

Covid-19 lockdowns, income distribution, and food security: An analysis for South Africa



Channing Arndt^{a,*}, Rob Davies^b, Sherwin Gabriel^a, Laurence Harris^{c,d}, Konstantin Makrelov^e, Sherman Robinson^a, Stephanie Levy^f, Witness Simbanegavi^e, Dirk van Seventer^b, Lillian Anderson^a

^a Environment and Production Technology Division, International Food Policy Research Institute (IFPRI), USA

^b Trade and Industrial Policy Strategies, Pretoria, South Africa

^c School of Finance and Management, SOAS, United Kingdom

^d UNU-WIDER, Helsinki, Finland

^e Research Department, South African Reserve Bank, South Africa

^f Department of International Development, London School of Economics and Political Science, United Kingdom

ARTICLE INFO

Keywords:

Food security
Covid-19 impacts
SAM multiplier Model
Income distribution

ABSTRACT

Absent vaccines and pharmaceutical interventions, the only tool available to mitigate its demographic effects is some measure of physical distancing, to reduce contagion by breaking social and economic contacts. Policy makers must balance the positive health effects of strong distancing measures, such as lockdowns, against their economic costs, especially the burdens imposed on low income and food insecure households. The distancing measures deployed by South Africa impose large economic costs and have negative implications for the factor distribution of income. Labor with low education levels are much more strongly affected than labor with secondary or tertiary education. As a result, households with low levels of educational attainment and high dependence on labor income would experience an enormous real income shock that would clearly jeopardize the food security of these households. However, in South Africa, total incomes for low income households are significantly insulated by government transfer payments. From public health, income distribution and food security perspectives, the remarkably rapid and severe shocks imposed because of Covid-19 illustrate the value of having in place transfer policies that support vulnerable households in the event of 'black swan' type shocks.

1. Introduction

The battle against the Covid-19 pandemic presents countries with difficult policy choices. Absent vaccines and pharmaceutical interventions, the only tool available to mitigate its demographic effects is some measure of physical distancing, to reduce contagion by breaking social and economic contacts. Distancing measures adopted range from purely advisory to complete lockdown of households and non-essential producers. They impose a negative shock on the economy, with immediate decline in economic activity followed by medium-term and long-term economic effects. The burden of these shocks is not borne equally across society. Policy makers must balance the positive health effects of the measures against their economic costs and the burdens

imposed, particularly on low income and food insecure households.

This paper examines the implications of lockdown policies for income distribution and food security, using South Africa as a case country, with a focus on the role of social protection in preserving food security. Section 2 provides a brief literature review on the role of social protection in blunting shocks. Section 3 presents the lockdown policies pursued in South Africa. Section 4 describes the methodology employed and key data. Section 5 presents results with a focus on implications for earnings and total household income. Section 6 summarizes and concludes, highlighting the important role of social protection policies as a buffer in the presence of shocks.

* Corresponding author.

E-mail addresses: c.arndt@cgiar.org (C. Arndt), robdavieszim@gmail.com (R. Davies), s.gabriel@cgiar.org (S. Gabriel), lharris.uol@gmail.com, lharris.uol@gmail.com (L. Harris), Konstantin.Makrelov@resbank.co.za (K. Makrelov), s.robinson@cgiar.org (S. Robinson), S.Levy@lse.ac.uk (S. Levy), Witness.Simbanegavi@resbank.co.za (W. Simbanegavi), denvanseventer@gmail.com (D. van Seventer), l.anderson@cgiar.org (L. Anderson).

2. Shocks and social protection

The role of social transfers to provide consumption support to households who cannot meet their subsistence needs has been extensively studied (Barrientos and Hulme, 2016; World Bank, 2018; Hidrobo et al., 2018). Shocks studied include macroeconomic shocks (Galasso and Ravallion, 2004), refugee and protracted crisis (Bruck et al., 2019; Valli et al., 2019), and natural disasters (Skoufias, 2003). Another strand of the literature focuses on the response to supply shocks, such as food shortages, famines and droughts (Sen, 1986; Gilligan and Hoddinott, 2007; Aker et al., 2011; Asfaw et al., 2017). Some social protection programs include interventions responding to seasonal and regional supply shocks, such as the Productive Safety Net (PSN) program in Ethiopia (World Bank, 2018). Others offer productive asset transfers (Rwanda, India) or multi-faceted ‘graduation packages’ that tackle causes of economic and social exclusion (Banerjee et al., 2015).

The Covid-19 epidemic sets off a chain of events that runs from rapid increases in the share of the population infected to increasingly widespread sickness with positive and non-trivial probability of death (especially for the elderly and those with co-morbidities) to public health policies designed to contain the pandemic. Unfortunately, these public health policies have very large implications for economic activity and income, as will be shown. These shocks are sufficiently large to push many households into positions of food insecurity, especially in the absence of countervailing policies such as social protection. The lockdown can thus be characterized as a policy induced reduction in household capabilities (Sen, 1985).¹ Increased food insecurity results principally from the severe shock to household income and the means to purchase food rather than to a supply shock such as drought.

In the analysis performed, the food insecurity generated by the Covid-19 crisis is unrelated to the supply of food and unrelated to the logistics of food distribution.² Because the source of insecurity is a collapse in earnings, transfers via social protection are important to counter the effects of lockdowns, at least in the short run.

3. Lockdown policies in South Africa

To fight the spread of Covid-19 and buy time to develop and implement a long run response, President Ramaphosa declared a National State of Disaster with countermeasures on March 15, followed by a national stay-at-home (“Lockdown”) order issued on March 23, effective for three weeks from March 27. The initial three weeks was subsequently extended to five weeks, scheduled to end on April 30.

The March 15 policies limited the size of public gatherings, imposed travel restrictions, suspended schools, closed ports of entry, and cancelled government events. The national stay-at-home regulations imposed on March 27 can be divided into two components:

1. Preventing individuals from leaving their homes except under exceptional circumstances. They cannot go to work, unless employed in an essential sector, and are restricted in how and where they can spend their income.
2. Closing non-essential industries, leading to declines in production and possibly large numbers of workers being laid off.

Additional (voluntary) efforts by business and civil society included

¹ ‘A person has to starve if his entitlement set does not include any commodity bundle with enough food ... [as a result of some change in earnings such as] due to ill health ... fall in wages, ... [or] loss of employment.’ (Sen, 1986, p. 9, p. 9).

² The lack of relation to logistic in the model deployed conforms to conditions pertaining during the initial lockdown period. Over time, the Covid-19 crisis likely poses an additional threat to food security via potential trade disruptions affecting market integration, transportation and imports.

the suspension of major religious gatherings over Easter and discouraging outpatient and elective procedures at health facilities.

Since the Lockdown exempted essential activities, a complete cessation of activity was not expected. In the tourism sector, for example, although front-line services such as accommodation and car rental were locked down, other activities such as reservations and other support services were expected to continue with limited staff. A description of the size and sectoral composition of the lockdown policies can be found in (Arndt et al., 2020).

From both the demand and supply sides, the lockdown results in a massive decline in demand/supply of many industries. The effect is widespread across industries, but especially large in the service sectors (e.g., restaurants, entertainment, tourism, travel, hotels, etc.). The lockdown alone causes major impacts on employment, production, and demand. In addition, these impacts spill over into the macro economy. Industries are facing an uncertain future and are hesitant to engage in investment projects, resulting in a decline in aggregate investment. The pandemic is global, leading to a major decline in world trade.

4. Methodology and data

The direct impacts of the lockdown policies, combined with associated macro-economic shocks to household consumption, exports and investment, will have knock-on effects that spread through the entire economy. Reduced activity in one sector has consequences both for suppliers of intermediate inputs to that sector, who face lower demand, and for the users of the output of the sector, who face supply disruptions. These indirect effects are captured in input-output tables that focus on the flows of intermediate inputs across sectors in the economy. Additional indirect effects are captured by expanding input-output tables to a Social Accounting Matrix (SAM) that specifies income/expenditure flows for all economic agents. The SAM maps the “circular flow” of income from production, to value added (payments to labor and capital), to the distribution of income to households, government, and aggregate investment and, finally, back to the demand for commodities (Pyatt and Round, 1979).

The SAM supports a highly disaggregated linear multiplier model by converting the matrix flows to coefficients by dividing each entry by its column total. These coefficients are assumed to be fixed. In this specification, inputs into sectoral production are determined by fixed coefficients and value added is distributed in fixed proportions to households. The SAM is then partitioned into “endogenous” and “exogenous” accounts. The SAM-multiplier model deployed treats the elements of final demand (household consumption, investment, government expenditure, and exports) as exogenous variables that can be “shocked” to reflect the demand/supply effects of the lockdown policies. The SAM-multiplier model then solves for production by industries and all income flows: industry sales, value added (GDP and factor cost), and the distribution of income to households and government.³

The 2015 SAM for South Africa identifies 62 industries and 104 commodities (van Seventer et al., 2018). Income of labor is disaggregated by type. Receipts (income) are distributed to enterprises, households, government, and the rest of the world. Capital earnings, labor earnings, and transfers from government and the rest of the world constitute household income. Households are broken down into household expenditure groups according to deciles. The lowest expenditure group (decile 0 or hhd-0) represents households that cover 0–10% of all households when they are ranked from low to high total expenditure. The top decile, 90–100%, is disaggregated into an additional 5 groups, each representing 2% of all households.

For the purposes of this analysis, sources of income are important.

³ Arndt et al. (2020) provide the rationale for use of the SAM-multiplier model in the current context and include a mathematical appendix. Multiplier models are described in detail in Miller and Blair (2009).

Table 1
Household sources of income.

	Income from Wages				Capital Income	Transfers from Gov and RoW	Total
	flab-p	flab-m	flab-s	flab-t			
hhd-0	15.4	9.4	1.7	0.1	4.3	69.1	100.0
hhd-1	14.3	9.5	4.8	0.9	7.7	62.9	100.0
hhd-2	9.6	11.2	8.3	1.7	11.8	57.4	100.0
hhd-3	9.0	11.9	12.2	1.6	15.6	49.6	100.0
hhd-4	7.5	13.6	14.8	3.9	19.8	40.4	100.0
hhd-5	6.9	14.0	19.8	8.3	22.5	28.6	100.0
hhd-6	4.3	9.7	26.9	13.1	29.5	16.4	100.0
hhd-7	2.5	9.4	22.5	24.2	32.0	9.4	100.0
hhd-8	1.0	4.4	18.2	40.1	32.7	3.7	100.0
hhd-91	1.0	3.0	13.1	42.5	38.2	2.2	100.0
hhd-92	0.3	2.8	14.0	39.9	41.0	2.0	100.0
hhd-93	1.9	1.0	11.1	50.2	34.4	1.5	100.0
hhd-94	0.5	0.9	7.7	53.3	36.2	1.4	100.0
hhd-95	0.1	0.1	5.9	51.4	41.4	1.0	100.0

Notes: Flab-p: primary school educated or less; flab-m: completed middle school; flab-s: completed secondary school; and flab-t: tertiary educated; hhd-0: lowest decile; hhd-91-hhd-95: top decile divided into 5 equal parts.

Source: Estimated from the 2015 SAM ([van Seventer et al., 2018](#)).

These are illustrated in [Table 1](#). Two important items emerge from the table. First, as expected, lower income households derive most of their labor earnings from lower educated labor and receive very little capital income. Second, dependence on transfers (government transfers dominate) is very high for households at or below median income.

5. Results

Impacts are large. [Fig. 1](#) presents impacts on the income components of GDP (at factor cost). Once all direct and indirect (knock-on) effects are considered, GDP at factor cost falls by 34 per cent. Indirect effects account for about 20 percentage points of the 34 while direct lockdown policy shocks account for about 14. Notably, the negative impact on income is bigger for lower educated workers. Wage earnings are down by about 30 per cent in total, but earnings by lower educated workers fall by more than 40 per cent. Gross operating surplus (capital earnings) is down by close to 40 per cent. These differential impacts reflect the varying impacts of lockdown on industries with different shares and composition of value added.

These changes in factor incomes reflect quantity, and not wage, adjustments. Hence, the 40 per cent reduction in wage earnings in the lowest two education categories implies roughly a 40 per cent reduction in their hours worked. For a household dependent on wage earnings from low educated labor, these declines are clearly sufficient to threaten food security, particularly if the household was already vulnerable. Moving up the income distribution, the impact on hours worked for tertiary educated labor is less severe, at 26 per cent, as industries that intensively use highly skilled labor can adapt to lockdown with more flexible work arrangements.

Changes in factor incomes have implications for the distribution of household income. Results are shown in [Fig. 2](#). Lower income households suffer less than those at the upper end of the distribution. Several channels influence these results. [Fig. 1](#) shows that wage earnings of lower educated suffer more than those of higher educated labor. Since low income households depend more on lower education earnings (see [Table 1](#)) one would expect their incomes to suffer more. The major reason this is not the case is that lower income households also receive significant exogenous transfers from the government, which are assumed to be unaltered. This transfer income makes up a larger share of the income of poor households than at the top end of the distribution.

Combining these effects results in larger negative impacts on richer households. Middle income households rely more than the wealthy on lower educated wage earnings, but they are less cushioned than the poor by government transfers.

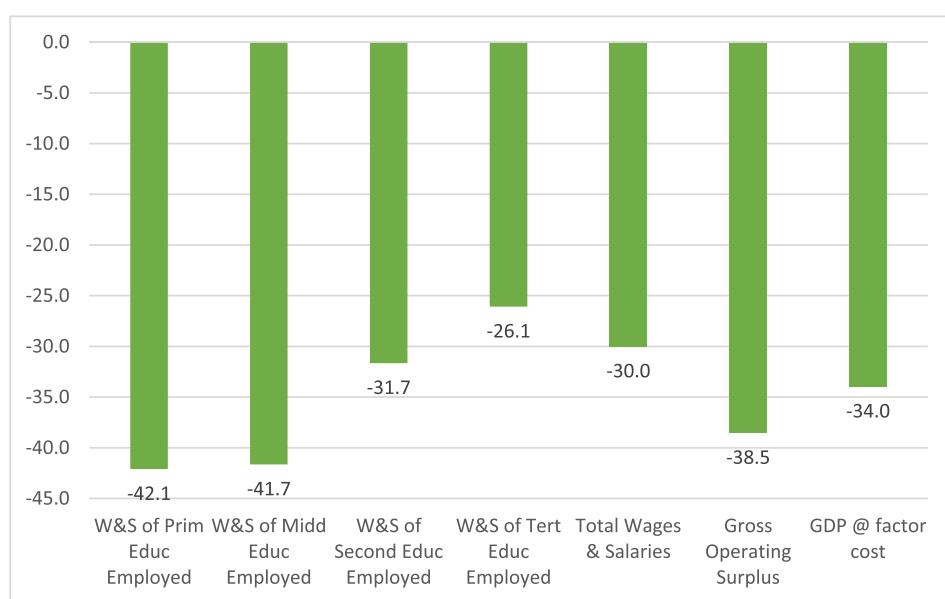


Fig. 1. Impacts on wage earnings and income GDP components, as percentage deviation from their pre-crisis levels.
Source: Own calculations.

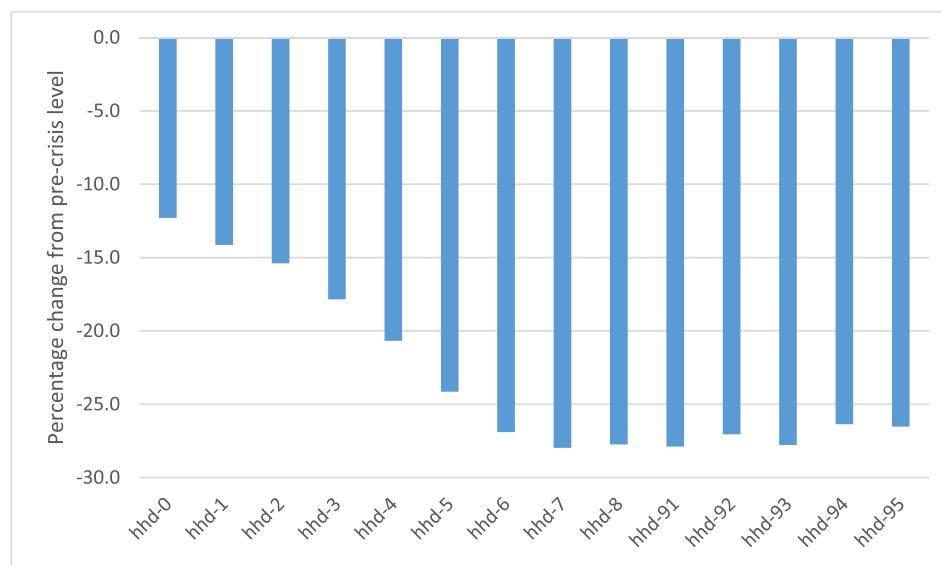


Fig. 2. Impacts on household incomes for the Full scenario, as percentage falls from their pre-crisis values.
Source: Own calculations.

6. Summary, conclusions and future analytical needs

The lockdown measures that South Africa has put into place to contain the novel coronavirus have negative implications for the factor distribution of income. Labor with low education levels are much more strongly affected than labor with secondary or tertiary education. Furthermore, the effects are very large. Reductions in hours worked by laborers with at most primary school education exceed 40 per cent while tertiary educated workers suffer a comparably much smaller but still very large reduction of about 26 per cent. Declines in use of capital are also large at nearly 40 per cent.

Based on these results, households with low levels of educational attainment and high dependence on labor income would experience an enormous real income shock that would clearly jeopardize the food security of these households. This effect comes about under the assumptions of very mild direct impacts on food production, no effect on food prices, and no effect on food distribution channels. The effect is mainly the result of the lockdown policies imposed by South Africa to contain the novel coronavirus with a relatively small additional effect due to the policies imposed by other countries and their implications for demand for South African exports.

In South Africa, total incomes for low income households are significantly insulated by government transfer payments. As a result of these transfer payments, incomes amongst low income households are, at least to some degree, protected. Continuation of these payments during the crisis is critical to maintaining food security amongst low income households.

Looking more broadly at developing countries with strong lockdown measures to counter the spread of novel coronavirus but weak social protection networks, the food security outlook for low income households appears likely to be grim. Even with the social protection measures present in South Africa, the sustainability of the lockdown beyond a few weeks is open to question. In developing countries where food insecure households receive no or very limited support, low income households will very rapidly confront a choice between seeking to generate income to prevent starvation and accept the risk of becoming infected, despite any official lockdown measures. From public health, income distribution and food security perspectives, the remarkably rapid and severe shocks imposed because of Covid-19 illustrate the value of having in place transfer policies that support vulnerable households in the event of 'black swan' type shocks.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

Support to SA-TIED from the National Treasury of South Africa, the European Union, UNU-WIDER and the CGIAR Research Program on Policies, Institutions and Markets is gratefully acknowledged.

References

- Aker, J.C., Boumijel, R., McClelland, A., Tierney, N., 2011. Zap it to Me: the Short-Term Impacts of a Mobile Cash Transfer Program. Center for Global Development working paper, p. 268.
- Arndt, C., et al., 2020. Impact of Covid-19 on the South African Economy: an Initial Analysis. UNU-WIDER SA-TIED, Helsinki. Working Paper 111.
- Asfaw, S., Carraro, A., Davis, B., Handa, S., Seidenfeld, D., 2017. Cash transfer programmes, weather shocks and household welfare: evidence from a randomised experiment in Zambia. *J. Dev. Effect.* 9 (4), 419–442.
- Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thysbaert, B., Udry, C., 2015. A multifaceted program causes lasting progress for the very poor: evidence from six countries. *Science* 348 (6236), 1260799.
- Barrientos, A., Hulme, D. (Eds.), 2016. Social Protection for the Poor and Poorest: Concepts, Policies and Politics. Springer.
- Brück, T., Cuesta, J., De Hoop, J., Gentilini, U., Peterman, A., 2019. Social protection in contexts of fragility and forced displacement: introduction to a special issue. *J. Dev. Stud.* 55 (Suppl. 1), 1–6.
- Galasso, E., Ravallion, M., 2004. Social protection in a crisis: Argentina's Plan Jefes y Jefas. *World Bank Econ. Rev.* 18 (3), 367–399.
- Gilligan, D.O., Hoddinott, J., 2007. Is there persistence in the impact of emergency food aid? Evidence on consumption, food security, and assets in rural Ethiopia. *Am. J. Agric. Econ.* 89 (2), 225–242.
- Hidrobo, M., Hoddinott, J., Kumar, N., Olivier, M., 2018. Social Protection, Food Security, and Asset Formation, vol. 101. World Development, pp. 88–103.
- Miller, R.E., Blair, P.D., 2009. Input-Output Analysis: Foundations and Extensions, second ed. Cambridge University Press, New York.
- Pyatt, G., Round, J.L., 1979. Accounting and fixed price multipliers in a social accounting matrix framework. *Econ. J.* 89, 850–873.
- Sen, A., 1985. Commodities and Capabilities. North Holland, Amsterdam.
- Sen, A., 1986. Food, Economics and Entitlements, vol. 1. UNU-WIDER Working Paper, Helsinki (February).
- Skoufias, E., 2003. Economic crises and natural disasters: coping strategies and policy implications. *World Dev.* 31 (7), 1087–1102.

Valli, E., Peterman, A., Hidrobo, M., 2019. Economic transfers and social cohesion in a refugee-hosting setting. *J. Dev. Stud.* 55, 128–146 sup.1.

van Seventer, D., Bold, S., Gabriel, S., Davies, R., 2018. A 2015 Social Accounting Matrix (SAM) for South Africa. UNU WIDER, Helsinki.
World Bank, 2018. The State of Social Safety Nets 2018. World Bank, Washington, DC.