

Cowpea production is a significant enterprise for smallholder farmers in Chuka Sub-County because of its cheap supply of nutritious food and it's also a source of revenue for the farmers. Despite its importance, cowpea production levels are a fraction of the potential due to low technical efficiency in enhancing soil fertility, agronomic practices, pest control, farm input utilization among others. This affects the revenue levels and food security of the smallholder farmers. This research aimed to analyze the production, socio-economic and institutional factors that affect smallholder farmers' technical efficiency on cowpea production in Chuka Sub-County, Tharaka Nithi County, Kenya. Cross-sectional data on cowpea production was obtained utilizing the multistage sampling procedure from a sample of 389 households in Mugwe, Magumoni and Karingani Wards. The target population was 12905 households. A structured questionnaire was administered to collect data and information on the production, socio-economic and institutional factors affecting smallholder farmers' technical efficiency. Descriptive research design was utilized to define the socio-economic and institutional qualities of the smallholder cowpea farmers. The stochastic production frontier model that is the Cobb Douglas production function, one step approach was used to ascertain the level of technical efficiency of the farmers, and the production, socio-economic and institutional factors influencing technical efficiency. The respondents' approximated average technical efficiency was 34%, which suggests that there is a chance of improving cowpea production by 66% through competent utilization of the existing production factors. The model parameters for the production factors approximated using the maximum likelihood method showed that labour, topdressing fertilizer, manure, pesticides and land size were significant production factors in cowpea production at a 5% level of significance. Further age, education, farming experience, extension contact and access to digital financial services significantly affected cowpea production technical efficiency. If the parameter coefficient has a negative sign, it implies that as the independent variable increases, technical efficiency levels increase since the level of technical inefficiency decreases. A positive sign for the parameter coefficient indicates that when the independent variable increases, technical efficiency will decrease because technical inefficiency will increase. The negative coefficients on the farming experience, education, and extension contact variables showed that an increase in any of the variables while maintaining the other variables constant might lead to a substantial improvement in the level of technical efficiency. The positive coefficients on age and access to digital financial services showed that an increment in those variables while maintaining the other variables constant, might result in a substantial decrease in the level of technical efficiency. Thus, cowpea farmers were not producing at their maximum capacity with the existing production factors. This study urges cowpea farmers to boost the use of labour, topdressing fertilizer, manure, pesticides and land size to improve production. For the purpose of improving cowpea production, farmers are encouraged to attend more trainings on cowpea production to add on to their knowledge and to contact extension officers to the highest frequency possible. The study's findings are beneficial to the cowpea farmers, agricultural institutions and the Ministry of Agriculture, Livestock, Fisheries and Cooperative. The cowpea farmers get to know the factors they can alter and improve their level of technical efficiency while the agricultural institutions and the Ministry of Agriculture, Livestock, Fisheries and Cooperative can add to their information on the level of technical efficiency of cowpea farmers in Chuka Sub-County, Tharaka Nithi County, Kenya.