Interactions across SDGs from rural social protection programmes: lessons from Brazil

KEY SUMMARY

- Rural social protection programmes can influence multiple Sustainable Development Goals (SDGs).
- Brazil's Zero Hunger (ZH) social protection programme is credited with enabling Brazil to meet its Millennium Development Goals, and the roll-out of similar programs in sub-Saharan Africa. However, a full exploration of ZH effect across multiple sustainable development objectives until now has been lacking.
- Between 2000 and 2013, the ZH programme increased food production (SDG 2) and slightly reduced poverty (SDG 1). It did not improve child health (SDG 2 and 3) and drove both losses and gains in natural vegetation (SDG 15) across rural Brazil.
- ZH's largest sub-programmes, PRONAF and Bolsa Familia, had contrasting effects.
- Increased effectiveness of rural social protection programmes could be achieved by coupling programmes with environmental conditionalities and minimum staple food production, rural extension services and basic infrastructure.
- Regular programme evaluations that capture variation in and across outcomes and locations can assist programmes adapt to local contexts.

INTRODUCTION

Social protection programmes are designed to reduce poverty, vulnerability, and foster social equity, and can facilitate progress towards multiple Sustainable Development Goals (SDGs). This briefing note is based on a study by Dyngeland, Oldekop & Evans (2020)† titled "Assessing multidimensional sustainability: Lessons from Brazil's social protection programs" published in Proceedings of the National Academy of Sciences of the USA (PNAS). This study assesses the effectiveness of Brazil's social protection programme in rural areas and evaluates outcomes across four SDGs: #1 no poverty, #2 zero hunger, #3 good health and well-being, and #15 life on land. It draws out implications for Brazil's progress towards the SDGs and similar programmes that are currently being developed in sub-Saharan Africa.

BACKGROUND

Transitions to sustainability

Transitions to sustainability require balancing human development with environmental integrity[1]. These transitions are urgent[2] but currently lacking: global hunger levels are rising[3], while agricultural production continues to drive natural vegetation and biodiversity losses[4,5]. A renewed focus on sustainability transitions is reflected in national and international development agendas, including the SDGs[6].

† Dyngeland C, Oldekop JA & Evans KL (2020), "Assessing multidimensional sustainability: Lessons from Brazil's social protection programs", PNAS, DOI: https://doi.org/10.1073/pnas.1920998117.

Source: J.Oldekop, author's own, Brazil.

Importance of smallholder farmers

Approximately 12% of the world's agricultural land is managed by 475 million smallholders producing on less than 2 hectares of land[7]. These farms are located in some of the worlds' most biodiverse and threatened landscapes[8]. They tend to have fewer negative environmental impacts and can have greater productivity per unit area compared to large-scale farms[9,10]. Smallholders significantly contribute to global and domestic food supplies[11], yet also tend to be poor and food insecure[12].

Social protection programmes

Policy debates on rural poverty often discuss interventions targeting smallholders. Social protection programmes are popular government and donor-led interventions[13], and aim to protect against poverty (through social assistance), vulnerability (through social insurance), and foster social equity (through inclusion efforts)[14].

Evaluating joint outcomes

Despite the need for holistic approaches, interventions tackling larger societal and environmental problems and their evaluations often focus on single outcomes[15]. Doing so risks addressing one problem (e.g. poverty) while exacerbating another (e.g. agricultural driven deforestation). Without holistic evaluations such trade-offs can remain overlooked[16,17]. Moreover, local contexts influence the effects of interventions: successes in one region might not equate to successes in other regions. Programme evaluations therefore also need to consider spatial variation in outcomes (heterogeneity).

EVALUATING THE IMPACT OF BRAZIL'S ZERO HUNGER (ZH) SOCIAL PROTECTION PROGRAMME ACROSS MULTIPLE SDGS

The ZH programme

Brazil's flagship ZH programme is considered the primary mechanism through which Brazil met the Millennium Development Goal of halving extreme poverty and hunger[18]. The programme is internationally renowned[19], and ZH-based interventions are implemented in multiple other countries in Latin America and sub-Saharan Africa[20,21].

Fully launched in 2004, ZH encompassed more than 30 sub-programmes. Four of these formed ZH's core[22]: The National Programme to Strengthen Family Farming (PRONAF), The Food Acquisition Programme (PAA), The National School Feeding Programme (PNAE) and Bolsa Familia (BF) (Box 1 and Figure 1). ZH has since evolved into the Brasil Sem Miseria programme (Brazil without extreme poverty), which continues to operate these four programmes.

Box 1 Main ZH sub-programmes

- **PRONAF** provides family run farms with low interest agricultural credits
- **PAA** provides family farms with access to price-controlled markets
- **PNAE** provides free school meals to all children. Minimum 30% of food has to be sourced from family farms
- **BF** provides cash-transfers to poor households conditional on child school attendance and health check-ups

Research into the effects of ZH and main sub-programmes on farming, food security, and child health remains inconclusive. Some report positive effects[23–29], while others report negligible or negative effects[30–33]. Only limited evidence exists about ZH's effects on the environment[33].

Existing evaluations have used different methodologies and focused on different outcomes, locations and time-periods. This has prevented a full exploration of ZH across multiple sustainable development objectives.

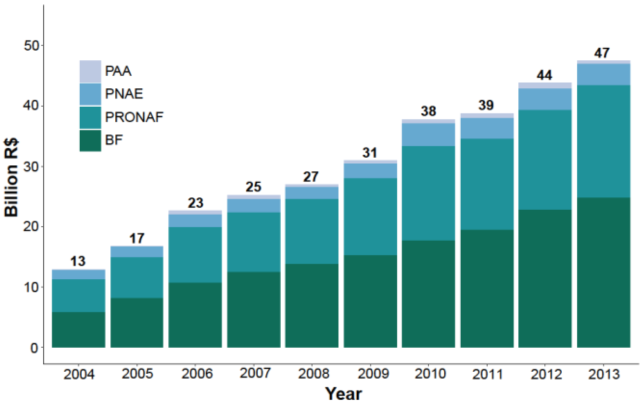

Figure 1. *ZH investment from 2004 to 2013, adjusted for inflation relative to 2013.*

Methodology

The study used publicly available data[34] to assess impacts of ZH investment on multiple sustainability outcomes across > 3,800 of Brazil's rural municipalities (74-97% depending on the outcome variable – see Dyngeland, Oldekop & Evans (2020) for details). The study has the following objectives:

- Assess long-term, large-scale effects of ZH, and the BF and PRONAF sub-programmes, on multiple sustainable development outcomes.
- Consider mean effects and spatially heterogeneous effects in the general population and the poorest sectors of society.
- Isolate the effects of ZH and sub-programmes by controlling for a range of confounding factors potentially influencing ZH allocation and outcomes.

NATIONWIDE IMPACTS ON SDGS

The following results are based on statistical methods aiming to replicate randomized controlled experiments (quasi-experimental methods) and report average impacts per rural municipality.

Food production (SDG 1)

Between 2004 and 2013, summed ZH investment increased per capita protein production by 53%. PRONAF increased per capita kilocalorie- and per capita protein production by 33% and 41%, respectively. BF increased per capita protein production by 168%. Four states experienced BF-linked increases-, and two states BF-linked reduction in kilocalorie production. The limited BF-linked increases in kilocalorie crop production is likely partially driven by a production switch to high-protein products (e.g., milk), or by encouraging a shift from food production to food purchases[32,33]. Declines in staple crop production could reduce food security and resilience to price shocks, particularly amongst poorer farmers that rely heavily on staple crops[32,35].

BF appears to have been well targeted in north-eastern Brazil (Figure 2), a poor region with low agricultural productivity[36]. PRONAF mainly targeted (and positively impacted) the already developed and agriculturally productive south[36] (Figure 2). PRONAF could deliver production increases in the north-east if some funds were diverted there.

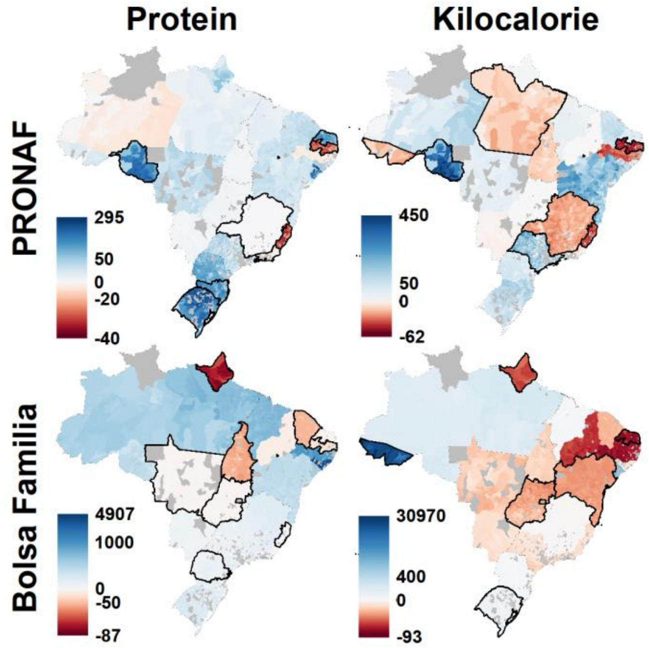

Figure 2. *Impact (% change) of PRONAF- and BF on per capita kilocalorie and protein production. Black borders show states with significantly different effects to an overall effect. For BF-Kilocalories, states with black borders are the only states where significant effects are found.*

Multi-dimensional poverty, food security and child health (SDG 1, SDG 2 and SDG 3)

Our multi-dimensional poverty measure incorporates seven metrics across three equally weighted dimensions: health (e.g. infant mortality), education (school attendance) and living standards (e.g. lack of access to safe water) and was typically unaffected by summed ZH investment (although investment reduced multi-dimensional poverty in the entire population in five states).

BF and PRONAF had contrasting effects on multi-dimensional poverty in the entire population (Figure 3). BF led to increased multi-dimensional poverty (by 35%), despite improving the educational dimension in four states, while PRONAF reduced multi-dimensional poverty (by 10%). Both BF and PRONAF generally had negligible effect on multi-dimensional poverty in the poorest sectors.

BF-linked negative effects could be due to a diversion of funds to BF and away from institutions and infrastructure that generate positive health outcomes (e.g. health centres)[37,38]. We find BF-linked increases in child malnutrition (by 68%; Figure 3), which also supports this. Negative effects on child health could arise from numerous mechanisms including supply side constraints or insufficient availability of additional support.

PRONAF's positive effects on the general population could be linked to improved labour markets driven by smallholder agricultural investment[35]. Negligible effects on the poorer sectors probably arise as poorer farmers tend to benefit less from labour market stimulation[39], and have lower PRONAF participation rates[40].

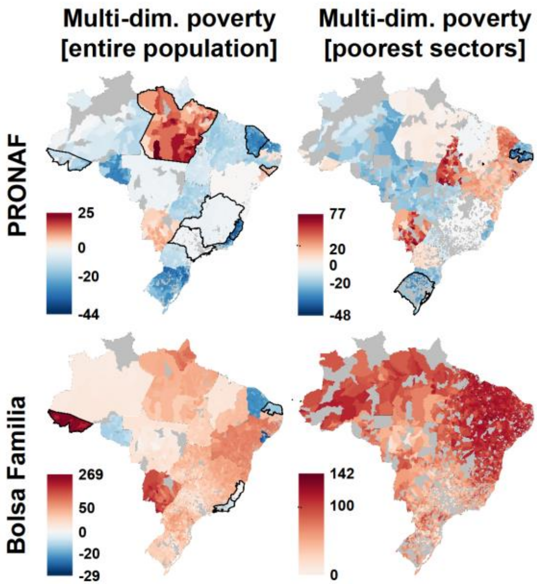

Figure 3. *Impact (% change) of PRONAF- and BF on multi-dimensional poverty in the entire population and poorest sectors. The impact of BF on child malnutrition in the poorest sectors is similar to multi-dim. poverty in the poorest sectors and is therefore not included here. Black borders show states with significantly different effects to the overall effect. For PRONAF-multi-dimensional poverty in the poorest sectors, states with black borders are the only states where significant effect is found. For BF-multi-dimensional poverty in the poorest sectors when lower quality data is excluded only two states remain with a significant effect (increase)*

Natural vegetation (SDG 15)

The impact of summed ZH-, PRONAF- and BF investment varied across biomes, driving both losses and gains.

The Pampa (characterized by large plains and natural grasslands) was particularly negatively affected by both PRONAF and BF, with an average 24% and 42% loss, respectively (14,427 km^2 and 34,704 km^2, respectively, across 92 municipalities). PRONAF and BF also drove losses in the Cerrado biome by an average 3% and 3.9%, respectively, (31,030 km^2 and 45,851 km^2, respectively, across 1,020 municipalities) and in the Amazon biome by an average 1.6% and 2.5%, respectively (42,863 km^2 and 82,597 km^2, respectively across 454 municipalities). Note, an apparent positive impact of summed ZH investment in the Amazon biome, which contrasts with the negative impact of PRONAF and BF, suggest that the more minor ZH sub-programmes (PNAE and PAA) may drive positive forest transitions in the Amazon. BF also drove losses in the degraded Atlantic Forest, with an average 0.9% (2,660 km^2 across 2,337 municipalities).

Conversely, the Atlantic Forest has been positively affected by PRONAF, with an average 10% gain in natural vegetation cover (22,316 km^2 across 2,337 municipalities). The Caatinga biome has also slightly benefitted from PRONAF and BF, with respective average gains of natural vegetation cover of 1.2% and 0.5%, (respectively 5,594 km^2 and 1,743 km^2 across 1,015 and 772 municipalities).

Cash-transfer programmes elsewhere have been linked to deforestation, driven by increased consumption- and subsequent production of products that require large areas of land[41].

Differences between biomes have likely facilitated different responses: the dominance of hills and peaks in much of the Atlantic Forest makes mechanization difficult, and likely influenced farmer's decisions to use PRONAF to intensify on suitable land (allowing for forest regrowth on marginal lands). Indeed, positive forest transitions in the Atlantic Forest are associated with agricultural intensification[42]. The relatively flat terrain in the Cerrado, and especially the Pampa, has facilitated expansion of arable systems (soy and sugar-cane). Moreover, the limited coverage of protected areas in the Pampa[43] may have facilitated agricultural expansion, and contrasts with higher rates of protection in other biomes, including the Atlantic Forest[44].

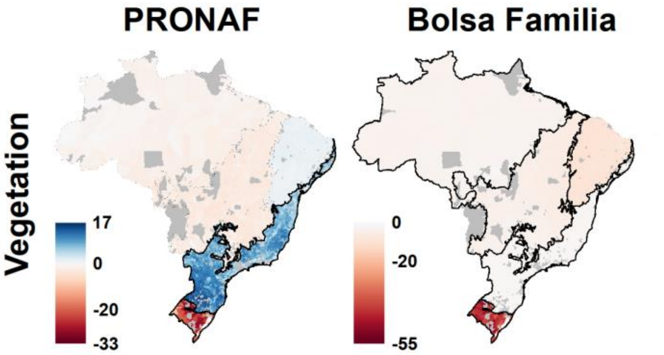

Figure 4. *Impact (% change) of PRONAF- and BF on natural vegetation over. Black borders show biomes with significantly different effects to an overall effect. When lower quality data is excluded the models predict BF-led vegetation gains (instead of losses) in the Caatinga. Moreover, the effect from PRONAF on Brazil overall-, Cerrado and Caatinga becomes non-significant.*

IMPLICATIONS

Alleviating poverty is essential, but insufficient attention is often give to the unintended environmental consequences of development policies. ZH social protection programmes targeting smallholder farmers have delivered joint positive outcomes across multiple sustainable development goals, but also trade-offs between environmental- (SDG 15), poverty- (SDG 1) and food security (SDG 2) goals (Figure 5).

Environmental conditionalities linked to social protection programmes that encourage retention or recovery of natural vegetation and promote sustainable farming practices could mitigate trade-offs between environmental and food production objectives. Ensuring minimum staple crop production or crop diversification could also increase resilience against price shocks and disease, and reduce the trade-offs that we find between food (kilocalorie) production, poverty and health.

Rural credit conditional on proof of environmental land registration and intent to follow environmental regulation (the Brazilian Central Bank's policy Resolution 3,545) has reduced deforestation rates in the Amazon[45]. In a similar vein, we suggest environmental conditionalities and promotion of sustainable farming practices could be based on proof of environmental compliance, and ideally should be targeted to the need of each region (e.g. encourage vegetation restoration in the highly degraded Atlantic Forest).

Conditionalities would have to be coupled with mechanisms to ensure that disadvantaged farmers can comply, participate and benefit from interventions. Site-specific agricultural extension services could play a key role[46], and social protection programmes should align efforts with existing regional and national extension services. Despite the importance of agricultural extension services, these services are insufficient in many areas in Brazil and other low and middle-income countries[12,47,48]. Such service provision also tends to fall outside the remit of social protection programmes[48].

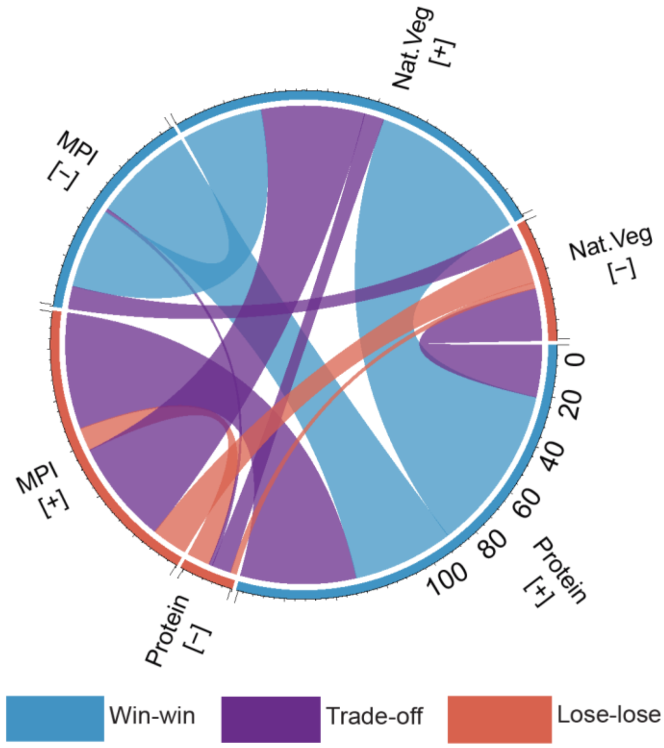

Figure 5. *Joint positive (win-win), trade-offs, and joint negative outcomes (lose-lose) from ZH across three sustainability outcomes. The diagram represents linkages between outcome possibilities (positive or negative). The thickness of each link between two outcomes represents the percentage of municipalities in which investment leads to the stated outcomes (indicated by the scale bar around the circle). Impact of program outcomes is calculated from robust multivariable regression models of a covariate balanced sample (n = 4,663-4,924 municipalities depending on the outcome pairings).*

Likewise, investment in social protection programmes should not come at the expense of basic services (e.g. health centres). Programme effectiveness ultimately depends on these services, which are often lacking in rural areas in lower- and middle-income countries. Diverting government spending from basic services could lead to trade-offs or joint negative sustainability outcomes.

Our results demonstrate spatial variation in impact, which highlights the importance of local contexts when designing and implementing social protection programmes. We also highlight potential mechanisms (e.g., switches in agricultural production practices; diversion of agricultural production practices; diversion of unding from basic services) which might have influenced ZH effectiveness. Lessons learned from ZH in Brazil could inform programme implementers elsewhere.

Currently ZH- and sub-programme inspired programs are being implemented in sub-Saharan African countries[21,49,50]. In this region rural infrastructure and support institutions are often very limited[51,52]. This could limit program effectiveness here. On the other hand, the potential to close yield gaps[53] and reduce poor health and food insecurity through increased food production is particularly high[54].

Social protection programmes are currently suffering from drastic budget cuts in Brazil[55]. Given the multiple benefits of ZH we identified, it is possible that current changes will halt and reverse Brazil's advances towards the SDGs. In contrast, several African countries have been increasing investment in social protection programmes based on ZH[20]. Moreover, as a response to the ongoing COVID-19 pandemic, the World Bank will over the next 15 months deploy up to $160 billion to support social protection measures in developing countries around the world[56]. Our results can inform the development of these strategies

POLICY RECOMMENDATIONS

Transitions to sustainability require balancing human development with environmental integrity. To help achieve this, we recommend that social protection programmes should:

- Promote minimum staple crop production or crop diversification to increase food security resilience against price shocks and reduce programme trade-offs;
- Couple environmental conditionalities (e.g. natural vegetation retention, restoration and sustainable farming practices) with social protection programmes to mitigate trade-offs between environmental and food production objectives.
- Provide additional support, especially to the poorest households and those with the greatest yield gaps, to ensure they are able to participate and benefit from programmes.
- Align programme implementation with national and regional systems and plans for providing infrastructure including rural extension services that play a key role in realising potential benefits of social protections systems.
- Carry out regular, detailed programme evaluations across multiple outcomes (including nontarget ones) to ensure that potential trade-offs and spatial variation in outcomes are identified and rectified.

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