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# Food-assistance programs and household resilience: a comparative study of China and Brazil

Jingjing WANG (✉)[1,2], Sergio SCHNEIDER[3], Ângelo BELLETTI[3], Shenggen FAN[1,2]

1 Academy of Global Food Economics and Policy, China Agricultural University, Beijing 100083, China.
2 College of Economics and Management, China Agricultural University, Beijing 100083, China.
3 Department of Sociology, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre 90010–150, Brazil.

## KEYWORDS

Comparative analysis, food-assistance programs, household resilience, institutional governance, social protection

## HIGHLIGHTS

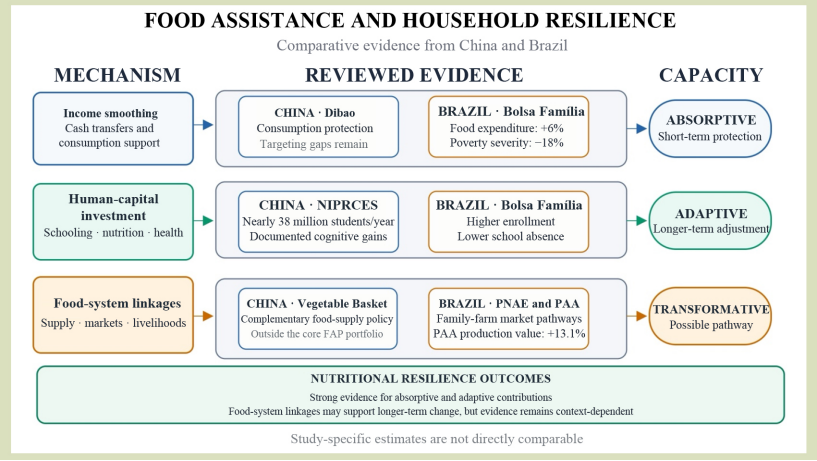
- China and Brazil use different food-assistance program designs to strengthen food security and household resilience.
- Both countries support children's education and nutritional gains through different program mechanisms.
- China's food-assistance portfolio emphasizes large scale direct nutrition provision and income support, whereas Brazil's include cash transfers, school meals and public procurement from family farms.
- However, neither country's institutional model eliminates target exclusions or implementation gaps.
- Producer and food-system linkages show potential; evidence of lasting structural change remains limited.

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Correspondence: jwang010@cau.edu.cn

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## GRAPHICAL ABSTRACT




## ABSTRACT

Food-assistance programs (FAPs) are important instruments for supporting household resilience, but institutional conditions can shape how program resources and designs translate into outcomes. This paper compares China and Brazil, two upper-middle-income countries with large but institutionally distinct food-assistance portfolios, using a framework comprising absorptive, adaptive and transformative capacities. In both countries, the most consistent evidence relates to absorptive and adaptive capacity through consumption support and the preservation of child nutrition, education and human-capital investment. Evidence from China documents the reach and developmental outcomes of minimum-income, school-feeding and nutrition programs, alongside targeting and local implementation constraints. Evidence from Brazil covers conditional cash transfers, school feeding and public procurement from family farms, while also highlighting persistent exclusion errors, municipal variation and policy redesign. Food-system and producer linkages provide potential pathways toward transformative capacity, although evidence of lasting structural change remains limited. Overall, the evidence indicates that both portfolios contribute most consistently to absorptive and adaptive

capacity through consumption protection and human-capital preservation, whereas evidence for transformative capacity remains limited and highly context-dependent.

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## 1 Introduction

Despite substantial reduction in poverty over the past three decades, food insecurity remains a persistent global challenge. In 2023, about 735 million people experienced hunger, while 2.3 billion lacked consistent access to adequate food[1]. The persistence of food insecurity in the face of declining absolute poverty reflects the complex nature of food access, determined not only by household income but also by food availability, market functioning, dietary norms and social-protection infrastructure[2]. In upper-middle-income countries where absolute poverty has declined substantially, food insecurity and double burden of malnutrition continue to affect vulnerable populations, necessitating sustained policy intervention[3]. In this context, food-assistance programs (FAPs) have become central policy instruments for addressing food insecurity and strengthening household capacity to manage food-related shocks[4].

China and Brazil provide analytically informative examples of large-scale but still evolving food-assistance portfolios. Since the early 2000s, both countries have expanded food-assistance interventions supporting food access and nutrition through distinct combinations of income transfers, school feeding, and targeted nutrition support. China has addressed food insecurity through a multipronged strategy, including the Dibao minimum livelihood guarantee established in 1999 with rural expansion in 2007[5,6], school-feeding initiatives through the Nutrition Improvement Program for Rural Compulsory Education Students (NIPRCES) launched in 2011, and targeted nutritional supplementation like the Ying Yang Bao program initiated in 2001[7]. Together, these programs collectively serve over 100 million individuals across distinct target populations. Brazil's food-assistance portfolio includes Bolsa Família, a conditional cash transfer established in 2003, the National School-Feeding Program (PNAE) and public food procurement through Food Acquisition Program (PAA)[8–10]. Despite shared objectives, namely, protecting food access and enabling human development, these programs differ significantly in design, coverage patterns, and outcomes[9,11].

Understanding how these programs build household resilience capacity, defined as the stock of assets, capabilities and resources that households maintain to withstand food security disruptions, across different institutional contexts contributes importantly to both social-protection scholarship and practical policy design in emerging economies. Resilience represents a central concern in food security literature and policy because it shifts attention from immediate consumption adequacy to household capacity to manage shocks and stresses[12,13]. The comparison of China and Brazil's approaches is particularly instructive because it reveals how institutional context, including administrative capacity, program governance architecture, and constitutional framing, shapes the design and effectiveness of food-assistance mechanisms.

Existing literature provides substantial evidence on the two national systems but generally examines them separately. Studies of China document the expansion and developmental effects of Dibao, NIPRCES and targeted nutrition interventions while identifying administrative fragmentation and uneven targeting as persistent constraints[5,7,14]. Research on Brazil evaluates the poverty and education effects of Bolsa Família and examines PNAE and PAA as complementary mechanisms connecting school feeding and family agriculture[8–10]. These literatures establish important program-specific findings, yet offer limited comparative understanding of how different food-assistance portfolios support household resilience. The contribution of this study is therefore comparative and integrative. It examines how income support, human-capital investment and food-system linkages can contribute to the absorptive, adaptive and transformative capacities of households under different institutional conditions. It then considers the implication of these capacities on nutritional resilience and nutrition security.

This study examines how food-assistance programs in China and Brazil contribute to household nutritional resilience under different institutional conditions, using a framework of absorptive, adaptive and transformative capacities. The

comparison focuses on three pathways: short-term consumption protection associated with absorptive capacity; the preservation of nutrition, education and other human-capital investments associated with adaptive capacity; and program linkages with livelihoods, producers and food systems that can contribute to transformative capacity. Nutritional resilience was examined across these pathways by considering whether the available evidence indicates improved ability to maintain adequate and nutritious diets. Given that the underlying studies differed in program, population, period and outcome measurement, the analysis identified evidence-consistent contributions and limitations rather than directly comparable or causally attributable effects. By analyzing these pathways, this study contributes in three ways: organizing heterogeneous evidence from both countries within a common resilience framework; distinguishing documented program outcomes from the institutional arrangements that could condition implementation; and identifying policy lessons whose transferability depends on administrative, market, fiscal and political context.

## 2 Conceptual framework and research design

### 2.1 Defining household resilience and food-assistance mechanisms

This study defined household resilience as the capacity of households to manage food-security shocks and stresses without suffering irreversible losses in well-being, assets or future opportunities[12,15]. Following the resilience literature, the analysis distinguished three functional capacities (Fig. 1). Absorptive capacity refers to the ability to cope with immediate shocks while maintaining essential consumption and avoiding damaging responses such as asset depletion. Adaptive capacity refers to the ability to adjust behavior, resource use, and livelihood strategies during prolonged or recurring stress while preserving human-capital investment. Transformative capacity concerns the ability to alter institutional, market and livelihood conditions that systematically reproduce vulnerability[13,16]. Nutritional resilience is an outcome-oriented concept describing whether households can maintain or improve access to adequate, diverse, safe and nutritious diets when exposed to shocks and longer-term stresses. Absorptive, adaptive and transformative capacities can each contribute to nutritional resilience, which in turn supports the broader objective of nutrition security.

Food-assistance programs can contribute to these capacities through three broad mechanisms. First, consumption smoothing through cash or food transfers primarily supports absorptive capacity by stabilizing consumption during shocks and reducing the need for damaging coping strategies, such as selling productive assets or withdrawing children from school[17,18]. Its effectiveness depends on transfer adequacy, coverage, reliability and responsiveness to changing needs. Second, human-capital investment can contribute primarily to adaptive capacity. School feeding, nutritional supplementation and education- or health-related program conditions can help households maintain children's nutrition, health and education during periods of hardship[19,20]. These effects can improve households' longer-term ability to adjust to economic and livelihood changes. Such programs can also provide immediate consumption protection, illustrating that the mechanisms and capacities are related rather than mutually exclusive. Third, food-system and producer linkages can create pathways toward transformative capacity. When food-assistance programs connect institutional food demand with family farmers, producer organizations or local food markets, they can influence market access, production incentives and the availability of nutritious foods[13,21]. The contribution of these arrangements to transformative capacity depends on their scale, durability, inclusiveness and structural effects.

Institutional conditions, including beneficiary-information systems, administrative capacity, legal frameworks, intersectoral coordination and non-state participation, can enable or constrain each pathway. Together, these pathways can support nutritional resilience through different combinations of the three capacities: immediate consumption protection, preservation of health and human capital, and longer-term changes in food access or livelihood conditions.

### 2.2 Research design

This study adopted a structured narrative synthesis of secondary literature, organized through a comparative institutional lens. Unlike a systematic review, this approach did not apply formal inclusion and exclusion criteria or assess publication bias. Evidence was selected based on relevance to the resilience framework and methodological rigor of the

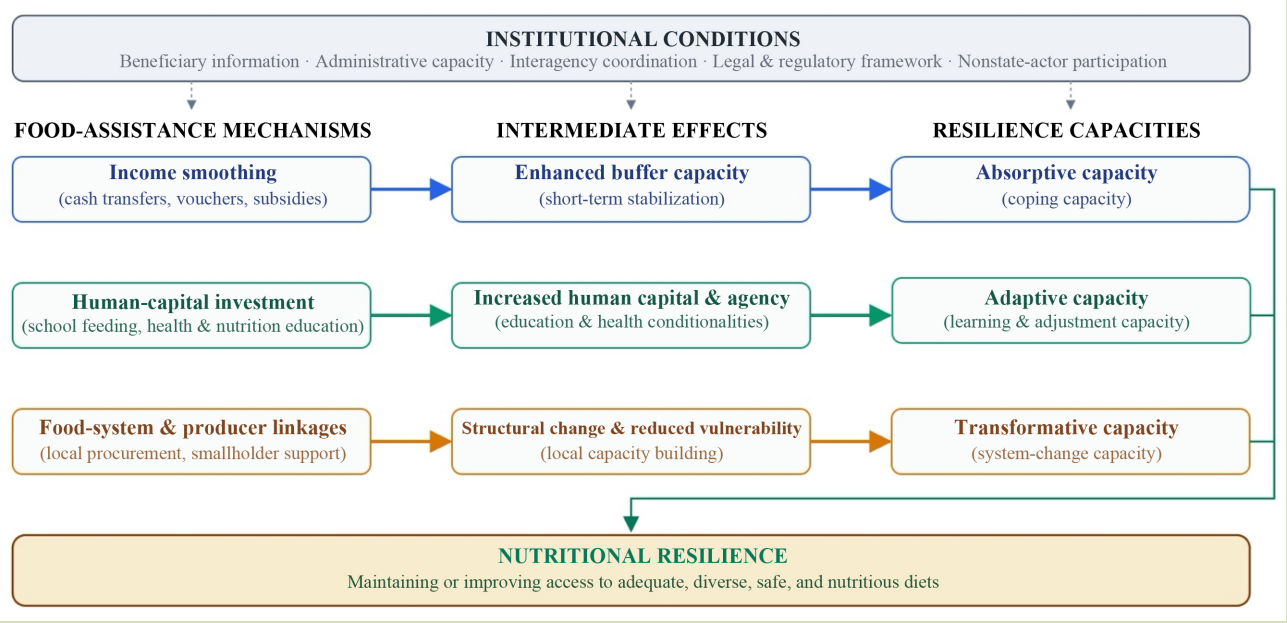



**Fig. 1** Conceptual framework linking food-assistance mechanisms, institutional conditions, and dimensions of household resilience. Arrows indicate relationships examined in the narrative synthesis rather than estimated causal effects.

underlying evaluations, with preference given to peer-reviewed impact evaluations and official administrative reports over gray literature where available. The analysis did not generate new empirical estimates but instead applied the resilience framework to organize and interpret existing data across different development contexts.

The analysis drew on peer-reviewed studies, administrative reports and selected institutional publications. For the Chinese context, evidence was synthesized from peer-reviewed impact evaluations of the NIPRCES and Dibao programs, alongside administrative data from the Ministry of Civil Affairs and the National Health Commission. For Brazil, the analysis relied on the extensive literature regarding Bolsa Família, as well as reports from the Unified Registry for Social Programs (CadÚnico) and the Food and Nutrition Surveillance System (SISVAN). Cross-national contextual and program evidence was drawn primarily from the 2010–2024 period, with earlier sources retained where necessary to document program origins and foundational evaluations.

Using this evidence base, the analysis first synthesized each country's program landscape, documented outcomes and principal limitations. Then it compared the evidence relating to absorptive, adaptive and transformative capacity and synthesized the implications for nutrition resilience. Institutional organization was examined as a set of conditions that could enable or constrain these pathways. While this methodology enabled a broad institutional comparison, it has important limitations. Evidence differed across programs in source type, outcome definition, population, period and identification strategy. Effect estimates were therefore compared as evidence of the types of outcomes documented within each national literature, not as directly comparable treatment effects. Coverage was also not equivalent: China's totals were combined participation or identification across several interventions and could have included overlapping populations, whereas Brazil's CadÚnico coverage describes registry enrollment rather than receipt of a specific benefit.

To place the comparative analysis in historical context, Fig. 2 presents selected milestones in the development of the principal food-assistance programs and related institutional arrangements in China and Brazil. Recent milestones include China's revised NIPRCES implementation measures in 2022[22] and Brazil's relaunch of Bolsa Família in 2023[23].

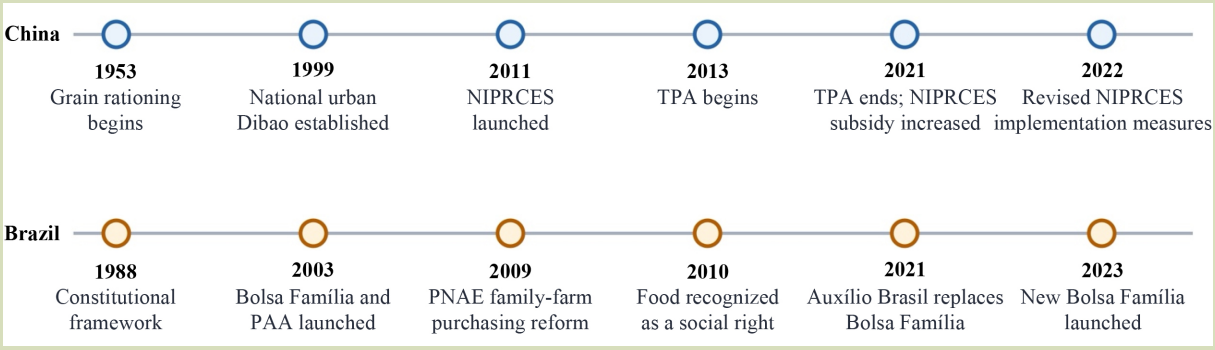



**Fig. 2** Selected milestones in the evolution of food-assistance programs in China and Brazil. The programs differ in objectives, target populations and institutional location; the timeline is not intended to imply direct program equivalence. NIPRCES, Nutrition Improvement Program for Rural Compulsory Education Students; TPA, targeted poverty alleviation.

# 3 China's food-assistance programs and household resilience

## 3.1 Food security and nutritional challenges in China

China's food security trajectory over four decades represents one of the largest and fastest improvements. Undernourishment prevalence fell from 22.9% in 1990 to below 2.5% by 2020, driven primarily by agricultural productivity growth, rural market reforms and rising household incomes[24]. By 2021, the government declared the elimination of absolute poverty as the rural poverty rate collapsed from 97% in 1978 to near-zero under the official 2300 yuan per year poverty line[5,25].

However, this success now coexists with an emerging double burden of malnutrition. National evidence continues to identify micronutrient and diet-quality concerns alongside rapid increases in overweight and obesity[26]. China is also undergoing a dietary transition characterized by greater consumption of animal products, salt and ultra-processed foods and declining consumption of some traditional foods[3]. These nutritional vulnerabilities vary geographically and across population groups, and migrants can face barriers to locally administered social protections because of household registration framework restrictions[6].

## 3.2 Evolution of the food-assistance program landscape

China's food assistance has evolved from the broad-based grain-rationing system introduced in the 1950s to a portfolio of targeted interventions. Modern programs focus on specific life-cycle windows, particularly children and low-income rural households[7]. The student milk program was launched in 2000 with subsequent intervention evidence documenting gains in growth and bone mineral accretion among participating schoolchildren[27]. Ying Yang Bao targets rural infants and young children with fortified complementary-food supplements; evaluations report improvements in anemia, growth and developmental outcomes[28,29].

NIPRCES is China's principal national school-nutrition program. Since its launch in 2011, it has expanded to reach nearly 38 million students annually across 1,552 counties in 28 provinces[30]. In 2021, the central government increased the daily meal subsidy from 4 to 5 yuan per student[31]. This 25% funding increase reflects a sustained institutional commitment to rural human capital, even as the program reached a mature implementation phase. Beyond direct caloric provision, NIPRCES serves as a vital infrastructure initiative; cumulative central investment of 197 billion yuan has been made not only for food costs but also for the construction and upgrading of school canteens in remote regions.

Beyond school meals, income-based resilience is addressed through the Dibao (minimum livelihood guarantee) and the targeted poverty alleviation (TPA) campaign. Dibao provides a means-tested cash transfer to about 62 million rural and urban residents at peak enrollment around 2013–2016[5], with coverage declining subsequently. TPA, which operated from 2013 to 2021, was a more granular initiative that identified 100 million individuals for a multimodal support system involving

housing relocation, asset grants and employment promotion[24,32].

China's private sector and NGO engagement in food assistance remains nascent. The Oasis Food Bank, established in 2014 as the country's first non-government-led food-assistance initiative, had by 2021 collected food from 312 donors and distributed it to about 1.25 million people; a meaningful contribution, but one operating without a regulatory support framework and dependent on donor goodwill rather than institutional embedding[7].

### 3.3 Resilience-building assessment: absorptive and adaptive capacity

When assessed through the lens of absorptive capacity, China's income-support and poverty-alleviation interventions (Dibao and TPA), have achieved broad reach, although targeting consistency remains a concern. Fragmented administration across multiple ministries and a lack of a unified registry mean that 30%–50% of eligible households have often been excluded based on local cadre discretion[14,33]. Given that transfer amounts (averaging 600–700 yuan per month for urban recipients and 400–500 yuan per month for rural recipients) are calibrated to consumption floors rather than asset-building, they might provide a modest buffer against acute food price shocks but could be insufficient during major or prolonged crises[5,6]. Participation in the program is associated with a statistically significant increase in household expenditure on children's education[34]. The NIPRCES functions as an effective income-smoothing mechanism by reducing the financial burden of education. By reducing school-related household expenditure, NIPRCES can lessen one source of financial pressure on low-income rural families[34].

China's adaptive-capacity evidence is concentrated in NIPRCES. Early exposure increased word-test scores by 0.337 standard deviations (SD) and mathematics scores by 0.195 SD[30], while participation was associated with a 0.22–0.42 SD increase in height-for-age scores[35]. One evaluation also found a 4.25 percentage-point increase in maternal labor-force participation, associated with reduced childcare demands[25]. Benefits nevertheless vary with school attendance, household food security and implementation conditions. Reports of inadequate cafeteria infrastructure and unbalanced menus in some sites indicate that program reach does not ensure uniform nutritional quality[36].

### 3.4 Nutritional and governance gaps

China's approach to nutritional resilience has historically prioritized caloric quantity, often resulting in grain-heavy menus[36]. Unlike the integrated supply-side model found in Brazil, Chinese FAPs operate primarily as demand-side interventions that do not structurally alter local food environments[7]. While targeted programs like Ying Yang Bao have successfully reduced anemia rates from 35% to 8.2% among rural infants, a critical gap persists in addressing the broader nutrition transition[3,28].

China's FAP architecture faces two structural constraints that limit its effectiveness beyond the program-level gains documented above. The first is governance fragmentation. Responsibilities are split between the Ministries of Civil Affairs, Education and Health, each maintaining separate beneficiary lists without a centralized registry[7]. The lack of a unified registry results in significant targeting inconsistencies[14]. Without a unified registry, ministries may have difficulty identifying coverage gaps across programs and coordinating supplementary support for households that remain underserved[33].

The second constraint is the predominantly demand-side orientation of the principal food-assistance portfolio. These programs increase purchasing power or provide in-kind nutrition but do not include a national PNAE-style requirement linking school-food expenditure directly to family farms. China nevertheless has complementary supply-side policies. The Vegetable Basket Project supports production, distribution, reserves, market information and price stability for major fresh-food categories, but it operates outside the narrowly defined food-assistance portfolio[37]. Reported variation in NIPRCES meal quality further indicates that nutritional standards and adequate funding do not always translate into diversified menus at every implementation site[36].

## 4 Brazil's food assistance programs and household resilience

### 4.1 Food insecurity and vulnerability in Brazil

Despite decades of economic growth, Brazil continues to face substantial food insecurity. During the peak of the COVID-19 pandemic, about 125 million people, 56.2% of the population,

experienced some form of food instability[1]. Within this group, 17.2 million individuals experienced severe food insecurity characterized as hunger[1]. This vulnerability is a reflection of deeply entrenched structural inequalities, including one of the highest Gini coefficients globally and a large urban informal sector that leaves 35% of the workforce without stable benefits[11]. Similar to China, Brazil confronts a double burden of malnutrition in which persistent stunting in impoverished regions coexists with a rapid rise in overweight and obesity[3]. With about 85% of the population living in cities, the food environment most Brazilians navigate daily is defined by food-service markets, supermarket retail, and away-from-home eating rather than by smallholder agriculture or food purchased for schools and other public institutions. About 30% of household food expenditure now occurs away from home, a share that has grown substantially since the mid-1980s and is closely associated with higher consumption of ultra-processed foods and declining intake of traditional staples such as rice and beans[38]. Surveillance data from SISVAN confirm that excess weight has increased consistently across all life stages and all macro-regions between 2008 and 2019, reaching 69.1% among adults in the southern Brazil by 2019, with rising ultra-processed food consumption documented even among pregnant women in southern states[39,40].

Brazil's food-assistance architecture developed within the broader rights-based framework of the post-1988 constitutional order. Food itself was added explicitly to the social rights listed in Article 6 by Constitutional Amendment No. 64 in 2010, strengthening the legal and normative basis for food-security policy[23,41].

## 4.2 Evolution of the FAP Landscape

As of June 2026, Brazil's Bolsa Família served about 19.4 million families comprising 52 million people[9,11]. By linking transfers to school attendance and health checkups, the program aims to build long-term human capital[8]. Participation is managed through CadÚnico, which includes more than 90 million low-income and socially vulnerable individuals and serves as the gateway to a wide range of federal, state, and municipal social policies, not only Bolsa Família[11]. Between 2001 and 2011, the Bolsa Família was responsible for between 12% and 21% of the total reduction in Brazil's Gini coefficient, highlighting its role in broader inequality reduction[9].

A second pillar of the Brazilian model is the complementary operation of PNAE and PAA. Under the 2009 PNAE reform, at least 30% of federal school-feeding transfers were to be used for direct purchases from family farms and traditional-community producers. From 2025 onward, this minimum threshold was increased to 45%, reflecting the recognition that there was room to further strengthen the policy and intensify support for family farming through public procurement. PAA is a related but administratively separate public-purchasing program. Together, they connect public food demand with family agriculture, but impacts estimated for PAA or PNAE should not be treated as effects of a single combined intervention[10,42].

Bolsa Família also did not persist unchanged throughout the study period. In 2021, it was terminated and replaced by Auxílio Brasil amid the social and economic disruption of the COVID-19 pandemic. De Sordi[43] interprets this transition as part of a wider reconfiguration and weakening of Brazil's social-protection network rather than as a simple change in program branding. However, in 2023, Bolsa Família was reinstated as the New Bolsa Família, restoring the broad scope of the original program while increasing the amount of benefits provided to eligible households. This subsequent policy reversal further illustrates how social policies remain subject to political contestation and shifting governmental priorities over time.

## 4.3 Resilience-building assessment: absorptive and adaptive capacity

In terms of absorptive capacity, Bolsa Família serves as Brazil's primary income-smoothing mechanism. Participation in Bolsa Família was associated with about 6% higher food expenditure among beneficiary households compared to non-beneficiaries, and the program further reduced the severity of poverty by 18%, providing a critical consumption floor[9]. While base grants typically cover 50%–70% of the poverty line, their regularity can help households plan consumption, although benefit rules and program designs remain politically revisable[11].

Brazil's adaptive-capacity building is driven by the conditionalities embedded in Bolsa Família. The program increased school participation for children aged 6–17 by 4.5 percentage points overall, with a larger estimated increase of

8.2 percentage points for girls, and reduced the probability of school absence by 3.6 percentage points among beneficiaries[8]. These enrollment and attendance gains most likely reflect the income effect of the transfer itself, by reducing household poverty and the opportunity cost of keeping children in school rather than the conditionalities operating as a strict enforcement mechanism, since compliance monitoring in Brazil has historically been applied with considerable tolerance[8]. Bolsa Família and NIPRCES therefore produce education-related outcomes through different mechanisms. Bolsa Família reduces household income constraints through cash transfers, whereas NIPRCES reduces school-related food expenditure through direct meal provision. Their estimated effects are not directly comparable.

### 4.4 Food security and nutritional resilience

Brazil's food-assistance portfolio combines school-meal standards with public purchasing from family farms. PNAE establishes nutritional requirements and restricts ultra-processed foods in school meals[42]. Its family-farm purchasing requirement is distinct from PAA, a separate public-purchasing program; therefore, the two should not be described as a single administrative linkage.

Evidence indicates that these purchasing arrangements can provide additional markets for family farmers, although results should be attributed to the specific program evaluated. A case-based institutional report describes how predictable school-food demand could reduce market uncertainty for participating producers[44]. A propensity-score-matching evaluation found that PAA participation increased production value by 13.1%, with larger effects among smaller, lower-income establishments and those in the semiarid region[45]. Related agricultural policies, including subsidized credit and technical assistance, also influence commercialization outcomes[46]. Although PAA and PNAE have substantial potential to transform Brazil's food system by linking public procurement with family farming, their effectiveness is highly context-dependent. Local institutional capacity, discretionary implementation, annual budget fluctuations, bureaucratic barriers and marked geographic heterogeneity produce considerable variation in program coverage and impacts across regions[47].

This supply-side strategy has a structural boundary defined by the populations and settings it was designed to reach. As established in previous section, about 85% of Brazil's population lives in urban areas, where retail availability and food-service markets influence dietary quality much more directly than purchases by schools and other public institutions. School feeding and public purchasing from rural producers reach only part of this wider food environment. Complementary regulatory, labeling, planning and public-health interventions are needed to improve retail markets, food-service consumption and urban dietary patterns.

### 4.5 Governance and accountability

Brazil's institutional organization combines an integrated household-information registry with program-specific eligibility rules and local verification. CadÚnico supports information sharing across social programs, but registration and exclusion errors persist and its coverage should not be equated with benefit receipt[11,48]. This arrangement differs from China's more program-specific beneficiary lists, but the available evidence does not establish uniformly superior targeting across all programs or localities.

Brazil's legal framework also differs from China's. Food was added to Article 6 of the Federal Constitution as a social right in 2010[23]. This strengthens the normative basis for food-security policy but it does not constitutionally entrench the design or continuity of a particular transfer program, as demonstrated by the transition from Bolsa Família to Auxílio Brasil[43]. Participatory councils provide channels for monitoring and representation, although their independent effects on program outcomes have not been isolated[41]. At the same time, these participatory institutions remain susceptible to political shifts, as illustrated by the dissolution of the National Council for Food and Nutrition Security in 2019 and its re-establishment under the subsequent administration in 2023, highlighting the institutional vulnerability of participatory governance mechanisms.

Brazil's food-security institutions also developed through sustained interaction between government and organized civil society, including national and municipal councils and food-and-nutrition security networks[41]. These institutions provide channels for participation and monitoring, although the evidence reviewed here does not isolate their independent effects on program outcomes.

### 4.6 Multisector collaboration

Brazil's programs involve coordination across education, health, agriculture and subnational government. PNAE combines federal rules with implementation by states and municipalities whereas selected municipalities have developed additional coordination with nutritionists, extension services, producer organizations and other local actors[44]. These cases illustrate possible coordination mechanisms but should not be treated as representative of uniform national implementation.

Civil-society organizations, producer associations, food banks, supermarkets and food companies also complement public provision in parts of Brazil. Evidence from southern Brazil illustrates how agroecological networks can support certification and market access[49]. During the COVID-19 pandemic, community initiatives expanded emergency food distribution and solidarity kitchens[43]. These actors can fill specific provision and coordination gaps, but they do not substitute for stable public programs, and the reviewed evidence does not quantify their aggregate contribution to household resilience.

China's NIPRCES also involves coordination across multiple government bodies, although the literature reviewed for this study describes more parallel administrative channels and fewer formalized non-state roles. The Oasis Food Bank provides one illustration of non-governmental provision but a single organization cannot represent the full scale of non-state participation in China. The comparison highlights differences in the documented roles of governmental and non-state actors in food-assistance provision.

## 5 Comparative analysis

### 5.1 Absorptive capacity: income-smoothing mechanisms

Access limitations affect the absorptive reach of income-support programs in both countries, although the available exclusion estimates are not directly comparable. Table 1 provides a comparison of selected indicators of program reach and targeting. China's rural Dibao is estimated to exclude 30%–50% of eligible households[14]. Brazil's integrated registry supports cross-program identification but systematic-review evidence documents continuing exclusion associated with registration, documentation, income reporting and local implementation[48].

Transfer amounts in both countries provide meaningful protection. China's Dibao benefits average 600–700 yuan per month for urban recipients and 400–500 yuan per month for rural recipients and are calibrated primarily to minimum consumption needs rather than asset accumulation[5,6]. Brazil's Bolsa Família base benefits, by comparison, typically amount to 50%–70% of the poverty line[11]. In both countries, the protective role of transfers depends on benefit adequacy, coverage and responsiveness to shocks.

### 5.2 Adaptive capacity: human-capital investment

Both countries operate large-scale school-linked interventions that can support adaptive capacity by reducing financial barriers to nutrition and education. The underlying

**Table 1 Comparison of income-smoothing mechanisms**

| Dimension | China | Brazil |
|---|---|---|
| Program reach* | Dibao reached about 62 million people at peak enrollment[5]; NIPRCES serves about 38 million students annually[29]; TPA identified about 100 million people cumulatively during 2013–2021[24,32]. These populations could overlap | Bolsa Família reached 19.4 million families, comprising 52 million people in June 2026; more than 90 million people were registered in CadÚnico in 2023. Registry enrollment is not equivalent to benefit receipt |
| Registry/targeting* | Program-specific administrative lists, substantial local variation, and local discretion | Nationally integrated CadÚnico records support multiple programs; eligibility rules and local registration and verification processes remain program-specific[9] |
| Targeting accuracy | Rural Dibao studies report exclusion of about 30%–50% of eligible households[14] | Exclusion errors are documented but no estimate is directly comparable in construction to the Dibao number[48] |
| Distributional evidence | Effects vary across programs and locations[5] | Bolsa Família accounted for an estimated 12%–21% of the decline in the Gini coefficient during the period examined[9] |

Note: *Program-reach and exclusion values are not directly comparable because they refer to different programs, populations, periods and measurement methods.

mechanisms nevertheless differ. Table 2 presents selected outcomes but differences in interventions and evaluation designs preclude a direct ranking. China's NIPRCES delivers nutrition directly through school-based provision, with evaluations reporting cognitive effects. Early exposure to the program significantly increased word-test scores by 0.337 SD and math scores by 0.195 SD[30]. Program participation was also associated with a statistically significant increase of 0.159–0.296 SD in household expenditure on children's education[34]. Another evaluation found a 4.25 percentage point increase in maternal labor-force participation[25].

Bolsa Família also produced education-related effects through income transfers and attendance requirements. During the period, as evaluated by Soares et al.[8], the attendance requirement was 85% for children aged 6–15, with a lower requirement for older adolescents. The program increased enrollment by 4.5 percentage points overall and 8.2 percentage points for girls and reduced school absence by 3.6 percentage points[8].

## 5.3 Transformative capacity: pathways and limitations

Evidence for transformative capacity is less conclusive than that for absorptive and adaptive capacity. In Brazil, PNAE and PAA create potential pathways by connecting public food demand with family farmers. PAA participation has been associated with increased production value among participating farmers, although coverage and implementation vary geographically[10,42,45].

China pursues some comparable objectives through policies located partly outside its principal food-assistance portfolio. The Vegetable Basket Project supports fresh-food production, distribution, reserves, market information and price stability, whereas the TPA campaign included employment, asset and livelihood interventions[32,37].

The evidence therefore identifies different potential pathways rather than demonstrating that either country has achieved transformative capacity through food assistance. Brazil incorporates selected producer linkages within public food programs, whereas China addresses supply stability and livelihood development primarily through adjacent policy systems. In both cases, durable transformation depends on agricultural, market, employment and regional-development policies extending beyond food assistance alone[13,16,21].

## 5.4 Nutritional resilience

The reviewed evidence shows that both national portfolios can contribute to nutritional resilience, although the reviewed studies did not directly measure it as a distinct multidimensional household outcome. In China, NIPRCES and targeted supplementation programs have generated documented improvements in child nutrition and development, but menu quality and implementation vary across locations[28,29,30,35,36]. In Brazil, Bolsa Família and PNAE support food access and school nutrition, and public purchasing provides additional nutritional and livelihood pathways[9,10,42,45].

These contributions remain constrained by exclusion, uneven implementation, transfer adequacy and changes in the wider food environment. Rising overweight, obesity and consumption of ultra-processed foods in both countries highlight the need for complementary nutrition and food-environment policies[3,38,39,40]. The comparison therefore supports a cautious conclusion; nutritional resilience may be strengthened through the combined effects of income support, human-capital protection and selected food-system linkages,

**Table 2 Comparative evidence of human-capital investment (adaptive capacity)**

| Outcome | China (NIPRCES) | Brazil (PNAE/Bolsa Família) |
|---|---|---|
| Cognitive gains | Word test, +0.337 SD; math, +0.195 SD[30] | No directly comparable estimate reviewed |
| Physical development | 0.22–0.42 SD increase in height-for-age[35] | Stunting reduction; physical development support[10] |
| Education enrollment | Household expenditure on children's education + 0.159–0.296 SD [34] | +4.5 pp (percentage points) overall enrollment; +8.2 pp for girls; 3.6 pp reduction in absences[8] |
| Adult labor co-benefits | Maternal labor-force participation +4.25 pp; daily childcare burden reduced ~3 h[25] | Not directly assessed in the evidence reviewed |

but the available evidence does not establish a comprehensive or durable nutritional-resilience outcome in either country.

### 5.5 Institutional organization comparison

Non-state actors contribute in both countries, but the evidence base is uneven. Brazilian studies describe roles for civil-society councils, producer organizations, agroecological networks, food banks and private firms, with substantial geographic variation[41,49]. China's Oasis Food Bank illustrates non-governmental provision but one organization cannot represent the national scale or diversity of private and civic activity[7]. The comparison therefore concerns documented institutional arrangements, not a ranking of civic capacity or effectiveness.

The two systems differ in beneficiary-information infrastructure, legal framing, intersectoral organization and documented channels of civil-society participation. These differences help contextualize the outcome patterns discussed in the previous sections. Brazil's CadÚnico supports nationally integrated household information whereas China's program-specific lists make cross-program coordination and deduplication more difficult. Brazil's recognition of food as a constitutional social right dates from 2010 and strengthens the legal basis for policy, but the Auxílio Brasil transition shows that specific programs remain politically revisable. Brazil also has more formally documented participatory institutions and arrangements connecting public food programs with family farms, although their implementation varies across municipalities. China, meanwhile, demonstrates substantial administrative mobilization and documented program-level impacts despite a different legal and civic configuration.

### 5.6 Synthesis: lessons from the comparison

Interpreted through the resilience framework, the reviewed evidence is strongest for contributions to absorptive and adaptive capacity. Cash transfers and school-based provision can protect consumption and reduce some immediate costs faced by low-income households, although transfer adequacy and exclusion remain important constraints. School feeding, nutritional supplementation and education-linked transfers provide more consistent evidence of contributions to child nutrition, schooling and human-capital investment. Food-system purchasing and livelihood interventions identify possible pathways toward transformative capacity, but the available evidence does not establish broad or durable structural transformation attributable to food-assistance programs alone. The reviewed findings also have implications for nutritional resilience, although neither country's evidence base directly measures it as a distinct, multidimensional household outcome.

Three policy lessons emerge. First, integrated beneficiary information can support cross-program coordination, alongside continued efforts to improve registration and address exclusion. Second, public purchasing can expand market opportunities for farmers, with implementation adapted to local production, logistics and administrative conditions. Third, intersectoral and participatory arrangements may support implementation and oversight, but their independent effects are not identified in this narrative synthesis. Overall, both countries' school-linked interventions provide comparatively strong evidence of protecting human-capital investment whereas evidence of broader food-system transformation remains limited and context-dependent.

## 6 Conclusions and policy implications

This comparative analysis shows that food-assistance programs can support several dimensions of household resilience across diverse institutional contexts. The evidence indicates that institutional organization could condition how program resources and designs translate into targeting, nutrition, education and livelihood outcomes; it does not establish that governance architecture is more important than spending or program design. China and Brazil each combine important program-level achievements with substantial implementation and scope limitations.

However, these achievements rest on a fragile foundation in both countries. Both national portfolios support absorptive and adaptive capacities, helping families cope with and adjust to shocks, but evidence of their contributions to transformative capacity remains limited.

Despite these limitations, the comparison documents credible resilience-related achievements in both countries. Brazil illustrates one approach to integrated beneficiary information, rights-based policy and direct public purchasing from family farms, while also showing that these arrangements do not eliminate exclusion, municipal variation or political redesign.

China demonstrates large-scale administrative reach and strong evidence of selected child-development effects, while facing challenges of cross-program coordination and beneficiary identification. Lessons from either system therefore require adaptation rather than direct transfer.

These findings are subject to important methodological constraints. The analysis is limited by the data asymmetry between Brazil's unified administrative registry and China's more dispersed, ministry-led reporting systems. Both countries also have significant provincial and municipal implementation heterogeneity that a national-level comparison cannot fully capture. Granular cost-effectiveness data linking program design choices to long-term health outcomes remain scarce and represent a priority for future research.

For policy, the synthesized evidence points to several directions for consideration rather than prescriptions established with causal certainty. Both countries may benefit from more adequate and predictable support, stronger attention to dietary quality and better coordination across programs. Brazil's experience linking public food demand with family agriculture provides a useful example for China, but feasibility depends on local production, procurement capacity, food logistics and market structure. Integrated beneficiary information may facilitate coordination, while safeguards are still required to identify registration gaps and households facing documentation or service-access barriers. Finally, legal recognition and participatory institutions may strengthen policy legitimacy and oversight, but their effects cannot be separated from broader political and administrative conditions.

Ultimately, food-assistance programs are important buffers and human-capital investments, but they cannot by themselves deliver systemic food-system transformation. Progress toward transformative resilience requires complementary agricultural, nutrition, labor-market, public-health and food-environment policies beyond the normal scope of FAPs.

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**Compliance with ethics guidelines**

Jingjing Wang, Sergio Schneider, Ângelo Belletti, and Shenggen Fan declare that they have no conflicts of interest or financial conflicts to disclose. This article does not contain any studies with human or animal subjects performed by any of the authors.

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