

Jobs and violence: evidence from a policy experiment in DR Congo



Summary

Can job creation help decrease violence in conflict-affected regions? We study this question in the Democratic Republic of Congo, where the construction of three hydropower stations in North-Kivu generated nearly 60,000 one-month labor contracts for residents of the hosting chiefdoms. To quantify the impact on violence, we analyze close to 9,000 conflict events from 2009 to 2022 across 21 chiefdoms in North-Kivu, comparing trends and patterns of violence between ‘treated’ and ‘comparison’ chiefdoms. Our findings indicate that the labor-intensive construction program significantly reduced violence, with effects lasting up to 18 months after program end. We observe a 93% decline in the number of monthly conflict events in chiefdoms where the program was implemented. The reduction in violence was most pronounced in chiefdoms with the highest per capita wage injection. In the most remote, rebel-controlled chiefdom, the reduction in violence against civilians was preceded by a temporary surge in battles between the military and armed groups, likely representing the ‘clear’ phase of the ‘clear, hold, build’ counterinsurgency strategy.

Theoretical ambiguity

Can labor-intensive infrastructure programs curb crime and violence? In 2015, the construction of a hydropower plant in Matebe, North-Kivu province, led to a [surge in employment of local youth](#), allegedly turning them away from illegal activities. On April, 1st, 2018 an armed group [attacked a hydropower plant under construction in Ivingu](#), also North-Kivu, and killed a guard. These two news items illustrate the ambiguity of the answer to the question. On the one hand, providing jobs may reduce crime and violence, by raising the opportunity cost of illegal activities, winning hearts and minds, or both. On the other hand, aid programs may lead insurgents to capture the program, or sabotage it, fearing that successful programs would undermine their grip on civilians and the (war) economy they seek to control. Which effect takes the upper hand is [still debated in the literature](#).

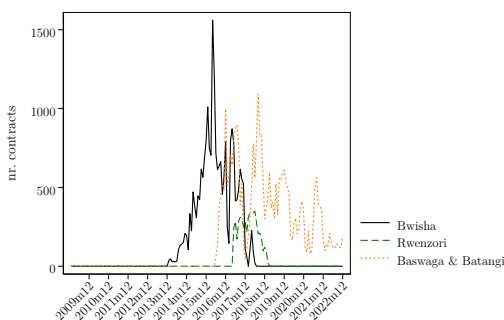
Workfare programs are a popular policy tool, even by the US army

In spite of the unsettled debate, workfare programs have become [increasingly popular in fragile and conflict-affected states](#), and infrastructure and other development programs are [promoted as a soft counterinsurgency strategy, most notably by the US army](#).

The popularity of these programs can be attributed to their threefold theorized benefits – alleviating poverty, rebuilding infrastructure, and reducing violence. This appeals to governments and donors as they search for an anti-dote to the [alarming co-occurrence of poverty and conflict](#), a trend expected to intensify by 2030, when two thirds of the world’s extremely poor are projected to live in fragile and conflict-prone nations. To better inform development programs in these conflict areas, it is imperative to investigate to what extent and under which circumstances their theorized effects can be realized.

We analyze a policy experiment that created many jobs in North-Kivu

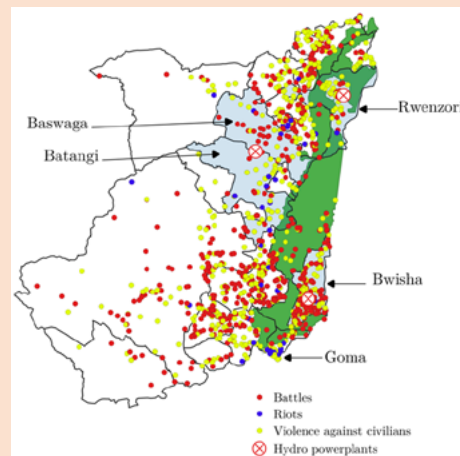
Our research focuses on North-Kivu province, one of the most conflict-ridden regions in the world, where over a hundred non-state armed groups strive to expand their spheres of influence. Several of these groups operate in and around Virunga National Park (VNP), using it both as a natural hideout and a lucrative income source through illicit resource extraction. Our analysis is based on a policy experiment involving the construction of three hydropower plants near the Park, which resulted in the creation of approximately 60,000 one-month labor contracts for residents of the chiefdoms where the plants were built. The plants were constructed by [Virunga Energies](#), a private hydroelectricity provider, that is part of the public-private partnership [Virunga Alliance](#). The Alliance has three goals: the conservation of Virunga National Park, poverty reduction, and the promotion of peace. It perceives these goals as [“interdependent and of equal importance because the success of one ultimately determines the success of the others”](#). To achieve these goals, the organization employs a combination of ‘sticks’



Workers were recruited locally, from chiefdoms where the power plants were built. They were offered one-month contracts on a rotating basis to maximize employment opportunities for as many people as possible. In total, the construction generated 156 months of employment and nearly 60,000 contracts. The figure shows the number of monthly contracts over time for each of the three treated areas.

We analyze 3,528 ‘chiefdom-month’ observations and compare violence across treated and comparison chiefdoms

We analyze conflict events that took place in the 21 chiefdoms of North-Kivu, over a period of 168 months (14 years between 2009 – 2022), which gives us 3,528 ‘chiefdom-month’ observations. On average, over this period, a chiefdom experienced 2.5 conflict events per month. How do we determine whether employment affected conflict? We can observe the evolution of conflict in ‘treated’ chiefdoms over time. But this does not tell us what the impact of employment is. For that, we need to know how conflict would have evolved in the absence of employment. This is the ‘counterfactual’, and it cannot be observed. So, we turn to a [Difference-in-Difference](#) analysis. We use the other chiefdoms in North-Kivu as a comparison group, and we analyze the evolution of conflict across ‘treated’ and ‘comparison’ chiefdoms. This kind of analysis relies on what is called a ‘parallel trends assumption’: we assume that in the absence of employment, conflict would have evolved in a similar way in ‘treated’ and ‘comparison’ chiefdoms. What makes this assumption plausible is that the selection of plant locations was largely determined by factors like the presence of a river, water flow, and river gradient, which are plausibly exogenous to conflict. In addition, when exploring the evolution of conflict over time and across ‘treated’ and ‘comparison’ chiefdoms, we find evidence in support of ‘parallel trends’.

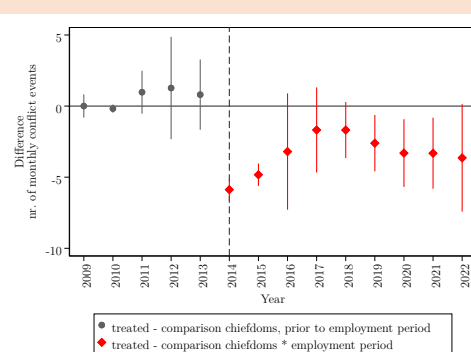


Our data on conflict comes from the Armed Conflict Location and Event Data project, ACLED. They collect information on conflict events from local, regional, and national news sources as well as reports from humanitarian agencies.

In the period 2009–2022, ACLED recorded about 8,800 conflict events in North-Kivu: more than 4,000 events of battles between armed actors, about 3,500 events of violence against civilians and nearly 1,200 riots. We plot these events on the map of North-Kivu.

The map shows the outline of the different chiefdoms, with those from where workers were recruited in grey. The location of the power plants is indicated with a red cross, while Virunga National Park is depicted in green. Goma, the provincial capital of North-Kivu, is also indicated

and ‘carrots’. The ‘sticks’ include park ranger patrols, penalties, fences, and joint operations against non-state armed groups by park rangers and soldiers of the national Congolese army (FARDC). The ‘carrots’ include community development initiatives, job creation, and electrification. The construction of the hydropower plants is part of this [‘soft counterinsurgency’ strategy](#).



In the 5 years prior to the first employment period (2009–2013), the average number of monthly conflict events is comparable across ‘treated’ and ‘comparison’ chiefdoms.

When looking at 2014–2022, and accounting for the timing of the construction at the three power plants, we observe that conflict was significantly lower in ‘treated’ chiefdoms during months when local employment was offered.

Our results show that jobs reduced armed conflict, except for a temporary surge in battles in one of the ‘treated’ chiefdoms

We find that, on average, the number of conflict events significantly decreased in ‘treated’ chiefdoms during the employment period. The estimated coefficients indicate a decrease of about 3.9 conflict events, which is sizeable compared to the average of 4.2 monthly conflict events in treated chiefdoms outside of the employment period. We find that all types of conflict significantly decreased during the employment period: a decrease of about 1.6 events of violence against civilians, 2 battles and 0.3 riots. Disaggregating these results by area, we find a significant decrease in all conflict types in Rwenzori and Bwisha. In Baswaga/Batangi, we observe a significant decrease in violence against civilians, but an increase in battles between armed actors. Further exploring this finding, we find that it is driven by an increase in battles between the military and non-state armed actors in the first quarter of the employment period. Overall, across the four ‘treated’ chiefdoms, we find that the conflict-reducing impact lasts on average about 1.5 years after the employment period ended. For violence against civilians, we find a significant reduction up to 2.5 years after the employment period.

Table 6: Average impact of employment shock on local conflict intensity

	Areas combined			
	(1) conflict	(2) violence	(3) battle	(4) riot
Employment	-3.922*** (1.334)	-1.559*** (0.317)	-2.037** (0.961)	-0.326*** (0.093)
Observations	3528	3528	3528	3528
Chiefdom FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Chiefdom time trends	Yes	Yes	Yes	Yes
Mean conflict:				
Areas combined	4.199	1.838	2.005	0.357

[1] *** p<0.01, ** p<0.05, * p<0.1; Standard errors are clustered at the level of the chiefdom and presented between brackets. Mean conflict indicates the mean nr. of monthly conflict events for treated chiefdoms outside the employment period.

Table 7: Impact of employment shock by chiefdom

	Areas separated			
	(1) conflict	(2) violence	(3) battle	(4) riot
Empl. Rwenzori	-2.970*** (0.520)	-1.606*** (0.176)	-1.251*** (0.326)	-0.112 (0.074)
Empl. Bwisha	-6.534*** (0.294)	-2.112*** (0.173)	-3.928*** (0.148)	-0.494*** (0.068)
Empl. Bas and Bat	0.062 (0.576)	-0.487** (0.225)	0.759* (0.414)	-0.210** (0.085)
Observations	3528	3528	3528	3528
Chiefdom FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes
Chiefdom time trends	Yes	Yes	Yes	Yes
Mean conflict:				
Rwenzori	3.214	1.579	1.290	0.345
Bwisha	10.553	4.307	5.377	0.868
Baswaga-Batangi	0.933	0.466	0.427	0.039

[1] *** p<0.01, ** p<0.05, * p<0.1; Standard errors are clustered at the level of the chiefdom and presented between brackets. Mean conflict indicates the mean nr. of monthly conflict events for treated chiefdoms outside the employment period.

The tables show the estimated impact of employment on violence, relying on a difference-in-differences estimation.

The Chiefdom Fixed Effects absorb all time-invariant factors at the chiefdom level (e.g., geography). The Year-Month Fixed Effects absorb all monthly varying factors that are common across the chiefdoms of North-Kivu (e.g., state of siege). The Chiefdom time trends control for the possibility that conflict was trending up or down prior to the start of employment.

The estimated coefficients indicate the change in the monthly number of violent events, which can be compared to the monthly average outside the employment period indicated in the bottom rows of the tables.

Results remain qualitatively unchanged in a battery of robustness checks accounting for the spatial & temporal diffusion of conflict, rainfall shocks and seasons, mineral price fluctuations, and changes in electrification.

We contribute to understanding the conflict-reducing potential of development programs in Eastern Congo

With our study, we shed light on the conflict-reducing potential of development programs in Eastern Congo. While its conflict is one of the longest and most lethal, so far, only two studies have experimentally evaluated development interventions aimed at stabilization and peace in the region. Both evaluated a [STEP Project](#) (Projet pour la Stabilisation de l’Est de la RDC pour la Paix), namely a STEP cash-for-work project (Brandily et al., mimeo) and a STEP community-driven development infrastructure project (Bousquet et al. mimeo). Both studies found no significant impact on social cohesion, crime and violence. The intervention we examine differs in two main aspects. First, it had a higher treatment intensity, with a wage injection ranging from 2.4 to 7.0 USD per capita, compared to 0.13 USD in Brandily et al. (mimeo) and an estimated 1.11 to 2.22 USD range in Bousquet et al. (mimeo). Second, in our case study, the construction was managed by the Park, which is described as a “[State within a State](#)” and “a place that ‘works’ in the otherwise chaotic and conflict-ridden eastern DRC”. The STEP projects were implemented by [DRC’s Social Fund](#) (Fonds Social de la République Démocratique du Congo), which faces similar capacity and transparency issues as other Congolese government institutions.

Our results can inform policy

The hydropower plants construction, characterized by a substantial per capita cash injection and implemented by a relatively well-functioning organization, significantly reduced violence. This decrease was observed across three different construction areas, including government-controlled regions and a remote area dominated by local armed groups. In the latter, we observed a temporary increase in battles between the military and rebel groups, likely due to the need to clear and secure the site, which faced resistance from rebels attempting to sabotage or capture the program. This underscores the complementary roles of job opportunities and military operations, demonstrating that employment alone cannot replace military interventions. The ‘clear – hold – build (well)’ approach also has its limitations. The impact of the short-term labor surge faded after 18 months. To sustain the benefits, additional measures could be considered to translate short-term income gains into lasting improvements, such as [a savings incentive, well-tailored training programs](#), and [cognitive behavior therapy to reduce illicit behavior](#). However, incorporating these elements would increase the complexity of implementation, requiring even greater capacity and expertise from the program executor.

There was variation across the three treated chiefdoms, in terms of remoteness, armed actors, the level of control of counterinsurgent forces, and the cash/job injection. The Baswagi & Batangi area stood out as the most remote, largely controlled by local armed groups. The Rwenzori chiefdom is the smallest and therefore has the largest job injection per capita

Area:	Matebe plant Bwisha Close to Goma	Mutwanga plant Rwenzori Remote	Luviro-Ivingu plant Baswagi & Batangi Very remote
Armed actors & conflict:	M23, FDLR Military vs rebel: 51% Rebel vs rebel: 4% Rebel vs civilian: 37%	ADF Military vs rebel: 39% Rebel vs rebel: 2% Rebel vs civilian: 47%	MaiMai, FDLR Military vs rebel: 36% Rebel vs rebel: 14% Rebel vs civilian: 39%
Estimated cash injection:	500,000 inhabitants 500,000 labor days: 3.5 USD/pp	55,000 inhabitants 115,000 labor days: 7.0 USD/pp	1,000,000 inhabitants 670,000 labor days: 2.4 USD/pp

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