



## POLICY BRIEF No. 52

# Future Bean Demand

August 2021

### Key message

Bean demand is projected to rise sharply throughout the developing world, in tandem with rising populations, both in absolute terms and relative to other staple crops. The surge will be especially pronounced in Sub-Saharan Africa, where population is projected to surpass 2.5 billion by 2050.

### Rationale and support

Legume demand is projected to rise more than proportionately with population in accordance with Bennett's Law: As incomes rise, demand for starchy carbohydrates falls, replaced by a more diverse diet (Figure 1). As a share of diet, protein calorie demand remains fairly constant throughout this nutrition transition (Perisse et al. 1969). However, starchy carbs and proteins are increasingly supplanted by more nutrient-dense legume carbs and proteins. As a result, legume demand is projected to increase by as much as 42% worldwide by 2050, compared to just 34% for the starchy staples (Gouel and Guimbard 2019). Consumer data from Uganda and Tanzania indicate a similar trend at the household level in Africa (Laroche et al. 2017).

Recent foresight analysis using the IMPACT model



Growth in bean demand stems not only from the increased number of mouths to feed, but also increasing per capita consumption of beans. Demand growth may come from both urban and rural households, as well as from new trade opportunities within Africa and beyond.



Bean producers are already struggling to meet current demand, resulting in high prices that place this important source of protein and micronutrients out of the reach of the low-income populations that most stand to benefit from them. The surge in demand looming just over the horizon thus poses a potential nutritional security emergency for such populations.



Bean research can deliver the genetic gain and biofortification required to cover both current shortfalls and the future surge in demand, but impacts depend on stable funding and on the effectiveness of local policies, institutions, and markets in realizing the genetic potential of new varieties.

### The fat-carb frontier

2017, N = 170, Adj. R-squared= 0.7  
Slope= -0.183, Y intercept= 5.3849

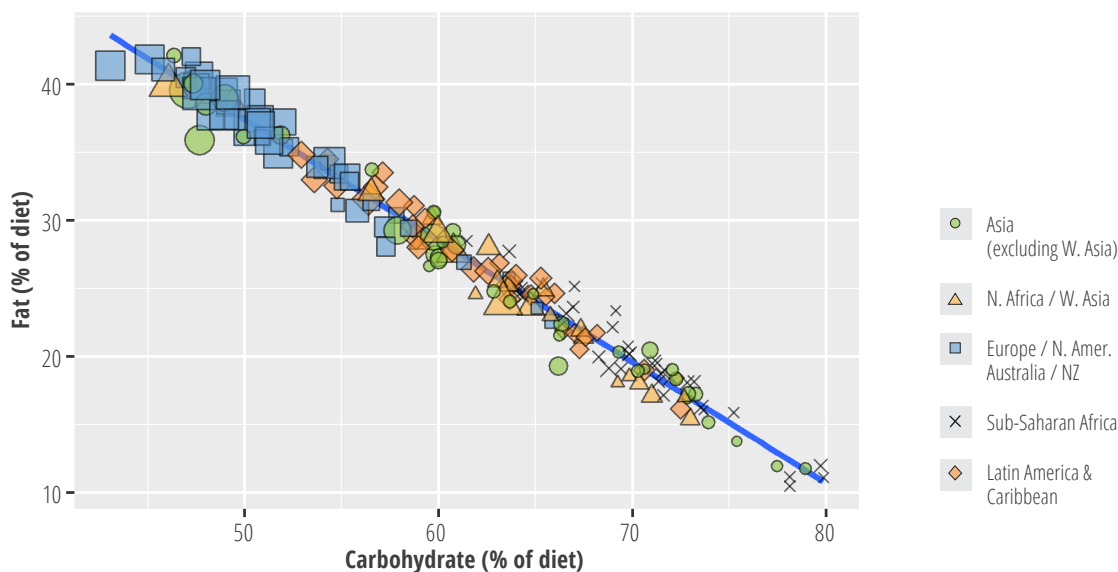


Figure 1.

Carb share of diet plotted against fat share of diet.

Source: Author's creation using the 2017 FAO Food Balance Sheet. The points are sized in proportion to GDP.

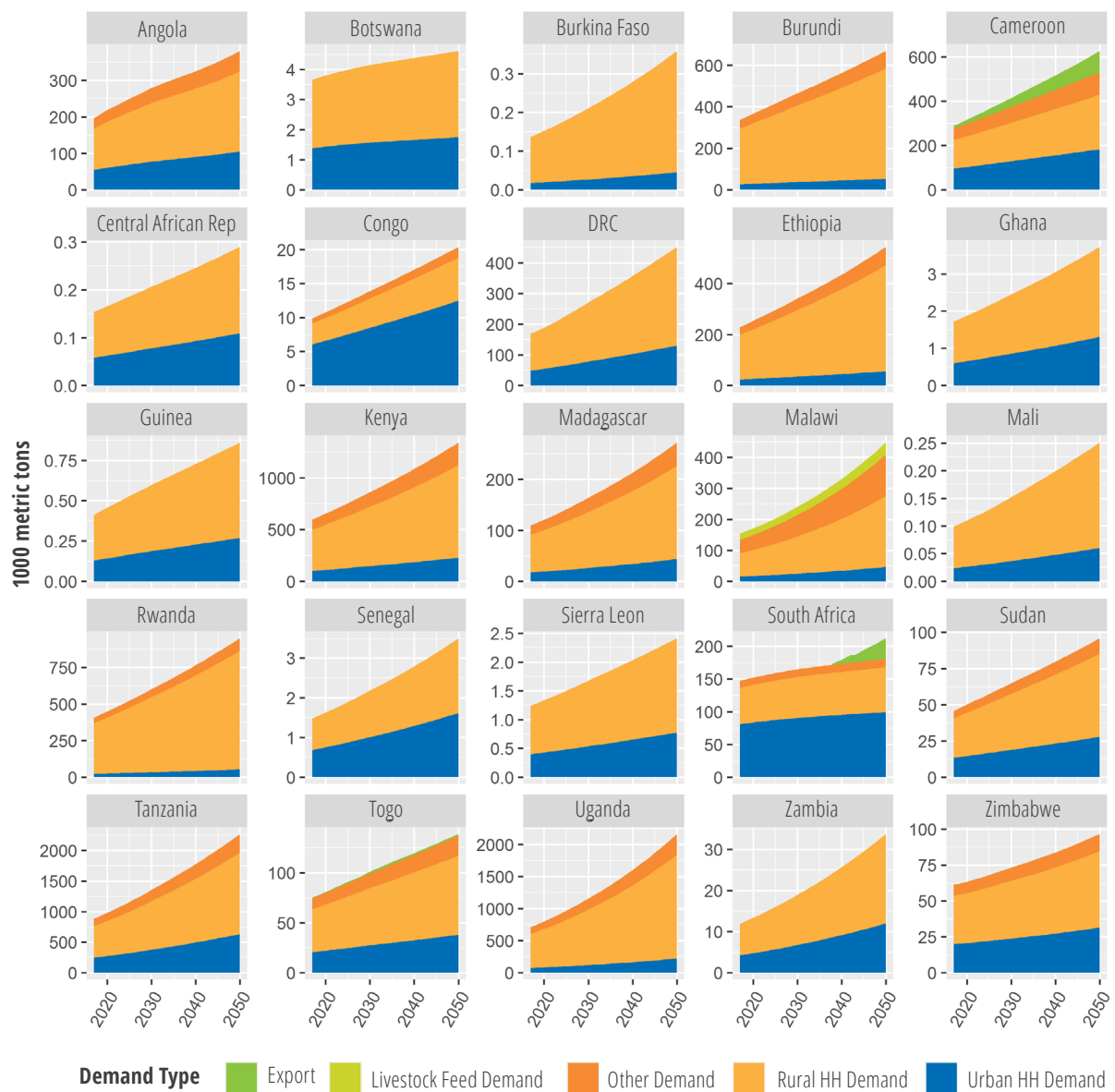


suggests that bean demand, in particular, could increase by well over 50% in many African countries (Figure 2).<sup>1</sup> To pick out just a few examples: In Tanzania, Uganda, Kenya, and the DRC, bean demand is projected to increase by 157%, 203%, 125%, and 168%, respectively. Demand is projected to increase in both rural and urban areas.

These projections are conservative since IMPACT assumes old bean yield growth estimates well below the Bean Program's preliminary estimates of 2%-3.3% per year from results in experiment station trials, and does not take into account the processed bean markets and trade opportunities that have begun to emerge in some of these countries.

Fledgling trade opportunities are also likely to boost

<sup>1</sup> IMPACT stands for "International Model for Policy Analysis of Agricultural Commodities and Trade". See Robinson et al. (2015) for model documentation. The IMPACT model run here assumed the "regional rivalry" Shared Socioeconomic Pathway 3 (which includes a bias towards national energy and food security goals over regional and global cooperative economic growth), and Representative Concentration Pathway 6.0 (which assumes emissions will increase out to 2080 before declining). Four Global Circulation Models were used to model future climate change: GFDL-ESM2M, HADGEM2-ES, IPSL-CM5A-LR, and MIROC-ESM.



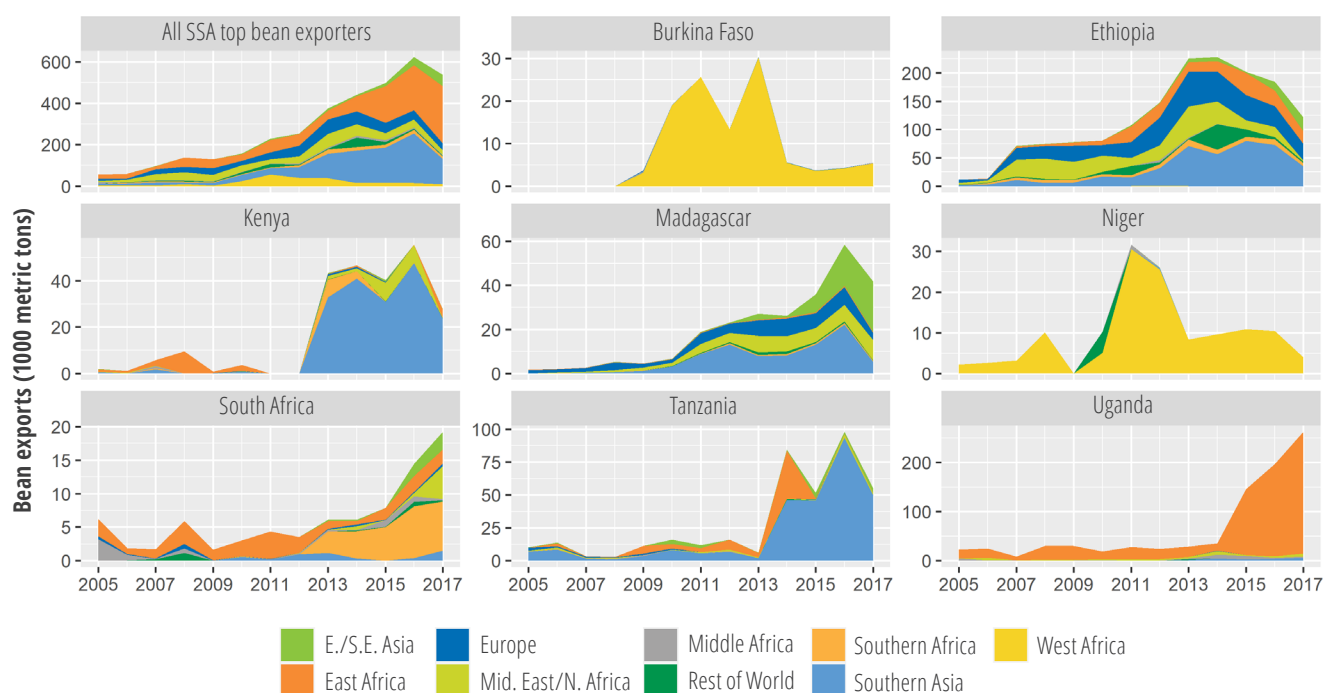
**Figure 2.** Bean demand projections out to 2050 for Sub-Saharan African countries computed by IMPACT. Note that the y axis is different for each plot to accommodate the wide differences in demand from one country to another.

demand. This includes the much discussed intra-Africa bean trade, but also less discussed trade opportunities beyond Africa. For example, bean is a preferred high value legume in India and demand there is expected grow among a growing middle class. Currently, about half of Sub-Saharan Africa's bean exports go to South Asia (Figure 3). This trade route may develop into an important source of revenue if African exporters can maintain their comparative advantage.





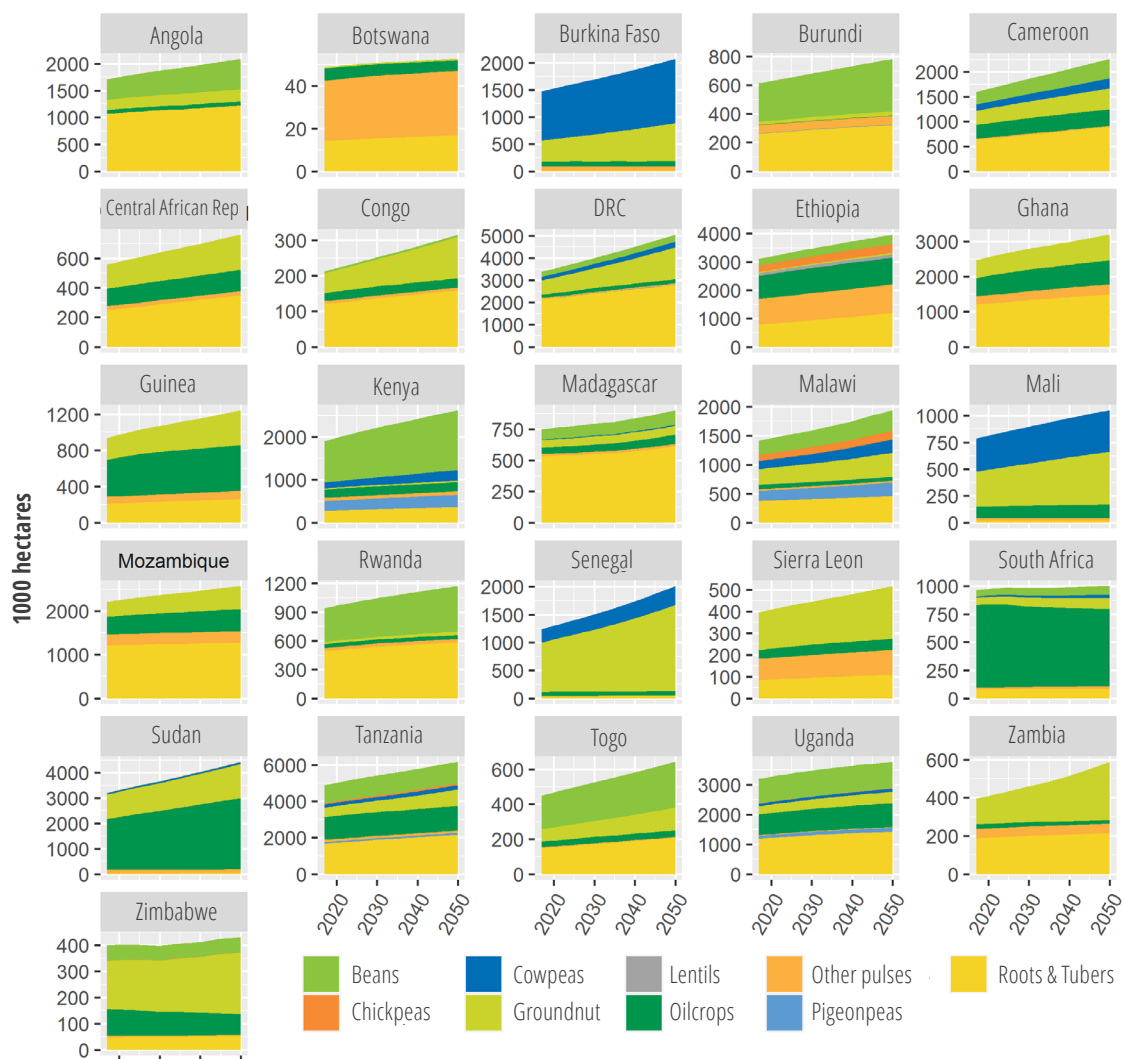
## Where are the beans going? Top bean exporters in Sub-Saharan Africa (accounts for 95% of total SSA bean exports)



**Figure 3.** African bean export destinations. Note that the y axis scale is different for each plot to accommodate the wide differences in trade volumes from one region to another.. **Source:** FAO

## Implications

- The implications of shifting staple food demand patterns for land use in Sub-Saharan Africa are depicted in Figure 4. The IMPACT analysis cited above indicates that bean cultivation is projected to constitute roughly half of non-cereal land use in a handful of countries where it is already predominant. In other legume producing countries, bean cultivation is projected to maintain, but not expand, its presence on a small share of non-cereal croplands, facing stiff competition from cowpea, pigeonpea, and chickpea. (Again, these results are based on conservative expected yield growth trajectories.)
- Bean production currently fails to meet existing demand in much of Sub-Saharan Africa—a supply shortfall that can be seen reflected in high prices and imbalanced diets that are deficient in protein and key micronutrients. In such underserved areas, the projected surge in bean demand poses a potential nutritional security emergency.
- Moreover, successful release and uptake of new bean varieties hinges upon how well the new varieties align with local consumer and producer trait preferences. A recent study shows that consumers in Northern Tanzania, for example, are willing to pay a 25% premium for high iron beans over the common variety. Short cooking time, palatability, low-flatulence, high yield, fast maturation, ease of shelling, and grain type (size, color, etc.) were also identified as bean traits in high demand (Rubyogo et al. 2019). The question remains as to how demand for particular traits will evolve ten to fifteen years in the future, when the new varieties being researched now will reach market.



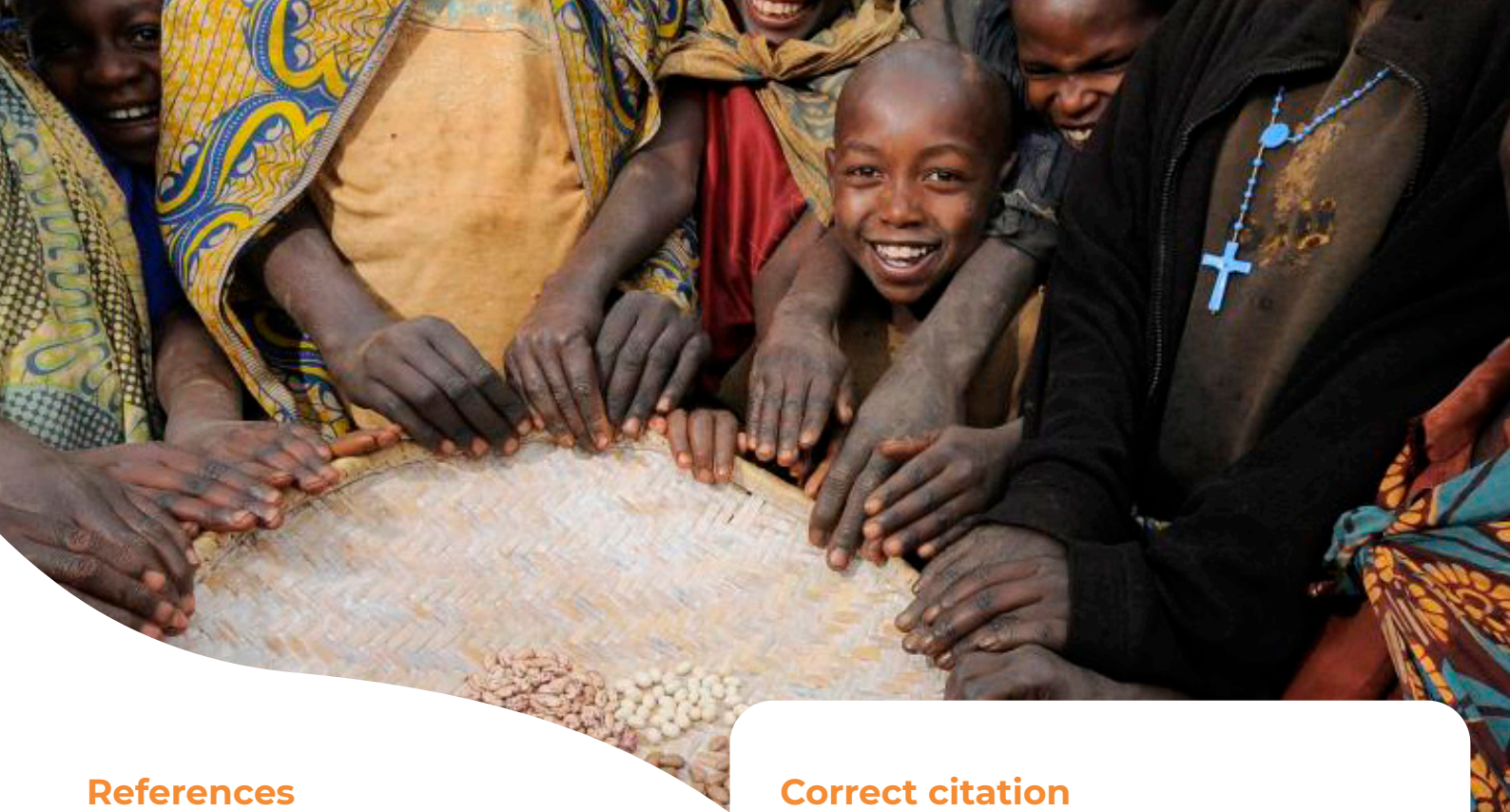
**Figure 4.** Land use demand projections out to 2050 computed by IMPACT. Cereal land use, which represents the largest demand share, is not included. Note that the y axis scale is different for each plot to accommodate the wide differences in total cropland from one country to another.

## WAY FORWARD

Bean breeders and agronomists have demonstrated that they can deliver the genetic gain and improved crop management required to address the current and oncoming nutritional security challenges under climate change. Whether or not this potential is realized, however, depends upon the level and stability of continued donor support.

It also depends upon the effectiveness of local policy and institutional frameworks in supporting release and uptake of new varieties and best agronomical practices. Recent experiences in Ethiopia offer encouragement in this regard. In 2005, Ethiopian bean yields averaged just 877 kg/ha. A decade later, after a coordinated effort involving government policy makers, researchers, extensionists, and the private sector, average yields doubled, and Ethiopia became an exporter to European and Asian markets.

Economic foresight analysis must be included early on in the breeding process in order to identify opportunities such as the Ethiopian case, and to thereby aid researchers and stakeholders in targeting the traits, populations, and environments that maximize uptake and impact. Inclusion of economic foresight is part and parcel of the ongoing transition to “Demand-led breeding” within the donor and international research community (Kimani and Anthony 2020).



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## Correct citation

Schiek, B., Bonilla-Cedrez, C., Prager, S.D. 2021. Future Bean Demand. Policy Brief No. 52 ; International Center for Tropical Agriculture (CIAT). Cali, Colombia. 6 p.

## Author Roles

- Benjamin Schiek, Economic analysis and reporting - b.schiek@cgiar.org
- Camila Bonilla-Cedrez, Agricultural Modeler Postdoctoral Fellow - c.bonilla@cgiar.org
- Steven Dean Prager, Leadership of economic modeling and analysis - s.prager@cgiar.org

## Acknowledgement

Many thanks to Dr. Enid Katungi and Dr. Steve Beebe for their valuable contributions.



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