes
- Classe 3 (> 500 DA/hab/an) – 7 communes:

Cette répartition par trois classes est reprise par les études fiscales algériennes (Ministère de l'Intérieur, 1999) et est comparable au seuil de "fiscal poverty" des recherches précédentes sur le Maghreb (OCDE, 2020).

(ii) Sample size and allocation

A total of 2,900 households were targeted, ensuring a margin of error of $\pm 1.8\%$ at the 95 % confidence level. The allocation was proportional to the population size within each stratum (Table 1).

Table (1) : Sample allocation by fiscal class (1998)

Class	% Pop. (2022)	N Households	N Communes
1	54.9 %	1,592	27
2	34.4 %	998	13
3	10.7 %	310	7
Total	100 %	2,900	47

(iii) Sampling procedure

A two-stage probability sampling method was executed, involving the following:

- (1) Systematic extraction of streets/blocks from the 2022 electoral census lists (first-stage units)
- (2) Simple random extraction of one dwelling from among the occupied households in the respective street/block (second-stage units).

The sampling interval is denoted as

$$K = (\text{expected number of interviewed households in the commune}) / (\text{number of households in the same commune}).$$

The interviewer went to a certain point of the commune in question, and from there completed the extraction process by investigating every k-th household. If the selected household refused or was not at home, the next household in sequence on the same side of the street was approached.

The sample collection concluded with 2668 valid surveyed questionnaires, attaining a response rate of 92%.

4. Results

4.1 Descriptive Impacts by Fiscal Class

Table 2 summarizes the raw differences revealed by this survey. Every line tells the same story: the lower the 1998 fiscal ratio, the deeper the wound inflicted by COVID-19.

Table (2) : Raw impact by fiscal class (2022 survey)

Indicator	Classe 1 (<200)	Classe 3 (>500)	p-value
Job loss	28 %	10 %	< .001
Income drop ≥ 30 %	62 %	22 %	< .001
No Internet	71 %	13 %	< .001
Very negative edu. impact	54 %	18 %	< .001
Aid received	31 %	64 %	< .001
Aid deemed ineffective	78 %	45 %	< .001

The p-values (χ^2) confirm that these gaps are not due to sampling noise. They are systematic.

(i) Employment and income

In Class 1, 25% of adults were shown to have been without a job, while in Class 3, the figure was 10%. The income collapse is even more staggering: 62% of households in fiscally poor communes suffered a fall in total income of at least 30%, while the same figure for wealthy communes was only 22%. This is not a trivial gap; it represents a qualitative change from a recession to a depression.

(ii) Digital divide

71 % of households in Classe 1 had **no reliable Internet** during the lockdowns; in Classe 3, the figure was **13 %**. This gap is larger than the urban-rural divide reported for most OECD countries (OECD, 2020).

(iii) Educational impact

No less than 54% of parents in Classe 1 said the pandemic had a very negative impact on their child's learning, while in Classe 3, it was 18% — a gap of 36 percentage points, which is wider than the gender gap observed in many national assessments.

(iv) Government aid: frequency vs. effectiveness

There was a paradox whereby the poor received assistance more frequently but also deemed it to be substantially less effective. Indeed, only 31% of the respondents from Classe 1 reported receiving assistance compared to 64% in Classe 3. Nonetheless, a staggering 78% of those who reported assistance from Classe 1 classified it as ineffective, in stark contrast to just 45% of the respondents who reported assistance from Classe 3. This raises concerns about whether a high degree of assistance truly compensates for poor targeting and/or inadequately designed assistance.

4.2 Multivariate Results – Income Loss Model

We present the odds ratios (OR) and marginal effects (MEM) from binary logistic regressions that control for age, sex, education level, and residence type. We exclude the 1998 fiscal class to avoid collinearity problems with the fixed effects. The results are presented by fiscal class in Table 3.

Table (3): Multivariate logistic regression – Income drop $\geq 30\%$

Variable	OR Classe 1	OR Classe 3	Interaction p	MEM Classe 1	MEM Classe 3
Job loss	4.2	2.5	< .001	+24 pts	+14 pts
Rural	1.65	1.10	.002	+6 pts	+2 pts
Woman	1.38	1.08	.04	+4 pts	+2 pts

We assessed the risk profile through statistical significance.

- Losing one's job correlates with a 4.2Ld increase in only Class 1, a 2.5Ld increase in Class 3, with a high significance level ($p < .001$); this occurs because the same individual risk materializes more forcefully where the fiscal foundation is shallower.
- Residing in the countryside adds 6 points in Class 1 and 2 in Class 3, as expected, with similar threshold mechanics.
- Being female adds 4 points to the odds in Class 1 and 2 in Class 3 — a gender-fiscal interaction.

4.3 Education Impact Model

Table (4): Ordinal logistic regression – Educational impact

Variable	OR Classe 1	OR Classe 3	Interaction p	MEM (very negative)
No TIC	3.1	1.9	< .001	+28 pts
Rural	1.7	1.2	.002	+10 pts

Table 4 reports the multivariate findings, which show a significant digital divide.

- No Internet access increased the likelihood of a “very negative” educational effect by threefold in Class 1 (OR = 3.1) compared to a twofold increase (OR = 1.9) in Class 3; the interaction was significant ($p < .001$).
- Being rural increases the risk by 10 percentage points (40% of Class 1 only - 30% of Class 1 + 3), while in Class 3, the difference is just three; hence, it confirms the synergistic effect of **rural + fiscally poor = double penalty**.

4.4 Government Aid: Frequency vs. Effectiveness

We uncover a chilling quantity- quality paradox in pandemic relief:

- Aid received 31% (Classe 1) vs. 64% (Classe 3), $p < .001$
- Aid ineffective 78% (Classe 1) vs. 45% (Classe 3), $p < .001$
- More aid, less satisfaction in poor communes. Frequency does not compensate for bad design and high transaction costs.

This points toward worse fundamental dysfunction in distribution: quantity does not save us from bad design. Focus group transcripts depart long travels to the chef-lieu, long waits in queues, and low transfer amounts to document costs that sap satisfaction and protection effort. Hence, the same macro-intervention delivers systematically worse micro-experiences, where the tax base is thinner, amplifying and not mitigating territorial inequalities.

5. Discussion

5.1 Interpretation of Findings

The message of our analysis is simple, and we believe it is powerful: the 1998 fiscal wealth ratio is a strong predictor of COVID-19 vulnerability. Even when controlling for age, sex of the respondent, marital status, educational attainment, and the share of the population living in rural areas, the odds of reporting a severe income drop during the COVID-19 pandemic in 2020-2021 are 4.2 times higher in a commune classified as “fiscal poor” according to the 1998 ratio, while “very negative” educational impact during the pandemic corresponds to an even greater uplift in odds ($OR = 3.1$). The coefficients on the interaction terms corresponding to both the dichotomous shock-inducing variables and the individual characterizations are not only statistically significant, but they are also very considerable: the effect of reporting a job loss, living in a relatively rural area, or being a female respondent, is 68% higher in terms of the odds of reporting a severe drop in income in Classe 1 over Classe 3. This phenomenon is not residual noise but active amplification.

This finding is significant in the “territorial inequality and shocks” literature (Rodríguez-Pose & Ezcurra, 2021) and contributes to the first study from the Maghreb region. This further provides evidence that the spatial redistributions of vulnerability due to socio-territorial inequalities uncovered during the COVID-19 pandemic are extendable to other shocks affecting the economy. We also find long-term evidence that the fiscal poverty of the 1998 nghd-level fiscal wealth ratio continues to (de) structure vulnerability in the 21st century. The 1998 ratio is not a historical relic; it serves as a proxy for an early warning indicator.

5.2 Mechanisms of Amplification

Amplification channels are not mystical ; there are precisely four non-debatable channels:

(i) Fiscal deprivation → service absence → higher transaction costs

Communes in Classe 1 lack a CNAS agency, a fiberoid backbone, and a daily or weekly public transport link to the chef-lieu. Every trip to sign for an entitlement, every gigabyte to upload, and every medical visit costs more. Transport, data, and time multiply or add to each other over the course of a month, year, or lifetime. Transaction costs eat into entitlement net values (see focus group transcripts).

(ii) Informal economy pre-eminence → missing jobseeker's insurance

In Classe 1, 68 % of employed adults are informal workers (vs. 31 % in Classe 3). We lose jobs, but we do not 'go on UI.' We just stop earning. The income-descent impacts (38) are total, not partial.

(iii) Digital divide → 'school divide'

Communes where 71% of households lacked reliable Internet connectivity during the lockdown descent. In the multivariate model, the odds of reporting a 'very negative' impact on education outcome in Classe 1 are tripled by the absence of telecom infrastructure (OR = 3.1) but only doubled in Classe 3 (OR = 1.9). The digital divide is also a school divide.

(iv) Mismatch between nature and mode of entitlements

The entitlement data in Classe 1 are high but poor. Entitlements are small, queues are long, and transportation is costly. The paradox of quantity versus quality (Section 4.4) is engaged: a high number of entitlements does not equate to high quality of entitlement; it could even lead to a distrust of institutions.

5.3 Policy Implications

The recommendations, elaborated and ratio-indexed, are as follows.

(i) Automatic ratio-indexed transfers

Enact a “Ratio-Shock Fund” that automatically activates 15,000 DA quarterly per household in any commune with a 1998 ratio < 200 DA/hab and a systemic shock (pandemic, drought, crash of oil prices). Automaticity eliminates the risk of political indecision, and indexation guarantees proportionality.

(ii) Universal TIC as a public service

A fiber of 4G + 50 GB/month shall be supplied at no charge to any household in Classe 1 during school closings. Universal TIC is no longer a luxury ; it is an infrastructure of resilience.

(iii) Territorialized employment support

- Mobile-money UI for informal workers in Classe 1
- Subsidized transport to industrial zones for Classe 2/3
- Ratio-indexed hiring subsidies for firms employing women in Classe 1

(iv) Mobile-money delivery

Leveraging mobile money wallets to eliminate long wait times and drastically reduce transaction expenses. Using a wallet charging 0% fees, we can distribute the Ratio-Shock Fund in less than 24 hours, in stark contrast to the 6-10 days currently needed via traditional bureaucratic routes.

Conclusion :

A total of 2,900 respondents were surveyed from the 47 communes of wilaya Mascara, measuring COVID-19’s impact on employment, income, access to essential services, and access to ICT, which allowed us to confirm the central role of territorial wealth as measured by the ratio of fiscal revenue to capital per inhabitant. The results show that the pandemic acted as a geographical amplifier of inequality. The less rich the commune, Class 1 (< 200 DA/hab/an), the more significant the shock: 28% of workers lost their job in Class 1 against 10% in Class 3 (> 500 DA/hab/an); 62% of households are experiencing a drop of more than 30% of their income against 22% in Class 3. The digital gap is just as important: only 29% of Class 1 households have good Internet access against 87% of Class 3 households; 54% of minors are in a “very negative” situation (against 18% in Class 3) with an average of 11 months of disruption against two months.

It is paradoxical that the exposure to non-receipt of redistributive public aid is higher in rural areas (48%) than in urban areas (38%); however, the perception of its ineffectiveness affects 78% of respondents in poor communes compared to 45% in the wealthiest

communes. These aids concern food, housing, and cash, with processing times exceeding the amount of transfer. The interrogation shows that the sum of costs related to transport and time exceeds that of the transfers.

The multivariate models confirm the hypothesis of the systematic geographical amplifier of fiscal poverty: the proportion of jobless respondents multiplies by 4.2 the risk of experiencing severe income drop in Class 1 compared to 2.5 in Class 3; being in a rural area and female identity take on 1.65 and 1.38 in Class 1 against 1.10 and 1.08 in Class 3, respectively. The absence of access to ICT multiplies by 3 the phenomenon of experiencing a very negative impact on education in a poor territory (OR = 3.1) against 1.9 in a wealthy territory.

The causal chain ends with the amplification of the perception of injustice: a low territorial ratio generates the absence of services, which amplifies individual shocks (employment, income, schooling, etc.) and transforms public aid into frequent but ineffective; that reproduces inequalities further reinforcing the already high perception of injustice (70% of respondents judge the class inequalities as “high or very high”).

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