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A Local Development Index for the CAR and Mali

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1 The Data Demand and Challenge

The Central African Republic (CAR) has been affected by repeated cycles of violence and conflict. A landlocked country in Central Africa, with an area of about 620,000 square kilometers and an estimated population of around 4.9 million, the CAR is sparsely populated. Despite a wealth of natural resources such as uranium, crude oil, gold, diamonds, cobalt, lumber, wildlife, and hydropower, as well as significant quantities of arable land, the CAR is among the ten poorest countries in the

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world. According to the Human Development Index, the country had the lowest level of human development in 2016, ranking last out of 188 countries.

The latest bout of insecurity started in late 2012 with a Séléka insurrection in the north of the country. This led to three years of violence, destruction of property, great human suffering, and left an estimated one-fifth of the population displaced. In May 2015, the Bangui Forum was organized to discuss the country's peace-building program, and to pave the way for elections. After another major outbreak of violence in September 2015, the country successfully held presidential and legislative elections in early 2016 and induced a lull in the conflict.

Despite the reduction in conflict, the country remained insecure even after the elections. More than a dozen armed militias remain active in the country today, controlling most of the country's territory. These armed groups are pursuing a wide spectrum of objectives. The Anti-Balaka, which arose from village-based self-defense groups, and the Union for Peace in the CAR (UPC), comprised mostly of Fulani cattle herders with the aim to protect transhumance corridors, have a strong focus on community protection. The Lord's Resistance Army (LRA), on the other hand, has no territorial or ethnic ties in the CAR, and uses the country as a safe haven and source of revenue through looting. The Popular Front for the Renaissance of the CAR (FPRC), by contrast, is active in the northern regions of the country and is closer to Chad. The United Nations peacekeeping mission (MINUSCA) operates among these armed groups. This mission, although unpopular, remains essential given the inoperative national defense and security forces, and the lack of state presence throughout the country.

To forge a national consensus on the country's needs and priorities for the first five years of the post-election period, in May 2016 the government of the CAR requested support from the European Union, the United Nations, and the World Bank Group to prepare a Recovery and Peacebuilding Assessment (RPBA). Those preparing the assessment were in urgent need of up-to-date information about the country, and requested data that could inform the planning of recovery activities and serve as a baseline for a monitoring system. The challenge was made greater by the fact that the new data and analytical results were needed

by September 2016, leaving only three months to prepare and complete the data collection. Moreover, the rainy season was about to start and road infrastructure was in poor condition.

Household surveys take time to design and implement, and a typical welfare survey takes more than a year to prepare, field, and analyze. It was clear that a more adapted solution would be needed. To complicate matters further, the conflict had left the country's statistical system, which had been reasonably developed prior to 2012, in poor shape. Many staff of the national statistical institute (ICASEES) had left, its offices had been pillaged, and much of the country's statistical memory had been wiped out. The existing sampling frame was outdated and no longer reliable given that entire villages had vanished, and 20–25% of the population was displaced.

2   The Innovation

When considering the request for new statistical data, the team realized that given the precarious security situation, travel would need to be minimized. At the same time, disparities between Bangui and the country's periphery had been recognized as one of the drivers of the conflict, and thus collecting information nationwide was imperative. Donors also made it clear that poverty estimates should be updated as insecurity and massive internal displacement had made the existing poverty estimates less relevant for decision making; as such, new poverty maps were needed that could be used to target interventions. It was evident, however, that it would be impossible to field and analyze a consumption survey within the given timeframe. Moreover, in the absence of a reliable sampling frame, such a survey would not constitute value for money.

The 2008 poverty numbers showed that even before the crisis, poverty in the CAR was pervasive. Poverty levels were estimated at 66% of the population, based on the international poverty line of US$1.90 per day in 2011 purchasing-power parity terms. Since that time, the country's gross domestic product (GDP) per capita fell by one-third, and recent estimates suggest that the poverty rate surged to more than 76%

in 2015. When almost everybody is poor, further refining the number of people living in poverty is of limited value, and means-based targeting is not a key priority. Instead, identifying what had to be targeted where was of greater importance.

Instead of producing a poverty map, the team decided to map the state of the nation by making a rapid assessment of the public services that were available. Drawing from the experience of Mali's Indice de Pauvrete Communale (District Poverty Index, IPC), a district census was designed for the CAR, called the *Enquête Nationale sur les Monographies Communales* (ENMC).[1,2,3] Enumerator teams would interview representatives and other district leaders from each of the 179 districts, the lowest administrative unit, in the country, using a structured questionnaire.[4] Since it was clear that in many locations officials were absent, and to avoid nonresponse because of this, the enumerator manual did not prescribe which officials had to answer, only that a group of officials who were knowledgeable about the district capital (*chef-lieu*) and the district's largest villages had to be identified. While this strategy was successful in that information was eventually obtained for every district, very detailed information from specialists could not be collected and questions had to remain relatively general.

The district census collected information on conditions in all districts across the country, including on local infrastructure, access to information (radio, television, and phone network), health and education facilities, local governance, economic activities, conflict, security, and violence, and local perspectives on security and policy priorities. On the basis that respondents would have more accurate information on their immediate environment, the questionnaire focused primarily

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[1]Observatoire du Développement Humain et Durable (ODHD), 2008. Profil de pauvreté des districts de Mali.

[2]While in this chapter the district census is emphasized, the ENMC also had a household survey component. More on this in Sect. 4.

[3]The instruments, data, and analysis of the *Enquête Nationale sur les Monographies Communales* (ENMC) can be downloaded from: http://bit.ly/2k7wFlq.

[4]The administrative divisions in the CAR are as follows: (1) prefecture, (2) sub-prefecture, and (3) district, referred to as *commune* locally. The 8 administrative subdivisions of the capital city, Bangui, were treated as districts in the ENMC. The district census was carried out at the district level in the CAR.

on the situation in district capital to improve the reliability of the data collected. In addition, district officials were asked to list the ten largest localities in their district outside the district capital, and to indicate the presence of schools, health facilities, water points, electricity, mobile phone networks, refugees and displaced people, transport opportunities, and markets in each of these localities.

A district census had several advantages. Districts are the smallest administrative divisions in the CAR, and are thus at the forefront of service provision. No sampling was required, as all 179 districts were to be covered. The small number of observations needed for this census had other advantages. Logistical complexity was reduced, and only a small number of enumerators had to be trained and supervised. Data collection and data entry were fast, and analysis and reporting were straightforward and visually appealing, as much of the information collected could be presented in the form of maps. Last but not least, the overall cost was small,[5] facilitating regular repeats of the ENMC and thereby ensuring that the RPBA's request to create the basis for a monitoring system could be fulfilled.

To facilitate decision-making, information collected in the district census was reflected in the Local Development Index (LDI). This composite index combines a range of policy-relevant indicators into a single measure. It thus sheds light on district conditions in a straightforward and easy-to-understand way. Moreover, by covering the entire country, the LDI could serve as an alternative to a poverty map, with the added advantage that all the tracked indicators are actionable by decision makers. This allows decision makers to identify which districts are in greatest need of additional investment. Decision makers can also use LDI scores as a basis for budget allocations, with underprivileged districts receiving larger per capita allocations, thus facilitating the process of decentralization.

The indicators used to construct the LDI fell into three categories: local administration, infrastructure, and access to basic services.

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[5]It cost US$180,000 to design, field, and analyze the ENMC. This covered the district census as well as the associated household survey.

Local administration was captured through indicators such as budget per capita (in local currency) allocated to the district, number of working staff at the local district government office, and presence of security forces (gendarmerie and police). The second pillar assessed the availability of basic infrastructure, including the presence of a mobile phone network and a banking system, and the transport cost per kilometer, as a proxy for mobility costs across the country. The third pillar measured the availability of basic services, such as public primary schools, health centers, sanitation systems, and clean water. These three pillars constitute the overall LDI. As there is no objective way for the different pillars to be weighted, and to keep the results tractable, each pillar was equally weighted in the final score: that is, the weight for each pillar was one-third. Within each pillar, some indicators were given a higher importance than others, and were therefore attributed different weights; however, each cluster of sub-activities, particularly health, education, and water, were assigned equal weights. Details of the weighting scheme are shown in Table 1.

3   Key Results

The district census brought the characteristics of different areas that are critical for development planning into a single database. It presented information about the agro-ecological zone, the main and secondary sources of income, the main crops grown, and whether there were any mining activities in each district. The census collected information about the presence of displaced people and whether NGOs were active in an area. It also collected information on infrastructure, such as roads and electricity, and service delivery, such as schools and health centers. Finally, the perceptions of local officials were collected on their development priorities and how the current situation differed compared to six months earlier.

The district census confirmed the dismal state of development in the CAR, and demonstrated the considerable variation that exists across districts. District administration offices were found to be understaffed and short of funding. In most districts, security personnel (police and gendarmes) were absent, and only 24 districts had 20 or more staff in the municipal office, with regular payment of municipal staff remaining a

Table 1 Local Development Index: components and weights

Sub-index	Weight	Indicators	Weight
Local administration	1/3	2016 budget per capita in CFAF (census 2003 population data)	1/3
		Number of staff in the local district government office (Mairie)	1/3
		Security, gendarmerie or police	1/3
Infrastructure	1/3	Cost of transport to Bangui (CFAF per km)	1/3
		Mobile phone reception in the district center	1/3
		Banking in the district center	1/3
Basic services	1/3	Percentage of the ten largest localities in the district with functional primary public schools	1/3
		District capital has a maternal health center	1/18 ⎫
		District capital has a hospital or a health center	1/18 ⎬ 1/3
		Percentage of the ten largest localities in the district with functional health centers	4/18 ⎭
		Presence of the national water company (SODECA) or local water distribution in the district capital	1/18 ⎫ 1/3
		Share of 10 largest localities in the district with clean water (public fountains, boreholes, or protected wells)	5/18 ⎭

Source Authors' visualization

problem. Moreover, 57 districts indicated not having received a budget allocation for 2016.

Access to infrastructure, including electricity, mobile phone coverage, banking services, and road networks, was found to be low. Only 15% of districts reported having electricity or some form of public lighting in the district capital, and only one of the 101 district capitals located in a rural area was found to be connected to the national electricity grid. Overall, only four in ten district capitals had at least one mobile phone provider in the district capital. Furthermore, only one in ten district

The district census elicited information about livelihoods, demonstrating how agriculture dominates the economy which has low levels of economic diversification.

In most districts, there was a predominance of agricultural activity, with the exception of Bangui.   *Moreover, livestock, mining activity, and commerce were the most common secondary activities.*
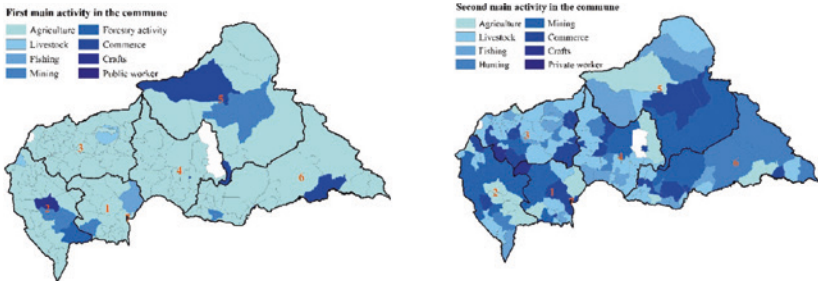
Interviews with local officials were used to elicit their development priorities.

District representatives' perceptions of changes in security and socio-economic conditions in the past six months.
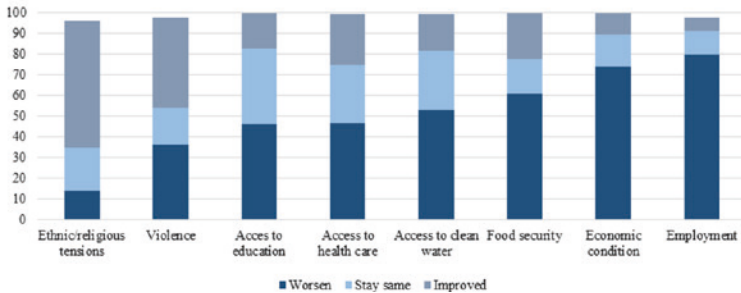
Fig. 1 Selected results from the district census (*Source* Authors' calculations based on the CAR District Census/ENMC)

capitals had some form of banking system, either a bank or a local credit union. Half of the districts reported that roads to Bangui were not accessible throughout the year (Fig. 1).

Local administration: Funding and staffing in districts

There was low capacity in local governance, as districts lacked staff and funding. This was combined with the absence of gendarmerie and police forces in many districts.
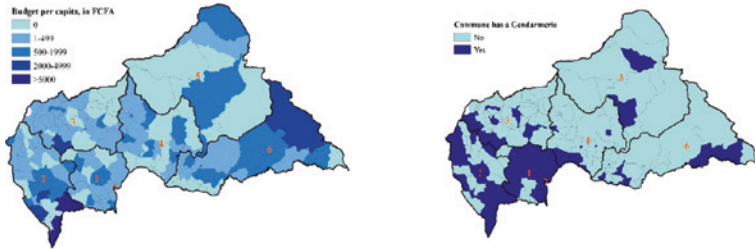
Local infrastructure: Mobile phone coverage, banking services, and roads

Essential infrastructure – e.g. mobile phone coverage, banking services, roads – was lacking in many districts.
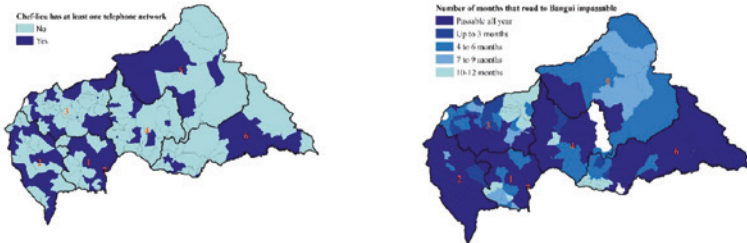
Access to basic services

Access to basic social services, such as primary schools and health centers, was found to be limited.
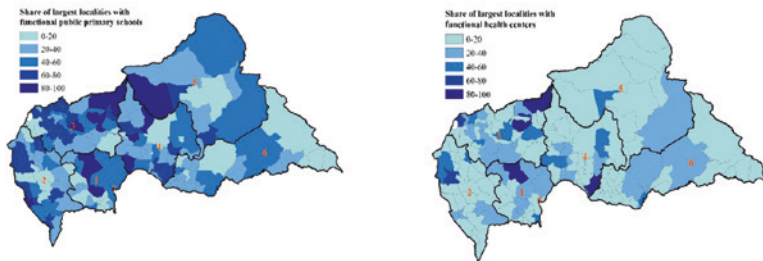
Fig. 2 Selected results on local administration, infrastructure, and access to services (*Source* Authors' calculations based on the CAR District Census/ENMC)

Access to basic social services such as public primary schools, health centers, and clean water was limited, especially outside district capitals. In the ten largest localities of each district, only 43% had a functional public primary school, 18% had a functional health center, and 43% had access to clean water sources. Access to clean water and sanitation systems were found to be limited even in the district capitals, where only 36% of the districts reported having clean water access points in their capitals (Fig. 2).

The LDI was constructed using the approach described in Table 1, shedding light on current conditions in a simple and straightforward way. The LDI score was low for most districts, indicating the need for substantial improvements across the country. Among the three pillars that form the LDI, local infrastructure varied more across districts, whereas access to basic services was relatively homogeneous. Compared to other districts in the country, those in Region 1, Region 2, and Region 7, which correspond to the capital and southwestern region of the country, were more likely to be in the top quintile of the LDI.

4   Implementation Challenges, Lessons Learned, and Next Steps

The ENMC demonstrated the feasibility of collecting nationwide information relevant to decision makers, both rapidly and in a cost-effective manner. The data informed project preparation and fed the RPBA monitoring system. Results have been widely disseminated, and representatives in each district have received posters showing how they perform relative to other districts in the country (Fig. 3). The district census will be repeated annually to track progress.

Because the main cost of most surveys is the transport cost for enumerators to physically reach the survey locations, the district census was supplemented by a light household survey at a marginal cost. The survey was considered 'light' in the sense that no detailed consumption data were collected. Sampling for the household survey took account of the fact that traveling throughout the country was still dangerous, and time was limited

The LDI score is low for a large share of districts, but districts located in the south-west regions have relatively higher LDI score.
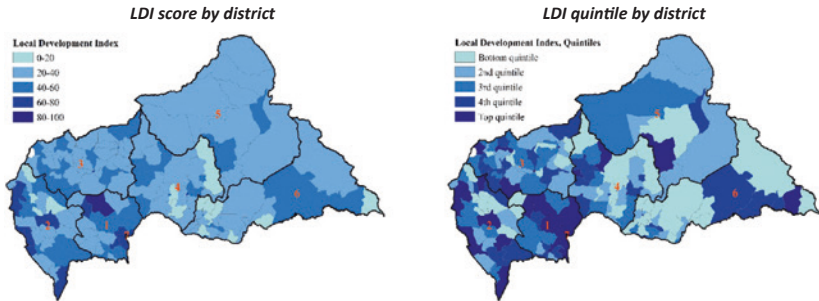

Fig. 3 Local Development Index across districts (*Source* Authors' calculations based on the CAR District Census/ENMC)

for data collection. Given these concerns, in addition to high transport costs, an unorthodox sampling design was selected in which ten households were interviewed in each district where five households were randomly selected from a randomly selected neighborhood of the chef-lieu, and five households were randomly selected from a randomly selected village located 20–40 kilometers from the chef-lieu. In each of the selected localities, a simple listing of households was completed, up to a maximum of 100 households, from which the five households were selected.

The survey was designed such that a team of two enumerators and a driver could collect all the information from one district within two days, allowing for speed of data collection, and reducing costs and exposure to risk. This strategy was successful. District officials from all 179 districts were interviewed, and in the end, households in only two districts could not be interviewed because the situation was too dangerous. Officials from these two districts were interviewed in neighboring locations. A total of 1767 households were interviewed.

The household survey served as a valuable complement to the district census. It allowed differences in perceptions and priorities for development between citizens and their representatives to be investigated, and the results show that these differences were minimal. Repeating both the household survey and the district census will aid in understanding whether improvements in service delivery as reported by district

Those with poor food consumption tend to be less wealthy and located in the two northern agro-ecological zone, which overlap with the Fertit, Yada, and Plateaux regions.
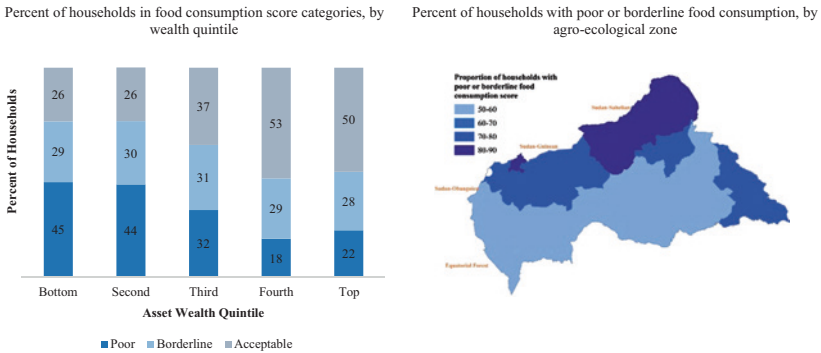

Fig. 4   Food consumption by wealth and agro-ecological zone (*Source* Authors' calculations based on the CAR District Census/ENMC)

representatives match improvements in outcomes, such as education and health, reported by households.

The household survey further allowed for the collection of information about wealth, displacement, the experience of shocks, the impact of the crisis, and food security. Using a concept borrowed from the World Food Programme, the Food Consumption Score (FCS) was calculated using information about the frequency with which nine different types of food had been consumed by the household in the past seven days.[6] The FCS was then used to explore which households found themselves in one of three categories: severely food insecure (poor), moderately food insecure (borderline), or food secure (acceptable) (Fig. 4).

In light of the situation, the ENMC was a success: the three-month deadline was met and a set of valuable data were generated, which informed and continues to inform decision makers. In an FCV context where state presence is limited and/or contested, the mere fact of collecting data nationwide contributed to a sense of equal treatment among districts and a feeling of belonging to one nation state.

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[6]World Food Programme 2008. Food consumption analysis calculation and use of the food consumption score in food security analysis.

This was important. The census was among the very few public initiatives which were successful in covering the entire territory and to which the Government could point as evidence of its commitment to all citizens across the nation's territory. A sample survey would not have had this intangible benefit.

With the benefit of hindsight, some aspects of the process could have been improved. More time could have been spent on developing the district census questionnaire, thus avoiding the need to change the contents of the questionnaire in its second wave (fielded in 2018) when the authorities were warming up to the idea of an LDI. On the other hand, once the initial LDI was constructed, it proved to be much easier to convince officials to substantively contribute to discussions about what it should entail.

While the team remains generally satisfied with the data collected by the household survey, it would have been advantageous if more households could have been interviewed in some areas. Bangui, the capital city, is comprised of eight administrative subdivisions (arrondissements), and the 78 households that were interviewed in Bangui were too few to support detailed reporting for the capital city. This also holds for some of the northeastern prefectures, which comprise very few districts and consequently, an insufficient number of observations were collected to support more disaggregated reporting. In addition, while the survey collected information from displaced people who were residing with extended families, camps for Internally Displaced People (IDP) were not covered by the survey.

Most importantly, the experience of ICASEES, the national statistical office, in fielding a survey in hard-to-reach and insecure areas was invaluable. Enumerators were given vests and their cars mounted with flags that demonstrated clearly that they worked for ICASEES, giving them some degree of protection from armed groups. Furthermore, enumerators assigned to at-risk areas were paid slightly more to motivate them to go and to avoid adverse selection in which the least experienced enumerators go to the most difficult areas. Trips were carefully planned, taking into account the type of infrastructure available and the appropriate means of transport. Where needed, motorbikes or boats were used.

Teams traveling into areas considered highly insecure were in regular contact with their team leader in Bangui. Although overall mobile phone coverage was limited to urban centers, it allowed teams to be followed closely as they moved from one location to the next. In some cases, teams borrowed radios from the UN or NGOs to contact supervisors. In addition, prior to the deployment, teams were trained to contact armed group leaders before entering areas controlled by them and to inform them about the data collection activity. Once in the area, the teams would pay a visit to these armed group leaders to seek their authorization in the form of a laisser-passer letter or stamp indicating their support for the activity. This allowed the teams to work in relative security, and the teams were escorted from the armed group in some cases in return for a small token of appreciation.[7]

Paper questionnaires were used, as tablets or smartphones were deemed too attractive to armed groups. UN flights were used to access hard-to-reach areas, where the teams often had to hire transport from local strongmen, giving them implicit protection. Teams received pocket money to be used at roadblocks to ensure safe passage. These measures turned out to be effective. Not only were all data collected in less than four weeks, but all teams returned to Bangui safe and unharmed.

Box 1   LDI in Mali allows for comparisons across time and space

For over a decade, Mali has conducted commune censuses which are similar to the Central African Republic (CAR) district census. While the CAR district census data are summarized in a Local Development Index (LDI), Mali's four commune censuses are used to compute the Indice de Pauvreté Communale (Commune Poverty Index, IPC) and poverty quintiles which are subsequently used in budget allocation formulas. The IPC is based on a principal component analysis (PCA) which is redone for every census, making the IPC noncomparable from one census to another.

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[7]Clearly the presence of an escort by an armed group may have influenced responses to certain questions. Teams had been instructed beforehand to make sure that if they had an escort, armed group representatives would not be present at the interview.

Taking advantage of the CAR experience, an LDI has been developed for Mali which allows comparisons of commune development across space and time. As in CAR, the LDI focuses on three aspects of development: local administration capacity, presence of infrastructure, and service delivery. These aspects have an equal weight of 33% and their sub-indicators are also equally weighted. The sub-indicators are common across all available commune censuses.

The LDI's definitions remain unchanged from one census to another and are comparable over time. The LDIs are positively correlated with the IPCs, and negatively with local poverty estimates. Because the LDI and CPI indices are ordinal, meaning that a lower value is associated with being poorer (IPC) or less developed (LDI), the (monotonic) relationship between them can be assessed using Spearman's correlation coefficient.[8] For the three first censuses for which both indices are available (2006, 2008, and 2013) the correlation coefficient lies above 0.65 with a *p*-value close to zero, suggesting a strong and statistically significant positive relationship. There is also a negative relationship between the LDI and the individual poverty rate (headcount ratio) of communes. The availability of a poverty map for Mali for 2009 made it possible to assess this relationship. Communes were grouped in two poverty categories depending on whether their poverty incidence was higher (first group) or lower (second group) than the national one. The LDI for poorer communes is significantly lower. Moreover, the LDI of the poor communes is lower than the national LDI average, which in turn is lower than the average LDI of the second group.

The new LDI is a useful tool for the analysis of development trends in Mali. For instance, looking at the regional LDI evolution between 2006 and 2017, Fig. 5 indicates that the communes in the region of Mopti and Segou had the highest increases in LDI (+76 and +61% respectively), while communes in the region of Kidal and Bamako had the lowest (+4 and +1% respectively). The big difference between Kidal and Bamako is that Bamako started at a very high base level, whereas Kidal started from a very low level. The LDIs show that before the crisis, the three northern regions were among the least developed in the country—lending support to grievances by the northern population about neglect by the central government. Broken down by livelihood zone, one notes that the progress in LDIs is strongly associated with crop production, and much less with nomadism and pastoralism.

The new index provides insight into the development dynamics of communes in the country. Figure 6, for instance shows the scatter plot of the

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[8]A positive (negative) monotonic relationship between two variables is a relationship doing the following: as the value of one variable increases, the other variable value increases (decreases).
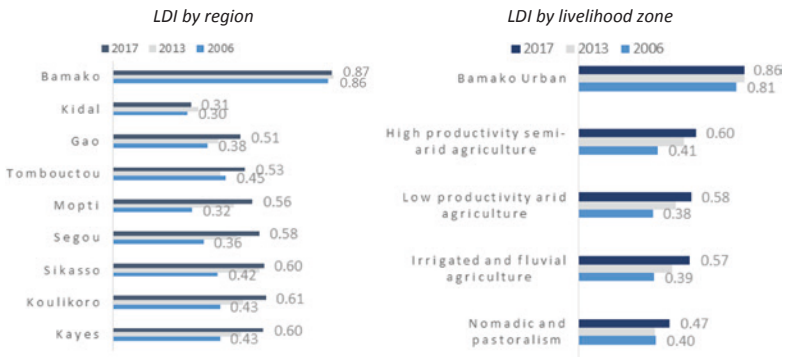
Fig. 5 Mali Local Development Indices, by region and livelihood zone (*Source* Authors' calculations based on the Mali Commune Censuses)
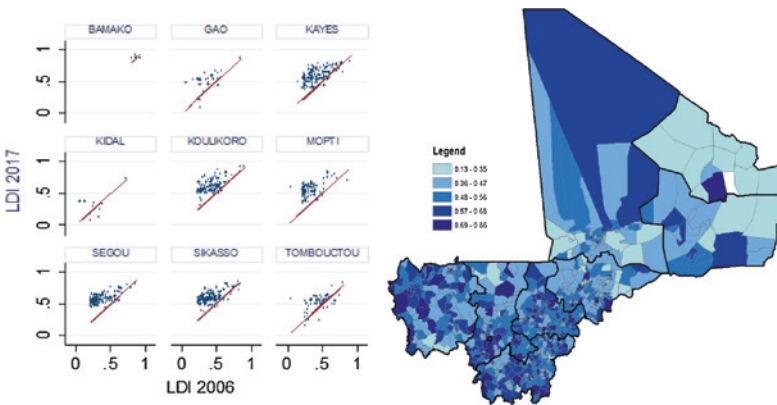

Fig. 6 LDI 2006 and 2017 by region and 2017 LDI map (*Source* Authors' calculations based on the Mali Commune Censuses)

LDI 2006 and LDI 2017 by region. It shows how the LDI for most communes improved (the dots lie above the 45-degree line), with the exception of Kidal and Tombouctou where a substantial fraction lies below the 45-degree line. The map demonstrates that almost all the worst performing communes can be found in the northern part of the country, and particularly in the North-East.

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