ABSTRACT

A key challenge facing the growth of agricultural sector in Kenya as well as most other developing countries is how to deal with the reality of climate change. In their goal to reduce their vulnerability to the harmful effects of climate change, smallholder farmers have resulted into numerous adaptation strategies that have collectively been referred to as Climate Smart Agricultural Technologies, Innovations and Management Practices (CSA TIMPS). Potato (*Solanum tuberosum*) is the second most important food crop in Kenya after maize. Despite the continued use of selected climate-smart agricultural TIMPs, potato productivity is unarguably low in Kenya (9.8 metric tons/ha), below the potential of 40 mt/ha. In addition, climate change has threatened the economic viability and sustainability of most agricultural activities, including potato farming. This study seeks to contribute to improved food security and livelihood of smallholder farmers in rural areas through enhanced productivity, economic viability and sustainability in potato farming. This study will be guided by production and farm-household theory and will use correlational research design. This study will use a sample of 384 smallholder farmers. A multi-stage sampling technique will be used to get the study sample with purposive selection to get the four counties in the first stage. Four sub-counties will be randomly selected in the second stage and eight wards will be randomly selected in the third stage. Researcher administered questionnaires, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) will be used to collect primary data. The research instruments will be pre-tested to determine the reliability of the instrument in Nakuru County. In this study, descriptive and inferential statistics will be used to analyze the collected data using Stata, FRONTIER® and NVivo software. Descriptive analysis will be used to characterize the types of climate-smart agricultural TIMPs among smallholder farmers. Multivariate Tobit regression model will be used in identifying factors that influence the uptake and extent of application of TIMPs. A threefold Blinder–Oaxaca decomposition of Stochastic Frontier Analysis (SFA) method will be used to determine the influence of selected CSA TIMPs on potato productivity among smallholder farmers. Benefit-Cost Ratio (BCR) analysis will be used in determining the influence of climate-smart agricultural TIMPs on economic viability among smallholder potato farmers. A threefold Blinder–Oaxaca decomposition of Generalized Linear Model will be used in analyzing the influence of climate-smart agricultural TIMPs on relative sustainability of smallholder potato farmers. The level of statistical significance will be set *apriori* at 0.05. This study will generate useful information about the contribution of selected CSA TIMPs to productivity, economic viability and sustainability of smallholder potato farmers for food and nutrition security, employment creation and improved livelihoods. The information generated from the study will aid in developing policy guidelines in line with the achievement of the Sustainable Development Goals (SDGs) number thirteen which seeks to achieve sustainable and effective climate change actions.